

Ultrasound Room	: Ultrasound Scanner-Sectral & Linear Computer etc.
Radio Therapy Room	: Brachy Therapy, Pocket Dosimeter and Simulator etc.
ECG Room	: 1-Channel & 3-Channel Electrocardiography etc.
EEG Room	: 18-Channel Electroencephalography etc.
Gastorintestinal Room	: Esophago-Gastroscope Fiberoptic, Proctosigmoidscope, Videoscope Machine for Endoscope, Colonoscope etc.
Dept. of ENT	: ENT Microscope, Laryngoscope etc.
Dept. of Ophthalmology	: Yag laser, Argon laser, Operating Microscope, A & B scanner, Fundus Camera, Slit lamp etc.
Dept. of Pathology	: Automatic Tissue Processor, Automatic Dispenser, Spectrophotometer, Automatic Chemistry Analyzer, Flame Photometer etc.
Dept. of Neurology	: Examining Lamp, Examining Instrument Set etc.
Bronchoscopy Room	: Bronchoscopic Table etc.
Dept. of Dentistry	: Dental Unit, Dental X-Ray Unit, Dental Panoramic X-Ray Unit, Laboratory Engine etc.
Rehabilitation Room	: Binary pool for Hydrotherapy, Bubbles Bathing Unit, Low Frequency Therapy Apparatus, Microwave Therapy Apparatus, Paraffin Bath etc.
Emergency Room	: Defibrillator, ECG Machine, Autoclave, Laryngoscope, Anesthesia Apparatus, Ventilator etc.
Dept. of Obstetrics & Gynecology	: Gynecological Examining Unit, Doppler Fetal Heart Detector, Colposcope, Cryosurgery System for Gynecology etc.
Dept. of Psychiatry	: Electro Convulsive Therapy Machine etc.
Training and Research Section	: Overhead Projectors, Copying Machine etc.
Nursing Service Division	: Suction Apparatus, Volume Respirator, Incubator, Cardiac Monitor etc.

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



## CHAPTER 3 OUTLINE OF THE PROJECT

### 3-1 Objective

VSMC, for which this Project is planned, is a tertiary medical institution that offers medical services to Region No.7 (Central Visayas) and adjacent areas. In specific terms it has the following functions:

- a. It is one of the eight (8) medical centers throughout the whole country. It offers tertiary medical care to a large area, including Region No.7 and a part of Leyte Island and Mindanao Island.
- b. It offers tertiary and secondary medical care to residents in and around Cebu city.
- c. It provides education and training for doctors and medical staff.

VSMC was established in 1913 and has been extended and remodeled repeatedly to meet immediate needs. However, its facilities have deteriorated considerably. Repeated extensions and remodelings have disturbed the path of flow and adversely affected the functioning of the hospital. Facilities and equipment at VSMC have not been supplemented or renovated to meet the increasing medical demand. This is obvious especially at the OPD Building. In order to solve these problems the Philippine Government has prepared the "OPD Building Extension Plan", which aims to increase space and restore and enhance the hospital's functions. The objective of this project is to contribute to the improvement of VSMC's hospital functions and medical services by constructing and procuring the facilities, machinery and equipment needed for the extension plan.

## **3-2 Study and Examination on the Request**

### **3-2-1 Justification and Necessity of the Project**

VSMC is located in Cebu city, the largest city in the southern part of the Philippines, and is one of the eight (8) medical centers in the country. It is the core medical institution for about 13 million people (equivalent to 20% of the total population) in Central Visayas Region (Region No.7) and the adjacent service area. With this background, the Project is judged to be appropriate and necessary for the following reasons.

- 1) The long economic depression in the Philippines has seriously delayed improvement of medical facilities and equipment. As a result it has become difficult to offer adequate medical services to the people, especially to residents in rural areas. It is important and indeed essential to improve the operation of VSMC, which is located in Cebu city, the second largest city after Manila. Improvement of VSMC will also contribute to meeting the National Health Plan's goal of decentralization.
- 2) At VSMC medical services have suffered due to the shortage of floor area, inefficient layout of the facilities, and the old and outdated state of medical equipment. A project for improving medical services is strongly required. Not only out-patient department functions but the efficiency of all medical activities at VSMC can be improved by constructing a new OPD Building, renovating the existing related facilities, and upgrading medical equipment. Therefore this Project is considered appropriate.
- 3) When this Project is completed, VSMC will be able to offer adequate medical services to the residents of its service area and offer a place for educating and training medical staff. Therefore this Project will make a significant contribution to health and medical care in the area.

### 3-2-2 Implementation and Operation Plan

#### (1) Personnel Assignment Plan

The following table shows the number of staff members engaged in medical activities in the Out-patient Department (OPD) of VSMC as of February 1993.

Figure/Table 3-1 Number of Medical Workers in Present OPD

	Total	Specialist Doctor	Resident Doctor	Post Graduate Intern	Intern
Head of OPD	1	1			
Mecical Setion					
Internal Medicine	5	1	2	1	1
Family Medicine	4	1	2	1	0
Pediatric	5	1	2	1	1
Obstetric/Gynecology	5	1	2	1	1
Surgery	5	1	2	1	1
Orthopedic	5	1	2	1	1
Neurosurgery	2	1	1	0	0
Ophthalmology	5	1	1	1	1
ENT			1		
Psychiatric	3	1	2	0	0
Dental	6	1	3	Assistant 2	0
Physiotherapy	13	2	1	0	10
Diabetic	iucled in Family Medicine				
Acupuncture	1	1	0	0	0
Examination	5	1	1	Technician 2	1
Sub Total	64	36		11	17
Nursing Section		Nurse		Trainee	
	24	4		20	
Support Section	4				
Total	93				

Source : VSMC

Forty-seven (47) doctors are engaged in medical activities in the OPD. This accounts for about 22% of all the doctors (221 doctors including post-graduate interns and consultants) at VSMMC. In addition, some of the visiting consultants and about seventeen (17) interns are engaged in medical activities in the OPD.

The OPD has a very small number of nurses. Only four (4) nurses are assigned full time to the OPD, or 1.4% of all the nurses at VSMMC (277 nurses including nurse attendants). Since VSMMC always has about 70 trainee nurses, the shortage of nurses in the OPD is alleviated by using trainee nurses. A total of about 20 (or 30%) of the trainee nurses are assigned to the OPD, thus this department depends heavily on trainees' labor. VSMMC has the following personnel plan for after completion of the New OPD Building:

Figure/Table 3-2 Personnel Plan in New OPD

	1993	After Completion	Increasing No
Head of OPD	1	1	0
Doctor	36	36	0
Post Graduate Intern	11	11	0
Intern etc.	17	17	0
Examination			
Technician etc.	0	10	10
Nurse	4	23	19
Nurse Trainee	20	25	5
Support Staff	4	13	13
Total	93	136	37

The number of out-patients was estimated at 700 per day in 4-2-2. Figure/Table 3-3 shows whether the expected number of patients can be taken care of by the number of doctors allocated to each department.

Figure/Table 3-3 No. of Doctors and Expected No. of Out-patients

Departments	Annual Number of Out-patients (Ave. 88~ 92)		Distri- bution of 700 Out- patients	Doctors (incl. Post- graduate Intern)	Out- pati- ents/ doctor • day	Remarks
	Number	%				
Family Medicine	14,302	13.34	93.35	4	23.34	3,957+849+9,499 Patients (including Dermatology, Diabetic etc.)
Medicine	15,207	14.18	99.25	4	24.81	
Pediatric	9,633	8.98	62.87	4	15.72	
OB/GYN	14,857	13.85	96.97	4	24.24	
Surgery	12,487	11.64	81.50	4	13.58	including Neurosurgery
Orthopedic	2,715	2.53	17.72	4	4.43	
EENT	11,961	11.15	78.07	4	19.52	
Psychiatric	7,864	7.33	51.33	3	17.11	
Dental	8,761	8.71	57.18	6	9.53	
Acupuncture	3,269	3.05	21.34	1	21.34	
Rehabilitation	6,195	5.78	40.43	3	13.48	
Total	107,251	100.00	700.00	43	16.28	

This table shows the number of out-patients that each doctor is required to examine per day in each department. The department of medicine has the largest average number of patients per day at 24.81. Since the department of medicine currently has four doctors assigned to examination and treatment, the total number of patients can be examined if each doctor works 6.2 per day, as the following equation shows.

$$24.81 \text{ patients/day} \times 15 \text{ minutes/patient} = 372.15 \text{ minutes}$$

$$372.15 \text{ minutes} + 60 \text{ minutes} = 6.2 \text{ hours}$$

(In the preliminary report on the basic design of the out-patient building at the Philippine General Hospital, average consultation time per out-patient is assumed to be 15 minutes in all



the departments. Similar data was obtained from this study. The average consultation time required for each out-patient is thus taken as 15 minutes here.)

Other departments will not need as much time to examine all their out-patients as the department of medicine, given the current availability of doctors as shown in Tale 3-3 shows.

The OPD will be operated by 23 nurses in total because an increase of 19 nurses is planned. This six fold increase is possible because they will still account for only about 8.3% of the total number of nurses. If 23 nurses take care of 700 patients per day, one nurse must take care of 30 patients. Since nurses are not assigned full time to a specific department but work by rotation, it should not be difficult to operate the OPD with 23 nurses. Trainees will be employed at the New OPD Building just as at present. In that case the total number of nurses will be 48. Since this means about 15 patients per nurse, there should not be any serious nursing problems at the New OPD Building.

When the New OPD Building is completed, the OPD will have about 50 trainees (in fact about 30 trainees on a constant basis), including 17 interns (assigned to wards/clinical section as well) and 25 trainee nurses to educate and train.

It should be possible to operate VSMMC without making any fundamental changes to the current system, aside from the staff increases noted above, if VSMMC's operational efficiency can be raised by extending and renovating the facilities.

## (2) Budget Appropriation

The DOH stated that it would appropriate enough funding for the increase in maintenance and personnel expenses after completion of this Project.

The average annual growth rate of VSMMC's budget over the past 5 years has been 16%. The budget for 1995, when the Project is completed, would be 104 million pesos at this growth rate. This means a 50% increase (37 million pesos) over the budget for 1992 (67 million pesos).

According to the estimate explained in 3-3-5, maintenance and management costs will increase by about 15.5 million pesos when the Project is completed. This increase is equivalent to 15% of VSMMC's predicted budget. VSMMC will have to depend on the DOH for a budget appropriation to cover the increased costs. In 1993 the DOH appropriated 603 million pesos for the eight (8) medical centers, including VSMMC. The predicted maintenance and management costs at VSMMC will be about 2.6% of the total budget for these medical centers. Using the average annual growth rate for the past five years (8.4%) for the budget of the eight (8) Medical Centers to predict the 1995 budget results in approximately 709 million pesos. The estimated additional maintenance and management costs could account for 2.1% of this estimated budget. Therefore the DOH's estimated budget increase for VSMMC is realistic.

### **3-2-3 Relation/Overlapping with Similar Projects**

#### **(1) Relation with Japan's Grant Aid**

The facilities and functions of the Out-patient Department Building of Philippine General Hospital (PGH), built with grant aid from Japan and completed in 1989, are similar to those planned under this Project. However, the following difference exists between the two projects. The service area of PGH's Out-patient Department Building is Metro Manila, while that of this project is Region No.7. and the adjacent area.

#### **(2) Relation with USAID (American Aid Organization)**

In 1992 the Child Survival Center was established on the premises of VSMMC with assistance from USAID. This center was established to provide preventive medicine in maternal and child health care, and belongs to the nursing division of VSMMC. The following difference exists between the Child Survival Center and the facilities planned under this Project. This Project aims to offer secondary and tertiary medical care, while the Child Survival Center is limited to preventive medicine, which is classified as primary medical care.

#### **(3) Relation with GTZ (German Aid Organization)**

The Hospital Equipment Maintenance Center was established on the premises of VSMMC by GTZ, and technical cooperation started in 1992. This center provides services not only to VSMMC but also to Central, West and East Visayas. Since its main function is to train engineers while repairing medical equipment, it will not conflict with this Project. The medical equipment to be provided under this Project will be maintained and repaired by this center.

### 3-2-4 Components of the Project

#### (1) New OPD Building

The New OPD Building consists of the following components as classified by function:

##### 1) Out-patient Diagnosis and Treatment Section

The out-patient diagnosis and treatment section comprises the rehabilitation department. This department must be established here because it is the policy of the DOH to establish this department at VSMMC in Region No.7.

##### 2) Examination Section (Endoscopy, ECG etc.)

The examination section consists of endoscopy, bronchoscopy, ECG, EEG and ultrasound rooms, which are located in different places at present in the existing building. The efficiency of examinations will be raised when those rooms are located in one section of the New OPD building. The examination section will be used by both out-patients and in-patients.

##### 3) Operation and Sterilization Section

The New OPD Building will have 3 minor operating rooms. The operation and sterilization section is essential for improving performance of minor operations.

##### 4) Education and Training Section

An education and training function will be provided under the Project as VSMMC accepts trainees from Region No.7 and adjacent areas.

##### 5) Service and Administration Section

The service and administration section will be established to ensure smooth coordination of the above functions.

#### (2) Renovation of the Existing Facilities

The following existing facilities will be partly renovated under this Project:

- Part of the emergency section renovated into a minor operating room
- Part of the existing facilities renovated into an X-ray room

Since these facilities are closely related to the functions of the OPD Building, there is sufficient need for renovating them.

### 3-2-5 Requested Facilities and Equipment

#### (1) Requested Facilities

##### 1) Construction site

The construction site was selected from the standpoint of minimizing construction work interference with the operation of the hospital during the construction period. As a result the site shown in the following illustration was judged the best.

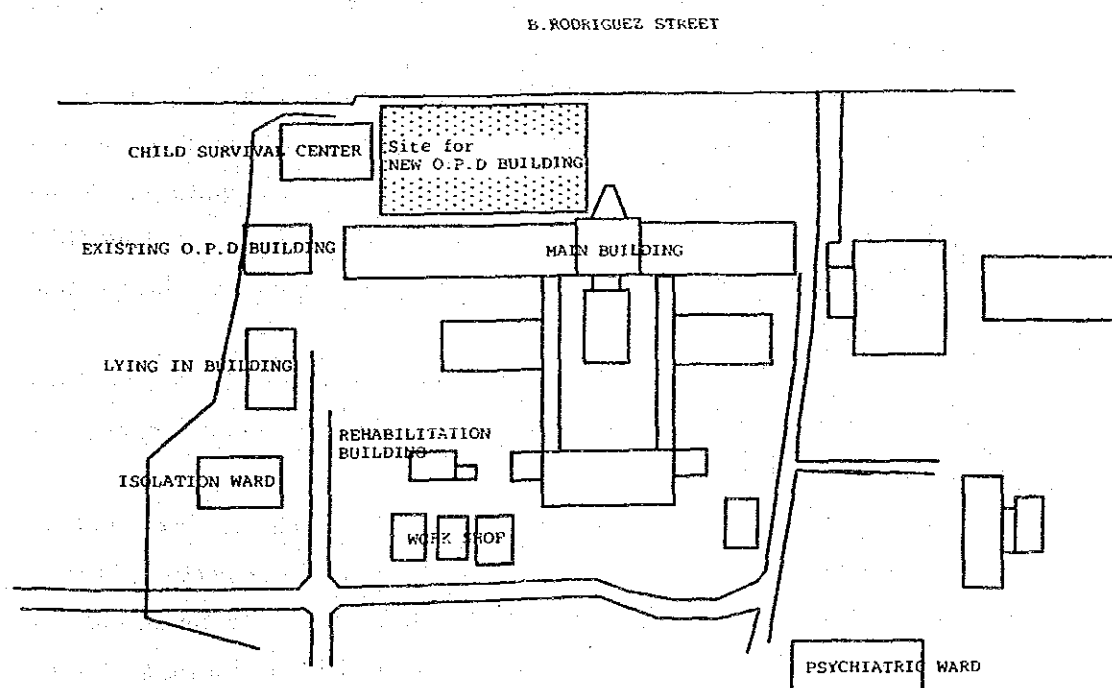
**Obstacles to access:** Access to the emergency section and the service section must be secured during and after construction work on the New OPD Building.

**Hindrance to emergency medical services:**

A space for emergency medical services must be secured around the entrance of the Emergency Section after the completion of the New OPD Building.

**Low rise building:** The building will be a 3-story building, as requested by the Philippines, while still fulfilling the requested functions.

Figure/Table 3-4 Location Map of Proposed Construction Site



## 2) Construction of the New OPD Building

The requested facilities were studied as summarized below. As a result, it was judged appropriate to construct a New OPD Building and to transfer all the functions of the existing OPD Building and some of the out-patient services currently scattered among different departments to the New OPD Building; and to renovate part of the related facilities.

### New OPD Building

Construction of a New OPD Building is appropriate for the reasons described in a. The pathology Section will not be included in the New OPD Building for the reasons described in b.

#### a. Existing OPD Building

- At present out-patients are examined and treated at the existing OPD Building. This building is located on the right side at the rear of the main building located in front of the hospital entrance. This building is inconvenient for new out-patients in OPD Building should be located at a place which can be seen easily, because it cannot be seen easily from the front entrance.
- At present a part of the locked ward in the back of the hospital is used for psychiatric out-patients. Neurosurgery and rehabilitation out-patients are treated in a separate building. Medical services should be improved by concentrating these scattered out-patient services in one building and shortening the distance patients have to travel.
- The waiting area for the existing OPD Building is located next to the entrance. It is a semi-outdoor space with only a roof. When the Study Team visited VSMHC, about 80 - 100 out-patients were in this semi-outdoor waiting area and about 70 - 80 out-patients were in the inner corridor of the existing OPD Building. These places were filled with about 200 people, including those people accompanying patients.
- The reception office is located in a passage about 3 m wide and 5 m long. This creates confusion as medical records are stored in the reception office, but in a disorganized manner.

After being screened, patients go into the OPD Building. The approximately 2-meter wide middle corridor is used as a waiting area. Since doctors, nurses, patients and goods must use this corridor, it is difficult even to get through it. An appropriate space for proper medical services in OPD Building should be provided.

b. Pathology Section

- Difference in operating hours: The existing pathology section operates on a 24-hour basis to meet the need for first aid treatment, but the New OPD Building will not operate on a 24-hour basis. If the pathology section is located in the New OPD Building, it may become unable to meet the need for first aid treatment.
- Dual operation: There is a proposal to transfer a part of the pathology section to the New OPD Building. However, this would divide operation into two and would be inefficient from the standpoint of manpower and management.

Renovation of the Emergency Department, Radiology Department and Pharmacy Section

It is judged appropriate to renovate a part of the radiology department and the emergency section for the reasons described in a. b. In view of future plans, it would be best to renovate the pharmacy section into an X-ray room. Therefore, the pharmacy section should be relocated at Philippine expense before renovation work begins.

a. Radiology Department

- A 3-meter wide middle corridor is used as a waiting area. The pharmacy section and hist-pathological examination section are located on opposite sides of the corridor. The emergency section is located at the end of this middle corridor. Emergency patients are taken to operating rooms through this corridor as well. This middle corridor is extremely crowded. Renovation is necessary because this middle corridor is totally inadequate as a waiting area for the radiology department.
- Two X-ray units are installed at present, but one of them is out of order. Emergency patients and in-patients account for 62% and 33% of use respectively. Ordinary out-patients account for the remaining 4%. This is because emergency patients and in-patients are given higher priority. The demand for X-ray examinations for out-patients is expected to increase.
- It is anticipated that renovation work on the existing X-ray room will interfere with examinations and lower examination capacity. Therefore the most desirable method would be for the Philippines to renovate the pharmacy room into two new X-ray rooms after relocating the pharmacy section, at by Philippine expense, and leave the existing radiology department unchanged for future renovation.

b. Emergency Section

- Ordinary out-patients (especially new patients) often go to the emergency section because it can be found relatively easily from the front entrance, while the existing OPD Building is hard to find. This confusion should be eliminated.
- Since the emergency section was partly renovated in 1990 under a budget appropriation by the Philippine Government, the need for new renovations will be small. However, this section is inadequately equipped to perform minor operations, thus lowering its capacity to treat emergency patients. Therefore it is necessary to construct one minor operating room.

c. Pharmacy Section

- Since the construction site of the New OPD Building has been changed, there is no need to construct a passage connecting this section and the New OPD Building. However, it is desirable that this section be relocated at Philippine expense and that this space be used as a part of a new X-ray room.

