No.

MINISTRY OF HEALTH
THE KINGDOM OF CAMBODIA

BASIC DESIGN STUDY REPORT
ON
THE PROJECT FOR IMPROVEMENT OF THE KAMPONG CHAM HOSPITAL
IN
KAMPONG CHAM PROVINCE, THE KINGDOM OF CAMBODIA

MARCH 2007

JAPAN INTERNATIONAL COOPERATION AGENCY

AZUSA SEKKEI CO., LTD.

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PREFACE

In response to a request from the Government of the Kingdom of Cambodia, the Government of Japan decided to conduct a basic design study on the Project for Improvement of the Kampong Cham Hospital in Kampong Cham Province and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to the Kingdom of Cambodia a study team from 18th April to 15th May, 2006.

The team held discussions with the officials concerned of the Government of the Kingdom of Cambodia, 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 Cambodia 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 Kingdom of Cambodia for their close cooperation extended to the teams.

March, 2007

Masafumi Kuroki

Vice-President
Japan International Cooperation Agency

March, 2007

LETTER OF TRANSMITTAL

We are pleased to submit to you the basic design study report on the Project for Improvement of the Kampong Cham Hospital in Kampong Cham Province, the Kingdom of Cambodia.

This study was conducted by Azusa Sekkei Co., Ltd. under a contract to JICA, during the period from 17th April, 2006 to 30th March, 2007.

In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of Cambodia 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,

Hiroyuki KOIKE
Project manager,
Basic design study team on The Project for Improvement of the Kampong Cham Hospital in Kampong Cham Province,
The Kingdom of Cambodia
Azusa Sekkei Co., Ltd.

SUMMARY

Summary

The Kingdom of Cambodia (hereinafter referred to as Cambodia) is a constitutional monarchy in the ASEAN region. It is in the southwestern part of the Indochinese Peninsula, and achieved independence from France in 1953. This country has a population of 13,798,000 (2004) and a land area of 181,035 km^2 (about a half of the land area of Japan). It borders on Thailand, Laos, and Vietnam. Kampong Cham Province in the eastern region of Cambodia is the province having the largest population in the country, occupying the fertile land along the Mekong River. The provincial capital Kampong Cham is located about 120 km northeast of the national capital Phnom Penh.

Cambodia is making stable progress in economic growth mainly in the key industries of agriculture, forestry, and fishing, as well as the manufacturing industry. However, the impacts of the civil war that continued about 20 years from 1970 and the Asian economic crisis in 1988 have placed Cambodia among the poorest countries in Asia with the GDP of about 6.29 billion US dollars (2005) and the per capita GDP of 454 US dollars (2005).

The health sector has also been affected by the impacts of the civil war and other circumstances. Healthcare systems are underdeveloped across the country. The state of things remains inferior to that of surrounding countries, such as the maternal mortality rate of 440 per 100,000 (2004) and the infant death rate of 97 per 1,000 (2004) (the 25th worst figure in the world). Sector-wide improvement and reinforcement of the health sector, including finance, organization, human resources, services, and infrastructure, are urgently needed. In addition, medical institutions at the provincial level and lower levels are suffering from the quantitative and qualitative deterioration of healthcare services due to the superannuation of facilities and equipment, as well as the problem of the insufficient functioning of the referral mechanism. The composition of diseases is typical of a developing country, showing high prevalence of acute respiratory infection, diarrhea, tuberculosis, etc., and injuries from traffic accidents and land mines are also common.

To address these needs and problems, the Royal Government of Cambodia has been endeavoring to promote sector-wide improvement and reinforcement of the health sector, giving priority to the expansion of healthcare budgets, the organizational strengthening of the Ministry of Health, the reinforcement of healthcare worker training, the improvement of healthcare services, etc. in the Health Sector Strategic Plan 2003-2007 (HSP) formulated in 2002. In the Health Sector Support Project (HSSP), a component of the HSP developed as the practical plan for the improvement, penetration, and expansion of basic healthcare services, the Government is promoting various regional healthcare activities, placing the focus of healthcare service improvement on the strengthening of primary healthcare and referral systems at provincial- and lower-level medical institutions.

Against this background, in June 2005, the Royal Government of Cambodia formulated the “Plan for Improving Provincial Hospitals and Strengthening Provincial Schools for Nursing and Midwifery”, targeting provincial hospitals and nursing schools that are highly in need for improvement and strengthening in, of all 24 provinces in the country, Battam Bang Province in the Western Region (with an area of app. 11.7 thousand km^2 and a population of app. 980 thousand, as of 2004), Kampong Cham Province in the Eastern Region (with an area of 9,800 km^2 and a population of 1.83 million, as of 2004), and Stung Treng Province in the North Eastern Region (with an area of app. 11.1 thousand km^2 and a population of app. 1.01 million, as of 2004), and requested the government of Japan for a grand-aid assistance to financially back up the construction of facilities and procurement of equipment under the Plan.

In response to this request, the government of Japan conducted a preliminary survey led by the local ODA task force from November to December 2005. The survey found that: 1) Kampong Cham Province has the largest population in Cambodia and admits the second largest number of referral patients, after Phnom Penh, the capital city, who live below the poverty line in the provinces surrounding the capital but cannot access healthcare services in the city due to both economic and geographic constraints. Thus, the greatest benefits are expected, particularly for the poor, among the requested three provinces; and 2) Kampong Cham Nursing School has already received grass-root grant-aid assistance which provided new buildings, and there is no necessity recognized for improving its facilities or equipment at this point in time. As a result, Kampong Cham Hospital was selected as the subject of this project.

In response, the government of Japan decided to implement the basic design study and the JICA dispatched a basic design study team in April and May 2006. The study team held consultations with the parties concerned of the government of Cambodia, conducted a survey on related facilities, collected necessary documents, surveyed the project site, etc. and compiled this report after post-analysis in Japan and explanation of the draft basic design report at site in February and March in 2007.

The basic design study confirmed the necessity and appropriateness to improve the functions of the Kampong Cham Hospital in order to improve the quantity and quality of healthcare service provided by the hospital. For this purpose, the conclusion has been reached that it is necessary to construct the Obstetrics/Gynecology & Surgery Ward, the Operation Theater, and an Emergency & Imaging Building and to procure and install related equipment.

Facility and equipment plans were formulated based on the following principles in basic design study.

(1) Facility plan

Given the present situation where there is a shortage in the absolute number of medical technicians in the country, it is recommended to set the scale and grade for Kampong Cham Hospital at a level manageable by the currently assigned medical technicians. The departments targeted for the Project and the project contents will be selected based on the following policies:

i. The construction and relocation of the Obstetrics/Gynecology & Surgery Ward (including delivery department), which is severely deteriorated and has an urgent need, will be given the highest priority.
ii. The existing Operation Theater, which is deteriorated, will be reconstructed after the new Obstetrics/Gynecology & Surgery Ward (including delivery department) will have been completed.
iii. As close coordination with Surgical Operation Department is necessary for the present Emergency Building in terms of hospital development planning, it will be rehabilitated at the same time as the Operation Theater and the Emergency and Imaging Building.
iv. The current radiographic examination room in the Operation Theater, which provides insufficient radiation protection, will be reconstructed and integrated as an X-ray examination department together with the ultrasound room and the ECG room.
v. Regarding the scale of the wards, the Project plans to install 100 beds for the Surgery Ward and 30 beds for the Obstetrics/Gynecology Ward based on the estimation of the manageable operation and patient number with the current number of surgeons.
vi. The patient's rooms shall essentially be eight-bedded rooms; however, there will be some individual rooms to accommodate isolation beds.
vii. The Obstetrics/Gynecology & Surgery Ward will be two-story buildings. Slopes will be constructed for the transfer of patients and supplies.
viii. The facilities will be constructed in accordance with the grade and the scale appropriate for the operation and maintenance of the Hospital.
iv. Being the top medical institution in Kampong Cham Province, the buildings shall be constructed so as to be able to function even in the event of a disaster.
v. Being a training hospital of Kampong Cham Nursing School, conference rooms, etc shall be planned in the Obstetrics/Gynecology & Surgery Ward so as to provide students training in a smooth manner.

(2) Equipment plan

As for the formulation of the equipment plan, suitable equipments for the diagnosis and treatment functions of the new facilities shall be selected by comprehensively considering the characteristic of the Kampong Cham Hospital, the activities, the technical level and the financial capacity of the existing and related facilities, as well as the criteria of the Complementary

Package of Activities (CPA)(the Kampong Cham Hospital is classified for CPA3) , which is an equipment guideline regarding each level of medical institution.

The table below indicates the outline of facilities and equipment to be provided in this Project.

Building	Scale	Main facilities	Main equipment
Obstetrics/Gynecology & Surgery Ward	2,920.8m^2 RC structure, Two-storied	Bed rooms in surgical and Ob/Gy departments, nurse station, treatment room, conference room, delivery room, PMTCT room, eclampsia room, labor room, etc.	Bed, ultrasound apparatus, etc.
Operation Theater	792.0 m^2 RC structure, One-story	Operation hall, doctor room, preparation room, conference room, recovery room, ICU, decontamination/sterile processing room, equipment storage, etc.	Operating table, anesthesia apparatus, patient monitor, operation equipment for orthopedic surgery, autoclaves, etc.
Emergency &Imaging Building	531.0 m^2 RC structure, One-story	Consultation room, treatment room, treatment/minor operation room, observation room, nurse station, X-ray room, ultrasound room, ECG room, dark room, film storage, equipment storage	General X-ray film illuminator, C-arm-type X-ray film illuminator, X-ray film illuminator, ultrasound apparatus, etc.
Machine Building	195.6 m^2 RC structure, One-story	Electricity room, power generator room, pump room, maintenance room, receiving tank, etc.	
Others	173.8 m^2 RC structure, One-story	Connecting corridor, walkway, rain and wastewater treatment facility, exterior lighting	
	4,613.2 m^2		

The project cost necessary to carry out this Project is estimated to be 1.069 billion yen(1.063 billion yen by the Japanese side, 6 million yen by the Cambodian side). The Project is to be implemented

with A government bonds and the construction period is planned to be 24 months.
This Project is expected to bring about the following effects.

(1) Direct effects

i) The improvements that shall take place in the Obstetrics/Gynecology & Surgery Ward, Operation Theater and Emergency & Imaging Building will strengthen the respective departments, thereby avoiding structural risks that the existing buildings are potential of due to aging and improving qualitative functions of the departments. As a result, the project shall enable the hospital to provide sufficient healthcare services as the top referral hospital.

ii) By improving the Obstetrics/Gynecology & Surgery Ward, Operation Theater and Emergency & Imaging Building, the traffic lines of patients shall be streamlined in the hospital and also the functions of the facilities, such as testing, diagnosis, treatment, etc., shall expectedly lead to an increase in the number of both inpatients and outpatients (in the surgery, obstetrics, and gynecology departments)(5,247 patients per year: as of 2006), the number of operations (1,669 cases per year: as of 2006), and the number of diagnoses using radiographic and ultrasonic devices, electrocardiograms, etc. (4,651 cases per year: as of 2006).

iii) By providing a delivery room and a dedicated PMTCT room in the Obstetrics/Gynecology & Surgery Ward, the obstetrics and gynecology departments shall be strengthened with expectedly exerting effects of preventing mother-to-child transmission. Further, in the Operation Theater, the sanitary environment with respect to surgical operation shall be improved by connecting the recovery room and ICU individually with the operation room via dedicated passages as isolated zones. As a result, it is expected to improve the effects of preventing hospital infection as well as enabling adequate nursing services. Additionally, the installation of a dedicated control room in the general X-ray room at the Emergency & Imaging Building shall provide radiation protection for the hospital staff.

iv) Refurbishing the Emergency & Imaging Building and constructing a minor operation room and a dedicated observation room therein shall enable the hospital to promptly respond to and urgently diagnose patients from traffic accidents on the rapid rise in the project area and other emergency patients.

(2) Indirect effects

i) By improving the surgery department and obstetrics and gynecology department that are the core of Kampong Cham Hospital, the project shall restore the functions of the hospital as the top referral hospital and thereby contribute to improvement of the referral system within the province.

ii) It is expected to magnify benefits for the residents in the surrounding areas of the project site who were not able to access healthcare services due to geographical and financial constraints, etc.

iii) The function as the training hospital for the Kampong Cham Nursing School will be facilitated, leading to fostering of higher quality co-medicals, including nurses and midwives. Furthermore, it is expected to improve various community healthcare activities through these higher-level co-medicals.

It is deemed as appropriate to implement this Project in the grant-aid assistance scheme of the government of Japan based on the following reasons (1) ~ (4).

(1) The Kampong Cham Hospital is the top referral hospital that can only perform surgical operations in Kampong Cham Province. In addition to patients in the Province, residents from neighboring provinces who cannot enjoy healthcare service in the capital, Phnom Pehn, due to geological constraints and poverty, visit the hospital. Therefore, the Project benefit those who live in the region-about 1.83 million people throughout Kampong Cham Province and about 300 thousand of poor people in neighboring provinces in addition to about 270 thousand of local residents the hospital covers.

(2) Currently, the facility constraints of structural danger and superannuation of the buildings affect the healthcare service in the Kampong Cham Hospital. If this Project is implemented, the functions of the obstetrics/gynecology and surgery department including the delivery department, the operation theater, and the emergency & imaging department will be strengthened and the reliance and satisfaction of local residents will increase.

(3) The facilities and equipment do not especially require advanced techniques after the handover and the present staff will be able to manage them. Furthermore, the management budget of the hospital will expectedly be secured steadily after the handover, judging from the tendency of budget allocation from the Ministry of Health to the hospital in the past.

(4) The facility and equipment plan conform to the overall plans (HSP and HSSP) promoted by the government of Cambodia and will contribute to their realization.

It is vital that the Cambodian side implements its undertakings, such as removal of the existing structures, land creation, relocation of buried pipes and electric poles, preparation of exteriors, etc., at due timing for commencing the grant-aid assistance project,. Furthermore, in order to maximally leverage the facilities and equipment to be provided under the project and to exert and sustain the resulting effects, it is imperative for the government of Cambodia to tackle with the following issues.

(1)Effective use of revenue from consulting fees

It is expected that the improvement of facilities and equipment to be implemented under the

project will increase revenues from consulting fees of Kampong Cham Hospital. It is therefore necessary to effectively utilize these revenues in upgrading operation and maintenance of the facilities and equipment and facilitating procurement of medicines and medical supplies, so as to strive to provide higher-level healthcare services.

(2)Strengthening operation and maintenance of the facilities and equipment

Four maintenance engineers are staffed at Kampong Cham Hospital. Of these, two are in charge of electricity and the other two in charge of medical equipment. However, their present maintenance activities are limited to replacement of light bulbs, painting, woodworks, and the like, and they are not taking care of medical equipment, except for fairly simple works, such as replacement of examination light bulbs, replacement of fuses, etc. Although the project plans are designed to match with the technical level of the current maintenance personnel, in terms of operation and maintenance of the facilities, and to select equipment that requires minimum maintenance cost, with an aim to suppress running cost to a lower level, it is essential to improve the level of maintenance technology and earmark an adequate level of maintenance cost as a fixed budget every year. Moreover, the study team recommends registering the two maintenance engineers in charge of medical equipment to the medical equipment maintenance program initiated by the Ministry of Health, for them to build knowledge on medical equipment.

(3) Expansion of in-house training

Since the project improves and also significantly changes the method of managing the surgical operation department as well as the imaging department, it is called for to upgrade and expand in-house training from the current standard in order to make use of the improved environment.

(4) Strengthening of maternal and child healthcare

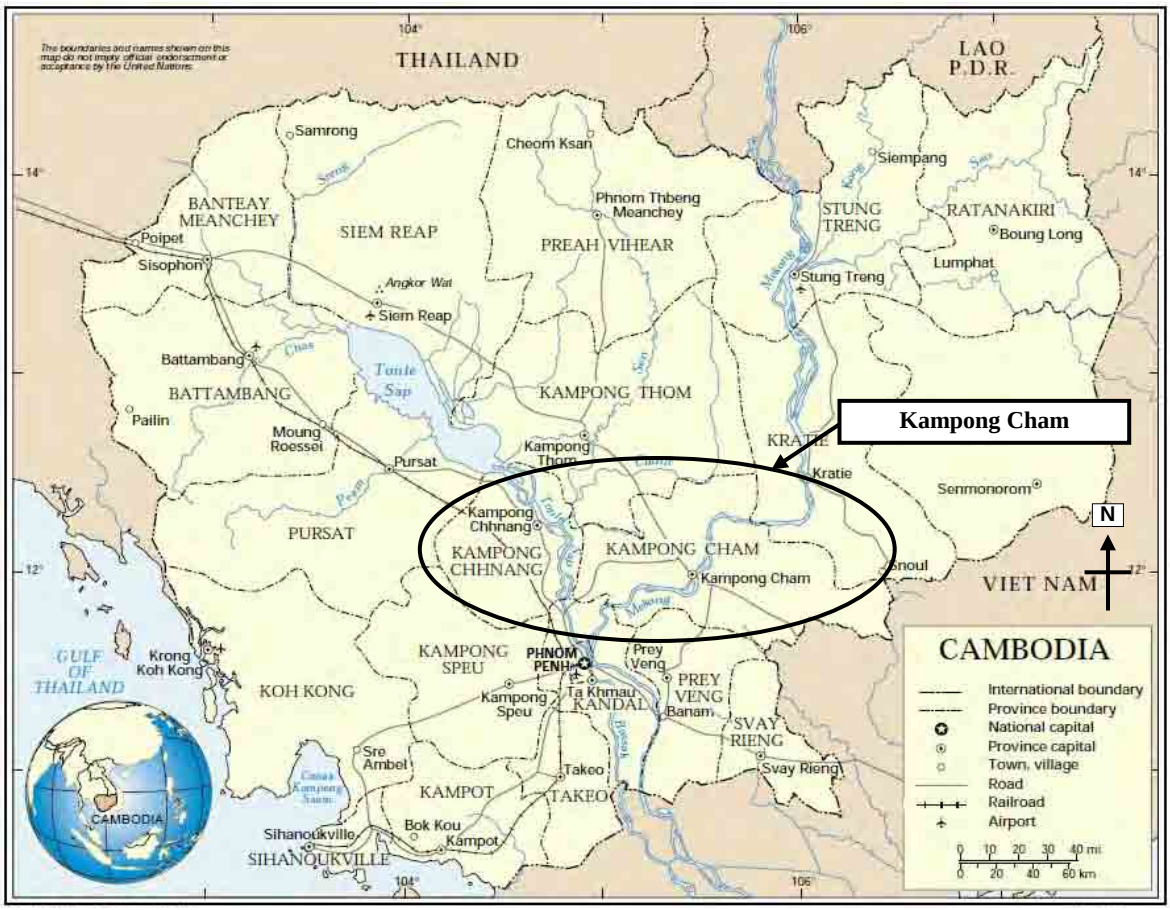
At the obstetrics and gynecology departments, it is essential to lead safe delivery through health education of women, examination of pregnant women, perinatal care, and PMTCT, and at the same time, to provide maternal and child healthcare services on a comprehensive scale by a combination of examination of new-born babies and infants, immunization, nutrition guidance, family planning, etc. It is called for to further strengthen the obstetrics and gynecology departments, in the form of, for example, protection of patients' privacy to allow patients to visit the hospital with ease of mind.

Contents

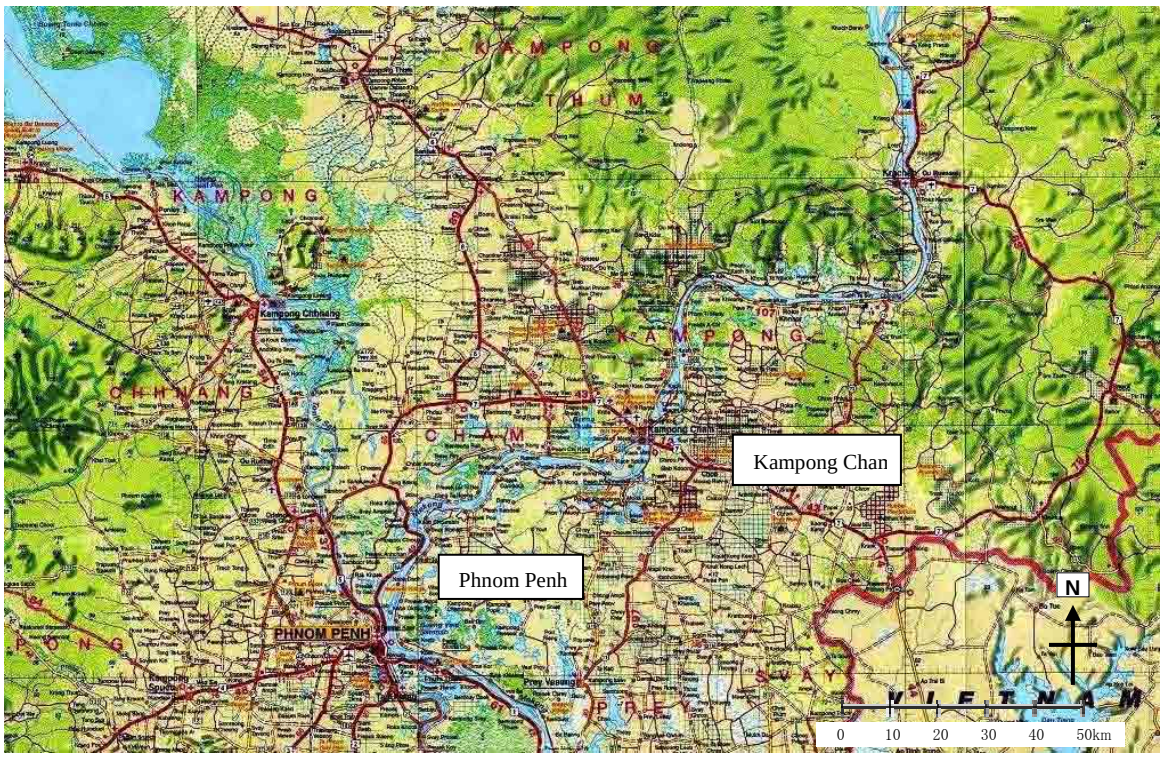
[Appendices]

[Attached documents]

LOCATION MAP



THE KINGDOM OF CAMBODIA



KAMPONG CHAM PROVINCE

THE PROJECT FOR IMPROVEMENT OF THE KAMPONG CHAM HOSPITAL IN KAMPONG CHAM PROVINCE, THE KINGDOM OF CAMBODIA

LIST OF FIGURES & TABLES

ABBREVIATIONS

Abbreviation	Idiom	Original Name
ADB	English	Asian Development Bank
AIDS	English	Acquired Immune Deficiency Syndrome
BHN	English	Basic Human Needs
BTC	English	Belgian Technical Cooperation
CPA	English	Comlementary Package of Activity
DFID	English	Department for International Development
DOTS	English	Directly Observed Treatment, Short Course
DSF	French	DOULEUR SANS FRONTIERE
EDC	French	Electricite du Cambodge
E/N	English	Exchange of Notes
EP	English	Emulsion Paint
FDH	English	Former District Hospital
GL	English	Ground Level
HC	English	Health Cenrter
HIV	English	Human Immunodeficiency Virus
HSP	English	Health Sector Strategic Plan
HSSC	English	Health Sector Steering Committe
HSSP	English	Health Sector Support Project
HWDP	English	Health Work Force Development Plan
IRIS	English	International Resources for the Improvement of Sight
JICA	English	Japan International Cooperation Agency
JIS	English	Japanese Industrial Standard
JOCV	English	Japan Overseas Cooperation Volunteers
MICADO	English	Mission Care Development Organization
MOH	English	Ministry of Health
MPA	English	Minimum Package of Activity
MSF	French	MEDECINS SANS FRONTIRES
NGO	English	Nongovernmeatal Organization
OD	English	Operational District
PHD	English	Provincial Health Department
PRH	English	Provincial Referal Hospital
PMTCT	English	Prevention of Mother to Child Transmission
RACHA	English	Reproductive and Child Health Alliance
RC	English	Reinforced Concrete
RH	English	Referral Hospital
RTC	English	Regional Trainning Center
STI	English	Sexually-Transmitted Infection
TSMC	English	Technical School of Medical Care
UNICEF	English	United Nations Children's Foundation
URC	English	University Research Co.
USAID	English	U.S.Agency for International Development
US-CDC	English	U.S.Centers for Disease Control and Prevention
VCCT	English	Voluntary Confidential Counseling and Testing

Chapter 1 BACKGROUND OF THE PROJECT

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The Royal Government of Cambodia formulated the "Plan for Improving Provincial Hospitals and Strengthening Provincial Schools for Nursing and Midwifery", targeting provincial hospitals and nursing schools that are highly in need for improvement and strengthening in, of all 24 provinces in the country, Battam Bang Province in the Western Region (with an area of app. 11.7 thousand km^2 and a population of app. 980 thousand, as of 2004), Kampong Cham Province in the Eastern Region (with an area of 9,800 km^2 and a population of 1.83 million, as of 2004), and Stung Treng Province in the North Eastern Region (with an area of app. 11.1 thousand km^2 and a population of app. 1.01 million, as of 2004), and requested the government of Japan for a grand-aid assistance to financially back up the construction of facilities and procurement of equipment under the Plan.

In response to this request, the government of Japan conducted a preliminary survey led by the local ODA task force from November to December 2005. The survey found that: 1) Kampong Cham Province has the largest population in Cambodia and admits the second largest number of referral patients, after Phnom Penh, the capital city, who live below the poverty line in the provinces surrounding the capital but cannot access healthcare services in the city due to both economic and geographic constraints. Thus, the greatest benefits are expected, particularly for the poor, among the requested three provinces; and 2) Kampong Cham Nursing School has already received grass-root grant-aid assistance which provided new buildings, and there is no necessity recognized for improving its facilities or equipment at this point in time. As a result, Kampong Cham Hospital was selected as the subject of this project.

Kampong Cham Hospital was originally constructed by France in 1927. After closure for several times due to the repeated civil wars, it was reopened as a provincial hospital

in 1979. Since then, Vietnam, Poland, Switzerland, France, and other donors have rendered cooperation to this hospital. The hospital today occupies an area of approximately 38.000m^2 and is a general hospital with 260 beds. However, some buildings are already more than 80 years old, and quite a few suffer from fall of ceiling slab or depression of floor resulting from concrete deterioration. The Obstetrics/Gynecology & Surgical Ward is noticeably in a critical state in terms of structure, because it was first constructed as a one-story building in 1964 and the second floor was added in 1991. Further, the Operation Theater (including X-ray rooms) is superannuated to the extent that it suffers from rainwater leak, though it was once renovated in 1990 after constructed in 1964. Thus, it is deemed as necessary to reconstruct the building.

