No.

BASIC DESIGN STUDY REPORT
ON
THE PROJECT FOR IMPROVEMENT
OF
HOA BINH GENERAL HOSPITAL
IN
THE SOCIALIST REPUBLIC OF VIET NAM

JULY 2005

JAPAN INTERNATIONAL COOPERATION AGENCY

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PREFACE

In response to a request from the Government of the Socialist Republic of Viet Nam, the Government of Japan decided to conduct a basic design study on the Project for Improvement of Hoa Binh General Hospital and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Viet Nam a study team from December 5th to 25th, 2004.

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

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

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

July 2005

Seiji Kojima
Vice President
Japan International Cooperation Agency

July 2005

Letter of Transmittal

We are pleased to submit to you the basic design study report on the Project for Improvement of Hoa Binh General Hospital in the Socialist Republic of Viet Nam.

This study was conducted by the Consortium of Nihon Sekkei, Inc. and Medical Engineering & Planning Co., Ltd., under a contract to JICA, during the period from November 2004 to July 2005. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of Viet Nam and formulated the most appropriate basic design for the project under Japan's grant aid scheme.

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

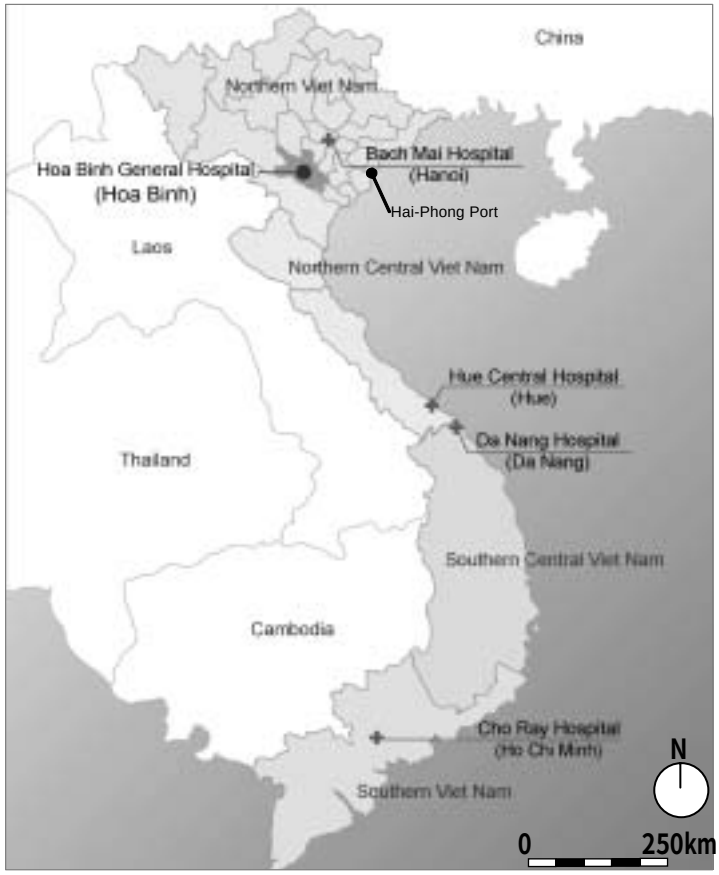
Very truly yours,

Masahiro Ikawa
Project Manager

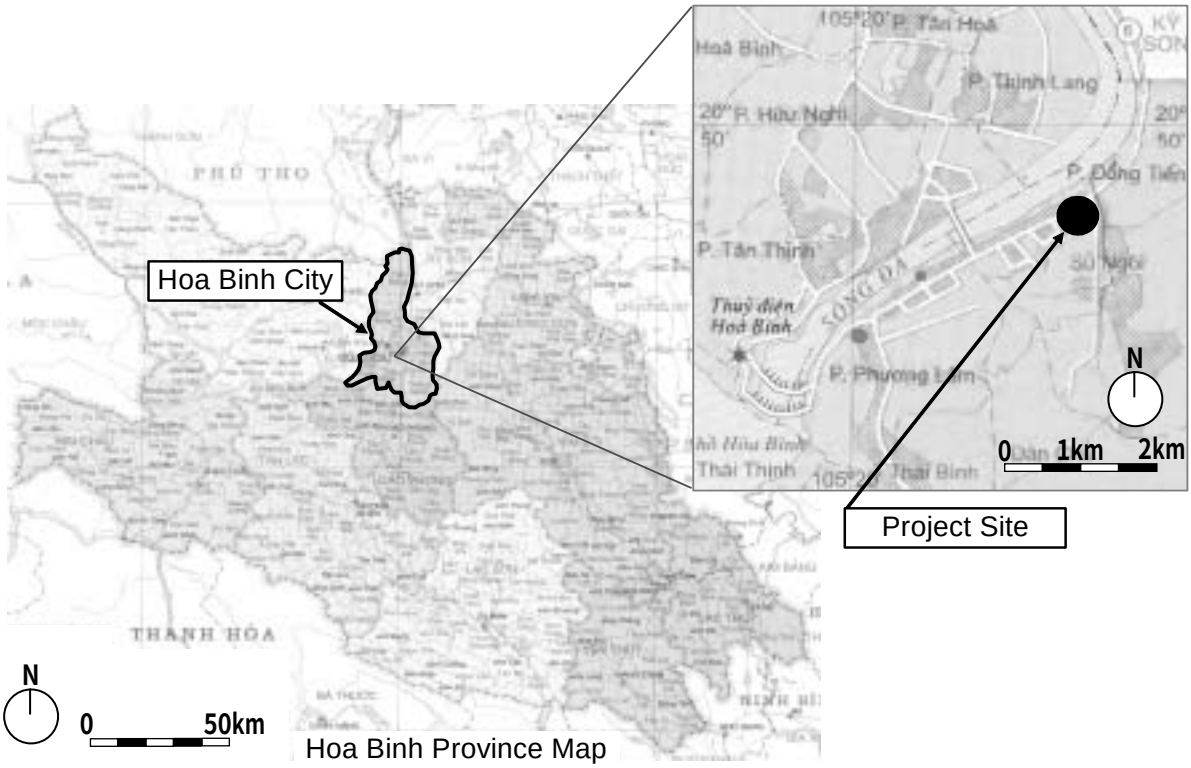
Basic Design Study Team on
the Project for Improvement of Hoa Binh General Hospital

The Consortium of Nihon Sekkei, Inc. and Medical Engineering & Planning Co., Ltd.

Location Map



The Socialist Republic of Viet Nam



Hoa Binh Province Map

Perspective

List of Figures & Tables

Chapter 2

ABBREVIATION

A/P	Authorization to Pay
B/A	Banking Arrangement
BMH	Bach Mai Hospital
BS	British Standard
CPRGS	Comprehensive Poverty Reduction and Growth Strategy
DOHA	Direction Office of Healthcare Activity
E/N	Exchange of Notes
ECG	Electrocardiogram
GDP	Gross Domestic Product
GNI	Gross National Income
HGH	Hoa Binh General Hospital
ICU	Intensive Care Unit
JASS	Japanese Architectural Standard Specification
JICA	Japan International Cooperation Agency
JIS	Japan Industrial Standard
MDF	Main Distribution Frame
MOH	Ministry of Health
MPI	Ministry of Planning and Investment
NGO	Non-Governmental Organization
PABX	Private Automatic Branch Exchange
PRSP	Poverty Reduction Strategy Paper
UNFPA	United Nations Population Fund
VND	Viet Nam Dong
WHO	World Health Organization

Summary

The Socialist Republic of Viet Nam (hereinafter referred to as "Vietnam") has a population of about 82.06 million (in 2004) with a total land area of 331,689 km^2. The country stretches 1,700 km long in a north to south direction and shares its borders with Cambodia, Laos and China.

Hoa Binh Province is located at the center of a mountainous area about 100 km south-west of the capital Hanoi. The City of Hoa Binh, where the site is located, is in a low lying area within the province with an altitude of 10 meters above sea-level. It belongs to the temperate Monsoon Climate Zone, with a relatively cool dry season and a hot humid rain season.

With the adoption of the Doi Moi Policy in 1986, the introduction of a market economy and opening to foreign markets was actively promoted. Vietnam joined ASEAN in July 1995 and has recorded generally good macro-economical achievements. (The average annual growth of GDP in the period between 1992 to 1997 was 8.9%). Vietnam was adversely affected by the Asian economic crisis in 1997 and economic growth was slowed for a period with a steep drop in GDP growth. Economic policy for strong promotion of foreign capital investments and exports were adopted resulting in a strong economic growth of 6 to 7% annually after 2000.

The private sector including foreign owned companies are the driving force behind the increase in industrial composition weight of the mining, manufacturing and service sectors. On the other hand, the private sector is hampered by difficulty in access to capital, small capitalization and low technical levels. Foreign owned firms also face difficulties in increasing the locally manufactured portion due to underdeveloped basic industries for manufacturing parts. Furthermore, the economic infrastructure, such as transportation, electric power supply, and telecommunications are also severally under-developed. Serious socio-economic problems are also present, including gap between the wealthy and poor, increase in disparity between regions, and deterioration of the daily life environment.

The Government of Vietnam formulated the Ten-Year Socio-Economic Development Strategy (2001 - 2010) in 2001. The strategy envisions the transition to an industrial country. The Comprehensive Poverty Reduction and Growth Strategy Paper (CPRGS) formulated in May 2002 proclaims the attempt to achieve both poverty reduction and economic growth. The long term basic policy of the Government of Vietnam is shown in the "Ten Year Socio-Economic Development Strategy (2001 - 2010)" and the "Seventh Socio-Economic Five Year Plan (2001 - 2005). Based on these two documents the "People Healthcare and Protection Strategy in 2001 to 2010", and the "Hospital Network Development Plan (2002 to 2010)" has been formulated. Especially the "Hospital Network Development Plan" states the policy to establish hospital facilities nationwide with the objective of providing good quality healthcare to residents.

The medical healthcare administration in Vietnam is divided into 8 regions. Comparison of the difference in the health indicators for each region reveals large disparity between regions. Especially, Northern Vietnam shows inferior figures in major health indicators compared to the national average and improvement of healthcare services in Northern Vietnam was recognized to be an urgent priority.

The Government of Vietnam selected Hoa Binh Province to be model area for the improvement of healthcare services in Northern Vietnam based on the criteria, 1) access from Hanoi is convenient, 2) it is included in the DOHA (training activities of medical staff, etc.) area of Bach Mai Hospital, the tertiary medical facility, and 3) the provincial healthcare indicators are inferior.

A project formulation survey was conducted by Japan International Cooperation Agency (JICA) in October 2002 on "Strengthening of Medical and Healthcare Services in Northern Region". This survey formulated Donor Assistance Programs in concert with ADB and UNFPA to strengthen the healthcare services in Hoa Binh Province.

Assistance in the healthcare sector from major donors to Northern Vietnam (mainly to Hoa Binh Province) is concentrated in improvement of the primary level, while Japanese Assistance has centered on providing Grant Aid and Technical Cooperation Projects to Bach Mai Hospital, the tertiary medical institution. The secondary level was left behind from the improvement activities, resulting in the present conditions of crowding of patients to the tertiary facility and lack of a proper medical referral system from primary level through to the tertiary level.

With this background, the Peoples Committee of Hoa Binh Province, the implementing agency of this Project formulated the "Hoa Binh Province Healthcare Sector Development Plan (2001 - 2010)". Under this Plan, improvement of facilities and medical equipment and training of medical staff is being implemented. Under this Plan, the Peoples Committee of Hoa Binh Province formulated the "Future Plan for Hoa Binh General Hospital" (Master Plan), to improve the functions of the only secondary medical institution in the province and thereby establishing an appropriate referral system.

At present, Hoa Binh General Hospital is a chaotic jumble of many buildings, new and old, some even more than 50 years old. The severe climate conditions have caused deterioration in many buildings. The hospital operations are also inefficient due to various medical functions being spread out among several buildings. The medical equipment are in poor condition with obsolete equipment past replacement time and a severe shortage in numbers.

The Master Plan for the hospital is being implemented (the complete rebuilding of the entire hospital) under the funding from Hoa Binh Provincial budget etc., but a full scale improvement of the facilities has not been realized due to a lack of sufficient funds. Under these circumstances the Government of Vietnam has requested the Government of Japan for Grant Aid Assistance to construct the core Hi-Tech Block and related facilities containing the various diagnostics and analysis departments, and operation theater and to procure the related medical equipment.

A related Technical Cooperation Project, "Hoa Binh Province Medical & Healthcare Services Strengthening Project" (July 2004 to June 2009) is presently being carried out. One objective of this project is to strengthen the referral system in Hoa Binh Province, and the improvement of Hoa Binh General Hospital, the only secondary medical institution in Hoa Binh Province, is urgently required for the smooth implementation and establishment of the referral system.

In response to this, the government of Japan has decided to conduct a basic design study, and the Japan International Cooperation Agency (JICA), an independent administrative institution, dispatched a basic design study team in December 2004. The study team had detailed discussions with the concerned parties of Vietnam, studied the relevant facilities, collected necessary materials, and surveyed the planned construction site. The study team has prepared this basic design study report, following the home office analysis and presentation of the basic design draft conducted in March 2005.

The result of the study has confirmed the necessity of improvement of Hoa Binh General Hospital, and necessities of construction of the core facilities including Hi-Tech Block and related facilities in the site of the Hoa Binh General Hospital, and procurement and installation of related equipment to realize the said improvement.

The following is the summary of the Project for Improvement of Hoa Binh General Hospital.

Responsible organization: The People's Committee of Hoa Binh Province

Executing agency: Hoa Binh General Hospital

Overall schedule: This Grant Aid Project will take a total of 18.5 months from the signing of the Exchange of Notes (E/N) to the completion of the project.

Planned construction site: Construction site in the Hoa Binh General Hospital premises in Hoa Binh City

Building structure: Hi-Tech Block:
Reinforced concrete, 3-storied aboveground building (newly constructed)
Related Facility:
Reinforced concrete, one-storied building (newly constructed)

Total floor area:	Hi-Tech Block:	3,949.0 m^2
	Related Facility:	57.0 m^2
	Total:	4,006.0 m^2

Facility and equipment plan: As shown below

Construction of Facilities	Hi-Tech Block 1F：X-ray examination department, Physiological examination, endoscope departments 2F：Specimen examination department, ICU 3F：Operation department, Sterilization room, Recovery room RF：Warehouse Related Facilities Incinerator：Incinerator, Stock space Sewage Treatment Plant： Machine room
Procurement of Equipment	The equipment necessary for the operation of Project facilities. （X-ray film processor、Hot-air sterilizer、Centrifuge etc.）
Soft Component	Technical instructions for facility maintenance system, and medical waste disposal system

The total project cost of this project is estimated at 1,008 million yen (983 million yen for the Japanese portion and 25 million yen for the Vietnamese portion).

The maintenance and operation cost after completion of this project is calculated at 1,191 million VND (8.22 million Yen). The present maintenance cost for the corresponding facilities to be replaced by the Project facilities are 600 million VND (approximately 4.14 million Yen) and the net increase in maintenance cost will be 600 million VND (approximately 4.14 million Yen). This amount corresponds to 4.3 percent of Hoa Binh General Hospital's annual budget for 2003 (13,816 million VND, approximately 96 million Yen). The Vietnamese side states that if the net increase is within 6 to 7% of the total hospital budget it can be provided and confirmed to make budgetary commitments. The increase in revenue for Hoa Binh General Hospital is about 40% from 2002 to 2003 (3,900 million VND) and the net increase of 600 million VND is 15% of the amount. Therefore, it is judged possible to incorporate the amount within the budget.

Realization of this project (the cooperation project of the Japanese side and the obligation of the Vietnamese side) is expected to bring about the following direct effects.

(1) Improvement of secondary level medical services at Hoa Binh General Hospital
Renewal of the obsolete facilities and equipment of Hoa Binh General Hospital will complement its hospital functions as a secondary medical institution.
Hoa Binh General Hospital will become able to provide medical services appropriate to secondary level to residents of the areas.

(2) Enhanced efficiency of medical services by centralization of the central diagnosis functions
The project will centralize the central diagnosis and treatment functions, presently separately located in the various buildings hospital premises. The centralization of these functions will improve the efficiency of medical services. Nosocomial infections will be prevented by the provision of ICU units, Operation Theater, and Sterilization Room with air-conditioning.

(3) Smooth implementation of DOHA activities
Hoa Binh General Hospital is designated as the training facility for lower level medical institutions in Hoa Binh Province and is also the educational hospital for the nurse school as well as being the only secondary medical institution in Hoa Binh Province. The new Hi-Tech Block will have a room for seminars and promote the smooth implementation of DOHA activities

This project is expected to bring about the following indirect effects.

(1) Improvement of services of the hospital realizable by increase in medical treatment fee
The numbers of surgical operations and medical examinations will increase on completion of the construction of new buildings and renewal of equipment. Consequently, the medical treatment fees collectable from patients will increase. The hospital is allowed to spend the revenue from medical treatment fees under its own budget. This will enable the hospital to further improve itself, and to increase the degree of financial independence of the hospital from the present state.

(2) Provision of a Model Secondary Medical Institution in Northern Vietnam
Through the implementation of Bach Mai Hospital Project by Japanese Technical Assistance, the strengthen of the referral system in Northern Vietnam with Bach Mai Hospital as the tertiary reference facility is projected. Hoa Binh Province is designated as the model area in this project. Therefore, the implementation of the Project facilities will enable Hoa Binh General Hospital to function properly as the secondary referral facility. This will strength not only the referral system of Hoa Binh General Hospital, but also serves as the model case for other provincial hospital improvements.

As enumerated above, realization of this project will improve the medical service to the people in this region, not limited to the 100 thousand people of Hoa Binh City where Hoa Binh General Hospital is situated but including the entire 770 thousand people of Hoa Binh Province, the region covered by Hoa Binh General Hospital. In this respect, implementation of this project as Japan's grant aid program is very significant as well as necessary, and the content of the project is highly relevant to the objectives for the project.

In implementing the Grant Aid Project it is important that the Vietnamese side's works are completed by the appropriate time. Demolition and removal of the existing facilities and ground preparation, in particular, must be completed by the time the Japanese side's works are concerned. Furthermore, the following arrangements and improvements are desired in order for this project to be operated smoothly and effectively.

(1) The hospital staff should receive sufficient training on proper operation and maintenance of the facilities to be built or modified by the Grant Aid Project, with a sufficient budget secured specifically for this purpose.

(2) It is necessary to strengthen the referral systems in Hoa Binh Province, which is not sufficiently functional, and to intensify the DOHA activities to reinforce the ties with the provincial health department and lower level hospitals, thereby upgrading the quality of regional medical services, including the preventive medical services.

(3) Appropriate amounts should be placed in the budget to deal with sudden failure of medical equipment. This will allow quick response for repairs and minimize the damage to healthcare services. Furthermore, amounts should be set aside annually based on consideration of useful life and depreciation of equipment. This will allow orderly replacement of obsolete medical equipment.

Table of Contents

Chapter 1. Background of the Project

CHAPTER 1. BACKGROUND OF THE PROJECT

The Government of Vietnam has proclaimed improvement of healthcare services as an objective in the "Seventh 5 Years Plan" (2001 - 2005), and the primary objectives for improvement of healthcare services in the "Healthcare and Protection Strategy 10 Years Plan" (2001 - 2010), a developmental project in the medical and healthcare sector, are 1) Provision of Primary Healthcare (PHC) to all citizens, 2) realization of access to high quality medical services, 3) realization of lower morbidity and increase in longevity.

Up to the present, the Government of Japan has implemented Grant Aid Projects for "Bach Mai Hospital Improvement Project" (1997 - 2000), "Hue Central Hospital Improvement Project" (2004 - 2006), "Cho Ray Hospital Improvement Project" (1995 - 1999) for the Northern, Central and Southern Regions, respectively. The Technical Cooperation Projects, "Cho Ray Hospital Project" (1995 - 1999) and "Bach Mai Hospital Project" (2001 - 2005) have provided assistance mainly to regional base hospitals (Tertiary Medical Facilities). In the Northern Region, reconstruction of the hospital network with Bach Mai Hospital as the regional base, provincial hospitals as secondary medical facilities and district hospitals as primary medical facilities was carried out. In Hoa Binh Province, the technical cooperation project "Hoa Binh Province Healthcare Strengthening Project" is being implemented to establish a model referral system.

In 2002, the project formulation study "Healthcare Organization Strengthening in Northern Region" was implemented. Under this study a donor assistance program was developed in cooperation with ADB and UNFPA to strengthen the healthcare system in Hoa Binh Province. (In this program, ADB and UNFPA will undertake projects to improve healthcare services in the primary sector, such as village healthcare projects and improvement of quality of reproductive healthcare services for residents of Hoa Binh Province, respectively. The Government of Japan will transfer the technical skills developed in Bach Mai Hospital, the tertiary medical facility in the Northern Region, to the Provincial General Hospital which is the secondary medical in the Northern Region and plans to establish a model referral system in Hoa Binh Province.) This project is an integral part of the improvement of the healthcare system.

The inpatient wards of Hoa Binh General Hospital constructed in 1960 and medical equipment installed during the 1970's to 1980's are still in use. The deterioration of buildings, water supply system and medical equipment is advanced. Furthermore, there are problems with human resources, budgetary matters and technical capabilities of the medical staff. The present state of the hospital is not very different from primary level facilities. The patients increasingly go directly to tertiary hospitals, such as Bach Mai Hospital in Hanoi, instead of the secondary institution, and Hoa Binh Hospital is not fulfilling its function as a secondary level medical institution.
In order to remedy this situation the "Future Plan for Hoa Binh General Hospital" (Master Plan) was developed. Some elements in the Master Plan has been implemented under Vietnam budget.
However due to lack of sufficient funds and other reasons, a full scale improvement of the facilities has not been realized.

Under these circumstances, the Government of Vietnam has requested the Government of Japan for Grant Aid Assistance to construct the following core facilities and equipment of the Master Plan. The contents of the request are summarized below;

Construction of Facilities: Hi-Tech Block including Diagnostic Department, Analysis Department and ICU (3 story 4,600 m^2) and Mechanical block (Single story, 400 m^2)

Procurement of Equipment: Ventilator, Patient Monitor, Defibrillator, Ceiling Operating Lamp, Anesthesia Apparatus, Suction Unit, Electric Surgical Unit, Endoscopy, General X-ray Appratus, Fluoroscopic X-ray T.V. System, Ultrasound Color Doppler, Autoclave, etc.

Chapter 2. Contents of the Project

CHAPTER 2. CONTENT OF THE PROJECT

2-1 Basic Concept of the Project

The Government of Vietnam pledges access of people to high-quality medical services in its "PEOPLE HEALTH CARE AND PROTECTION DEVELOPMENT TARGET IN 2001 - 2010," the development plan in the healthcare and medical service sector. As a means of realizing this objective, establishment of a proper referral system is urgently needed.
Japan has extended grant aid programs and technical cooperation to the Cho Ray Hospital, the core hospital in the South, the Bach Mai Hospital in the North, Hue Central Hospital in the Northern Central, and Da Nang Hospital in the Southern Central Regions. In this way, Japan has helped upgrade the level of medical care of Vietnam. Japan's assistance to the northern region has been centered on a grant aid program and technical cooperation to the Bach Mai Hospital, a tertiary medical institution, and simultaneous technology transfer to medical facilities at lower levels (with the Bach Mai Hospital as the base).
In Northern Vietnam, (Hoa Binh Province, in particular) the subject region of the Project, noticeable aid programs of major donors other than Japan are ADB's program on rural health program, UNFPA's reproductive health improvement program and programs on improvement of primary medical services.

In Northern Vietnam, Japan's past assistance has been directed more to the tertiary and primary medical levels than to the secondary medical level. Consequently, disproportionately large numbers of patients are coming to tertiary medical facilities, with the result that the referral system from the primary to the tertiary medical facilities does not function properly.
For the purpose of strengthening the referral system, Hoa Binh Province has been selected as the first model region for the referral system in the regional medical and healthcare service of the North, with Bach Mai Hospital acting as the core hospital. The reasons for selecting Hoa Binh Province include the following characteristics of the province: easy access to the Capital City of Hanoi; Hoa Binh Province is a low-income province; the high number of medical and healthcare problems; the high interest of the Ministry of Health in the province; the expectation of support from other donors.
Hoa Binh General Hospital is the only core hospital in Hoa Binh Province, and is the only hospital of the secondary level built in the period from 1958 to 1960. The hospital also plays the role of educational hospital for nurses, and is expected to play a more important role in the community health directive to medical facilities of lower levels called Direction Office of Healthcare Activity (DOHA).
The present state of Hoa Binh General Hospital is such that a large number of new and obsolete facilities and pieces of equipment are placed in a rather disorderly manner, including buildings nearly 50 years old. Various factors, notably the severe climatic conditions, promote deterioration of buildings. Furthermore, medical facilities and equipment of the hospital are either obsolete or in short supply. In short, the conditions do not permit the hospital to function properly as a secondary medical institution.

Against such a background, the People's Committee of Hoa Binh Province has developed a Master Plan for hospital improvement to improve the function of Hoa Binh General Hospital and thereby upgrade the medical services. Some of the elements of the Master Plan are being implemented by the budget of Hoa Binh Province; however, the budget is far too small to realize thorough and overall improvement of the hospital. This Grant Aid Project intends to construct Hi-Tech Block of examination and diagnostic department, operation theater and related facilities, which is the core of the hospital improvement Master Plan, and to provide related medical equipment.
Implementation of the requested Japanese assistance under Japan's Grant Aid Scheme will enable Hoa Binh General Hospital to function properly as the secondary medical institution of Hoa Binh Province, and will consequently enable the referral system to work properly, thereby improving the level of medical services of the province. Indirectly, the 770 thousand Hoa Binh population would receive beneficial effect from this project.

Table 2-1 shows the outline of the Grant Aid Project.

Table 2-1 Outline of the Grant Aid Project

	Components
Hi-Tech Block (3 storied, 3,950 m^2)	Operation Theater Physiological Examination Department Laboratory Image Diagnostic Laboratory Endoscope Departments ICU Recovery Room Sterilization Room Operation Theater Lecture Room Transformer, Stand-by Generator, Water Reservoir
Related Facilities (One storied, 57 m^2)	Incinerator (40m^2) Sewage Treatment, Machine room (17m^2)
Medical Equipment	Equipment for the Hi-Tech Block and for portions of the existing facilities
Soft Component	Technical instructions for facility maintenance system, and medical waste disposal system

2-2 Basic Design of the Requested Japanese Assistance

2-2-1 Design Policy

(1) Basic Policy

1) In formulating the hospital improvement project, consistency will be maintained between this improvement project (Grant Aid Project) and the Master Plan prepared by the hospital. This improvement project will integrate and centralize the functions of the Central Diagnosis and Treatment Division, now scattered throughout the hospital premises, to enable more efficient management of the hospital.

2) The Master Plan plans to increase the number of beds from the present 320 to 400 by 2010. However, the requested facility is the Hi-Tech Block, with functions for operations and examination; therefore, the scale of the facility cannot be simply decided according to the number of beds. The building size will be decided based on the result of analysis of the present numbers of operations and examinations, and the other factors such as the forecasted local population.

3) Hoa Binh General Hospital is the only secondary medical institution in Hoa Binh Province. In addition, Hoa Binh General Hospital is supposed to provide education and training services to medical and healthcare professionals of hospitals as the executing agency of DOHA, and also to serve as the education hospital for nursing school, etc. Accordingly, the Master Plan including the Grant Aid Project will be formulated so as to assist the smooth implementation of the DOHA activities.

4) The Project will be formulated to assist smooth implementation of Japan's technical cooperation program which will be carried out concurrently with the Project.

5) In developing the architectural plan and the equipment plan, administrative capability of the hospital for the existing facilities (number of medical and healthcare professionals, technological level, financial sustainability, state of procurement of consumables and spareparts, etc.) will be studied. Furthermore, the scope of the project will be limited to a proper level that can ensure sustainable technological and financial development of the hospital. In recognition of the purpose of the Project being to correct the present state of deterioration of hospital facilities, the design will not be excessive.

6) The facility plan will incorporate prevention, or suppression measures for nosocomial infections.

7) Obligations of the Japanese side and Vietnamese side will be clearly defined, with a full understanding of the Master Plan including the Grant Aid Project.

8) The basic design will consider the natural condition of the concerned areas and will develop a plan, in which medical services are not easily disrupted, even in difficult disaster situations.

9) The basic design will develop a plan that gives proper consideration to the environment of Hoa Binh General Hospital and its surroundings.

10) The study team will study assistance to the hospital by other donors, NGOs and donor countries, and will develop a plan that maintains cosistancy with such assistance works, and avoiding duplications of assistance.

(2) Policy toward Natural Condition

Hoa Binh Province is situated in the center of a mountainous area 100 kilometers to the southwest of Hanoi, the capital of Vietnam. Hoa Binh City is located in a low land area of Hoa Binh Province. Although Hoa Binh City is about 200 kilometers from the seacoast, it is only about 10 meters above sea level. Climatically, this area falls under the subtropical monsoon zone, in which the relatively cool dry season and hot and rainy wet season alternate. The basic design considers such natural conditions and establishes the following design policies for the project facilities.

1) Wind Speed and Wind Direction

The prevailing wind in Hoa Binh City will be effectively utilized for natural ventilation of the project facilities. Particular attention will be given to effective utilization of the northerly wind which prevails throughout the year; specifically, the Hi-Tech Block will be built on a east-west axis to secure good ventilation.

2) Precipitation

The maximum precipitation in Hoa Binh City for the past five years is about 2,500mm, and the average precipitation is about 2,000 mm. About 80 percent of the annual precipitation occurs during the rainy season which lasts from May to October. Accordingly, rain intensity of 150mm/hour will be used for design value of drainage from the roof or the exterior drainage, instead of 100mm/hour normally used.

3) Temperature and Humidity

Hoa Binh City is very hot and humid in summer. Even in the winter dry season, the humidity can be as high as 80%. The buildings will be designed to have wider openings so that windows may facilitate ventilation. To prevent mold growth, construction materials with flat surfaces will be selected to the extent possible. The floor plan will also give consideration to avoid forming niche-like spaces.

4) Sunshine

The sunshine hour is the shortest during the rainy season (from May to October), and is the longest during the dry season (from November to February). Hoa Binh City is located at latitude 20 degrees 49 minutes north, and longitude 105 degrees 20 minutes east, or south of the tropic of Cancer, and sunlight is received from the north in summer. Therefore, the building needs shielding against the intense sunshine. Installation of eaves and balconies are effective.

5) Disaster

① Earthquake

Northern Vietnam, an area which extends from latitudes 17 degrees to 23.5 degrees north, and longitudes 102 degrees to 108 degrees east, experienced more than 2,000 earthquake tremors since the year of 1900, if weak ones are included.
About 60 of them were measured in Hoa Binh Province and surrounding areas.

Against such a background, structural design of buildings needs to consider a certain degree of resistance against seismic forces. The structural design of the Project will incorporate seismic design.

② Typhoon

Data on past typhoons indicate that the maximum wind speed was 25m/sec. The structural design of buildings will refer to the Vietnamese standards for wind loads.
Precipitation exceeded 200mm/hour once in the past 30 years. Instead of using such a large precipitation, occurring only rarely over several decades, as design standard for drainage, measures such as installation of overflow pipes will be considered to cope with emergencies.

(3) Policy toward Socioeconomic Condition

Due to war, Vietnam has long lagged behind the other ASEAN countries in economic development. Since 1986 when the government of Vietnam adopted the policy of Doi Moi, the government has promoted economic development, with delegation of management decisions to state companies, and active introduction of foreign capital. However, human resource development required for management of companies, and installation of social infrastructure are still insufficient.
There are many virtues of the Vietnamese people worthy of admiration, organizational strength of people typical of socialism, diligent and hardworking people, for example. The Project will give due consideration to the socioeconomic aspects of Vietnam mentioned above, and will promote effective project management by encouraging prompt decision making, while giving sufficient advice to the Vietnamese side on the establishment of their executing organization.

(4) Policy toward Construction Business Conditions, Procurement Conditions or Particular Business Conditions, Trade Practices

Since economic liberalization, foreign construction companies have entered the Vietnamese construction market, and this has helped upgrade the construction technologies and mechanization of Vietnamese construction industry. Construction companies of such countries as Hong Kong, Singapore, ROK, Japan, Germany have formed joint venture companies with Vietnamese companies, and have been engaged in construction projects related mainly to foreign capital investments. As a result, an increasing number of Vietnamese engineers have experienced Japanese ways of construction and construction management, and technology transfer and mechanization have made remarkable progress, with noticeable advancement in construction abilities.
Presently, a number of large construction sites for 14 to 20 storied buildings are seen in Hanoi City. Heavy construction machines such as tower cranes, heavy lift cranes, mobile concrete pumps, and pile drivers are used at these construction sites. The prices of construction materials are continuing to rise sharply as a result of the construction boom. Notably steel products are similar to Japan. Under such circumstances, the construction cost is expected to be 10 to 15 percent higher than the corresponding period last year. Accordingly, the Project will give utmost caution to the selection of materials to suppress increase in unit construction costs. Construction materials are generally procurable in Hanoi and surroundings, except for specialized products, and their supply are relatively stable.