3) Building Utilities

It is judged appropriate to extend and improve building utilities for the New OPD Building including related facilities for the following reasons:

a. Water supply facility

City service water cannot be used as the source of water because the supply capacity is insufficient. Therefore, water must be supplied from a well.

Initially the construction of a new well was assigned to the Philippines, which plans to appropriate funds in the fiscal 1994 budget for its construction. The well should be included in this project since this Project will be completed during fiscal year 1994.

Since the well water is anticipated to be very hard, a water softener is essential to make it drinkable. Therefore a water supply facility, including a well, a water softener and a water tank, will be installed exclusively for the New OPD Building.

b. Sewage treatment system

In view of current conditions, a sewage treatment system not only for the New OPD Building but also for existing facilities should be considered in order to prevent infection within the hospital and to prevent environmental pollution in the surrounding area. Since the Philippine Government plans to improve the

sewage treatment system for the whole hospital under the budget for fiscal 1994, this Project will be limited to a sewage treatment system for the New OPD Building.

c. Medical gas system

Since nitrous oxide gas and oxygen will be used only in the minor operating rooms in the New OPD Building, there is no need for central supply. Therefore cylinders will be installed in the minor operating rooms.

d. Air-conditioning and ventilation system

The current facilities have no air-conditioning system to control air-conditioning and ventilation centrally. Window-type air conditioners are installed where functionally necessary. Rooms without air conditioners are ventilated and cooled by natural ventilation from window sashes.

A building plan that is suitable for the climate and air-conditioning equipment which meets the financial restrictions are essential for this Project. In principle, natural ventilation will be used and only those rooms where it is functionally necessary will be air-conditioned.

e. Waste and garbage disposal system

Environmental considerations, especially measures for preventing pollution, are important in planning waste treatment and disposal. Since the environmental office does not permit each facility to burn its waste, VSMMC must depend on the waste collection system of Cebu city. However, provisions for sorted collection should be made for the future.

Waste from the New OPD Building can be classified broadly into medical waste and general waste. Solid medical waste is sealed after being sterilized and stored with general solid waste in a designated waste yard and removed everyday by Cebu city trucks. Liquid medical waste is sterilized at a sewage treatment plant and discharged.

Under this Project a solid waste storage yard to be used exclusively by the New OPD Building will be constructed for sorted garbage collection.



## (2) Requested Medical Equipment

Medical equipment was classified into three major categories, that needed for the New OPD Building, existing facilities and renovated areas (X-ray room, emergency section etc.) and analyzed as follows.

### New OPD Building

The Medical Equipment that the following departments need for basic medical activities will be planned. Importance will be attached to easy maintenance and preventing the need for additional manpower. The current minor operating rooms show serious deterioration and there are problems maintaining an aseptic and sterile condition. This must be taken into account in planning equipment for them.

The requested Medical Equipment for each of the major departments is considered below.

#### 1) General Surgery

The requested equipment consists of basic equipment and is appropriate.

#### 2) Minor Operating Room

Medical equipment required mainly for minor operations in the departments of general surgery, neurosurgery, ophthalmology and ENT will be planned. The cataract set of the department of ophthalmology will be excluded from this Project. The current operating microscope will be used. Although a bronchoscope was requested for this department, the equipment in the bronchoscopy room will be used to avoid overlapping.

#### 3) Department of Neurosurgery

A CT scanner and a cassette changer are given high priority by the Philippines. However, these require considerable maintenance and high management costs. Since the policy of this Project is to provide basic equipment, they will be excluded.

#### 4) Department of Orthopedics

The requested equipment consists of basic equipment and is appropriate.

#### 5) Department of Medicine

The project will not provide a computer because it is not regarded as basic equipment. An ultrasound scanner, an ECG machine and an EEG machine are requested, but the equipment planned for the ultrasound room, the ECG room and the EEG room will be used to avoid overlapping. The other requested equipment is appropriate.

6) Diabetes Clinic Room

The requested equipment consists of basic equipment and is appropriate.

7) Department of Pediatrics

Most of the requested equipment is appropriate. However, the requested computer will be excluded because it is not regarded as basic equipment. A ECG machine is requested, but the equipment planned for the ECG room will be used to avoid overlapping.

8) Department of Family Medicine

The requested equipment is on the whole appropriate.

9) Department of Dermatology

The requested equipment is on the whole appropriate. A slide projector is requested, but the one that will be installed at the training and research section will be used to avoid overlapping.

10) Ultrasound Room

Most of the requested equipment is appropriate, but the computer will be excluded from this Project. A typewriter is regarded as general office equipment and excluded from the Project.

11) ECG Room

The requested equipment is on the whole appropriate, but a typewriter will be excluded from the Project.

12) EEG Room

The requested equipment is on the whole appropriate, but a typewriter and a computer will be excluded from the Project.

13) Endoscopy Room

A video camera, a video scope, a computer, an ERCP scope and a rectoscope will be excluded from the Project because they are not regarded as basic equipment. The other equipment is appropriate.

14) Department of ENT

The requested equipment, except an ENT endoscope, is regarded as basic equipment and appropriate.

15) Department of Ophthalmology

A Yag laser, an Argon laser, A and B scanners are not regarded as basic equipment. They will be excluded from the Project because technical training is necessary for their operation and they are hard to repair within the country.

16) Department of Dentistry

The equipment, (excluding an ultrasound scaler, dental operating instrument and an electric knife), is regarded as basic equipment and appropriate.

17) Rehabilitation Room

Liquid muscle force training equipment and a rim loader will be excluded from the Project because spare parts are hard to obtain in the country and a higher priority is given to basic equipment. Rehabilitation equipment has not been disseminated widely in the Philippines and there are very few trained rehabilitation technicians. Since no equipment maintenance system has been established, basic equipment that is especially easy to maintain and handle will be planned.

18) Department of Psychiatry

An overhead projector (the one to be installed at the training and research section should be used) and a computer (not regarded as basic equipment) will be excluded from the Project.

19) Department of Obstetrics & Gynecology

A colposcope and a cryosurgery system will be excluded from the Project because they are not regarded as basic equipment.

20) Department of Neurology

The requested equipment consists of basic equipment and is appropriate.

21) Bronchoscopy Room

The requested equipment consists of basic equipment and is appropriate.

## 22) Nursing Service Division

The requested equipment is on the whole appropriate. As for the cardiac monitor, a central monitor will be excluded from the Project because it requires training of operation of a bed side monitor as a basic equipment. Instead, the number of bed side monitors will be increased so that they can be used for training as well.

## 23) Patient Education/Counseling Room

Since the requested equipment is not medical equipment, it should be installed by the VSMMC. However, a blackboard and whiteboard will be installed to facilitate the necessary education and counseling.

### Pathology Room

That equipment which is inadequate or needs to be renovated due to age will be selected from the basic equipment. The existing available equipment seems to be in good operating condition, but it is insufficient to perform all the necessary examinations. Therefore the Project will provide those pieces of equipment that are currently insufficient or inoperable. Since the department of pathology has no water distiller, a basic item of equipment, distilled water must be purchased from outside. It is essential that a water distiller be installed in order to increase the reliability of examinations.

### X-ray room

There are two X-ray units and one mobile X-ray unit in the X-ray room, but they need to be renovated because their service life has expired. One of the X-ray units (both of them were manufactured by Siemens) was installed 12 years ago. Since it is an old model, spare parts cannot be obtained. It suffers from frequent breakdowns and is difficult to maintain. The other X-ray unit has a fluoroscope table, but its positioning collimator and fluoroscope table are broken beyond repair. This unit is apparently used for fluorographs in emergencies. The mobile X-ray unit (manufactured by Siemens) was installed 12 years ago and is left unused because it cannot be repaired. The annual number of X-ray examinations is approximately 15,000. This is too few given the role of VSMMC. Two X-ray units and one mobile X-ray unit will be installed when the X-ray room is renovated under the Project. Although the Philippines is strongly requesting a CT scanner, this will be excluded from the Project because the highest priority must be given to basic equipment.

### Emergency Section

At present the emergency section has scarcely any equipment. That equipment necessary for administering smooth first aid activities smoothly will be provided.

### **3-2-6 Necessity of Technical Cooperation**

VSMC is one of the eight (8) medical centers in the Philippines and its service area consists of Central Visayas and the adjacent area. VSMC also provides education to medical staff in its service area. This leads one to assume that the standards of medical technology, operation, maintenance and management at VSMC are more or less high, (although they may not be sufficiently high). Therefore the discussion of technical cooperation may be limited to the operation of medical equipment. However, the medical equipment planned under the Project (all basic equipment) can be operated with the skills that VSMC has at present. The medical equipment which will be installed under the Project will be maintained and repaired at the Hospital Equipment Maintenance Center, located in the premises of VSMC and run with technical cooperation from GTZ.

For the above reasons it is judged possible to achieve the expected benefits of the Project without further technical cooperation.

### **3-2-7 Basic Stance on Cooperation**

The above analysis clarified the benefits and feasibility of the Project and the Philippine Government's ability to implement it. The benefits of the Project are consistent with the grant aid policy of the Japanese Government. For this reason it was concluded that it is appropriate to execute the Project with grant aid from Japan. The project outline will be considered and its basic planning carried out on the assumption that it will be implemented with grant aid from Japan. However, it is acceptable to change a part of the request as stated in "3-2-4 Components of the Project" and "3-2-5 Requested Facilities and Equipment."

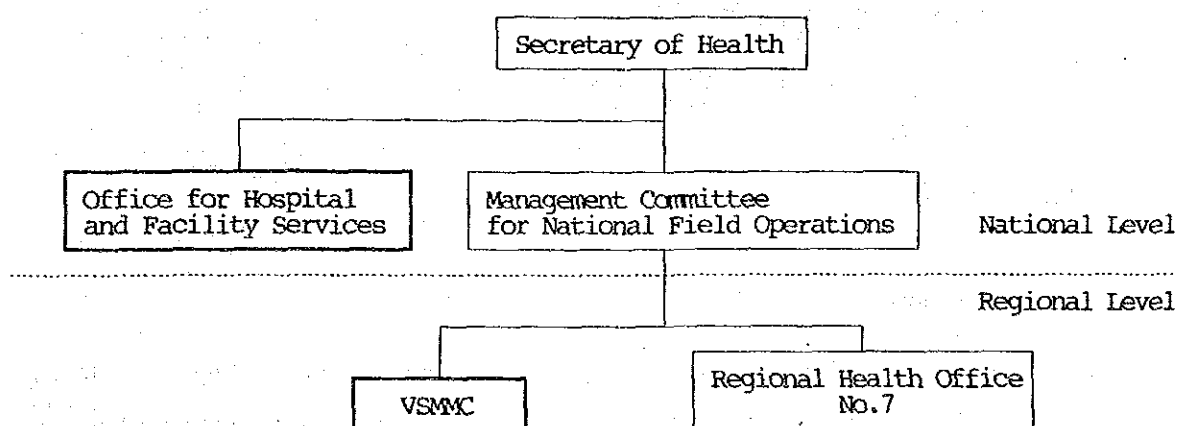
### 33 Outline of the Project

#### 3-3-1 Executing Agency and Operational Structure

##### (1) Executing Agencies

According to the system of medical administration in the Philippines, VSMMC is placed under the Management Committee for National Field Operations, which is under the jurisdiction of the Secretary of Health. However, the agencies executing the Project are the Office for Hospital and Facility Services in the DOH and VSMMC. Although the Regional Health Office in Region No. 7 manages the operation of VSMMC, the Management Committee for National Field Operations determines strategies and policies at the national level.

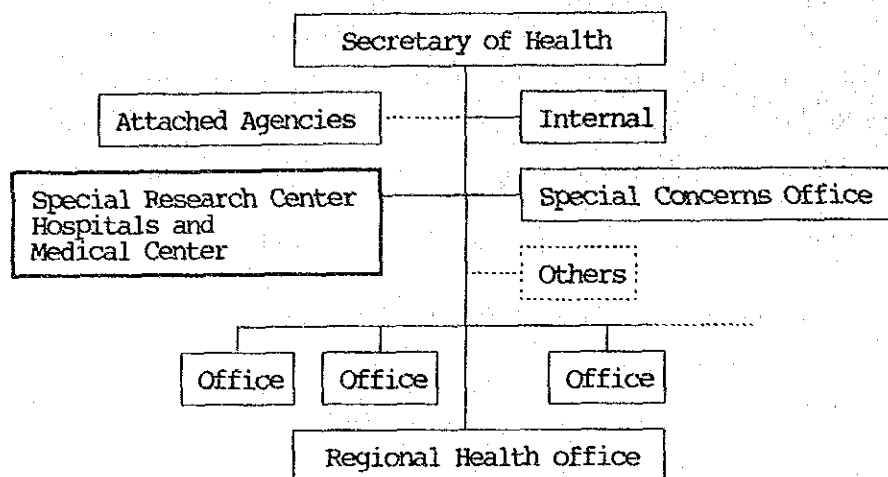
Figure/Table 3-5 Present Organization of Executing Agency



Source: DOH

At present the Philippine Government is promoting a reform (re-centralization) of the administrative structure. Under the proposed reform national hospitals, national research institutes and medical centers would be placed under the direct control of the DOH as shown below.

Figure/Table 3-6 Medical Center in Planned Organization



Source: DOH

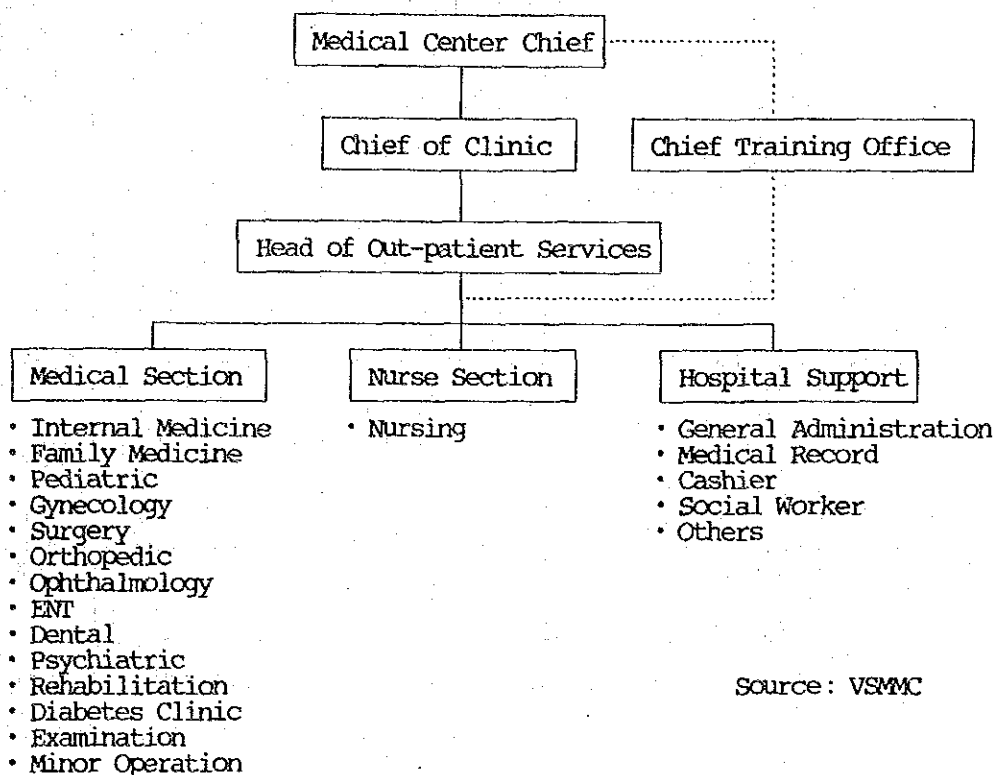
## (2) Operational Structure

The New OPD Building of VSMHC will be organized as shown below in Figure/Table 3-7. The OPD, which is currently one of the departments within the professional medical staff division, will become an independent organization while remaining in this division.

At present the OPD has 93 staff members, consisting of 65 members in the professional medical staff division, 24 members in the nursing division and 4 members in the Hospital Support Division. When the New OPD Building is completed, these will be increased to 75 members, 48 members and 13 members, respectively. It will be operated by 136 staff members in total. The professional medical staff division will have an increase of 10 examination technicians. They will be transferred from existing facilities because their examination functions will be moved to the New OPD Building. The number of doctors does not have to be increased as mentioned in 3-2-2. The number of nurses is 4 at present, but will be increased to 23 according to VSMHC's personnel plan. This is equivalent to 8.3% of all the nurses at VSMHC. This assignment is regarded possible in view of the overall balance of staff, as mentioned in 3-2-2. The hospital support division will have an increase of 4 office workers and

5 institutional workers. The above staff increase is possible because VSMC and the DOH assure support in the form of budget appropriations and personnel assignments.

Figure/Table 3-7 Planned Organization of New OPD



### 3-3-2 Plan of Operation (Activity)

The specific activities planned for the New OPD Building are explained below.

#### (1) Diagnosis and treatment

##### 1) Diagnosis and treatment section

Diagnosis and treatment service will be given 5 days a week. The operation hours in the New OPD building will be 8 AM – 12 PM in the morning and 1 PM – 4 PM in the afternoon. The medical service hours are 5.5 hours in the existing OPD building. Although each department has different medical service hours, medical service hours in the New OPD building will be planned as 5 – 6 hours/day.



Although each department has different medical service hours, medical service hours in the New OPD building will be planned as 5 – 6 hours/day.

The following table shows the service schedule of the major departments according to VSMMC's own plan.

Figure/Table 3-8 Time Schedule for Medical Services in New OPD

	Mon	Tue	Wed	Thu	Fri
Surgery					
General Consultation	○	○	○	○	○
Alimentary Tract Surgery	PM				
Pediatric	○	○	○	○	○
Urologic		PM			
Neurosurgery		○		○	
Endocrine & Soft Tissue			AM		
Orthopedic	○	○	○	○	○
Internal Medicine					
General Consultation	○	○	○	○	○
Neurology	○	○	○	○	○
Cardiology	○	○	○	○	○
Nephrology	○	○	○	○	○
Infectious Disease	○	○	○	○	○
Wellness Clinic	○			○	
Gastroenterology					AM
Hypertension & Hematology clinic		○			
Pulmonary			○		
Family Medicine					
OPD Triage	○	○	○	○	○
General Consultation	○	○	○	○	○
Dermatology Clinic		○		○	
Gynecology	○	○	○	○	○
E/ENT	○	○	○	○	○
Dental	○	○	○	○	○

Source: VSMMC

## 2) Examination section

This section can give various examinations using ECG, EEG, an endoscope, a bronchoscope and ultrasound equipment. It will be used by both out-patients and in-patients.

3) Minor operating rooms

At present 24 operations are performed per day. The New OPD Building will have 3 minor operating rooms and a sterilization room. They will be operated under an independent system.

4) Acceptance of referral patients

Since VSMMC is the only tertiary medical institution in Region No.7 and the adjacent service area, which together have a population of 13 million, it accepts referral patients.