The following table is a summary of the final request from the government of Cambodia with regard to the hospital, which basically complies with the CPA guidelines and reflects the results of the Basic Design Study.

1. Facility (Department)
   1) Surgical Building & Obstetrics/Gynecology Building (including the Delivery rooms)
   2) Operation Theater (including ICU/Recovery and Sterilization rooms)
   3) Emergency Building
   4) Imaging Building
2. Medical Equipment

   Medical Equipment for the above 4 buildings (117 items) : Delivery Bed, Fetal Monitor, Bed, Ultrasound Apparatus B/W, Operating Lamp Ceiling Type, Operating Table with Leg Traction Apparatus, Anesthesia Apparatus with Ventilator, Patient Monitor, Orthopedic Surgical Set, Sterilizing Machine, General Diagnostic X-ray Unit, C-Arm mobile X-ray Unit for Surgical Unit, Mobile X-ray Unit, Ultrasound Doppler, Fiberscope, Defibrillator, etc.

Chapter 2 CONTENTS OF THE PROJECT

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2-1 Basic Concept of the Project

2-1-1 Objectives of the Project

The overall goal of this Project is to contribute to the improvement/strengthening of the healthcare sector as a whole, the agenda of the Government of Cambodia based on their "Health Sector Strategic Plan 2003-2007 (HSP)" formulated in 2002. Priority issues include, expansion of healthcare financing, strengthening of the organization of the Ministry of Health, human resource development of healthcare workers, and improvement of healthcare services.

In line with the Health Sector Support Project (HSSP), a component of the HSP, the aim of this Project is to improve the current situation at Kampong Cham Hospital, where the provision of appropriate healthcare services is impossible due to deterioration of the facility/equipments, and to upgrade the quality and quantity of the healthcare services it provides. The hospital has a large number of referral patients, and is the only top referral hospital that is capable of performing surgical operations.

2-1-2 Outline of the Project

Being the top referral hospital with 260 beds in Kampong Cham Province, the highest populated province in Cambodia, Kampong Cham Hospital accommodates the poor from the neighboring provinces who do not have the access to the healthcare services in the capital city of Phnom Penh due to financial or geographical constraints. Therefore, upgrading the aging facility/equipments of the hospital is expected to bring the most benefit to the poor segment, and will greatly contribute to the improvement of the healthcare sector of the Province.

Although the number of referral cases is high for accidents and obstetric-gynecologic disorders, Kampong Cham Hospital is facing difficulty in providing healthcare services appropriate of the only referral hospital in the Province, due to the deterioration of the facility/equipments of the Obstetrics/Gynecology & Surgery Ward including delivery department, and of the operation building (including X- ray room).

The target of this cooperation Project will include the construction of facilities and the procurement of the necessary equipments for the following facilities currently in need of improvements; the Obstetrics/Gynecology & Surgery Ward (including delivery department) which is structurally dangerous in present state and is in need of urgent restoration; the operation department which is now decrepit and has rainwater leakage; the X-ray division (including ultrasound room and electrocardiographic monitor) which has insufficient radioactive protection and needs upgrading; and the emergency division which requires improved usability.

2-2 Basic Design of the Requested Japanese Assistance

2-2-1 Design Policy

This Grant Aid will be provided in order to contribute to the strengthening of referral systems, the core issue of the Health Sector Support Project (HSSP), whose purpose is to improve the healthcare services at Provincial level. Therefore, the Project will target Kampong Cham Hospital, the top referral hospital of Kampong Cham Province, and will include the construction of a facility with a surface area of 4,613.2m^2, comprising Obstetrics/Gynecology & Surgery Ward (including delivery department), Operation Theater, Emergency and Imaging Building, and will also include the purchase of the necessary equipment. Based on the request of the Government of Cambodia, the field surveys, and on the result of discussions, the following basic policy will be applied for the formulation of

the Project Plan.

(1) Basic Policy

The Basic Design Study Team visited the Kampong Cham Hospital in response to the request for rehabilitation of deteriorating facilities such as the Imaging Building, the Operation Theater, the Obstetrics/Gynecology Building, the Emergency building, and others (specialized outpatient department). However, it was found that the two-storied Obstetrics/Gynecology & Surgery Ward, which included the delivery rooms, was in the most decrepit and dangerous state.

There were additional requests from the Cambodian side, for the construction of a building for outpatient services, and for the refurbishment of the current Internal Medicine Building and the examination building. However, a safety survey was conducted by the study team on each building of the hospital, which led to a conclusion to prioritize the departments located in the most dangerously deteriorated building, as well as the departments related to them.

1) Gradation of Scale and Grade of Assistance

Given the present situation where there is a shortage in the absolute number of medical technicians in the country, it is recommended to set the scale and grade for Kampong Cham Hospital at a level manageable by the currently assigned medical technicians. The departments targeted for the Project and the project contents will be selected based on the following policies:

i. The construction and relocation of the Obstetrics/Gynecology & Surgery Ward (including delivery department), which is severely deteriorated and has an urgent need, will be given the highest priority.

ii. The existing Operation Theater, which is deteriorated, will be reconstructed after the new

Obstetrics/Gynecology & Surgery Ward (including delivery department) will have been completed.

iii. As close coordination with Surgical Operation Department is necessary for the present Emergency Building in terms of hospital development planning, it will be rehabilitated at the same time as the Operation Theater and the Emergency and Imaging Building.

iv. The current radiographic examination room in the Operation Theater, which provides insufficient radiation protection, will be reconstructed and integrated as an X-ray examination department together with the ultrasound room and the ECG room.

v. Regarding the scale of the wards, the Project plans to install 100 beds for the Surgery Ward and 30 beds for the Obstetrics/Gynecology Ward based on the estimation of the manageable operation and patient number with the current number of surgeons.

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viii. The facilities will be constructed in accordance with the grade and the scale appropriate for the operation and maintenance of the Hospital.

ix. Being the top medical institution in Kampong Cham Province, the buildings shall be constructed so as to be able to function even in the event of a disaster.

x. Being a training hospital of Kampong Cham Nursing School, conference rooms, etc shall be planned in the Obstetrics/Gynecology & Surgery Ward so as to provide students training in a smooth manner.

2) Basic Policy on Selecting the Equipment

As for the formulation of the equipment plan, suitable equipments for the diagnosis and treatment functions of the new facilities shall be selected by comprehensively considering the

characteristic of the Kampong Cham Hospital, the activities, the technical level and the financial capacity of the existing and related facilities, as well as the criteria of the Complementary Package of Activities (CPA)(the Kampong Cham Hospital is classified for CPA3) , which is an equipment guideline regarding each level of medical institution.

i. The departments concerned

The equipment to be provided under the Project shall be the equipment related to the Obstetrics/Gynecology & Surgery Ward, the Operation Theater, and the Emergency and Imaging Building and the equipment necessary for the other existing buildings shall be provided by the Cambodian side. The selected equipments should adapt to the current situation of the relevant departments and the number of equipment shall be planned in accordance with the medical functions, scale, and the operation system of the hospital.

ii.The equipments

In this Grant Aid Project, the selection of the equipments shall be in conformity with the CPA3 guideline developed by Cambodia. The equipments stipulated in CPA3 consist of minimum medical equipments and appliances needed to raise the level of healthcare services, which have been selected through consultations with donors including JICA, and by taking into consideration issues such as the present standard of healthcare, the maintenance status and the operation costs. Furthermore, since HSSP supported by organizations such as the World Bank are implementing facility improvements based on CPA3, it is preferable to formulate the Project in accordance with CPA3 in order to unify the level of healthcare services (i.e. to coordinate donor countries' assistance) across the country.

However, this does not signify the necessity to exclude the equipments not included in CPA3, or to impose the equipments enlisted in CPA3, since CPA3 provides that each hospital select their equipments by considering the regionality and activities.

As for the Definitive List of Requested Equipments attached to the minutes, most of them

are equipments and appliances selected in CPA3. Moreover, it has been confirmed through discussions that consumables and general furniture which are included in CPA3 but are not suitable for Grant Aid will be excluded from the Project, and have already been deleted from the Definitive List of Requested Equipments.

(2) Policy on Natural Conditions

Cambodia belongs to the region of tropical monsoon climate, where one year is largely divided into the rainy season and the dry season. The rainy season continues from the end of May to late October, with the most rainfall during the last two months (September – October). The dry season extends from early November to Mid may, with hardly any rainfall during this period but a high temperature exceeding 37℃ from March to April. In order to improve the Hospital's habitability under such climate conditions, the Project will include placement of eaves to shield direct sunlight and to prevent rain from blowing in, and their positioning will take natural ventilation into consideration. Although Cambodia is not a quake-prone country, it is expected that Kampong Cham Hospital will serve as the base of restoration activities in the event of a disaster, being the top referral hospital in Kampong Cham Province. With this in mind, the structural planning will be based on safety and durability. The Complementary Package of Activities (CPA), formulated by the Ministry of Health of Cambodia in 2003, acts as the guideline for establishment of hospitals; however, the Project will adopt the Japanese design standards as there are neither design standards nor design codes applicable to general buildings.

(3) Policy on Social Conditions

The architectural style characteristic of general private residences in Cambodia is a wooden stilt house with high-pitched roof. It can be said that it is an architectural style suitable for the natural conditions in Cambodia, taking ventilation into consideration and

preventing water leakage. A temple architecture called pagoda also has a distinctive architectural style with several layers of high-pitched roofs. While old temples are constructed with a combination of wood and bricks, relatively new temples have reinforced concrete as the main structure and light gauge steel constituting the framework of the elaborate roof structure.

The Project will apply local construction methods as the basis, and adopt the reinforced concrete moment frame structure. The outer walls will be built with concrete blocks for durability, with upper part in bricks. In line with the local method, the outer walls will have mortar setting bed with pebble dash finish for durability. Most part of the roofs will be pitched and covered with cement tiles, intended for a heat insulation effect by increasing the airspace under the roof. Some areas of the flat roof will be constructed with asphalt exterior thermal insulation method.

(4) Policy on Construction and Procurement Conditions

1) Building Plan

In Cambodia, very few large-scale construction projects are implemented in cities other than Phnom Penh. For this reason, training skilled workers to engage in construction works in the Province is a challenge. For projects requiring a health care facility, work forces and skilled workers are occasionally called upon from the capital city. Instructions by Japanese engineers on construction management will also be essential for this hospital project. Complicated and difficult designs shall be avoided, but a simple construction that ensures solidity shall be considered. Since many of the construction materials will be purchase in local of neighboring Thailand and Viet Nam production, process management will be of special importance, together with quality inspection and inventory control which must be conducted thoroughly. Application for construction permission prior to commencement of the construction will not

be necessary; however, an approval must be obtained regarding land application from the Ministry of Land Management, Urban Planning and Construction by submitting the required documents through the Ministry of Health.

The current situation of the major infrastructures and the planning policies are described below:

i. Electricity

The electric power station of the electricity company, Electricite Du Cambodia Electricity of Kampong Cham Province (hereafter referred to as “EDC”) , situated adjacent to the hospital across the road on the eastern side of the premises, supplies the electricity to the city (within approximately 3.5km radius of EDC). It has five diesel generators, and has a maximum supply capacity of approximately 2,500kW (present level of demand for the city is approximately 2,000kW).

Moreover, a new power station (with supply capacity of approximately 4,000kW) is currently under construction about 2.5km away, and is scheduled to start supplying electricity to the city in one year time, at which time the current power station will be converted to a transformer station. High-voltage service lines laid by the road on the eastern side of the hospital premises are planned to be renewed to 22kV service line in several years from now.

In order to avoid being influenced by the condition of current electric facilities of the ward buildings, and to prevent long power-cuts in the existing buildings during the construction period, the electricity for the Project will be supplied separately from the existing buildings. The plan will be made with 22kV in mind.

ii. Telephone

Currently, there are only three fixed-line telephones in the hospital, which are used for the director’s room, the fax machine in the administration office, and for the internet. In view of

the fact that the major means of communication is cell phone, the Project plan will only include the telephone lines that can be connected, and will consider the installation of internal extension lines.

iii.Television

The rooms with television in the existing buildings are, the administrative offices, staff rooms, and the halls of the ward buildings. Each building has an individual antenna erected, and installation of community antenna television will also be considered for this Project.

iv. Air conditioning

At present, the rooms with air-conditioner are the operation rooms, the Director's room, the examination rooms, and the blood transfusion rooms. The ward buildings and the Emergency Building are not air-conditioned but the rooms are equipped with ceiling fans. Only the operation rooms have mechanical ventilation system installed, and other rooms have exhaust fans on the wall.

With running-cost reduction in mind, the Project plans to restrict the numbers of air-conditioned rooms to a minimum. Air-conditioned rooms in the new facilities will include the operation rooms, the operation hall, the treatment rooms, the X-ray room, the ultrasound room and the single-bedded rooms. Rooms with no air-conditioner will have ceiling fans or wall fans installed.

In principle, mechanical ventilation will not be installed in the rooms with windows. Lavatories and shower rooms without windows will have mechanical ceiling ventilation.

v. Water supply

The aging water supply system in the vicinity of the hospital, currently provided by the Province, suffers from deterioration obliging the use of large pumps to overcome its serious leakages problems. To reduce the fuel cost, water is only supplied from 8 a.m. to 1 p.m. However, ADB-1725 assistance project is supporting the construction of the main pipes and the sub-pipes of 155,000 m each together with the construction of an elevated water supply

tank of 500m3, which are all due for completion in June 2006. These new facilities are expected to allow water to be supplied 24 hours a day.

Water sources of the new water supply system are two wells of 4m (width) x 4m (length) x 15m (depth). The water quality survey conducted prior to the launch of the project had given favorable results. It is reported that chlorination (chlorine concentration 0.02%) is also under consideration.

Pipelines of the new water supply system have already been laid down along the roads surrounding the hospital (eastern side and the southern side). The diameter of a pipe is 250mm, the underground depth is 1m, and the water pressure is 3.5bas.

Supply conducts for the Hospital are drawn from the main water supply system at two points. Under the circumstances where the water supply is limited to a period between 8 a.m. and 1 p.m., well water is being mixed to the public water supply. The diameter of the supply conduct is 40mm.

In this Project, water will be drawn into the hospital premises from the new water supply main pipes, stored in the water receiving tank, pumped up to the elevated reservoir, and distributed to the necessary places by gravity water supply system.

vi. Water discharge

At the time of the Basic Design Study, public sewerage system was not in place and general service water, hospital effluent and film developing fluids were all discharged into a pond in the premises, either passing through or bi-passing the septic tanks (for removal of solid matters).

A public sewerage pipe has since been laid down by the hospital across the hospital premises and buried the pond. The Project will construct a new septic tank near the pipe, into which wastewater from the newly constructed buildings will be drained for purification, and then discharged into the public sewerage system. General service water from hand-wash basins and sinks will be discharged into the public sewerage system without purification;

however, pumping will be necessary due to the shallowness of the pipe. Chemicals wastes from the dark room will be stored and then discarded by the disposal services.

vii. Rainwater drainage

The public sewerage system within the premises, laid down by the Hospital after the Basic Design Study, utilizes concrete pipes with a diameter of 600mm. Once outside the hospital premises, the public sewerage connects to a concrete pipe with a diameter of 1,000mm, laid 1.5 – 2m underground along the road, and is led to a lake located in the north-eastern side of the hospital premises.

The purpose of the public sewerage system is to prevent flooding in the surrounding areas during the rainy season, and there is a catchment basin placed within the premises that connects to it.

In this Project, rainwater from the roof, composing a large area of the Hospital, will be collected and drained into the public sewerage system. As the underground depth of the public sewerage system is shallow, the drainage system for this Project is planned to maximize the use of U-shaped gutters to achieve shallowness that allows natural water flow when connecting to the public sewerage system.

viii. Hot water supply

In view of the fact that the existing Hospital does not have the hot-water supply system, it is assumed that the use of hot-water is minimal.

The Project will install simple and individual electric hot-water supply system in the places where hot water is indispensable, such as the delivery department and the emergency department.

ix. Gas

Although there are propane gas suppliers in the city, the hospital does not use gas as it possesses no supply system. Therefore, the use of gas will not be anticipated in this Project plan.

x. Medical gas

The only medical gas currently being used is in the form of oxygen tanks in operation rooms and Emergency ward post operation rooms. Oxygen tanks are supplied by gas suppliers in Phnom Penh, and the monthly consumption is between 60 to 70 tanks (5m3/tank).

Although oxygen is the only medical gas applicable in this case, the Project will establish a central piping system to ensure its stable supply to operation rooms, post operation rooms/ICU, observation rooms, treatment rooms, and delivery rooms.

xi. Laundry

There is no laundry service for patients and staff at this Hospital, and only the operating gowns are washed in the sterilization room of the surgical operation department.

The Project will also establish a laundry room attached to the Central Sterilization room of the surgical operation department, to clean some items such as the operating gowns.

xii. Kitchen

Food is provided twice a day to patients, at lunch and at dinner, but about half of the inpatients do not utilize this service and they purchase their own food or have their family bring in some food for them instead. The kitchen is an individual building located by the howe on the western side of the Tuberculosis ward.

xiii. Waste management

Medical wastes of Kampong Cham Hospital, such as injection needles, are being disposed of by the incinerators at the neighboring health center. The policy is to treat general wastes with the incinerator installed within the hospital premises; however, the wastes that are beyond the processing capacity of the incinerator have been observed to be left neglected. In the future, the hospital side intends to transfer the general wastes to the waste disposal facility managed by the 5 neighboring communities. Small organs and placentas are being buried within the hospital premises, the southern side of the

Obstetric/Gynecology ward building, but in the future they will be transferred to temples for cremation.

Therefore, the Project will not include the construction of a new incinerator in the plan.

2) Equipment Plan

None of the requested medical equipments and appliances is manufactured in Cambodia and most of the widely-distributed equipments are made in Japan, Europe, USA, China or Taiwan. However, many healthcare workers and medical equipment agents consider Chinese or Taiwanese products to be cheap but poor in quality. For medical equipments requiring regular maintenance, many public hospitals have never concluded maintenance agreements with agents and are requesting charged repair services in the event of malfunction. Furthermore, many hospitals do not have replacement parts or consumables in stock and they can be in a situation where they are unable to promptly deal with problems as simple as changing lamps. In this Grant Aid Project, manufacturers whose agents are located in Cambodia or neighboring countries (Thailand, Viet Nam) will be selected for the equipments requiring replacement parts or consumables or for those requiring maintenance services by the relevant manufacturers. Specifications will be studied based on Japanese, European or American products, but procurement from third countries will also be taken into consideration. For the equipments not requiring replacement parts or consumables, specification criteria will be based on Japanese products, but procurement of third country products will also be considered.

(5) Policy on Practical Use of Local Contractors

1) Building Plan

In Cambodia, there are approximately 180 local construction companies in operation, and several Japanese companies established in Phnom Penh. The leading local construction

companies also have experience in Japan's Grant Aid Projects. In general terms, the awareness on quality control or safety control is low in Cambodia, and comprehensive construction capability is yet to be established. Therefore, it will be necessary to provide thorough instructions on Japanese style management methods. Since the number of skilled local workers is limited, it is important to dispatch Japanese field supervisors to provide guidance on construction, while making maximum use of the know-how of the local contractors.

2) Equipment Plan

In principle, in order to ensure effective and long-term use of the equipments procured by the Project, manufactures having their agents in Cambodia or in the neighboring countries will be selected for equipments requiring procurement of consumables and replacement parts specific to the product, or those requiring repairs and regular maintenance by the relevant manufacturers.

(6) Policy on Operation and Maintenance Abilities of Execution Organization

1) Building Plan

There are four maintenance technicians at Kampong Cham Hospital. Two are in charge of electricity, and the other two are in charge of medical equipments. Under current situation, however, only limited amount of work has been done on some parts of the facilities (changing light bulbs, painting, woodwork etc.). As for maintenance of medical equipments, hardly any work has been done, except for simple works such as changing light bulbs for lamps and fuses for appliances. Moreover, for medical equipments, since there are only a limited number of agents in Cambodia, the agents from the neighboring Thailand or Viet Nam are called upon for assistance when there is need.

In view of such circumstances, the hospital shall register these two technicians for the

medical equipment maintenance program (executed by JICA experts), which the Ministry of Health has started to implement, in order to acquire the knowledge on the maintenance of medical equipments.

2）Equipment Plan

In Cambodia, where maintenance system for medical equipments is yet to be established, Kompong Cham Hospital is no exception having no maintenance personnel with sufficient knowledge and expertise, assigned as maintenance personnel. Even for the operators of the medical equipments, their knowledge level hardly reaches 100%. Consequently, care will be needed when setting the grades for the equipments to be provided. Meanwhile, plans to improve the maintenance technology in district hospitals are underway, and the knowledge on the maintenance of medical equipments should be acquired by registering for medical equipment maintenance program (executed by JICA experts) which the Ministry of Health has started to implement.

In this project, in order to ensure appropriate use and maintenance of the procured equipments, operating instructions and regular maintenance methods of the trainings should be provided by the suppliers to the staffs concerned of the hospital at the time of delivery.

(7) Policy on Gradation of Building and Equipment

1) Building Plan

The facility grading of the building shall be determined based on the current hospital. The project plan will place eaves on the entrances and use natural ventilation in order to limit the air-conditioned areas, making it technically and financially appropriate for the future operation and maintenance of the Kampong Cham Hospital. In addition, as Kampong Cham Hospital is the only core hospital that has the capacity to perform surgical operations among the top referral hospitals of the Kampong Cham Province, and by considering the role it

may play as the base of restoration activities at the time of a disaster, the buildings will be constructed with solid construction specifications.

In terms of the maintenance of the building, construction materials to be adopted should be easily repairable, renewable, replaceable and commonly available locally. As for construction methods, special methods will be avoided and locally popular methods shall be adopted. Electrical machineries will be installed taking ease of maintenance and operation as well as durability into consideration.

2) Equipment Plan

i. Specification of equipments

In principle, specifications in conformity with CPA3 shall be adopted, and specifications requiring difficult operation and maintenance will be avoided.

For precision medical equipments that are sensitive to voltage fluctuations (patient monitors, ECG, Ultrasound Apparatus etc.), provision of voltage stabilizers shall be considered for individual equipment.

ii. Quantity of equipments

The quantity of equipments shall be planned in accordance with the diagnosis and treatment functions and the number of health care workers of the hospital. In particular, in view of the limited number of health care workers, the quantity shall essentially be kept to a minimum. Extra supplies of steel surgical tools must be included in the quantity plan, considering their operational aspects (mandatory sterilization process), and the minimum quantity would be two sets. Some of the medical equipments/appliances and medical furniture in the existing departments are still in usable condition, therefore, those equipments and furniture will be relocated to the new facilities and shall be excluded from the list of items to be supported by the Japanese assistance. The criteria for relocation of equipments are as listed below:

Medical equipment: Less than four years from purchase (less than seven years, at the time of the new hospital's opening)

Medical appliance: Less than four years from purchase (less than seven years, at the time of the new hospital's opening)

Medical furniture: Less than seven years from purchase (less than ten years, at the time of the new hospital's opening)

However, for second-hand procurements (mostly aid supplies from NGOs etc.), due to the fact that their manufacture dates are often uncertain, consultant's assessment based on the conditions at the time of study phase shall an addition in determining their inclusion.

(8) Policy on Method of Construction, Procurement and Schedule

1) Building Plan

Although supplies of most of the construction equipments, including framework materials, finish materials and facility equipments, are dependent on imports, construction methods manageable with the local technology will be applied in consideration of future needs such as maintenance. Procurement of construction materials will require careful preparations, including temporary construction/labor plans, import/transport plans, and construction plans, among others. Especially when the finishing works are scheduled during the rainy season, a construction process incorporating sufficient time for the curing of the bed will be required. In order to ensure timely provision of aggregate during framework set-up, an early procurement will be necessary. The plan must give considerations on preventive measures against early deterioration caused by problems of humidity, such as mold and rust.

Since most of the construction materials will be imported, the construction schedule will be greatly influenced by the procurement of the materials. Therefore, procurement plans

must be made based on constant verification of the planned quantity and the inventory for each of the materials and equipments, in order to avoid delays in construction schedule caused by material shortage.

2) Equipment Plan

Due attention should be paid for the installation of special equipments such as the X-ray unit, Sterilizing machine, Operating lamp ceiling type, as their installation works must be scheduled in tandem with the construction schedule of the buildings. In this Project, the existing equipments will be relocated by the Cambodian side upon completion and delivery of the facilities, therefore, care should be taken in securing the installation positions for the newly procured equipments as well as the delivery route for the equipments to be relocated.

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

(1) Premises

Kampong Cham City is located in the northeast of Phnom Penh at the distance of 120 km along national route No. 7. Kampong Cham Hospital, at which the project site is located, is in the central part of Kampong Cham City, facing a street on which there are Province Governor's official residence and Provincial Government offices.

The premises are interspersed with about 21 buildings, including the 3 buildings constructed as the original hospital complex in 1927 under the French colonial administration and the central building constructed in 1991. The premises of the hospital occupy the area of about 38,000 m^2 on a largely flat land, gently slanting downward from north to south. There was a sunken area in the southern corner, where the flows of wastewater and garbage converge in Basic Design Survey. After that, Kampong Cham Hospital side buried.

The project site is planned to cover the currently empty frontcourt and the area from which the existing Pharmacy Building and Obstetrics/Gynecology & Surgery Ward will be removed. Because new facilities will be developed while the hospital is in use, construction should be planned in phases.

It has been confirmed that the whole premises of the hospital, including the project site, are owned by Kampong Cham Hospital.