(5) Policy toward Employing Local Contractors

The contractor for the construction work of the Project will be a construction company registered in Japan. Normally, Vietnamese construction workers will be engaged in the construction work under subcontract to the main contractor. Although Vietnamese workers who have worked for Japanese construction companies and acquired skills comparable to their Japanese counterparts are available, highly skilled workers qualified for specialized facilities or for advanced technologies are still in short supply. Depending upon required quality of construction work, Japanese professional specialists will need to be dispatched to deliver technical instructions and construction management. In employing local construction companies, proper instructions and management by Japanese companies are necessary in such respects.

(6) Policy toward Executing Agency's Managing and Maintenance Ability

Hoa Binh General Hospital has a history of more than 40 years. Throughout its history, the hospital has added hospital facilities one after another. There are some 20 major buildings. Even some of the recent buildings have deteriorated faster than normal, presumably as a result of severe climatic conditions: high precipitation, high temperature and high humidity. A staff of three persons in charge of facilities and 10 persons for medical equipment is doing maintenance of this hospital. Regarding the maintenance of medical equipment, the hospital may be regarded as having an established system of maintenance, although there is room for improvement in technological and staffing aspects. Facility maintenance on the other hand, requires the strengthening of staffing and technical training.
Given the above condition, one of the most important aspects of project formulation is to facilitate maintenance and to reduce running costs. Materials locally procurable will be preferentially adopted as much as possible.

(7) Policy toward Determination of Grade for Facility and Equipment, etc.

1) Facility Plan

In determining the grades of facilities, reference will be made to the Standards for Medical Facilities used in Vietnam. However, the Japanese standards will be used as necessary to supplement the Vietnamese Standard. The Project consists of the Hi-Tech Block and related facilities, and determination of grades will be conducted to suit the respective functions of these buildings.

2) Equipment Plan

Medical equipment necessary for diagnosis and treatment will mainly be included in the project. Obsolete equipment will be replaced and those with insufficient number will be replenished to restore and improve the deteriorated medical services. Care must be exercised in determining the grade to limit facilities and equipment to those which do not disproportionately increase the operation and maintenance costs of the hospital.

(8) Policy toward Method of Construction and Procurement, and Implementation Schedule

1) Policy toward Method of Construction

A thick peat formation, 20 to 30 meters thick, reaching the depth of the load bearing layer, extends under the entire Hoa Binh City Area. Generally, pile foundations are necessary for building construction.
The commonest type of building structure is reinforced concrete frame structure with brick walls reinforced by lintel girders.

2) Policy for Method of Procurement

Major materials are procurable without problem in and around Hanoi, with few exceptions. Materials of various qualities and specifications from Europe, Southeast Asia, and China are marketed in Vietnam. The materials and equipment to be employed will be locally procured to the extent possible in order to facilitate maintenance and repairs after commissioning. However, quality and availability of the materials will be confirmed to avoid any adverse effect on the construction schedule.

Materials and equipment procured in Japan or third countries and imported will be transported by sea to Hai-phong Port in Vietnam, and transported over land to the construction site in Hoa Binh City by vehicle. The Hanoi City authority bans large vehicles from entering the city in the daytime, and allows them to pass through the city only at night. Therefore, the transportation route has to be planned to bypass Urban Hanoi. Some materials and equipment will need to adopt packing methods that can provide sufficient protection against possible damage from shock, high humidity and high temperature.

3) Implementation Schedule Policy

The planned construction site of the Project is situated in Hoa Binh City, in the area where there is no time regulation on traffic of construction vehicles. Therefore, there is no time constraint on working hours (mid-night construction and holiday construction works). Conceivably, there are few factors that may affect the construction schedule.

There are some buildings on the planned site. These buildings need to be demolished and infrastructure needs to be installed according to the construction schedule of the project.

Diagnosis and treatment activities are being conducted in the existing building on the planned construction site of the Hi-Tech Block. Therefore, this existing building must be demolished by Vietnamese side before the construction of the Hi-Tech Block. This existing building contains a total of 112 beds and delivery rooms. The Table below shows the temporary relocation plan for the construction period. This schedule has been confirmed not to cause any problems.

Table 2-2 Temporary Relocation Plan of the Wards to be Demolished

Ward (to be demolished)	Number of beds	Place to be temporary relocated	Note
Pediatrics	20	- Tuberculosis Ward - Washing and Kitchen Building (1,200 m^2) - Ky Song Hospital	- The Tuberculosis Ward is to be completed by February 2006 in Hoa Binh General Hospital premises - The Washing and Kitchen Building is to completed by October 2006, in Hoa Binh General Hospital premises. - A part of Ky Song Hospital will be used as a temporary ward, if necessary.
Obstetrics (delivery room) Gynecology	50 (2) 15		
Ophthalmology Dent Maxillo Facial	15 12		
Total	112		

As a precautionary measure against possible delay of the above construction works to be done by the Vietnamese side, tentative use of the Ky Song Hospital (with 50 beds) situated near the city border is considered. The Ky Song Hospital with an occupancy rate of 75 percent, or with estimated 25 beds available, is confirmed to be able to accommodate patients who have to be diverted from Hoa Binh General Hospital in case of delays of the above works. Should such a measure become necessary, medical staff will be dispatched from Hoa Binh General Hospital. On the other hand, the study team has been informed that the arrangement for temporary relocation associated with the works to be done on the Vietnam's budget would not have any problem.

2-2-2 Basic Plan (Facility Plan/Equipment Plan)

2-2-2-1 Overall Project Description (Study of the Request)

(1) Field Survey and the Final Request

The field survey was carried out from December 5 to December 25, 2004. The final request agreed in the discussions during that period is shown below.

Table 2-3 Contents of Request, Initial and Final

Block	Initial request	Final request (Minutes of Discussion)
Hi-Tech Block	Operation Theater Laboratory Image Diagnostic Laboratory Functional Exploration Delivery room ICU Lecture room	Operation Theater Laboratory Image Diagnostic Laboratory Functional Exploration ICU Lecture room
Mechanical Block	Water Treatment Transformer Stand-by Generator Medical Gas Supply	 Transformer Stand-by Generator Medical Gas Supply Sewage Treatment Incinerator
Medical Equipment	Equipment for the new building Emergency/ICU Operation Dept. (including Sterilization Room) Diagnostic Imaging Dept. Function Test Dept. Equipment for existing facilities Outpatient Clinic Internal Medicine Ward Infections Ward Tuberculosis Ward Pediatric Ward General Surgery Ward Ob/Gy Ward	Equipment for the new building Emergency/ICU Operation Dept. (including Sterilization Room) Diagnostic Imaging Dept. Function Test Dept. Equipment for existing facilities Outpatient Clinic Internal Medicine Ward Infections Ward Tuberculosis Ward Pediatric Ward General Surgery Ward Ob/Gy Ward Additional requested equipment Biochemical Analyzer Color Doppler ultrasound diagnosis unit

1) Hi-Tech Block

The initial request (November, 2002) included delivery rooms. The existing delivery rooms are provided next to the present obstetrics wards. In conjunction with the implementation of the Grant Aid Project, the existing obstetrics wards (including the paediatrics wards) will be demolished. It has been confirmed that a new obstetrics ward building will be constructed by Vietnamese budget which will take over the present system, and delivery rooms will be installed in the new obstetrics ward building. Accordingly, the delivery rooms in the initial request have been deleted from the final request.

2) Mechanical Block

A sewage treatment plant and an incinerator for the Mechanical Block were requested additionally for environmental considerations. The water supply condition of the area including the hospital has been improved by the implementation of a waterworks project under assistance of another donor. For this reason, the water treatment requested was judged to be not necessary and excluded from the request.

3) Medical Equipment

The items in the original request were considered necessary and appropriate for provision in secondary level medical facilities. At the time of the field survey, additional request was made according to the list of standard equipment list (2002) developed by the Ministry of Health of Vietnam.

(2) Study on the Request

The results of the study on the final request by the Vietnamese side are as follows.

1) Facility Plan

① Consistency with Master Plan prepared by Hoa Binh General Hospital

Being up to 45 years old, the facilities of Hoa Binh General Hospital are considerably deteriorated. The hospital has added new facilities and modified the old facilities without a well-defined total facility plan (master plan) until quite recently. As a result, the hospital can not conduct efficient medical services.

During the field survey period, the study team had detailed discussions on total facility configuration of the hospital, etc., with Hoa Binh General Hospital and concerned Vietnamese officials including representatives of the Health Department of Hoa Binh Province, based on the total master plan of Hoa Binh General Hospital presented by the Vietnamese side. As a result, it was confirmed that implementation of the Project would integrate and centralize the main functions of Hoa Binh General Hospital.

The outline of the Master Plan and the planned construction site are shown in the Figure below. The People's Committee of Hoa Binh Province will promote related projects under the assumption that the master-plan-based rebuilding of Hoa Binh General Hospital is to be completed toward the end of 2007. The total cost for the implementation of the Master Plan is estimated to be 1.9 billion VND. The source of funding is projected to be from the Ministry of Health, the People's Committee of Hoa Binh Province and Japanese Grant Aid.

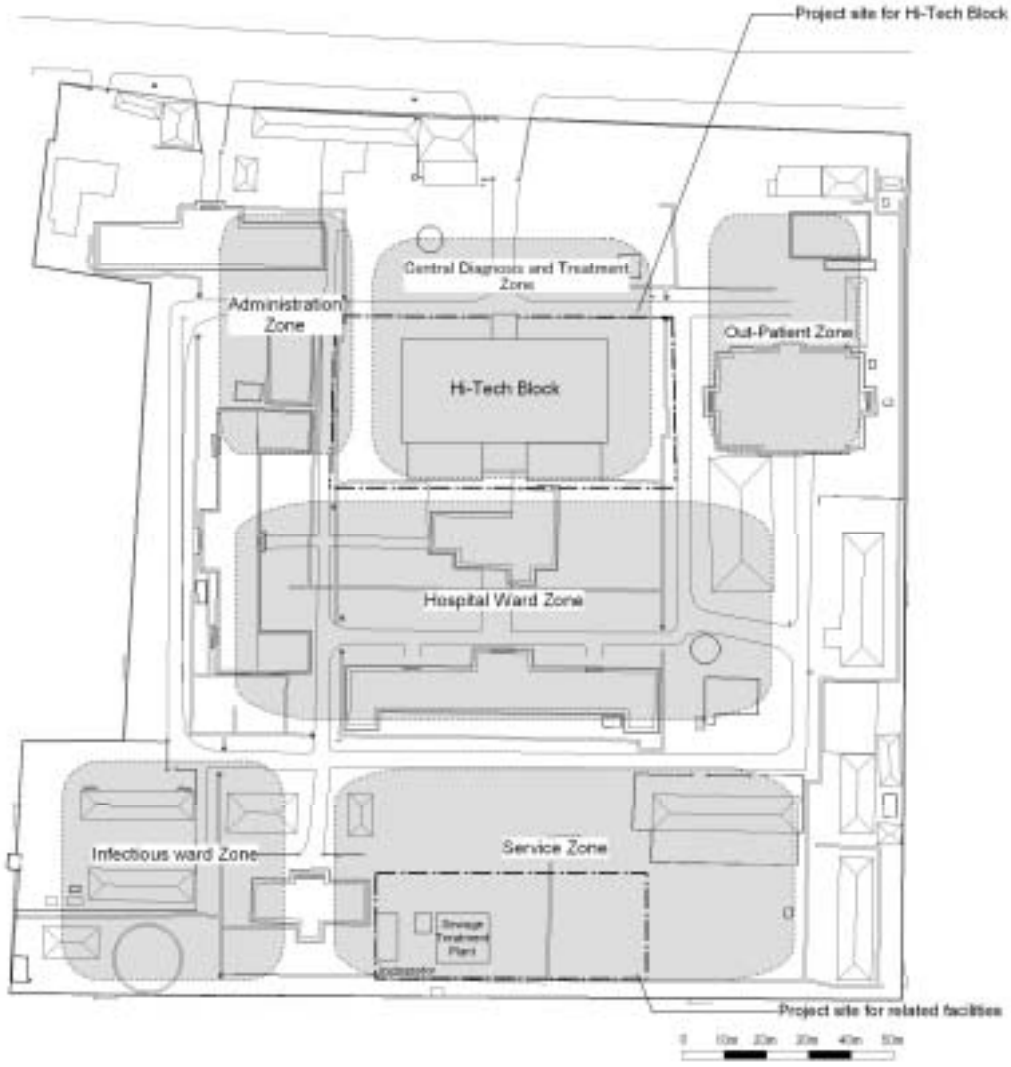


Figure 2-1 Layout of Facilities for Master Plan and Grant Aid Project

② Scope of the Grant Aid Project (Facilities)

The contents of the request concern the central diagnosis and treatment functions of Hoa Binh General Hospital, with highly essentially departments including operation theater and ICUs. The Health Department of Hoa Binh Province has already developed the Master Plan for rebuilding of the hospital, and is in the process of rebuilding the hospital out of their own budget; however, the committee's efforts have not realized total improvement, mainly because of insufficient budget. Such simple buildings as wards or administration buildings are considered possible for the Vietnamese side to rebuild under such arrangements as national budgeting; however, the central diagnosis and treatment portions which require advanced construction technologies are difficult to construct. Therefore, it is considered very effective to build the central diagnosis and treatment portions as a Grant Aid Project.

Inclusion in the Grant Aid Project of both the sewage treatment and the incinerator additionally requested should be considered important from the standpoint of consideration to the surrounding environment. Installation of these facilities will enable the hospital to properly treat wastewater and medical wastes in the hospital premises, thereby preventing environmental contamination attributable to wastewater and medical wastes both inside the hospital premises and its surrounding area.

Furthermore, the scopes of Master Plan and the Grant Aid Project are shown below.

Table 2-4 Master Plan Scope and the Grant Aid Project Scope

Department	Facility Name
Outpatient Department	Outpatient Building
	Rehabilitation Ward
Central Diagnostics Department	Hi-Tech Block
Medical Wards	Obstetrics Pediatrics Ward
	Internal medicine Ward
	Surgery, Orthopedic, Ear Nose & Throat, Ophthalmology
	Psychiatrics
Infectious Diseases Department	Tuberculosis Ward
	Infectious Diseases Ward
	Autopsy, Mortuary
Administration Department	Administration Building
Service Department	Laundry, Kitchen
	Related Facilities

Note: Shade indicates the Grant Aid Project scope.

③ Project scope to facilitate activities of DOHA

Hoa Binh General Hospital will have functions as a base for the DOHA activities of the primary medical facilities in Hoa Binh Province and as clinical education hospitals such as a nursing school. Therefore, it is important that the Grant Aid Project should give due consideration to such functions of the hospital and secure a space for a Lecture room for trainees in the scope of the Grant Aid Project.

④ Due consideration to the referral function as a secondary medical institution

The project will promote the smooth implementation of the ongoing Japanese technical Grant Aid Project. To promote establishing a desired model referral system in Hoa Binh Province, it is first necessary to rehabilitate Hoa Binh General Hospital, which is the top secondary referral hospital in the province, and to restore the hospital to its functions as the top secondary referral hospital. Implementation of the Project is expected to improve the medical services of Hoa Binh General Hospital, leading to improvement of the referral system.

⑤ Prevention of nosocomial infection, and environmental contamination

In order to protect postoperative patients from possible nosocomial infections to the extent possible, the design will consider separation between clean areas and contaminated areas in operation theater, and elimination of crossing of circulation lines of patents and those of medical and healthcare professionals. Improvement of the treating methods of medical wastes, water treatment, and sewage treatment included in the Grant Aid Project will also help suppress nosocomial infections.

2) Equipment plan

① Scope of the Grant Aid Project (Medical Equipment)

The plan will cover the procurement of equipment for the cooperation facilities, which are the departments of the Hi-Tech Block and the departments of existing facilities

Table 2-5 Equipment Procurement Plan

	Hi-Tech Block	Existing Facilities
Target Departments	Emergency/ICU Operation Dept. (including Sterilization Room) Diagnostic Imaging Dept. Functional Test Dept. Clinical Examination Dept.*)	Outpatient Clinic Internal Medicine Ward Infectious Disease Ward Tuberculosis Ward Pediatric Ward General Surgery Ward Ob/Gy Ward

*) Although the Clinical Examination Department was not included in the original request, improvement of this department was considered essential to the performance of functions of the hospital, and it was decided to consider only the biochemical analysis units to replace existing equipment.

② Review of Items in the Additional Request

The additional request contains expensive items of medical equipment, and these were considered to pose difficulties in efficient operation, in view of the present maintenance system, budgets, and manpower organization of Hoa Binh General Hospital. Because of this reason, the study team explained that the additional request was basically unacceptable, but the Vietnamese side expressed strong request concerning the following 6 items:

a. CT scanner
b. C-arm X-ray unit
c. Laparoscope
d. Color Doppler ultrasound diagnosis unit
e. Automatic biochemical analyzer
f. Automatic blood count analyzer

Of the above 6 items, a, b, c, and f were excluded from this plan, because they were considered inappropriate for inclusion in the plan at present in view of the current operation, management, and maintenance conditions of the hospital. The other 2 items (color Doppler ultrasound diagnosis unit and automatic biochemical analyzer) were included in this plan, because they had been used beyond their normal useful life and were worn out. The necessity and appropriateness of these items were confirmed.

Table 2-6 Review of Additional Requested Items

Name of Item	Reason for Request	Existing Equipment	Reason for Exclusion
a. CT scanner	To improve diagnostic functions	Not available	①Because the hospital does not have a cerebral surgery department at present, introduction of the new unit to improve diagnosis will not improve treatment. ②Because there is no existing equipment, introduction of the new unit will require addition of personnel and increase the burden on the hospital's maintenance budget. ③About 4 million yen of maintenance cost will be required yearly, and paying it from the hospital's maintenance budget will be too much a burden.
b. C-arm X-ray unit	To renew existing unit with hardware failures	Available	It was confirmed that a unit procured in 2002 using the JICA special budget is left unused with hardware failures. The existing unit should be repaired and used. The request is excluded from this plan.
c. Laparoscope	To begin laparoscopic surgery	Not available	①Because this is a newly introduced technology, its necessity and appropriateness are not confirmed. ②This technology can be performed at Bach Mai Hospital on a referral basis.
f. Automatic blood count analyzer	To renew malfunctioning existing unit	Available	The malfunctioning of the existing unit has been repaired by the engineers of the manufacturer's local agency, and the unit is now operating well. The existing unit is new (introduced in 2001) and is suitable for continued use.

③ Basic Policy for the Selection of Medical Equipment

The result of the field survey revealed that the existing items cannot perform their intended functions due to oldness or shortage in numbers. It was considered necessary to provide assistance to restore these functions. Because basic instruments that are used frequently in routine work are particularly undersupplied, an emphasis will be placed on the provision of these instruments.

According to this understanding of the situation, the Equipment Plan includes equipment selection prioritizing the following 3 aspects, while basing itself on the "Basic Criteria for Selecting the Equipment". (See Appendix 5)

- Renewal of antiquated equipment,
- Supplementation of equipment with inadequate numbers, and
- Provision of basic instruments that are used routinely.

The quantity of each equipment item will be planned based on the comprehensive evaluation of existing equipment in terms of operating conditions, allocation, number of tests performed, number of surgical operations, etc. The items that are planned to be procured in a future technical cooperation project will be excluded from the plan, as well as the items that should be procured as part of facility construction rather than medical facilities.

Some items of equipments which have electronic parts, such as Color Doppler Ultrasound Apparatus, Automatic analyzer, Blood Pressure Monitor, etc. shall be provided with AVR (Automatic Voltage Regulator) to protect from voltage fluctuations.

Spare parts shall not be included because there is one year guarantee by manufacturer after handing over.

④ Table of the Equipment Study Result

The review of the requested equipment is summarized in the following Table.

Table 2-7 Equipment Study Result

Department	Description	Requested Q'ty	Existing Q'ty	Procurement by Technical Cooperation Scheme	Categories			Planned Q'ty	Q'ty agreed in Minutes of Discussions	Installation Work
					Replacement	Supplement	Instrument for daily use			
Outpatient	Examining Table	20	8		●		●	7	7	
Outpatient	Gynaecological Examining Table	2	1		●		●	1	1	
Outpatient	ENT Treatment Unit	1					●	1	1	
Outpatient	Examining Lamp	10	6		●			5	6	
Outpatient	Film Viewer	5	5		●			5	5	
Outpatient	Weighing Scale with Measure Rod	4	2		●		●	2	5	
Outpatient	Fetal doppler	1						0	1	
Outpatient	Diagnosis instrument set		2		●		●	6	6	
Outpatient	Small operation instrument set		1		●		●	6	6	
Outpatient	Drying oven		1		●			7	7	
Outpatient	Suction Unit		1		●			1	1	
Outpatient	Traial lens set		1		●		●	1	1	
Outpatient	Dental instrument set		1			●	●	1	1	
Outpatient	Instrument table		1		●		●	8	8	
Outpatient	Instrument cabinet		8		●		●	8	8	
Outpatient	Autoclave for Dental clinic							0	1	
Outpatient	Micromotor for Dental		1		●			1	1	
Emergency / ICU	Patient Monitor	4	4	5		●		3	11	
Emergency / ICU	ECG with analyzer	1	1			●		1	1	
Emergency / ICU	Suction Unit	2	2	3		●		2	2	
Emergency / ICU	Examining Lamp	2	1		●			0	2	
Emergency / ICU	Low Pressure Continuous Suction Unit	2	1			●		1	2	
Emergency / ICU	Ventilator		2	5		●		0	4	
Emergency / ICU	ICU bed						●	12	15	
Emergency / ICU	Drying oven		1			●		1	1	
Emergency / ICU	Diagnosis instrument set		2			●	●	2	2	
Emergency / ICU	Film Viewer Big size					●		1	1	
Internal medicine	ECG with analyzer	4				●		1	3	
Internal medicine	Film Viewer	2	1		●	●		3	3	
Internal medicine	Examining Lamp	4	1		●	●		0	3	
Internal medicine	Syringe Pump	2	1			●		3	3	
Internal medicine	Infusion Pump	2	1			●		2	3	
Internal medicine	Nebulizer	4	1			●		2	4	
Internal medicine	Suction Unit	2	1		●			3	3	
Internal medicine	Low Pressure Continuous Suction Unit	5	1		●			2	3	
Internal medicine	Diagnosis instrument set		1				●	6	6	
Internal medicine	Pulseoximeter							1	3	
Internal medicine	Instrument table		1			●	●	6	6	
Infectious Disease	Examining Lamp	2	1		●	●		0	1	
Infectious Disease	Film Viewer	2	1		●	●		1	1	
Infectious Disease	Suction Unit	2	1			●		1	1	
Infectious Disease	Infusion Pump	2	1			●		0	1	
Infectious Disease	Nebulizer	2	1		●	●		1	1	
Infectious Disease	Pulseoximeter							0	2	
Infectious Disease	Instrument table		1		●		●	1	1	
Infectious Disease	Instrument cabinet		1			●	●	1	1	

Department	Description	Requested Q'ty	Existing Q'ty	Procurement by Technical Cooperation Scheme	Categories			Planned Q'ty	Q'ty agreed in Minutes of Discussions	Installation Work
					Replacement	Supplement	Instrument for daily use			
Infectious Disease	Syringe Pump		1			●		1	1	
Tuberculosis	Examining Lamp	2	1		●			0	1	
Tuberculosis	Film Viewer	2	1			●		1	1	
Tuberculosis	Nebulizer	2	1			●		1	2	
Tuberculosis	Pulseoximeter					●		1	1	
Tuberculosis	Instrument table		1		●		●	1	1	
Tuberculosis	Instrument cabinet		1		●		●	1	1	
Pediatrics	Examining Lamp	2	1		●			0	2	
Pediatrics	Infusion Pump	1	1			●		0	2	
Pediatrics	Film Viewer	1	1		●			0	1	
Pediatrics	Low Pressure Continuous Suction Unit	2	1					0	2	
Pediatrics	Drying oven	2	1					0	1	
Pediatrics	Nebulizer	2	1					0	2	
Pediatrics	Ventilator for Children	2						0	2	
Pediatrics	Phototherapy unit with baby cots							0	4	
Pediatrics	Infant warmer							0	3	
Pediatrics	Examining table for baby		1					0	1	
Pediatrics	Instrument cabinet		1					0	2	
Pediatrics	Billirubin meter			1				0	1	
General surgery	Minor operating table		1		●			1	1	
General surgery	Mobile operating lamp		1		●			1	1	
General surgery	Gypsum bandle table		1		●			1	1	
General surgery	Suction Unit		1		●			1	1	
General surgery	Film viewer		1			●		1	1	
General surgery	Minor operating instrument set		1			●	●	2	2	
General surgery	Syringe Pump		1			●		2	2	
General surgery	Infusion Pump		1			●		1	2	
General surgery	Patient Monitor		1		●			1	1	
General surgery	Instrument table		1		●		●	1	1	
General surgery	Instrument cabinet		2		●		●	2	2	
General surgery	Drying oven		1		●			1	1	
Operation theater	Operating Table with Orthopedic Set	1	1		●			1	1	
Operation theater	Operating Table	3	5		●			2	4	
Operation theater	Ceiling Operating Lamp	5	3		●			4	6	●
Operation theater	Electric Surgical Unit	5	1		●	●		4	6	
Operation theater	Scrub Station	2			●			2	3	●
Operation theater	Suction Unit	6	2			●		2	4	
Operation theater	Film Viewer	3	2					0	6	
Operation theater	Minor Operating Instrument Set	4	2			●	●	4	6	
Operation theater	Medium Operating Instrument Set	3	2			●	●	2	4	
Operation theater	Major Operating Instrument Set	3	1			●	●	2	3	
Operation theater	Syringe Pump	3	1			●		2	3	
Operation theater	Infusion Pump	4	1			●		2	4	
Operation theater	Patient Monitor	5	1			●		3	5	
Operation theater	Instrument table	6	5		●	●	●	4	6	
Operation theater	Drying oven	2	1		●			1	2	
Operation theater	Defibrillator	2	1			●		2	2	
Operation theater	Gynaecological Operating Table	2	1		●			1	1	
Operation theater	Instrument cabinet		3					0	6	
Operation theater	Anesthesia apparatus with ventilator		1	2		●		1	3	
Operation theater (Recovery)	Patient Monitor		1					0	1	
Operation theater (Recovery)	Suction Unit		1			●		1	1	

Department	Description	Requested Q'ty	Existing Q'ty	Procurement by Technical Cooperation Scheme	Categories			Planned Q'ty	Q'ty agreed in Minutes of Discussions	Installation Work
					Replacement	Supplement	Instrument for daily use			
Operation theater (Recovery)	Blood pressure monitor					●		1	1	
Operation theater (Recovery)	Pulseoximeter					●		1	1	
Obstetrics	Delivery Table	4	3					0	3	
Obstetrics	Gynaecological Examining & Delivery Table	4	1					0	1	
Obstetrics	Vacuum extractor	4						0	2	
Obstetrics	Examining Lamp	4	1					0	2	
Obstetrics	Film Viewer	2	1					0	2	
Obstetrics	Syringe Pump	2	1					0	2	
Obstetrics	Infusion Pump	2	1					0	2	
Obstetrics	Family Planning Instrument Set	2	1					0	2	
Obstetrics	Instrument table		1					0	2	
Obstetrics	Fetal monitor (CTG)			1				0	1	
Obstetrics	Fetal doppler		1	2				0	2	
Obstetrics	Instrument set for Delivery		3					0	3	
Obstetrics	Drying oven		1					0	1	
Image Diagnosis	Film Viewer Big size	4	1			●		1	2	
Image Diagnosis	Fluoroscopic X-ray T.V. System	1	1		●			1	1	●
Image Diagnosis	X-ray Film Processor	1	1		●			1	1	●
Image Diagnosis	General X-ray Appratus	1	1		●			1	1	●
Image Diagnosis	Ultrasound color doppler		1		●			1	1	
Function Exam.	Spirometer	1				●		1	1	
Function Exam.	ECG with analyzer		1	1				0	1	
Function Exam.	EEG		1					0	1	
Function Exam. (Endoscopy)	Bronchus Fiberscope	1						0	1	
Function Exam. (Endoscopy)	Gastro Fiberscope	1	1		●			1	1	
Function Exam. (Endoscopy)	Endoscopic table		1			●		1	1	
Function Exam. (Endoscopy)	Cleaner for Endoscopy		1			●		1	1	
Sterilized supply room	High pressure steam sterilizer›300L	1				●		1	2	●
Laboratory (Bio-chem)	Automatic analyzer		1		●			1	1	

3) Soft Component

At present, there are deficiencies in facility maintenance and an almost total lack of classified collection of medical waste due to lack of knowledge of the maintenance staff. The hospital side must recognize the importance of the maintenance department and take appropriate maintenance activities to remedy the situation. Therefore, it was judged that implementation of Soft Component to provide Technical guidance for facility operation and maintenance, including medical waste disposal was justified.

The basic policy will be to set the scope within the sustainable development in technical and financial terms based on existing facility management capabilities.

2-2-2-2 Site Plan

(1) Shape and Use of the Site

National Highway No. 6, a main trunk road of Vietnam, runs along the north border of the site of Hoa Binh General Hospital. It is considered natural that the present entrance to the hospital site will be used in the future.

Two construction sites are set aside for the Project, one in the northern central portion of Hoa Binh General Hospital premises for the Hi-Tech Block, the other in the southern portion of the premises for the related facilities.

The construction site for the Hi-Tech Block is situated directly facing the entrance to the hospital, the best location for visit by referral patients, and readily noticed by patients' families and visitors who come to the hospital.

The construction site for the related facilities is well suited to connect to intake for infrastructure and to discharge wastewater.

The shape of the entire hospital site is nearly rectangular and the area is about 4 hectares. The construction site for the Hi-Tech Block measures about 80 meters in the east west direction and 40 meters in the north south direction, with an area of about 3,200m^2. The construction site for the related facilities measures about 65 meters in the east west direction and 25 meters in the north south direction, with an area of about 1,600m^2.

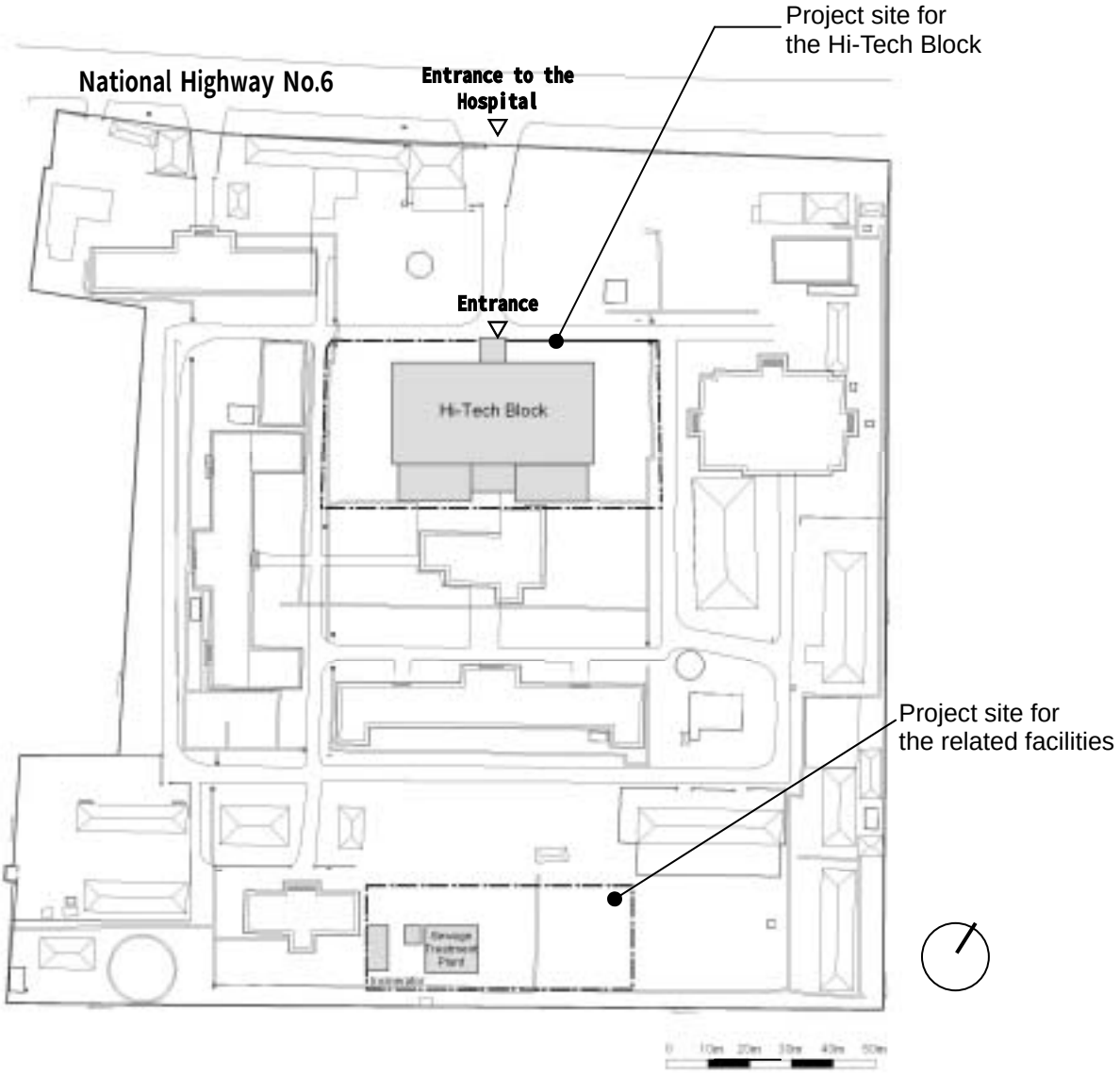


Figure 2-2 Layout Plan

2-2-2-3 Architectural Plan

(1) Facility Composition

The Hi-Tech Block includes X-ray diagnosis rooms, physiological examination rooms, specimen examination rooms, operation theater, sterilization rooms for operation theater, which constitute the central diagnosis and treatment function, and ICU and lecture room.
Functions constituting the central diagnosis and treatment area to which patients come for diagnosis and treatment, such as X-ray diagnosis rooms, physiological examination rooms, will be placed on the first floor. The functions without significant patient circulation, such as the specimen examination rooms and operation theater will be placed on the upper floors.
In Viet Nam (Hoa Binh General Hospital as well), the function of ICU is related more closely with various diagnostic and treatment departments than with the operation theater; therefore, it is not directly connected with the operation theater but is placed on the second floor just beneath the operation theater to facilitate access also from various diagnosis and treatment departments.
The lecture room is placed on the first floor, because the lecture room will be a base of the DOHA activities and therefore should be readily accessible for visitors not belonging to the hospital. The function of the lecture room is closely related with the administrative function of the hospital. Therefore, the lecture room is placed in the location close to the administration building planned by the Master Plan.