(3) Education and Training

VSMMC plays the role of an education hospital as well. It accepts 22,000 trainees every year from its service area. At the same time it promotes education and dissemination of preventive medicine to its visitors, including patients and those accompanying them.

**3-3-3 Location and Condition of the Project Site**

VSMMC, where the Project construction site is located, is situated nearly at the center of Cebu city. It takes about 40 minutes from Mactan International Airport by car. VSMMC is a medical center having about 500 beds. VSMMC's premises of about 16 ha are dotted with 1 - 4 storied reinforced concrete buildings as well as block and wooden facilities. The construction site of the Project is located on the north side of VSMMC's premises facing Rodriguez Street. This site is used as a parking lot at present and has the foundations of an old building and trees. It was confirmed during the field study that these will be removed by the Philippine Government before beginning construction work on the Project.

**3-3-4 Description of Facilities and Equipment**

(1) Description of Facilities

The construction and renovation work planned for the New OPD Building and existing facilities is outlined below.

### New OPD Building

Figure/Table 3-9 Floor Area Tabulation of New OPD Building

Sections	Floor Area (m <sup>2</sup> )
Out-patient Medical Service	1,103.08
Examination (including Minor Operation Rooms)	445.39
Administration	519.85
Common Space	2,077.26
Total	4,145.58

The New OPD Building will have the following functions.

- 1) Department of Medicine
- 2) Department of ENT
- 3) Department of Ophthalmology
- 4) Department of Surgery
- 5) Department of Family Medicine
- 6) Department of Rehabilitation
- 7) Department of Pediatrics
- 8) Department of Orthopedics
- 9) Department of Psychiatry
- 10) Department of Gynecology
- 11) Department of Dentistry
- 12) Others
  - Examination Section
  - Minor Operation Section
  - Education and Training Section

### Renovation Work

- 1) Emergency Section
  - One minor operating room will be constructed.
- 2) Radiology Section
  - A part of the existing facility (pharmacy and hist-pathology rooms) will be renovated into two X-ray rooms.

## (2) Description of Medical Equipment

The medical equipment that will be installed under the Project will consist of those items regarded as necessary for the New OPD Building and the renovated radiology section and emergency section, and those items judged essential for the existing facilities.

The major medical equipment is listed below.

### New OPD Building

Dept. of Surgery	: Examining Light, Suction Unit, Autoclave, Treatment Instrument Set etc.
Minor Operating Room	
(General Surgery)	: Operating Light, Anesthesia Apparatus, ICU Bed, Operating Instrument Set etc.
(Neurosurgery)	: Operating Binocular Microscope, Cranial Instrument etc.
(Ophthalmology/ENT)	: Bronchoscope, Operating Instrument for Ophthalmology etc.
(Anesthesia)	: Pulse Oxymeter etc.
(Other)	: Catheter Set etc.
Dept. of Orthopedics	: Arthroscopy Set
Diabetes Clinic Room	: Examining Table, Glucometer etc.
Dept. of Pediatrics	: Examining Instrument Set etc.
Dept. of Family Medicine	: Computer, Sphygmomanometer etc.
(Dept. of Dermatology)	: Microscope, PUVA Lamp etc.
Ultra Sound Room	: Ultrasound Scanner-Sectral & Linear etc.
ECG Room	: 1-channel & 3-channel Electrocardiography etc.
EEG Room	: 18 Channel Electroencephalography etc.
Gastrointology Room	: Esophago-Gastroscope Fiberoptic, Proctosigmoidoscope, Colonoscope etc.
Bronchoscopy Room	: Bronchoscopic Table etc.
Dept. of ENT	: ENT Microscope, Laryngoscope etc.
Dept. of Ophthalmology	: Operating Microscope, Fundus Camera, Slit lamp etc.
Dept. of Medicine	: Sphygmomanometer, Examining Table, Examining Instrument Set etc.
(Dept. of Neurology)	: Examining Lamp, Examining Instrument Set etc.
Dept. of Dentistry	: Dental Unit, Dental X-Ray Unit etc.

Rehabilitation Room	: Low Frequency Therapy Apparatus, Microwave Therapy Apparatus etc.
Dept. of Gynecology	: Gynecological Examining Unit, Doppler Fetal Heart Detector, Colposcope etc.
Dept. of Psychiatry	: Electro Convulsive Therapy (ECT) Machine etc.
Training and Research Center	: Overhead Projectors etc.
Nursing Service Division	: Suction Apparatus, Volume Respirator, Incubator, Cardiac Monitor etc.
Hospital Support Division	: Unit of Mimeographing/Duplicating
<u>Renovated Areas</u>	
Dept. of Radiology	: General X-Ray Unit, Multi-Purpose X-Ray Unit with TV Set, Mobile X-Ray Unit etc.
Emergency Section	: Defibrillator, Autoclave, Laryngoscope etc.
<u>Existing Areas</u>	
Radio Therapy Room	: Pocket Desimeter
Laboratory Section	: Spectrophotometer, Flame Photometer etc.

### 3-3-5 Maintenance and Management Plan

#### (1) Maintenance and Management System

The maintenance and management operations of the facilities and medical equipment can be classified broadly into those which can be performed by VSMMC employees and those which must be subcontracted to specialists from outside.

##### 1) Maintenance and management operations by employees

###### a. Maintenance and management of building facilities

Employees are to perform routine cleaning, maintenance and inspection of facilities and routine check-ups on equipment based on operating manuals, and take action in the event of simple problems such as water leakage. When a complicated problem arises with a facility or piece of equipment, they are to contact the related enterprise.

###### b. Maintenance and management of equipment

Doctors, nurses and medical technicians are to perform routine cleaning and adjustment of the equipment they use. When a problem which cannot be handled by employees occurs, they are to ask the Hospital Equipment Maintenance Center or the manufacturer's agent etc. to fix it.

Facility maintenance staff and equipment maintenance staff must be appointed for the above maintenance and management work. It is desirable for VSMMC to prepare maintenance and management manuals based on facility and medical equipment operating manuals, documents containing instructions on routine inspections and periodical inspections, and those containing instructions on emergency reporting (to work subcontractors, agents, manufacturers etc.) so that the facilities and equipment can be operated and maintained effectively in all circumstances.

2) Subcontracting to specialists

Periodical inspections by specialists are obligatory for elevators. Therefore such inspections should be subcontracted to the manufacturer etc.

3) Training during test run of facilities and medical equipment

Generally operating manuals are explained immediately before completion and transfer. However, some basic knowledge is necessary for operation. Therefore it will be necessary to give as much training as possible on operating procedures, trouble-shooting procedures and methods of repair even while construction and other work is still in progress.

(2) Maintenance and Management Costs

Maintenance and management costs were estimated. The results are shown below. Increased maintenance and operation costs are to be born by the DOH as mentioned in 3-2-2.

Figure/Table 3-10 Increased Maintenance and Operation Costs Estimate for New OPD Building

Unit: Peso

Items	Cost Estimate
1) Medical Equipment	11,645,000
2) Medical Gas	785,000
3) LP Gas	117,000
4) Electricity	1,766,000
5) Power Generator	75,000
6) Personnel Expenses	1,149,000
Total	15,537,000

The breakdown for estimated maintenance and management costs is explained below.

- 1) Equipment maintenance cost etc. .... P 11,645,000/year

Maintenance and management costs for medical equipment can be classified broadly into the cost of reagents and consumable supplies required for diagnostic equipment and pathological examination equipment, and the cost of repair and periodical inspections.

Reagents, consumable supplies and replacement parts required during the first year will be supplied under the Project. Subsequently funds will have to be appropriated for the maintenance and management of equipment.

However, the 1-year supply of reagents, consumable supplies and replacement parts, provided at the time of equipment installation, may not comprise all that is necessary. Any shortages must be supplied from VSMMC's budget.

Maintenance and management costs for medical equipment consist of the following:

- a. Maintenance cost for major equipment..... P 724,000/year

1. General X-ray unit:

$$50KW \times P 2.3/KW H \times 50h/week \times 50 weeks/year = P 287,500/year$$

2. Multi-purpose X-ray unit with TV set:

$$75KW \times P 2.3/KW H \times 50h/week \times 50 weeks/year = P 432,250/year$$

3. Mobile X-ray unit:

$$0.7KW \times P 2.3/KW H \times 30h/week \times 50 weeks/year = P 2,415/year$$

4. Ultrasound linear scanner

$$0.45KW \times P 2.3/KW H \times 50h/week \times 50 weeks/year = P 2,587/year$$

- b. Cost of reagents and consumable supplies ..... P 7,115,000/year

1. Reagents for pathological examinations

$$10,000 samples \times P 330 (Average unit price) = P 3,300,000$$

2. X-ray film

$$20,000 rolls of film \times P 120 (Average unit price) = P 2,400,000$$

3. Recording paper

$$100 packages \times P 650 (Average unit price) = P 65,000$$

4. Monitoring electrodes

$$500 electrodes \times P 700 (Average unit price) = P 350,000$$

5. Other

$$= P 1,000,000$$

- c. Maintenance and management costs ..... P 3,806,000/year  
 These costs consist of the cost of replacement parts, repairs and maintenance contracts. They were estimated to be about 2.5% of the price of the equipment.

Total a. 724,000 + b. 7,115,000 + c. 3,806,000 = p 11,645,00/year

2) Cost of medical gas -- P 785,000/year

Oxygen and nitrous oxide gas are used. Monthly consumption was estimated based on the size of VSMMC. Monthly consumption:

Oxygen : 7m<sup>3</sup> cylinder × 35 cylinders/month; current price P 32/m<sup>3</sup>

Nitrous oxide : 30kg cylinder × 10 cylinders/month; current price P 192/kg

Therefore, the annual cost would be as follows:

Oxygen : 32/m<sup>3</sup> × 7m<sup>3</sup> cylinder × 35 cylinders = P 7,840/month

Nitrous oxide : P 192/m<sup>3</sup> × 30kg/cylinder × 10 cylinders = P 57,600/month

Monthly cost ..... P 65,440/month

Annual cost : P 65,440/month × 12 months = P 785,280/year

3) Cost of LP gas ..... P 117,000/year

LP gas is used mainly for the sterilizer in the sterilizing room:

Monthly LP gas consumption : 25kg/day × 30 days/month = 750kg/month

Monthly cost of LP gas : P 13/kg × 750kg/month = P 9,750/month

Annual cost of LP gas : P 9,750/month × 12 months/year = P 117,000/year

4) Electricity costs ..... P 1,766,000/year

Electricity costs consist of distribution charge and power consumption charge.

Electricity costs are estimated under the following conditions.

Facility capacity : Transformer capacity: 400KVA × 2 units = 800KVA

Demand : 800KVA × Demand factor (0.75) × Diversity factor (0.5) × Power factor (0.9) = 270KW

a. Distribution charge (Contract power 270KW)

Demand 270KW × P 25/KW = P 6,750/month

Consumption 54,000KWH × P 0.47 = P 25,380/month

P 32,130/month ..... <1>

b. Power consumption charge

270KW × 8H × 25 days/month = 54,000 KWH/month

54,000 KWH/month × P 2.3 = P 124,200/month ..... <2>



a. + b. = P 156,330/month

Public hospital discount: (54,000 KWH/month  $\times$  P 0.17 = P 9,180/month)

P 156,330/month - P 9,180/month = P 147,150/month

c. Annual electricity costs

P 147,150/month  $\times$  12 months = P 1,765,800/year

5) Cost of generator operation and maintenance ..... P 75,000/year

Diesel oil is used to fuel the private generator.

The estimate assumes that a power failure occurs 5 times/month and lasts for 3 hours each time.

60l/h  $\times$  3h  $\times$  5 times/month  $\times$  12 months  $\times$  P 7/l = P 75,600/year

6) Labor cost ..... P 1,149,000/year

Nurse	I	P 3,650 $\times$ 10 persons $\times$ 12 months	= P 438,000/year
	II	P 4,650 $\times$ 3 persons $\times$ 12 months	= P 167,400/year
	III	P 5,350 $\times$ 1 persons $\times$ 12 months	= P 64,200/year
<u>Assistant</u>		<u>P 2,800 <math>\times</math> 5 persons <math>\times</math> 12 months</u>	<u>= P 68,000/year</u>
Sub-total			P 837,600/year
Office worker	I	P 2,700 $\times$ 3 persons $\times$ 12 months	= P 97,200/year
	II	P 5,150 $\times$ 1 person $\times$ 12 months	= P 61,800/year
<u>Worker</u>		<u>P 2,550 <math>\times</math> 5 persons <math>\times</math> 12 months</u>	<u>= P 153,000/year</u>
Sub-total			P 312,000/year
<hr/> Total			<hr/> P 1,149,000/year

## **CHAPTER 4 BASIC DESIGN**



## CHAPTER 4 BASIC DESIGN

### 4-1 Design Policy

#### (1) Policy Related to Natural Conditions

Cebu city is in Cebu Island, which is located at the center of Central Visayas. In terms of climate the city is in a tropical rain forest and is located within the East Asian monsoon zone. In terms of topography the city is in the circum-pacific volcanic belt.

In determining architectural policies, the following factors relating to the above natural conditions are important: a. High temperature and high humidity; b. Strong insulation; c. Monsoons; d. One of the heaviest rainfalls in the world; and e. An earthquake-prone region. Accordingly the following policies should be taken:

- a. Take care to provide natural ventilation for the facilities.
- b. Use heat insulation materials for the roof. Walls should have ample insulation capacity. Use deep eaves effectively to avoid direct sunshine.
- c. Consider monsoons and create a "wind passage" in accordance with wind direction. Prevent dust where a high degree of cleanliness is demanded because of the nature of the facility (hospital).
- d. Use reliable materials for roofs and construct deep eaves to prevent damage or leakage from rain. Deep eaves are important for protecting the outer walls of the building as well. Carefully prepare a water discharge plan for the hospital grounds. Consider a lightning arresting facility in case the building is struck by lightning.
- e. Structurally the building should have high aseismic performance.

#### (2) Policy Relating to Social Conditions

Since many charity patients and their families come to the hospital, the building should be easy to find and the waiting space should be sufficiently large to accommodate them. It should be easy to take measures for preventing robbery at night. It should be easy to manage the facilities.

#### (3) Policy Relating to Laws and Regulations

After the DOH gives its approval to the design, a construction license should be obtained from Cebu city in compliance with the Building Permission Law etc. The design should

comply with the related laws and regulations, such as the Building Standards Act and the Fire Act. Guidelines should be studied in advance and reflected in the design. Discussions should be held with the governmental offices concerned throughout the construction period to ensure the design is adequate.

(4) Policy Related to Utilization of Local Enterprises, Local Equipment and Materials

Since the so-called wet method (plaster work such as mortar finish) requires a drying period it greatly effects the construction schedule. Therefore the use of the wet method should be limited to the extent possible. The construction period should be shortened by adopting mainly the dry method.

The survey of construction sites in Cebu city revealed that facilities and equipment such as batcher plants, mixer trucks and concrete pumps are available. The use of cranes would appear possible as many multi-storied buildings were under construction in the city. Collecting aggregates is prohibited around Cebu city. To use a large amount of high quality aggregates they must first be carried from Toledo city. Therefore the unit price of concrete is higher in Cebu city than in Manila. Molds and lumber of high quality are hard to obtain.

(5) Policy Relating to the Executing Agency's Maintenance and Management Ability

VSMC's ability to bear maintenance and management costs is not great. To lower maintenance and management costs natural ventilation should be used where possible and air-conditioning equipment that increases electricity bills should be minimized. Lighting equipment of low illumination should be used and combined with natural light. Sanitary facilities should be designed to facilitate replacement. Pipes should be made of durable materials and have cleaning holes wherever necessary. A septic tank should be carefully considered to control pollution, but its maintenance and management costs should not be high. The finishing materials for the building should be durable and easy to maintain.

(6) Policy Relating to Scope and Level of Facilities and Equipment

Although the New OPD Building is a part of the hospital, it should have a separate energy supply. This is because the existing energy supply capacity is not sufficient for supplying energy to the New OPD Building. Therefore energy-related rooms such as power and machine rooms should be constructed independently of the existing facilities. The flow of patients should be separated from the flow of employees and goods where possible to prevent disorder.

A reinforced concrete structure, the most widely used type of construction in the Philippines and relatively inexpensive, should be adopted.

Selection of medical equipment should take maintenance costs into account. Equipment which entails relatively low maintenance costs should be selected to prevent an excessive burden on the Philippines.

(7) Policy Relating to Construction Period

The construction period should be as short as possible to complete the Project within the framework of the grant aid system (within a single Japanese fiscal year). The dry method, which cuts down the construction period, should be actively adopted.

## **4-2 Study and Examination on Design Criteria**

### **4-2-1 Grade of the Facilities**

VSMC is a tertiary medical institution for Region No. 7 and the surrounding area. The population of its service area is 13 million. In view of the position and role of VSMC, its current grade is not adequate in terms of space and functions. VSMC does not have sufficient medical equipment for advanced medical services and its facilities do not have enough space to install new medical equipment. A plan to renovate all the VSMC facilities would be difficult to implement because the existing facilities were constructed at different times and there is a problem with budget restrictions. Therefore, a complete reconstruction has been selected in Japan because the functional service life of the buildings has expired even if their physical service life has not. VSMC depends mostly on the national budget for the cost of maintaining and managing its buildings and operating the hospital. Even if it is reconstructed completely, it will not necessarily bring about good results because maintenance and operating expenses will increase. If it is converted into a modern medical institution, it will be faced with even greater expenses. In view of the urgent need to offer inexpensive and high quality medical services to as many people as possible, it is desirable to construct the New OPD Building in such a way as to offer medical services to the greatest number of people.

### **4-2-2 Predicted Number of Out-Patients**

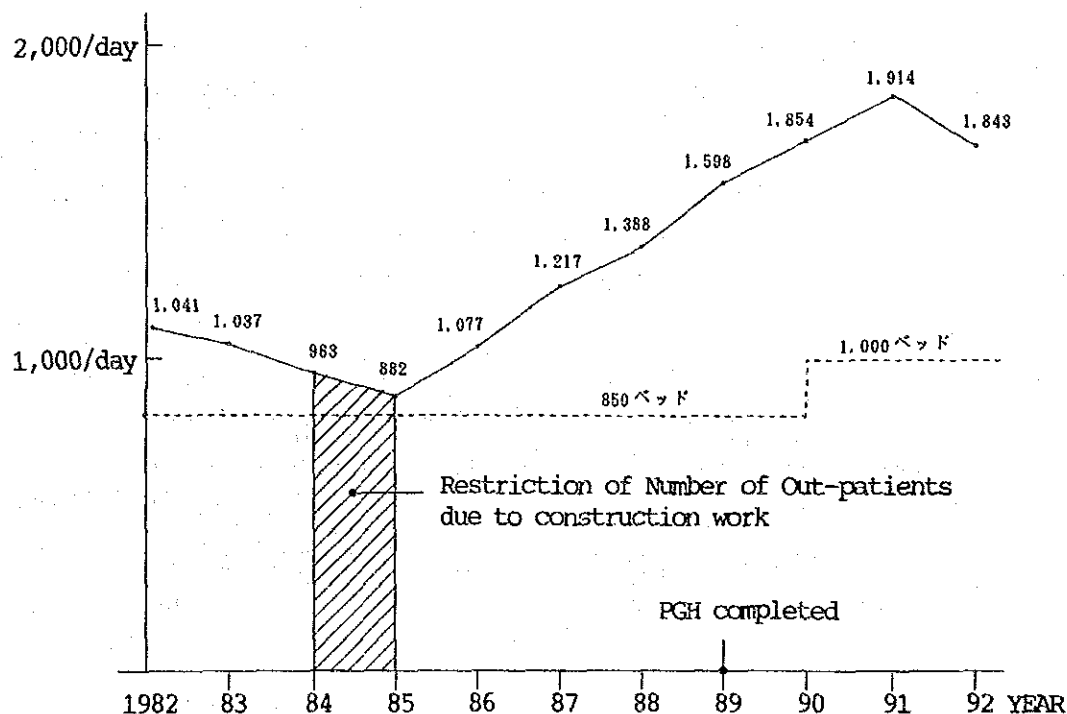
About 500 out-patients receive diagnosis and treatment every day at the existing OPD Building, but the demand for medical care is suspected to be larger than this. The number of out-patients at VSMC will be set as follows. The growth rate of the population in Region No. 7 is about 1.9%, equivalent to about 80,000 per year. However, the number of beds at public hospitals in Region No. 7 has remained unchanged at 2,775 beds over the last five years. The number of beds at private hospitals is 2,618, increasing only by 68 over the last three years. The fact that the number of beds is almost unchanged indicates that medical facilities have been unable to keep up with the population growth rate even though hygiene and various facilities have been improved. The number of out-patients at VSMC has remained nearly at the same level over the past five years. When compared with the growth rate of population, this seems to indicate that the current facilities are nearly at capacity limit. The predicted number of out-patients in the New OPD Building is determined as follows.