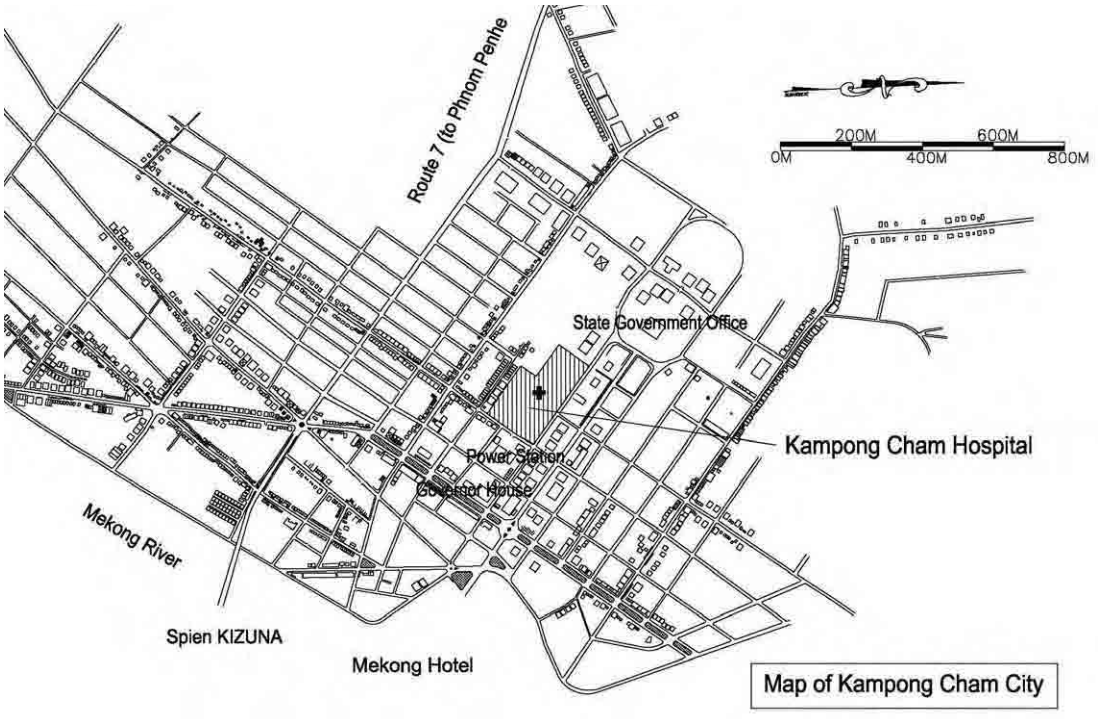


Fig. 2-1 Location Map of Kampong Cham Hospital

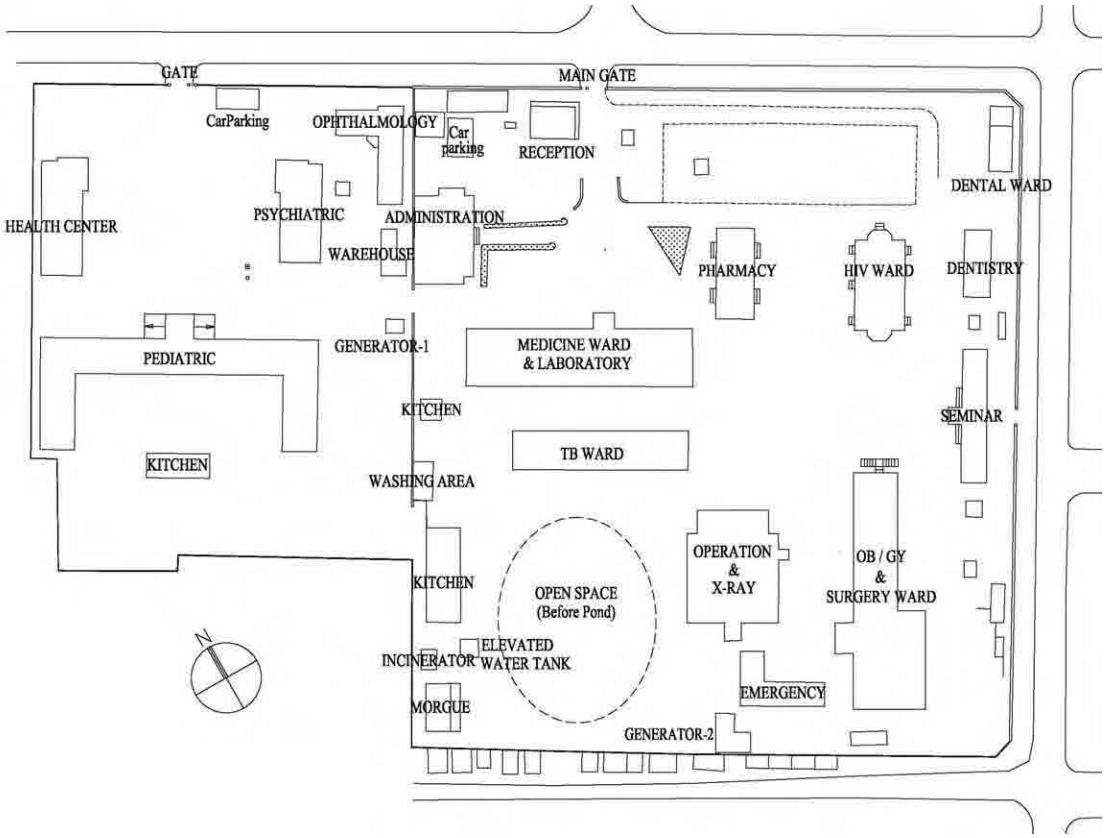


Fig. 2-2 Current Status of Kampong Cham Hospital

(2) Layout Plan

Considering the need to minimize the impact on inpatients and the availability of land (open space and demolition of buildings), construction work should be planned in 2 phases.

1) Phase Plan

i. Phase 1 Construction Work

The Obstetrics/Gynecology & Surgery Ward (including the Delivery section), which are most dangerous in structural terms, will be moved from the entrance garden of the hospital to a newly constructed building next to the central ward and the tuberculosis ward. The construction in this phase will require demolition of existing Pharmacy and Training Building.

The phase 1 construction work will include the following parts:

- Obstetrics/Gynecology & Surgery Ward (including the Delivery section)
- Facility and Machinery Building.

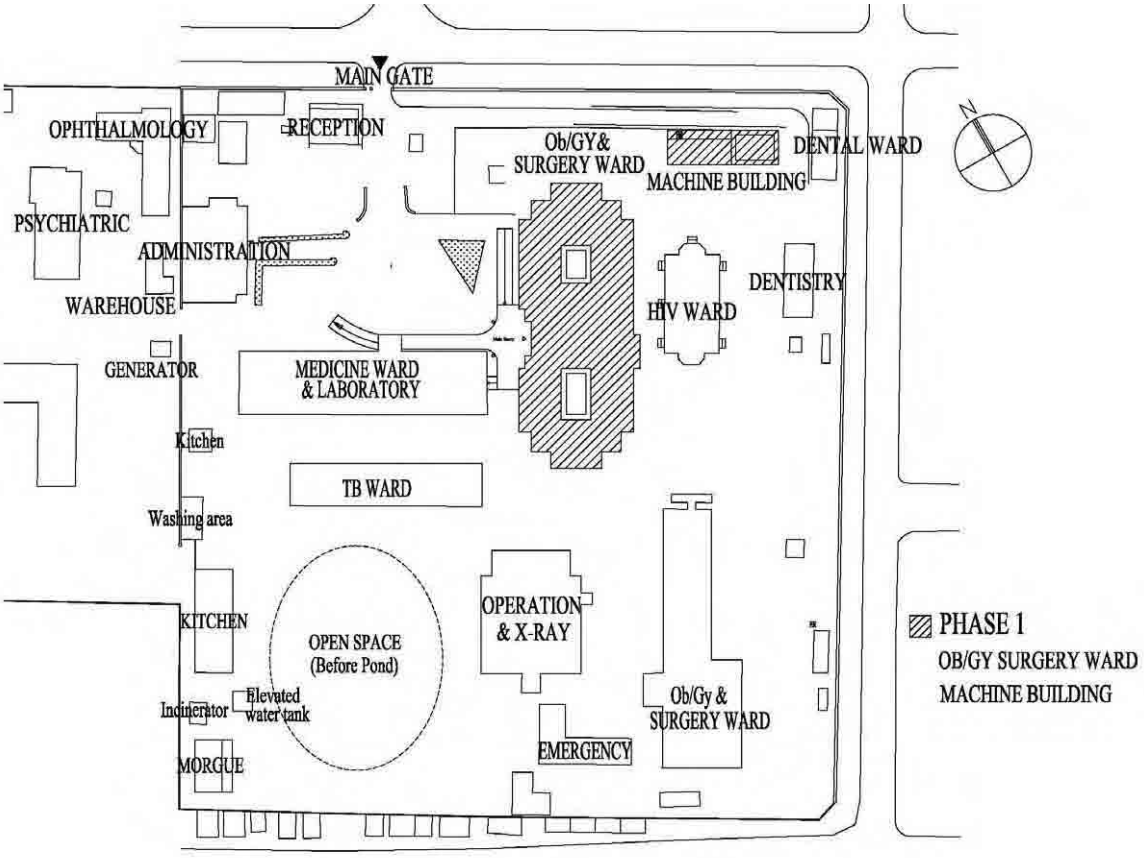


Fig. 2-3 Layout Plan for Phase 1 Construction Work

ii. Phase 2 Construction Work

The existing Obstetrics/Gynecology & Surgery Ward (including the Delivery section), Training Building, lavatories for patients, etc. will be demolished, and the Operation Theater (including the Central Supply Department and the post operation rooms/ICU), Emergency and Imaging Building, etc. will be constructed.

After the completion of the second phase, the functions of the Operation Theater (including Sterilization room and X-ray room) and the Emergency Building will be relocated to new buildings. The existing Emergency Building will be reused for the Dermatology Department in a Cambodian-side project.

The phase 2 construction work will include the following parts:

－Operation Theater (including the Central Supply Department and the post operation rooms/ICU)

－Emergency and Imaging Building

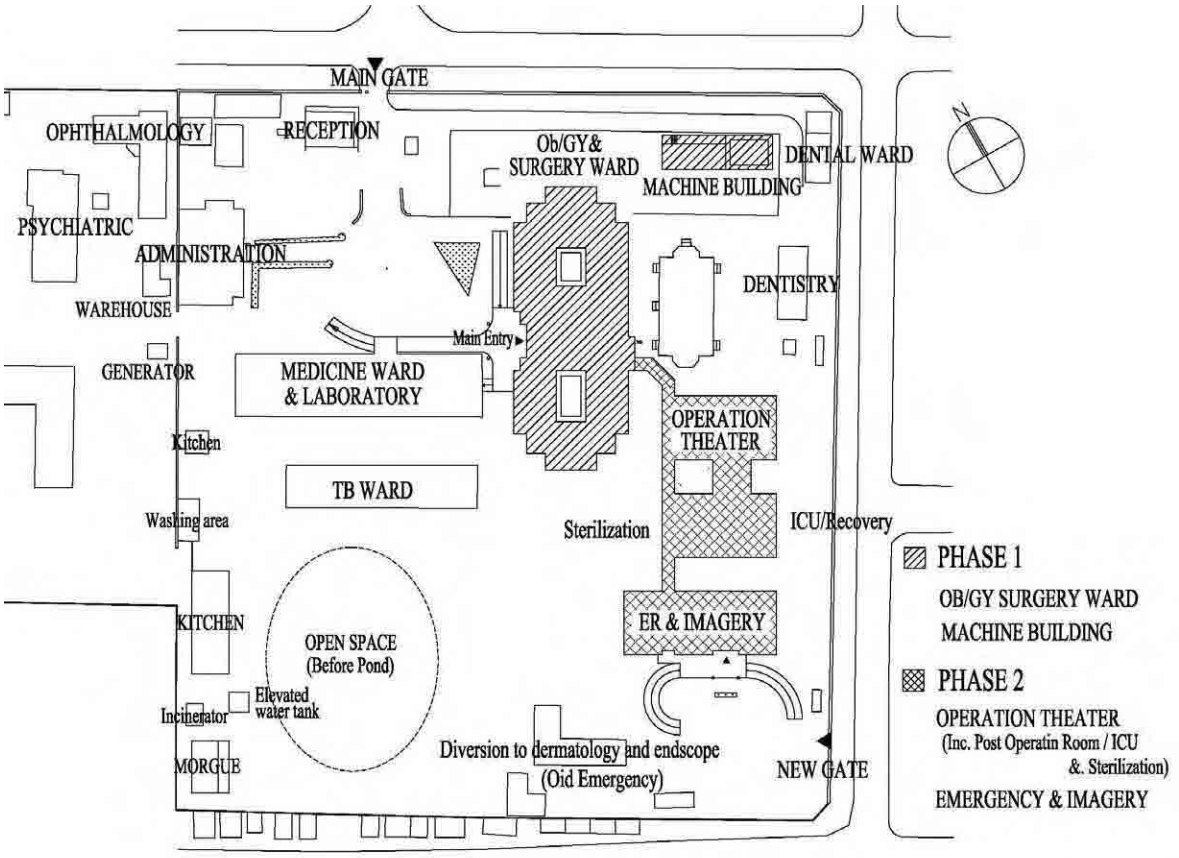


Fig. 2-4 Layout Plan for Phase 2 Construction Work

2) Demolition Plan

i. Phase 1 Construction Work

The following structures will be demolished before the beginning of phase 1 construction work.

a. Pharmacy Building

b. Training Building

c. Exposed obstacles and underground facilities such as buried pipes.

ii. Phase 2 Construction Work

The following structures will be demolished before the beginning of phase 2 construction work:

a. Obstetrics/Gynecology & Surgery Ward

b. Outdoor lavatories

c. Exposed obstacles and underground facilities such as buried pipes.

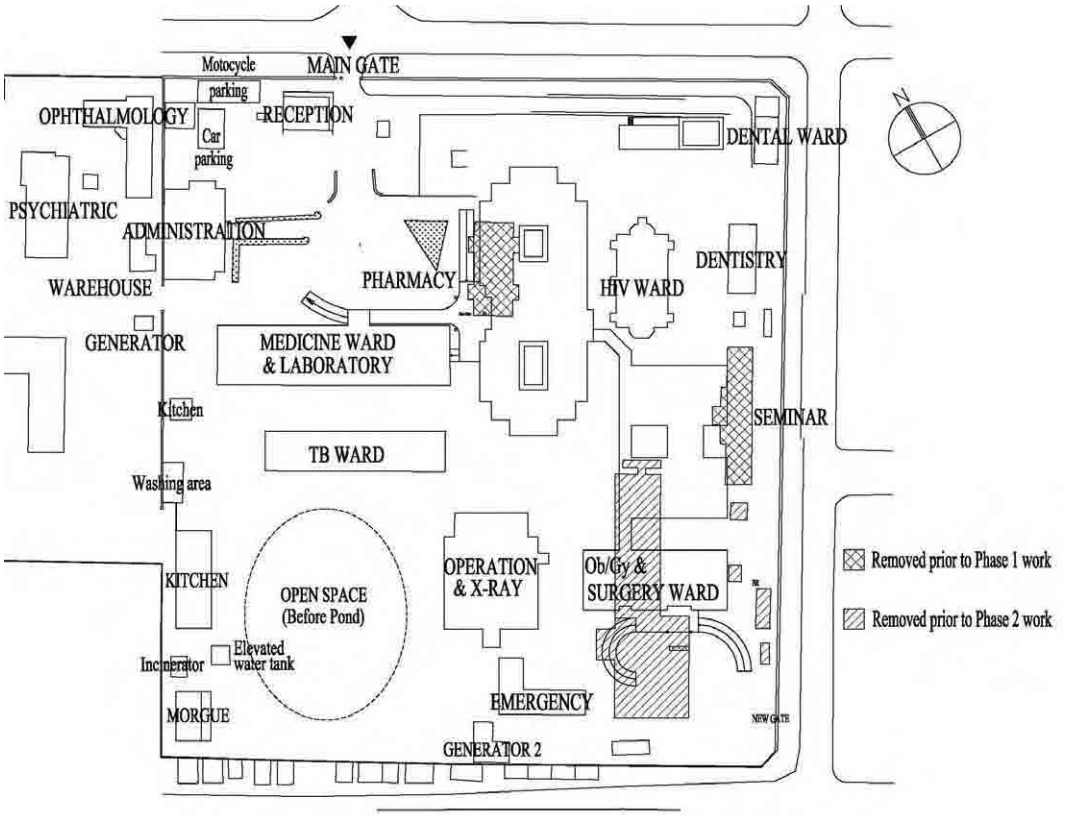


Fig. 2-5 Demolition Plan

(3) Construction Plan

1) Floor Planning

i. List of Facilities by Department

a. Obstetrics/Gynecology & Surgery Ward (Including the Delivery section)

Major rooms are as listed below:

i Surgery Ward

8-bed rooms, 3-bed rooms, 1-bed rooms, patient lavatories and shower rooms, laundry, day corner, nurse station, treatment room, conference room, staff room, and warehouse.

ii Obstetrics/Gynecology Ward

8-bed room, 4-bed room, 1-bed room, patient lavatories and shower rooms, laundry, day corner, delivery room, eclampsia room, labor room, preparation room, nurse station, obstetrics consultation room, gynecology consulting room, PMTCT (prevention of mother to child transmission) room, ultrasound room, conference room, doctor room, staff room, Oxygen room, and warehouse.

b. Operation Theater

Major rooms are as listed below:

i Operation Division

Nurse station, doctor room, gown changing room, equipment preparation room, preparation hall, operation rooms, conference room, clean storage, waste treatment room, equipment storage, and oxygen room.

ii Post Operation Rooms/ICU

Ante room, ICU rooms, post operation rooms, nurse station, staff room, utility room, family lavatories, and warehouse.

iii Central Supply Department

Decontamination and sterile processing rooms, linen laundry, clean storage, and staff room.

c. Emergency Division

Reception room, consultation and treatment room, minor operation room, observation room, utility room, doctor room, staff room, warehouse, clean storage, patient lavatories.

d. X-ray Division

Reception/staff room, X-ray room, control room, darkroom, film storage, equipment storage, ultrasound room, ECG room.

e. Other

Electrical room, generator room, pump room, workshop, reservoir tank.

ii. Calculation of the Size of Hospital

The goal of this Project is to realize a facility plan to improve the healthcare functions of Kampong Cham Hospital, which have been deteriorated due to aging of facilities, as well as to address the future increase in the number of patients. However, considering the current situation of Cambodia suffering from the shortage of healthcare specialists, the size of

hospital facilities in this Project will be limited within the capacity of existing personnel.

The calculation of the size of hospital facilities has been based on the actual records of Kampong Cham Hospital for the period from 2001 to 2005, for which a relatively complete set of data is available.

a. Discussion on the Number of Beds

The calculation of the planned number of beds in the Surgery and Obstetrics/Gynecology departments should cover only the fiscal years in which the expected demand for surgical operations will not exceed the capacity of the present personnel. Applying this requirement to the calculation based on the past increase in the number of operations, the limit should be the fiscal year 2012. Accordingly, this Project should be implemented in the scale of 100 beds in the Surgery department and 30 beds in the Obstetrics/Gynecology department, as shown in the Table below.

Table 2-1 Estimated Number of Ob / Gy and Surgery Patients in 2012

	Application	Existing (Authorized)	Existing (Actual)	Plan
Obstetrics	40	30	34	30
Gynecology	20			
Surgery	120	70	78	100
Ward total	180	100	112	130
ICU/Post Operation	10	10	12	8
Emergency/Observation	6			6
Total	196	110	124	144

i. Number of Surgical Operations

With the current number of surgeons, the hospital is capable of performing 6 operations per day, including planned and emergency operations, at the maximum. Therefore, the maximal number of operations in a year is:

6 operations/day x 365 days = 2,190 operations

The past records of the hospital indicate the annual growth rate of 1.07 for planned operations and 1.09 for emergency operations in average. Based on these rates, the number of operations in 2012 is expected to be 2,205, as shown in the Table below. The number of operations per day (weekday) would be 6.4, when the limit of the hospital's capacity is reached.

Table 2-2 Number of Surgical Operations (Major) 2002 -2005 (cases)

	2001	2002	2003	2004	2005	Growth rate per year
Number of planned operations	246	316	278	331	312	1.07
	growth rate	1.28	0.88	1.19	0.94	
Number of emergency operations	984	1,018	1,023	1,214	1,357	1.09
	growth rate	1.03	1.00	1.19	1.12	
Total	1,230	1,334	1,301	1,545	1,669	

Source: Kampong Cham Hospital (Answer to the Questionnaire of the Basic Design Study Team)

Table 2-3 Estimated Number of Surgical Operations in 2012

		2005	2008	2011	2012
a) No. of planned operations	No. of Operations per Year	231	283	347	372
	Average No. of Operations per Day (÷260day)	0.9	1.1	1.3	1.4
b) No. of emergency operations	No. of Operations per Year	1,003	1,299	1,682	1,833
	Average No. of Operations per Day(÷365day)	2.7	3.6	4.6	5.0
Total		1,234	1,582	2,029	2,205
Average No. of Operations per Day		3.6	4.6	5.9	6.4

Therefore, the hospital with the current number of surgeons can cope with the increase in the number of operations until 2012, and the number of beds should be planned to accommodate the number in 2012 at the maximum.

ii. Calculation Regarding the Surgery Ward

The past records of the hospital indicate the growth rate of 1.07 in the number of patients. The total number of inpatients in the Surgery Ward in 2012 is estimated to be 34,578, and

the following calculation shows that 106 beds will be needed, including emergency observation beds.

Number of needed beds = Total patients per year / occupancy rate x 365

Occupancy rate = 0.9

34,578 / 0.9 x 365 = 105.2 → 106 beds

Because the yearly total number of patients (34,578) includes surgery emergency cases, the above number of beds is regarded to include emergency observation beds, which are assumed to be 6 beds. Therefore, the plan should consist of 6 emergency observation beds and 100 surgery beds.

Table 2-4 Average Growth Rate of Surgery Inpatients

	2002	2003	2004	2005	Growth Rate Per Year
Number of Surgery Inpatients (persons)	1,953	2,038	2,270	2,414	
Growth Rate		1.04	1.11	1.06	1.07

Table 2-5 Number of Surgery Inpatients in 2005

	2005
a) Surgery emergency	3,684
b) Surgery 1	5,933
c) Surgery 2	11,917
Total	21,534

Table 2-6 Estimated Number of Surgery Inpatients per Year(Growth rate:1.07)

	2005	2008	2011	2012
a) Surgery emergency	3,684	4,513	5,529	5,916
b) Surgery 1	5,933	7,268	8,904	9,527
c) Surgery 2	11,917	14,599	17,884	19,135
Total	21,534	26,380	32,317	34,578

iii. Obstetrics/Gynecology Ward

The averages in the past 5 years suggest the growth rate of 1.03 for normal delivery and

complicated and abnormal delivery, 1.08 for caesarian operation, and 1.05 for gynecology cases. Based on these data, the total number of obstetrics/gynecology patients would be 9,654, and the following calculation indicates that 30 beds will be needed.

Number of needed beds = Total patients per year / occupancy rate x 365

Occupancy rate = 0.9 (same as in the Surgery Ward)

9,654 / 0.9 x 365 = 29.39 → 30 beds

Table 2-7 Average Growth Rate of Ob / Gy patients

	2001	2002	2003	2004	2005	Average Growth Rate	The number of cases ratio in 2005
a) Normal Delivery	229	372	305	587	644	*1	42.6%
Growth Rate		1.62	0.82	1.92	1.10	1.03	
b) Complicated delivery	133	169	161	159	142		9.4%
Growth Rate		1.27	0.95	0.99	0.89	1.03	
c) Caesarean operations	182	186	200	255	238		15.8%
Growth Rate		1.02	1.08	1.28	0.93	1.08	
d) Gynecology	453	621	438	512	487		32.2%
Growth Rate		1.37	0.71	1.17	0.95	1.05	
Total No. of Obstetrics & Gynecology Inpatients (persons)	997	1,348	1,104	1,513	1,511		100.0%

*1: The growth rate of normal delivery is based on the Kampong Cham Hospital's target value instead of past average.

Although the actual mean growth rate of normal delivery in the past 4 years is 1.37, normal delivery should primarily be conducted at lower-level institutions, as stated in the national policy of Cambodia.

As the present growth rate is not likely to continue in the future, the target value of 1.03 is used instead of the actual rate.

According to the data from the hospital, the actual total number of patients in the Obstetrics/Gynecology Ward is 7,082. Applying the above-mentioned percentages, this total can be broken down as shown in the Table below.

Table 2-8 Total Number of Obstetrics and Gynecology Patients in 2005

	2005
a) Normal Delivery (42.6%)	3,018
b) Complicated delivery (9.4%)	666
c) Caesarean operations (15.8%)	1,115
d) Gynecology (32.2%)	2,283
Total Number of Obstetrics & Gynecology Patients (persons)	7,082

The number of patients in 2012, estimated from the percentage of inpatients shown in Table 2-8, is as shown in Table 2-9.

Table 2-9 Estimated Growth in the Number of Obstetrics and Gynecology Patients per Year

	Average Growth Rate	2005	2008	2011	2012
a) Normal Delivery (42.6%)	1.03	3,018	3,298	3,604	3,712
b) Complicated delivery (9.4%)	1.03	666	728	795	819
c) Caesarean operations (15.8%)	1.08	1,115	1,405	1,769	1,911
d) Gynecology (32.2%)	1.05	2,283	2,643	3,059	3,212
Total Number of Obstetrics & Gynecology Patients (persons)		7,082	8,073	9,228	9,654

b. Calculation of the Number of Operation Rooms

At present, the hospital has 3 teams performing operations in the Surgery department and 2 teams performing operations in the Obstetrics/Gynecology department. First, an operation room should be provided for the obstetrics/gynecology operation teams, which frequently perform emergency operations such as caesarian operations. In addition, there should be 2 surgical operation rooms, one for general surgery and one for orthopedic surgery requiring special equipment. Therefore, the plan for this Project should include 3 operation rooms, each for general surgery, orthopedic surgery, and obstetrics/gynecology.

c. Calculation of the Number of Beds in ICU/ Post Operation Rooms

In the case of this hospital, only a small portion of medical care is provided in the wards.

Most of postoperative care is given intensively in the post operation rooms, and the period of patient's stay in these rooms tends to be long.

As the number of operations is assumed to be 6 cases per day, 6 beds for postoperative recovery are planned. Including 2 additional beds for severe patients, 8 beds are planned in total in ICU/ post operation rooms. One of the beds for severe cases will be in a 1-bed room for the patient requiring isolation.

d. Calculation Regarding the Emergency Division

Table 2-10 summarizes the number of surgery patients in 2005.

After arriving at the reception at the entrance of the hospital, patients are directed to the Surgery department, the Internal Medicine department, and other departments. While surgery patients are typically registered for admission in the Surgery Emergency Division, some patients may be registered directly in Surgery 1 and Surgery 2. In addition, most patients registered in the Surgery Emergency Division move to Surgery 1 and Surgery 2. Because of these reasons, there are some disagreement in the numbers of admitted and discharged patients in the Table below, but the total numbers for the Surgery department as a whole are basically consistent.

Table 2-10 Number of Surgery Patients in 2005

	Surgery Emergency	Surgery 1	Surgery 2	Surgery Total
No. of beds	10	30.	36.	76
No. of inpatients (Person)	1852	75	516	2,443
Number of discharge	444	597	1115	2156
Number of external transfer	116	1	7	124
Number of unauthorized discharge	17	11	49	77
Number of death	57	0	0	57
Number of total discharge	634	609	1,171	2,414
Number of stay	3,684	5,933	11,917	21,534
Duration of stay	2.0	9.7	10.2	

Source: Kampong Cham Hospital Statistics Office.

Note: The mean period of stay (days) in Surgery Emergency has been calculated by dividing the yearly number of inpatients by the number of admitted patients (1,852). The mean period of stay

(days) in Surgery 1 and Surgery 2 has been calculated by dividing the yearly total number of inpatients by the total number of discharged patients.