(2) Conditions for Determination of Facility Capacity

The following assumptions have been established as basis for calculating required capacities of pertinent rooms of the concerned departments. Relevant data were processed to arrive at the required capacities.

Assumption

1) Annual Working Day

The diagnosis and treatment departments are open five days a week from Monday to Friday except for those concerning emergency treatments, which are open throughout the year; therefore, annual working days are assumed to be 260.

2) Conditions of Operation of the Central Diagnosis and Treatment Function

Based on the results of interview surveys and other information, the time efficiencies of various rooms of the central diagnoses and treatments function are assumed as indicated below. These values agree with conditions confirmed in other hospitals in Vietnam, including Hue Central Hospital, and is considered to be appropriate.

General roentgenography: 12 persons per hour
Radioscopy: 3 persons per hour
ECG: 2 persons per hour
EEG: 1 persons per hour
Ultra sound: 6 persons per hour
Endoscope: 1.5 persons per hour
Operation Department: 2.5 procedures per day per room

3) Conditions for the number of beds

The beds are in use 365 days a year. The patients stay in the ICU for 3.8 days and in the recovery room for 1 day on average.
The hospital should have some ICU beds and recovery room beds unoccupied in preparation for emergencies. For this reason, the appropriate occupancy rate is assumed to be 90% for the capacity calculation. Although accurate written data is not available, the number of patients for ICU is approximately 920 per year based on the interviews and observation of the existing ICU.

4) Patient Estimation

The number of patients is estimated for the year 2012, or five years after the Project is commissioned. The number of patients is considered to increase in proportion to the population; therefore, the number of patients is estimated according to the population increase forecast by the provincial authority based on the past population increase in Hoa Binh Province of Vietnam. The Table below shows the data on population the study team has obtained. From this Table the population in the year of 2012 is estimated to be about 1.1 times the present population (2005). The rate of population increase in Vietnam is 1.18 percent (2003); from this, the forecast by the Hoa Binh Province authority is considered to be correct. Accordingly, the number of patients is assumed to be 1.1 times the present number.

Table 2-8 Rate of Increase for Population in Hoa Binh Province

Year	Population	Rate of increase
1999	759,555	—
2003	795,430	*1.181%
2004	805,452	1.260%
2005	814,715	**1.150%
2010	862,654	***1.177%
2012	883,080	1.177%

*Average rate of increase for 4 years from 1999 to 2003
**Forecast population and rate of increase in Hoa Binh Province for 2005
***Forecast population for 2010 and average rate of increase for 5 years
Source: People's Committee of Hoa Binh Province

(3) Calculation of Number of Rooms Required

The numbers of required rooms for individual functions of the hospital are calculated as shown below from the data obtained for 2003 with the exception of the X-ray Department, for which data for 2003 shows reduced operation days because of equipment failure, and the data for 2002 is used in the calculation.

Table 2-9 Major Medical Activities in the Hoa Bihn General Hospital

	1999	2000	2001	2002	2003
Number of beds	250	250	250	300	300
Total number of operations	2,174	2,079	2,331	2,607	2,792 (major operation 1,933)
Number of Fluoroscopy examination	4,897	4,926	3,650	4,253	3,307
Number of general X-ray examination	8,101	8,005	9,179	12,543	10,602
Ultra sound examination	6,726	4,121	4,737	7,054	8,830
ECG examination	1,833	1,792	1,575	2,038	2,527
EEG examination	0	0	326	820	1,047
Endoscope examination	3,085	1,685	1,873	1,880	1,920

Source: Hoa Binh General Hospital

A. X-ray Department

General X-ray	12,543 × 1.1 (rate of population growth)/260 days /6 hours/12 persons (number of patients per hour) = 0.74 1 room
Fluoroscopy	4,253 × 1.1 (rate of population growth)/260 days/6 hours/3 persons (number of patients per hour) = 1.00 1 room

B. Physiological examination, endoscope Departments (the movement to the new building is the Vietnamese portion of work.)

ECG	2,527 × 1.1 (rate of population growth)/260 days/6 hours/2 persons (number of patients per hour) = 0.89 1 room
EEG	1,047 × 1.1 (rate of population growth)/260 days/6 hours /1 person (number of patients per hour) = 0.74 1 room
Ultra sound (For obstetrics)	existing equipment 1 room
Color Doppler (Ultra Sound)	8,830 × 1.1 (rate of population growth)/260 days/6 hours/6 persons (number of patients per hour) = 1.04 1 room
Endoscope	1,920 × 1.1 (rate of population growth)/260 days/6 hours/1.5 persons (number of patients per hour) = 0.90 1 room

C. Operation Department

Operation room	1,933 × 1.1 (rate of population growth)/260 days/2.5 persons (rotations per day) = 3.27 4 rooms (including one for infectious diseases)

The above Figure is for 260 day, however, if emergency treatment on 365 days/24 hour basis is assumed many more operations can be performed (4 rooms × 2.5 persons × 365 days/1.1 = 3,318). If 3 persons per day can be treated the operation numbers can be increased to just under 4,000 (4 rooms × 3 × 365/1.1 = 3,981).

D. ICU Department

Number of beds	920 × 1.1 (rate of population growth) × 3.8 days (average in hospital days)/365 days = 10.53 10.53/0.9 (occupancy rate) = 11.7 12 beds (including 2 beds for infectious diseases)

The present occupancy rate is about 0.8; however, this study uses an occupancy rate of 0.9, assuming more effective use of beds.

E. Recovery Department

Number of beds	1,933 × 1.1 (rate of population growth) / 260 days = 8,178 8 beds

Recovery beds are used for 24 hours. After the patient regains consciousness, he is taken to ICU or other wards according to status.

(4) Required Floor Area

The total floor area of the planned building is calculated from the required numbers and other information of various rooms calculated above. The area of a given room of the Project is determined referring to the standards for medical facilities in use in Vietnam and standards for

floor area of medical facilities of Japan (Design Reference Tables of the Architectural Institute of Japan), while considering the present states of the existing facilities concerned.
Further, determination of floor area takes into account the layout of the medical facilities and equipment to be installed in each room, numbers of patients and medical staff to be working in the room.

Table 2-10 Floor Area of Each Room of the Project Facility

Hi-Tech Block (1st floor)

〔Department〕 Room	Area (㎡), Size (m)	
〔Physiological examination, endoscope〕		
ECG, Ultra Sound, Consultation	47.1	3.18 × 9.18
		2.83 × 6.35
Color Doppler Room	10.1	3.18 × 3.18
EEG	10.1	3.18 × 3.18
Physical Test	20.1	3.18 × 6.35
Staff Room (1)	21.2	7.50 × 2.83
Conference Room (1)	19.0	3.18 × 6.00
Endoscope, Exam, Wash Room	51.6	8.60 × 6.00
Sub Total	179.2	
〔X-Ray〕		
CT	38.7	6.15 × 6.30
Fluoroscopy	17.7	6.18 × 2.88
Preparation Room	9.0	3.13 × 2.88
Dark Room	9.8	3.13 × 3.15
Mammography Room	16.3	5.20 × 3.15
Film Viewing	14.9	5.20 × 2.88
X-Ray	24.1	4.03 × 6.00
Staff Room (2)	30.2	10.68 × 2.83
Sub Total	160.7	
〔Machine Room〕		
Sterilization Machine Room	6.0	3.00 × 2.03
PBX Room	6.9	3.00 × 2.33
Medical Gas Room(1)	13.5	3.00 × 4.50
Medical Gas Room(2)	20.2	4.50 × 4.50
Medical Gas Room(3)	26.5	3.00 × 8.85
Work Shop	19.5	4.50 × 4.35
Water Reservoir	34.5	5.85 × 5.90
Pump Room	17.9	
Sub Station	100.2	11.33 × 8.85
Generator Room	42.2	5.30 × 6.83
		3.00 × 2.03
Neutralization Machine Room	6.0	3.00 × 2.03
Sub Total	293.4	
〔Others〕		
Lecture Room	84.0	6.83 × 12.30
Night Duty(1)	10.7	3.40 × 3.15
Night Duty(2)	10.8	3.43 × 3.15
Manager's Room(1)	19.3	6.83 × 2.83
Doctor's Room	43.2	6.83 × 6.33
WC(1)(2)(5)	29.2	9.30 × 3.15
Changing Room(1)	14.6	4.65 × 3.15
Changing Room(2)	14.6	4.65 × 3.15
Common Space	592.3	
Sub Total	818.7	
1st Floor Total	1452.0	

Hi-Tech Block (2nd floor)

〔Department〕 Room	Area (㎡), Size (m)	
〔ＩＣＵ〕		
Night Duty(3)	12.0	3.83 × 3.15
Night Duty(4)	12.0	3.83 × 3.15
Manager's Room(2)	15.3	5.78 × 2.65
Conference Room(2)	20.1	6.35 × 3.18
Rest Room(1)	17.4	3.00 × 5.83
Changing Room(3)	17.4	3.00 × 5.83
Changing Room(4)	16.4	2.83 × 5.83
Dirty Utility Room(1)	5.1	1.65 × 3.15
Ante Room(1)	9.9	3.33 × 3.00
Equipment Room(1)	12.8	4.50 × 2.85
ICU(1)	208.0	14.98 × 9.33 etc.
ICU(2)	22.8	6.35 × 3.60
ICU(3)	19.0	6.35 × 3.00
Sub Total	388.2	
〔Specimen Examination〕		
Blood Bank	22.0	5.83 × 3.78
Blood Collecting Room, Waiting(3)	16.9	2.83 × 6.00
Hematology	47.3	6.00 × 6.00
		3.00 × 3.78
Analytical Measurement	10.8	3.00 × 3.60
Draft Room	9.0	3.00 × 3.00
Balance Room	9.5	3.00 × 3.18
Biochemistry Room	69.2	6.00 × 9.78
		1.15 × 9.18
Washing(2)	12.0	3.00 × 4.00
Dark Room(2)	9.4	3.00 × 3.15
Cutting Room	9.0	3.00 × 3.00
Pathology	31.8	3.15 × 9.85
		2.85 × 0.30
Ante Room(2)	8.0	2.00 × 4.00
Dirty Test Room	10.0	2.50 × 4.00
Medium Prep Room	10.0	2.50 × 4.00
Micro Biology Room	43.0	7.00 × 6.15
Changing Room(5)	14.6	4.65 × 3.15
Changing Room(6)	14.6	4.66 × 3.15
Night Duty(5)	9.4	3.00 × 3.15
Night Duty(6)	9.4	3.00 × 3.15
Manager's Room(3)	18.0	6.00 × 3.00
Manager's Room(4)	18.0	6.00 × 3.00
Manager's Room(5)	18.9	6.00 × 3.15
Conference Room(3)	12.3	4.35 × 2.85
Corridor(6)	29.2	16.00 × 1.83
Corridor(7)	62.6	2.15 × 18.30 etc.
Sub Total	524.9	
〔Others〕		
WC(3)	10.1	3.18 × 3.18
WC(4)	10.1	3.18 × 3.18
Common Space	224.9	
Sub Total	245.1	
2nd Floor Total	1158.2	

Hi-Tech Block (3rd floor)

〔Department〕 Room	Area (㎡), Size (m)	
〔Operation〕		
Operation Room(1)	37.8	6.15 × 6.15
Operation Room(2)(3)(4)	127.2	18.18 × 7.00
Equipment Room(2)	21.0	3.00 × 7.00
Dirty Utility Room(2)	6.0	3.00 × 2.00
Operation hall	92.5	21.18 × 2.83
		2.83 × 9.83
		2.83 × 1.68
Washing(3)	6.0	2.83 × 2.15
Ante Room(4)	15.7	2.70 × 5.83
Corridor for Used Material	51.9	24.18 × 2.15
Manager's Room(6)	12.7	4.00 × 3.18
Night Duty(7)	11.8	3.00 × 3.18
		1.00 × 1.50
		1.00 × 1.68 ×0.5
Night Duty(8)	15.6	3.18 × 3.73
		2.00 × 1.50
		1.00 × 1.50 ×0.5
Rest Room(2)	6.7	1.18 × 3.18
		2.00 × 1.50
Changing Room(7)	19.0	2.83 × 6.73
Changing Room(8)	20.1	3.00 × 6.73
Conference Room(4)	22.5	3.35 × 6.73
Staff Room(5)	9.5	3.00 × 3.18
Ante Room(3)	23.2	2.83 × 8.23
Sub Total	499.2	
〔Sterilization〕		
Sterilized Equipment Room	56.2	6.00 × 5.83
		3.00 × 2.83
		6.98 × 1.83
Changing(11)	12.1	3.48 × 3.50
Disposal Room	15.0	3.00 × 5.00
Washing & Packing Room	73.3	9.50 × 6.15
		5.65 × 2.65
Autoclaves Room	24.0	6.00 × 4.00
Changing Room(9)	19.0	3.00 × 6.35
Changing Room(10)	19.0	3.00 × 6.35
Sub Total	218.6	
〔Recovery〕		
Recovery Room	137.3	11.83 × 9.90
		3.00 × 6.73
Storage Room(1)	3.6	1.15 × 3.18
Storage Room(2)	4.0	1.15 × 3.55
Dirty Utility Room(3)	3.6	1.15 × 3.18
Sub Total	148.5	
〔Others〕		
Air Conditioning Machine Room	51.7	3.45 × 15.00
Common Space	333.7	
Sub Total	385.4	
3rd Floor Total	1251.7	

Hi-Tech Block (Roof)

〔Department〕 Room	Area (㎡), Size (m)	
〔Others〕		
Storage(3)	55.0	6.98 × 7.05
		2.00 × 2.90
Common Space	31.7	2.00 × 4.15
		3.33 × 7.05
Roof Total	86.7	
Total Floor Area	3948.6	

Related Facilities

〔Department〕 Room	Area (㎡), Size (m)	
〔Incinerator〕		
Incinerator	40.0	4.00 × 10.00
〔Sewage Treatment Plant〕		
Machine room	17.2	4.05 × 4.25
Total Floor Area	57.2	

(5) Facility Configuration (Function)

The facility configuration of the Grant Aid Project is as shown below.

Table 2-11 Facility Configuration of the Project

Building / floor		Configuration
Hi-Tech Block	1st	X-ray Department, Physiological Examination and Endoscope Department, Staff Night Duty Rooms and others, Machine Room
	2nd	Specimen Examination Department, ICU Department
	3rd	Operation Department, Recovery Department, Sterilization Department
Related Facilities		Incinerator, Sewage Treatment Plant, Machine Room

(6) Floor Planning

X-ray Department

The reception of the X-ray Department is located so as to be easily noticeable from the main entrance of the building. Locating the X-ray Department on the first floor makes the department easy for patients to access.

Rooms containing sophisticated medical facilities and equipment need air conditioning. The rooms associated with radiography are placed in the central part of the building where temperature and humidity conditions are relatively stable and less susceptible to influences from outside. Around such rooms are placed waiting spaces for patients which are naturally ventilated. The traffic lines of hospital staff and those of patients are clearly separated to improve the hospital functions and efficiency.

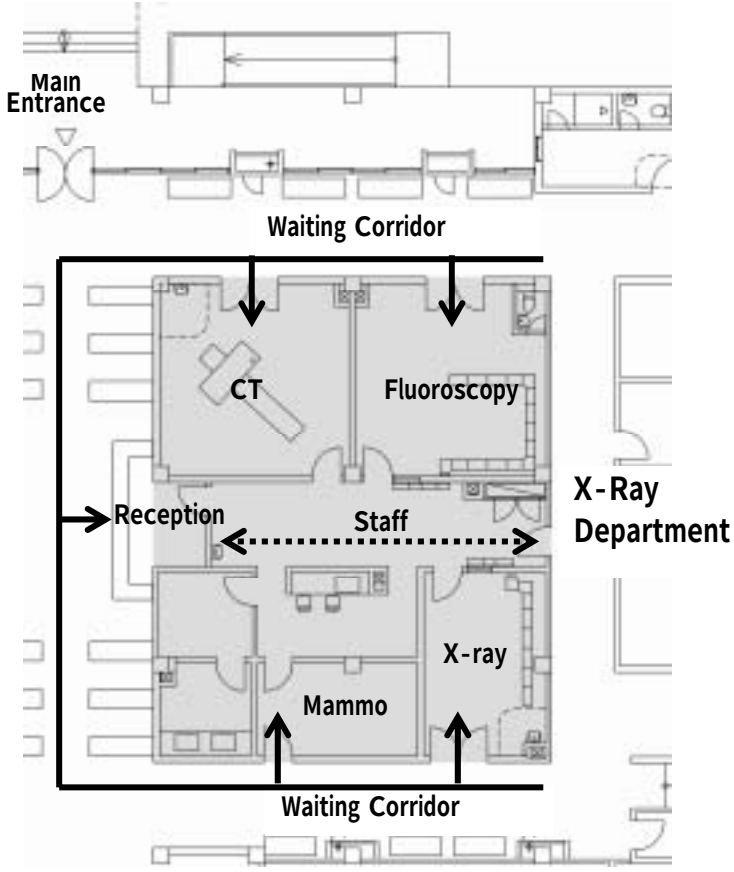


Figure 2-3 Hi-Tech Block 1st floor X-ray Department

Physiological Examination Department, Endoscope Department

The reception is located close to the main entrance so that it may be easily noticed by the patients.

Various test rooms constituting the Physiological Examination Department are arranged for ease of comprehension of the floor layout by the patients and also to help the hospital staff work efficiently.

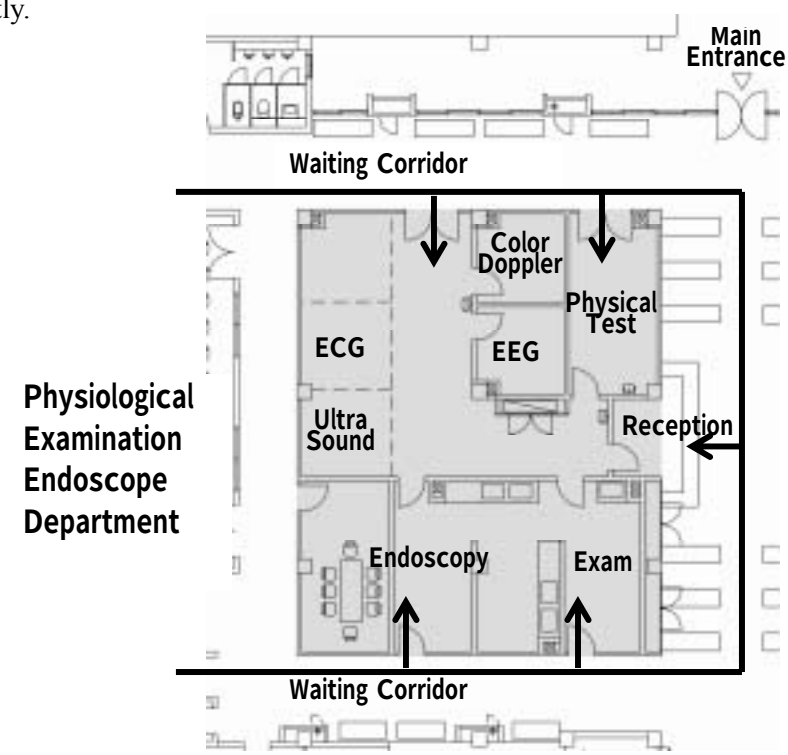


Figure 2-4 Hi-Tech Block 1st floor
Physiological examination/Endoscope Department

Specimen Examination Department

The function of this department consists mainly of blood examinations, biochemical examinations, pathological examinations, and microbiological examinations. The test rooms of these functions will be large multi-functional rooms having external walls with windows open to the outside, to achieve high workability and efficiency.

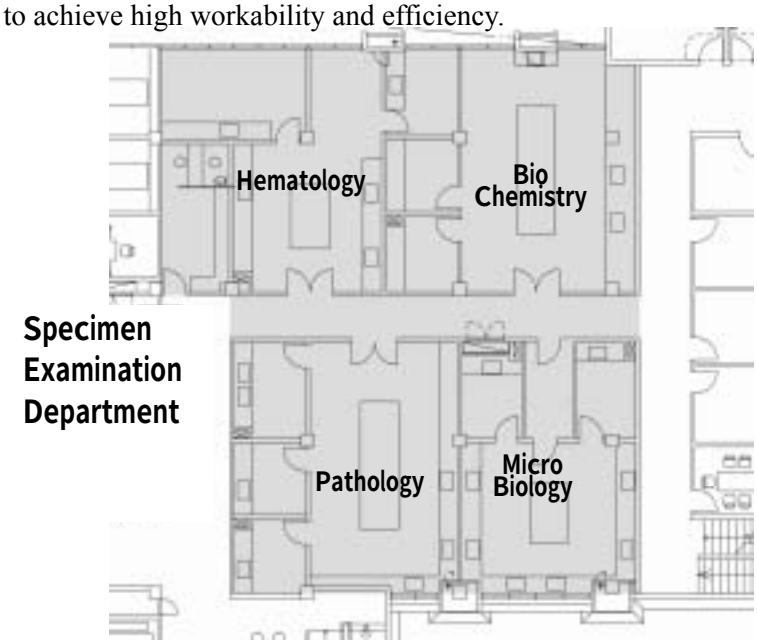


Figure 2-5 Hi-Tech Block 2nd floor
Specimen Examination Department

ICU Department

The ICU is designed to be easily visible from the staff station. The design calls for passing the changing room for changing garments when entering the ICU from the ordinary corridor.

The ICUs of hospitals in Vietnam, (Hoa Binh General Hospital for example), mainly accommodate serious patients from various diagnosis and treatment departments, rather than accommodate postoperative patients. The wards for infectious diseases are private (one-bed) rooms and belong to the ICU Department.

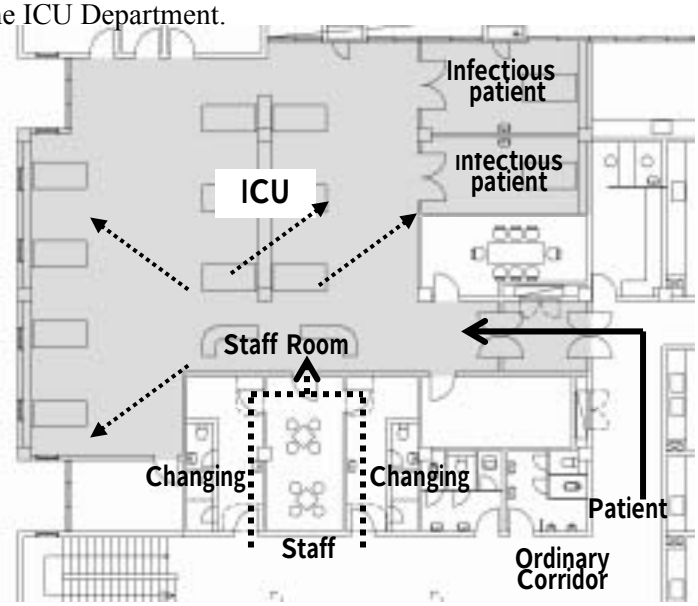


Figure 2-6 Hi-Tech Block 2nd floor ICU Department

Operation Department, Recovery Room

The system of dual corridors will be applied to the Operation Department mainly to ensure prevention of infection, and the circulation lines of contaminated postoperative equipment and materials are strictly distinguished from those of medical staff and patients.

Since orthopedic operations will also be conducted, operation theaters will be wider to permit layout of operation facilities and equipment.

The recovery room will be made easily visible from the staff room and is directly connected with the Operation Department.

In Japan, patients stay in the recovery room only until they recover from anesthesia; however in Vietnam, unlike Japan, patients normally stay for 24 hours after operation on an average. The design assumes 24-hour stay after operation.

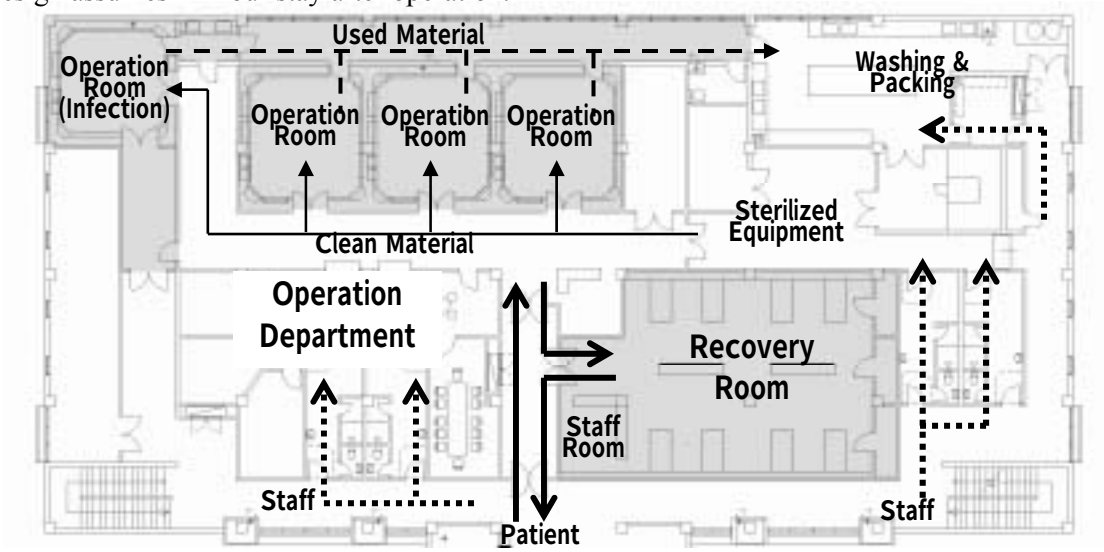


Figure 2-7 Hi-Tech Block 3rd floor Operation Department/Recovery Room

(7) Elevation Planning (shape, exterior surfacing material)

Almost all existing buildings have cement mortar walls finished with paints, presumably because these materials are relatively easy to maintain. Portions that can be easily reached by hand will be finished with painted cement mortar that can be easily repainted. Portions that are difficult to reach by hand will be finished with porcelain tiles that do not require frequent cleanings. A number of existing buildings adopt vertical or horizontal concrete louvers to fend off the direct sunlight. The Project also adopts such louvers to the portions for natural lighting and ventilation to reduce heat load.

(8) Section Planning

The Master Plan prepared by the hospital specifies that the floor level of the first floor be 150mm to 450mm from the ground level. The site of hospital is generally lower by 1 meter than National Highway No. 6 which runs in front of the hospital. To reduce the risk of damage by heavy rains associated with typhoons to the extent possible, the floor level of the first floor is set at 450mm from the ground.

The common areas, such as corridors and patients' waiting rooms are planned mainly for natural ventilation. The building will be designed to have sufficient openings to permit air to pass through. Furthermore, to provide greater air volume, the ceilings will not be covered by ceiling boards.

The Hi-Tech Block is a three-storied building, with operations and ICUs on the upper floors. Therefore, elevators suited for quick and safe transportation of patients are installed.

The story height will be 4.2 meters to secure enough space for pipes and ducts for air conditioning, water supply and drainage.

Ideally speaking, two sets of elevators should be installed to have one elevator operational during maintenance. However, one set of elevator will be installed for the reason of operation cost, while preserving a space for an additional elevator.

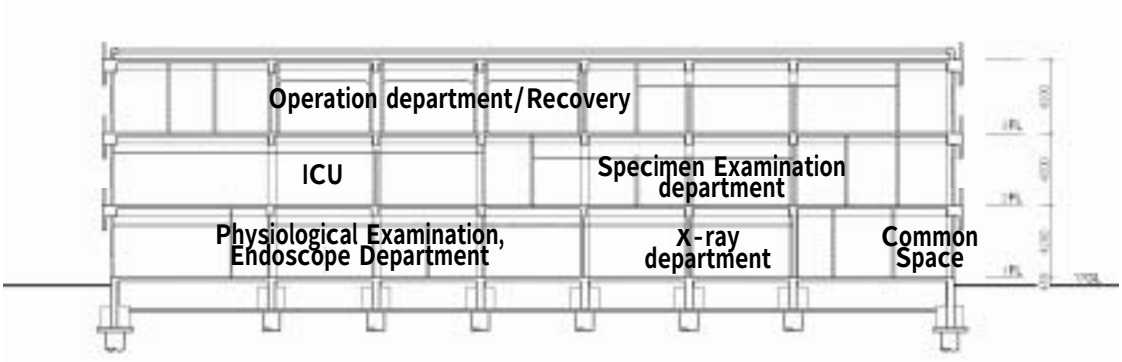


Figure 2-8 Section Diagram of Hi-Tech Block

2-2-2-4 Structural Plan

(1) Structural Plan

The major facility to be newly constructed by the Project is the Hi-Tech Block that has central diagnosis and treatment function, ICUs and training function. The Hi-Tech Block is a three-story rectangular building measuring 54 meters by 31 meters in plan. The basic span of the building is 6 meters by 6 meters, and the floor to floor height is 4.2 meters for all stories. The building will be of reinforced concrete structure, a structure common in Vietnam. The building is a rigid frame structure of reinforced concrete, with reinforced concrete walls constituting portions of the structure, such as stairwell. The design will use seismic structural design.

(2) Foundation Plan

For the Hi-Tech Block, pile foundations, resting on the 18 meter deep gravel-containing sand layer as bearing stratum, will be used.
Precast RC piles of 400mm to 500mm diameter are commonly used locally. However, supposing the length of the piles to be 18 meters, three piles must be connected with two joints to secure the necessary length. In this case, the reliability of joints is questionable with the method locally adopted. For this reason, the cast-in-place concrete piles will be adopted, a method more reliable and also used locally in many cases.

(3) Basic Policy for the Structural Design

The following are basic policies for the structural design for the Project.

- The magnitudes of forces and loads acting on the buildings will be determined from such factors as local climatic conditions, topography, ground conditions, and uses of the buildings.
- The allowable stresses of the materials used for design calculation will basically conform to the various standards of Vietnam. However, quality of each material will be taken into consideration in determining the allowable stresses.
- The stress analysis and cross section analysis of the frame will be done according to the various standards of Vietnam and Japan.

(4) Load and External Force

The loads and external forces will be calculated according in principle to the architectural standards of Vietnam.

1) Dead load

The dead load will be determined as the calculated sum for all materials and members.

2) Live load

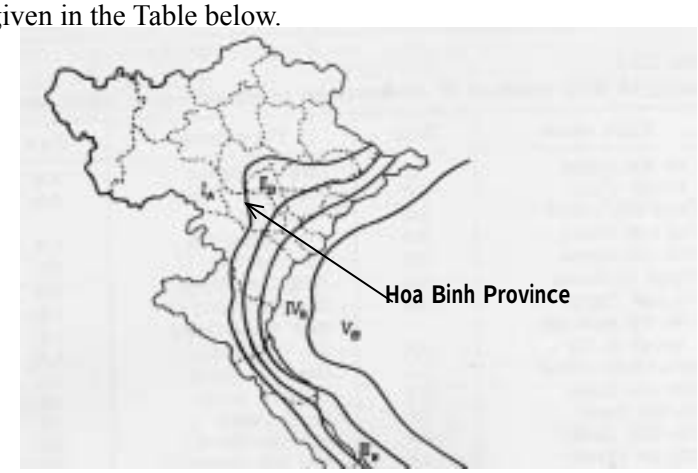
The live load will be determined according to the design standards on load, TCVN2737, of Vietnam, and the planned use of the rooms. The typical live loads are shown in the Table below.