Generally, an approximate number of out-patients per day in a general hospital is about twice the number of beds. For example, PGH had 1,919 out-patients and 1,000 beds in 1991, so the

number of out-patients was 1.919 times as large as the number of beds. The average ratio for the past five years is 1.824, almost 2 times of the number of beds.

The following graph shows changes in out-patient numbers at PGH, although the growth rate of the population in Metro Manila (2.8%) may differ from that of Region No. 7 (1.9%).

Figure/Table 4-1 Change of Number of Out-patients at PGH

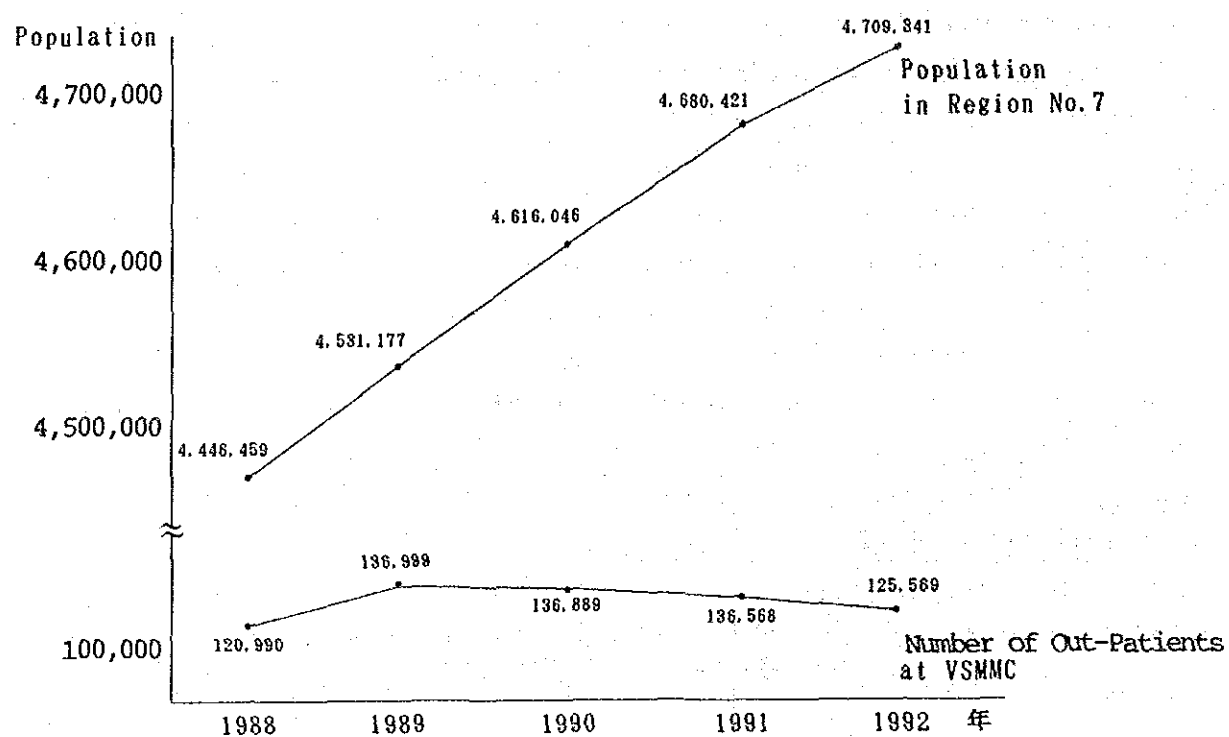


Source : PGH

The official number of beds at VSMMC is 350. If the number of out-patients is based on the official number of beds and the data of PGH, it should be 638 ( $350 \text{ beds} \times 1.824$ ). However for this project the number of out-patients is assumed at two times the official number of beds in view of the possibility of a sudden short-term increase in out-patients due to unknown factors such as disaster, as well as the fact the real number of beds is 549. In total, the number of out-patients is assumed to be 700 persons/day.



Figure/Table 4-2 Change of Population in Region No.7  
and Number of Out-patients at VSMC



Source : VSMC

#### 4-2-3 Size of the Facility and Basis of the Required Floor Area

##### (1) Total Area of the Out-patient Consultation Section

Hereafter the ordinary center to center distance of columns at a hospital is assumed to be  $6\text{m} \times 6\text{m}$  (1 span).

##### 1) Required number of booths

- The number of out-patients per day is assumed to be 700 persons/day as mentioned in 4-2-2. The number of out-patients in the rehabilitation department is predicted to be about 40 based on the percentage (5.78%) in the average total annual number of out-patients of the departments planned for the new OPD Building in 1988 through 1992. The area for the physical therapy department must be determined separately because of various factors such as equipment layout. Therefore, the area for the other departments will be determined on the assumption of 660 patients per day ( $700 - 40 = 660$ ).

The number of out-patients who can be examined per examination booth per day is depends on the examination time per day, which varies between departments, but is taken were as approximately 5 – 6 hours, as shown in 3-3-2. If the average examination time required for one out-patient is taken as 15 minutes, then 20 to 24 out-patients can be examined daily in one both. ( $5 - 6 \text{ hours} \div 15 \text{ minutes} = 20 - 24 \text{ patients}$ )

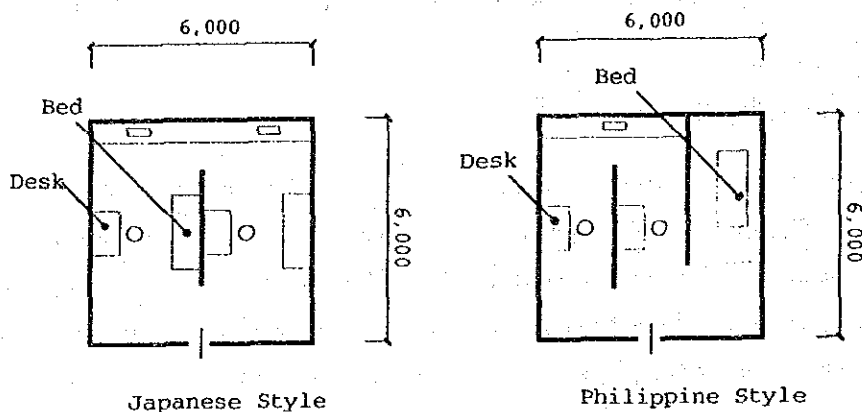
The average time per out-patient in the preliminary report is assumed to be 15 minutes for all departments. Since similar data was obtained in this study, the average consultation time required for each out-patient is taken as 15 minutes. The average number of booths needed to examine 660 out-patients per day is between 33 and 27.5. ( $660 \text{ patients} \div 20 - 24 \text{ patients/booth} = 33 - 27 \text{ booths}$ ) Since VSMHC has an education and training role, it needs space for such activities. In consideration of this requirement and the need during peak periods, we may conclude that 33 booths are required.

##### 2) Necessary number of spans (Area)

- a. The Outpatient Consultation Section consists of the following types of spaces:
  - Consultation booths (1/3 span): 33 booths
  - Diagnosis and treatment booths (1/3 span): 1 booth is necessary for every 2 consultation booths.  $33/2$  booths

- Central treatment room (1/2 span): Requested by VSMMC, 2 booths in total (1 booth for internal medicine and 1 booth for surgery)

Figure/Table 4-3 Planning of Consultation Booth



b. In sum, the necessary number of spans is as follows.

$$(1/3) \times 33 + (1/3) \times 33/2 + (1/2) \times 2 = 17.5 \text{ spans}$$

## (2) Division Among Departments

It was determined above that the out-patient consultation section must have 17.5 spans. The necessary number of spans is 16.5 when the central treatment room (1 span) is subtracted. These spans are to be divided up among all the departments according to the percentage of out-patients over the past 5 years. The following table gives data on out-patients and the number of spans distributed to each department in the basic design of the New OPD Building plan (draft). Note that pediatrics department out-patients (5 years old or younger) and physiotherapy department out-patients are not included in the annual number of out-patients. This is because infants aged 5 and younger are accepted by the Child Survival Center and the size of the physiotherapy department cannot be calculated from the number of out-patients only.

Figure/Table 4-4 Area Distribution for Clinics

Clinics	No. of Out-patients /year 5-year Average (88-92)		Span Distribution (1-span=6m× 6m) ×		Notes
	Number	%	16.5span× %	Proposed	
Family Medicine	14,302	14.15	2.34	3.00	including Wellness Clinic
Internal Medicine	15,207	15.05	2.48	2.00	including Hematology
Pediatrics	9,633	9.53	1.57	1.00	Emergency dept. treats general diseases
Gynecology	14,857	14.70	2.43	1.20	excluding obstetrics
Surgery	12,487	12.36	2.04	2.00	
Orthopedics	2,715	2.69	0.44	1.00	Needs 1-span for equipment layout
EEENT	11,961	11.84	1.95	2.50	Including inspection room
Psychiatrics	7,864	7.78	1.28	1.00	
Dentistry	8,761	8.67	1.43	2.00	
Acupuncture	3,269	3.23	0.53	0.80	
(Treatment)			1.00	1.00	Requested by VSMC
Total	104,834	100.00	17.50	17.50	

### (3) Shared Space and Auxiliary Space

The New OPD Building must have common areas such as a waiting room, corridors, stairs, ramps, elevators and toilets, as well as auxiliary areas such as examination rooms, management rooms, a medical history record room and a machine room, in addition to diagnosis and treatment areas. The total area of diagnosis and treatment space and auxiliary space is 2,028 m<sup>2</sup>. If this is regarded as purpose room space, its ratio to the shared space (2,117 m<sup>2</sup>), such as corridors, is approximately 1: 1. The out-patient department building at Philippine General Hospital has the same ratio. This ratio is considered appropriate in the Philippines when compared with the out-patient department building at Philippine General Hospital.

#### (4) Comparison with Requested Plan

A comparison of the requested plan and the draft plan for each department is given in Figure/Table 4-5.

The difference between the plans is twofold. The department of radiology and the department of pathology are excluded from the new building (the existing facilities will be renovated) and the rooms associated with minor operating theatres are to be newly included under the proposed plan. Excluding these two points, the proposed plan reflects the spirit of the requested plan.

The large difference in the total floor area between the request (2,561m<sup>2</sup>), preliminary study (3,000m<sup>2</sup>) and the proposal (4,145.58m<sup>2</sup>) is explained by the following reasons:

- a. In the common area an additional set of stairs has been provided for the purpose of disaster prevention. The service flow and patient flow paths were separated for functional reasons. The dimensions of the ramp and the stairs requested would not function properly.
- b. The area for the diagnosis and treatment section was determined from the number of out-patients as explained in 4-3-2 (1).
- c. Rooms that should be attached to the examination section, such as equipment storage room, waiting room and dressing room, are absent from the request. They have been added to the proposed plan.
- d. In the service section a machine room, which is essential for equipment planning, is missing from the requested plan. This also was added in the proposed plan.

Figure/Table 4-5 Detailed Floor Area Tabulation of New OPD Building

Dept.	Room	Requested Plan		Proposed Plan		Notes
		Area	Number	Area	Number	
Common Use	Entrance Hall	36	1	27.65	1	
	Waiting Area	24	1	148.68	1	According to the Number of Out-Patients
	C.R	162	3	190.14	8	Divided for Staff-use and Patients-use
	Over Bridge	54	2	54.00	2	
	Corridor	671	—	1,012.62	—	Divided for Staff-use and Patients-use
	Ramp	135	—	426.60	—	
	Stairs	36	1/Floor	137.77	2/Floor	
	E.V	18	1	40.68	2	Divided for Staff-use and Patients-use
	ES · PS	0	—	20.34	—	
	Lounge Corner	0	—	18.78	—	For Staff including Students
Sub Total		1,136 m <sup>2</sup>		2,077.26 m <sup>2</sup>		
Clinic	Family Medicine	24	1	60.37	5-booths	According to the Number of Out-Patients
	Internal Medicine	90	6-booths	60.38	5-booths	"
	Pediatrics	24	1	39.19	2-booths	"
	Gynecology	36	4-booths	53.86	3-booths	"
	Surgery	51	3-booths	78.38	4-booths	"
	Orthopedics	51	3-booths	39.19	2-booths	"
	Ophthalmology	66	1	48.97	2-booths	"
	ENT	18	1	48.97	2-booths	"
	Dermatology	18	1	21.26	1-booth	"
	Psychiatrics	0	—	40.82	3-booths	"
	Dentistry	66	3-units	71.60	4-units	"
	Rehabilitation	246	1	203.58	1	"

Dept.	Room	Requested Plan		Proposed Plan		Notes
		Area	Number	Area	Number	
Clinic	Acupuncture	30	1	27.78	2-booths	According to the Number of Out-patients
	Diabetes	30	1	0	—	Use the Wellness Clinic
	Treatment	36	1	42.52	2	According to the Number of Out-patients
	Staff Area	15	1	41.43	3	
	Waiting Area	0	—	164.40	3	
	Wellness Clinic	0	—	40.82	2-booths	Requested by VSMMC
Sub Total		801 mf		1,103.08 mf		
Inspection	Bronchoscopy	30	1	21.26	1	
	Endoscopy	36	1	27.12	2	
	ECG	24	1	18.08	2-beds	
	Ultrasound	27	1	13.56	1	
	EEG-Neurology	74	1	21.26	1	
	X-ray	78	1	0	—	Renovate the existing facilities
	Laboratory	72	1	0	—	Use the existing facilities
	Staff Area	0	—	13.81	1	
	Recovery	0	—	14.74	1	
	C.R	0	—	4.00	1	
	Medical Equipment	0	—	14.74	1	
	Sub Waiting Area	0	—	28.52	2	
	Waiting Area	0	—	54.80	1	

Dept.	Room	Requested Plan		Proposed Plan		Notes
		Area	Number	Area	Number	
Op.	Minor Op.	48	3	57.59	3	
	Corridor	0	—	43.82	—	
	Recovery	0	—	21.30	1	
	Change Rm	0	—	18.15	1	
	Nurse Station	0	—	13.89	1	
	Sterilizing Rm	0	—	39.19	1	
	Medical Equipment	0	—	19.56	1	
Sub Total		339 m <sup>2</sup>		445.39 m <sup>2</sup>		
Adm.	Reception	18	1	19.44	1	
	Office	21	1	22.04	1	
	Chief Rm	0	—	51.51	1	Include an office of Family Medicine
	Social Worker	0	—	9.00	1	
	Dissemination Corner	0	—	18.78	1	
	Medical Record	24	1	34.30	1	
	Doctor's Rm	51	1	0	—	Use the existing facilities
	Nurse's Rm	51	1	18.78	1	
	Conference	102	1	75.12	1	
Sub Total		267 m <sup>2</sup>		248.97 m <sup>2</sup>		
Service	Storage etc.	18	—	45.19	—	
	Machine Rm.	0	—	225.69	—	
Sub Total		18	—	270.88	—	
Grand Total		2,561 m <sup>2</sup>		4,145.58 m <sup>2</sup>		



## **43 Basic Plan**

### **4-3-1 Site and Layout Plan**

#### **(1) Basic Policy on the Site Plan and Adequacy of the Construction Site**

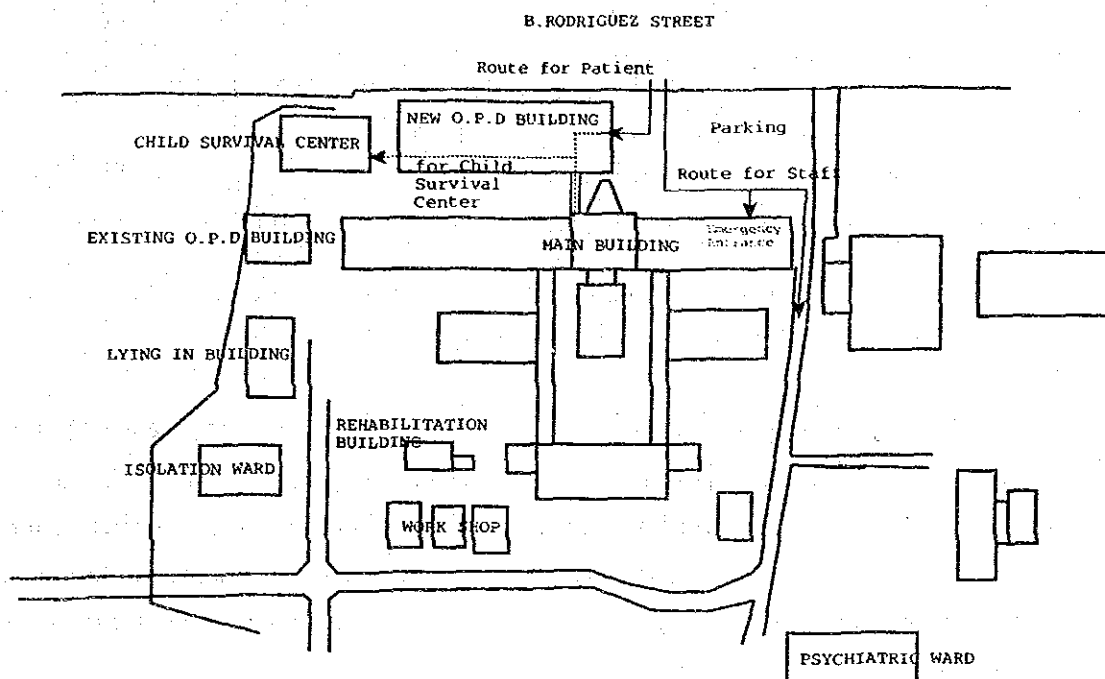
- a. The Project construction site is located on the premises of VSMMC between the main building and Rodriguez Street. The New OPD Building must be located where it can be found easily because it accepts out-patients. In addition, due consideration should be given to its functional connection with the central diagnosis and treatment section, the emergency section and the pharmacy, and its positional relationship to them. In consideration of the above factors, the New OPD Building should be located in front of the existing facilities and connected with the entrance hall on the 1st floor and the center hall on the 2nd floor, which are the functional contact points of the existing facilities.
- b. The construction site is long on the east-west axis and short on the north-south axis. Since the entrance of the current main building was designed with importance attached to the facade, the Philippine party requested that it not be completely hidden by the New OPD Building. This request should be taken into account in the site plan. In determining the dimensions, height, materials and design of the New OPD Building, all effort should be made to utilize the front facade of the existing main building and to attain high functionality at the same time. The east end of the New OPD Building should be near the front entrance of the main building and the west end should be about 10m from the Child Survival Center. This distance was determined because the Child Survival Center has some out-patient functions so it needs a link to the New OPD Building, but medical services at the Child Survival Center should not be hindered by construction work.
- c. Although the construction site is rather small, it has good ground conditions and is situated at the highest point on the VSMMC grounds. Therefore this site will be adopted as the construction site of the Project.