The number of treatment tables and the number of beds in observation rooms are calculated based on the above number of emergency patients. It is considered that the treatment room in the Emergency Division needs 3 treatment tables, similarly to the present situation. In this Project, the plan will include a treatment and minor operation room (2 beds) that is used chiefly for preoperative preparation and treatment and a consultation room that can be used for treatment.

Table 2-11 Calculation of the Number of Treatment Tables

	Number of surgery patients in 2005 (persons) A	Average number of surgery patients per day (persons) B	Number of surgery patients per day in peak time (persons) C	Estimated Number of surgery patients per day in peak time (persons) D	Average time taken for treatment (minutes) E	Number of patients to be treated per table (persons) F	Estimated number of operation tables D/F (rooms)	Number of operation tables needed (rooms)	Requested number of operation tables (rooms)	Preset number of operation tables (rooms)
Number of treatment tables	21,534	59.0	41.3	66.3	25	21.6	3.1	3	3	3

A: Number of surgery patients in 2005.
B: Mean daily number of surgery patients. B = A / 365 days.
C: It is assumed that 70% of patients arrive during the peak time from 8:00 a.m. to 5:00 p.m.
D: Number of patients in 2012 (predicted from the 1.07 growth rate of emergency operations).
E: The time for treatment of 1 case is assumed to be 25 minutes, including preparation and cleaning.
F: Calculation for treatment during the peak time. [540 minutes] / [25 minutes/person] = 26.1 person/room

The number of beds in the observation room is calculated as follows. Based on number of patients discharged from the Surgery Emergency Division in 2005, 6 beds are needed in the observation room, as shown in the Table below.

Table 2-12 Calculation of the Number of Beds in the Observation Room

	Number of discharge emergency patients in 2005 (persons) A	Average number of emergency patients per day (persons) B	Estimated Number of surgery patients per day in 2012 C	Duration of stay (day) D	Estimated number of beds in observation room (beds) E	Planned number of beds in observation room (beds)	Requested number of beds in observation room (beds)	Present number of beds (beds)
Observation room	634	1.7	2.8	2	5.6	6	6	10

A: Number of surgery emergency patients discharged in 2005.
B: Mean daily number of emergency patients. B = A / 365 days.
C: Number of patients in 2012 (predicted from the 1.07 growth rate of emergency operations).
D: The mean period of stay is assumed to be 2 days.
E: Estimated number of beds in the observation room = C x D.

In addition to the above-mentioned treatment room and observation room, the Emergency Division will have other rooms, such as reception and accounting (24-hour operation), a hall to accommodate many patients during a disaster, consultation room, doctor room for duty doctors, nurse station facing the observation room, utility room, staff room, and warehouse.

iii. Verification of the Calculation of Hospital Size

Public general hospitals in modern Japan has an floor/bed ratio of 50-80 m^2 per bed. Kampong Cham Hospital in the present state has 260 beds in a 9,275 m^2 total floor area, which means 35.7 m^2 per bed. This size is considerably smaller than that recommended in Japan.

The sum of the existing 245 beds (excluding the 15 beds for Hansen's disease located in different premises) and the planned increase (30 beds in the Surgery Ward) will be 256 beds. Assuming a rate of 60 m^2/bed, the total floor area of the hospital should be 15,900 m^2. Using this value as the standard total size and referring to the typical floor-area distribution in Japanese public general hospitals as a yardstick, the size of each department involved in this Project is estimated as follows.

Table 2- 13 Calculation of Scale of Facilities

Department	Standard Area Ratio (%)	Calculated Area (m^2) 15,900 m^2	Planned Area (m^2)
Ward	40	6360.0	2,784.3
(Surgery 100 Beds, Obstetrics & Gynecology 30 Beds)	130Beds/265Beds	3,120.0	
Delivery	1	159.0	136.5
Operation Theater (Include Sterilization)	5	795.0	792.0
Emergency Department	3	477.0	346.5
Imaging Department	4	636.0	184.5
Service, etc.	10	1,590.0	369.4
Total floor Area		10,017.0	4,613.2

The followings discuss the departments showing numerical discrepancy in the comparison between calculated and planned figures in the above Table.

a. Ward

The area of the planned ward is about a half of the calculated area. This is because the Project does not include the 135 beds in Internal Medicine ward (46 beds), Pediatrics ward (25 beds), Tuberculosis ward (30 beds), HIV (20 beds), Oral Surgery/ENT (7 beds), and Ophthalmology (7 beds).

b. Emergency Building

The plan should be developed to allow the addition of consultation and treatment rooms in the Emergency department at the time of future expansion of the Imaging Building.

c. Imaging Building

The planned floor area is considerably smaller than the standard size. The floor plan should be developed so that the facility can be expanded in the future when the shortage of radiologists in Cambodia would be resolved and expansion would be needed.

The comparison of the present and planned areas of various rooms in each department is given in the following pages.

iv. Floor Planning

a. General Patient Room (Surgery Ward, Obstetrics/Gynecology Ward)

The patient rooms of the Obstetrics department should consist of modules accommodating beds that are wide enough to allow the mother to lie down with the neonate. Therefore, each 8-bed room in the general ward should consist of a 6.0 m x 7.5 m modules.

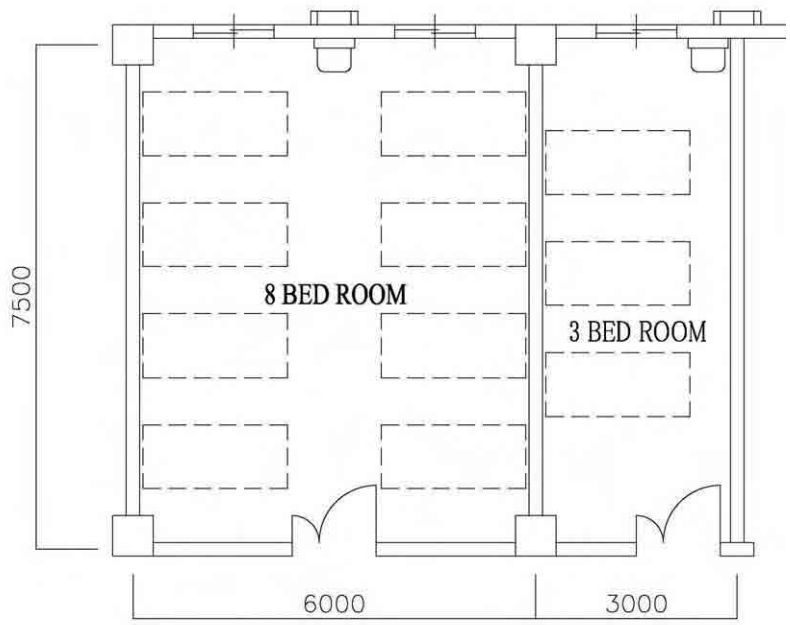


Fig. 2-6 Plans of 8-bed Room and 3-bed Room

b. 1-bed and 3-bed Rooms (Surgery Ward, Obstetrics/Gynecology Ward)

Each 1-bed room should consist of a 3.0 m x 6.5 m module with a toilet and a shower.

Each 3-bed room should consist of a 3.0 m x 7.5 m module without a toilet and a shower.

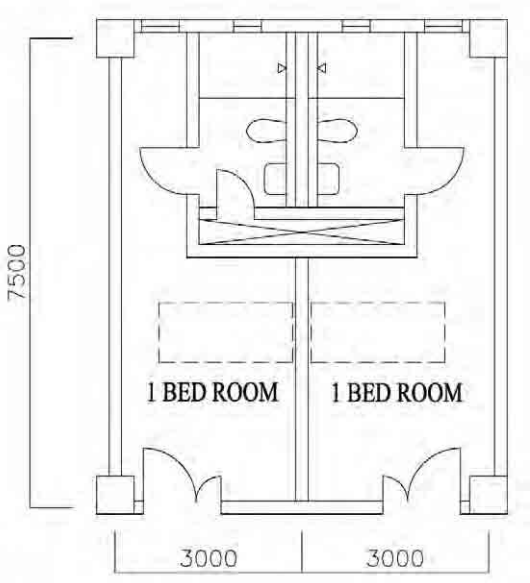


Fig. 2-7 Plan of 1-bed Room

c. Delivery Room (Obstetrics/Gynecology Ward)

The module of each delivery room should be 8.0 m x 6.0 m, and the separation between 2 delivery beds should be achieved by curtains.

A working table, a sink, and a slop sink should be installed along the wall.

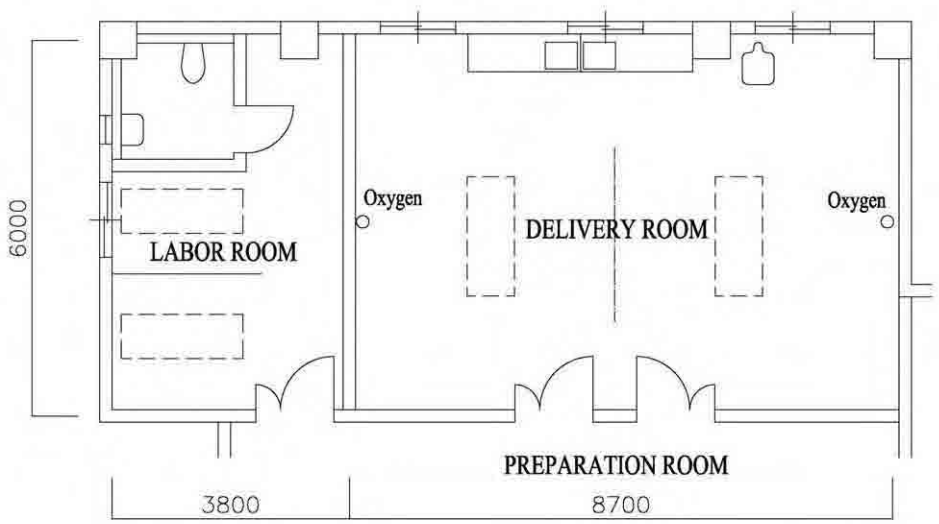


Fig. 2-8 Plan of Delivery Room

d. Operation Rooms (Operation Theater)

The module of each operation room should be 6.0 m x 6.0 for general surgery and obstetrics/gynecology and 6.0 m x 9.0 m for orthopedic surgery.

A dedicated corridor should be provided for the movement from the operation room to the post operation rooms /ICU and to the Central Sterilization room to prevent intersection with the movement of general patients.

Each operation room should have medical gas outlets supplying oxygen via centralized piping.

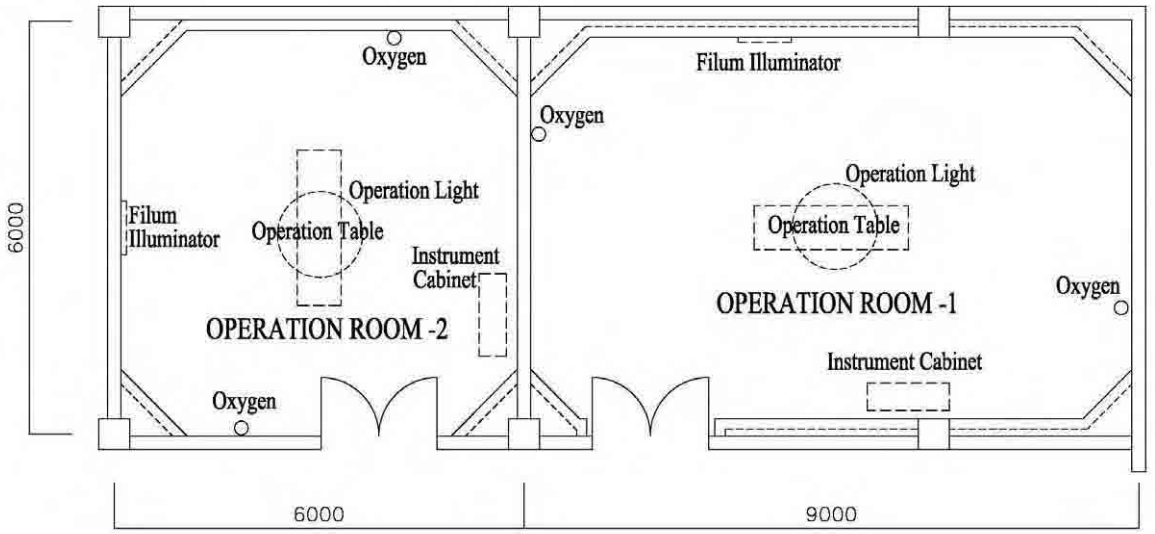


Fig. 2-9 Plan of Operation Room

e. Minor Operation and Treatment Room (Emergency Building)

The wide treatment room in the Emergency Building should be equipped so that minor surgery can be performed in the room. It should be sized 9.0 m x 6.0 m to accommodate 1

operating table and 1 treatment table with preparation and sterilization corner, and should be equipped with a shower booth for washing the patient's body that may be soiled, e.g., in a traffic accident.

A working table, a sink, and a slop sink should be installed along the wall.

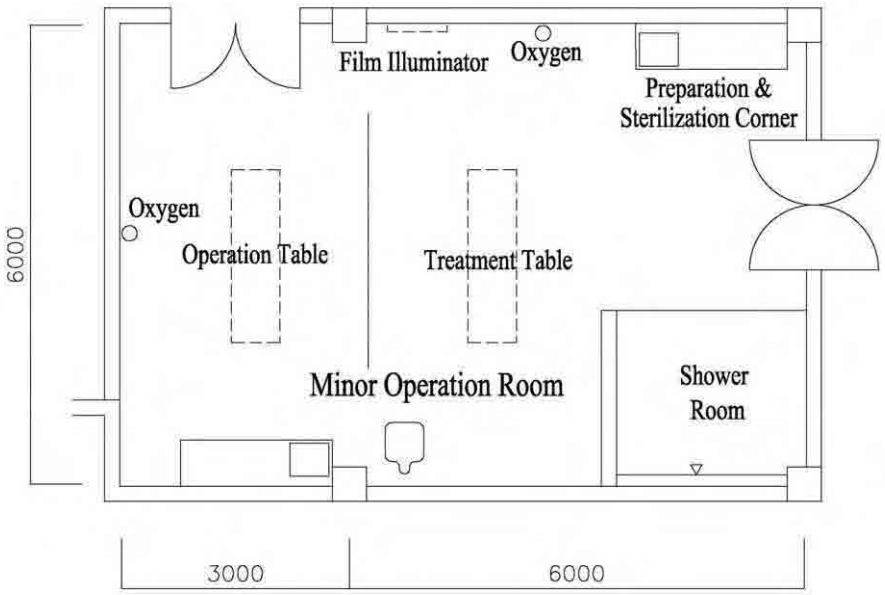


Fig. 2-10 Plan of Minor Operation and Treatment Room

f. X-ray Room (Imaging Building)

The radiology room should be sized 6.0 m x 4.0 m and be adjacent to the control room as staff room.

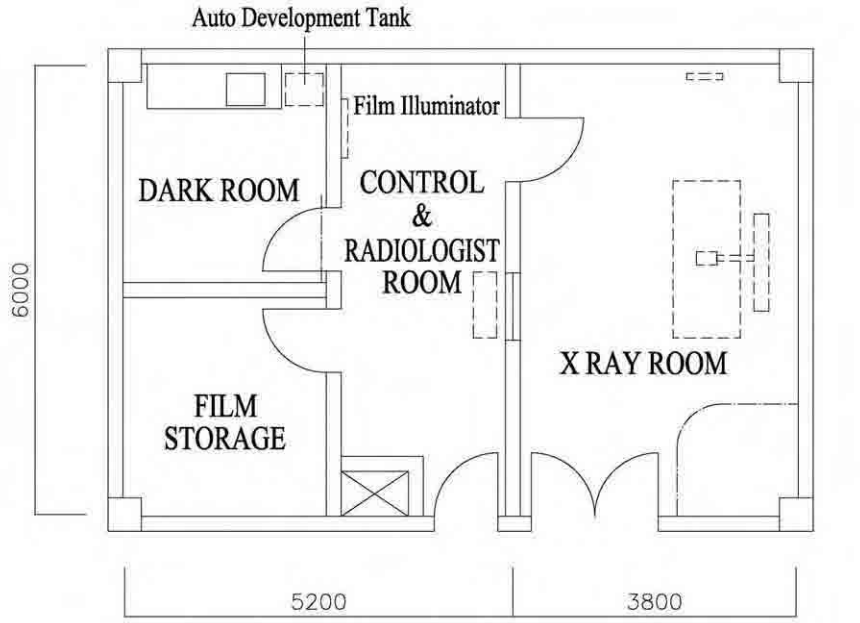


Fig. 2-11 Plan of X-ray Room

g. Ultrasound Room and ECG Room (Imaging Building)

Each should be sized 3 m x 6 m, and be located next to each other.

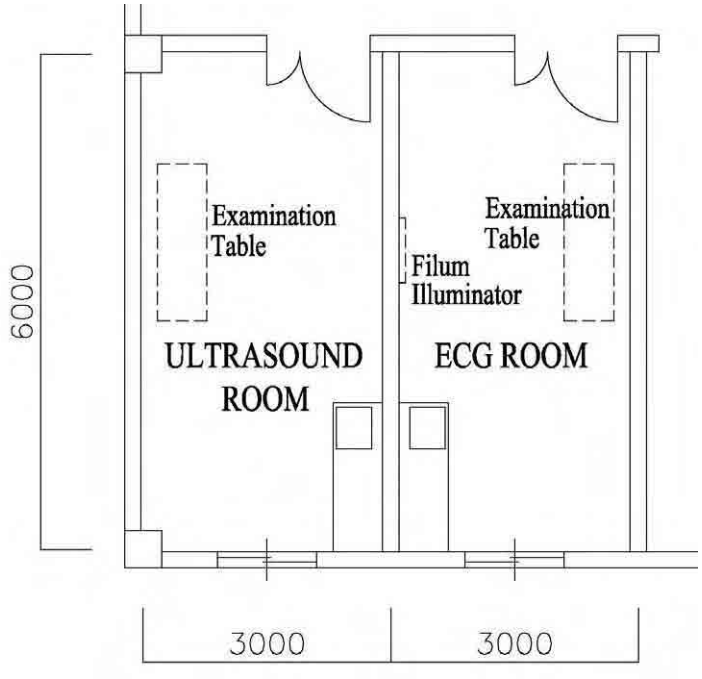


Fig. 2-12 Plans of Ultrasound Room and ECG Room

v. Planned Area

Table 2- 14 Area Table by Building

Phase Plan		Phase I		Phase II			
Floor	Area	Ob / Gy & Surgery Ward	Machine Building	Operation Theater	Emergency & Imaging Building		Others
					Emergency	Imaging	
	Main Contents	100 Surgery beds 30Ob/Gy beds 2 Delivery beds 2 Labor beds 2 Eclampsia beds	Electrical Room Generator Room Pomp Room Maintenance Room Reservoir Tank	3 OP Room 6 Recovery beds 2 ICU beds	Consultation & Treatment Room Minor OP Room 6 Observation beds	X-ray room Ultrasound ECG	Corridor
PH	48.0	48.0	-	-	-	-	-
2 F	1,299.0	1,299.0	-	-	-	-	-
1 F	3,266.2	1,573.8	195.6	792.0	346.5	184.5	173.8
Total	4,613.2	2,920.8	195.6	792.0	346.5	184.5	173.8

Table 2- 15 Table of Calculated Areas (unit: m^2)

Division		Room Name	Requested area		Existing area		Planned area	
			Original	New Request	Area	Numbers	Area	Numbers
Obstetrics / Gynecology & Surgery Ward	Ob / Gy Ward	Bed Room		60 beds	177.3	30 beds	204.6	30 beds
		Nurse Station			82.5		33.6	
		Gynecological Counseling Room		1 room	16.2		19.3	
		Obstetrics Consultation Room		1 room	16.2		19.3	
		Ultrasoud Room		1 room			22.5	
		PMCTP Room		1 room			18.0	
		Doctor Room			21.0		13.5	2 Rooms
		Labor Room			16.2	2 beds	21.0	
		Eclampsia Room					15.0	
		Delivery Room		2 beds+1 bed	16.2	1 beds	59.5	2 beds
		Preparation Room			16.2		15.7	
		Staff Room			45.6		9.6	
		Oxygen Room					5.5	
		Sub Total			407.4		457.1	
	Surgery Ward	Bed Room		120 beds	532.2	76 beds	630.0	100 beds
		Nurse Station			82.8		45.6	
		Treatment Room			12.6		40.5	
		Staff Room			33.0		20.1	
		Sub Total			660.6		736.2	
	Common	Conference Room					90.0	
		Day Corner					141.8	
		Common Space			654.0		1495.7	
		Sub Total			654.0		1727.5	
		Total	1,000.0		1722.0		2920.8	
Operation Theater	Operation Div.	Gown Changing Room					36.0	
		Nurse Station					14.1	
		Doctor Room			32.0		18.0	
		Preparation Room			32.0		21.0	
		Ante Room					15.0	
		Operation Hall			40.0		57.0	
		Operation Room 1		4 rooms	40.0		54.0	
		Operation Room 2			40.0		36.0	
		Operation Room 3					36.0	
		Conference Room					12.0	
		Equipment Storage			40.0		12.0	
		Clean Storage					10.5	
		Solid Storage					10.5	
		Oxygen Room					24.0	
		A/C Machine Room					27.0	
		Sub Total			224.0		383.1	
	ICU / Recovery	Ante Room					9.1	
		post operation room		10 beds	57.0	8 beds	71.5	6 beds
		ICU					14.0	2 beds
		Nurse Station					14.1	
		Utility Room					6.9	
		Equipment Storage					8.0	
		Staff Room					25.8	
		Sub Total			57.0		149.4	

	Sterilization	Laundry			24.0		18.0	
		Decontamination Room					18.0	
		Sterile Processing Room			30.0		54.0	
		Clean Storage			20.0		36.0	
		Staff Room					16.6	
		Storage			20.0			
		Sub Total			94.0		142.6	
	Common Space / Corridor				144.0		116.9	
	Total		300.0		519.0		792.0	
Emergency & Imaging Building	Emergency Div.	Reception / Staff Room					14.4	
		Consultation & Treatment Room			24.7		18.0	
		Minor Operation Room					54.0	
		Doctor Room			12.4		18.0	
		Staff Room			12.4		36.0	
		Nurse Station			25.9		15.6	
		Observation Room		6 beds	31.5	5 beds	44.0	6 beds
		Utility Room					8.0	
		Equipment Storage					7.2	
		Common Space / Corridor			37.1		131.3	
		Sub Total	800.0		144.0		346.5	
	Imaging Div.	Reception / Staff Room			10.0		9.0	
		Staff Room			30.0		9.0	
		Film Storage					8.4	
		Dark Room			4.0		8.4	
		Control Room			16.0		14.4	
		X ray Room		1 room	20.0		22.8	
		Ultrasound Room		1 room			18.0	
		ECG Room					18.0	
		Equipment Storage					18.0	
		Common Space / Corridor			60.0		58.5	
		Sub Total	100.0		140.0		184.5	
	Total						531.0	
Corridor							173.8	
Machine Building		Work Shop					28.2	
		Electrical Room					19.8	
		Generator Room					24.0	
		Pomp Room					18.0	
		Reservoir Tank					105.6	
		Total					195.6	
Grand Total (m^2)			2,200.0		2525.0		4613.2	

2) Elevation and Cross-section Planning

In external appearance, buildings should have pitched roofs as a design feature following the tradition of Cambodia. Flat roofs will be used partly to accentuate the symbolism of these pitched roofs.

a. While the project site has a level difference of about 1.5 m between the north and south ends, the buildings constructed in the northern and southern parts will have different floor levels to minimize the need for the land preparation work conducted by the Cambodian side.

b. The floor level of the 1st floor of the Obstetrics/Gynecology & Surgery Ward will be aligned with the floor level of the existing Central building.

c. To avoid flooding due to heavy rain, the floor level of the 1st floor will be set higher than the ground level by about 1 m. Slopes will be provided for the movement of wheelchairs and stretchers, as well as articles carried into and out of the building.

d. Patient rooms using natural ventilation will have high ceilings to ensure sufficient air volume.

e. Each building will have the eaves to limit the entry of direct sunlight into rooms and to prevent the penetration of rainwater into walls.

f. The height of story (the height from the floor surface to the top edge of the roof beam) is determined according to the following conditions.

- Obstetrics/Gynecology & Surgery Ward: According to the CPA standards, the ceiling height of patient rooms using natural ventilation should be 4 m.
- Operation Theater: The ceiling height of operation rooms should be determined based on the 3 m minimum requirement for installation of the operating lamps. That of post operation rooms /ICU rooms should be determined similarly to patient rooms.
- Emergency and Imaging Building: The ceiling height of observation rooms should be determined similarly to patient rooms. That of the air-conditioned X-ray room, ultrasound room, and ECG room should be 2.8 m.

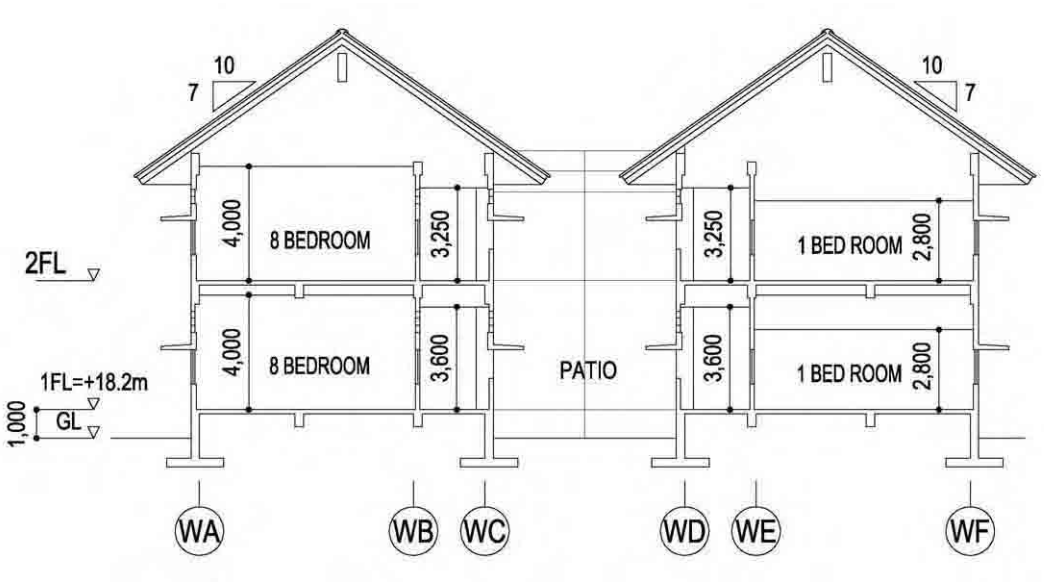


Figure 2-13 Cross Section of Obstetrics / Gynecology & Surgery Ward

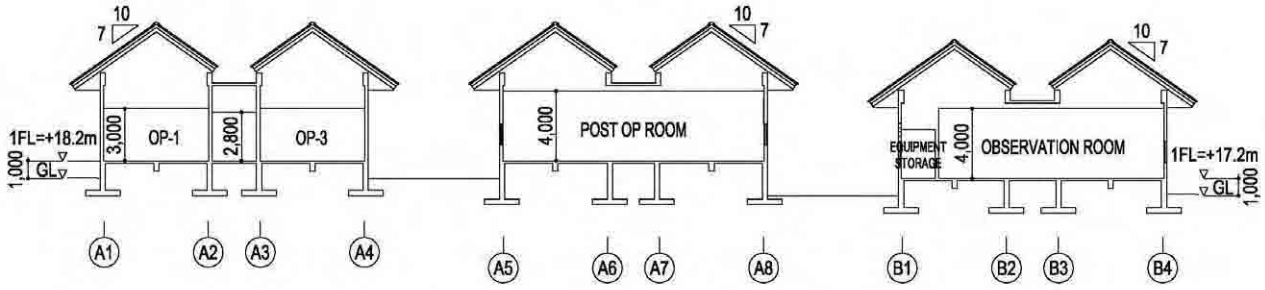


Figure 2-14 Cross Section of Emergency & Imaging Building

2) Structural planning

i) Preconditions for structural planning

・Seismism: Cambodia is situated far off the Pacific Rim seismic focal region; there is no record of damage from earthquakes.