Table 2-12 Typical Live Load

Room	Live load (N/m^2)
Recovery room, ICU	2,000
Diagnosis and treatment room, operation room, various examination room, office room	3,000
Machine room	5,000
Roof	1,000

3) Wind load

The previously mentioned design standard on load, TCVN2737, is used to calculate the wind loads. The reference wind pressure that should be used for calculation is available for each area. Hoa Binh City falls under the IA area, for which the design reference wind pressure is 550N/m^2, as given in the Table below.



Source: CONSTRUCTION PUBLISHING HOUSE "BUILDING CODE OF VIETNAM VOLUME Ⅲ ISSUED IN CONJUNCTION WITH DECISION No 439/BXD-CSXD OF THE MINISTER OF CONSTRUCTION DATED 25 SEPTEMBER 1997"

Figure 2-9 Area Classification for Wind Pressure in Vietnam

4) Seismic load

The architectural standard of Vietnam requires buildings to be designed incorporating the seismic load. However, the standard does not indicate practical methods for setting the seismic force.

The record on earthquakes in Hoa Binh and surroundings since 1900 indicates about 60 earthquakes including weak tremors. 15 earthquakes were reportedly of magnitude equal to or greater than 4. The strongest was recorded in 1991, with a magnitude of 4.8.

Table 2-13 Record on Major Earthquakes in Hoa Binh and Surroundings

Year	Earthquake center		Depth (km)	Magnitude
	Latitude north	Longitude east		
1997	21.58	105.75	4	4.0
1993	21.04	104.63	19	4.2
1992	21.19	104.18	9	4.2
1992	21.19	104.27	5	4.3
1991	21.36	104.18	11	4.4
1991	21.38	104.16	7	4.8
1989	20.81	105.30	2	4.6
1987	21.57	106.27	10	4.6
1982	21.02	104.30	10	4.1
1977	20.05	105.62	19	4.7
1977	20.31	105.78	17	4.1
1975	21.00	106.82	15	4.1
1974	20.63	105.10	17	4.1
1973	20.30	104.96	17	4.1
1973	20.44	105.47	17	4.1

Source: NATIONAL CENTER FOR SCIENCE AND TECHNOLOGY OF VIETNAM INSTITUTE OF GEOPHYSICS "EARTHQUAKES IN THE NORTH OF VIETNAM UP TO 2002 between latitudes 17.0N and 23.5N"

The design of the project facilities will consider seismic load value of about 4 of the Japan Meteorological Agency Seismic Intensity Scale as the strongest expectable earthquake, and will set the ground surface acceleration at about 50gals, considering the past earthquake intensity record and occurrence frequency. This value corresponds to about a quarter of the seismic load used for seismic design in Japan.

(5) Material

1) Concrete

Plain concrete will be used. Design strength of Fc = 24N/mm^2 will be used.

2) Reinforcing bar

Deformed bars will be used. The bars will conform to Japanese Industrial Standards (JIS) G3112, which are easily procurable locally. Two types of different strengths, SD295 (yield point strength at 295N/mm^2 or more) and SD345 (yield point strength at 345N/mm^2 or more), will be used.

2-2-2-5 Mechanical and Electrical Plan

(1) Electrical Facilities

1) Electric Power Supply System

The electric power will be supplied from the Electric Company of Hoa Binh Province to the project facilities, through the electric room of the Mechanical Building in the hospital premises. The power will be taken from the trunk line to the southwest of Hoa Binh General Hospital, in a single three line, three phase 6 kV high-tension line. The Project will require an estimated 500kVA of electric power (100-130VA/m^2×4,000m^2＝approx. 500kVA). Transformers, distribution panels and other facilities will be installed to distribute electric power to required power points. High tension power supply to the new sub-station will be the obligation of the Vietnamese side.

The distribution system will follow the standard four cable, 380V/220V 3 phases distribution scheme of Hoa Binh area. The results of field surveys have confirmed that the voltage of commercial power fluctuates in a range of ±10%. Proper measures will be taken to protect equipment susceptible to voltage fluctuation on an individual basis.

Furthermore, power failure is expected to occur two or three times a month on average for a maximum of 30 minutes each. Accordingly, a diesel power generator will be installed to keep the minimum required functions of the project in operation. The total power capacity for important pieces of medical equipment that need backup electric power is about 160kW. In addition, electric power must be supplied to air conditioning for important rooms such as operation rooms, ICU and lighting outlets. The combined required capacity of the power generator is estimated at 300kVA. Sound insulation, and sound and vibration prevention measures will be installed to reduce environmental hazards. Fuel will be provided to the diesel engine via a service tank (a small feed tank).

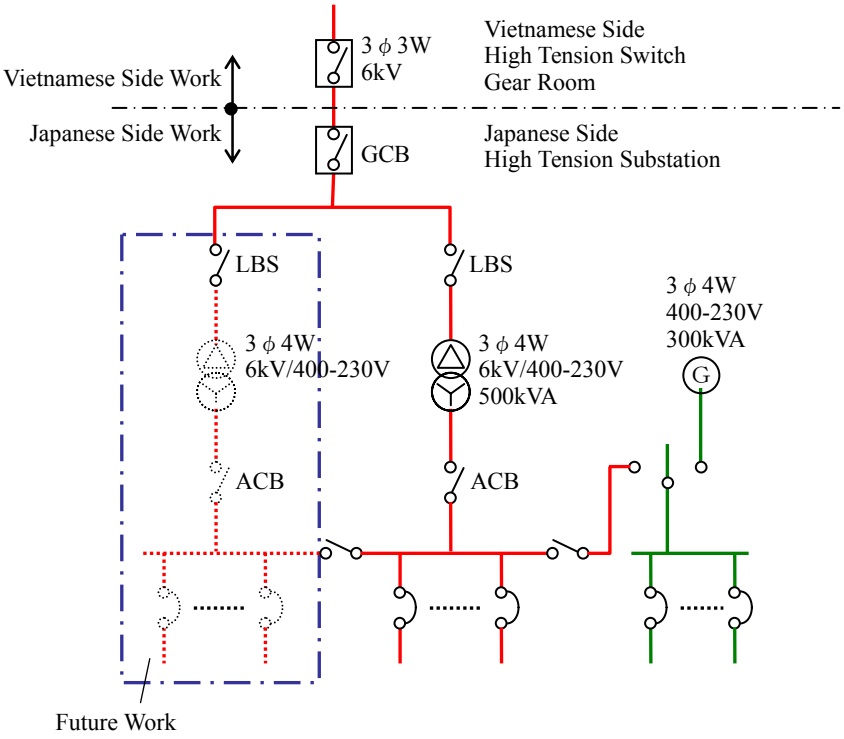


Figure 2-10 Power Receiving Schematic Diagram

2) Lighting System

The design illuminance will be set at 60 to 70 percent of the JIS Standards, considering the present local conditions. The light sources will mainly be fluorescent lamps because of their high illumination efficiencies and extensive acceptance in Vietnam. However, the lighting equipment installed in the clean rooms will be selected so that the specifications may fit the particular conditions of each room. Switch zones will be broken into small areas to save lighting cost.

Wall outlets will be basically of the type commonly used in Vietnam, two rod pins with a grounding slot or two parallel flat blades, but the location and specifications of a given wall outlet will be determined to fit the specified power source, capacity, connection of the equipment to which the electric power is supplied.

3) Lightning Arrester, Grounding Device

To protect the facilities from lightning, lightning rods and roof conductors will be installed. The medical facilities and equipment, electrical facilities, communication facilities and similar facilities and equipment will be provided with a grounding device as required by individual specifications.

4) Telephone System

Telephone cables will be taken from the existing overhead main of the Hoa Binh Province's telephone company at the southwestern end of the hospital premises and connected to the main distribution frame (MDF) within the planned site. The estimated capacity required of the project is about 10 outside lines (0.002 line/m^2) and 100 inside lines (0.02 lines/m^2), including future expansion. The project will install a new PABX (private automatic branch exchange) of the required capacity, with a provision for addition of PABX to cope with an incremental demand that may occur in the future. The installation of the telephone cable from the main to the newly installed MDF and the connection from the MDF to the existing telephones will be the obligation of the Vietnamese side.

5) Public Address System

The main part of the public address system will be installed to enable central controlling of public addressing to the facilities of the Project, such as paging of doctors, and emergency announcements for evacuation and guidance in case of fire. The Project will not consider extension to existing facilities. However, the system incorporates provision for connection of amplifiers, etc. to enable addressing to other facilities.

In addition, waiting rooms, for the X-ray Department, and similar room will be equipped with individual paging system for paging of patients.

6) Interphone Facility

Simultaneous two-way interphone systems will be installed in such places as operation room where communication between inside and outside the room is necessary.

Also, machine room will be equipped with an interphone for communication with the maintenance staff in the mechanical building.

7) Automatic Fire Alarm System

Automatic fire alarm systems will be installed according in principle to Vietnamese laws, regulations and standards concerning firefighting and fire prevention to enable early detection of fire and to prevent fire damages from spreading.
The Japanese firefighting standards will be referred to as supplement. Push-button fire alarms and emergency exit indicators will be installed. The scope of monitoring is limited to the facilities of the Grant Aid Project.

8) Television Common Antenna System

The conduit pipe and boxes will be installed for future usage as necessary in appropriate locations for Television System.

9) Cable Piping for Computer Network

Cable pipes and boxes will be installed as necessary in appropriate locations from the vertical electrical shaft on each floor to connect a new LAN system with the existing system. Installation of the instruments for computer network system, cables and circuit jacks will be the obligation of the Vietnamese side.

(2) Machines

1) Water Supply System

The field survey and the discussions with the Waterworks Bureau of Hoa Binh City has confirmed that water supply system is relatively reliable. Therefore, a substitute water supply source for water failure is not planned. The required amount of water supply to Hi-Tech Block is estimated at $60m^3$/day.
The Project plans for installation of a 50mmφ receiving pipe from the 150mmφ city water main installed under the road south of Hoa Binh General Hospital. The water receiving tank can secure $60m^3$ of water, equivalent to one day's consumption, as a reserve against a water failure of several hours. The water receiving tank will be an aboveground concrete tank to prevent contamination of water. Elevated water tank will be placed near the Machine Building to distribute water by gravity. To supply water to portions where the pressure is inadequate, pressure will be supplemented by pumping.
The water supply system within the site is the Japanese side work; however, installation of the receiving line to the site border is the obligation of the Vietnamese side.

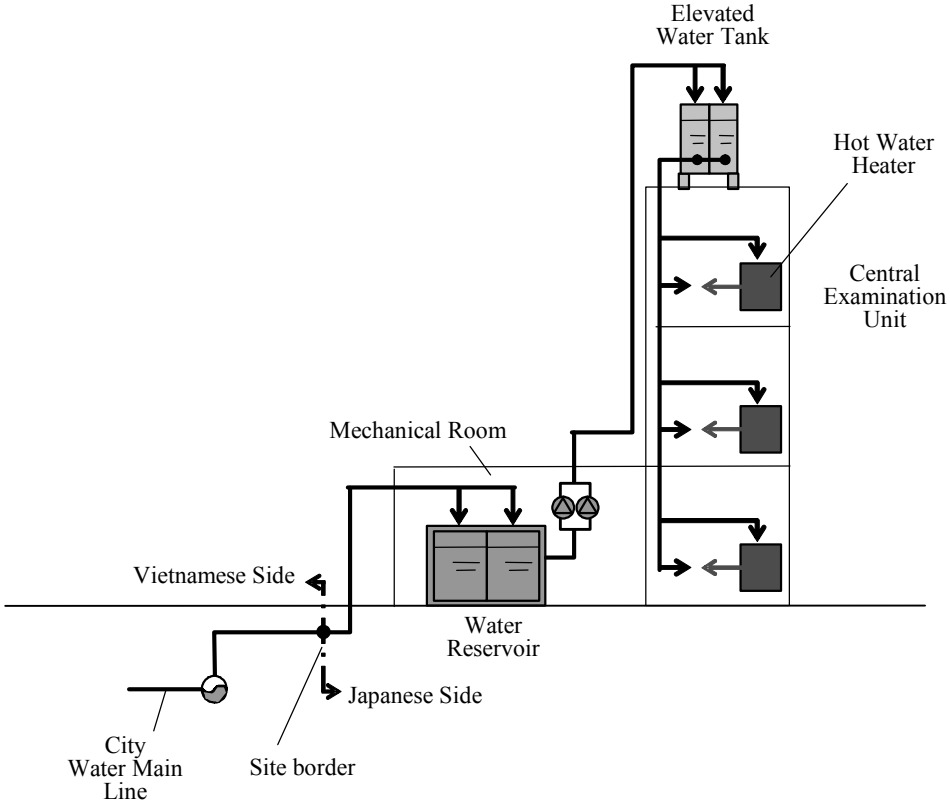


Figure 2-11 Water Supply and Hot Water Supply Flow

2) Wastewater System

The hospital presently discharges general wastewater (foul wastewaters and miscellaneous wastewaters) without proper treatment. Wastewaters from the project facility will be treated in compliance with the laws of Vietnam. The treated wastewater will be discharged to the existing roadside stormwater gutter. However, the existing stormwater gutter system ends within the hospital premises; therefore, the study team has requested that the Vietnamese side connect the existing stormwater gutter to the wastewater main of Hoa Binh City before the construction work of the Project begins. The Hoa Binh Province authority has promised timely implementation of the wastewater connection.

The special wastewaters from the examination or infectious disease sections will be separately neutralized and disinfected, followed by treatment in the sewage treatment facility, together with the general wastewater. Stormwater will be drained first to roadside gutters surrounding the building and finally discharged to the existing roadside gutter.

Installation of the sewage treatment facility within the project site is the Japanese side's work; however, construction of wastewater related works outside the site boundary is the obligation of the Vietnamese side.

The wastewater treatment facility will adopt a biological treating system for easiness of maintenance and lower operating costs. The contemplated capacity of the wastewater treatment facility is about 128 ㎥(400ℓ/bed×320beds) per day. As agreed with the Environment Department of the Hoa Binh City government, average water quality standards for the treated water to be discharged are 30ppm for BOD (biochemical oxygen demand) and 50ppm for SS (suspended solids).

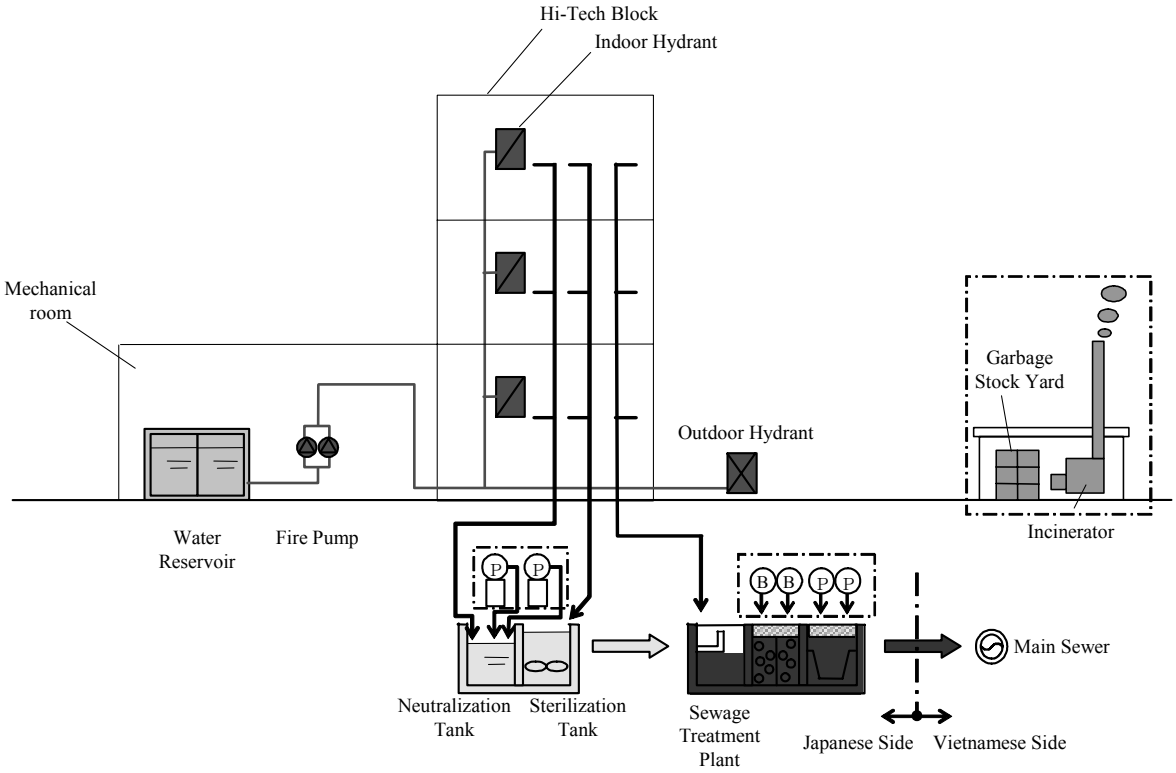


Figure 2-12 Drainage System, Fire Hydrant System and Garbage Disposal Flow

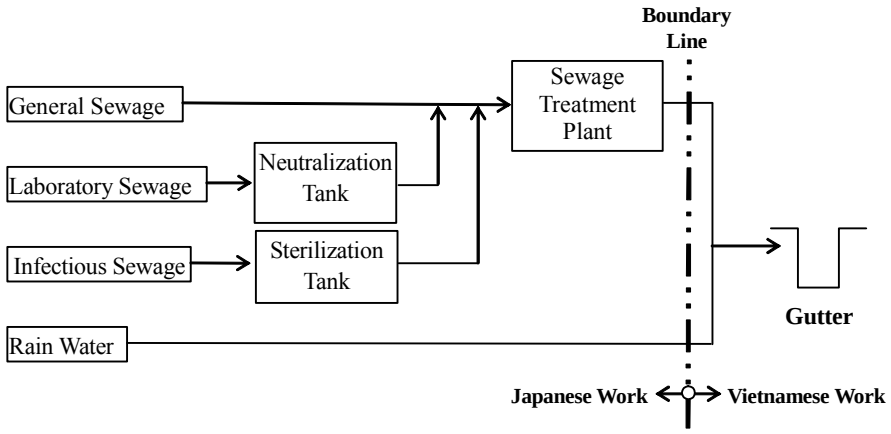


Figure 2-13 Flow of the Wastewater System

3) Hot Water Supply System

Hot water will be supplied by an individual system to such facilities as showers, wash stands, wash rooms where hot water is needed. Electric water heaters will be installed as necessary.

4) Sanitary Fixture

Water closet bowls of the toilets used by the hospital staff will be of the Western style, equipped with a water spray for washing and roll paper holder. The toilets to be used by patients and people will be a combination of both Western and Asian styles, equipped with a water faucet for cleaning. The flushing unit for the water closet bowl will be of the flush valve type, which is more durable. The urinals will be of wall hung type, along with urinals for small boys of floorstanding type equipped with a flush valve.

The wash stands and sinks in clean zones will be provided with elbow faucets as a measure to prevent nosocomial infection. The hand washer disinfectors to be provided in the pre-clean rooms to the operation rooms will be procured as medical equipment. The showers will be of wall-mounted type, instead of hand-held type, in view of better durability of the former.

5) Firefighting Facility

As a result of a discussion with the Fire Bureau of Hoa Binh City, it has been agreed that the firefighting facilities will in principle conform to the standards of Vietnam, but the Japanese standard will be applied to supplement the standards of Vietnam as necessary. The firefighting facilities to be installed are indoor hydrants, outdoor hydrants and fire extinguishers. Two fire pumps will be provided for indoor and outdoor hydrants, and a $50m^3$ water tank is provided to secure water for the fire pumps.

6) Medical Gas Facility

A new medical gas system will be provided for the facilities of the Project. The medical gas system will provide oxygen, vacuum suction, pneumatic air and nitrous oxide. It will be a central system from the viewpoint of safety, operability and maintenance. However, nitrous oxide gas will be supplied separately by Vietnamese side with cylinders, because the required locations of nitrous oxide gas system are limited.

The basic policy for the medical gas facilities are as follows. Oxygen will be supplied to the new facilities from cylinders. The gas outlets will conform to the British Standards (BS) now in use. The number of oxygen humidifiers and that of vacuum suction units will be 50 percent each of the numbers of outlets.

The Table below shows the rooms requiring medical gases.

Table 2-14 Rooms Requiring Medical Gases

Room	Oxygen	Vacuum suction	Pneumatic air	Note
Operation room	○	○	○	Installed on the ceiling and wall
Recovery room	○	○	○	
ICU	○	○	○	

7) Waste Treatment Facility

Presently, municipal wastes are piled in the open at the Hoa Binh Waste Treatment Facility from which seepages flow down to the Da River. The medical wastes from the hospital are either dumped untreated in a concrete tank in the backyard of the premises or buried, emitting disagreeable odors.

From the standpoint of preventing environmental contamination, installation of proper depots for sorted collection of wastes and an incinerator is planned at the request of the Vietnamese side. The treatment capacity should include those generated at the existing buildings. The specifications of incinerator should conform to the environmental standards of Vietnam.

There are a number of incinerator manufacturers capable of manufacturing incinerators conforming to such standards. A significant number of similar incinerators now operate in Hanoi. Therefore, the hospital can properly operate and maintain the incinerator by arranging a maintenance contract.

In addition, sorted collection of waste is considered indispensable to achieve efficient combustion, when an incinerator is installed.

8) Air Conditioning Facility

The Project will depend mainly upon the natural ventilation system for most rooms. Nevertheless, air conditioning will be provided to rooms where air conditioning is indispensable for the function of the room. Individual air-cooled air conditioning only for cooling is the air conditioning system common locally and will be adopted for the Project. However, as the lowest temperature can be as low as 7°C during the winter season (November to February), such rooms as operation rooms, recovery rooms, ICUs need heating. These rooms will adopt air conditioners with air-cooled heat pumping that can heat the rooms as well as cool them. The air conditioners will be of wall type, ceiling suspended type, ceiling cassette type, or floor standing type, depending upon the purpose of the room.

The operation rooms, requiring clean condition to be compared with other areas, will adopt air conditioning systems equipped with medium filters.

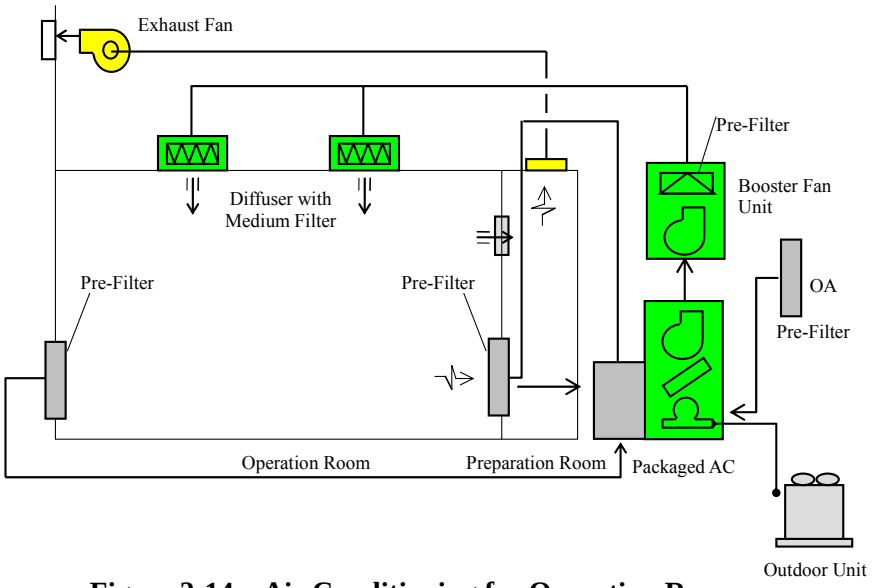


Figure 2-14 Air Conditioning for Operation Room

The recovery rooms, ICUs, preparatory rooms to the operation rooms also require a semi clean condition; therefore, these rooms will adopt air conditioners of ceiling cassette type equipped with medium-efficiency filter.

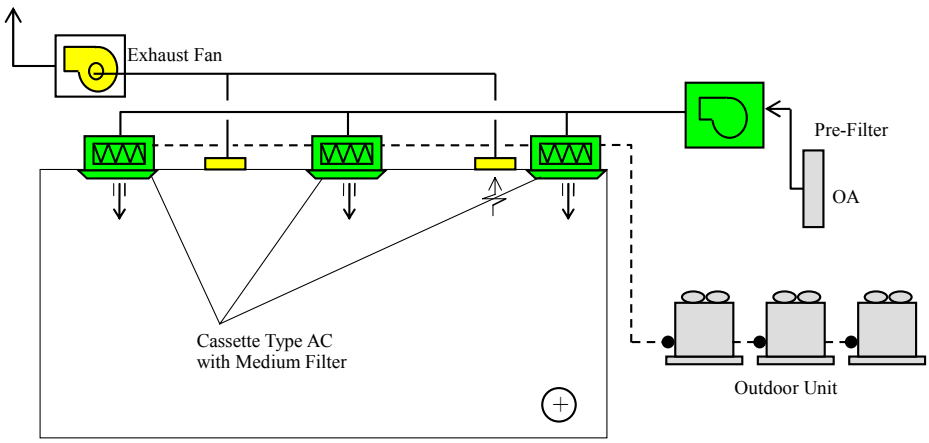


Figure 2-15 Air Conditioning for Recovery, Preparation Room, ICU

Those rooms which can use common air conditioners will use air conditioners of wall type or ceiling suspended type, equipped with an ordinary pre-filter. The standard filters used for air conditioners will be of long life type, with wide filtration areas to reduce the frequencies of cleaning works.

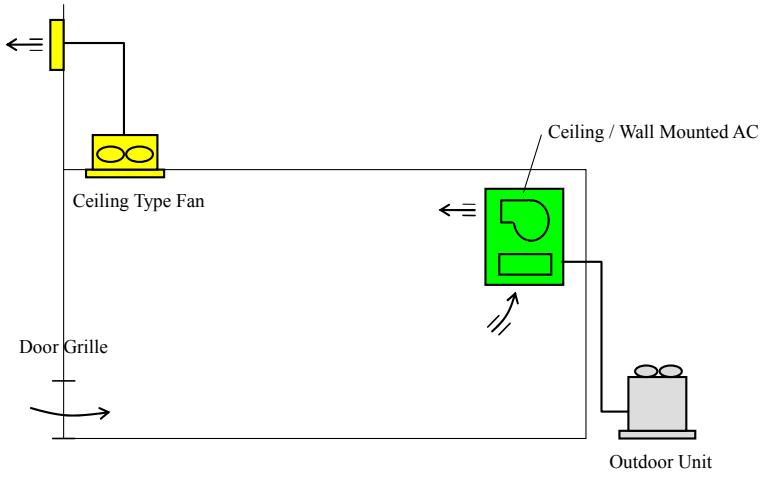


Figure 2-16 Air Conditioning Flow Diagram (General)

Rooms without air conditioning will be equipped with ceiling fans or wall fans, and have natural ventilation with operable windows. Mechanical ventilation will be provided to rooms without windows or to rooms where heat, vapors or odors are generated. Shown below is a Table listing the rooms having air conditioning and a conceptual drawing of air conditioning flow. The examination rooms which are not equipped with an air conditioner and CT room will be equipped with power outlets and pipe sleeves as a provision for future installation of air conditioners.

Table 2-15 Type of Air Conditioning by Room

Room	Air conditioner 1)	Room pressure 2)	Air filter 3)	Note 4)
Operation room	F	P	M	Cooling and heating *
Recovery room	C	P	M	Cooling and heating *
ICU	C	P	M	Cooling and heating *
Preparatory room to operation room	C	P	M	Cooling *
CSSD (Central Sterile Supply Department, clean zone)	C	P	M	Cooling
Radiography related room	W	E	L	Cooling and heating *

Note 1) F: Floor standing type with duct, C: Ceiling cassette type, W: Wall type (or Ceiling suspended type)
2) P: Positive pressure, N: Negative pressure, E: Ambient pressure
3) M: Medium filter, L: Pre filter
4) *: Operable during power failure by the power of emergency power generator

(3) Location of the Sewage Treatment Plant and Main Pipe for Drainage

After discussions with Vietnamese side, it was agreed to plan the Sewage Treatment Plant in the southern part of the site, following the Master Plan. The ideal route for the sewage main is a direct connection of the Hi-Tech Block and Mechanical Building in the north-south direction. However, this route will cross with the location for the obstetrics wards in the Master Plan. The Master Plan has already been approved by the People's Committee of Hoa Binh Province and revision to the Plan will be difficult. The route for the sewage main will be planned around the planned sites for buildings in the Master Plan.

2-2-2-6 Construction Material Plan

The materials and construction methods common in Vietnam will mainly be selected for the sake of facilitating maintenance after commissioning of the project.
The following are important considerations for the selection of construction materials.

(1) Exterior Finishing Material

1) Roof

The roofs of the buildings will be flat roofs, to be in harmony in design with the surrounding buildings and better water proofing. The flat roof will have a gradient of about 1/30 to facilitate drainage. A urethane roofing material will be selected for reliability in water proofing performance and for facilitating future maintenance. The roofs will have heat insulation under the roof slab.

2) External wall

The external walls will be of exposed concrete finish, concrete blocks or bricks finished with cement mortar, all common locally. Portions exposed directly to rain will be of concrete blocks to increase water resistance. For tall rooms, areas where maintenance work is difficult will be finished with virtually maintenance-free porcelain tiles.

(2) Interior Finishing Material

1) Floor

Hospitals have heavy circulation of hospital staff and patients and the floor must be very durable. The Project will use tiles for the floors which are durable and commonly used locally.

2) Wall

The walls of toilets, rooms where wastes are handled, shower rooms and similar rooms that are close to sinks, washstands, stools, urinals or faucets that can be contaminated, or are apt to be stained, will be finished entirely with easy to clean tiles. Other walls will be finished by tiles on areas reachable by hand. Upper areas will be cement mortar finished with paint.
The radiography rooms will be made of reinforced concrete capable of shielding radiation. The walls, inside walls and corners of pillars of the corridors that could be hit by stretchers or similar objects will have stretcher guards that can also serve as hand rails, or corner guards.

3) Ceiling

The ceilings of air-conditioned rooms need to be reasonably airtight. The light gauge steel structures generally used locally (T bar), with rock wool sound insulation board, or ordinary ceiling board, will be used. The rooms without air conditioning rely on natural ventilation and need to have a large air volume. Therefore, these rooms will not have ceilings. Instead, the concrete slabs will be finished with paint.
Ceilings of such rooms as toilets, where water-related equipment is provided, will be made of locally common light steel (T-bar) frames and calcium silicate boards, finished with paint. Although these rooms will be naturally ventilated, they have a number of water pipes, for supply and waste water, overhead.

4) Doors and Windows

External doors and windows will be aluminum sashes to ensure durability. However, the entrances where personal traffic is heavy, and operation theater requiring easy cleanability and durability, will have stainless steel doors. Internal doors that may be frequently hit by carts and stretchers will be steel or light steel doors, and other doors will be wooden. Rooms that need radiation shielding will have steel doors with lead lining.

Table 2-16 Summary of Exterior Finishing Materials and Application Methods

Building element	Local method (including the existing buildings)	Adopted method	Reason for adopting the method
Roof	Slanted roof Flat roof (asphalt water proofing)	Flat roof (urethane water proofing, heat insulation under slab)	Excellent water proofing and heat insulating properties.
External wall	Cement mortar finished with paint	Cement mortar finished with paint Porcelain tile	This method is common in local area, and the local people are accustomed to maintenance of this type of wall. Materials that seldom require maintenance are used for portions out of the reach.
Floor	Tile	Homogeneous porcelain tile	Homogeneous porcelain tiles are common in the subject area. This material is easy to clean and durable.
Interior wall	Tile Paint	Tile Paint Panel	These are common materials in the local area, and relatively easy to maintain. Panels will be used only for room that require high levels of cleanliness.
Ceiling	Paints Rock wool sound insulation board	Paints Rock wool sound insulation board	These materials are common in the subject area, and are relatively easy to maintain. Boards are used to improve air conditioning efficiency, to conceal piping, etc. and to prevent dust from accumulating in particular spots.
Doors and Windows	Aluminum Steel Wooden	Aluminum Steel Wooden Stainless steel	These are commonly used in the subject area. Portions of buildings with heavy circulation or that require high levels of cleanliness, will use stainless fittings.