#### **(2) Basic Policy for the Layout Plan**

- a. The approach to the existing emergency section located at the east wing of the existing main building should not be blocked during construction or after completion.
- b. The relationship with the X-ray section and the pathology section, which have strong functional links with the New OPD Building, should be taken into account.
- c. Advantage should be taken of different levels on the site.

- d. The axis should run west-east because of the natural conditions, especially the direction of monsoons.
- e. The layout should not hinder the functional rearrangement of the hospital in future.
- f. A trunk power line, sanitary pipes etc. will be installed independently of the existing facilities.

Figure/Table 4-6 Flow Plan on VSMC's Premises



#### 4-3-2 Architectural Plan

##### (1) New OPD Building

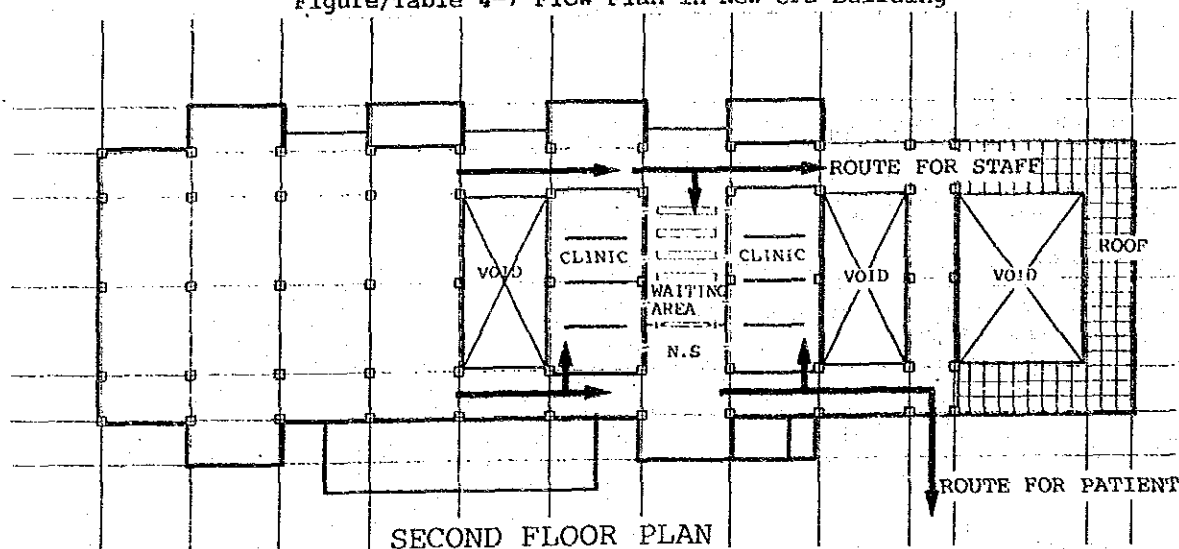
###### 1) Flow planning

One of the serious problems at VSMC is the mixture of flows. People accompanying patients (families) may be found throughout the hospital. Families enter the pathology and X-ray rooms and even the wards to help patients. Since their flow overlaps with the flow of employees and goods, the flows are mixed. It is often not clear who are out-patients and who are employees.

The existing OPD Building is so small that staff members are hindered by patients in the corridors. A new flow plan was developed for this Project. The flow of employees

and goods should be completely separate from the flow of patients and their families. The consultation area should be located between these two flows.

Figure/Table 4-7 Flow Plan in New OPD Building



Ventilation is an important factor in the plan. Therefore a courtyard will be constructed between the patient corridor and the employee corridor. Since the corridors of the New OPD Building match the direction of monsoons, natural winds can be brought in. According to the local meteorological data southwest winds prevail for 4 months, from June through September, and northeast winds prevail during the rest of the year.

The longer side of the building faces Rodriguez Street. It is near an intersection and the volume of traffic is large. Therefore the employee corridor should face Rodriguez Street to minimize the effect of noise and vibrations on the consultation and examination rooms.

## 2) Functional plan

The New OPD Building is to have one semi-basement and 3 stories above ground. Out-patients will go toward the entrance hall of the existing main building, which has an impressive facade, but the entrance and the waiting hall of the New OPD Building will be located in front of it. The 1st floor will have a waiting hall, a reception office, an accounting office, the OPD chief's room, the department of family medicine, the department of medicine, the department of pediatrics, the department of orthopedics, the department of surgery, the department of dermatology, hematoncology room and wellness clinic. The 2nd floor will have the pathology rooms (ECG, EEG, endoscope

etc.), the department of ophthalmology, the department of ENT, the department of dentistry and the department of gynecology. The 3rd floor will have the department of psychiatry, minor operating rooms, a medical records storage room, a rehabilitation room, a dressing room for nurses and a conference room. The semi-basement will have a machine room.

### 3) Floor plan

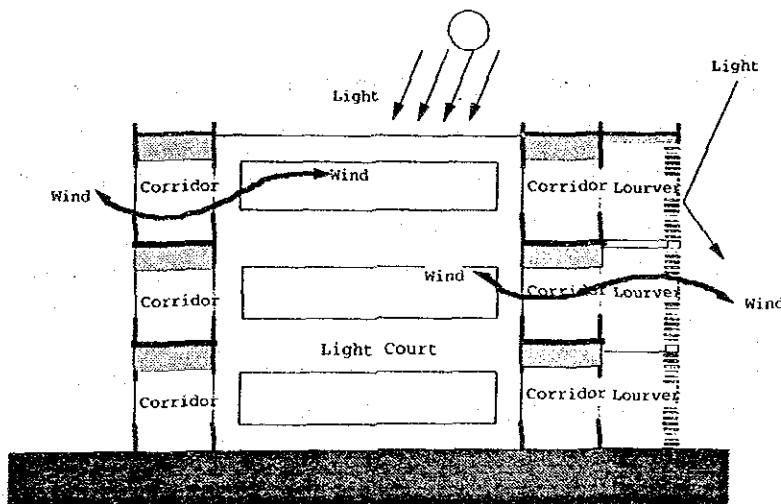
The floors of the New OPD Building will be connected by stairs, elevators and ramps. They will be located on the outside of the two corridors. Thus the core (stairs, elevator, toilets etc.) will be located outside the corridors.

### 4) Sectional plan

**Roof:** Insulating materials will be laid on the roof slabs to attain an insulating effect. The thermal load of the whole building will be decreased by shielding light from windows using louvers for windows.

**Light garden:** The building will have two light gardens at the center. Diagnosis and treatment rooms and corridors will face onto light gardens for ventilation.

Figure/Table 4-8 Section Plan



**Floor:** Stones which can be obtained locally will be used for concrete slabs.

**Interior:** The inner walls will be built by the dry method.

## (2) Renovation Plan

### 1) Emergency Section

One minor operating room will be constructed by renovating the current family medicine room (15m<sup>2</sup>). The floor and walls will be repaired and renovated completely.

### 2) X-ray Section

To avoid problems arising from examination activities during construction work, the existing hist-pathology room and the pharmacy room should be renovated into a new X-ray section comprising 2 X-ray rooms. As a result the existing X-ray room No. 2, which is operating at present, can be used throughout the renovation period and extra space can be secured for future extensions. Before implementation of the renovation work, the existing hist-pathology room and the pharmacy room must be relocated and the other related rooms must be relocated as well. VSMMC is to bear the cost of this relocation work. To obtain space for their final location, the social worker room and the family planning room, which are located in the main building at present but are suitable for the OPD Building, will be relocated to the New OPD Building and the Existing OPD Building respectively. The procedure for X-ray section renovation work is described below and shown in Figure/Table 4-9.

Before construction work:

1. Relocate the neurosurgery wards (basement) to the medicare wards which are unoccupied at present.
2. Relocate the histopathology room and the pathologist office to the neurosurgery wards which have been vacated.
3. Relocate the chief of clinic's room to the pathology office which has been vacated.
4. Relocate the nursing library (used mainly for nurses' meetings) temporarily to the nursing skills laboratory.
5. Relocate the social worker's office temporarily to the orthopedic conference.
6. Relocate the pharmacy to the nursing library and the social worker's office, which have been vacated.

**Renovation work:**

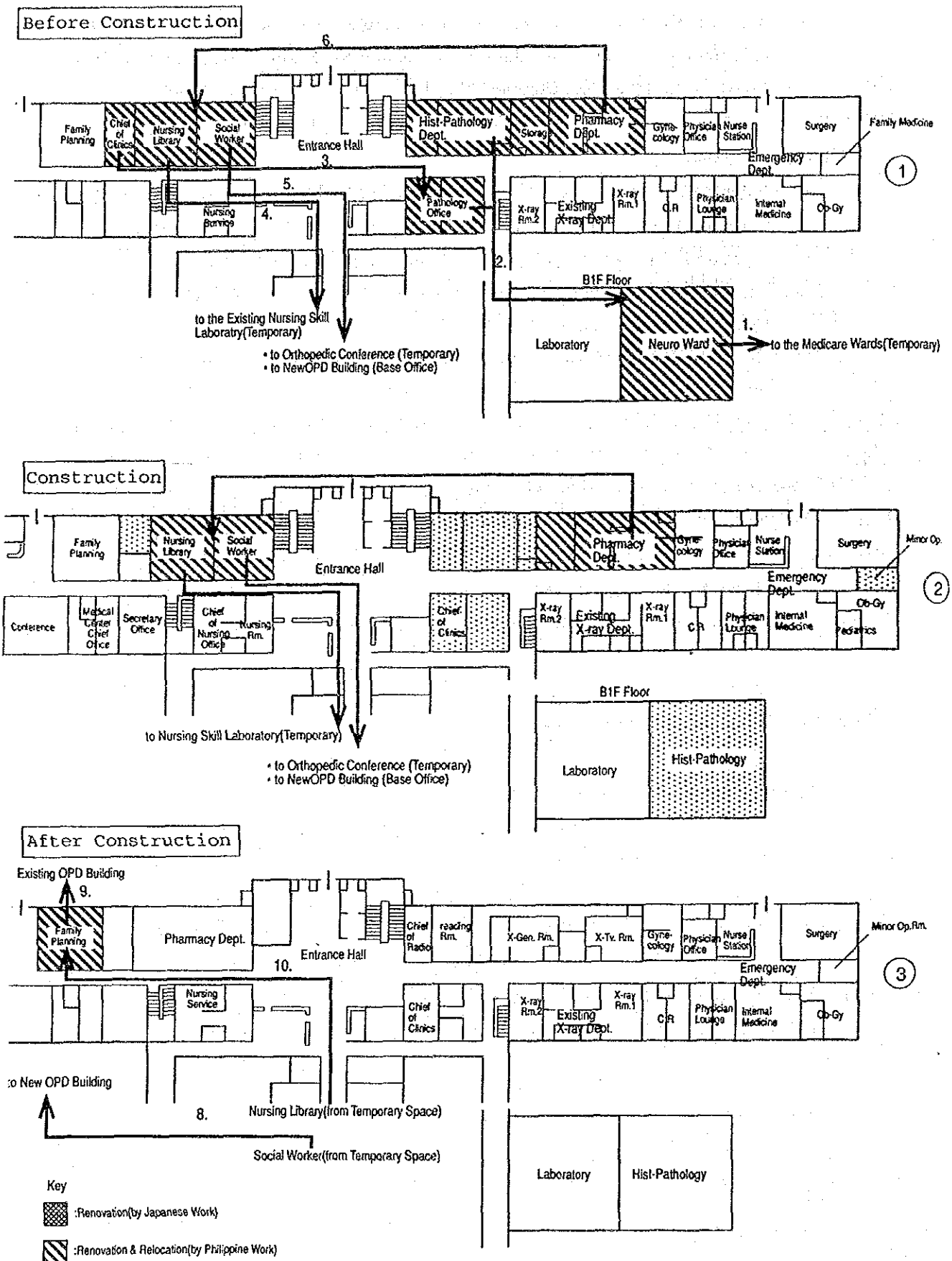
7. Renovate the space of the vacated histopathology room and pharmacy section to X-ray rooms. (Carry out the renovation work in parallel with the new OPD Building construction work.)

**After construction**

8. Relocate the base office 1 of the social worker's office, which was temporarily relocated, to the new OPD and distribute the other sections to the wards.
9. Relocate the family planning room to the 1st floor of the existing OPD.
10. Relocate the nursing library, which was temporarily relocated, to the vacated family planning room.
11. Use the 2nd floor of the existing OPD as part of the pediatrics ward.

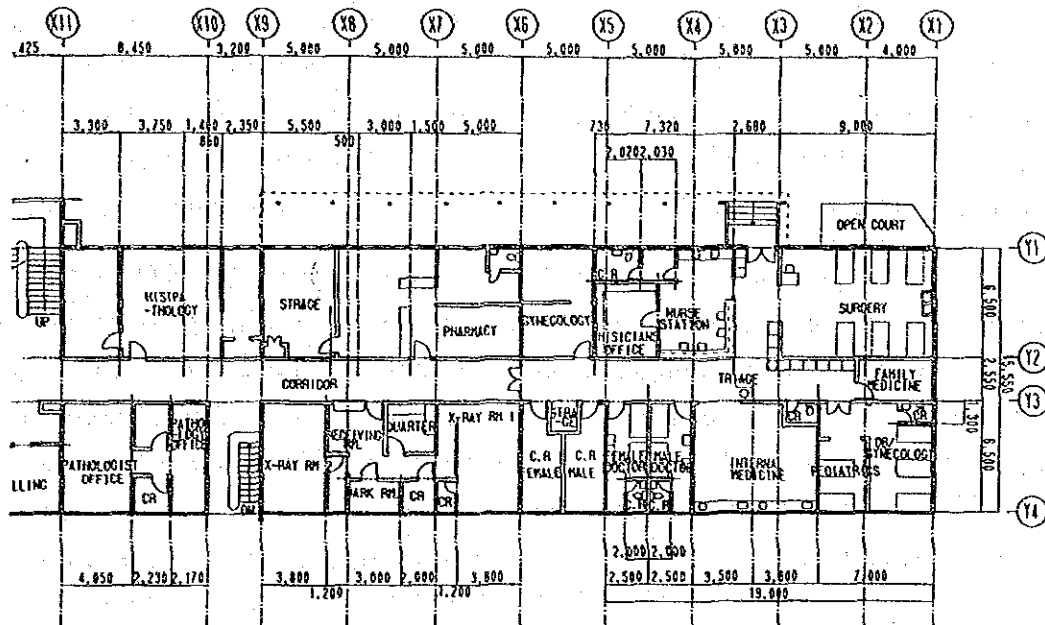
The Philippine Government is to bear the cost of all the above work except Renovation Work 7.

Figure/Table 4-9 Scope of Renovation Work and Phasing

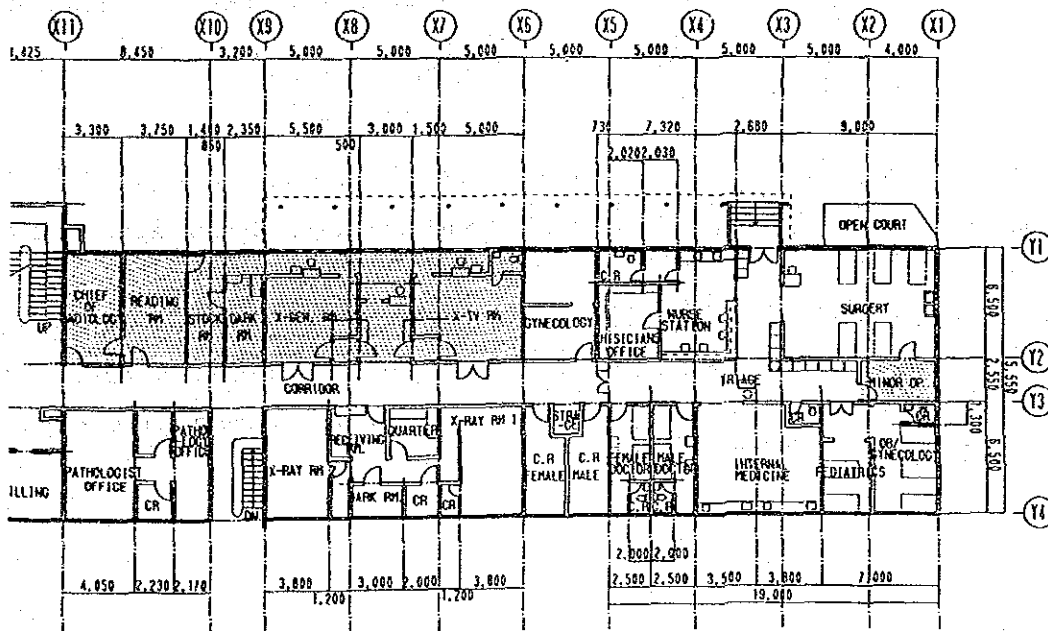


Figure/Table 4-10 and Figure/Table 4-11 show the current plan and the renovation plan for the emergency section and the X-ray section respectively.

Figure/Table 4-10 Existing Floor Plan X-ray and Emergency Deptt.



Figure/Table 4-11 Renovation Floor Plan for X-ray and Emergency Deptt.





### 3) Renovation to connect the New OPD Building and the main building

The New OPD Building will be connected to the existing main building at the entrance hall by a connecting corridor on the 1st floor and at the stairs room on the west side of the entrance hall on the 2nd floor. The stairs must be removed and remodeled. Japan is to cover the cost of this work.

#### 4-3-3 Structural Plan

##### (1) Soil Condition of Construction Site

Test borings have been conducted at a total of three locations on the proposed OPD site.

The findings are that the soil within the first 1.5m of the surface is generally semi-plastic clay, followed more than 20m of clayey limestone containing slight amounts of organic elements. The N value of clayey limestone is more than 10 and the stratum is good for the foundations of the proposed OPD building.(See Appendix)

Ground surface G.L.± 0

	Clay with an N value of approx. 7
G.L.- 1.5m	
	Clayey limestone with an N value of approx. 10
G.L. - 7.5m	
	Clayey gravel with an N value of approx. 22
G.L. - 10.5m	
	Clayey limestone with an N value of approx. 25
G.L. - 13.5m	
	Clayey limestone with an N value of approx. 16
G.L. - 19.5m	

Through well drillings in the vicinity the water table has been found to be about 35m below the ground surface; the foundation soil is non-liquefiable even during a very strong earthquake.

Based on the results of soil investigation, the long-term unit bearing capacity of the ground stratum is estimated at 20t/m<sup>2</sup>. For the proposed 3-story (with 1 basement) OPD building, the recommended depth of footing excavations is at least 1.5m in order to ensure that the footings rest uniformly on the soil.

## (2) Main Structure

This building, for use by the out-patient department of the hospital and mainly separate consultation rooms, needs to be of a slab structure solid enough to resist vibration.

A reinforced concrete construction is recommended to maintain atmospheric harmony of elevation design with the existing buildings and because it is the most popular form of construction in the Philippines.

From the viewpoint of building construction costs a 6m x 6m grid ductile moment-resisting space frame is recommended along with an exterior wall of block with stone and/or sprayed finishes and partially of RC shear wall.