・Typhoons: Although Cambodia is recognized as a country with many floods, storms, etc., it is conceivable with equal with Japan by the wind speed record.

・Soil conditions: The soil of the project site gradually slopes down appocisi1 one meter from the front side of the building toward the back of the site. The delta in the elevation is almost 1 m more or less. The excavation at two locations in the construction site as part

of a plate bearing test found that the soil between the surface level and a depth of about 1.0 m seems to be backfilling and the soil deeper than that stable cohesive soil (POINT A) and sandy soil (POINT B).

・Groundwater level: No groundwater was confirmed by the excavation in the plate bearing test (between the ground level and a depth of approximately 1.25m.)

ii) Structural planning

・Structure type: The project site is situated in the inland part of the continent where impact of typhoons and earthquakes is regarded as minimal. The main structure shall therefore consist of reinforced concrete, in view of the ease, costs and construction work achievement of procuring the necessary materials in the country.

・Frame method: Due to the facts that there is no record of earthquakes in the country and that the formwork accuracy is not favorable, the frame shall be a pure rigid-frame structure in principle, instead of concrete walls, except the X-ray and X-ray-related rooms and other limited areas. For the sake of weight saving, the roofs shall basically be light roofing, with an exception of concrete slab flat roofs, in consideration of sectional planning and drainage slope. As for the floors of the first stories, structural slabs shall be adopted for the under floor pits, apart from the backfilling segment.

iii) Foundation planning

・As a result of the plate bearing test at two locations in the construction site, the long-term bearing capacity of soil was deemed as 15tf/m^2 (≒150kN/m^2). In addition, the loading test was conducted at a depth of 1.25m from the current surface level at each point of testing.

・Since the surface ground is backfilling, which has uneven geotechnical characteristics and hence cannot be expected of a good bearing power, the foundation method shall be spread foundation with its supporting layer at below the backfilling stratum (around 1.0m depth from

surface).

iv) Design load

・Seismic load: Since there has been no earthquake recorded in the past, there is no need for consideration on a seismic load. However, in view of the institution usage of the hospital, horizontal power be considered on the design. The setting of horizontal power reduces the seismic load of Japan to half and use.

・Wind load: Though no damage from typhoons has been reported so far, the wind load shall be set at the level of the Japanese standards for inland areas (terrain category III, 30m/s) by the wind speed record.

・Live load: The live load shall be set as in the table below, based on the (Japanese) Construction Standard Law and its Enforcement Ordinance.

Table 2- 16 Live Load

Room	Live Load (N/ m^2)			Remarks
	Floor	Frame	Earthquake	
Examination room and related rooms	2900	1800	800	
Operation room, X-ray room and related rooms	5000	2400	1300	Heavy equipment
Waiting rooms	2900	2600	1600	
Offices and related rooms	2900	1800	800	

Source: Building Standards of Japan, etc.

v) Materials to be used

・Concrete: Based on the outcomes of the field survey, aggregate produced in Cambodia and cement coming from Thailand shall be used. Since these cannot be mixed at a plant or factory, they need to be mixed at the construction site (weight combination). Therefore, it is necessary to plan an adequate mixing rate and conduct a test mixing, so as to assure the design strength. The standard design strength is set at Fc24N/mm^2.

・Reinforcing steel: Reinforcing bars shall be procured from Vietnam. However, in case that it is difficult, procuring from Thailand or Japan shall also be considered. The standards of the

material shall be equivalent to SD295A and SD345 of Japan.

・Steel frame: Steel frames shall be procured from Vietnam. However, in case that it is difficult, procuring from Thailand or Japan shall also be considered. The standards of the material shall be equivalent to SS400 and SSC400 of Japan.

1) Facility planning

i) Power facility

i. Power equipment

a. Introduction of electricity

Electricity shall be drawn from the utility pole of Electricite Du Cambodia Electricity of Kampong Cham Province (hereinafter referred to as “EDC”), which stands on the road west of the project site, into the premise, via an overhead high-voltage 3-phase/3-wire 6.9kv(or 22kv)-50Hz service line. An H utility pole for transformer (with a transformer) shall be set up inside the premise, for step-down to 3-phase/4-wire 400V-230V. The power will then travel via buried wire to the distribution panel installed in the electricity room of the machine room building.

This incoming power shall be supplied only to the buildings to be constructed under the Project.

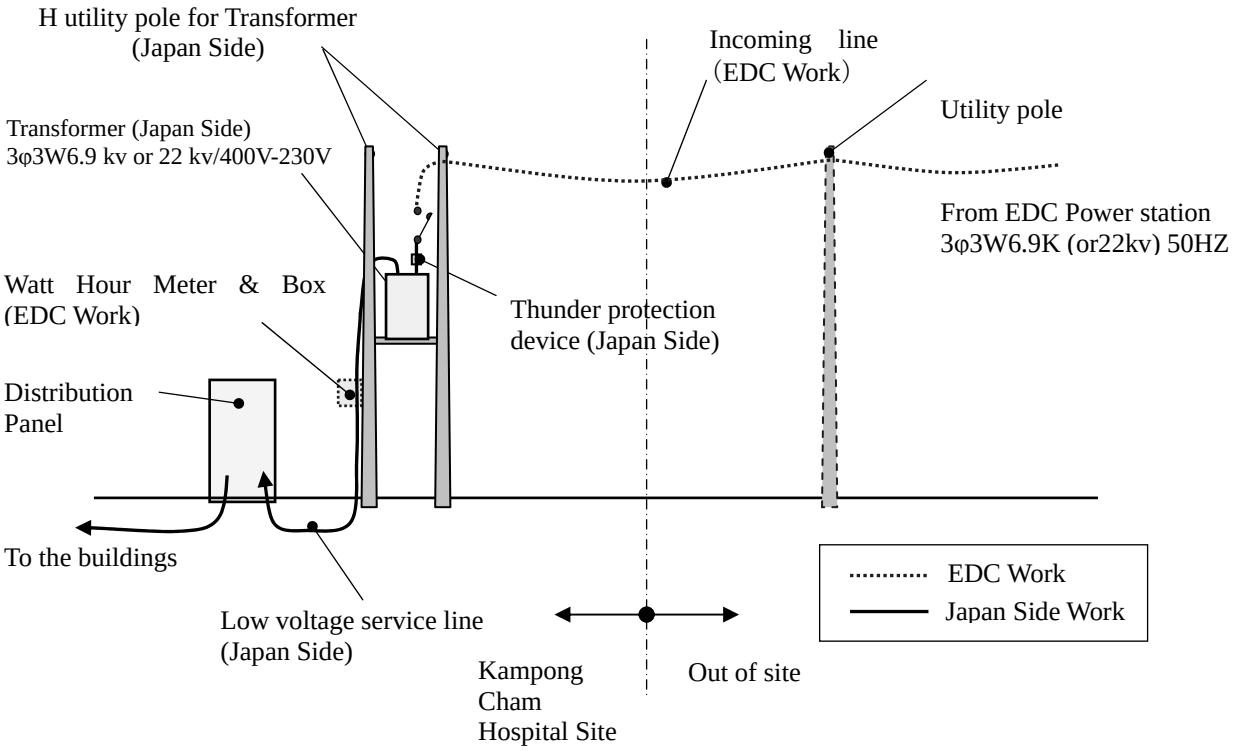


Figure 2-15 Work Classification for Incoming Electric Power

b. Substation

・Transformer: Outdoor-type, oil-filled 250KVA transformer

・Low-voltage distribution panel: Indoor independent-type (to be installed in the machine room building) with a service voltage of 3-phase/4-wire 400V-230V

The branching breaker shall be MCCB.

A surge protection device (SPD) shall also be provided in order to protect from surge resulting from lightning.

・Phase-advancing capacitor: A phase-advancing capacitor shall be installed so as to increase the power factor to above 90% after the improvement.

With the automatic power-factor control, the number of banks shall be set at 4.

The serial reactor shall be set at 6% of the capacity of the capacitor.

c. Private power generator

・A private power generation room shall be set up next to the place where the substation is

installed, and a lower-voltage generator shall be put in place.

・The capacity shall be 3-phase/4-wire, 400/230V, 60Hz and 75KVA (on a rough calculation basis).

・A mounting-type with a capacity worth more than two operating hours shall be selected for fuel tanks.

The power load to the generator shall be set as shown in the table below.

Table 2-17 Emergency Power Load

Load differentiation	Supply range
Lighting Fixture	Operation Room, Operation Hall, Post-Operation Room/ICU, Minor Operation Room, Emergency Observation Room, Delivery Room, : 100%　Each Nurse Station : 30%
Air Conditioning Load	Operation Theater Air Conditioning Machine, Delivery Room Air Conditioning Machine
Sanitation Load	Water Supply Pump, Drainage Pump
Medical Equipment	Operating Light, Receptacle of Operation Room and Minor Operation Room, Receptacle of Emergency Observation Beds and Delivery Room, Refrigerator

d. Electrical mains and power equipment

・XLPE/PVC cable shall be adopted for the low-voltage mains, which shall be protected by PVC conduit under the ground and inside the buildings.

・The size of the cable shall be designed as to satisfy the load current, and the potential drop in the mains shall be set at 3% or less, in principle.　(The size of neutral line shall be set at 100% of the line wire.)

・Power branching wire shall be laid by either vinyl wiring + PVC piping works or cable works.

・Branch circuits of the equipment installed outdoor and in the water section shall be ELCB (30mA 0.1sec).

e. Lights and power receptacles

Branch circuits for lights and power sockets for general use shall basically be single-phase/2-wire 220V-20A, which shall be protected by the wiring breaker of the distribution panel. Moreover, the circuits for the equipment to be installed in the water section shall be accompanied by an earth leakage breaker. The wiring method shall be either cable works or wiring + pipe laying works. An SPD shall be provided for every distribution board.

Of the receptacle circuits, plug outlets for medical devices for patients shall use the medical power sockets and medical earth terminals, for the sake of patients' safety. Potential bonding shall be implemented for those in the delivery, recovery/ICU, and operation rooms.

Lighting fixtures shall be planned primarily as fluorescent lights (FL36W).

The lighting intensity level of each room shall be planned with due consideration given to the current status of the existing facilities and operating time periods.

Table 2-18 below summarizes the lighting intensity and lighting fixture of each of major rooms.

Table 2-18 Lighting Intensity Plan

Rooms	Lighting Intensity	Lighting Fixture
Office	-300 Lux	Recessed fluorescent lamp
Nurse station	-300 Lux,	Recessed fluorescent lamp
Bed rooms	-100 Lux,	Surface-mounted fluorescent lamp
Delivery room	-300 Lux	Recessed fluorescent lamp with cover
Operation hall	-300 Lux	Recessed fluorescent lamp with cover
Operation room	-500 Lux	Recessed fluorescent lamp with cover
ICU	-300 Lux	Recessed fluorescent lamp
Observation room	-300 Lux	Recessed fluorescent lamp
Locker room	-100 Lux	Surface-mounted fluorescent lamp
Shower rooms	- 75 Lux	Surface-mounted fluorescent lamp
Dark room	-200 Lux	Surface-mounted fluorescent lamp
Entrance hall	-100 Lux	Surface-mounted fluorescent lamp
Corridor	- 75 Lux	Surface-mounted fluorescent lamp
Storage	- 75 Lux	Surface-mounted fluorescent lamp

f. Emergency lights and guide lights

In order to secure the minimum lighting in case of a blackout, emergency lighting fixtures with storage battery shall be provided in the corridors and operation and delivery rooms. Furthermore, guide lights shall be deployed in the corridors to indicate the emergency exits.

ii. Light electrical equipment

a. Telephones

An intercom system shall be set up in the Surgery Ward, Operation Theater, and Emergency Building, to establish a communication line among the nurse stations and between the nurse stations and the doctors' rooms. As for outside calls, the Project will only cover necessary piping.

The telephone exchanger shall be set up in the warehouse adjacent to the nurse station on the first floor of the clinical ward.

b. Alarm devices

The office shall be installed with an alarm board which will indicate a failure or any other anomaly of the equipment to allow immediate response. More specifically, the board will notify an anomalous rise or decline of the water level of the tanks, a breakdown of the generators, an earth fault of the distribution panels, and any other failures, with a warning display together with buzzer sound.

c Emergency warning devices

Though there are no standards regulating firefighting equipment, emergency warning devices shall be provided for the purpose of early announcement of fire inside the buildings. Emergency bells, emergency buttons and red display lamps shall be installed in adequate places in the corridors.

ii) Machinery

i Air-conditioners

Air-conditioners shall be installed in the following rooms.

Table 2-19 Lists of rooms with Air-conditioning

Building Name	Floor	Room Name	Air Conditioning System
Emergency & Imaging	1	Minor OP Room	Ceiling cassette-type cooling splitter air-conditioner
	1	X-Ray Room	Wall-type room air conditioner
		ECG Room	ditto
		Ultrasound Room	ditto
Operation Theater	1	ICU	Wall-type room air conditioner
	1	OP-1	Cooling duct-connection-type package air-conditioner
		OP-2	ditto
		OP-3	Cooling duct-connection-type package air-conditioner
		O.P. Hall	Ceiling cassette-type cooling splitter air-conditioner
Ob/Gy & Surgery Ward	1	Delivery Room	Ceiling cassette-type cooling splitter air-conditioner
		Ultrasound Room	Wall-type room air conditioner
		1 Bed Room	Wall-type room air conditioner

The cooling condition in rooms shall be set at 26℃, equivalent to the standard air-conditioning design in Japan. The heating function is not needed.

Room air-conditioning equipment for the operation rooms shall be installed in the respective machine rooms, which will keep positive pressure ventilation inside of the operation rooms by taking in air from outside using the ventilator. The machine will be attached with a medium-performance filter at the air outlet in order to secure the cleanliness of the air inside the rooms. The outdoor equipment shall be set up immediately outside of each air-conditioned room.

ii. Ventilators

Ventilators shall be provided in the X-ray and ultrasound rooms where air-conditioning is constantly needed and in toilets and shower rooms where there are no windows on the external walls. The other rooms shall, in principle, take in air naturally from the windows.

The exhaust of the ventilators shall be released into the atmosphere through vents on the external walls or under the eaves. In the other rooms with no air-conditioners, such as the

offices and wards, ceiling fans or electric fans shall be put in place depending on the size of room.

iii Water supply system

Water shall be drawn into the premise by branching from the public water conduits, 250A, laid on east and south sides of the premise recently by Cambodia.

The water introduced shall first be stored in the receiving tank, pumped up to the elevated tank mounted on the roof of the clinical ward by the pump, and distributed to the places in need for water using gravity.

Water shall be supplied to the buildings to be newly constructed by Japan in principle, and does not cover the existing areas. However, as for the places where the existing water pipes will be cut and isolated because of the Project, Japan shall install water supply inlets and Cambodia shall be responsible for the rest of the work laying water pipes to connect to the existing buildings.

iv Water heater

Wall-type, electric instantaneous water heaters of about 3.0kW shall be provided in the places in need for hot water.

v Drainage facility

Drainage shall be separated into rainwater, sewage and miscellaneous wastewaters before discharged into the public sewer pipes that cross the premise.

U-shaped conduits shall be used for rainwater where possible. The bottom of the pipes must be kept as shallow as possible, so that the fluid can flow to the public sewer system by gravity.

Sewage shall be carried into and treated in the purification tank mounted on a side of the public sewer system, before pumped up and discharged to the sewer system.

Miscellaneous wastewaters shall be released into the public sewer system without any treatment, but they shall flow into the discharge tank of the purification tank first to be

pumped up and discharged together with sewage, because the bottom of the pipe is too shallow for gravity discharge.

The purification tank shall be of a water sprinkler filtration system, which does not require motive energy.

vi Sanitary fixtures

Toilet bowls and wash basins shall be provided in each toilet. The bowls shall in principle be a Western-style as well as flushing type and install a hand shower so as not to pour the foreign substance. In addition, slip sinks, wash basins, showers, etc. shall be provided in accordance with the architectural planning.

vii Firefighting equipment

In compliance with the Japanese Fire Protection Law, extinguishers and indoor hydrants shall be put in place. Wall-type 30A hydrants shall be adopted as indoor hydrants and deployed so as to cover everywhere in the buildings within 25m. The hydrant pumps shall be installed in the machine room outside and water shall be conveyed from there to each building.

Further, extinguishers shall be placed at a walking distance interval of 20m or less throughout the buildings.

viii Medical gas equipment

A central gas supply facility for oxygen gas shall be installed. Cylinders shall be set up in the oxygen rooms in the Operation Theater and the Ob/Gy and Surgery ward, to distribute the gas to the following points.

Operation Theater	OP-1	2 points (wall)
	OP-2	2 points (wall)
	OP-3	2 points (wall)
Post Operation / ICU	Post Operation	7 points (wall)
	ICU compartment	1 point (wall)
Emergency	Minor OP Room	2 points (wall)

	Observation	3 points (wall), (One point to 2 beds)
Ob/Gy & Surgery Ward	Delivery	2 points (wall)

2) Planning of construction materials

In Cambodia, most of construction materials are imported. However, those that are generally available in the country and easy to maintain by the Cambodian side in the future shall be procured as to main materials. The following tables show main finishes for the exterior and interior.

Table 2- 20 Exterior Finish Schedule

Position	Finish Schedule
Roof	Slope roof: Steel frame truss, plywood, asphalt roofing, cement tile Flat roof : Asphalt Waterproof Roofing covered by concrete with outside heat insulation system
Outside Wall	Wash Gravel on Mortar Trowel
Windows/Doors	Colored Aluminum Sash

Table 2- 21 Interior Finish Schedule

Build. Name	Section Name	Room Name	Finish Schedule			
			Floor	Basement	Wall	Ceiling
OBSTETRICS / GYNECOLOGY & SURGERY WARD	Surgery Ward	1 Bed Room /3 Bed Room /8 Bed Room	Non Slip Ceramic Tile	EP	EP	Acoustic Board
		Nurse Station /Treatment room	Ditto	Ditto	Ditto	Ditto
		Staff room	Ditto	Ditto	Ditto	Ditto
	Obstetrics/Gynecology	1 Bed Room /4 Bed Room /8 Bed Room	Non Slip Ceramic Tile	Ditto	Ditto	Acoustic Board
		Gynecological Counseling Room / Obstetrics Consultation Room /PMTCT room/ Ultrasound Room	Ditto	Ditto	Ditto	Ditto
		Nurse Station	Ditto	EP	EP	Ditto
		Delivery Room	Ditto	Ceramic Tile	Ceramic Tile	Ditto
		Preparation Room	Ditto	EP	EP	Ditto
		Eclampsia Room / Labor Room	Ditto	EP	EP	Ditto
		Doctor Room	Ditto	Ditto	Ditto	Ditto
		Staff room	Ditto	Ditto	Ditto	Ditto
	Common	Conference Room	Ditto	Ditto	Ditto	Acoustic Board
		Day Corner	Ditto	Ditto	Ditto	EP
		Entrance Hall	Ditto	EP	EP	Ditto
		Toilet/Landry/Shower room	Ditto	Ceramic Tile	Ceramic Tile	Ditto
		Slope/Stairs/Corridor	Ditto	EP	EP	EP

Build. Name	Section Name	Room Name	Finish Schedule			
			Floor	Basement	Wall	Ceiling
OPERATION THEATER	Surgery Operation	Ante room	Ditto	Ditto	Ditto	Acoustic Board
		Reception/ Nurse Station	Ditto	Ditto	Ditto	Ditto
		Doctor Room	Ditto	Ditto	Ditto	Ditto
		Gown changing room	Ditto	EP	EP	Ditto
		Operation hall	Ditto	Ceramic Tile	Ceramic Tile	Ditto
		Preparation Room / Clean Storage	Non Slip Ceramic Tile	EP	EP	Acoustic Board
		Operation room	Vinyl Flooring Sheet (Load Preventive & Conductive Type)	Vinyl Flooring Sheet	Ceramic Tile	EP
		Post operation room	Non Slip Ceramic Tile	EP	EP	Acoustic Board
		ICU	Ditto	Ditto	Ditto	Ditto
		Conference Room	Ditto	Ditto	Ditto	Acoustic Board
		Equipment storage	Ditto	EP	Ditto	EP
		Utility room	Ditto	Ceramic Tile	Ditto	EP
	Central Sterilizing & Supply Division	Staff room	Ditto	EP	EP	Acoustic Board
		Decontamination Room / Sterile Processing Room	Non Slip Ceramic Tile	Ceramic Tile	Ceramic Tile	EP
		Equipment storage	Non Slip Ceramic Tile	EP	EP	EP
		Laundry	Non Slip Ceramic Tile	Ceramic Tile	Ceramic Tile	EP
	Others	Oxygen room	Dust Preventive Resin	Dust Preventive Resin	Exposed RC	Acoustic Board
		Corridor/Connection corridor	Non Slip Ceramic Tile	EP	EP	EP
		A/C machine room	Dust Preventive Resin	Dust Preventive Resin	Glass-wool mat	Glass-wool mat
EMERGENCY & IMAGERY BUILDING	Emergency	Minor Operation Room	Non Slip Ceramic Tile	Ceramic Tile	Ceramic Tile	EP
		Examination/Treatment room	Ditto	EP	EP	Acoustic Board
		Nurse Station	Ditto	EP	Ditto	Ditto
		Observation room	Ditto	Ditto	Ditto	Ditto
		Doctor Room / Staff room	Ditto	EP	EP	Acoustic Board
		Utility room	Ditto	EP	EP	EP

Build. Name	Section Name	Room Name	Finish Schedule			
			Floor	Basement	Wall	Ceiling
	Imaging	Reception/Staff room	Ditto	EP	EP	Acoustic Board
		X ray room	Ditto	Ditto	Ditto	Ditto
		Ultrasound Room / ECG Room	Ditto	Ditto	Ditto	Ditto
		Control Room	Ditto	EP	EP	Acoustic Board
		Dark Room	Ditto	EP	EP	EP
		Film Storage	Ditto	EP	EP	Acoustic Board
		Equipment storage	Ditto	EP	EP	Acoustic Board
	Common	Entrance hall	Ditto	Ceramic Tile	Ceramic Tile	EP
		Corridor	Ditto	EP	EP	Ditto
		Patient toilet	Ditto	Ceramic Tile	Ceramic Tile	Ditto
		Cleaning tool room	Ditto	Ceramic Tile	Ceramic Tile	EP
MACHINE BUILDING		Workshop	Non Slip Ceramic Tile	EP	EP	Acoustic Board
		Electricity room	Dust Preventive Resin	Dust Preventive Resin	Exposed RC	Exposed RC
		Generator room	Ditto	Ditto	Glass wool Mat	Glass wool Mat
		Pump room	Dust Preventive Resin	Dust Preventive Resin	Exposed RC	Exposed RC

Note EP: Emulsion Paint

(4) Basic plan for equipment

1) Study on the requested equipment

In line with the design policies, the necessity and appropriateness of each item of the requested equipment were evaluated in depth, based on the function, role, technical level, financial capacity and maintenance capability ascertained by the field survey, and an overall decision was made as follows. The evaluation results of individual pieces of the equipment are provided in Attached Documents-4 “Equipment List”.

1-1) Classification

(i) Replacement: Equipment to be procured to replace the existing equipment

(ii) New: Equipment that has not been used in the target department and will be procured anew under the Project.

(iii) Addition: The same or similar equipment to be procured to increase the quantity of the existing equipment

1-2) Criteria

(i) Study on the purpose of use

○: Fundamental equipment in line with the activities of the target facility

×: Equipment not in line with the activities of the target facility or equipment that can be substituted by more simple equipment or should be examined after sorting out and separating the contents of the request

(ii) Study on the necessity

○: Equipment deemed as indispensable for the current activities

×: Equipment deemed as to have a low necessity compared with the activities and bring limited benefits or equipment that can be substituted by the existing equipment

(iii) Study on the technical level

○: Equipment suitable for the current technical level of the hospital or expected to match a technical level improved by technical cooperation projects, etc. in near future

×: Equipment that requires a high standard of technology, which most likely cannot be achieved by improved technical levels in the future

(iv) Study on the operation scheme

○: Operators are already deployed or can expectedly be deployed.

×: No operators can be expected to be deployed.

(v) Study on the maintenance scheme

○: Equipment that is easy for the incumbent staff to maintain and for which the maintenance system of the manufacturer is in place or necessary consumables and spare parts are available in the country.

×: Equipment that is difficult to maintain and will result in a maintenance problem after the adoption or for which it is difficult to obtain necessary consumables and spare parts in the country.

(vi) Study on the operation and maintenance costs

○: Equipment that requires almost no operation and maintenance costs or is a replacement of the existing equipment, which will not impose a budgetary burden upon the Cambodian side.

×: Equipment to be newly purchased or added, which will require an enormous amount of operation and maintenance costs and cause budgetary problems.

(vii) Overall decision

○: Equipment deemed as appropriate to be procured and to be included in the Project

×: Equipment to be excluded from the Project

1-3) Outline of a study on the main equipment

The most of the main equipment is in accordance with the CPA3 guidelines, with consideration of the status quo of the country.