(3) Associated Facility for Construction

Usable lives of many of building systems are from 10 to 15 years, markedly shorter than those of construction materials. Therefore, selection of such facilities must be made so as to facilitate maintenance, including renewals, by the Vietnamese side after these facilities have been handed over to the Vietnamese side. In this context, these facilities will be mainly procured locally, or from third countries near Vietnam, while ensuring acceptable levels of quality.

2-2-2-7 Equipment Plan

(1) Equipment Plan

Hi-Tech Block

1) ICU

This department offers emergency outpatient care and emergency hospitalized care. Because of its importance, this department has been provided with medical equipment (patient monitors, defibrillators, suction units, respirators, etc.) that were procured locally using the JICA special budget. However, because these units are insufficient in number relative to the number of patients, this Project will include medical equipment to supplement this shortage. The planned equipment will include patient monitors, ECG, ICU beds, X-ray film viewer, etc.

2) Operation Theater (including Sterilization Room)

This Project will include the equipment for 4 operating rooms. However, existing items suitable for continued use will be relocated by the Vietnamese side after completion of the Hi-Tech Block. The items that are planned to be procured in a technical cooperation project will be excluded from the planned quantities. The planned equipment will include operating tables, anesthesia machines, operation lamps, hand washing/disinfection units, patient monitors, defibrillators, electrosurgical unit, etc.

3) Radiology Department

The radiography-fluoroscopy unit will be renewed, because this unit which conducting a key function of the hospital is used in a dangerous condition due to age and hardware failure. The general radiography unit and the X-ray film developer will also be renewed.

4) Endoscopy/Physiology Examination Department

At present, endoscopic examinations and ultrasound cardiograph examinations are performed in a part of the Radiology Department, and ECG and multipurpose ultrasound examinations are performed in a part of the Out-patient Department. However, these are planned to be unified according to the Master Plan into a separate department. Therefore, the plan in this Project will be formulated on the premise that there will be a separate Endoscopy/Function Examination Department.
A Spiro meter unit will be newly introduced to respond to the increasing patients with respiratory diseases. Because this apparatus is a simple tabletop unit supplied by multiple local agents, it is considered that there will be no problems in maintenance.
The endoscope examinations are performed only on upper digestive tract. The handling and operation of this equipment can be managed by existing personnel, and there will be no problems in maintenance.
The ultrasound diagnosis unit which is required for a key function of the Endoscopy/Function Examination Department needs to be renewed, because it has become old and the need for renewal is high. In view of the recent rapid increase in patients with heart disease and other chronic diseases, this plan will include a color Doppler ultrasound diagnosis unit, which is suitable for diagnosing the heart and other cardiovascular functions and evaluating blood flow.

5) Laboratory Department

The Laboratory Department is an essential department needed for the functions of the hospital. At present, the department is performing more than 150 tests a day. It is difficult to handle this number with manually-operated tests, and the need for an automatic biochemical analyzer is considered higher. It is difficult to continue the use of the existing unit, which was donated by another donor, because it is getting old, and there are no local

agents. There are no problems in the skill required for operating the automatic analyzer, since the operators have sufficient experience in its use. It is also considered that there will be no problems in management and maintenance, since reagents, expendables, and maintenance services will be available if the equipment in the Project is to be procured from a manufacturer having a local agent and the automatic analyzer is included in the Project. Other existing items will not be included in the plan, since simple but sufficiently usable units that are suitable for continued use are available.

Existing Buildings

1) Out-patient Clinic

The basic instruments in consultation and treatment rooms are markedly old and undersupplied, and they need prompt improvement. For this reason, the Project will include examination tables, examination lamps, X-ray film viewer, body height scale/weighing scales, examination instrument sets, drying oven, instrument tables, instrument cabinets, etc. for consultation and treatment rooms in required quantities.

2) Internal Medicine Ward

Expansion of the Internal Medicine Ward has been planned to respond to the rapid increase in patients with heart disease, hypertension, renal failure, etc., but the availability of existing equipment is very limited. Therefore, the Project will provide for required numbers of basic instruments, including ECG, X-ray film viewer, examination lamps, suction machines, nebulizers, instrument tables, syringe pumps, infusion pumps, and others.

3) Infections Ward

Basic instruments will be procured for the one existing treatment room. The planned equipment will include X-ray film viewer, suction machines, nebulizers, pulse oximeters, instrument tables, instrument cabinets, syringe pumps, etc.

4) Tuberculosis Ward

Similarly to the Infections Department, the Tuberculosis Ward has one treatment room lacking sufficient quantities of basic instruments, which the Project will provide. The planned equipment will include X-ray film viewer, infusion pumps, pulse oximeters, instrument tables, instrument cabinets, etc.

5) Pediatric Ward

The existing facilities have no basic equipment, except incubators. Functionally required equipment will be provided by the Project. New equipment will include, infant ventilator, phototherapy device and infant warmers. All are basic equipment with no problems in operation or maintenance.

6) Surgical Ward

In addition to ordinary hospital rooms, there is a small operating room to treat patients requiring simple surgery and those requiring cast braces. However, the oldness of equipment is causing troubles. For this reason, the Project will provide equipment for small surgical operations, including operating table for small surgery, mobile operating lamp, gipsum table, suction machine, X-ray film viewer, instrument set, patient monitor, drying oven, etc.

7) Obstetics/Gynecology Ward

The delivery room of the Ob/Gy ward has three delivery tables and one gynecological examination table. Because these are structurally weak and dangerous, they will be renewed by the Project. Basic equipment including vacuum extractor, examination lamp, X-ray film viewer, instrument table, etc. will to be provided.

Other

1) Voltage, Regulator Consumables and Spare Parts

In order to protect electronic circuitry, equipment with electronic part, including color doppler sonic analyzer, auto respirator, anesthesia apparatus and other will be provided with appropriate capacity automatic voltage regulators (AVR).
Equipment requiring consumables shall be provided with up to 3 months supplies. However, reagents for automatic analyzer must be tendered separately to meet Vietnamese regulations. The reagents will be placed in Vietnamese budget portion and deleted from the Project list.
Spare parts are not included in the Project, since all equipment shall have 1 year warranty from supplier.

2) Changes to Equipment to be procured by the Project

As a result of analysis in Japan, it is considered appropriate to curtail the items and quantities listed in the Table 2-17 from the viewpoint of project cost. The reasons for curtailment are as follows:

① Necessity and appropriateness are questionable.
② The need can be met by an alternative plan.
③ The item should be included not in the equipment plan but in the facility plan or the construction plan.
④ Procurement in a technical cooperation project is being considered.
⑤ It is judged that procurement by the Government of Vietnam is feasible.

Table 2-17 The List of Changing of Planning

Cont. No.	Code No.	Department	Description	Planned Q'ty	Q'ty in Minutes of BD	Appropriateness	Alternative Plan	Facility plan	Technical Cooperation	Procurement by Vietnamese side is feasible
4	39	Outpatient	Examining Lamp	5	6					●
6	40	Outpatient	Weighing Scale with Measure Rod	2	5					●
7	46	Outpatient	Fetal doppler	0	1				●	
18	6	Emergency / ICU	Patient Monitor	3	11				●	●
21	39	Emergency / ICU	Examining Lamp	0	2			●		
22	44	Emergency / ICU	Low Pressure Continuous Suction Unit	1	2					●
23	34	Emergency / ICU	Ventilator	0	4				●	
24	1	Emergency / ICU	ICU bed	12	15					●
28	41	Internal medicine	ECG with analyzer	1	3					●
30	39	Internal medicine	Examining Lamp	0	3					●
32	60	Internal medicine	Infusion Pump	2	3					●
33	51	Internal medicine	Nebulizer	2	4					●
35	44	Internal medicine	Low Pressure Continuous Suction Unit	2	3					●
37	54	Internal medicine	Pulseoximeter	1	3					●
39	39	Infectious Disease	Examining Lamp	0	1					●
42	60	Infectious Disease	Infusion Pump	0	1					●
44	54	Infectious Disease	Pulseoximeter	0	2	●				
48	39	Tuberculosis	Examining Lamp	0	1					●
50	51	Tuberculosis	Nebulizer	1	2					●
65	55	Pediatrics	Billirubin meter	0	1				●	
73	60	General surgery	Infusion Pump	1	2					●
84	25	Operation theater	Film Viewer	0	6			●		
95	9	Operation theater	Instrument cabinet	0	6			●		
120	41	Function Exam.	ECG with analyzer	0	1				●	
121	52	Function Exam.	EEG	0	1					●
122	48	Function Exam. (Endoscopy)	Bronchus Fiberscope	0	1					●

(2) Equipment Plan

Based on the above analysis and discussions with concerned parties, the planned equipment list was decided as shown in Table 2-18.

2-18 Planned Equipment

Code No.	Description	Total
1	Fluoroscopic X-ray T.V. System	1
2	General X-ray Apparatus	1
3	X-ray Film Processor	1
4	Film Viewer A	14
5	Film Viewer B (Big size)	2
6	Ultrasound color doppler	1
7	Anesthesia apparatus with ventilator	1
8	Patient Monitor	7
9	Defibrillator	1
10	ECG with analyzer	2
11	Ceiling Operating Lamp	4
12	Examining Lamp	5
13	Electric Surgical Unit	4
14	Gastro Fiberscope	1
15	Endoscopic table	1
16	Cleaner for Endoscopy	1
17	Suction Unit A	3
18	Suction Unit B	8
19	Low Pressure Continuous Suction Unit	4
20	Nebulizer	4
21	Spirometer	1
22	Pulseoximeter	3
23	Syringe Pump	10
24	Infusion Pump	5
25	Operating Table	2
26	Operating Table with Orthopedic Set	1
27	Gynecological Operating Table	1
28	Examining Table	7
29	Gypsum bandle table	1
30	ICU bed	12

Code No.	Description	Total
31	Small operation instrument set	8
32	Diagnosis instrument set	14
33	Major Operating Instrument Set	2
34	Medium Operating Instrument Set	3
35	Minor Operating Instrument Set	6
36	High pressure steam sterilizer	2
37	Drying oven	12
38	Dental instrument set	1
39	Automatic analyzer	1
40	Weighing Scale with Measure Rod	2
41	Scrub Station	2
42	Instrument cabinet	13
43	Instrument table	23
44	ENT treatment unit	1
45	Mobile Operating Lamp	1
46	Micrometer for dental	1
47	Blood Pressure monitor	1
48	Ventilator for Children	2
49	Phototherapy unit with baby cots	4
50	Infant warmer	1
51	Examining table for baby	1
52	Delivery table	3
53	Gynecological Examing & Delivery Table	1
54	Vacuum extractor	2
55	Instruments set for delivery	3
56	Instruments set for family planning	2
57	AVR 0.5 KVA	16
58	AVR 1.0 KVA	9
59	AVR 2.0 KVA	2

Table 2-19 Major Equipment List

No.	Description	Specifications or Composition	Q'ty	Purpose and Appropriateness to use and the Grade of Equipment
1	Fluoroscopic X-ray T.V. System	Control; local and remote Output ; -radiography 40 to 150kV, 10 to 630mA -fluoroscopy 50 to 125kV, 0.5 to 4.0mA TV monitor: 17 inches	1	To observe patients as well as head, breast and abdomen. Equivalent grade to the existing one.
2	General X-ray machine	Control; General Output ; General radiography 40 to 150kV, 10 to 630mA Focus size; 0.6/1.2mm TV monitor: 17 inches	1	To observe patients as well as head, breast and abdomen.
6	Ultrasound Color Doppler	Mode; B, M, B/M Doppler monitor; Color, more than 15 inch probe 3 pcs. provided	1	For imaging diagnosis of disease morphology and tissue conditions by sending ultrasound to the patient's body and analyzing the transmitted or reflected waves.

No.	Description	Specifications or Composition	Q'ty	Purpose and Appropriateness to use and the Grade of Equipment
7	Anesthesia Apparatus with Ventilator	3 gases (O2 , N2O, Air) type 2 Vaporizer of halothane and isofluren Low-oxygen safety mechanism Mode for respiration ; SIMV , CMV , PEEP , CPAP and more For: Adult and child Tidal volume ; approx.20～1400mL/min With Humidifier	2	For carrying out operations safely without pains to patients. A ventilator carry out ventilation for patients who can not do spontaneous breathing. Equivalent grade to the present one.
8	Patient Monitor	Display; more than 8.4 inch Measurement; electrocardiogram, blood pressure, respiration, body temp., pulse, SpO_2, and non-invasive Battery and recorder provided	12	To monitor vital signs of patients. Equivalent grade to the present one. Used in Operation room.
13	Electro Surgical Unit	Type; Monopolar, and Bipolar, Program Function; Cutting, coagulation, blend Memory; 4 or more	6	To cut off vital tissue, making homeostasis and coagulating during operation. Equivalent grade to the present one.
14	Gastro Fiberscope	Type; Gastrovideoscope -Electrosurgical unit, leakage tester, Video system etc. Insertion tube; Inner dimension 2.0-2.4mm Distal end; Outer dimension 8.7mm or less	1	To examine and diagnose patients' gastrointestinal.
16	Cleaner for Endoscopy	Washing measure; Ultrasound/Ozone/Chemical Washing Volume; 2 units of endoscopy Washing time; 20 minutes or less Drying procedure; Air intake	1	To wash the used endoscopy after examination or treatment of patient. Type of washing are available, Ultrasound, Ozone and chemical.
25	Operation table	Control：Manual Accessories: Screen frame, Shoulder pad, Arm rest with pad, Root rest High-Low adjustment：770-1010mm Trendenberg：+15°/-25° Lateral tilt：18°/18°	2	To support patient laying on the table top and to carry out operation. Standard accessories are required to fix the region of patient.
26	Operation table with orthopedic instrument	Control：Manual Accessories：Curtain Frame, Shoulder pad, Upper limb support, Traction device, Lower limb support, etc. High-Low adjustment：770-1010mm Trendenberg：+15°/-25° Lateral tilt：18°/18°	1	To carry out the operation for the patient. Special accessories are required for orthopedic operation.
33	Instrument set for Major operation	Instrument 68 kinds	3	To carry out operation to open abdomen, digestive region, etc.
36	High Pressure Steam Sterilizer	Effective volume; 400L or more Single door type Chamber material: SUS304 Steam supply: With Boiler	2	To sterilize instruments. Equivalent grade to the present one.
39	Automatic Chemistry Analyzer	Type：Random access Test capacity：160～180 sample/hour Chemical: Open type Parameter：20～27 item Wave length：340～600nm	1	To examine patient's blood automatically. Equivalent grade with present one.
44	ENT Treatment Unit with Instrument Set	Spray：4 units Type: Vacuum hanger type Vacuum pump：200W Accessories: Chair, Instrument	1	To examine and diagnosis patient's for eye, nose and throat.
48	Ventilator for child	For: Child and infant Ventilation mode：Assist/Control, SIMV Breathing type：CPAP, PCV, VCV Tidal volume：0-1,000mL Breath frequency：1-120bpm Battery and compressor included	2	To assist the breathing for the patient who cannot breath by himself. Equivalent with existing one.

2-2-3 Basic Design Drawing

Table 2-20 List of Drawings

	Unit Name	Drawing Name	Scale	Page No.
1	Hi-Tech Block	Site Plan	1/200	49
2		1st floor plan	1/200	51
3		2nd floor plan	1/200	53
4		3rd floor plan	1/200	55
5		Roof plan	1/200	57
6		Elevation / Section	1/400	59
7	Incinerator / Machine room for Sewage Treatment Plant	Floor Plan, Elevation, Section	1/250	61

Hi-Tech Block

Y7
Y6
Y5
Y4
Y3
Y2
Y1

6000
6000
6000
6000
6750
2250

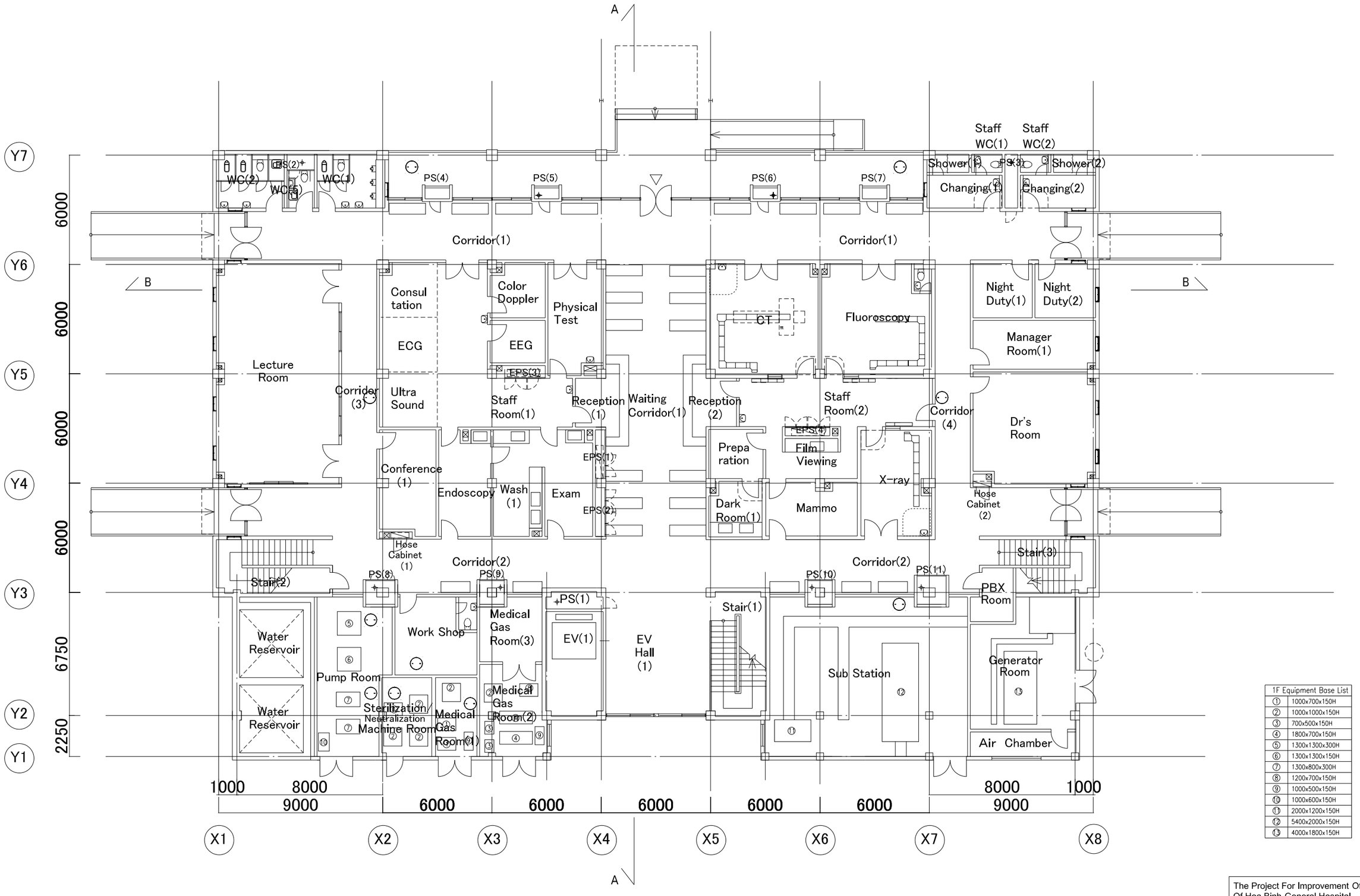
X1
X2
X3
X4
X5
X6
X7
X8

1000
8000
9000
6000
6000
6000
6000
6000
8000
1000
9000

N

The Project For Improvement Of Faciliti
Of Hoa Binh General Hospital

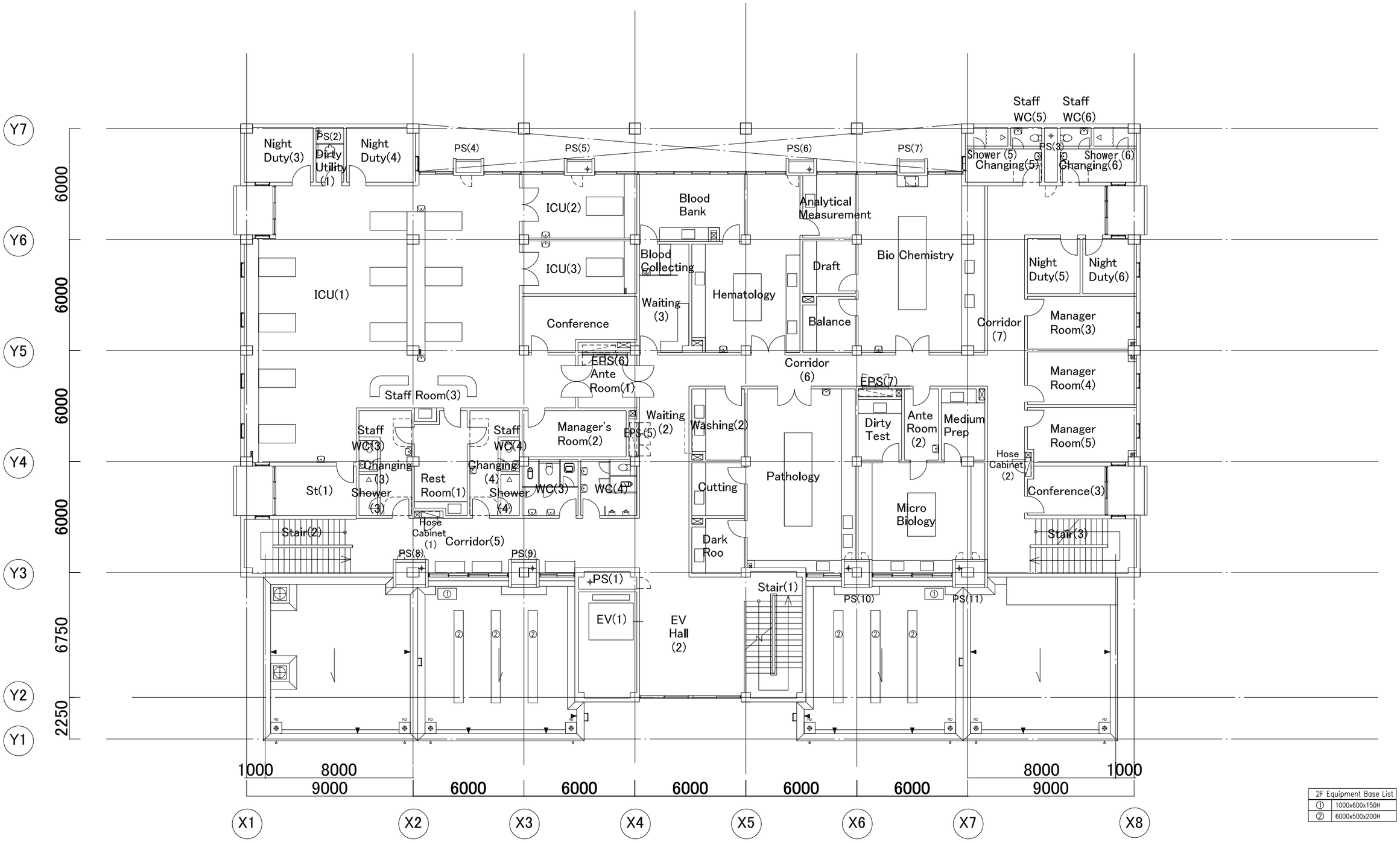
Site Plan 1/200 49



1F Equipment Base List	
①	1000x700x150H
②	1000x1000x150H
③	700x500x150H
④	1800x700x150H
⑤	1300x1300x300H
⑥	1300x1300x150H
⑦	1300x800x300H
⑧	1200x700x150H
⑨	1000x500x150H
⑩	1000x600x150H
⑪	2000x1200x150H
⑫	5400x2000x150H
⑬	4000x1800x150H

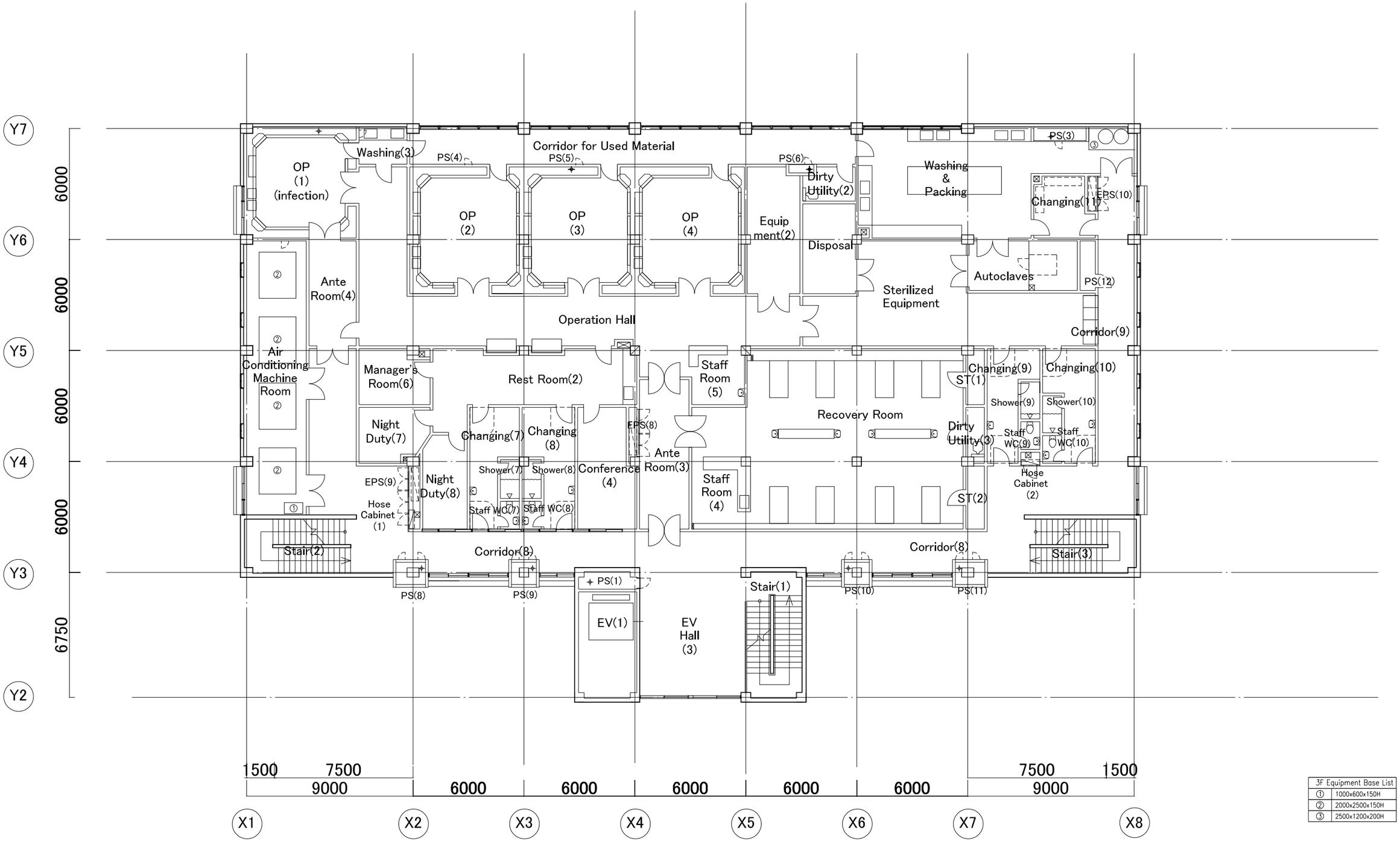
The Project For Improvement Of Facilities Of Hoa Binh General Hospital

1f Plan	1/200	51



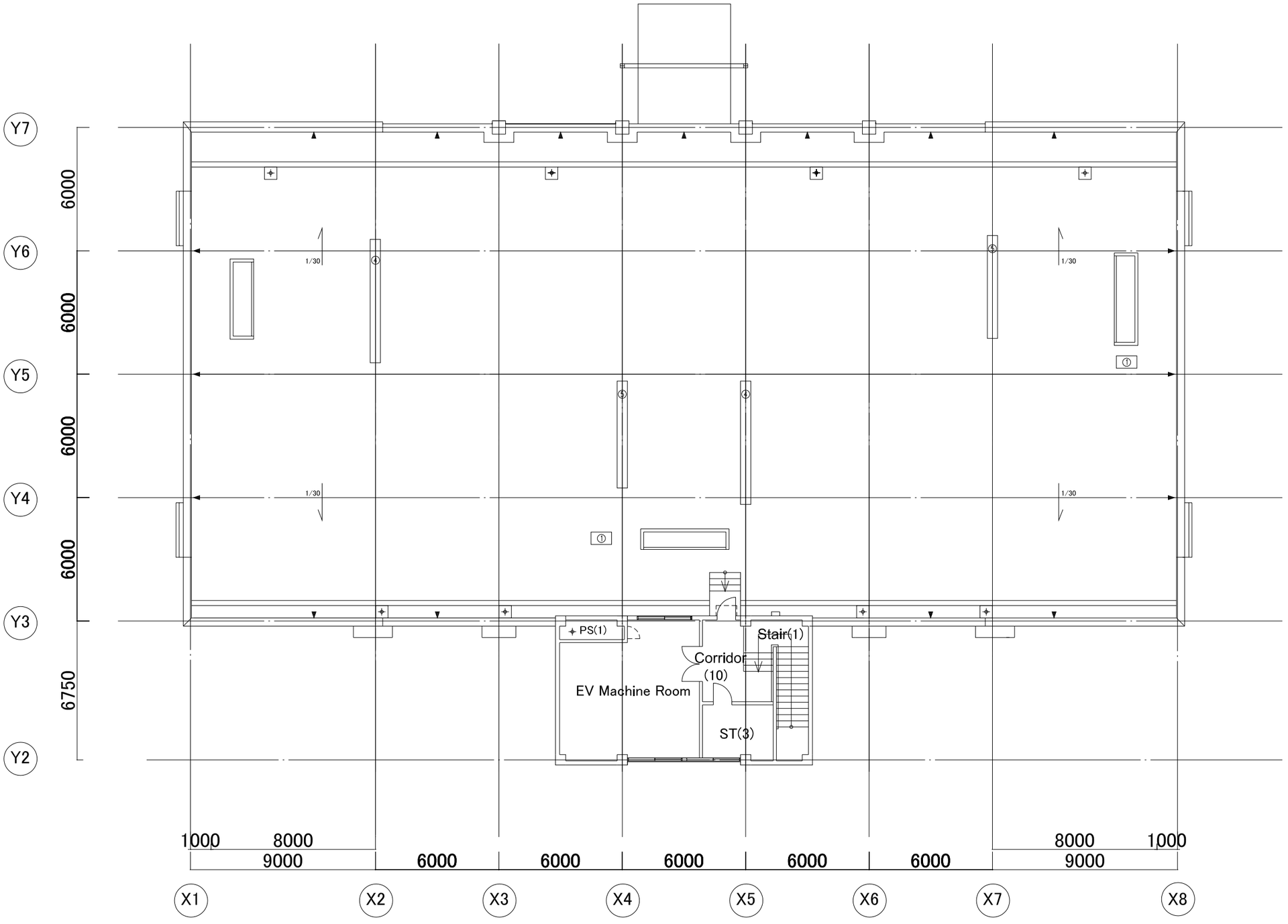
2F Equipment Base List	
①	1000x600x150H
②	6000x500x200H

The Project For Improvement Of Facilities Of Hoa Binh General Hospital		
2f Plan	1/200	53

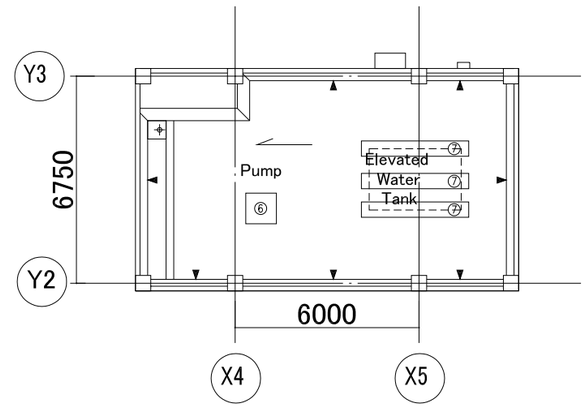


3F Equipment Base List	
①	1000x600x150H
②	2000x2500x150H
③	2500x1200x200H

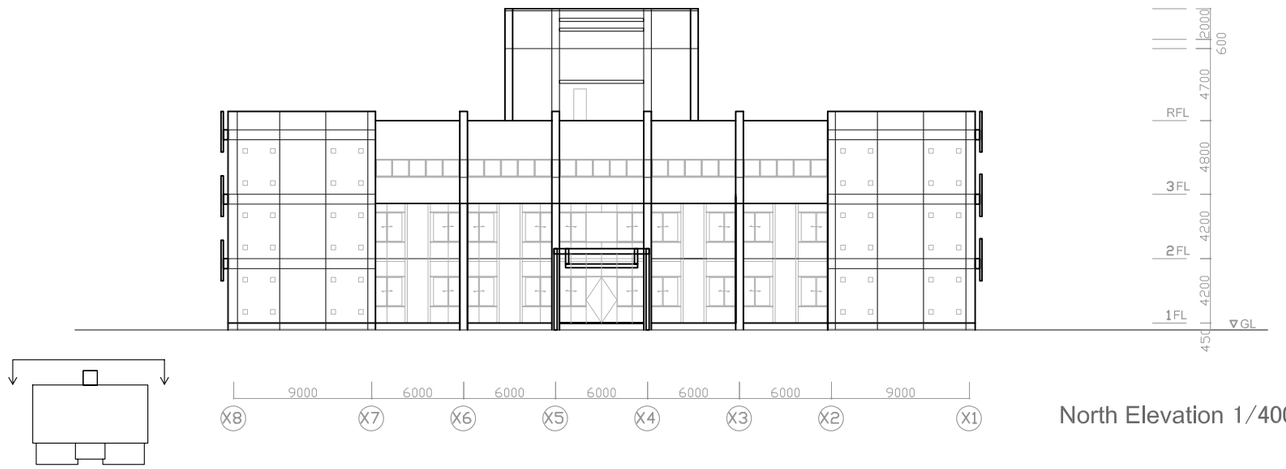
The Project For Improvement Of Facilities Of Hoa Binh General Hospital		
3f Plan	1/200	55