## (3) Standards and Regulations

Structural design will proceed according to the following standards and regulations:

- National Building Code of the Philippines
- National Structural Code of the Philippines
- ACI Building Code Requirements for Reinforced Concrete
- AISC Specifications for the Design
- ASTM Standards
- Japan Industrial Standards

## (4) Construction Materials

Materials to be used will be as follows:

- Concrete : 28-day compressive strength  $FC' = 3,000 \text{ PSI } (211\text{kg/cm}^2)$   
Slump 12cm - 18cm
- Deformed bar : Yield strength  $FY = 49,000 \text{ PSI } (3,500\text{kg/cm}^2)$   
 $FY = 42,000 \text{ PSI } (3,000\text{kg/cm}^2)$   
JIS G 3112 Standardized product
- Steel : Yield strength  $FY = 34,000 \text{ PSI } (2,400\text{kg/cm}^2)$   
JIS G 3102 (SS400) Standardized product  
JIS G 3112 (SSC400) Standardized product  
JIS G (STK400) Standardized product

(5) Structural Design Load

1) Load will be as follows:

• Consultation room	2,390 Pa (245kg/m <sup>2</sup> )
• Hall	2,400 Pa (245kg/m <sup>2</sup> )
• Library	5,980 Pa (610kg/m <sup>2</sup> )
• Roof	0m <sup>2</sup> ~ 20m <sup>2</sup> 960 Pa (100kg/m <sup>2</sup> )
	21m <sup>2</sup> ~ 60m <sup>2</sup> 770 Pa (80kg/m <sup>2</sup> )
	over 61m <sup>2</sup> 580 Pa (60kg/m <sup>2</sup> )

2) Wind load will be as follows:

Cebu city (Zone II; See Appendix)

Wind Load  $Q = CPA$

C: Wind Pressure Coefficient (See Appendix)

P: Wind Pressure

A: Wind Pressure Area

Wind velocity  $V = 175 \text{ km/Hr}$

Wind pressure over 30m above ground :  $P = 2,400 \text{ Pa (245kg/m}^2\text{)}$

9 - 30m above ground :  $P = 1,920 \text{ Pa (200kg/m}^2\text{)}$

under 9m above ground :  $P = 1,440 \text{ Pa (150kg/m}^2\text{)}$

3) The seismic load will be as follows:

Cebu City

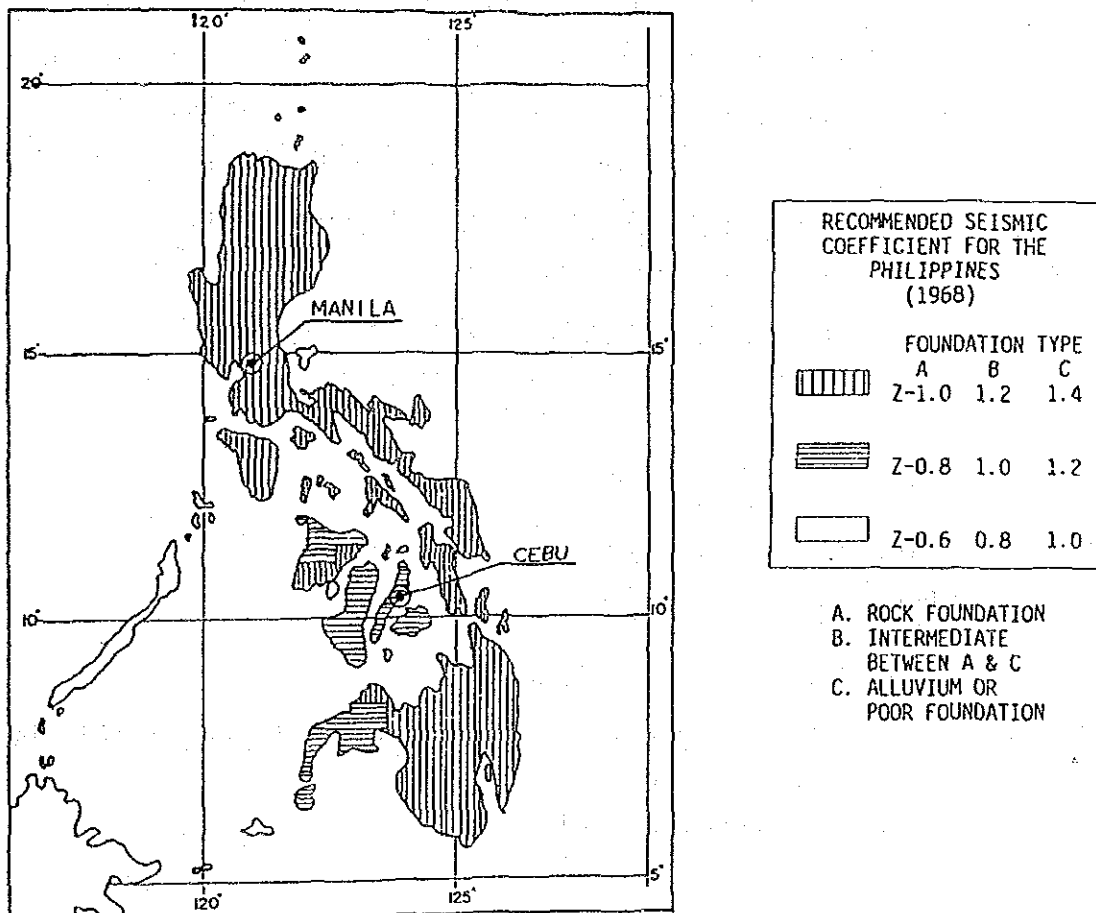
Seismic force

$V = ZIKCSW$

a. Numerical coefficient dependent upon the zone

$Z = 1.2$

Figure/Table 4-12 Zoning Map for Seismic Coefficient



b. Importance coefficient

$$I = 1.25$$

Figure/Table 4-13 Importance Coefficient

TYPE OF OCCUPANCY	I
Essential facilities	1.5
Any building where the primary occupancy is for assembly use for more than 300 persons (in one room)	1.25
All others	1.0

c. Structural type coefficient

$$K = 0.8$$

Figure/Table 4-14 Structural Type Coefficient

TYPE OF ARRANGEMENT OF RESISTING ELEMENTS	VALUE OF K
1. All building framing systems except as hereinafter classified	1.00
2. Building with a box system as specified in Section 2312 (b)	1.33
3. Buildings with a dual bracing system consisting of a ductile moment-resisting space frame and shear walls or biased frame	0.80
4. Buildings with a ductile moment-resisting space frame	0.57
5. Elevated tanks plus full contents, on four or more cross-braced legs and not supported by a building	2.5
6. Structures other than buildings and other than those set forth in Table No. 23-J	2.0

d. Numerical coefficient  $C = \frac{1}{15\sqrt{T}} < 0.12$

T : Fundamental elastic period of building vibration

$$T = \frac{0.05H}{\sqrt{D}} \text{ or } 0.10N$$

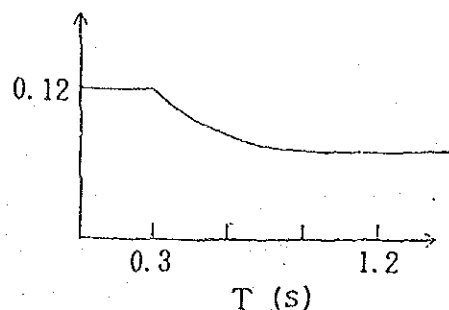
(ductile moment-resisting space frames)

D : The dimension of the structure, in feet, in a direction parallel to the applied forces. (tf)

H : Height in feet above the base (ft)

N : The total number of stories above the base

Figure/Table 4-15 Numerical Coefficient Curve



e. Numerical coefficient for site-structure resonance

$$S = 1.0 + \frac{T}{T_s} - 0.5 \left( \frac{T}{T_s} \right)^2 \quad \frac{T}{T_s} < 1.0$$

$$= 1.2 + 0.6 \frac{T}{T_s} - 0.3 \left( \frac{T}{T_s} \right)^2 \quad \frac{T}{T_s} > 1.0$$

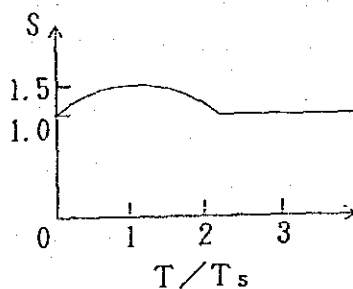
T shall be not less than 0.3 seconds.

$$0.5 < T_s < 2.5$$

$T_s$  = Characteristic site period (S)

When  $T_s$  is not properly established, the value of S is 1.5.

Figure/Table 4-16 Numerical Coefficient for Site-structure Resonance Curve



f. Total dead load:  $W = DL + LL/4$

#### **4-3-4 Building Facility Plan**

##### **(1) Electrical System**

###### **1) Power supply system**

Power (13.8KV) will be routed to the substation in VSMMC from the power company (VECO). Necessary equipment such as transformers and a distribution panel will be installed at the substation. Then power will be supplied to the loads. The 3-phase 3-wire 220V supply method, which is used for the existing facilities, will be adopted.

###### **2) Generator system**

A diesel generator set will be installed for the Project facilities for providing backup during a power failure.

###### **3) Lighting and power receptacles system**

Most of the lamps will be fluorescent lamps. Their arrangement will account for outdoor light during daytime. The standard level of illumination will comply with the Philippine standards. Consultation room: 300 lx. All the power receptacles will be 220V and have an earth electrode.

###### **4) Telephone system**

A telephone switchboard (PABX) will be installed in this building and connected with the existing PABX. The Philippines is to bear the cost of the cable work up to the MDF in this building and remodeling the existing PABX in order to connect the two.

###### **5) Public address system**

A public address system for providing general and emergency information to the entire building will be installed. Individual public address equipment to be used for calling patients will be considered for the reception office etc.

###### **6) Fire alarm system**

An automatic fire alarm system will be installed to enable prompt discovery of fire and to prevent it from spreading.

## (2) Water Supply and Drainage System

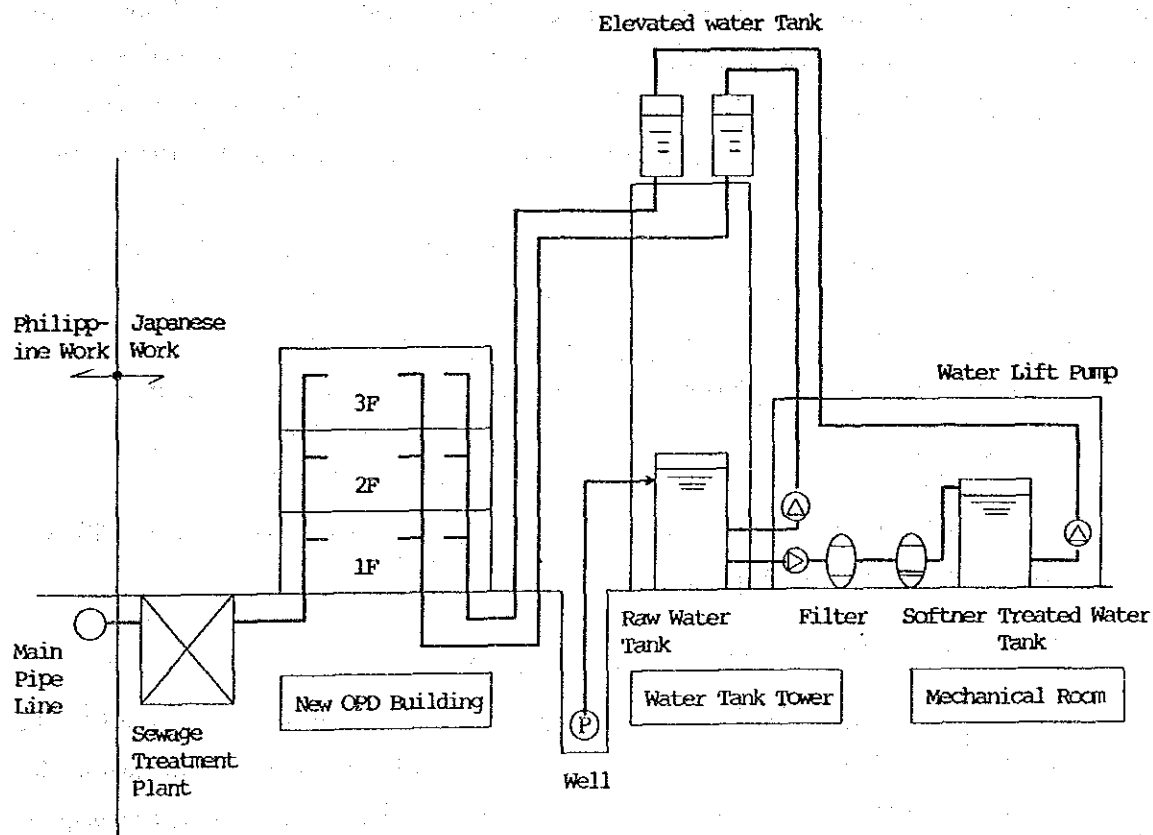
### 1) Water supply system

Water will be supplied from a newly constructed well. It should be possible to obtain backup from existing water supply pipes. Since the water of the existing well is quite hard, filtering equipment and water softening equipment are necessary in order to make the water drinkable. To reduce the maintenance cost, non-drinking service water will be supplied directly without use of the water softener system.

Well water will be routed to a water tank and supplied to various places after being sterilized with chlorine. This tank will have a 2-tank structure on the ground for sanitary reasons.

Special water (sterilized water, distilled water etc.) for medical equipment will be supplied locally by installing the necessary equipment.

Figure/Table 4-17 Diagram for Plumbing System





2) Drainage system

Soiled water and general waste water will be treated with sewage treatment equipment and channeled to the existing discharge pipe. Rain water will be channeled to the existing catch basin.

3) Sanitary fixtures

Sanitary fixtures will be selected to meet local conditions. Since sanitary fixtures are easily broken, the type locally available will be adopted.

4) Sewage treatment system

In selecting a sewage treatment plant, ease of operation, maintenance and management as well as its operating cost must be considered. The standards of effluent water quality issued by the Environmental Management Bureau is BOD 150ppm, SS 200ppm.

A simple system which runs on a combination of the setting/septic tank (precipitation-separation) method and the decomposing treatment with micro-organism is proposed for this Project. It will be constructed in the low area at the southwest end of the site located on the south side of the existing infectious disease ward.

5) Gas system

Propane gas will be supplied to the boiler for the autoclave.

A centralized system will be adopted for reasons of safety and ease of supply.

6) Fire fighting system

Indoor fire hydrants and fire extinguishers will be installed in compliance with the laws and standards of the Philippines.

7) Water and garbage disposals

Under the Project, the Radio-therapy (cobalt) equipment will not be installed in the New OPD Building. Therefore, it is not necessary to install a treatment system for radioactive. A treatment system for heavy metals and solutions contained in organic solvents is also unnecessary as there will be no laboratory experiments or research activities in the New OPD Building.

### (3) Air-conditioning and Ventilation System

Cebu city has a tropical climate but the hospital has limited funds for maintenance and management. Therefore air-conditioning and ventilation will be planned in accordance with the following basic policy:

- a. The plan must account for natural conditions, such as solar radiation, temperature and wind direction.
- b. The necessary level of cleanliness for a medical institution must be attained.
- c. Running costs must be minimized.
- d. It should be possible to take adequate action in the event of equipment breakdown.
- e. Operation, maintenance and management must be relatively simple.

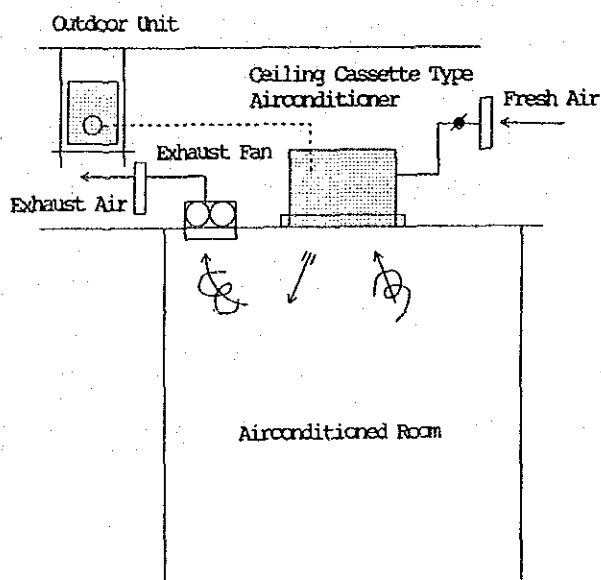
#### 1) Air-conditioning system

In principle, natural ventilation will be adopted. Air-conditioning will be limited to the rooms that functionally require air-conditioning. Individual air-cooled and separate-unit-type air-conditioners will be used because they can be operated locally and maintenance, management and trouble-shooting are relatively easy. Indoor units will be installed on the ceiling or wall. Outdoor units will be installed on the veranda or rooftop.

The following rooms will be air-conditioned:

- |    |  |
|----|--|
| 1F | Treatment room, office for family medicine, OPD chief's room, chief nurse's room |
| 2F | Endoscopy room, examination rooms, ECG room, EEG room                            |
| 3F | Minor operating rooms, conference room   |

Figure/Table 4-18 Diagram for Air-conditioning Basic Idea



## 2) Ventilation system

The rooms that are not air-conditioned will be ventilated by natural or mechanical means. Since northeast and southwest winds are prevalent in Cebu city, these winds will be fully utilized. Void spaces will be designed at the center of the building in order to raise ventilation capacity. Greater ventilation efficiency is expected on windy days because air will be channeled out from these void spaces. A ceiling fan will be installed on the ceiling of the waiting room etc. in order to circulate air to cool the interior.

### 4-3-5 Construction Material Plan

#### (1) Comparative Study with the OPD Building at Philippine General Hospital (PGH)

The study team studied the current state of various finishing materials used for the OPD Building of PGH, which was completed in 1989. The results are reported below.

The OPD Building of PGH was constructed by a Japanese construction company and Philippine subcontractors. Damage attributable to seasonal changes is more serious than anticipated. For example, the multi-layer coating material of the external walls is peeling, the finishing mortar of the walls and the terrazzo of the floors are cracked, and water leaks from part of the roof.

The peeling of the multi-layer coating material is caused by insufficient adhesion between it and the plaster base. The construction company concerned explains that buildings constructed in that period have similar troubles because the quality of the base mortar was low. It seems attributable partly to the local method of spreading mortar powder on the surface of the plaster finish in order to improve appearance. This phenomenon can be prevented by drying the base sufficiently before applying the final finish. A building finished with a similar multi-layer coating material is located near the OPD Building of PGH, and it maintains its spectacular appearance to a remarkable degree.

Cracks in the wall finishing mortar and floor terrazzo seem attributable mainly to shrinkage. Cracking is unavoidable due to dry shrinkage which occurs when a large area is finished within short time.

The most serious type of damage to construction members caused by seasonal changes is the effect of insulation on roofing materials. It is desirable to design the largest possible roof with a simple structure for a building with a complicated plan such as a hospital. In consideration of the above factors, the construction materials are planned as follows for the Project.

## (2) Structural Members

A reinforced concrete structure will be employed for the core areas, such as the main structural body, the elevator shafts on the outside of the two corridors, stairs, ramps and lavatories.

The floors will be made of concrete slabs. The use of F decks etc., which require no timbering, will be used for floor construction molds.

## (3) Finishing Materials

The inner walls facing the ceiling or corridor will be made of a light steel frame base and covered with plaster boards and flexible boards.

The roof will be constructed by placing a metallic roof on roof slabs. An air layer will be formed between them to increase insulating capacity.

Since the entrance hall is in the front part of the building, it will be constructed of aluminum sashes and glass.

## (4) Building Utility Equipment

Compared with the building itself, equipment for the various facilities has a shorter service life and more frequent problems. Therefore durability is important. Energy saving equipment which is easy to operate will be selected to lower maintenance and management costs.

Since some utility equipment tends to deteriorate or corrode quickly, materials of high durability will be used.

### 1) Equipment

- a. Most of the equipment used for power, water supply/sewage and air-conditioning facilities will be procured from Japan. Diffusers of general specifications can be procured locally.
- b. Products susceptible to breakage, such as sanitary wares, will be procured locally whenever possible.