・Anesthesia apparatus with ventilator

The current equipment was procured in around 2000 and is partially broken. Anesthesia apparatuses are indispensable for surgical operations; use of an apparatus with strong likelihood of a breakdown is a great concern because it may lead to a critical medical accident that sacrifices patients lives. Vaporizer to be procured in the Project shall be of a halothane type, which is commonly used in Cambodia. In addition, Kampong Cham Hospital employs intravenous anesthesia using syringe for sustaining anesthetization; thus no consideration shall be given to use of nitrous oxide gas.

・Defibrillator

There are no defibrillators at present but they are definitely needed for cardio-pulmonary resuscitation at the Emergency and Operation departments. Only external paddles are planned in the Project, and no internal paddles that require cardiotomy. The number of the devices shall be determined after examining possible coordination and sharing among the departments.

・ECG unit

This is new equipment to be procured. It was concluded as necessary to have it in place generally for emergency outpatients. The equipment to be provided under the Project shall have basic functions. While the printer is pre-equipped, one for which the paper supply route is established in Cambodia shall be selected.

・Electrosurgical unit

The existing equipments were procured by an NGO. The date and year of manufacture are unknown, but they are estimated as at least eight years old based on the status quo, and are heavily deteriorated. They are essential tools for surgery, and thus it

is deemed as appropriate to replace them in the Project.

・Infant incubator

Basically, treatment of newborn babies is performed in the Pediatrics department. However, in some cases where immature or seriously-ill infants are born, first-aid treatment should be performed in the Obstetrics department. Therefore, infant incubators are vital for the Obstetrics Ward.

・Operating lamp, ceiling-type

The current lamp has one arm and seven lights. Three out of the seven bulbs are out due to a short in internal wiring. The lack of lighting intensity affects surgery. The lighting intensity of the planned equipment is set at approximately 100 thousand lux with standard specifications.

・Operating lamp, Mobile-type

One operating lamp, Mobile type is available in one of the operation rooms, but it is not used because it is broken. A portable lamp which does not act as a backup in case of a blackout is meaningless. Therefore, a new lamp shall be provided under the Project in the emergency and operation rooms to brace for operation at a time of power failure.

・Patient monitor

The existing equipment in the operation room was procured by an NGO. The date and year of manufacture are unknown, but they are estimated as at least eight years old based on the status quo and are heavily deteriorated. Since this equipment is necessary for continuously monitoring the state of the patient, it will be provided in both the operation rooms and ICUs. The items to be covered by the monitor consist of standard items, such as electrocardiograph, respiration, SPO2 (oxygen saturation), noninvasive blood pressure (NIBP), and temperature. The printer is not pre-equipped. Since electrodes are consumables, one that uses electrodes procurable in the country shall be

selected.

・Ultrasound apparatus, for the Obstetrics and Gynecology B/W.

Ultrasound apparatus is as effective as X-ray imaging for ascertaining the state of a human body. The existing equipment is deployed in the Internal Medicine department. One unit shall be provided to the Obstetrics department, since it is essential for monitoring the progress of growth of embryos. The existing equipment was procured in 2001 as a second hand, and is a Japanese make at age of more than 10 years. Although it is still working without a problem, it is high time for replacing.

・Ultrasound apparatus, for general abdominal

The existing equipment was granted in 2001 by an NGO as a second hand, with unknown manufacturing year and date. It was not functioning soundly immediately after it was granted, and is completely out of order today. In addition, there is no distributor of this equipment in Cambodia, which makes it impossible to repair it. Ultrasound apparatus enables detection of lesions and examination of expansion of diseases, such as internal organ diseases, in a noninvasive manner. Therefore, it is highly needed and called for. The equipment to be procured under the Project shall be one for which the local distributor exists in Cambodia or in any of its neighboring countries.

・Sterilization machine

Sterilization machine are used for sterilizing forceps and other instrument set and operation gowns to be used in surgery and are vital for prevention of infection. The existing equipment includes one horizontal-type (electrical) unit and two vertical-type units. One of the vertical units is out of order, and it was found impossible to repair it as a result of consultation with the sparepart supplier.

The capacity of Sterilization machine shall be determined based on the following calculation of the number of items to be sterilized in the target buildings.

<Assumptions>

*No. of beds : 144

*No. of outpatients : 65 patients/day (23,546/year as of 2005, including emergency cases and hence divided by 365 days)

*No. of deliveries : 1.6 cases/day (approximately 580 cases/year on average between 2001 and 2005, on the 365 days/year basis)

*No. of operations : 4.3cases/day (average between 2001 and 2005, (296.6 planned cases/year × 1/240) + (1,119.2 emergency cases/year × 1/365), including Caesarean sections.)

<Necessary quantity per department>

*Medical wards : 0.003 M^3/case

*Outpatient : 0.001 M^3/case

*Delivery : 0.002 M^3/case

*Operations : 0.120 M^3/case

*Reserves for emergency use: 25% of the amount necessary for a week day

<Necessary quantity per day>

* Medical wards : 144 beds × 0.003 M^3/case = 0.432 M^3

* Outpatient : 65 patients/day × 0.001 M^3/case = 0.065 M^3

*Delivery : 1.6cases/day × 0.002 M^3/case = 0.003 M^3

*Operation : 4.3cases/day × 0.120 M^3/case = 0.516 M^3

*Reserves for emergency use: 1.016 M^3 (Q'ty for medical wards + Q'ty for outpatient + Q'ty for delivery + Q'ty for operation) × 25%= 0.254 M^3

Total : 0.432 + 0.065 + 0.003 + 0.516 + 0.254 = 1.270 M^3/day

<Necessary capacity of autoclave>

*Load efficiency : 60%

*No. of runnings/day : 5 times

Necessary capacity of autoclave: 1.270 M^3 x 60% ÷ 5 times = 0.152 M^3

In this cooperation project, the sterilizing capacity per autoclave shall be set at a 0.152 M^3 level, with one-unit design. The existing sterilizers shall be used in parallel as needed.

・Universal operating table

The existing table is too superannuated to adjust the crank. The fact that it cannot hold the patient in the most appropriate position has an impact on surgery. The planned product shall accommodate both general surgery as well as Caesarean sections. Further, as for specifications, a general hydraulic type shall be selected with standard configuration of accessories.

・Operating table, with leg traction apparatus

The existing table is no longer functional due to aging and lack of spare parts, which has an impact on performance of operations. Kampong Cham Hospital often accepts orthopedic patients injured in car accidents, therefore, in addition to operating tables for general surgical operations, those with leg traction apparatus to be used for orthopedic operations shall also be procured in this Project. As for the specifications, a general hydraulic type shall be selected, with minimal accessories necessary for the Orthopedic department.

・General diagnostic X-ray unit

The existing equipment used was manufactured in 1997, and due to chronological deterioration, the operation panel is partially damaged and sometimes the switch cannot be turned on when scanning. Further, the stand for patients is also damaged, which requires the patient's body to be adjusted by him/herself or with help of his/her family. This situation not only imposes unnecessary load to the patient but also entails a risk of the patient falling off from the stand, possibly leading to a medical accident. The Project is, therefore, planned to provide a standard set of equipment that comes with

Bucky table and stand.

・C-arm mobile X-ray unit for surgical unit

The existing equipment incurs frequent failures, such as a failure of fluoroscopic imaging, due to chronological deterioration, and is unable to fulfill the original function, affecting performance of operations. The equipment to be procured under the Project shall have standard specifications with two monitors.

・Mobile X-ray unit

The current equipment has a damaged arm, which can therefore no longer sustain the imaging angle. As a result, the X-ray technician has to hold the arm when imaging. If it continues to be used in this condition, it may result in an X-ray tube dropping toward the patient when scanning during an operation, which will possibly lead to a medical accident. The equipment to be procured under the Project shall have standard specifications.

・Automatic respirator

Although CPA3 calls for it, the existing respirator at Emergency department (ICU) is out of order. It is deemed too complex for the incumbent medical staff at Kampong Cham Hospital to utilize this equipment in terms of operation, response to failures, etc., considering that it is directly linked to human life. Moreover, it is deemed difficult to secure budgets for expenses for repair and inspection by the local distributor. Thus, this equipment shall be excluded from the Project.

・Film dryer

Since this can be substituted by the automatic X-Ray film processor, small, it shall be excluded from the Project.

・Electric tourniquets

It is needed as emergency tourniquet on an emergency patient with severe bleeding.

The hospital does not possess any at present, and provision of a new one entails a concern over their technical and maintenance capabilities. Thus, it shall be excluded from the Project.

・Oxygen concentrator

Since there is no patient with chronic respiratory diseases and oxygen can be supplied by oxygen cylinders, it is excluded from the Project.

・Fiberscope

Although a French NGO has granted used fiberscopes to the hospital, there is no record of use of the equipment and it is stored in the director's office. As for the conditions of the existing equipment, some damage to the fibers is observed. Physicians in the position of using a fiberscope are slated for taking a fiberscope training in Thailand, however, the medical technical level of these physicians, in terms of treatment and therapies for polyp removal operation of stomach and colon, are unclear, which may lead to medical accidents such as paracentesis accidents.

Considering the facts that there is no record at Kampong Cham Hospital, the medical technical level of physicians is unknown, and a concern remains on the maintenance capability, it is excluded from the Project.

・Cystoscope

At Kampong Cham Hospital, a number of surgical operations are performed on bladder stone and atretocystia patients (30 cases/year), and thus this equipment is highly needed. However, since CPA3 does not obligate a possession of this equipment and the hospital does not have one at present, which means it is new to them and a concern remains on their technical and maintenance capabilities, it is excluded from the Project.

1) Study on the quantity

The quantity of equipment to be procured shall be determined by calculating the necessary

quantity of equipment based on the numbers of outpatients, operations, and tests, time taken for consultation, and the amount of items to be sterilized, on daily and department bases, and the number of staff members who use the equipment. In addition, any equipment that can be substituted by the existing equipment shall be excluded from the scope of provision by Japan.

Defibrillators, Mobile X-ray unit and some other portable equipment shall be shared among departments in need for those devices.

2) Overall plan

The equipment to be procured under the Project shall be deployed in the Surgery ward, the Obstetrics and Gynecology department, the Operation theater (including sterilization), the Imaging department, and the Emergency department, all of which will be newly constructed in Kampong Cham Hospital by this Project. The Project plan shall conform to the functions and activities of the hospital and the facility planning.

The layout of the equipment is as provided in Attached Documents-2 “Equipment Layout List”.

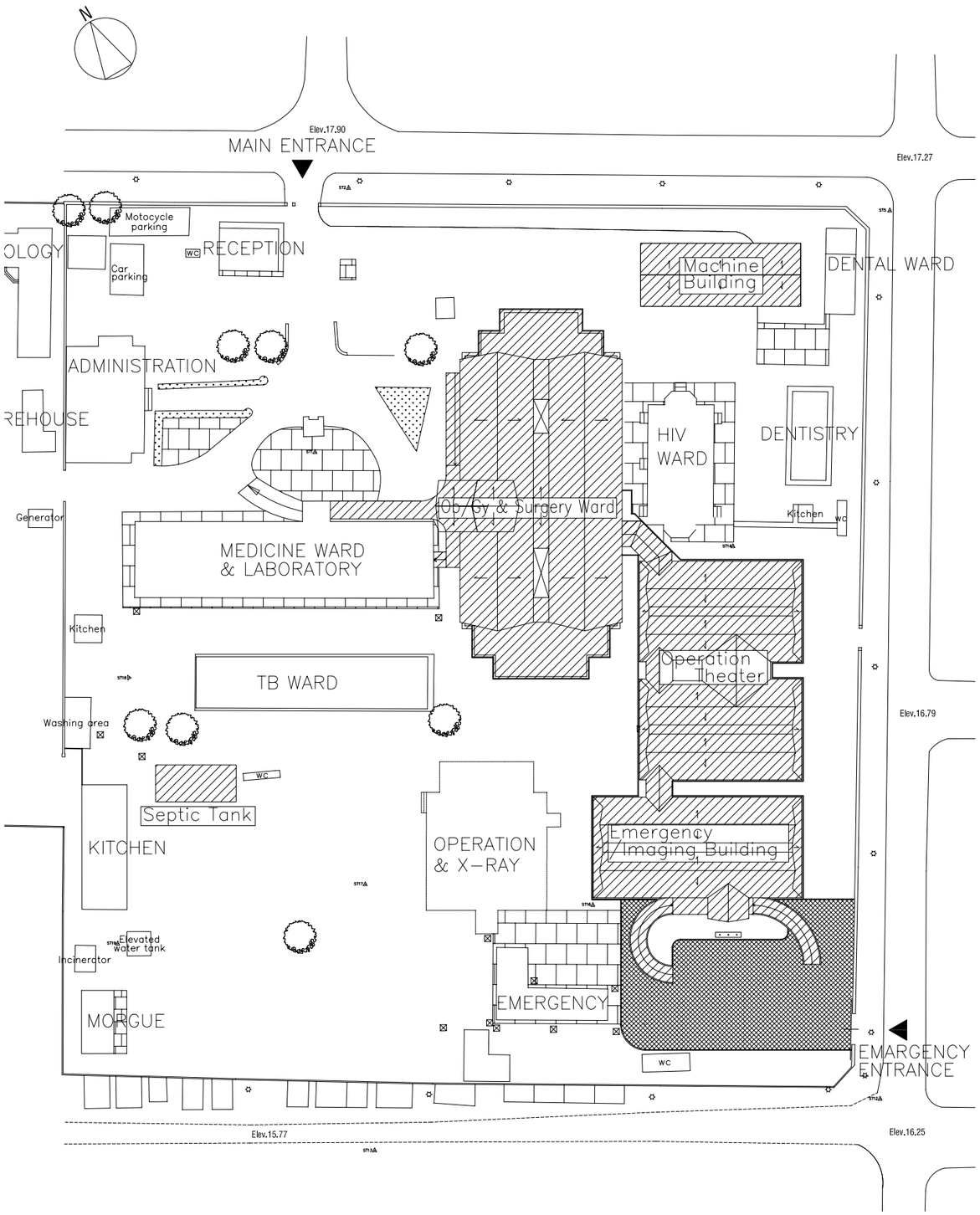
3) Equipment plan

As a result of detailed examination on the requested equipment, the components of the equipment to be procured in this Project were finalized as attached hereto along with an outline of each primary component. (Attached Documents-3 “Outline of Main Equipment” and Attached Documents-4 “Equipment List”)

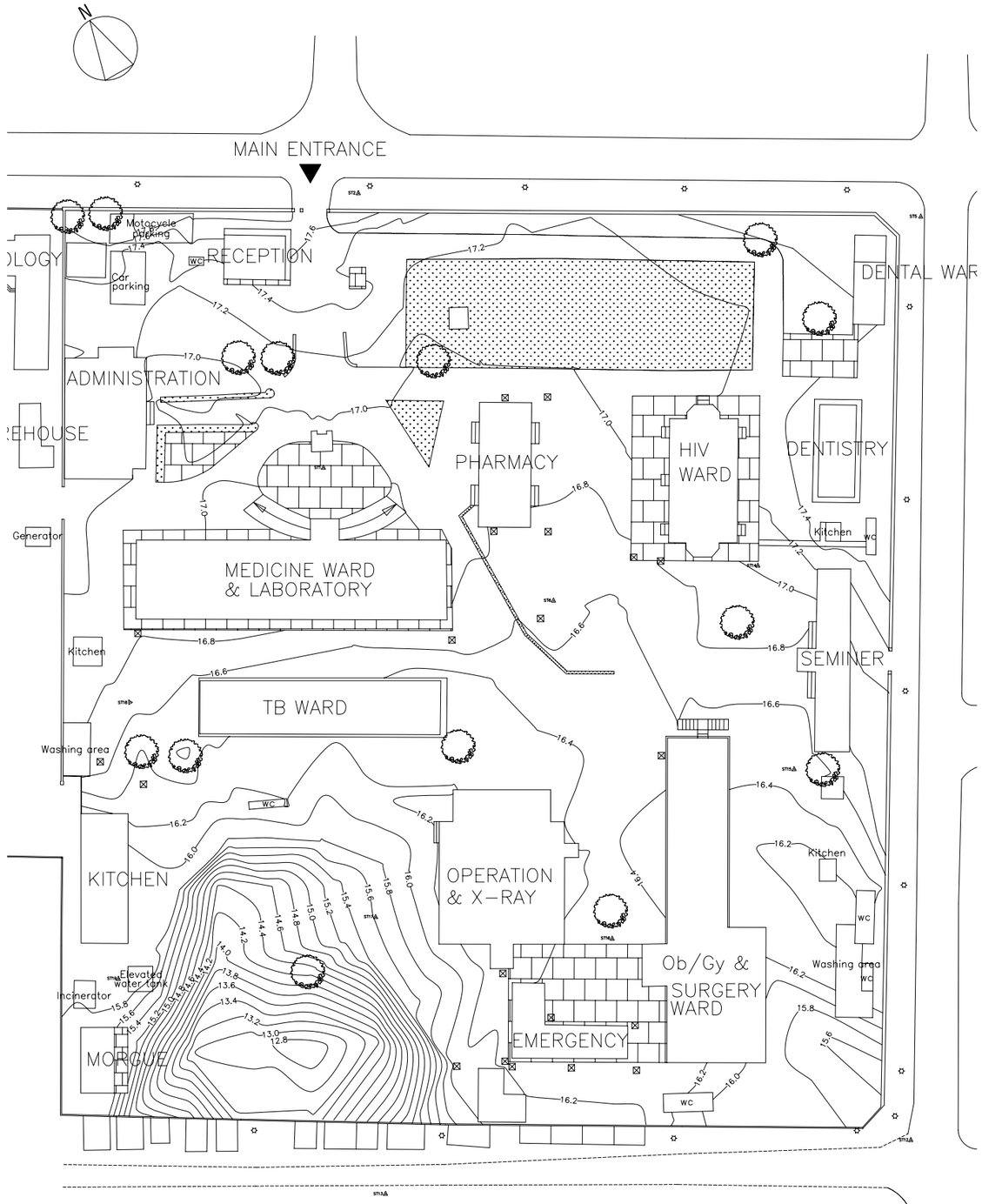
2-2-3 Basic Design Drawing

Table 2- 22 Basic design Drawings List

01	Present condition figure/Site Plan		1/1,000
02	Demolition Buildings plan (by Cambodia Side)		1/1,000
03	Obstetrics / Gynecology & Surgery Ward	First Floor and Second Floor Plan	1/400
04	Obstetrics / Gynecology & Surgery Ward	Pent House and Roof Plan	1/400
05	Operation Theater & Emergency / Imaging Building	Floor and Roof Plan	1/400
06	Machine Building	Floor and Roof Plan, Section, Elevation	1/400
07	Obstetrics / Gynecology & Surgery Ward, Operation Theater & Emergency / Imaging Building	Elevation 1	1/400
08	Obstetrics / Gynecology & Surgery Ward, Operation Theater & Emergency / Imaging Building	Elevation 2	1/400
09	Obstetrics / Gynecology & Surgery Ward	Sections	1/400
10	Operation Theater & Emergency / Imaging Building	Sections	1/400

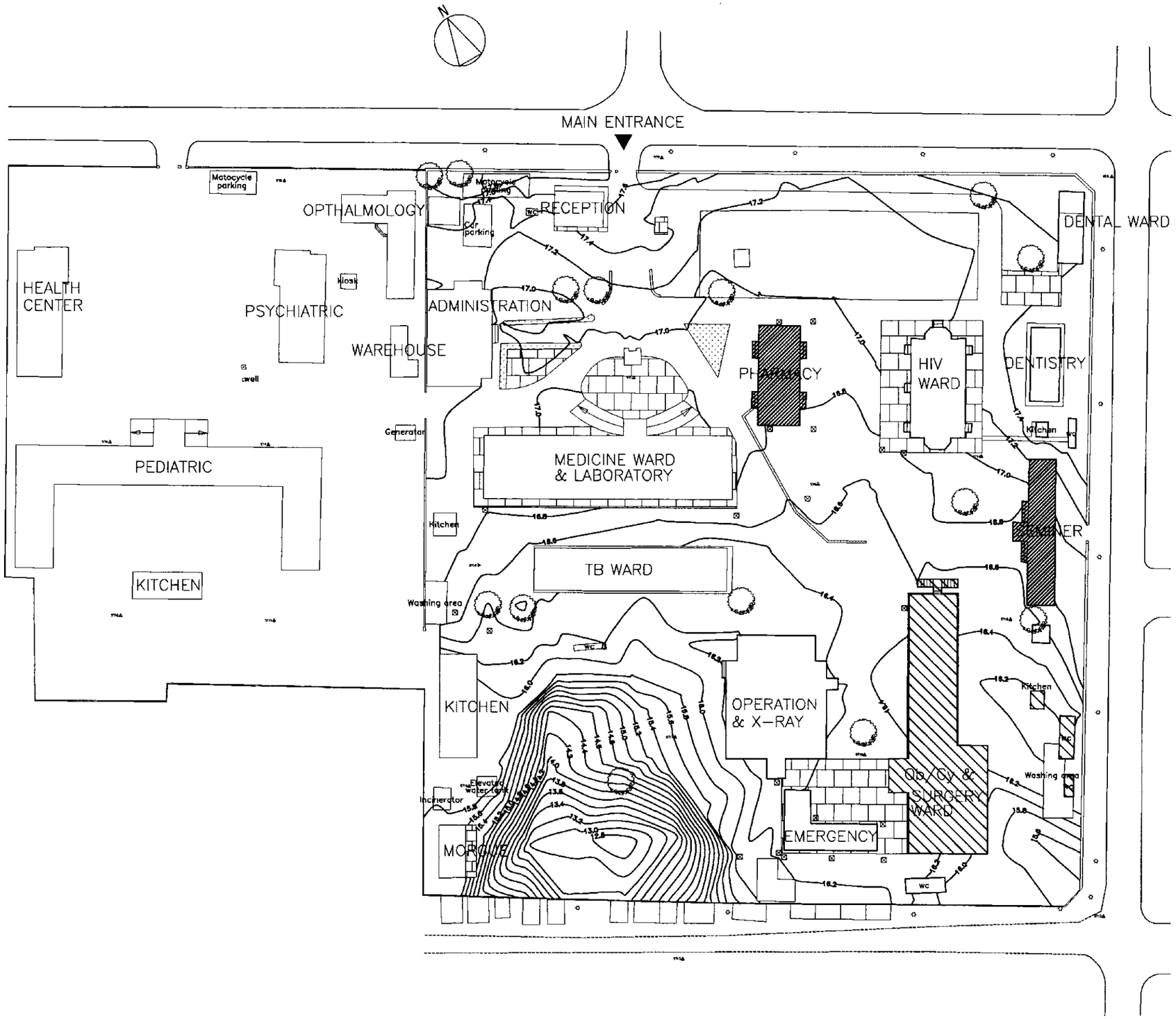


SIte Plan 1/1000



Present condition figure 1/1000

(01 Kampong Cham Hospital Present condition figure/Site Plan)



Demolition Buildings Plan 1/1000

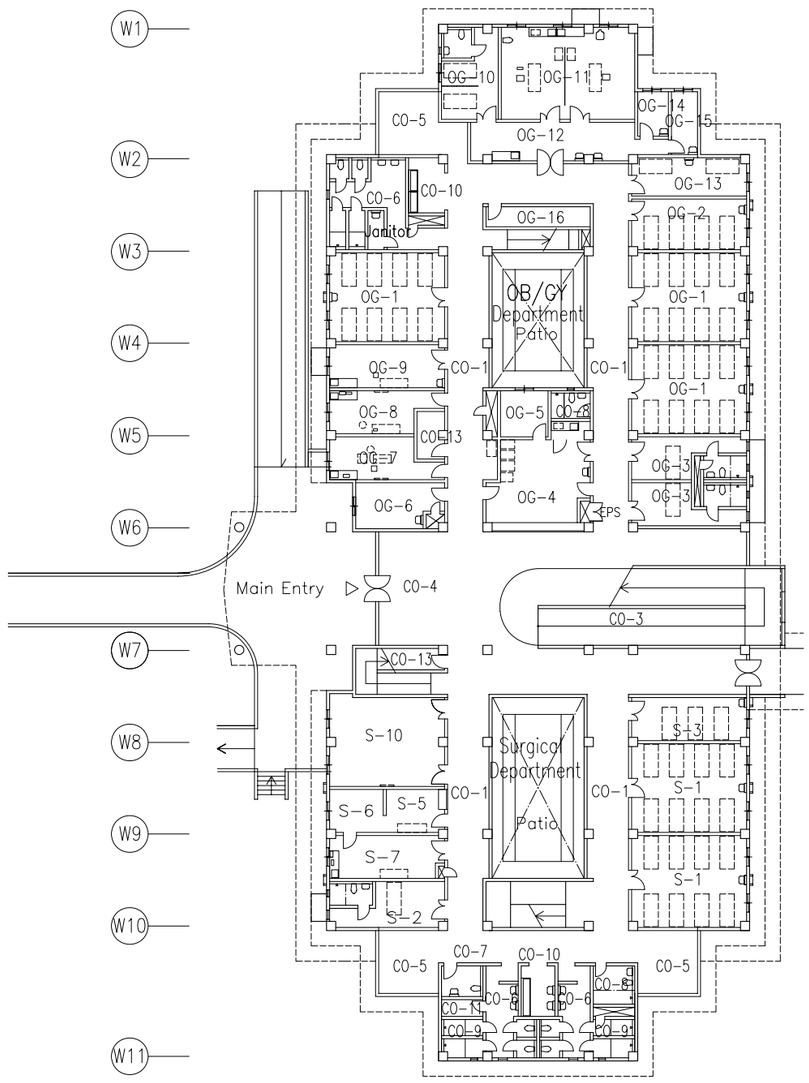
(02 Kampong Cham Hospital Demolition Buildings Plan (by Cambodia Side))