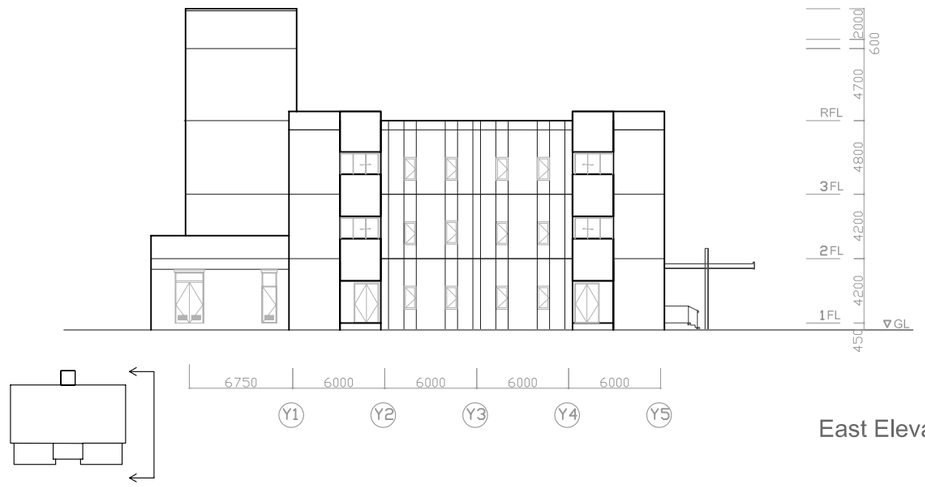
RF Equipment Base List	
①	1000x600x150H
②	2000x2500x150H
③	2500x1200x200H
④	6000x500x200H
⑤	5200x500x200H
⑥	1000x1000x200H
⑦	3500x500x600H



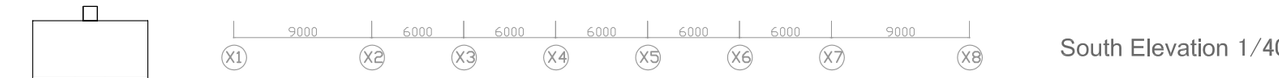
The Project For Improvement Of Facilities Of Hoa Binh General Hospital		
Rf Plan	1/200	57



North Elevation 1/400

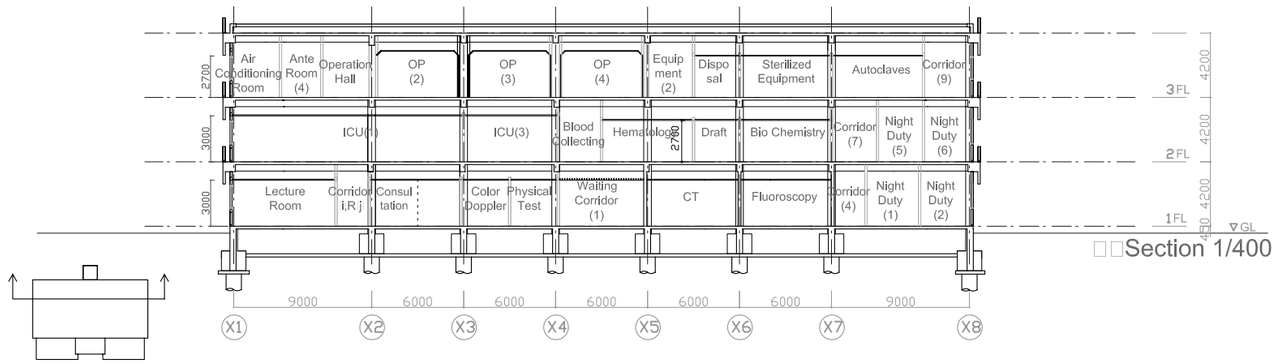


East Elevation 1/400

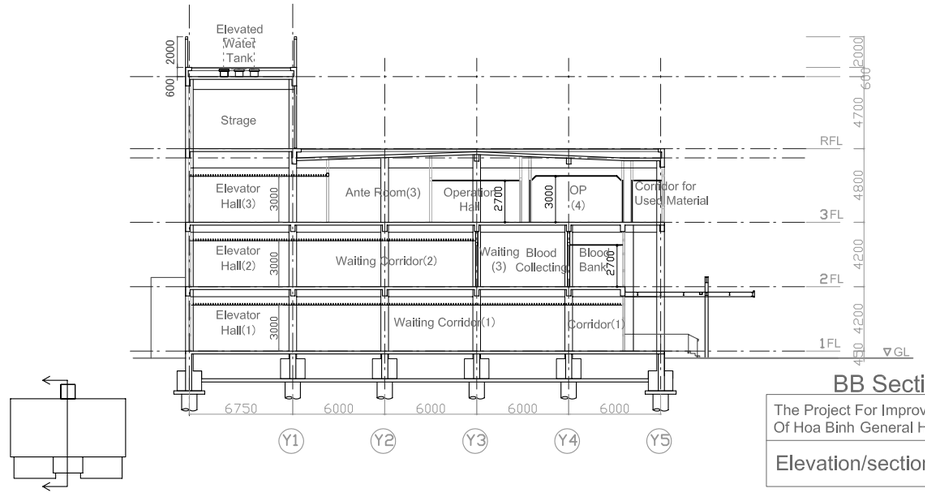


South Elevation 1/400

West Elevation 1/400

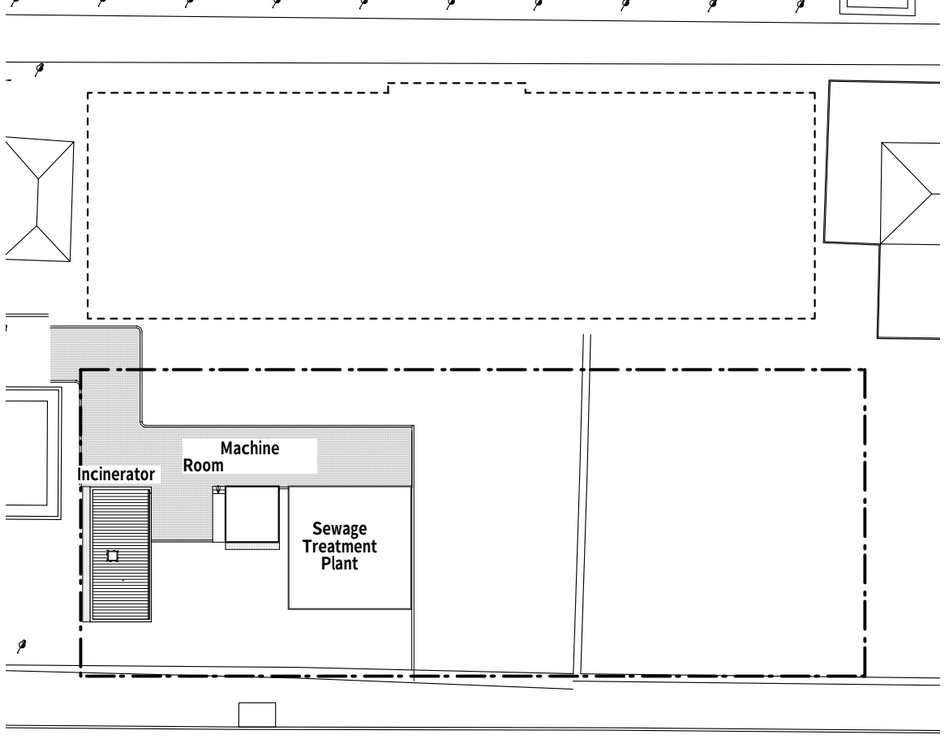


□□Section 1/400

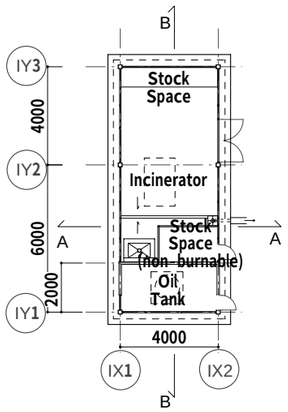


BB Section 1/400

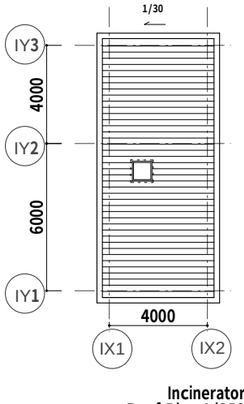
The Project For Improvement Of Facilities Of Hoa Binh General Hospital	
Elevation/section 1/400	59



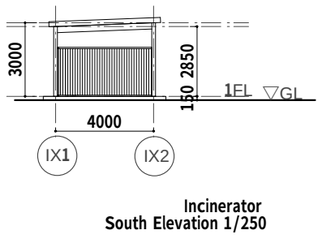
Related Facilities
Site Plan **1/250**



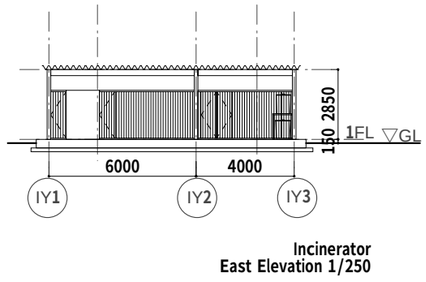
Incinerator
1f Plan 1/250



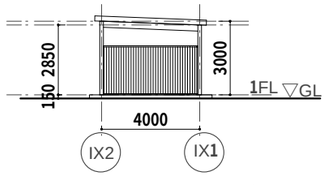
Incinerator
Roof Plan 1/250



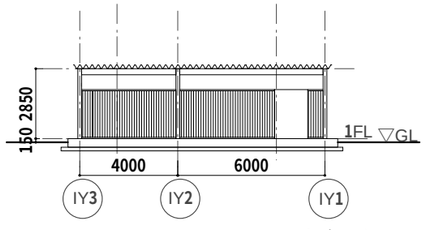
Incinerator
South Elevation 1/250



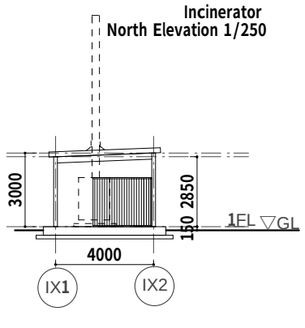
Incinerator
East Elevation 1/250



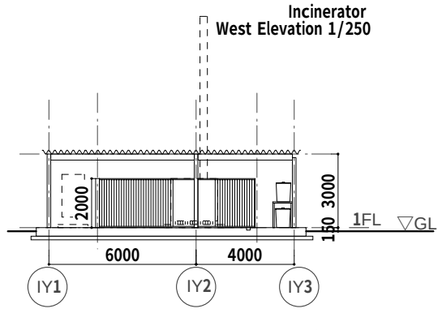
Incinerator
North Elevation 1/250



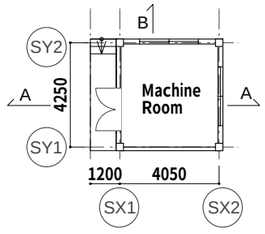
Incinerator
West Elevation 1/250



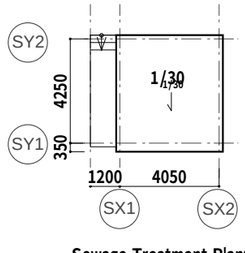
Incinerator
AA Section 1/250



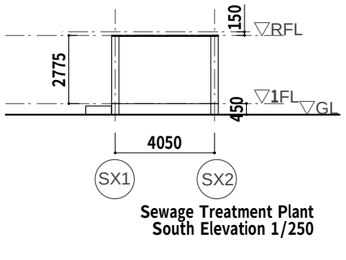
Incinerator
BB Section 1/250



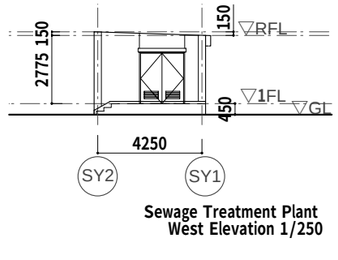
Sewage Treatment Plant
1f Plan 1/250



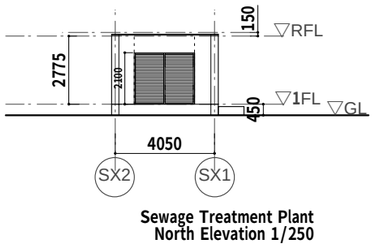
Sewage Treatment Plant
Roof Plan 1/250



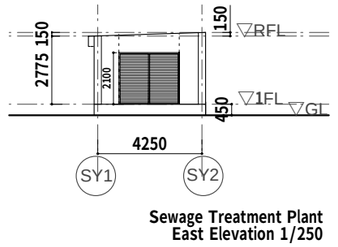
Sewage Treatment Plant
South Elevation 1/250



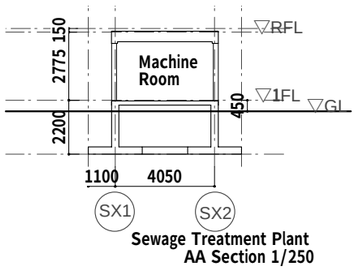
Sewage Treatment Plant
West Elevation 1/250



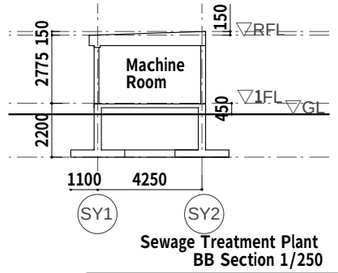
Sewage Treatment Plant
North Elevation 1/250



Sewage Treatment Plant
East Elevation 1/250



Sewage Treatment Plant
AA Section 1/250



Sewage Treatment Plant
BB Section 1/250

The Project For Improvement Of Facilities Of Hoa Binh General Hospital	
Incinerator/Sewage Treatment Plant Plan/Elevation/Section **1/250**	**61**

2-2-4 Implementation Plan

2-2-4-1 Implementation Policy

(1) Organization for Project Implementation

The Project will be implemented under the Grant Aid Scheme of Japan, after cabinet approval by the Government of Japan, and after the exchange of notes (E/N) on the project has been effected between the two governments.

The responsible agency of the Vietnamese side concerning implementation of the project is the People's Committee of Hoa Binh Province (Health Department of Hoa Binh Province), and the implementing agency is Hoa Binh General Hospital. The party to the contract of the Vietnamese side is also Hoa Binh General Hospital, which will sign the consultant agreement and the construction/equipment contract. Hoa Binh General Hospital will also execute obligations of the Vietnamese side of the Project.

The relations between the responsible agency and the implementing agency with the parties to the contracts are shown in the Figure 2-18.

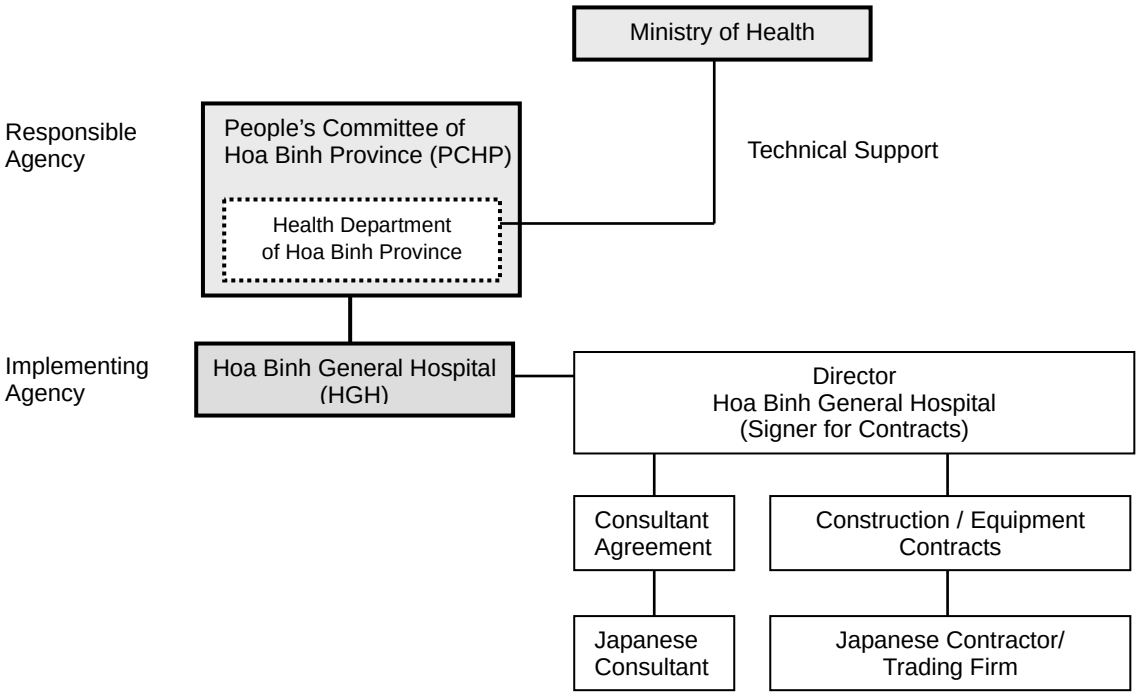


Figure 2-17 Organization for Implementation of the Project

This is the first time that the People's Committee of Hoa Binh Province, the responsible agency, has received Japan's grant aid. It has been confirmed that Project Committee will be established to promote the smooth implementation of the Project. The organization for implementation of the Project structure is shown in Figure 2-19.

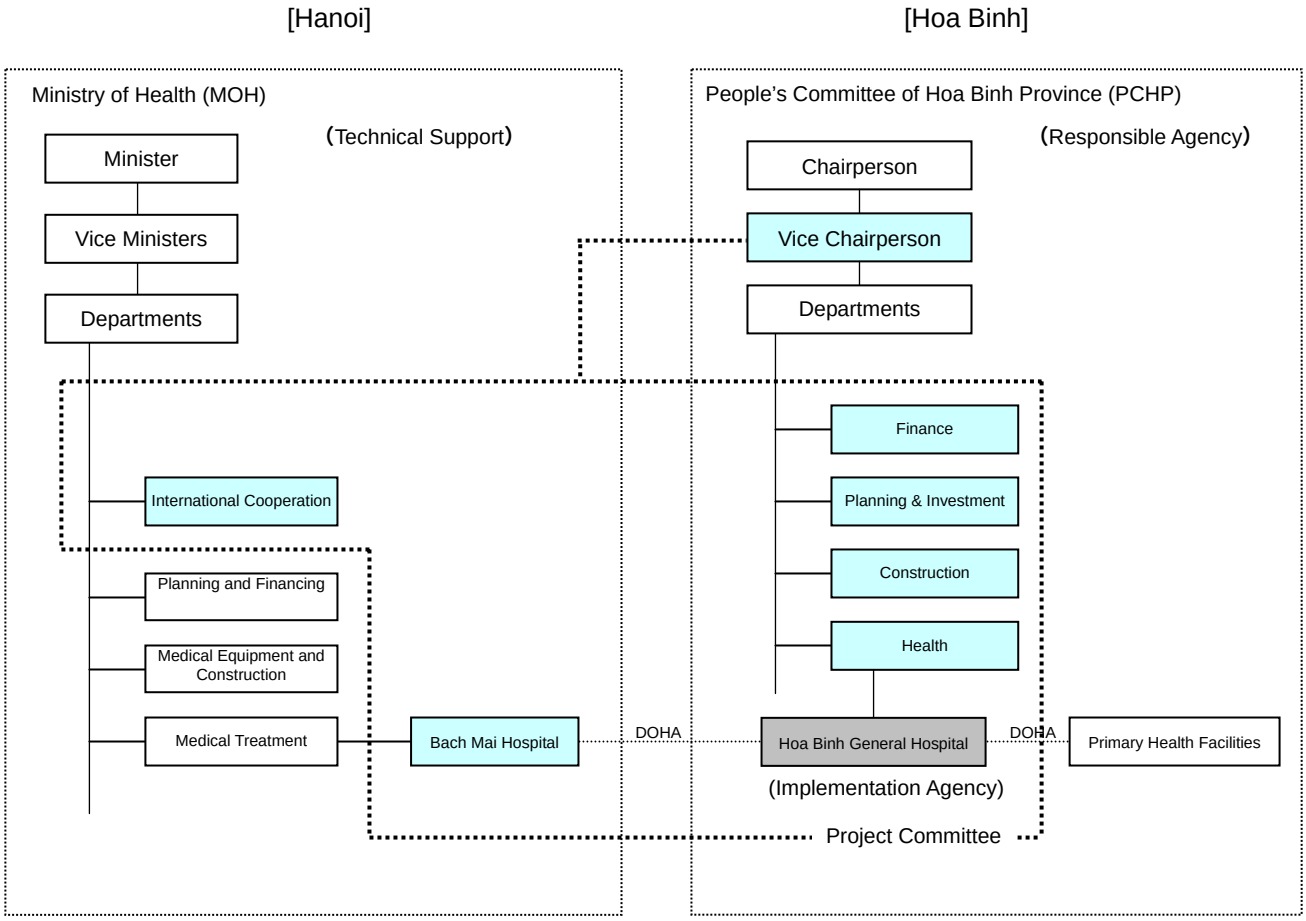


Figure 2-18 Organization of the Project Committee

The members of the committee and their main roles are as shown below.

Proposed Project Committee Members
- Chairman : Vice Chairperson of People's Committee of Hoa Binh Province (PCHP)
- Members of Committee
  - Dept. of International Cooperation, MOH
  - Bach Mai Hospital MOH
  - Dept. of Health, PCHP
  - Dept. of Finance, PCHP
  - Dept. of Planning & Investment, PCHP
  - Dept. of Construction, PCHP
  - Hoa Binh General Hospital

Major Functions of Project Committee
- Signing for Contracts and other required documents
- Banking Arrangement, Authorization to Pay
- To exempt customs duties, internal tax and other fiscal levies
- Project promotion including Tender procedures
- To get building permission and other necessary permissions
- To ensure unloading and customs clearance at port of disembarkation
- Appointment of required staff to the Project

The project committee will study the tender documents (detailed design drawings, specification documents, etc.), and inspect the construction work of the Project, while Hoa Binh General Hospital will act as contact and coordinating office. The People's Committee of Hoa Binh Province will make final approvals after receiving reports from the committee. The whole procedure is summarized in Figure 2-20 below.

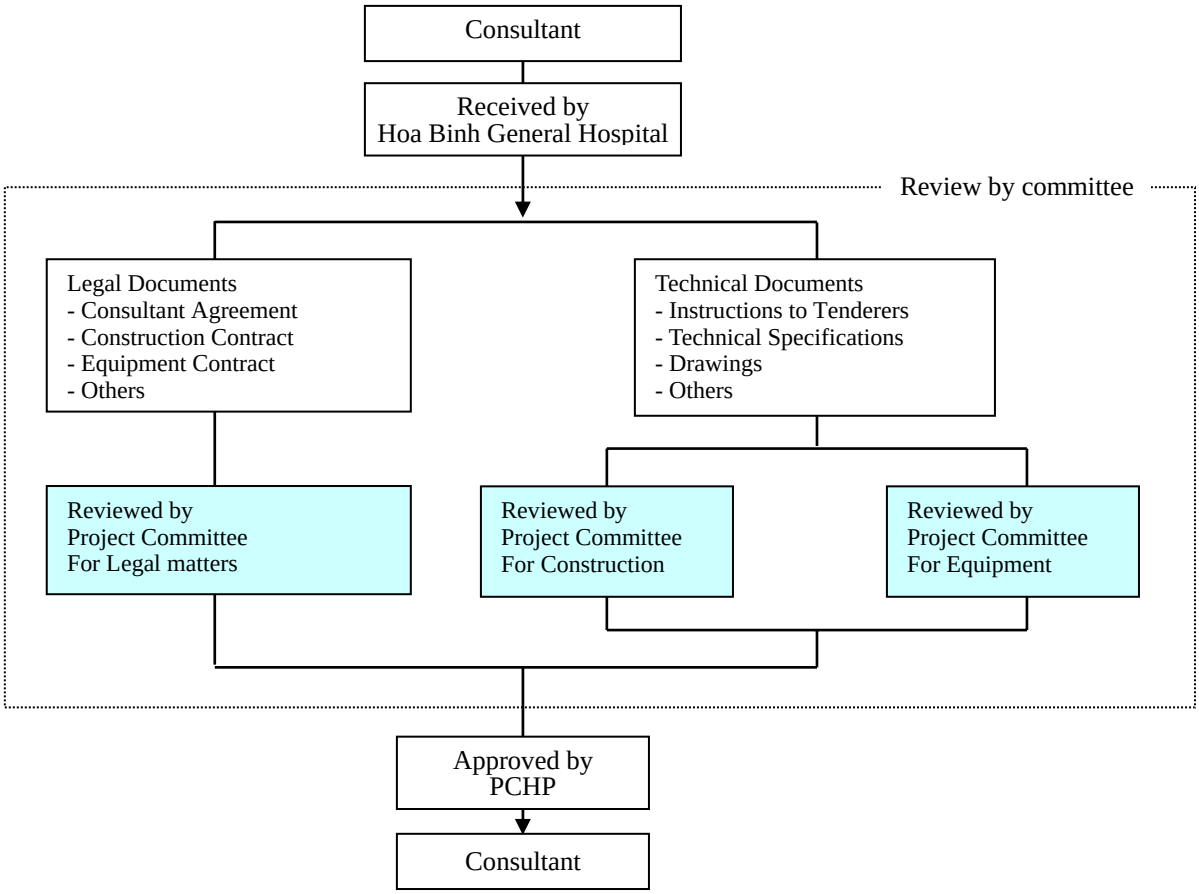


Figure 2-19 Procedure for Approval of Tender Document, etc.

Hoa Binh General Hospital will execute the procedures for construction permit legally specified in Vietnam.

(2) Consultant

After the exchange of notes has been effected, Hoa Binh General Hospital shall enter an agreement (contract) with a consultant, having a status of Japanese juridical person, on development of the detail design and construction supervision. The agreement becomes effective after verification by the Government of Japan. In order to smoothly implement the Project, it is important that the agreement with the consultant be sealed as quickly as possible after the exchange of notes has been effected. The consultant, after the agreement has been signed, is required to prepare the tender documents (detailed design drawings, specification document, etc.) based on the Basic Design Study Report, in consultation with Hoa Binh General Hospital, and to obtain the confirmation of contents of such documents by the Vietnamese side according to the above-mentioned procedure for approval. The tender work and the construction supervision will be executed according to the contents of the tender document.

(3) Construction Contract / Order for Procurement of Facility and Equipment

The Project consists of the construction work per se in which the facilities are constructed, and procurement work in which facilities and medical equipment are procured, installed and test operated. The eligible candidates for the contractor are limited to Japanese juridical persons meeting certain qualifications. The contractor will be selected by the general competitive bidding with limited qualifications.
Hoa Binh General Hospital shall seal a contract with each of the contractors for construction and for procurement duly selected by bidding, and receive verification of the contract documents from the government of Japan. Thereafter, the contractors shall begin their respective works without delay, and shall complete their works according to the contract.

(4) Commissioning of Local Consultant

Since a significant amount of construction work is done following local construction methods, it is necessary to engage local architectural engineers for supervision of the construction works, in addition to the Japanese engineers stationed locally. Since the construction of the Hi-Tech Block involves more mechanical systems works and electrical works than ordinary hospital buildings, local mechanical and electrical engineers will be employed.

(5) Participation of Local Building Engineer and Dispatch of Japanese Professional Specialist

The largest construction company in Vietnam has a payroll of about 18 thousand (including 5 thousand employees working overseas), of which about 1,000 are engineers. The annual construction is equivalent to about 16 billion yen. A branch of a relatively large construction company operates in Hoa Binh City, but the head office in Hanoi handles the work under foreign companies. Hoa Binh is located about 70 kilometers from Hanoi and head offices of large construction companies in Hanoi normally handle construction works.
Large construction companies in Hanoi have had experience in construction works for Japanese companies, and hence have knowledge of construction methods of Japanese construction companies. However, they do not have enough engineers who can actually implement Japanese methods of construction. Therefore, the main contractor (Japanese general contractor, for example) must provide technical instructions. In short, the main contractor needs to employ local building engineers to work under the supervision of Japanese engineers, who will have in depth control of construction process and schedule, quality, safety management of construction and providing detailed instructions.
Because the Central Diagnosis and Treatment Function is included in the project, the construction and installation of the Project requires a very high level of quality control compared with normal hospital construction projects. Therefore, technical guidance and construction management of Japanese professional specialists in these particular fields are indispensable. For construction and fitting of such particular facilities as operation room, professional specialists will be dispatched from Japan or other developed countries.

2-2-4-2 Implementation Conditions

(1) Temporary Work Plan

As agreed in discussions with Hoa Binh General Hospital, the Project will provide temporary offices for the consultant, contractor and subcontractor, material depot and warehouse, etc., on a vacant lot adjacent to the project site.

Of the main construction materials, bricks are manufactured in the suburbs of Hoa Binh City. However, important structural materials such as reinforcing bars and formwork materials will be procured in Hanoi. Although concrete can be obtained from the batcher plant of a local general contractor, a batcher plant will be installed in the construction site in case the quality or supply of local concrete is not completely reliable.

The construction site of the Project is within the premises of Hoa Binh General Hospital. The hospital will be open and diagnosis and treatment works will be conducted as usual even during the construction period. In addition, construction work under Vietnamese obligation will be done concurrently. With all these duly considered, it is important to effectively utilize the peripherals areas of the site. In planning traffic lines for construction, the routes for bringing in the construction materials and work areas will be thoroughly studied to secure safety and efficiency of the construction work. It is necessary to hoard the site and post guards at all approaches to prevent the hospital staff or third persons from entering, and also to forestall thefts. In order for the construction vehicles not to interfere with traffic in the surroundings, and to prevent traffic accidents, traffic guides will be posted on the front road and main points of road in the premises.

(2) Material Procurement

Main construction materials are procurable locally and in Hanoi and its surroundings except for certain materials. Products of various qualities and specifications manufactured in Europe, Southeast Asia and China are marketed in Vietnam. The materials and equipment to be procured will be locally procured to the extent possible in order to facilitate maintenance and repairs after commissioning of the facilities. However, quality and availability of the materials will be thoroughly confirmed to avoid any adverse effect on the construction schedule.

Materials and equipment procured in Japan or third countries and imported will be transported by sea to Hai-phong Port in Vietnam, and transported by land to the construction site in Hoa Binh City by vehicle. The Hanoi City authority bans large vehicles from entering the city in the daytime, and allows them pass through the city only at night. Therefore, the transportation route must be planned to bypass Urban Hanoi. Some materials and equipment need to adopt packing methods that can provide sufficient protection against possible damages from shock, high humidities and high temperatures.

(3) Construction Method

The buildings are of reinforced concrete rigid frame structure built on pile foundations. The walls are mainly of brick masonry. The walls for radiography rooms will be RC walls effective in shielding radiation. The roofs will be flat roofs of concrete slabs with water proofing. Appropriate heat insulation will be considered for the roof.

(4) Legal Consideration

The objective of the Project is to partly supplement the Master Plan for improvement of Hoa Binh General Hospital. Therefore, the Project shall abide by a variety of requirements specified in the above-mentioned Master Plan such as regulation on building shape. Specifically, there are regulations on the floor height of the first floor (150mm to 450mm from the ground surface), on setback of wall surface line from the National Highway No. 6, or front road (37 meters from the road center) and maximum height of the building (30 meters).

2-2-4-3 Scope of Work

The Japanese side works and the Vietnamese side works are defined as stated below to help promote the Project smoothly.