### 2) Materials

- a. Lines, ducts and piping materials of general specifications can be procured locally. However, heat resistant wires, vinyl chloride lined steel pipes etc. will have to be imported from Japan.

- b. Most coating materials can be procured locally. Insulating materials etc. will have to be imported from Japan.

#### **4-3-6 Medical Equipment Plan**

##### **(1) Policy on the Equipment Plan**

Medical equipment will be selected with the following considerations:

- a. The role and operational efficiency of each department should be considered and the highest priority given to the basic equipment necessary for medical services.
- b. Equipment should be selected which can be repaired locally and has a long service life disregarding the service life of medical equipment in Japan.
- c. Local availability of consumables and spare parts and the maintenance system should be studied. Equipment should be selected which can maintain its functionality and performance.
- d. Operating costs should be as low as possible.
- e. The supply voltages are single phase 220V and three phase 220V. Equipment should be selected which has a built-in power unit of the above specifications to prevent malfunctioning.
- f. Since water contains a large amount of organic compounds, appropriate measures should be taken when selecting equipment using water.
- g. Equipment which does not require technical training should be selected whenever possible.
- h. English operating and repair manuals should be available.

##### **(2) Consumable Supplies and Spare Parts**

Some of the medical equipment will require a large amount of consumable supplies. Given current conditions, the Project should include enough consumable supplies and spare parts for 1 to 2 years.

(3) Training in Equipment Operation

The necessary training in operating the equipment will be given such that it can adequately fulfill its potential when installed.

(4) Equipment Plan for Each Department

1) Department of Radiology (Existing room)

The X-ray units and the mobile X-ray unit to replace those which have exceeded their service life, will be installed.

2) Department of Pathology (Existing room)

Basic equipment will be installed to replace, those items which at present are insufficient or must be renovated due to age.

3) Emergency Section (Existing room)

The minimum basic equipment necessary for first aid treatment will be installed. Equipment needed for general anesthesia will be excluded. That necessary for treating emergency out-patients will be installed.

4) New OPD Building

- Department of Surgery

The basic necessary equipment will be installed.

- Department of Neurosurgery

Basic equipment will be installed. A CT scanner and cassette changer will be excluded.

- Minor Operating Room

Basic equipment for minor general surgery operations, neurosurgery, ophthalmology and ENT will be installed.

- Department of Orthopedics

Basic equipment will be installed.

- Department of Medicine

Basic equipment will be installed. Ultrasound, ECG and EEG machines, which will be installed in other departments, will be excluded.

(Neurology)

Basic equipment will be installed.

- Wellness Clinic Room

Basic equipment will be installed.

- Department of Pediatrics

Basic equipment, excluding that to be installed in other departments, will be installed.

- Department of Family Medicine

Basic equipment will be installed.

(Department of Dermatology)

Basic equipment, excluding that to be installed in other departments, will be installed.

- Department of ENT

Basic equipment will be installed. An ENT endoscope will be excluded.

- Department of Ophthalmology

Basic equipment will be installed. Items requiring technical training or which are hard to repair locally (Yag laser, argon laser, A scan, B scan etc.) will be excluded.

- Department of Dentistry

Basic dental equipment will be installed.

- Department of Rehabilitation

Basic training equipment which is easy to maintain and handle and for which there is considerable need will be installed.

- Department of Psychiatry

Electro-convulsive therapy equipment will be installed.

- Department of Gynecology

The highest priority is given to basic equipment. A colposcope and a cryosurgery system will be excluded.

- Ultrasound Room

An ultrasound scanner with both sector and linear modes will be installed.

- ECG Room

A 1-channel ECG machine and a 3-channel ECG machine will be installed.

- EEG Room

An 18-channel EEG machine will be installed.

- Endoscope Room

Frequently used endoscope equipment will be installed.

- Bronchoscopy Room

Basic equipment will be installed.

(5) Medical Equipment List

The medical equipment planned is listed below:

• For New OPD Building	Qty		Qty
1) <u>DEPARTMENT OF SURGERY</u>			
1. Film illuminator	1	8. Anesthesia apparatus	1
2. Autoclave for treatment	1	9. Ventilator	1
3. Treatment instrument set	1	10. Anesthesia instrument set	1
4. Minor surgical instrument set	1	11. Recovery bed	1
5. Overhead operating room light	1	12. Pulse oxymeter	2
6. Suction unit with stand	1	13. Pneumatic tournique	1
7. Laryngotracheoscope	1	14. Vascular Surgical instrument set	1
8. Electrocautery unit	1	15. Libache knife	1
9. Examining light	1	16. Finochetto rib retractor	1
10. Examining instrument set	1	17. Tracheostomy set	1
11. Weighing scale	1	18. Resectoscope	1
12. Boiling sterilizer	2	19. Laparoscope	1
13. Oxygen inhalator treatment	1	20. Skin graft knife	1
14. Examining table	2	21. Skin graft mesher	1
15. Doctor's desk	4	22. General anesthesia machine	1
16. Doctor's chair	4	23. Film Illuminator	1
17. Patient's chair	6	2)-2 (ENT)	
18. Dressing table	4	1. Operation binocular microscope	1
19. Instrument table	2	2. Mastoid set	1
20. Instrument cabinet	2	3. Hartman alligator	1
21. Waste receptacle	2	4. Mastoid drill	1
2) <u>MINOR OPERATING ROOM</u>		5. Middle ear curette	1
2)-1 (GENERAL SURGERY)	3	6. Round knife	1
1. Minor operating table	4	7. Autoclave	1
2. Minor operating light	3	8. Self retaining mastoid retractor	1
3. Electric suction unit	2	9. Nasal forceps	1
4. Cardiac monitor	1	10. Thermal Blankets	1
5. Defibrillator	3	11. Straight hartman forceps	1
6. Laryngoscope	1	12. Instrument cabinet	1
7. Electro cautery unit	1	13. Bone rongeur	1



	Qty		Qty
14. Blood pressure apparatus & stand	1	14. Filing cabinet	1
15. Head light	1	15. Aluminium pail	1
2)-3 (NEUROSURGERY)		16. Cast knife	1
1. Operation binocular microscope	1	17. Manual cast cutter	1
2. Cranial instrument	1	18. Patient's chair	5
3. Neurosurgery treatment set		5) <u>DEPARTMENT OF MEDICINE</u>	
2)-4 (STERILIZING ROOM)		1. Film illuminator	1
1. Sterilizer	1	2. Instrument cabinet	1
2. CO <sub>2</sub> gas sterilizer	1	3. Medical refrigerator	1
3) <u>DEPARTMENT OF NEUROSURGERY</u>		4. Weighing scale	1
1. Diagnostic instruments	1	5. Height scale	1
a. Ophthalmoscope	1	6. Examining instrument set	1
b. Oscope	1	7. Sphygmomanometer with stethoscope	1
c. Tuning fork	1	8. Examining table	3
d. Pin wheel	1	9. Examining light	3
e. Reflex hammer	1	10. Waste receptacle	1
4) <u>DEPARTMENT OF ORTHOPEDICS</u>		11. Doctor's desk	5
1. Athroscopy set	1	12. Patient's chair	5
- Light source		6) <u>WELLNESS CLINIC ROOM</u>	
- Fiberoptics		1. Weighing scale	1
- Probes & instruments		2. Height scale	1
- TV monitor		3. Examining light	1
- Video cassette recorder		4. Examining table	1
2. Examination table	1	5. Filing cabinet	1
3. Doctor's table	1	6. Medicine refrigerator for insulin	1
4. Doctor's chair	1	7. Overhead projector	1
5. Emergency light	1	8. Carousel screen	1
6. Electric cast cutter	1	9. Glucometer	1
7. Cast spreader	1	10. Waste receptacle	1
8. Examining instrument set	1	11. Doctor's desk	1
9. Spica table	1	12. Doctor's chair	1
10. Dressing tray with trolley	1	13. Patient's chair	1
11. Film illuminator	1	14. Nurse table & chair	1
12. Pneumatic tourniquet	1	15. Small table for dutecian & chair	1
13. Instrument cabinet	1		

	Qty		Qty
7) <u>DEPARTMENT OF PEDIATRICS</u>		9. Instrument cabinet	1
1. Examining table	1	10) <u>ULTRASOUND ROOM</u>	
2. Film illuminator	1	1. Ultrasound linear scanner with printer	1
3. Examining light	1	2. Bed for patient	1
4. Weighing scale	1	3. Desk & chair	1
5. Height scale	1	4. Steel cabinet	1
6. Examining instrument set	2	11) <u>ECG ROOM</u>	
7. Doctor's desk	2	1. 1 channel ECG machine	2
8. Doctor's chair	2	2. 3 channel ECG machine	1
9. Patient's chair	1	3. Bed for patient	2
10. Bone marrow set	1	4. Desk & chair	1
11. Incision & drainage set	1	5. Steel cabinet	2
12. Ophthalmoscope	1	12) <u>EEG ROOM</u>	
13. Otoscope	1	1. 18 channel EEG machine	1
14. Instrument cabinet	1	2. Steel cabinet	1
15. Dressing table	1	3. Filing cabinet for trasings	1
16. Pediatric stethoscope	1	4. Desk & chair	1
17. Microscope	1	5. Patient bed	1
18. Waste receptacle	1	13) <u>ENDOSCOPE ROOM</u>	
8) <u>DEPARTMENT OF FAMILY MEDICINE</u>		1. Esophago-gastroscope fiberoptic with complete accessories	1
1. Computer with printer	1	2. Colonoscope fiberoptic with complete accessories	1
2. Sphgmomanometer	5	3. Suction apparatus	1
3. Examining table	3	4. Endoscopic cabinet & accessory cabinet	1
4. Consultation table & chairs	5	5. Instrument table	2
5. Dressing table	3	6. Kick bucket	2
6. Cabinet	2	7. Endoscopic table	2
7. Foot stool	5	8. Light source	2
9) <u>DEPARTMENT OF DERMATOLOGY</u>		9. Film illuminator	1
1. Microscope	1	10. Lecture scope	1
2. Camera	1	11. Soaking tray for endoscope & colonoscope	1
3. Cautery machine	1		
4. Wood lamp	1		
5. Examining table	1		
6. Examining instrument set	1		
7. Doctor's desk & chair	1		
8. Patient's chair	1		

12.	Endoscopic hanger	Qty			
13.	Cautery set	1			
14.	Alligator forceps	1			
15.	Doctor's desk & chair	2			
16.	Patient's chair	2			
17.	Fiberotic cleaning machine	1			
18.	Ultrasonic cleaner	1			
14)	<u>BRONCHOSCOPY ROOM</u>				
1.	Bronchoscope	1			
2.	Bronchoscopic table	1			
3.	Bronchoscopic cabinet	1			
4.	Suction apparatus	1			
5.	Light source	1			
6.	Film illuminator	1			
7.	Bronchoscopic hanger	1			
8.	Instrument table	1			
9.	Patient's chair	1			
10.	Doctor's desk & chair	1			
15)	<u>DEPARTMENT OF ENT</u>				
1.	Suction machine	1			
2.	Mastoid set	1			
3.	Straight hartman forceps	1			
4.	Hartman alligator	1			
5.	Hartman cup	1			
6.	Self retaining mastoid retractor	1			
7.	Riget laryngoscope	1			
8.	Middle ear curette	1			
9.	Round knife, middle ear	1			
10.	Mastoid drill	1			
11.	Nasal forceps	1			
12.	Laryngeal mirror	1			
13.	Ear speculum 1 set	1			
14.	Nasopharyngeal mirror	1			
15.	ENT chair unit	1			
16.	Patient's chair	1			
17.	Doctor's desk & chair	1			
16)	<u>DEPARTMENT OF OPHTHALMOLOGY</u>				
1.	Operating microscope and assistant's scope	1			
2.	Biometer	1			
3.	Autorefractor	1			
4.	Cataract set	1			
5.	Goldman perimeter	1			
6.	MKeratometer	1			
7.	Fundus camera	1			
8.	Ophthalmology unit	1			
9.	Patient's chair	1			
10.	Doctor's desk & chair	1			
17)	<u>DEPARTMENT OF NEUROLOGY</u>				
1.	Examining lamp	1			
2.	Examining instrument set	1			
3.	Film illuminator	1			
4.	Instrument cabinet	1			
5.	Examining table	1			
6.	Waste receptacle	1			
7.	Patient's chair	1			
8.	Doctor's desk & chair				
18)	<u>DEPARTMENT OF DENTAL</u>				
1.	Dental chair unit	3			
2.	Dental X-ray unit intraoral	1			
3.	Autoclave for dental	1			
4.	Instrument cabinet	1			
5.	Examining & treatment instrument set	3			
6.	Amalgamator	1			
7.	Electric boiling sterilizer	3			
8.	Doctor's chair	3			

	Qty		Qty
19) <u>DEPARTMENT OF REHABILITATION</u>		3. Doctor's desk & chair	3
		4. Patient's chair	3
19-1) <u>(THERAPEUTIC-EXERCISE ROOM)</u>		21) <u>DEPARTMENT OF GYNECOLOGY</u>	
1. Bicycle exerciser	1	1. Clinical examination table	4
2. Quadriceps table	1	2. Gynecological examining unit	2
3. Duplex pulleys	1	3. Doppler fetal heart detector	1
4. Rotary wrist machine	1	4. Instrument cabinet	1
5. Facillator	1	5. Examining instrument set	1
6. Lower limbs extension & flexion exercise chair	1	6. Aspirator	1
7. Restrator	1	7. Waste receptacle	2
8. Wall leant board	1	8. Weighing scale	2
9. Training mat	1	9. Patient chair	4
10. Dumbell set with rack	1	10. Doctor's desk & chair	4
11. Mat platform	1	11. Vacuum extractor	1
12. Exercise stairs	1	12. Spot light	2
13. Parallel bars	1	13. Electric boiling sterilizer	1
14. Overhead frame	1		
15. Overhead training bed	1	22) <u>NURSING SERVICE DIVISION</u>	
16. Posture training mirror	1	1. Oxygen therapy set	5
17. Wall tall bars	1	2. Inhalation therapy set	5
18. Chinning bar	1	3. Suction Apparatus	5
19. Hydraulic couch	1	4. Resuscitater set	5
		5. Cardiac monitor	3
19-2) <u>(ELECTROMEDICAL &amp; THERMO-THERAPY ROOM)</u>		6. Autoclaves	1
1. Traction	1	7. Stretcher	3
2. Low frequency therapy apparatus	1	8. Wheel chair	3
3. Ultrasound diathermy equipment	1		
20) <u>DEPARTMENT OF PSYCHIATRY</u>		23) <u>PATIENT EDUCATION/COUNSELING ROOM</u>	
1. Electro convulsive therapy (ECT) machine	1	1. White board	1
2. Electric boiling sterilizer	1	2. Black board	1
		3. Flip chart stand	1

	Qty		Qty
24) <u>TRAINING AND RESEARCH CENTER</u>		13. Refrigerator centrifuge	1
1. Overhead projector	1	14. Blood gas analyzer	1
2. Carousel projector	1	15. Flame photometer	1
3. VHS player	1	3) <u>EMERGENCY FOOM (Existing room)</u>	
4. TV monitor	1	1. Defibrillator	1
5. Sound system with microphones	1	2. ECG machine	1
6. Camera with Macro-lens	1	3. Wall mounted BP apparatus	4
25) <u>HOSPITAL SUPPORT DIVISION</u>		4. Cast cutter	1
1. Unit for mimeographing/duplicating	1	5. Hand surgery set	1
26) <u>SPARE PARTS STOCK ROOM</u>		6. Autoclave (desk type)	1
1. Rack for spare parts	1	7. Cardiac Monitor	1
• For Existing Rooms		8. Nebulizer	2
1) <u>DEPARTMENT OF RADIOLOGY (Renovation)</u>		9. O <sub>2</sub> meter apparatus	4
1. General X-ray unit	1	10. Suction unit	4
2. Multi purpose X-ray TV set	1	11. Tracheostomy set	1
3. Mobile X-ray unit	1	12. Laryngoscope	2
4. Cassette pass box	2	13. Burr-holding instruments	1
5. Film illuminator	2	14. Minor operating table	1
2) <u>DEPARTMENT OF PATHOLOGY (Existing room)</u>		15. Minor operation light	1
1. Autoclave vertical type	1	16. Instrument cabinet	2
2. Water still	1	4) <u>RADIO THERAPY ROOM (Existing room)</u>	
3. Incubator	1	1. Pocket dosimeter	2
4. Centrifuge	1		
5. Automatic dispenser	1		
6. Laboratory instrument set	1		
7. Spectrophotometer	1		
8. Microhematocrit centrifuge	2		
9. Pipette shaker	1		
10. Hemoglobinometer	1		
11. Microscope	1		
12. Ultra-low temperature freezer	3		

Specifications for major equipment are as follows:

- New OPD Building

1) MINOR OPERATION ROOM

DESCRIPTION: ANESTHESIA APPARATUS (PEDIATRIC, ADULT)

Safety device : O<sub>2</sub> concentration of min. 30% at the total flow of 3L/min. is maintained.

O<sub>2</sub> flush : 40 – 48L at O<sub>2</sub> pressure of 3.5kg/cm<sup>2</sup>

Type of ventilator : electricity operated time cycle/volume limited

DESCRIPTION : ANESTHESIA APPARATUS (PEDIATRIC, ADULT)

Type : Volume preset time cycling Pressure Preset time cycling

Tidal volume : 50 – 1300ml

Respiratory rate : 6 – 40 times/min. in CMV; 0 – 40 times/min. in IDV

2) ENT

Item No. : B-2-1

DESCRIPTION : OPERATION BINOCULAR MICROSCOPE

Optical system

Binocular tube : Straight type, 10X

Object lens : W.D. 230 and 400mm

Magnifications : Manual step by step changing. 6X, 10X, 16X, 25X.

3) NEUROSURGERY

Item No. : B-3-1

DESCRIPTION : OPERATION BINOCULAR MICROSCOPE

OBSERVATION TUBE      inclination angle : 30 – 110° variable  
interpupillary distance adjustment range : 52 –  
76mm

OBJECTIVE              Working distance : 295mm

EYEPIECE              12.5x

ACTUAL FIELD OF VIEW 69 – 14mm dia.

4) STERILIZING ROOM

Item No. : B-4-1

DESCRIPTION : STERILIZER, 600 × 1000 × 650, 430 lit.