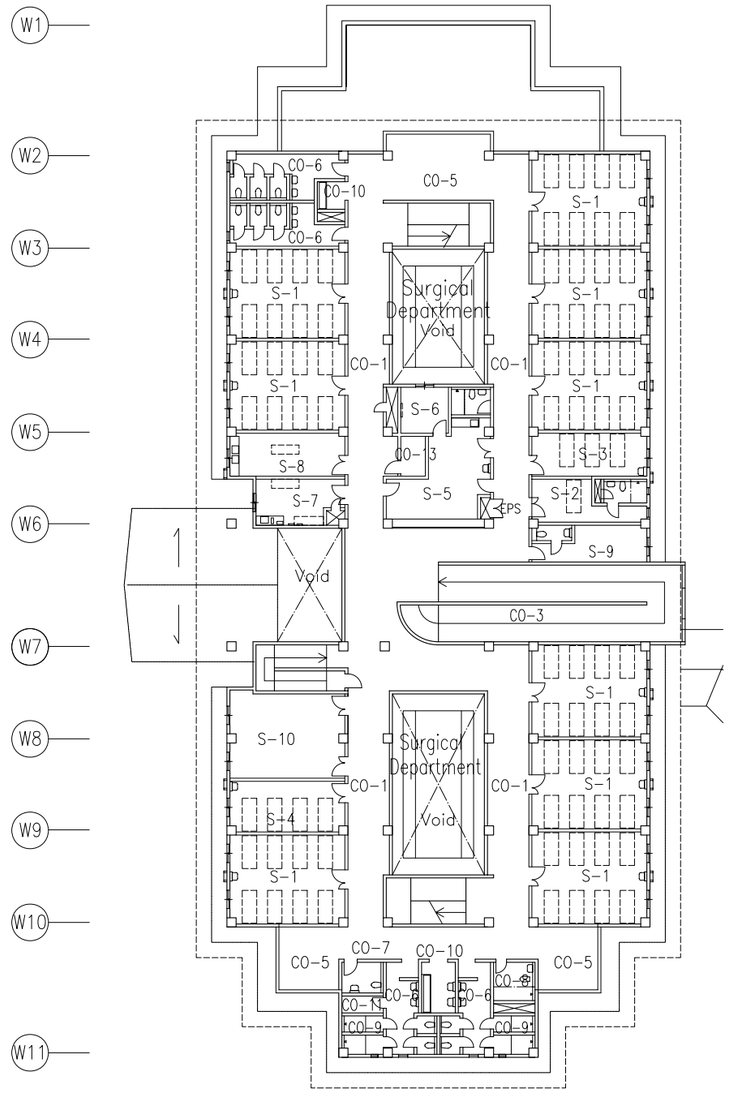
Ob/Gy WARD

	Rm Qty	Bed Qty
8Bed Rm	3	24
4Bed Rm	1	4
1Bed Rm	2	2
TOTAL	–	30

SURGERY WARD 2

	Rm Qty	Bed Qty
8Bed Rm	5	40
3Bed Rm	1	3
1Bed Rm	1	1
TOTAL	–	44





SURGERY WARD 1

	Rm Qty	Bed Qty
8Bed Rm	2	16
3Bed Rm	1	3
1Bed Rm	1	1
TOTAL	–	20

First Floor Plan

SURGERY WARD 3

	Rm Qty	Bed Qty
8Bed Rm	4	32
4Bed Rm	1	4
1Bed Rm	–	–
TOTAL	–	36

Second Floor Plan

OBSTETRICS ／
GYNECOLOGICAL WARD

OG－1	Bedroom(8 bed)
OG－2	Bedroom(4 bed)
OG－3	Bedroom(1 bed)
OG－4	Nurse Station
OG－5	Staff Room
OG－6	PMTCT Room
OG－7	Gynecologic Consultation
OG－8	Obstetrics Consultation
OG－9	Ultrasound Room
OG－10	Labour Room
OG－11	Delivery Room
OG－12	Preparation Room
OG－13	Esclampsia Room
OG－14	Doctor Room(Male)
OG－15	Doctor Room(Female)
OG－16	Oxygen Room

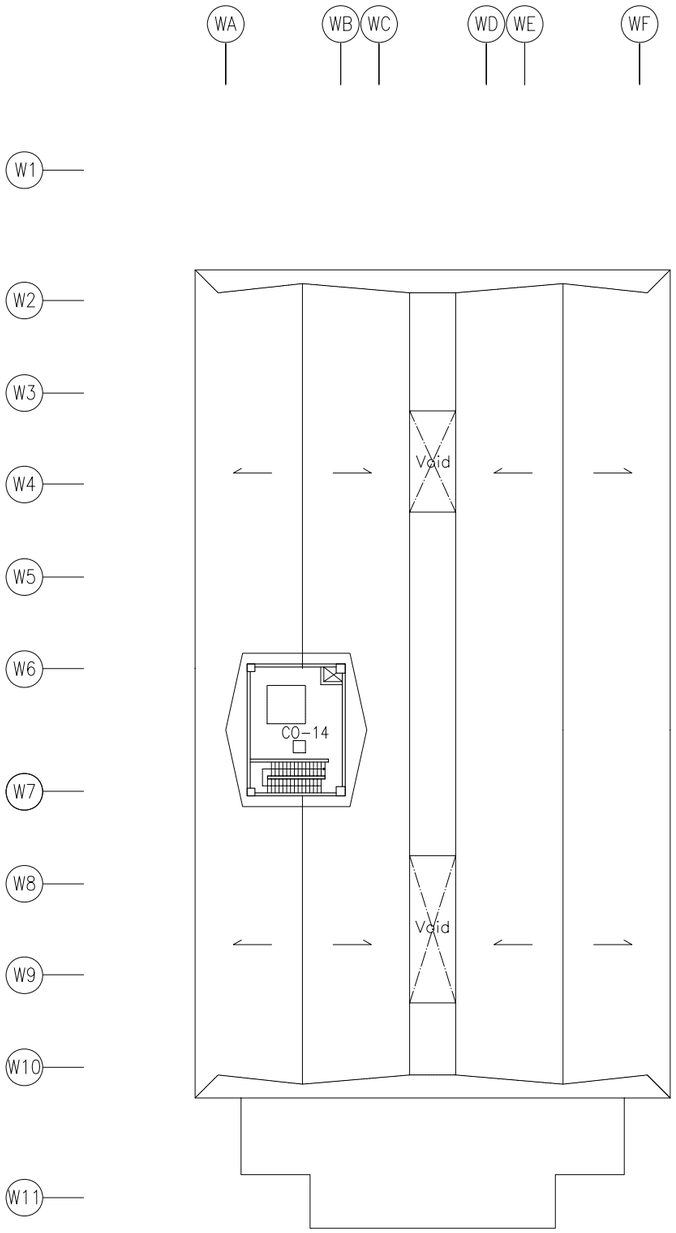
SERGICAL WARD

S－1	Bedroom(8 bed)
S－2	Bedroom(1 bed)
S－3	Bedroom(3 bed)
S－4	Bedroom(4 bed)
S－5	Nurse Station
S－6	Staff Room
S－7	Treatment Room
S－8	Plaster Room
S－9	Doctor Room
S－10	Conference Room

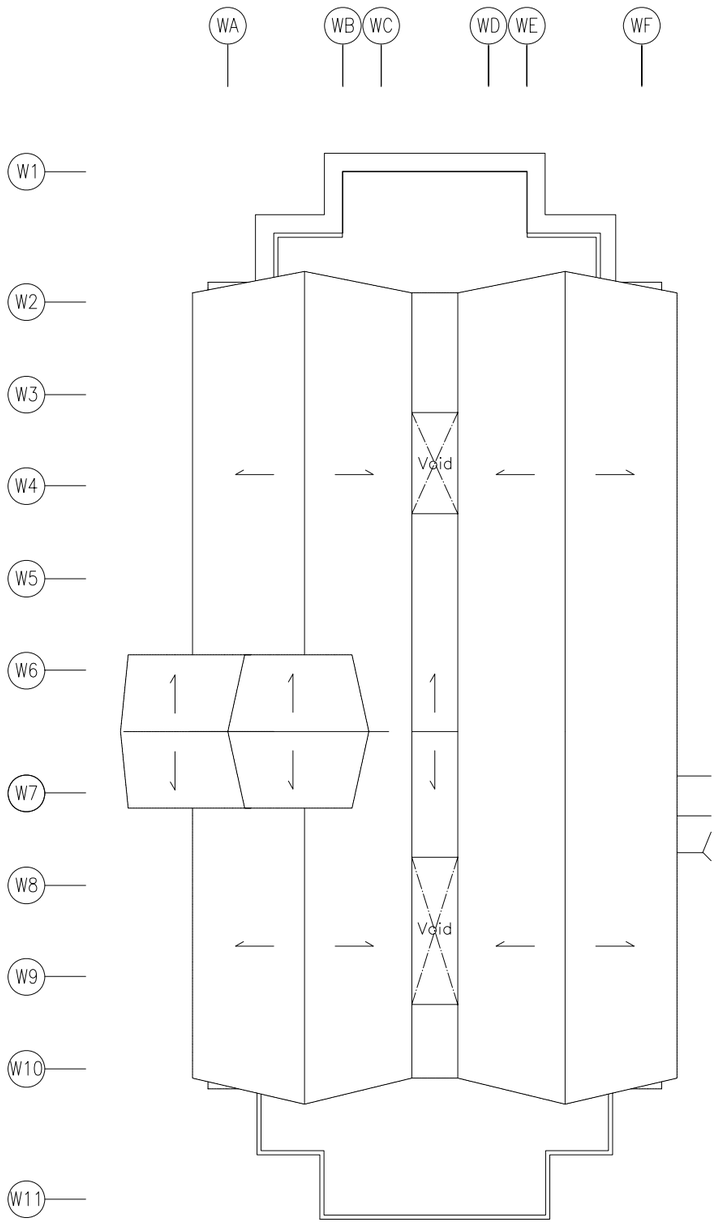
COMMON （共通）

CO－1	Corridor
CO－2	Staircase
CO－3	Slope
CO－4	EntranceHall
CO－5	DayCorner
CO－6	Toilet
CO－7	Handicapped Toilet
CO－8	Staff Toilet
CO－9	Shower Room
CO－10	Laundry Room
CO－11	Janitor Closet
CO－12	PS,EPS etc
CO－13	Storage

(03 Kampong Cham Hospital Obstetrics/Gynecology & Surgery Ward First and Second Floor Plan 1／400)

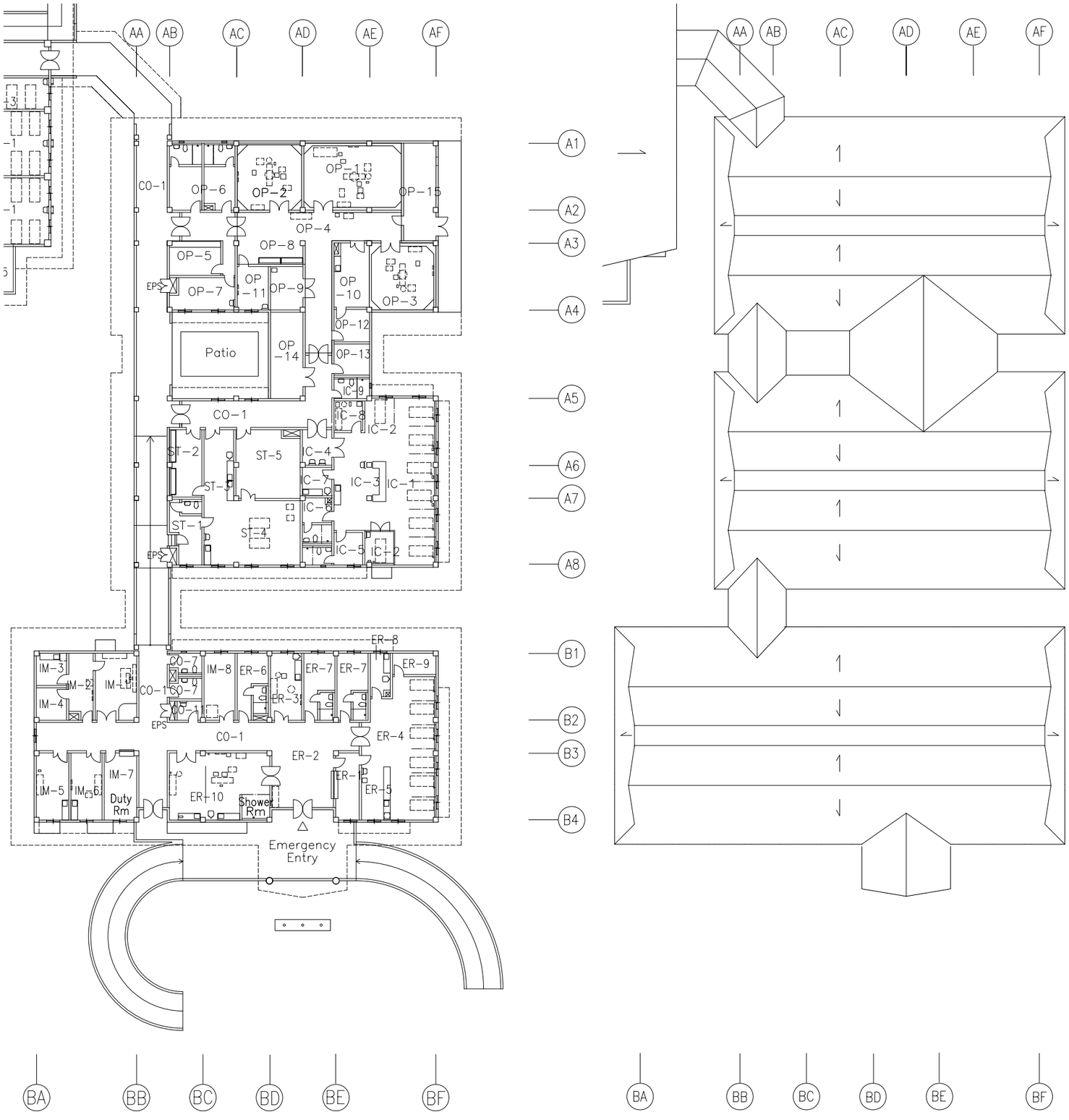


Penthouse Plan



Roof Plan

(04 Kampong Cham Hospital Obstetrics/Gynecology & Surgery Ward Penthouse and Roof Plan 1/400)



OPERATION

OP−1	Operation Room1	EMERGENCY	
OP−2	Operation Room2	ER−1	Reception/Office
OP−3	Operation Room3	ER−2	Hall
OP−4	Operation Hall	ER−3	Consultation/Treatment Room
OP−5	Nurse Station	ER−4	Observation Room(6 bed)
OP−6	Gown Changing Room	ER−5	Nurse Station
OP−7	Doctor Room	ER−6	Doctor Room
OP−8	Scrub Corner	ER−7	Staff Room (1),(2)
OP−9	Equipement Storage	ER−8	Utility Room
OP−10	Preparation Room	ER−9	Equipment Storage
OP−11	Conference Room	ER−10	Minor Operation Room
OP−12	Clean Storage		
OP−13	Solied Storage	COMMON	
OP−14	Oxygen Room	CO−1	Corridor
OP−15	Machine Room	CO−7	Handicapped Toilet
		CO−11	Janitor Closet

STERIALIZATION

ST−1	Staff Room
ST−2	Laundry
ST−3	Decontermination Room
ST−4	Sterile Processing Room
ST−5	Clean Storage

ICU

IC−1	Post−Operation Room(6 Bed)
IC−2	ICU (2 Bed)
IC−3	Nurse Station
IC−4	Vestibule
IC−5	Staff Room 1
IC−6	Staff Room 2
IC−7	Utility Room
IC−8	Equipement Storage
IC−9	Familiy Toilet Shower

IMAGING

IM−1	X−ray Room
IM−2	Control Room
IM−3	Dark Room
IM−4	Film Storage
IM−5	ECG Room
IM−6	Ultrasound Room
IM−7	Reception/Staff Room
IM−8	Equipment Storage

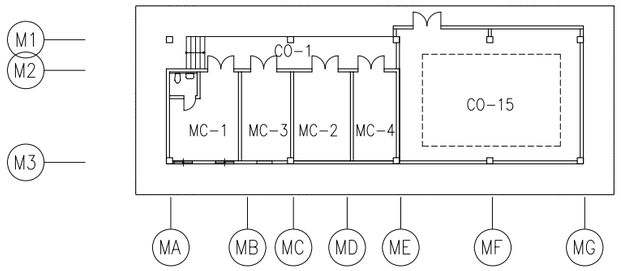
〈05 Kampong Cham Hospital Operation Theater & Emergency/Imaging Building Floor and Roof Plan 1/400〉

MECHANICAL

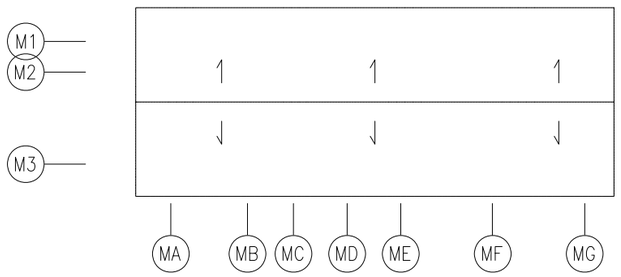
MC−1	Work Shop
MC−2	Electrical Machine Room
MC−3	Generator Room
MC−4	Pump Room

COMMON

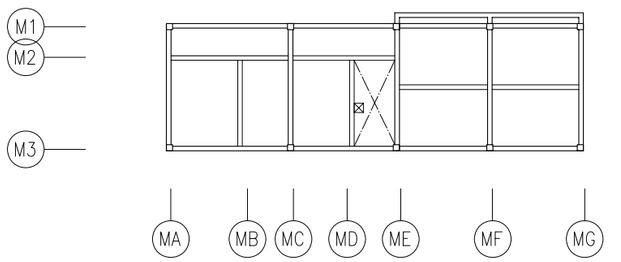
CO−1	Corridor
CO−15	Reservoir Tank



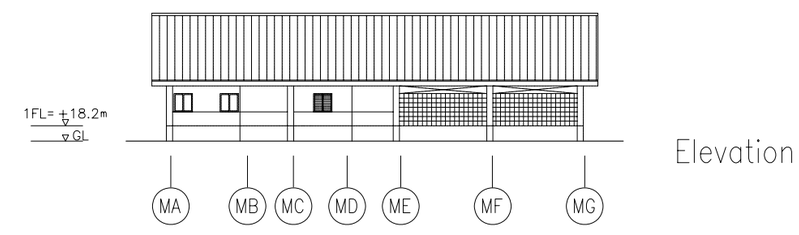
First Floor Plan



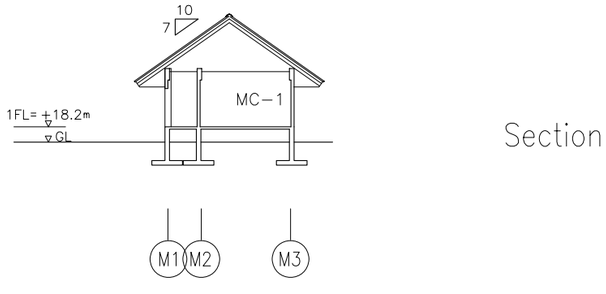
Roof Plan



Pit Plan

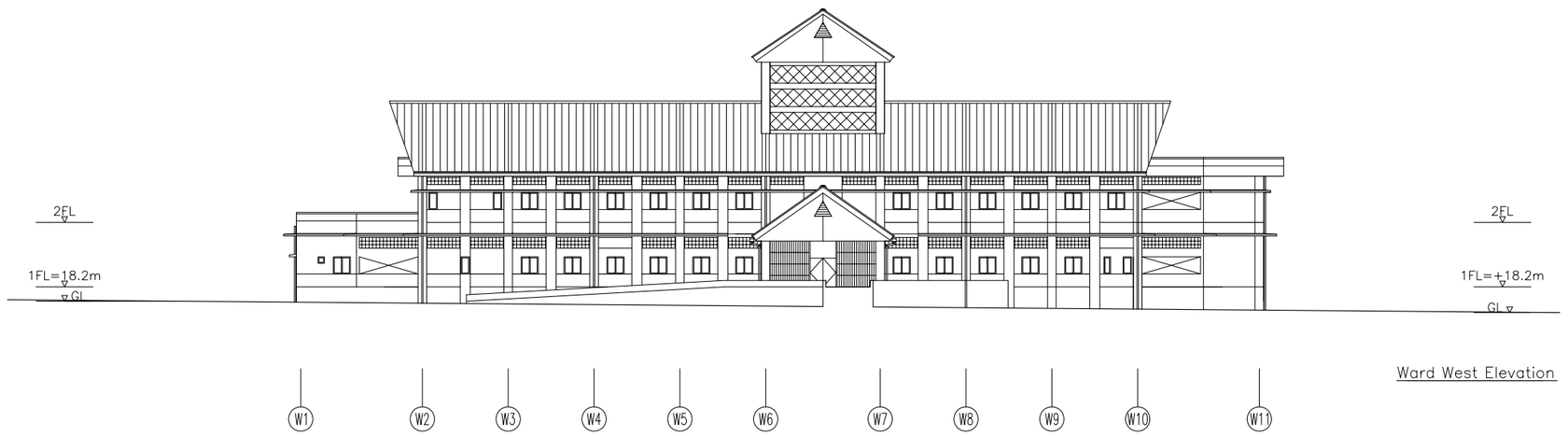


Elevation

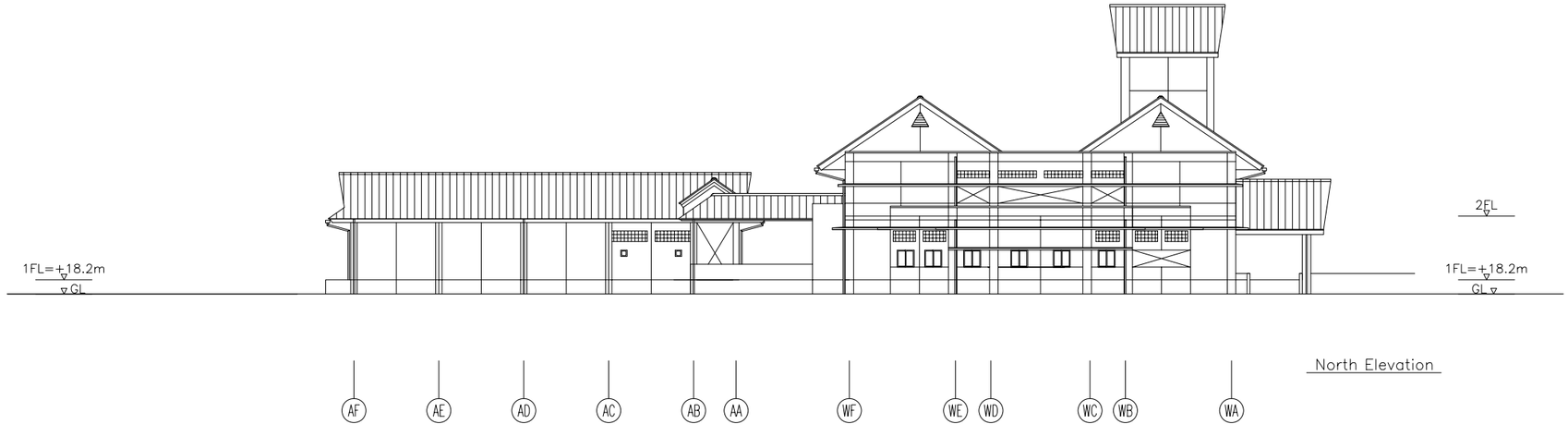


Section

(06 Kampong Cham Hospital Machine Building Floor and Roof Plan, Section, Elevation 1/400)

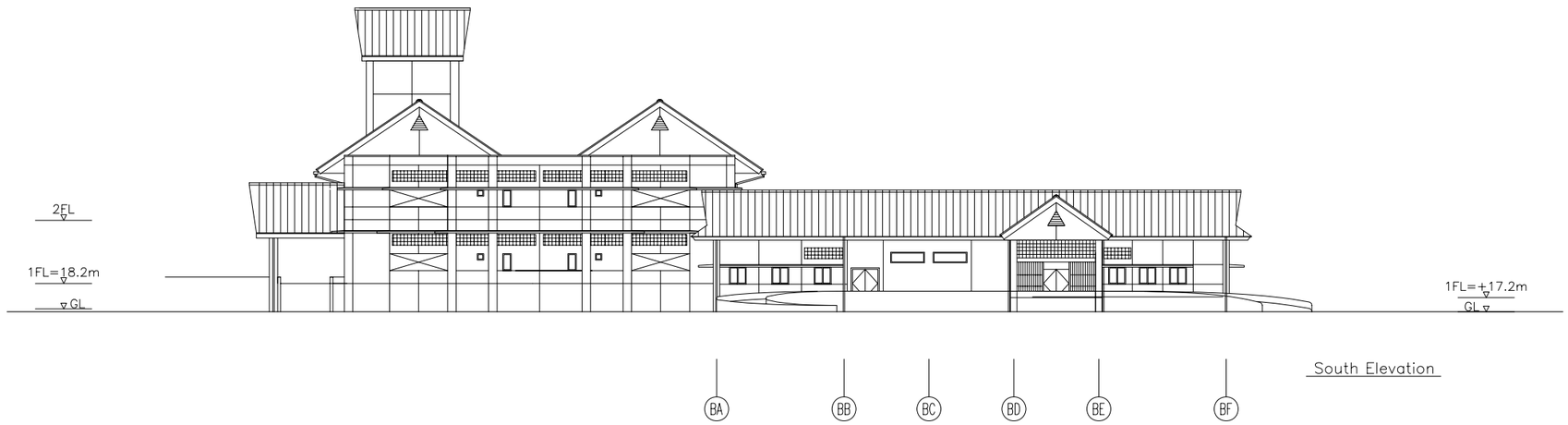


Ward West Elevation



North Elevation

（07 Kampong Cham Operation Theater & Emergency/Imaging Building Elevation1 1／400）

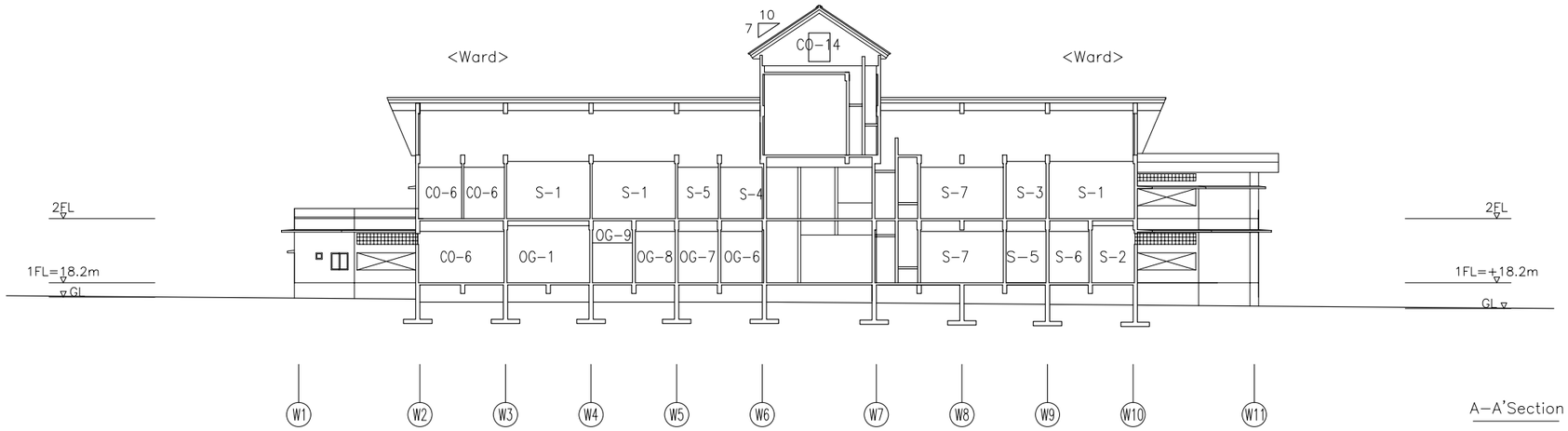


South Elevation

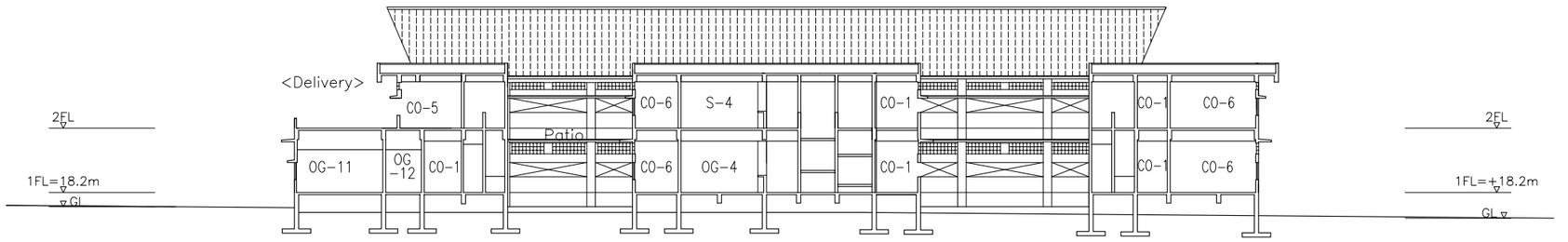
Operation Theater & Emergency
/Imagery Building
West Elevation