Table 2-21 Japanese Obligation and Vietnamese Obligation

To be covered by Japanese Side	To be covered by Vietnamese Side
	To secure and prepare land
	To get building permission
	To clear, level and reclaim the site when needed 1) Dismantle of existing building within the site 2) Dismantle of existing electrical power cable crossing the site 3) Dismantle of existing telephone line crossing the site 4) Dismantle of existing water pipe crossing the site 5) Dismantle of existing sewage pump pit and sewage pipe crossing the site
	To construct gates and fences in and around the site
	To construct the parking lot 1) Outside the site
To construct roads 1) Within the site	To construct roads 1) Outside the site
To construct Exterior Work within the site 1) Planting, Lighting, Stormwater gutter	To construct Landscaping 1) Landscaping and planting, Storm water gutter of outside construction area
To construct the building 1) Architectural Work including fixed furniture, fit up 2) Electrical Work Power Supply, Lighting and Socket Outlet, Lightning Protection and Earthling, Telephone, Public Address, Intercom, Fire Alarm, Master TV Piping, Piping for LAN System Network 3) Mechanical Work Water Supply, Drainage, Hot Water Supply, Sanitary Fixture, Fire Fighting, Air Conditioning 4) Other Utilities Generator System, Medical Gas System, Sewage Treatment Plant, Incinerator, Elevator System	
To provide facilities for the distribution of electricity, water supply, drainage and others 1) Electricity a. The main circuit breakers and one transformer b. The conduit pipe and wiring from main breaker to Hi-Tech Block.	To provide facilities for the distribution of electricity, water supply, drainage and others 1) Electricity a. High tension power supply to new sub-station b. Additional transformer for future plan c. Cabling connection & modification in the existing buildings d. Temporary cabling to the existing buildings for transfer
2) Water Supply a. The supply system within the site.	2) Water Supply a. The city water distribution main to the water reservoir at Hi-Tech Block b. Piping connection & modification in the existing buildings
3) Drainage a. The drainage system within the site b. The sewage treatment plant c. Drainage piping between Hi-Tech Block and Sewage treatment Plant	3) Drainage a. The drainage system outside the site and to connect to city drainage system b. Piping connection & modification in the existing buildings
4) Telephone system a. The MDF and the extension after the main distribution flame/panel	4) Telephone system a. The telephone main trunk line to the main distribution frame/panel (MDF) of the building b. Cabling connection & modification in the existing buildings
5) Furniture and Equipment a. Curtain Rail b. Fixed furniture c. Supply and installation of Medical Equipment	5) Furniture and Equipment a. Curtain, Blind b. General furniture c. Moving and installation of existing Equipment

Important considerations for the smooth implementation of the Project include control of scheduling of construction works and installation works concerning buildings works, electrical works and mechanical works. People engaged in construction need to understand the works of medical equipment works and adjust the construction work schedule to the requirement of medical equipment installation. As the Project includes removal of existing buildings, preparation of infrastructure, and exterior works by the Vietnamese side, coordination between the Japanese side construction work and the Vietnamese side construction work is important. It has been confirmed with the Vietnamese side that the infrastructure works (electric power, city water supply, water supply and wastewater facilities, etc.) will be completed by the time of the commencement of construction and installation works of the Project. Nevertheless, it is important that both parties coordinate with each other in detail to ensure that the above works have been done in time for the commencement of construction, to avoid any adverse effect. In addition, by the time of hand over to new infrastructure facilities, the temporary line and pipe must have been provided by Vietnamese side.
The boundaries of the Project site indicated in the Table 2-21, "Japanese Obligation and Vietnamese Obligation," are shown in Figure 2-20.

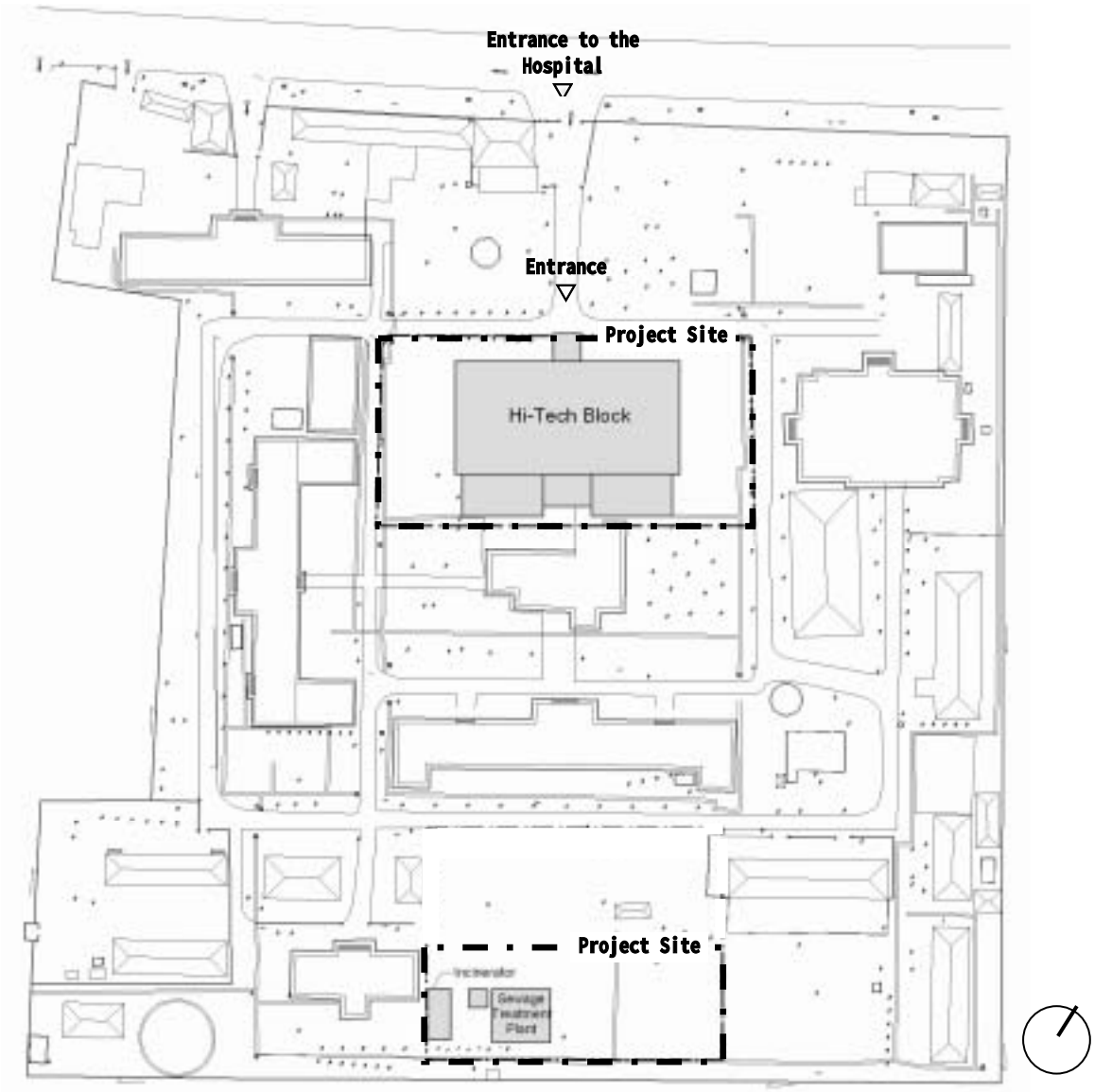


Figure 2-20 Demarcation between the Japanese Side Work and the Vietnamese Side Work

2-2-4-4 Consultant Supervision

A Japanese consultant firm will conclude the Agreement for Consultants Services with HGH and the said consultant will prepare the tender documents for construction and equipment procurement. After assisting in tendering of the Project, upon the award of construction and equipment procurement contract(s), the consultant will commence the construction supervision services. The purpose of supervision services executed by the consultant is to oversee the construction of the facilities and the procurement and installation of equipment, to ensure quality and construction progress is consistent with the contents of contract documents. To secure this, the consultant as a supervisor will issue guidance, advice and coordination to the contractor(s) regarding quality of works and progress of construction schedule. The consultant services includes the following items:

(1) Assistance in tendering of construction and equipment procurement contract(s)

This item includes the preparation of tender documents necessary to select the contractor(s) for construction and equipment procurement and also the issuance of Tender Notice, acceptance of tender applications, pre-qualification of applicants, holding of explanatory meeting for tendering, distributing tender documents and accepting and evaluation of tenders. Furthermore, the consultant will lend guidance and assistance for the contract signing procedure between the successful tenderer and HGH.

(2) Issuing guidance, advice and coordination to contractor(s)

The consultant will examine the construction schedule, construction plans, procurement plan of construction materials and procurement & installation plans for equipment submitted by the contractor and issue guidance, advice and provide coordination.

(3) Inspection and approval of working drawings and shopdrawings prepared by contractor(s), subcontractors and suppliers.

The consultant will inspect the work drawings, shop drawings and other construction documents and provide approval along with any necessary guidance.

(4) Confirmation and approval for construction materials and production equipment

The consultant will inspect the proposed construction materials and equipment for conformity with the contract documents and issue approval of their use and procurement.

(5) Inspections of works

The consultant will conduct factory inspections of construction materials and procured equipment, attend construction tests and conduct tests to measure quality and performance compliance as necessary.

(6) Progress report of construction and installation.

The consultant will ascertain the status of construction schedule and site conditions and report on the construction progress to concerned agencies of both countries.

(7) Confirmation and verification of trial run results and final inspection upon completion.

The consultant will conduct completion inspections for buildings, ancillary systems and equipment procurement and conduct trial runs of the equipment to confirm that the completed facilities meet the performances stipulated in the contract documents and submit a completion inspection report to Hoa Binh General Hospital.

(8) Construction Supervision Organization

The consultant will assign one resident engineer to perform the activities described above. In addition, the consultant will send experts in relevant fields to the site, as necessary, following the progress of the construction works. The experts will conduct discussions, inspections, guidance and coordination necessary for project implementation. Furthermore, the consultant will assign experts in Japan to establish a back up system. Finally the consultant will report to the concerned agencies of the Government of Japan concerning relevant matters on the progress of the Project, payment procedures, completion and handing over and other matters.
A draft Supervision Organization is shown in the following Figure.

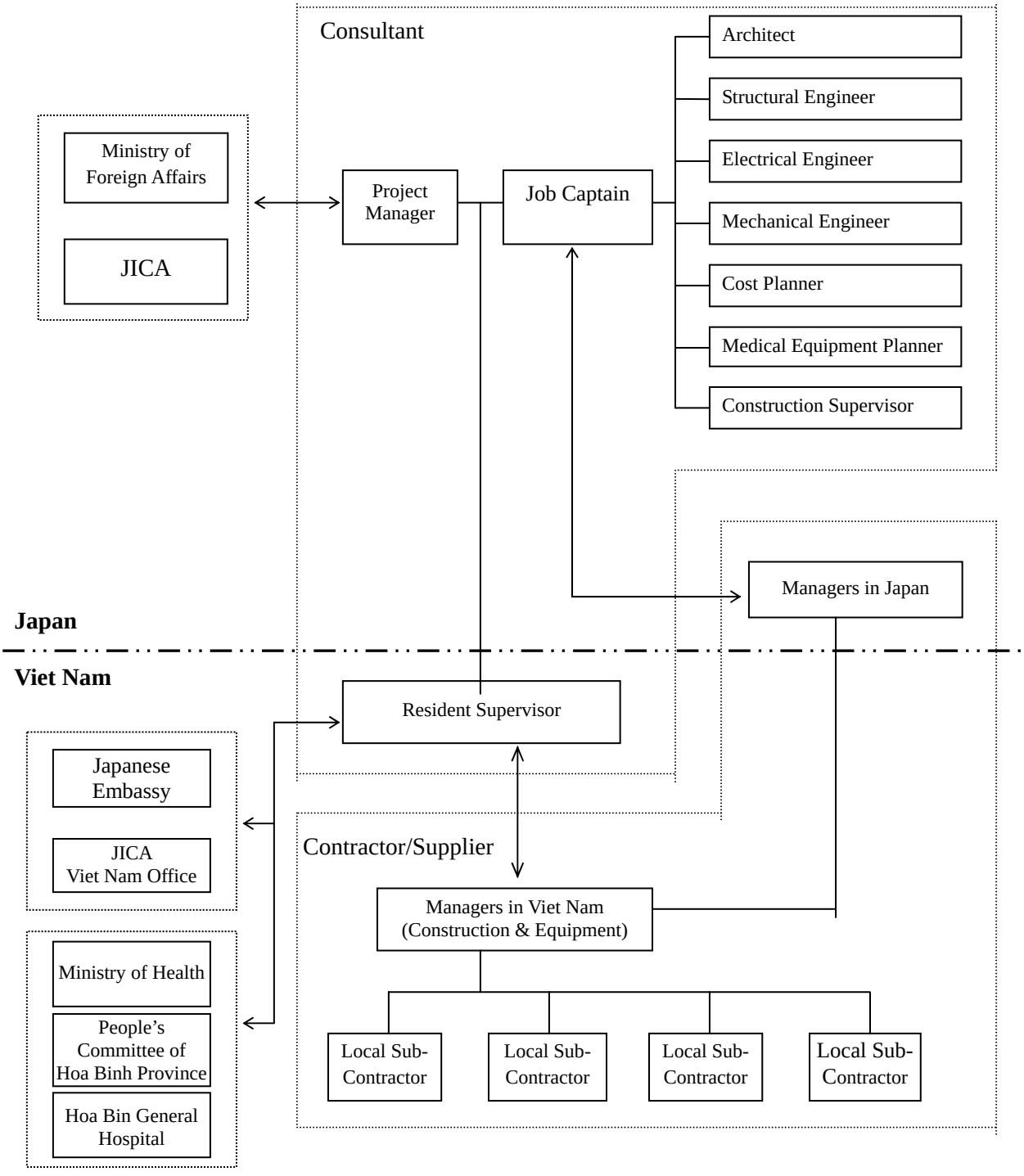


Figure 2-21 Supervision System

2-2-4-5 Quality Control Plan for Concrete

(1) Materials

1) Cement

Ordinary Portland cement will be used.

2) Aggregate

- Fine Aggregate
  Crushed stones or sand will be used as fine aggregate. When using sea sand, the chloride ion content must be below the standard set in JASS 5.
- Coarse Aggregate
  River gravel or crushed stones will be used as coarse aggregate. The maximum size of coarse aggregate will be 20mm.
- Admixture
  Standard AE water-reducing agent or equivalent will be used.
- Water
  Water from city water mains or equivalent will be used. Recycled water will not be used in general.

(2) Mix Proportion Plan

- The required quality is for the strength of the structural concrete after 28 days to be equal to or above design standard strength. To achieve the required quality, the ratio of components will be determined by trial mixings, with reference to the following.

  ① Water Content
  AE water-reducing agent will be used when appropriate to ensure a good workability with water content of 185kg/m^3 or less.
  ② Cement Content
  The cement content should be a minimum of 270kg/m^3 and a maximum water/cement ratio of 65%, with the water/cement ratio as small as possible.
  ③ Air Content
  Air content of 4.5% will be the standard.
  ④ Chloride Content
  The chloride content, measured as the chloride ion content, should be 0.3kg/m^3 or less, taking into account the volume of chemical admixture.

- Establishment of Mix Proportion Strength
  In principle, the mix proportion strength will be set following JASS 5. The mix proportion strength is expressed as the compressive strength of normally cured samples after 28 days. The larger one of the values calculated from the equations given below is regarded as the mix proportion strength of the sample.

$$F = Fq + T + 1.73\,\sigma$$
$$F = 0.85\,(Fq + T) + 3\,\sigma$$

where

F: Mix proportion strength of concrete (N/mm^2)
Fq: Standard quality strength of concrete (N/mm^2)
σ: Standard deviation of strength of concrete used (N/mm^2)
T: Correction factor for estimated average temperature for the 28 day period following concrete placement (N/mm^2)

And Fq is formulated as follows;

$$Fq = \max(Fc + \Delta F, Fd + \Delta F)$$

Fc ：Standard design strength of concrete (N/mm^2)
Fd ：Standard permanence strength of concrete (N/mm^2)
⊿F：Value of premium considering of the concrete strength between cast-in-site and test pieces. (= 3 N/mm^2)

(3) Receipt of Concrete at the Site

When using ready-mixed concrete from a factory, it must be confirmed that the following points are conformed to.

1) The factory must have permanently-stationed engineers who have a thorough knowledge of concrete techniques.
2) The factory must be located close enough for it to take less than 120 minutes from the start of mixing till completion of casting when the temperature is below 25℃, or less than 90 minutes when the temperature is above 25℃.
3) The product must be of the quality required in the Project documents.

(4) Quality Control for Concrete

1) System of Quality Control for concrete work
Quality control for concrete will conform to the procedures shown in the Table below.

Table 2-22 Quality Control for Concrete Works

Process	Test Item	Control Items	Record Method
Supervision of concrete placement	Quality of fresh concrete	Slump test, Flow test, Air content, Concrete temperature, Chloride content	Concrete Casting Control Form
Supervision of sample curing	Ambient temperature	Average temperature	Temperature Control Form
	Temperature of curing water	Average water temperature	Temperature Control Form
Control of strength	Confirmation of strength at removal of formwork	Equal to or greater than required strength obtained from calculation	Strength Control Form
	Judgement of strength of structural concrete	Equal to or greater than required strength obtained from calculation	Strength Control Form

2) Test for Quality Control of Fresh Concrete
Pre-casting inspection and confirmation will be carried out for the items given in the Table below.

Table 2-23 Quality Control Tests for Fresh Concrete

Test Item	Test Method	Timing / Frequency	Criterion of Judgement
Slump Value	JIS A 1101 equivalent	Each batch	Tolerance of ±2.5cm
Air Content	JIS A 1128 equivalent		Tolerance of ±1.5 %
Temperature of concrete	Measurement by thermometer		35℃ or below
Segregation	Visual Inspection		No segregation visible
Chloride Content	JASS 5 T-502 equivalent	First batch each Day	Chloride ion content of 0.3kg/m^3 or less

3) Control of Concrete Strength

Sampling methods and methods of curing used to test the strength of concrete are summarized in the Table below.

Table 2-24 Control of Concrete Strength

Purpose of Test		Confirmation of Strength of Structural Concrete	Confirmation of Strength at Removal of Formwork
Sampling	Sampling Method	JASS 5 T603 Equivalent, Samples Taken on Site	JASS 5 T603 Equivalent, Samples Taken on Site
	Frequency of Test	Every casting day and every casting block , or once in every 150m^3 of casting concrete	Every casting day Normally twice a day, three samples each time
	Number of samples	Three each time	Three each time
	Form of sample	15cm Cube	15cm Cube
Curing of Samples	Method of curing	On site curing in water	In sealed condition on site
	Place of curing	On Site	On Site
Strength Test	Place of Test	At an official institution or on Site	At an official institution or on Site
	Witness to test	Consultant Supervisor	Consultant Supervisor

- Judgement and Confirmation of Concrete Strength

a) Judgement Standard for strength of structural concrete

$$X \geq F_q \quad (\mathrm{N/mm^2})$$

b) Judgement Standard for strength at removal of formwork.

$$X \geq F_q \quad (\mathrm{N/mm^2})$$

2-2-4-6 Procurement Plan

(1) Procurement of Construction Material and Equipment

The objective of the Project is to provide hospital facilities; therefore, rigid and durable products will be procured so that the intended performances of facilities are assured. Reliable sustainability of performance, ease of management and maintenance, ease of cleaning, of materials and equipment should be duly considered in procurement work. Specifically, the following procurement policies will be pursued.

1) Local procurement

The materials and equipment locally procurable will be procured to the extent possible so that repairs and maintenance works are facilitated after commissioning. Their procurable quantities and qualities will be confirmed. Imported products that are freely available in the domestic market (always available in the domestic market without going through import procedures) will be regarded as equivalent to domestic products and preferentially adopted.

2) Overseas procurement

Required materials and equipment which are difficult to procure in the domestic market, which do not meet the required quality, or which are not stably available in the domestic market will be procured in Japan or in third countries and imported. In the case of overseas procurement, the contractor should coordinate with Hoa Binh General Hospital about import and customs clearance so that procedures of duty exemption and other procedures may be executed smoothly.
Also, if the “price + packing and transportation cost” of importation from Japan or any third country is found lower than the “locally procured price” of given products, overseas procurement and importation of such products will be considered.

3) Transportation plan

Materials and equipment procured in Japan or third countries and imported will be transported by sea to the Hai-Phong Port of Vietnam, and transported by land to the construction site in Hoa Binh City by vehicle. The Hanoi City authority bans large vehicles from entering the city in the daytime, and allows them to pass through the city only at night. Therefore, the transportation route has to be planned to bypass Urban Hanoi. Some materials and equipment need to adopt packing methods that can provide sufficient protection against possible damages by shocks, high humidities and high temperatures.

4) Procurement plan

The Table below shows major materials and equipment broken down into local procurement, third country procurement, and procurement in Japan. Major materials and equipment concerning electric facilities and machines are procured in third countries or in Japan, with few exceptions.

Table 2-25 Procurement Plan of Major Construction Materials and Equipment

Work category	Material and equipment	Local	Third country	Japan	Note
Reinforced concrete work	Portland cement	○			Local product conforming to JIS Standard can be manufactured.
	Fine aggregate (sand)	○			Local procurement
	Coarse aggregate	○			Local procurement
	Deformed bar	○			Products conforming to JIS Standard are available.
	Form	○			Local procurement
Steel work	Structural Steel	○			Products conforming to JIS Standard are available.
Masonry	Concrete block	○			Local product can be manufactured in the neighboring Hoa Binh City.
	Brick	○			Local procurement
Water-proofing work	Asphalt waterproofing			○	Local quality is inferior and guaranteed work by local contractor using imported materials will be specified.
	Liquid-applied membrane waterproofing			○	Ditto
	Sealing compound	○			Ditto
Plastering work	Terrazzo	○			Local procurement
Tile work	Earthenware tile	○			Local procurement
	Porcelain tile	○			Local procurement
Carpentry	Wood	○			Local procurement
	Glued laminated wood	○			Local procurement
	Plywood	○			Local procurement
Metal work	Light steel frame backing	○			Local procurement
	Decorated metal ware	○		○	Partially from Japan
	Finished metal products	○		○	Partially from Japan
Plastering work	Cement mortar	○			Local procurement
	Plaster	○			Local procurement
Wooden fitting work	Hinged door	○			Local procurement
	Wooden fitting frame	○			Local procurement
	Fixture metals	○			Local procurement
Metallic fitting work	Aluminum window		○	○	Local products have quality problems and third country or Japanese products will be procured.
	Steel fitting		○		Local products have quality problems and third country products will be procured.
	Stainless steel fitting			○	Local products have quality problems and Japanese products will be procured.
Glass work	Plain sheet glass	○			Local procurement
Painting work	Interior painting	○			Local procurement
	Exterior painting	○			Local procurement
Interior finish work	Plaster board	○			Local procurement
	Rock wool sound insulating board	○			Local procurement
	Glass wool	○			Local procurement
	Lead-lined board			○	Local products have quality problems and Japanese products will be procured
Furniture	Counter, table	○			Local procurement
	Rocker, shelf	○			Local procurement
Miscellaneous works	Sink, laboratory bench	○		○	Portions for which high performance is required will be Japan made.
Exterior work	Paving material	○			Local procurement

Work category	Material and equipment	Local	Third country	Japan	Note
Electric facility work	Wiring accessory	○			Local procurement
	Lighting equipment		○	○	Specialty products: Japan made.
	Boards		○	○	Ditto
	Stand-by generator		○	○	Ditto
	Wires and cables	○		○	Ditto
	Telephone exchange		○		Local products are not available.
	Interphone			○	Local products do not satisfy quality requirements.
	Public address system			○	Ditto
	Fire alarm			○	Ditto
Machine facility work	Electric water heater		○		Local products are not available.
	Pump		○	○	Local products do not meet quality.
	Air conditioner		○	○	Sources of procurement depend upon specification.
	Forced fan and exhaust fan		○	○	Ditto
	Ventilating fan, ceiling fan		○	○	Ditto
	Air intake exhaust fitting		○	○	Ditto
	Sanitary ware		○	○	Ditto
	Duct material	○	○		Ditto
	Piping material	○		○	Ditto
	Thermal insulating material			○	Local products are not available.
	Automatic controlling unit			○	Ditto
	Medical gas facility			○	Japanese products will be used because of high quality requirements.
	Sewage treatment facility			○	Local products are not available.
	Incinerator	○			
Elevator facility work	Elevator	○			Products by Japanese manufactures will be procured locally

(2) Procurement Plan of Medical Equipment

1) Use of local agents

Most of equipment planned to be procured will be imported from outside of Vietnam. Equipment will be selected among those manufactured by agents that have their agents in Vietnam with service parts and consumables judged to be domestically available. While products made in Japan, Europe and the United States may be adopted, such factors as track records/capabilities, ease of repair and maintenance, and popularity in Vietnam will be taken into consideration in the selection. In terms of radiography-related equipment such as radiography unit and expensive equipment such as ultrasound diagnosis units, agents in Vietnam dealing in Japanese products have staff, who have received training in Japan and are certified as repair engineers. They are capable of attending to the technical needs. Engineers of agents dealing in European and American products have received technical training in Singapore, Hong Kong and the like. They also are capable of attending to technical needs. Approximately 30 agents have been recognized in Hanoi City.

2) Equipment Procurement Plan from Third Country

In Vietnam, most items of medical equipment used in Japan are available domestically. However, if the source of procurement is limited to Japan and Vietnam, a fair competitive bidding may not be arranged; so the source of procurement needs to be extended to a third country. In addition, while Vietnamese products are considered to be widely distributed at a low price, due consideration needs to be paid to the quality and the durability in light of the future activity of the hospital.

The following Table shows the expected source of procurement for key equipment.

Table 2-26 Key Equipment Procurement Plan List

Name of Equipment	Local Procurement	Procurement from Japan	Third Country Procurement (DAC nations)
Radiography-fluoroscopy unit, general radiography unit, ultrasound diagnosis units (Color Doppler), X-ray film developer		○	
Autoclave, Cauteries, ECG, defibrillators, shadowless lamps, patient monitors		○	○
Ventilator, anesthesia machines, biochemical analyzer, endoscopes, cleaner for endoscopes, neonatal incubators, pulseoximeter		○	○
Operating tables, examination tables, delivery beds, examination lamps, ICU beds, plaster table, infant warmer	○	○	○

3) Feasibility of Local Procurement

General medical equipment (General radiography unit, ultrasound diagnosis units, etc.) popular in Vietnam is dominated by products made in Japan, Europe and the United States. The simple equipment items (such as instrument tables and instrument cabinets) will be planned to be procured from among locally manufactured products, since locally manufactured products are widely available in the domestic market.

4) Availability of Third Country Products

Procurement from third countries will be considered in the case where the supplier has a local agent in Vietnam and will present no problems as to maintenance, and procurement of replacement parts and consumables and the procurement cost is competitive with other alternatives.

5) Transportation

The transportation period of medical equipment is estimated to be approximately 1.5 months including the days for various procedures associated with shipment.

6) Installation of Equipment

The equipment requiring installation/adjustment is shown in Table 2-27. Installation consists mainly of securing the place and connection to electricity. These works are borne by Japanese Grant Aid Portion.

Table 2-27 Installation Works for Equipment

Equipment Name	Nos.	Water	Drain	Steam	Ventilation	Other
Fluoroscopic X-ray T.V. System	1					Electrical connection only
General X-ray Apparatus	1					Electrical connection only
Cleaner for Endoscopy	1	○	○			
High Pressure Steam Sterilizer	1	○	○		○	Panel Work

2-2-4-7 Implementation Schedule

The implementation schedule after the exchange of notes is as shown below. The schedule includes the detailed design work by the consultant, execution of the tender, execution of construction by the contractor and supervision by the consultant.

(1) Detailed Design Work

First, Hoa Binh General Hospital and the consultant, a Japanese juridical person, enter an agreement on the detail design of the Project (preparation of the tender document), followed by the approval of the agreement by the government of Japan. Thereafter, the consultant prepares the tender document based on this basic design study report, while collaborating with Hoa Binh General Hospital. The completed tender document needs to be approved by Hoa Binh General Hospital.
The detailed design work is expected to take 3.5 months.

(2) Tender Work

The tender work is expected to take three months.

(3) Construction Work by the Contractor and Supervision by the Consultant

The contractor starts construction work after the contract for the construction has been sealed and the said contract has been verified by the government of Japan. At the same time, the consultant starts supervision of the construction works.
The construction work is expected to take 12 months.
The details of the works for each stage are as shown below.

Table 2-28 Content of the Construction Work

Construction of Facilities	Hi-Tech Block RC made, 3-storied building, total floor area: 3,949 m^2 1F：X-ray examination department, Physiological examination, endoscope departments (1,452 m^2) 2F：Specimen examination department, ICU (1,158 m^2) 3F：Operation department, Sterilization room, Recovery room (1,252 m^2) RF：Warehouse (87 m^2) Related Facilities Incinerator：Incinerator, Stock space (40 m^2) Sewage Treatment Plant： Machine room (17m^2)
Procurement of Equipment	The equipment necessary for the operation of Project facilities. （Radiography unit、Hot-air sterilizer、Centrifuge, ECG, etc.） The basic equipment necessary for existing facilities
Soft Component	Technical instructions for facility maintenance system, and medical waste disposal system

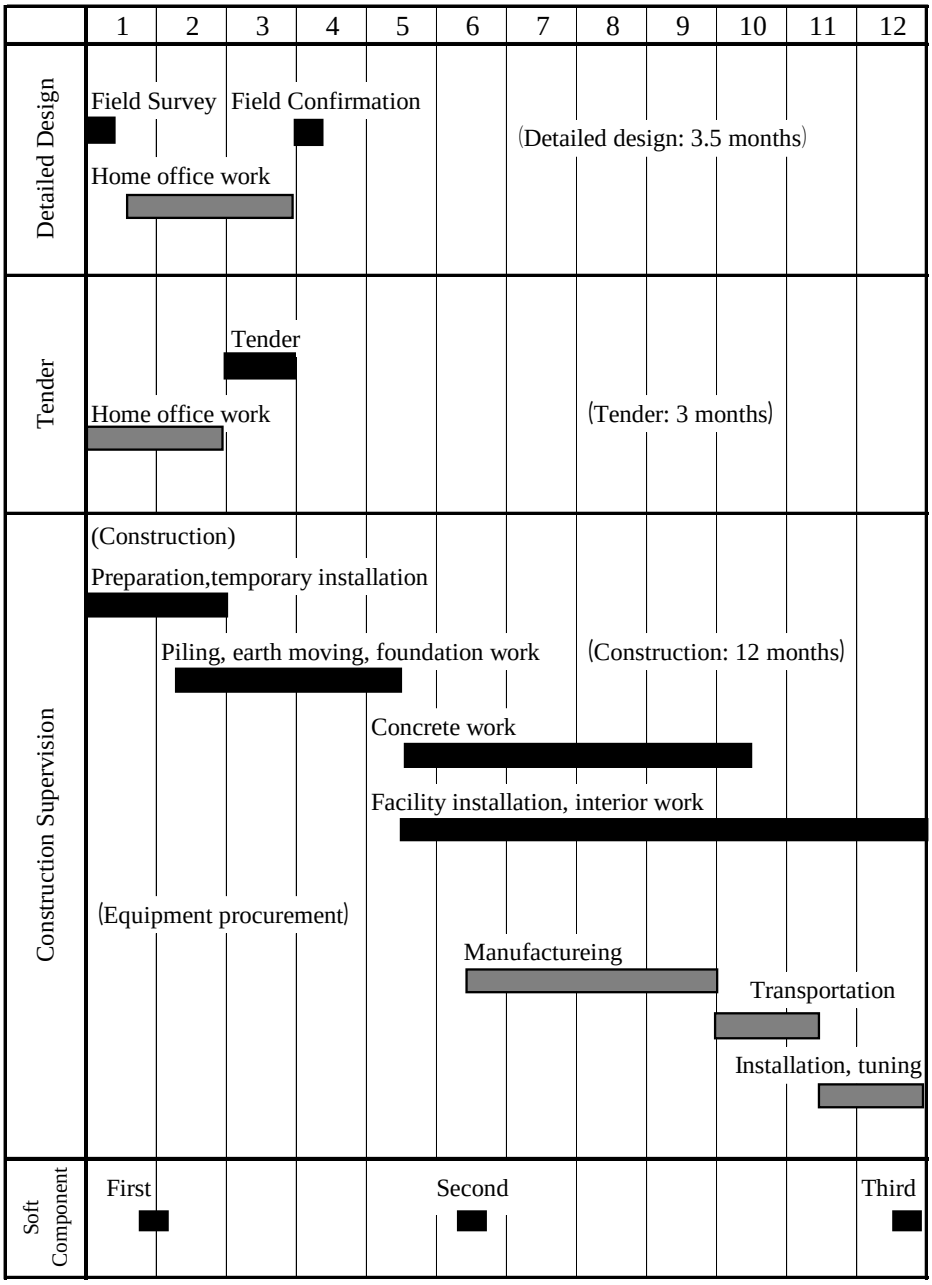


Figure 2-22 Work Schedule

2-3 Obligations of Recipient Country

The obligations of the government of Vietnam are shown below;

1) Exemption of any tax or duty on every item or act concerning the Project
2) Application for and acquisition of building permits and other approvals necessary for the Project
3) Issuance of the banking arrangement (B/A) and the authorization to pay (A/P), and bearing of commission fees associated with it
4) Prompt landing of building and equipment cargoes at port, procedure for exemption of duties, customs clearance, and assurance thereof, and securing of prompt domestic transportation
5) Provision of convenience necessary for entry to and stay in Vietnam to the Japanese nationals who are to execute provision of facilities and equipment and other works according to the certified contract
6) Exemption of all duties, all taxes in Vietnam to the Japanese nationals who are to execute provision of facilities and equipment and other works according to the certified contract
7) Realization of the budget required for effective use and maintenance of the facilities and equipment constructed and procured by the grant aid scheme.
8) Removal of existing facilities in the plant site and ground preparation of the site
9) Construction of boundary walls, gates and exterior works
10) Laying of the electric power cables, city water facility, sewerage facility, telephone trunk lines to the boundary of the site
11) Transportation of the existing facilities and equipment, which are to be moved to the new building, and installation therein
12) Purchase of general furniture and installation
13) Bearing of expenses that become necessary for reasons other than those procured in the grant aid program

The estimated cost to be borne by the Vietnamese side is as follows.