Function	General goods sterilization
Operation	Automatic
Performance	Steri, temp : Max. 135°C
	Steri, time : Max. 60 min (Changeable)
	Drying : Repeating Vacuum method

5) DEPARTMENT OF ORTHOPAEDICS

Item No. : D-1

DESCRIPTION : ARTHROSCOPY SET, LIGHT SOURCE

Telescope	Direction of view	: 0°
	(color)	: Green
	Field of view 1 in the air	: 96°

Trocar Sheath Components

Trocar sheath, Trocar, Obturator

Photo	Still, TV, Cine
-------	-----------------

6) ULTRASOUND ROOM

DESCRIPTION : ULTRASOUND LINEAR SCANNER WITH PRINTER -  
SECTORAL & LINEAR CANNER \_

Scanning system	: Convex, Linear
Examination mode	: B, B/B, M, B/M
Ultrasound output power level control	: 3 steps
Field display : Depth	: 4 steps
Angle, or width	: 2 steps
Display monitor	: 12" B/W monitor

7) EEG ROOM

DESCRIPTION : 18 CHANNEL EEG MACHINE

Sensitivity control
High frequency filter
Low frequency filter
Frequency response : Pen 120Hz Amp. 3kHz
Electrode selector

8) ENDOSCOPE ROOM

DESCRIPTION : FIBEROPTIC CLEANING MACHINE

Washing methods : Revolving slit spray

9) BRONCHOSCOPE ROOM

DESCRIPTION : BRONCHOSCOPE, FLEXIBLE (PEDIATRIC AND ADULT)

Optical System Field of view : 120°

Depth of field : 3 – 50mm

10) DEPARTMENT OF ENT

DESCRIPTION : ENT CHAIR UNIT

Sray : Direct-coupling type

Ventilation : 351 litters/min or more

650mmHg or more

11) DEPARTMENT OF DENTAL

DESCRIPTION : DENTAL CHAIR UNIT

Seat Movement Method : Hydraulic

Height of Seat (from Floor)

Maximum : 750±10mm

Minimum : 450±10m (With Step : 840±10mm)

12) HOSPITAL SUPPORT DIVISION – FOR ALLOCATION TO OPD –

DESCRIPTION : UNIT OF MIMEOGRAPHING? DUPLICATING (GOOD  
QUALITY MANUAL, ELECTROCALLY OPERATED)

Type : Desktop

Copying System : Single-component Toner Projection Development (TPC)

Copyboard : Fixed

Maximum original size : A3 (297 × 420mm)

Copy Sizes : from A6 (105 × 148mm) to A3



• Existing Buildings

1) DEPARTMENT OF RADIOLOGY (Renovation)

DESCRIPTION : GENERAL X-RAY UNIT

Rated output (a) Radiographic rating : 200mA at 125kV

300mA at 100kV

(b) Fluoroscopic rating : 4mA at 120kV

X-ray tube stand : Floor to ceiling mounted type

Radiography table : Bucky table with Tomographic attachment

Vertical radiographic stand : Tilttable (Horizontal – Vertical – –15°)

DESCRIPTION : MULTI PURPOSE X-RAY TV SET

Rated output (a) Radiographic rating : 200mA at 125kV

320mA at 100kV

(b) Fluoroscopic rating : 4mA at 120kV

Radiographic/fluoroscopic table : Table-side control and cassette type

Image intensifier, TV : 9"II and 12" TV Monitor

X-ray tube stand : Floor to ceiling mounted type

Vertical radiographic stand : Tilttable (Horizontal – Vertical – –15°)

DESCRIPTION : MOBILE X-RAY UNIT

Type of high voltage generator : Capacitor – discharge type

Maximum tube voltage : 100kV

Capacity of capacitor : 1μF

mAs colue : 0.8 to 32mAs

Mobile cart : Motor – driven type

2) DEPARTMENT OF PATHOLOGY (exisiting room)

DESCRIPTION : BLOOD GAS ANALYZER

Reported results

Parameter measured: Measurement range: Display resolution

pH 6.00 – 8.00ph 0.01ph unit

pO<sub>2</sub> 0 – 700mmHg 1mmg

pCO<sub>2</sub> 5 – 250mmHg 1mmHg

#### 4-3-7 Basic Design Drawings

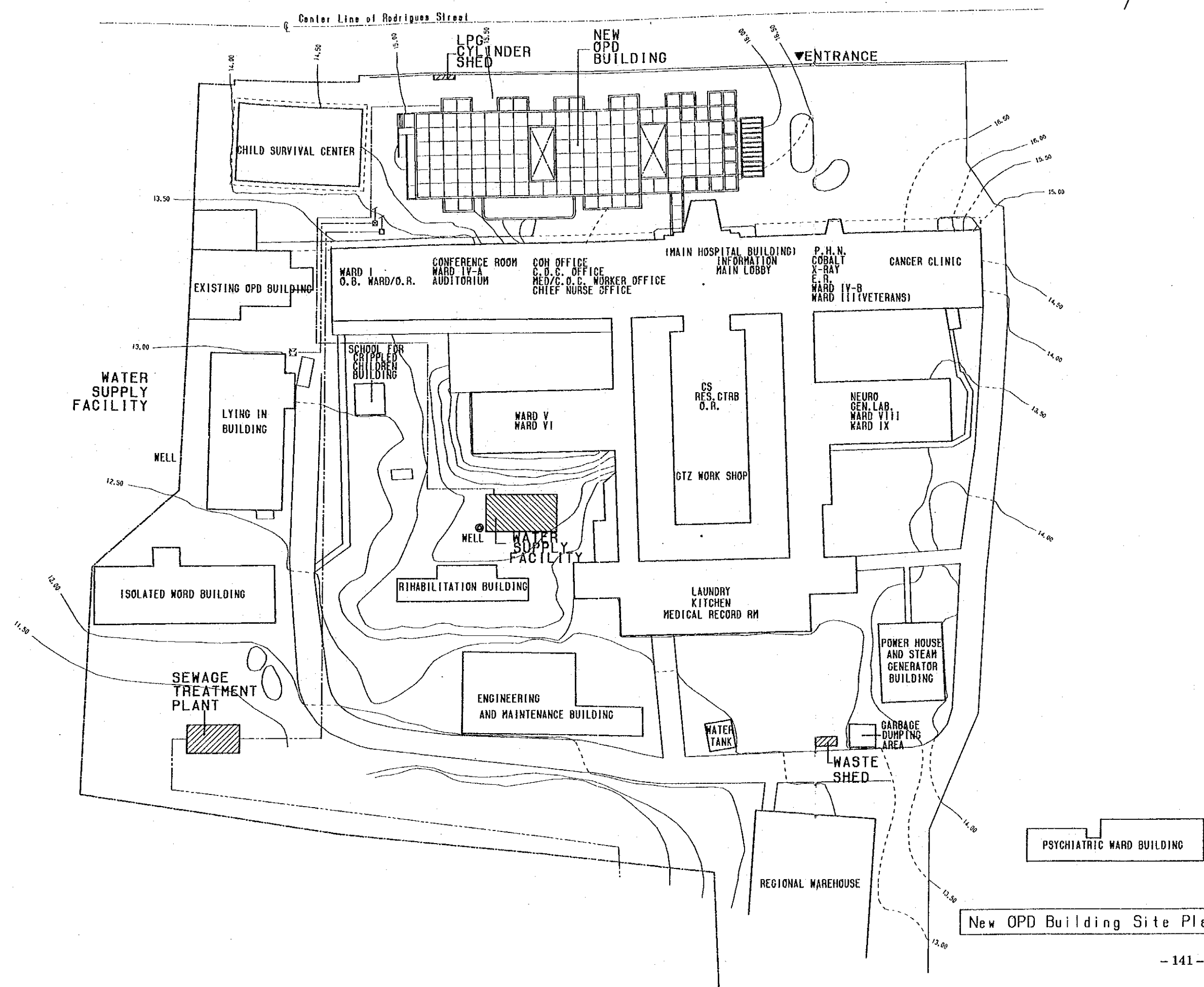
Figure/Table 4-19 Floor Area Tabulation

Construction Items		m <sup>2</sup>	Notes
New OPD Building	B1 Floor	267.81	
	1st Floor	1,517.85	
	2nd Floor	1,244.05	
	3rd Floor	1,115.87	
	Total	4,145.58	
	(Entrance Porch etc.)	318.26	
Renovation for Existing Building	X-Ray Dept.	173.23	X-Ray Rm.
	Emergency Dept.	15.00	Minor OP Rm.
	Total	188.23	
Infrastructure	Sewage Treatment Plant		Septic Tank etc.
	Water Supply Facility		Pump Station, Deep Well
	Waste Shed		
	LPG Cylinder Shed		

Figure/Table 4-20 List of Basic Design Drawings

No.	Name of Drawings	Scale
1	Site Plan	1/800
2	New OPD Building 1st Floor Plan	1/300
3	New OPD Building 2nd Floor Plan	1/300
4	New OPD Building 3rd Floor Plan	1/300
5	New OPD Building B1 Floor Plan	1/300
6	New OPD Building Elevation	1/300
7	New OPD Building Section	1/300
8	Existing Building Renovation Floor Plan, Section	1/300



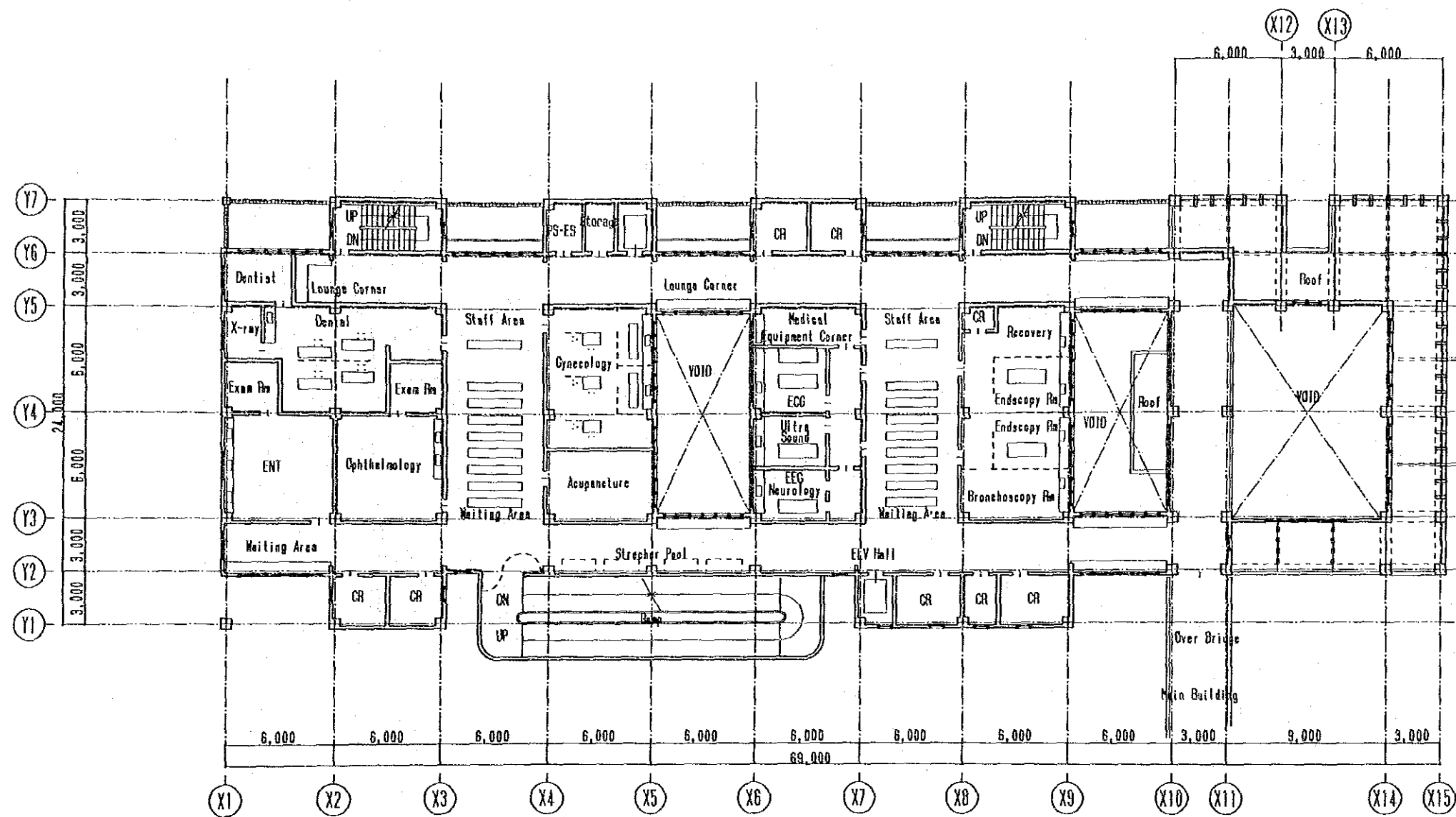


New OPD Building Site Plan 1/800 1









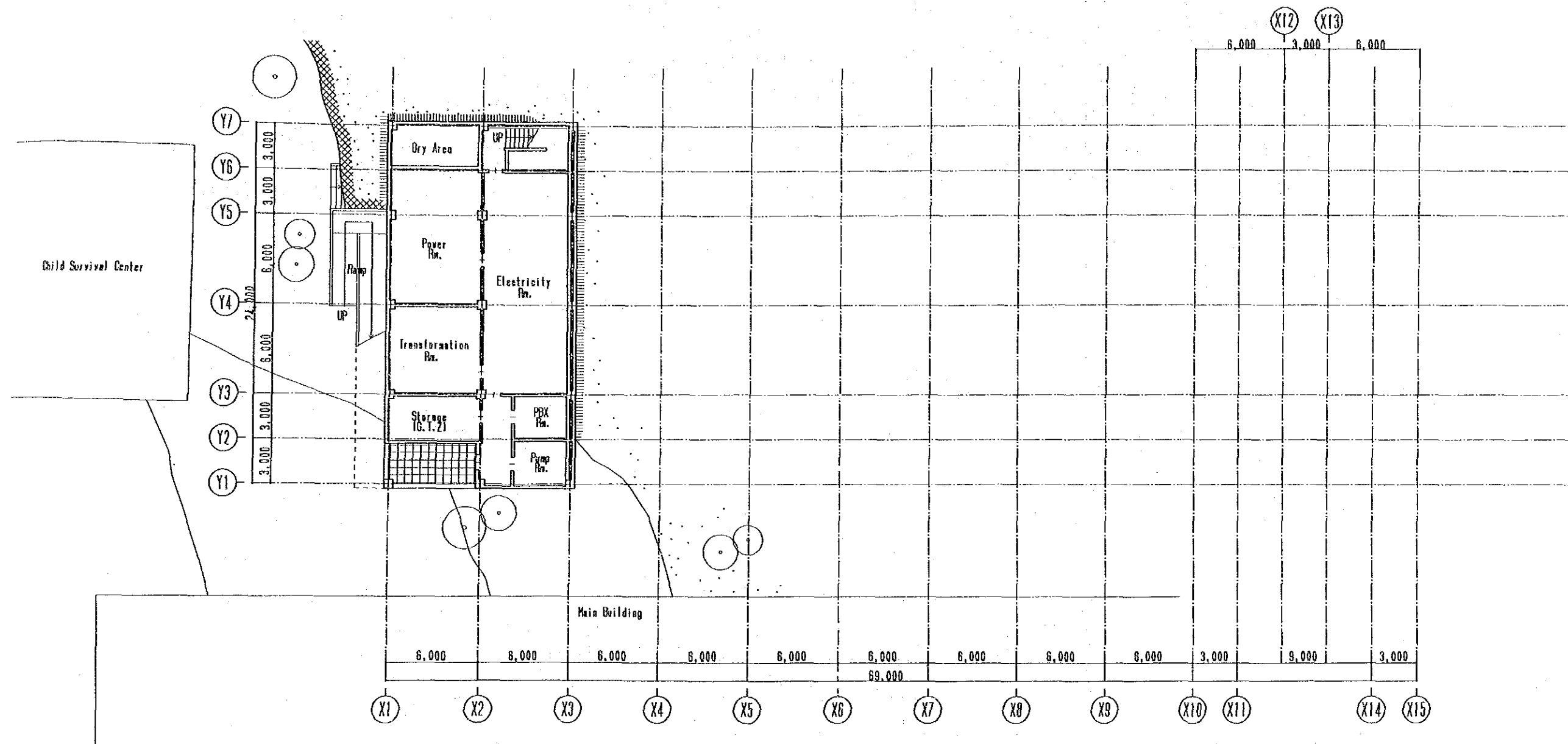
New OPD Building 2nd Floor Plan 1/300 3





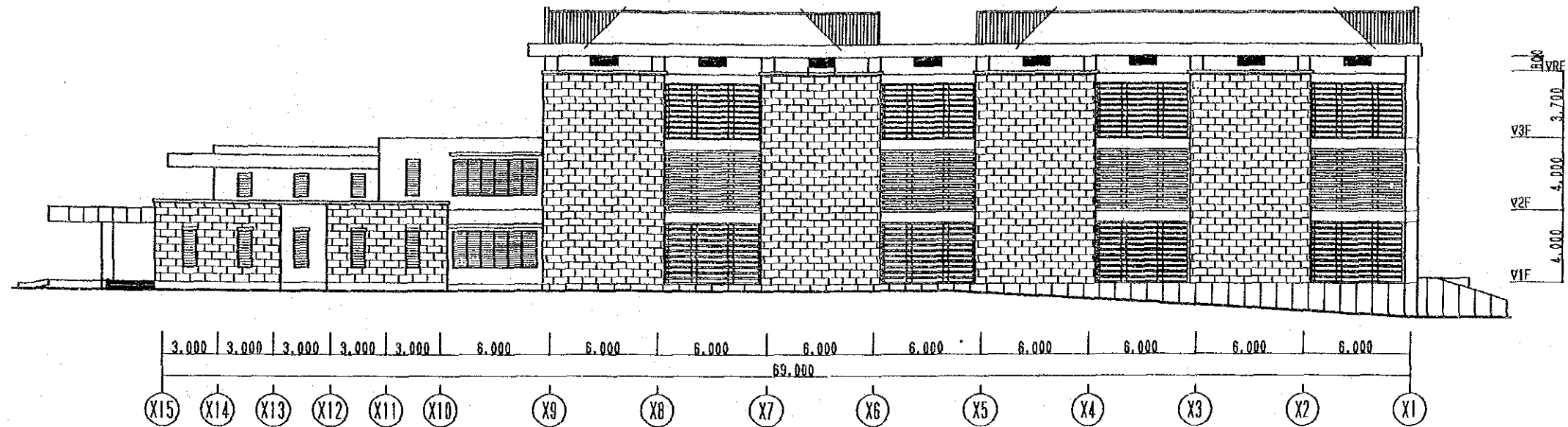




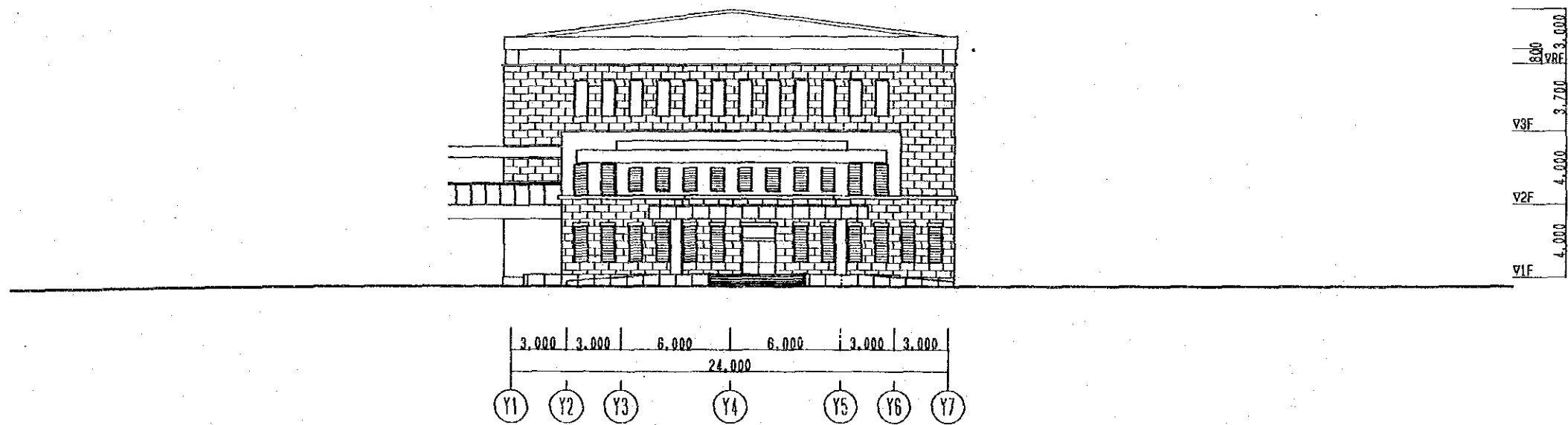


New CPD Building B1 Floor Plan 1/300 5





North Elevation



East Elevation

New OPD Building Elevation	1/300	6
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