Table 2-29 Cost of Vietnamese Obligation Works

(US Dollars)

Work item	Cost
1. Demolition of existing building	78,000
2. Connection of electric power line, water line, wastewater line (about 500 meters)	65,000
3. Exterior Works (Landscaping, Planting, etc.)	22,000
4. Others (blind, general furniture, etc.)	63,000
Total	228,000 (about 25 million yen)

2-4 Project Operation Plan

2-4-1 Approximate Cost of the Grant Aid Project

Cost of Japanese Obligation Works

The cost to be borne by the Japanese side is as follows.

Table 2-30 Approximate Total Project Cost

Approx. 982 million yen

Item		Estimated project cost (million yen)		
Facility	Hi-Tech Block	657	694	843
	Exterior	37		
	Furniture, fixture	0		
Equipment	Hi-Tech Block	121	149	
	Existing facility	28		
Detailed Design, Consultant Supervision				131
Soft Component				8

This cost estimate is provisional and would be further examined by the Government of Japan for the approval of the Grant.

2-4-2 Operation, Management and Maintenance Plan of the Project

(1) Facility

Hoa Binh General Hospital has a facility management department reporting directly to the director of the hospital. The department is engaged mainly in management and maintenance of facilities, management of drivers, management of the warehouse, cleaning and management of waste. Three persons are in charge of maintenance of the facilities, an electrician, a building technician and a carpenter. Presently, the hospital has no workshop and only a few tools. These persons conduct only minor maintenance and repair works.
This Project does not intend to use finishing materials that require special maintenance. Nevertheless, the project intends to use special equipment and building systems that require maintenance staff having professional knowledge as listed below.

- Air conditioning facilities for operation theater
- High voltage power receiving facility
- Power generator facility
- Medical gas facility
- Sewage treatment facility
- Elevator facility

In order to be able to maintain such facilities, the hospital needs to employ a minimum of the following new staff. It has been confirmed that the personnel will be recruited by March 2006.

- Electrical engineer: 1 person, bachelor degree level
- Mechanical engineer: 1 person, bachelor degree level
- Mechanics and electrician: 3 persons, technical school graduate level

(2) Equipment

Presently, the hospital has nine persons for management and maintenance of equipment. However, their present knowledge and experiences were found not sufficient to qualify them for the work of management and maintenance of equipment. The present state is such that Equipment Management Ledger, the source of basic information, is not prepared. The Equipment Management Ledger should be prepared in time for completion of this Project.
The present Equipment Ledger records the date of procurement, item, quantity, and model at the time of procurement, but does not provide information on the state of management and maintenance after procurement. Although the Ledger records maintenance of such important instruments (automatic hemocytomer of the Clinical Examination Division, for example), it has been confirmed that the items and details recorded are not enough to be of use in later maintenance works.
The medical equipment division of Bach Mai Hospital conducts technical training to management and maintenance engineers of hospitals of lower levels, such as provincial hospitals. Some of the management and maintenance engineers of Hoa Binh General Hospital have attended such training courses conducted by Bach Mai Hospital. Bach Mai Hospital is expected to strengthen such training activities.

2-4-3 Management, Maintenance and Operation Costs

(1) Maintenance and Operation Cost

The following pages show the result of calculations of maintenance and operation cost after completion of the project.

Table 2-31 Calculation of Maintenance and Operation Costs

Unit: Vietnamese Dong (VND)

Item	Initial fiscal year	Following fiscal years	Note
1) Electricity charge	472,500,000	472,500,000	
2) Telephone charge	32,274,000	32,274,000	
3) Water charge	67,500,000	67,500,000	
4) Gas charge	0	0	
5) Medical gas charge	18,144,000	18,144,000	
6) Diesel fuel cost	63,360,000	63,360,000	
7) Filter replacement	0	40,000,000	Two years after completion and onward
8) Maintenance of major equipment	79,000,000	79,000,000	
9) Building maintenance	0	38,000,000	Two years after completion and onward
Sub total	732,778,000 (5,056,000 yen)	810,778,000 (5,594,000 yen)	
10) Equipment maintenance cost	229,792,000 (1,585,000 yen)	380,456,000 (2,625,000 yen)	
Total	962,570,000 (6,641,000 yen)	1,191,234,000 (8,219,000 yen)	
Present budget (for the functions to be included in Hi-Tech Block)		600,000,000	
Necessary additional budget		approx. 600,000,000	

(Exchange rate: 1 VND/0.0069 yen)

1) Electricity charge: ····· 472,500,000 VND/year
According to the electricity tariff of the utility electric company of Hoa Binh Province, the following electric rate is applied to Hoa Binh General Hospital.

Minimum charge: not applicable
Meter rate: 900 VND/kWh (including tax)

The capacities of the facilities of this Project are about 500kW(100-130W/m^2×4,000 m^2 =500kW), based on the transformers capacity for the expansion facilities and average electric power consumption is considered to be about 50 percent of the contract capacity; therefore, electric power consumption is about 250kW.
The electricity charge is estimated as follows.

Meter rate charge:
900 VND/kWh × 250kW × 7h × 25 days × 12 months = 472,500,000 VND/year
Therefore, annual electricity charge is 472,500,000 VND/year.

2) Telephone charge: ·····32,274,000 VND/year
The frequencies of telephone line uses are assumed as follows. The frequency of use are taken from general use patterns at hospitals in Viet Nam.

Hoa Binh City call: 3 minutes/one call, 50 calls/day
Domestic long distance call: 3 minutes/call, 5 calls/day (mainly to Hanoi)
Overseas long distance call: 5 minutes/call, 10 call/month (mainly to Japan)

The telephone charge is estimated as follows.

Hoa Binh City call:
400 VND/minute × 3 minutes/call × 50 calls/day × 25 days × 12 months
= 18,000,000 VND/year
Domestic long distance:
1,200 VND/minute × 3 minutes/call × 3 calls/day × 25 days × 12 months
= 3,240,000 VND/year
Overseas long distance:
13,500 VND/minute × 5 minutes/call × 10 calls/month × 12 months
= 8,100,000 VND/year
Sub total:
18,000,000 + 3,240,000 + 8,100,000 = 29,340,000 VND/year

Total (including 10% tax):
29,340,000 VND/year × 1.1 = 32,274,000 VND/year

Therefore, the annual telephone charge is 32,274,000 VND/year.

3) Water charge: ·····67,500,000 VND/year
According to the tariff of the Waterworks Company of Hoa Binh Province, the following rate will be applied to Hoa Binh General Hospital.

Minimum charge: not applicable
Meter rate: 4,500 VND/m^3
The consumption of water by Hoa Binh General Hospital is estimated at about 50 m^3/day (Outpatients 230 persons × 30 ℓ/person + Inpatients 20 persons × 500 ℓ/person + Doctors 120 persons × 220 ℓ/person + Interns 60 persons × 100 ℓ/person is assumed) from the types and capacities of the facilities.

The water charge is estimated as follows.

Meter rate charge: 4,500 VND/m^3 × 50 m^3/day × 25 days × 12 months
= 67,500,000 VND/year

Therefore, the annual water charge is 67,500,000 VND/year.

4) Gas charge: ·····0
The planned facilities use gas only for limited purposes such as examinations, and the consumption is very small. Therefore, gas charges are not counted.

5) Medical gas: ·····18,144,000 VND/year
The medical gas used at Hoa Binh General Hospital is oxygen. The hospital uses oxygen at such facilities as operation rooms, ICUs, recovery rooms. The consumption of medical gas is estimated as follows.

Consumption of oxygen is assumed at 6 m^3/day (Outlet No. 28 × Simultaneous use ratio 0.3 ×3 ℓmin/per outlet × time in use 240 min is assumed).

Annual consumption
Oxygen 6 m^3/day × 30 days × 12 months = 2,160 m^3/year
Medical gas (oxygen) charge: 8,400 VND/m^3 ×2,160 m^3/year = 18,144,000 VND/year

Therefore, the annual medical gas charge is 18,144,000 VND/year.

6) Diesel fuel cost: ·····63,360,000 VND/year
Diesel fuel is used as fuel for the emergency power generator and the incinerator. Consumption of diesel fuel by the incinerator is assumed at 40 liters/day (Operated at 6.66 ℓ/h × 6 hours). The emergency power generator is assumed to operate at 60 liters/hour (fuel consumption for 300 kVA) two hours a month, for an assumed frequency of power failures of four times a month plus test operation time. The unit price of diesel fuel is 4,000 VND/liter.

Monthly fuel consumption:
40 liters/day × 30 days/month + 60 liters/h × 2 h/month = 1,320 liters/month
Annual fuel cost:
4,000 VND/liter ×1,320 liters/month × 12 months/year = 63,360,000 VND/year

Therefore, the annual fuel cost is estimated at 63,360,000 VND/year.

7) Consumable (filter) replacement cost: ····· 40,000,000 VND/year
Air conditioners for such rooms as operation rooms, ICUs are equipped with medium filters. Every air conditioner is equipped with a pre-filter.
The replacement frequency of each filter is assumed as follows. The pre-filter is regenerated and reused; therefore, there is no renewal cost of pre-filters.

Pre-filter	About once/month cleaning (based on data from past Grant Aid Projects)
Medium filter	About 1.0 times/year (2,000,000 VND/piece)

Consumable replacement cost
20 pieces/year × 1.0 × 2,000,000 VND = 40,000,000 VND/year
Total 40,000,000 VND/year

Therefore, Consumable (filter) replacement cost is estimated at 40,000,000 VND/year.

8) Maintenance cost of major facilities·····79,000,000 VND/year
Some of major facilities of this Project need to be maintained by professionals of contractor. The cost of maintenance contract for major facilities and equipment is estimated as shown in the Table below.

Table 2-32 Estimated Cost of Maintenance for Major Facility

Facility	Maintenance cost (VND)	Periodic maintenance frequency
Incinerator	24,000,000	2 times/year
Medical gas system	9,000,000	2 times/year
Power Substation (including the transformer)	32,000,000	2 times/year
Power generator	3,600,000	Once/year
Air conditioner, floor standing type	10,400,000	4 times/year
Total	79,000,000	

9) Building maintenance cost: ····· 38,000,000 VND/year

The Project has selected exterior and interior finishing materials that facilitate maintenance and housekeeping of the buildings, or maintenance free so to speak. The exterior finishing materials are designed to require nothing but periodic cleaning. Regarding the interior finishing materials, the floors are finished with stones or local terrazzos, and walls with tiles and paints. With such materials, maintenance cost of the buildings -- including the costs for exterior and interior maintenances, repairs and replacement parts, purchase of electric, water supply and drainage systems, air conditioning facilities based on data from past Grant Aid Projects -- is assumed to be 10,000 VND/m^2/year, or one half or one third of Japan's unit cost.

Therefore, the annual maintenance cost of the buildings is 10,000 VND/m^2/year × 3,800 m^2 = 38,000,000 VND/year. Since the buildings are new, this maintenance cost arises two years after the completion and onward.

10) Equipment maintenance cost: ····· 380,456,000 VND/year

The equipment plan formulation policy focuses on replacement of decrepit equipment and supplement of insufficient equipment in number as well as maintenance-free, basic and simple equipment. For those equipment, no replacement parts will be required for one year while the equipment are under the manufacturer's gurantee. The breakdown of principal equipment maintenance costs based on quotations cost during Basic Design Study are as follows:

・ Maintenance cost associated with radiography units (bulbs, films, maintenance contract cost, etc.)	1,378,800 yen
・ Automatic biochemical analyzer (reagents)	562,500 yen
・ Color Doppler ultrasound diagnosis unit (archival paper, gel)	281,250 yen
・ Maintenance cost associated with EGCs (archival paper, gel)	130,800 yen
・ Anesthesia machines (anesthetic)	39,600 yen
・ Others (such consumables as patient monitors, shadowless lamps, and defibrillators)	232,200 yen
Total	2,625,150 yen (VND380,456,522)

The equipment maintenance costs are 229,792 VND (approximately 1,580,000 yen) for the initial fiscal year and approximately 380,456,000VND (approximately 2,625,000 yen) for the second fiscal year onward after the manufacturer's guarantee is over.

(2) Financial Status

The revenue, the expenditure and the breakdown of principal financial items at Hoa Binh General Hospital for the most recent four years are shown below.

Table 2-33 Revenue, Expenditure and the Breakdown of Principal Financial Items of Hoa Binh General Hospital

【INCOME】		2001		2002		2003	
		Mil.VND	%	Mil.VND	%	Mil.VND	%
Medical Services	Medicine	1,177	-	2,466	-	3,212	-
	Examination	123	-	149	-	234	-
	Delivery	36	-	37	-	42	-
	Operation	163	-	170	-	194	-
	Admission charge	427	-	475	-	554	-
	Other services	1,091	-	622	-	2,452	-
	Sub-total	3,017	34.5%	3,919	39.6%	6,688	48.4%
Helth insurance		1,776	20.3%	2,276	23.0%	3,062	22.2%
People's Committee		3,964	45.3%	3,702	37.4%	4,066	29.4%
Total income		8,757	100.0%	9,897	100.0%	13,816	100.0%
【EXPENDITURE】		2001		2002		2003	
		Mil.VND	%	Mil.VND	%	Mil.VND	%
Salary		2,960	33.8%	3,798	38.4%	3,940	28.5%
Maintenance of Equipment		248	2.8%	257	2.6%	268	1.9%
Maintenance of Facilities		649	7.4%	721	7.3%	698	5.1%
Heating & Lighting		252	2.9%	222	2.2%	348	2.5%
Medicine		1,177	13.4%	2,466	24.9%	3,212	23.2%
Consumables & Reagents		1,332	15.2%	1,420	14.3%	1,786	12.9%
Education & Training		45	0.5%	54	0.5%	106	0.8%
Others		2,094	23.9%	959	9.7%	3,458	25.0%
Total expenditure		8,757	100.0%	9,897	100.0%	13,816	100.0%

Source: Answer to the Qustionnaire from Hoa Binh General Hospital

The budget of the Department of Health of Hoa Binh Province was 32 billion VND (approximately 228 million yen) as of 2002. The budget for Hoa Binh General Hospital was approximately 9.9 billion VND (approximately 68 million yen) in 2002, which was 30% of the Hoa Binh Province Health Department Budget for that year.

Salary of staff is increase year by year in expenditure, but its weight is only 28.5% in 2003. On the other hand, procurement cost of medicine, including reagents and consumables is increasing rapidly (The weight is 1,429,000,000 VND, 28.6% in 2001 increasing to 4,998,000,000 VND, 36.1% in 2003). Maintenance and repairs are stable at 700,000,000 VND for facilities and 250,000,000 VND for equipment.

In Vietnam, budget allocation to the Health Sector is determined by the Ministry of Finance and the Ministry of Planning and Investment. The Ministry of Health will calculate the budget of individual hospitals according to the budget document on the basis of the number of beds approved by the Ministry of Health, which will be allocated to the individual hospitals from the Regional People's Committee.
The governmental health budget has increased significantly since the 1990s and reached 139,700 billion VND (approximately 963.9 billion yen) in 2002. The health budget ratio of the national budget reached 5.2% with the per capital health budget corresponding to approximately US$5.7. However, the level is low compared with US$7.2 of Cambodia and US$6.2 of Indonesia among the neighboring nations.

Table 2-34 Health Related Budgets

	2000	2001	2002
National budget (1 billion VND)	108,961	123,700	139,700
Year-on-year increase rate of the national budget (%)	-	14	13
Health budget (1 billion VND)	5,098	6,189	7,266
Health budget ratio in the national budget	4.6%	5.0%	5.2%
Per capita health budget (thousand VND)	65.6	78.6	91.1
Budget of the Department of Health of the Hoa Binh Province (1 billion VND)	33.72	34.19	32.81

Source: The national budget was compiled from Health Statistics 2002 and the budget of the Department of Health of the Hoa Binh Province was compiled from the questions and answers

The other expense above include sequential expenses for construction of facilities following the Master Plan, training of medical staff, travel and stay expenses to attend overseas seminars and provision of meals and medicine to the patients who are poor or belong to minorities.

(3) Financial Status and Maintenance Cost

The maintenance and operation cost after completion of this project is calculated at 1,191 million VND (8.22 million Yen). The present maintenance cost for the corresponding facilities to be replaced by the Project facilities are 600 million VND (approximately 4.14 million Yen) and the net increase in maintenance cost will be 600 million VND (approximately 4.14 million Yen). This amount corresponds to 4.3 percent of Hoa Binh General Hospital's annual budget for 2003 (13,816 million VND, approximately 96 million Yen). The Vietnamese side states that if the net increase is within 6 to 7% of the total hospital budget it can be provided and confirmed to make budgetary commitments. The increase in revenue for Hoa Binh General Hospital is about 40% from 2002 to 2003 (3,900 million VND) and the net increase of 600 million VND is 15% of the amount. Therefore, it is judged possible to incorporate the amount within the budget.

2-5 Other Relevant Issues

Soft Component Plan (Draft)

(1) Background for Soft Component Planning

The objective of the Hoa Binh General Hospital Improvement Project is to improve the hospital services. The study has concluded that in order to achieve and to sustainably maintain the objectives, it is not only necessary to construct the new Hi-Tech Block and Machinery Building and to procure related equipment, but also to provide assistance in operational maintenance technology, including disposal of medical wastes. The Vietnamese side requested the Japanese side to provide technical guidance in hospital facility management and medical waste disposal for the following items.

Hoa Binh General Hospital plans to reinforce its human resources for operation and maintenance and to form cooperation networks with local agents in Vietnam after the completion of construction and procurement of the Project facilities and equipment, in order to properly operate and maintain the Project facilities and equipment.

There are presently 3 maintenance staff for facility maintenance, but they are mostly of technician level skills and cannot fully organize and carry out a systematic daily inspection and periodical maintenance program. There are 9 technical staff for medical equipment maintenance, but they do not have sufficient skills. When medical equipment breaks down, the department staff refers the equipment to local agents for repairs on an individual basis. Procurement of replacement parts is also not adequate, leading to late response to breakdowns and increased maintenance costs.

Furthermore, disposal of medical waste is also a problem. This problem arises because the potential danger from infectious medical waste such as used gauge dressings and syringes is not recognized and disposed of both in and out of the hospital along with normal garbage. At present the maintenance staff referred to above collect the waste, but they have no knowledge of waste collection principles, almost no classified collection of refuse is conducted, and medical waste is disposed of within the hospital premises, including partial burial.

In order to respond to these problems, the hospital staff need to recognize the importance of the maintenance department as one of the functions of the hospital. The maintenance department must establish an appropriate maintenance system and each technical staff must also become aware of the necessary functions and to improve their technical skills. Therefore, the Project will incorporate the establishment of a facility and equipment maintenance system and the establishment of an internal hospital medical waste collection and disposal system based on classified collection of medical waste as the Soft Component of the Project. The Project plans to provide an incinerator within the hospital premises for disposal of waste and utilization of the incinerator will be considered in the Waste Disposal System.

It has been confirmed that the maintenance organization for maintenance of medical equipment is to be established by the Vietnamese side with assistance from Bach Mai Hospital. Therefore, the Soft Component will not include equipment maintenance. The facility maintenance and waste collection and disposal system described above will be implemented under this Project. However the medical equipment maintenance organization under Bach Mai Hospital assistance must be completed before this Project is commenced.

The expected achievements from the Soft Component program are described below;

1) Recognition by the Hoa Binh General Hospital staff of the importance of maintenance activities and the recruitment of additional staff for the maintenance department and the development of the technical capabilities of each individual staff.

2) Establishment of a maintenance system of an appropriate level for Hoa Binh General Hospital, including an administrative system for facility and equipment, keeping track of equipment resister book, repair history and replacement of equipment, stock management system for consumables and spare parts, and daily inspection and periodical maintenance systems.

3) Establishment of a system to enable budgetary planning for procurement of consumables, spare parts, replacement of equipment and commissioning to external agents.

4) Establishment of an appropriate waste disposal and incinerator operation system for collection and disposal of medical waste utilizing the incinerator to be procured by the Project.

The Soft Component program will incorporate participatory methods using workshops to formulate plans and contents to attain sustainable development.

(2) Objectives of Soft Component Program

1) Recognition by the People's Committee, Health Department and the staff of Hoa Binh General Hospital of the importance of maintenance activities.

2) Establishment of a maintenance organization in Hoa Binh General Hospital.

3) Establishment of a medical waste collection and disposal system.

(3) Target Achievements of Soft Component Program (Direct Effects)

Table 2-35 Direct Effects of Soft Component Program

Contents of Technical Guidance	Direct Effects	Target Audience
Guidance on the importance of the maintenance system	The importance of maintenance system will be recognized. A sustainable maintenance system will be established and appropriate staff will be recruited.	People's Committee of Hoa Binh Province, Health Department, Director, Maintenance Department
Guidance on facility management technical skills	The technical skills of the staff will be enhanced. Appropriate use and operation of the facilities will be attained improvement of response to breakdowns, and periodical maintenance will be conducted.	Maintenance Department
Guidance on preparation of annual maintenance program and its implementation	Appropriate maintenance staff will be deployed with sufficient numbers and technical skills. Annual maintenance program will be prepared. Consumables items, numbers of spare parts and maintenance costs for the following year can be grasped, allowing smooth budgeting and implementation.	Director, Maintenance Department
Guidance for establishment of a medical waste disposal system	Awareness of medical waste disposal will be promoted and primary treatment of infectious waste will be carried out. Classified collection of waste will be definitely carried out. Incinerator will be operated and maintained in a proper manner.	Director, Each Medical Department, Disposal Staff

(4) Confirmation of Attainment of Target Achievements

Table 2-36 Confirmation of Attainment of Target Achievements

Item	Method of Confirmation
Enlightenment on improvement of maintenance system	Sufficient maintenance staffs are recruited. Sufficient maintenance budget is allocated.
Assistance in establishment of maintenance system	Maintenance system manual is formulated. Equipment register book is prepared.
Guidance in technical skills on maintenance	Periodical inspection and adjustment are scheduled. Maintenance department will explain and guide doctors and nurses in operation of equipment when necessary.
Guidance on preparation of facility maintenance plan	Documents, including building system / equipment register book, maintenance records, annual maintenance plan are prepared. Maintenance budget for following year is prepared.
Guidance on establishment of medical waste disposal system	Medical waste disposal manual is prepared. Incinerator operation and maintenance manual is prepared.

(5) Soft Component Activities (Input Program)

At present when equipment have breakdown, local agents of the equipment are contacted on a piece by piece basis. This cannot said to be an appropriate system for maintenance of equipment. The technical guidance plans to prescribe the functions and reliability of the equipment to be procured by the Project and to increase the capacity utilization rate of the equipment and promote the full use of the equipment.
A detail list of activities is shown below. The activities will be finalized after discussions with hospital staff.

Table 2-37 Soft Component Activities

Item	Activities
Enlightenment on maintenance system reinforcement	Examples of maintenance systems will be shown through workshop programs. A rough summary of the future maintenance system desirable for Hoa Binh General Hospital will be prepared along with a rough flow chart of the necessary procedures by the participants.
Assistance in establishing a maintenance system	Based on the above rough draft of the maintenance system, operational procedure charts, operation manuals, and various format sheets will be prepared under assistance
Guidance on technical skills for facility maintenance	Guidance on preparation of equipment register book. Building system, medical equipment: Name of system, Equipment, Model No., Manufacturing No., Maker Name, Telephone number, and person in charge Local agent: Name of agent, Telephone number, Facsimile number, person in charge. Classification: Classification, Management number, Placement, Date of Installation, Date of disposal Maintenance: Annual maintenance contract, Summary of equipment Guidance in preparation of maintenance log book. Guidance in method for managing spare parts orders, stock management.
Guidance on preparation of facility maintenance plan	Guidance on preparation of maintenance plan and annual maintenance plan. Guidance on preparation of budget for following year.

(6) Procurement method of Implementation Resources for Soft Component

The consultant conducting the guidance will first formulate the contents of the guidance and assistance activities and the complete schedule for the program. The consultant will implement the technical guidance step by step while continuously appraising the inputs and results. The general flow of the program is described below.

1) Prior Preparation in Japan

Reference material concerning probable maintenance systems, and medical waste disposal systems, including procedure forms, procedure flow charts, etc. will be prepared and readied for presentation at the initial workshop.

2) Initial Guidance in Vietnam

A workshop will be held to enlighten each person in charge and maintenance staff on the merits of strengthening the maintenance system, clarify the present problems and finalize the input program. The workshop will introduce examples of maintenance system and medical waste disposal systems. Next, the participants will prepare the plan for the system to be implemented at Hoa Binh General Hospital as part of the training. Technical guidance on implementation based on the prepared plan will be conducted. During this activity, spare parts list for existing equipment will be collected and collated, parts order numbers, facility / equipment register book, and maintenance budget plans will be prepared using the procedure formats and procedure flow chart prepared in the workshop activities. The existing medical waste disposal system will also be improved by introducing the classified waste collection system. Guidance will be provided on using the prepared formats until the next technical guidance. One facility maintenance technician and one medical waste management technician will be dispatched to Vietnam.

3) Second Guidance in Vietnam

The actual results of using the formats prepared in the initial guidance will be confirmed. Necessary changes to the formats and systems will be carried out and any necessary additional guidance will be provided.
The selection of the equipment for the building systems procured by the Project (air conditioning, medical gas, sewage treatment, power receiving, emergency generators, electronic systems, etc.) and incinerator will be finalized and some equipment will be expected to be already on site by this time. More specific technical guidance adapted to the selected machinery will be provided. Two facility maintenance engineers (one in charge of air conditioning, sanitary, sewage treatment and medical gas systems and one in charge of power receiving and transformer, generator, and electrical systems) and one medical waste management engineer will be despatched.

4) Activities in Japan

The results of the initial and second guidance in Vietnam will be reviewed and any necessary adjustments for final guidance items and flow charts will be conducted. The facility management system and actual installed equipment and incinerator will be adjusted at this time.

5) Third Guidance in Vietnam

Third and final guidance in Vietnam will be conducted using the final guidance items, flow chart and formats will be used to provide final guidance in Vietnam. One facility maintenance engineer will be despatched.

The following 3 Japanese engineers will dispatched to Vietnam to transfer technical skills to hospital staff.

1. Facility Management Engineer (1):
   Air Conditioning, Sanitary System, Special Equipment

2. Facility Management Engineer (2)
   Power receiving and Transformer, Electrical Systems
3. Medical Waste Management Engineer:
   Medical Waste Collection System

The hospital will be required to designate a local engineer with computer skills and a translator during the technical guidance implementation to assist the technical transfer from the Japanese consultants and the hospital maintenance staff. Selection of a local engineer will allow an extended period of technical guidance after the Japanese consultants have returned to Japan enabling greater efficiency in transfer of technical skills.

(7) Implementation Schedule of Soft Component

Table 2-38 Implementation Schedule of Soft Component

	1	2	3	4	5	6	7	8	9	10	11	12
Construction Schedule	Start				Hi-Tech Block							Finish
Soft-Component Program in Viet Nam	First time				Second time						Third time	

(8) The Output of Soft Component

Table 2-39 Output of Soft Component

Item	Output
Enlightenment on maintenance system	Draft maintenance system plan, Organization chart, Staff development plan
Assistance in establishment of maintenance system	Procedure manual, Various formats, Equipment register book
Guidance on maintenance technology	Technical manual on maintenance
Guidance on preparation of maintenance plan	Procedure manual, Annual maintenance plan, Maintenance budget
Guidance on medical waste disposal system	Medical waste collection and disposal manual, Incinerator operation manual

(9) Responsibilities of the Implementing Agency

The Soft Component program is implemented to ensure the sustainable development by the Vietnamese side. Therefore, each step must use methods that promote pro-active and self-initiated activities by the Vietnamese side. Good understanding by the Vietnamese implementing agency on the objectives of the Soft Component is essential.

In other words, each responsible staff of People's Committee, Health Department and Hoa Binh General Hospital must understand and take appropriate activities concerning the objectives and implementation procedures of the assistance program. The most important and essential element is the appropriate assignment of staff for the Soft Component implementation. Recruitment of facility maintenance technicians with suitable skill levels and reinforcement of medical equipment maintenance engineers prior to commencement of the guidance is required. The technical guidance by Soft Component will provide technical guidance and assistance to these staff. Each responsible staff of People's Committee, Health Department and Director of the hospital will be the responsible maintenance officers of Hoa Binh General Hospital and will be responsible for the continuous implementation of training and management of facility and equipment maintenance system.

Chapter 3 Project Evaluation and Recommendations

CHAPTER 3. PROJECT EVALUATION AND RECOMMENDATIONS

3-1 Project Effect

(1) Expected Direct

This project is expected to bring about the following direct effects.

1) Improvement of secondary level medical services at Hoa Binh General Hospital

Renewal of the obsolete facilities and equipment of Hoa Binh General Hospital will complement its hospital functions as a secondary medical institution.
Hoa Binh General Hospital will become above to provide medical services appropriate secondary level to residents of the areas.

2) Enhanced efficiency of medical services by centralization of the central diagnosis functions

The project will centralize the central diagnosis and treatment functions, presently separately located in the various buildings hospital premises. The centralization of these functions will improve the efficiency of medical services. Nosocomial infections will be prevented by the provision of ICU units, Operation Theater, and Sterilization Room with air-conditioning.

3) Smooth implementation of DOHA activities

Hoa Binh General Hospital is designated as the training facility for lower level medical institutions in Hoa Binh Province and it also the educational hospital for the nurse school as well being the only secondary medical institution in Hoa Binh Province. The new Hi-Tech Block will have a room for seminars and promote the smooth implementation of DOHA activities.

(2) Expected Indirect Effect

This project is expected to bring about the following indirect effects.

1) Improvement of services of the hospital realizable by increase in medical treatment fee

The numbers of surgical operations and medical examinations will increase on completion of the construction of new buildings and renewal of equipment. Consequently, the medical treatment fees collectable from patients will increase. The hospital is allowed to spend the revenue from medical treatment fees under its own budget. This will enable the hospital to further improve itself, and to increase the degree of financial independence of the hospital from the present state.

2) Provision of a Model Secondary Medical Institution in Northern Vietnam

Through the implementation of Bach Mai Hospital Project by Japanese Technical Assistance, the strengthen of the referral system in Northern Vietnam with Bach Mai Hospital as the tertiary reference facility is projected. Hoa Binh Province is designated as the model area in this project. Therefore, the implementation of the Project facilities will enable Hoa Binh General Hospital to function properly as the secondary referral facility. This will strength not only the referral system of Hoa Binh General Hospital, but also serves as the model case for other provincial hospital improvements.

(3) Performance Indicator

The increase in numbers of referral patients from district hospitals and other medical facilities under the direction of Hoa Binh General Hospital, the increase in numbers of X-ray fluoroscopic examination, and increase in numbers of ultrasound examinations will be used as parameters for evaluation of this project.

3-2 Recommendations

In order for the project to be smoothly and effectively managed, it is recommended that the following improvements or arrangements be done.

(1) The hospital staff should receive sufficient training on proper operation and maintenance of the facilities to be built or modified by this Grant Aid Project, with a sufficient budget secured specifically for this purpose.

(2) It is necessary to strengthen the referral systems in Hoa Binh Province, which is not sufficiently functional, and to intensify the DOHA activities to reinforce the ties with the provincial health department and lower level hospitals, thereby upgrading the quality of regional medical services, including the preventive medical services.

(3) Appropriate amounts should be placed in the budget to deal with sudden failure of medical equipment. This will allow quick response for repairs and minimize the damage to healthcare services. Furthermore, amounts should be set aside annually based on consideration of useful life and depreciation of equipment. This will allow orderly replacement of obsolete medical equipment.