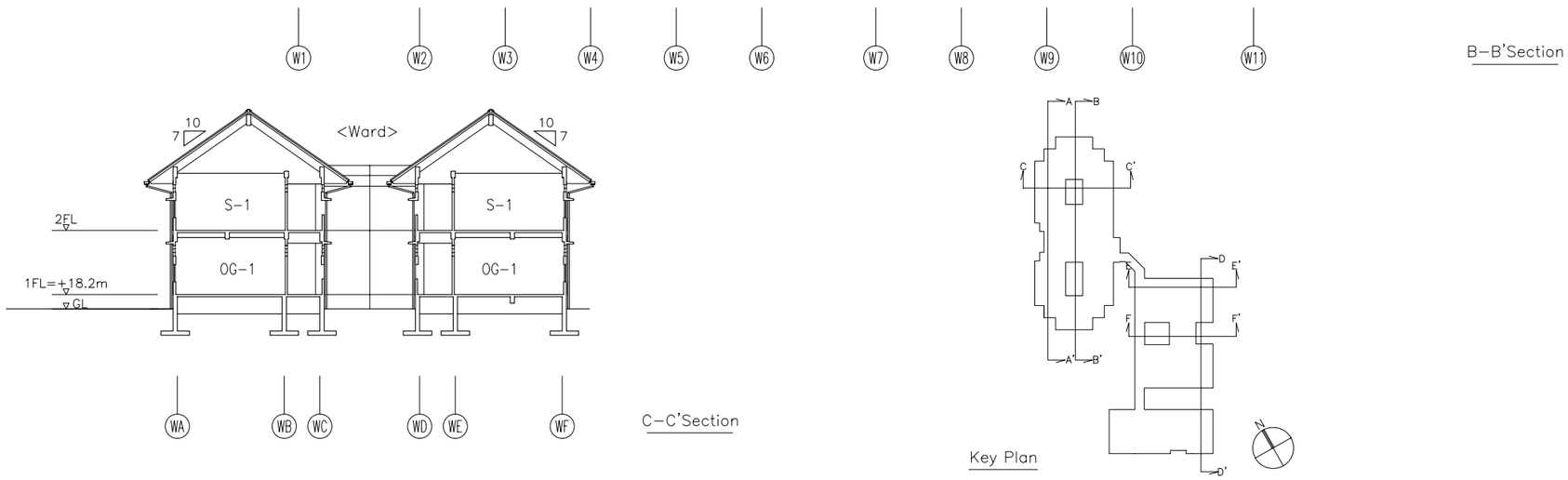
Operation Theater & Emergency
/Imagery Building
East Elevation

(08 Kampong Cham Operation Theater & Emergency/Imaging Building Elevation2 1/400)



A–A'Section



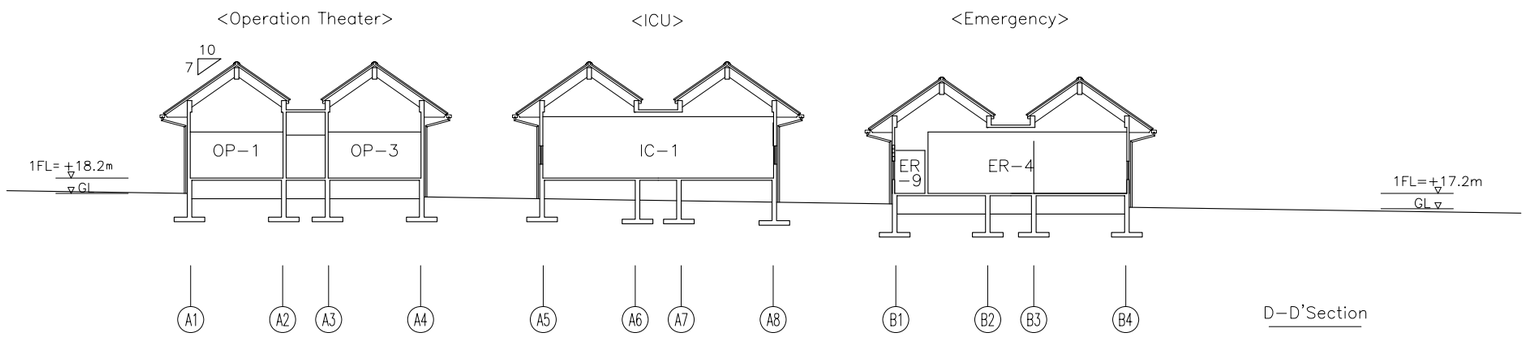


B–B'Section

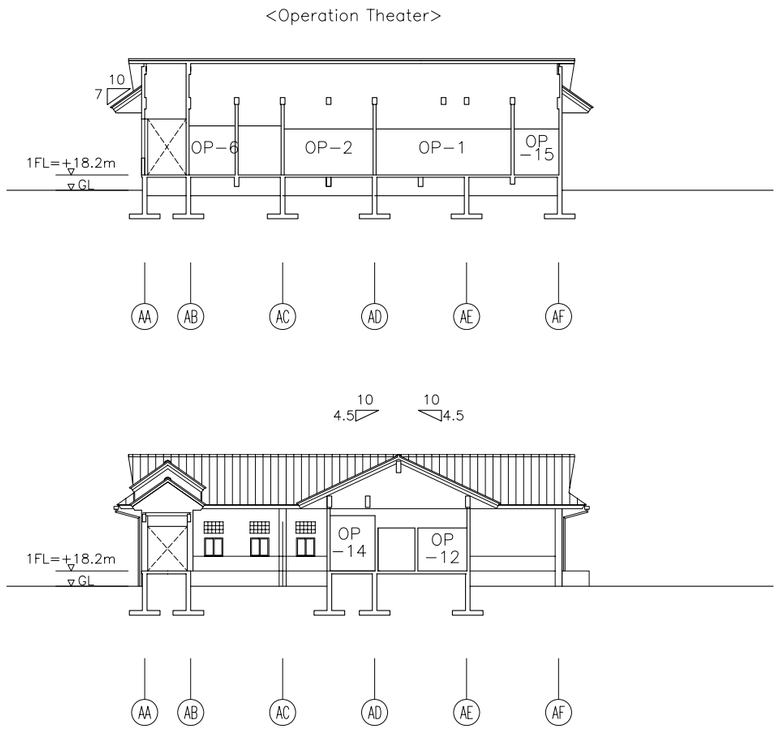
C–C'Section

Key Plan

(09 Kampong Cham Hospital Obstetrics/Gynecology & Surgery Ward Sections 1/400)

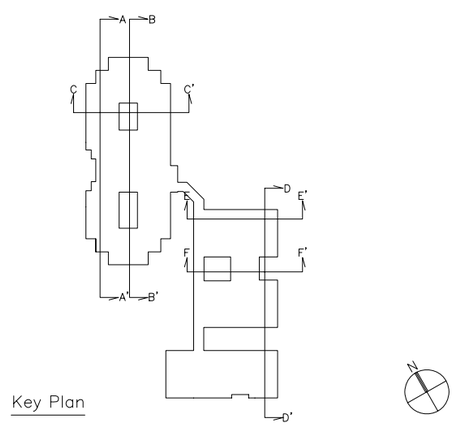


D－D'Section



E－E'Section

F－F'Section



Key Plan

（10 Kampong Cham Operation Theater & Emergency/Imaging Building Sections 1／400）

2-2-4 Implementation Plan

2-2-4-1 Implementation Policy

The elements of this project include facility construction work, supply and installation of equipment, and the scope of cooperation regarding to the project undertaken by the Japanese side will be implemented according to the framework of Japanese grant aid. Implementation of this plan shall be initiated officially only after it is approved by the Governments of both countries and the exchange of notes (E/N) is signed. Immediately after signing of the E/N, the Cambodian organization that is responsible for implementation of this project and the Japanese consultant firm shall enter a contract and initiate the detail design work of the project. When the design is completed, the Japanese construction companies and equipment supply and installation companies participate in the tender for their works. The successful tenderers for construction of facilities and supply and installation of the equipment proceed to their work. The basic principles and items to be proposed for implementation of this project are described below.

1) Executing organization

The implementing entity in the project is the Ministry of Health of Cambodia, and the Provincial Health Department of Kampong Cham and Kampong Cham Hospital will be responsible for operation and maintenance of the facilities and the equipment provided by Japan.

2) Consultant

After signing of the E/N, the Japanese consultant firm and the Government of Cambodia enter a consultant contract according to the formal procedure for the Grant Aid System of the Government of Japan. This consultant firm executes the following activities under this Contract.

① Detail design of the project: To prepare the design documents (specifications and technical reference materials on the facilities and equipment included in the project).

② Tender: To cooperate in selection of the construction firm(s) and equipment supply and installation firm(s) through the tender and in transaction of procedures required under the contract.

③ Construction supervision: To supervise so that instructions for construction of facilities, delivery and installation of the equipment, operation and maintenance are given properly.

In the detail design stage, the consultant determines the construction plan and the equipment supply plan in detail based on the basic design investigation of the project, reviews the equipment, and prepares the tender documents consisting of specifications of the project plan, tender terms and conditions, draft of the contracts required for the construction work and procurement of equipment.

Cooperation to the tender procedure means to observe selection of the construction firm(s) and the equipment supply and installation firm(s) through the tender and to help them transact the formal procedures required for execution of their contracts and preparation of the reports to be submitted to the Government of Japan.

Construction supervision means to check whether or not each work item done by the construction firm and the equipment supply and installation firm as specified in each contract and to confirm that the contents of their contracts are executed appropriately. In addition, to promote smooth implementation of the project, the consultant shall, in the neutral position, provide related parties with advice and guidance and serve as a coordinator among them.

Listed below are major items in the scope of the construction supervision work.

① Procedures required for verification and approval of the work implementation plan, implementation drawings, equipment specifications and other documents submitted by the construction firm(s) and equipment supply and installation firm(s).
② Inspection and approval prior to shipment of the construction materials, supply, installation and handling of the equipment.
③ Confirmation of instructions for the construction machines and materials, supply, installation and handling of the equipment.
④ Checking and reporting the progress of the construction.
⑤ Observation of handing over the completed facilities and equipment.

The consultant shall execute above items and report to the related authorities of the Government of Japan about the progress of this project, the payment procedure and handing over of the completed facilities.

3) Construction firm(s) and equipment supply and installation firm(s)

The construction firm(s) and the equipment procurement firm(s) shall be selected through the open tender for the Japanese corporations that are qualified to the specific requirements. In principal, contracts will be made through the negotiation between the Ministry of Health and the construction firm(s) and the equipment procurement firm(s) that proposed the lowest

price and succeed in the subsequent negotiations.

The construction firm(s) and the equipment supply and installation firm(s) shall construct the facilities, supply, deliver and install necessary construction materials and equipment according to the terms and provisions of contracts, and provide technical guidance for operation, maintenance and management of the procured equipment to the Cambodian side. Furthermore, besides providing guidance for securing a system of supply by suppliers, manufacturers and agencies of spare parts and consumables needed for the different equipment for continuous use of it after it is procured, providing of support to make it possible to receive services such as gratis repair during the period of guarantee, paid repair after the period of guarantee, technical guidance, etc.

4) Japan International Cooperation Agency

The Grant Aid Management Department of Japan International Cooperation Agency shall give due advice to the consultant, construction firm(s) and equipment supply and installation firm(s) so that the project is implemented in conformity with the Grant Aid System. Also, it shall hold consultations with the executing organizations of this project as necessary for untroubled implementation of the project.

5) Preparation for implementation plan

The representatives of the executing organization on the Cambodian side and the consultant shall review the implementation plan during the implementation design period. They shall make clear the scopes of the construction work Japan and Cambodia take charge, confirm through consultations the starting time and the method of each work and discuss so that all the works carried out smoothly according to the implementation schedule in this report. In particular, the Cambodian side has to be sure to carry out, at its own expense before commencement of the facility construction work, such as to secure and prepare the land, to dismantle the road and to shift the existing the water pipe, etc.

2-2-4-2 Implementation Conditions

Described below are those items to be noted for implementation of the project. They should be fully taken into consideration when making the implementation plan.

1) Schedule Management

In order to avoid the rainy season the foundation work will be started, if at all possible,

before the rainy season. In the work scheduling, adequate consideration will also be given to the fact that if the rainy season is avoided for the finishing work, that with ensure better quality thereof.

2) Sending of Technicians for Equipment Installation

It is extremely important to impart knowledge and skills regarding appropriate operation and maintenance of the equipment so as to contribute to Medical services through continuous proper operation of the supplied equipment after implementation of the project. That being the case, technicians who are thoroughly familiar with the operation of the different equipment will be selected as the equipment installation technicians, and sufficient time will be allotted for them to explain operation thereof (operation techniques, simple repair techniques, inspection methods, etc.) and to make sure that those concerned on the receiving side acquire sufficient understanding concerning its operation and maintenance.

3) Safety Control

Temporary fence will be established and persons in charge of giving direction to enter within the site, and other measures will be provided to give sufficient safety control since the construction under this project will be implemented within the premise of the hospital in service.

2-2-4-3 Scope of Works

It is mutual cooperation between Japan and Cambodia that makes implementation of this project successful. When this project is implemented under the Japan's Grand Aid, it is advisable that the Governments of Japan and Cambodia undertake the scopes of works as described below respectively.

1) Undertakings borne by the Government of Japan

The Government of Japan undertakes consultation of this project and the works related to construction of the facilities, procurement and installation of equipment as described below.

① Consultation

i. To prepare implementation design documents for the facilities and equipment subject for this project and their tender terms documents.

ii. To cooperate in selecting the construction firm(s), and equipment supply and installation firm(s) and executing contracts for the project.

iii. To supervise the instructions for the construction of the facilities and delivery, installation,

operation and maintenance of the equipment.

② Construction of facilities, supply and installation of Medical equipment

i. To construct facilities subject to this project.

ii. To procure construction materials and equipment subject to this plan, transport and deliver them to the site.

iii. To instruct installation of the equipment subject to this project, conduct a trial run and make adjustments.

iv. To explain and instruct operation and maintenance methods for the equipment subject to this project.

2) Undertakings borne by the Government of Cambodia

The Government of Cambodia is to bear the cost of, and implement, the following work concerning, among other things, preparation of the facility construction site.

① Preparation of the construction site

i. To secure and prepare the land for the construction and the temporally work.

ii. To clear the existing facilities including trees and plants

Before start of Phase I construction: Pharmacy Building and Seminar Building

Before start of Phase II construction: Ob / Gy & Surgery Ward and Patient toilet.

iii. To transfer overhead electric wire and utility poles.

Overhead electric wire, distribution and drainage pipes running into the buildings to be constructed shall be relocated and removed as necessary.

iv. To reclaim the project site.

v. To secure water supply and take necessary procedure.

② Outdoor work

i. Landscape planting, etc.

③ Transfer of the existing furniture and equipment.

④ To make measures so that the Japanese firms will be exempted from the tax, local tax and various financial loads imposed by the Government of Cambodia on purchase of goods and provision of services executed according to the formally approved contracts.

⑤ To provide measures to facilitate speedy custom clearance and surface transportation procedure for the equipment and materials to be exported from Japan and other foreign countries according to the approved contracts.

⑥ To provide measures to facilitate procedures for those Japanese who enter Cambodia and stay here to carry out their roles for the project.

⑦ To issue approvals and permissions required for implementation of this project.

⑧ To pay all the necessary expenses other than those borne by the Government of Japan.

2-2-4-4 Consultant Supervision

1) Implementation supervision policy

Under the policy of the Grant Aid System of the Government of Japan, the consultant forms, based on the concept of the basic design, a team that is responsible to execute the project including preparation of the implementation design to achieve smooth and successful implementation. The implementation supervision policy for this project is outlined below.

① To keep close contact with those who are in charge of the project representing related organizations of both countries so that construction of the facilities and installation of equipment will be completed without delay.

② To provide quick and appropriate advice and suggestions from the neutral standpoint to the construction firm(s), equipment supply and installation firm(s) and others concerned.

③ To provide appropriate guidance and suggestions regarding suitable equipment layout and adjustment of tie-in with facilities as well as operation and management after handing over. And to confirm that implementation has been completed and terms of each contract are fulfilled, to observe handing over the facilities and equipment and obtain an approval of receipt from the Cambodian side.

2) Construction supervision plan

As the types of construction works involved in this project are versatile, a resident supervisor (in charge of construction) is appointed and the following engineers are dispatched from time to time, keeping step with the progress of the construction works.

- Manager of general affairs (Overall coordination, process control)
- Engineer in charge of construction (Confirmation of construction methods, design concept, construction drawings, specifications of materials, etc.)
- Engineer in charge of structure (Confirmation of the ground conditions, foundation work, framework)
- Engineer in charge of electrical installation (Power supply & distribution system, electric

service and substation, etc.)

- Engineer in charge of mechanical installation (Utility supply and processing system, air conditioning, water supply, drainage and hygiene system, etc.)
- Engineer in charge of equipment (Instruction for equipment installation, adjustment with the facility, confirmation of operation instructions, etc.)

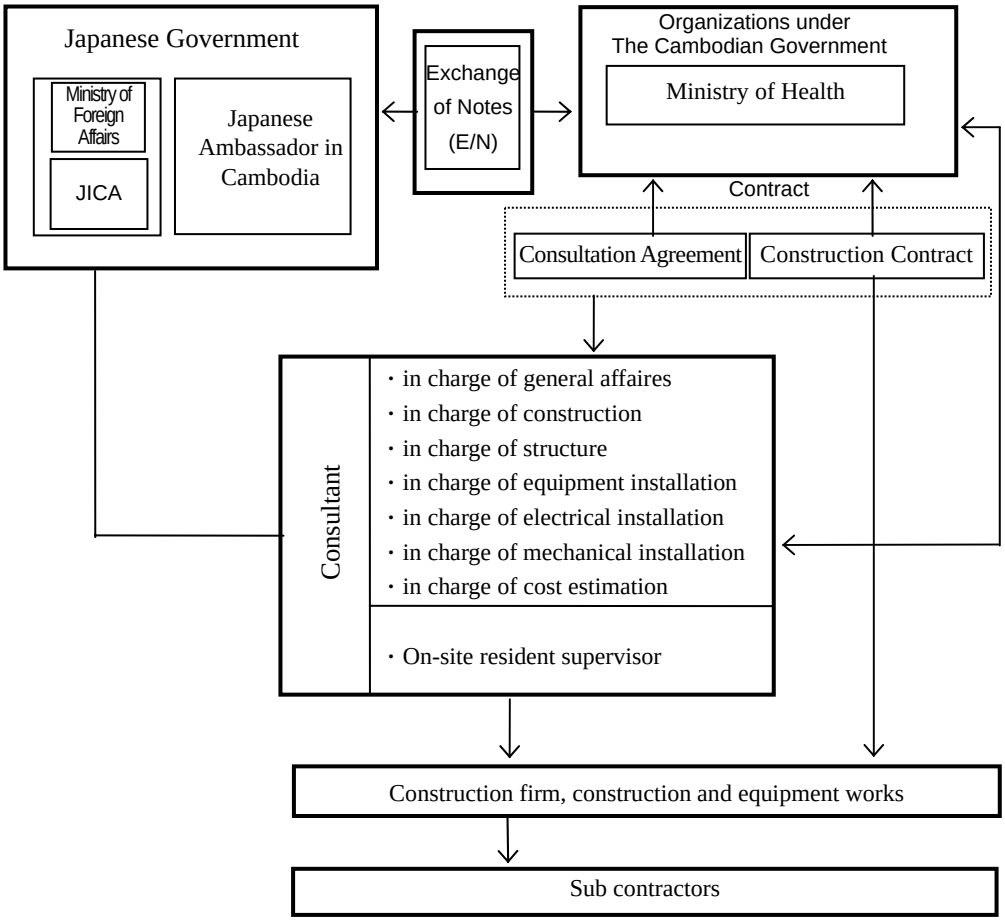


Figure 2-16 Construction Administration System

2-2-4-5 Quality Control Plan

1) Quality Control of Facility

The Construction firm(s) will submit the documents of construction plans in advance to the consultant according to the construction contract (drawings, specifications and etc.) The consultant will verify the adequacy prior to the commencement of construction listing the

specific inspection items and indicating the frequency to work for securing high level of quality control.

Major controlling items are listed below.

① Material

On-site resident supervisor will implement the inspection of receiving construction materials.

i. Reinforcing mill sheets, results of tension strength tests and makers names

ii. Analysis tables of cement material identification, tables of test results and makers names

iii. Analysis of salt components in aggregate, size distributions, densities and percentages of absorption

iv. Reinforced concrete

iv-1 Checking Mixing Plans

Confirmation and determination of the aggregate quantity, slump, cement-water ratio, air quantity and salt components through test mixings

iv-2 Compression Tests

Determination of the standard control values from analysis of result tables

iv-3 Control of material quantity measures and complete control of material storage

iv-4 Prior submittals of concrete casting plans

② Standards of Control

The consultant will carry out the construction supervision with certain standards of control based on the approved construction schedule plans. The standards of control will be basically governed by the standards of Japan.

③ Soil Bearing Capacity

Confirmation of the soil bearing capacity will be carried out with the presence of on-site resident supervisor on the site by implementing plane table loading tests.

2) Quality Control of Equipment

Ready-made medical equipment to be procured for this project will be selected from the equipment that complies with JIS, UL, IEC, ISO and other international standards. The consistencies between the equipment to be procured and the contents of the contract will be confirmed at the inspections carried out before shipment together with the inspections carried

out by the third agencies for the components of shipment and containers.

2-2-4-6 Procurement Plan

1) Construction material

The construction materials that can be procured domestically are limited to sand and gravels, lumber, cavity bricks, unglazed bricks, concrete blocks, etc. Therefore, body materials or finish materials, including cement and reinforcing steels, and equipment will be procured from Japan or the third countries (Thailand, Vietnam, Singapore, Indonesia, etc.)

As for the labor services, very few engineers are available in Cambodia, and there have not been many construction projects implemented in the country. Under these circumstances, Cambodia has not been able to cultivate skilled engineers and hence suffer from chronic shortage of skilled engineers and insufficient labor conditions. Therefore, the dispatch of Japanese supervisory staff in accordance with the progress of construction is essential.

Table 2-23 Procurement of Construction Materials and Equipment

Material/ Equipment	Cambodia	Japan	Third Countries	Procurement reason	Note
Architectural material					
Cement	○				Purchase in local of Thailand production
Brick	○				
Steel Bar	○				made in Vietnam
Steel Beam	○				Purchase in local of Thailand production
Lumber	○				
Roofing	○				
Ceramic Tile	○				
Interior paint	○				
Heat insulation	○				
Aluminums window			○		made in Thailand
Metal Fittings			○		made in Thailand
Glass	○				Purchase in local of Thailand production
Vinyl Tile	○				Purchase in local of Thailand production
Ceiling Board	○				
Key system			○	To keep quality	made in Japan
Electrical material					
Transformer			○		made in Thailand
Main incoming / distribution Board			○	To keep quality	made in Thailand
Wires, cables			○		made in Thailand
Lighting Equipment			○		
Distribution panel			○		
Medical earth		○		To keep quality	made in Japan

Medical isolation box		○		To keep quality	made in Japan
Generator			○		made in Thailand
Plumbing material					
PVC Pipe			○		made in Thailand
Pump			○		
Plumbing Fixtures			○		
Panel system water Tank		○		not found by a near neighboring country	made in Japan
Lavatory for operation		○			
Medical gas system		○			
Air conditioning equipment					
Air conditioning system			○		made in Thailand
Ventilator			○		
Ceiling fan			○		

2) Equipment

Among the medical equipment to be procured under this project, such equipment that require unique spare parts or consumables or technical services will be procured from those manufactures who have distributors or branches in Cambodia or neighboring Thailand or Vietnam. Moreover, while the medical equipment to be procured under this project shall in principle be procured from Japan or in Cambodia, some may also be procured in third countries if deemed as more favorable for the project in consideration of the following conditions with prior approval of the Government of Japan.

The equipment to be procured is not manufactured in Japan.

Although the equipment is manufactured in Japan, limiting the procurement country to Japan may undermine the fairness in the tender.

The transportation of equipment is extremely high; the procurement from Japan may have a negative impact on the efficacy of the project; or maintenance of the equipment is fairly difficult due to lack of the manufacturer's agency or other factors.

Such equipment that will assumedly be procured from third countries and that need agency or branch in the country is summarized in Attached-4 "Equipment List".

3) Method of Transportation and the Point of Delivery

When transporting medical equipment from overseas to the Kampong Cham Hospital, the most general transportation route starts at the Sihanoukville port in Cambodia where the equipment is landed, and takes National Route No. 4 to Phnom Penh and National Route No. 7 through 5 to the hospital. Even when transporting from Thailand, which has a border with Cambodia, landing at the Sihanoukville port and taking the same land route are most common,

considering that transshipment at the border is time-consuming, that duty free procedures have to be taken in Phnom Penh, and that the security in the border area is poor. In the same way, National Route No. 5 and No.7 shall be taken via No.1 for the procurement of reinforcing steel from Vietnam as customs procedures will be taken in Phnom Penh.

2-2-4-7 Operational Guidance Plan

In order to ensure appropriate use and maintenance of the procured equipments, the following trainings should be provided by the technicians of suppliers to the staffs concerned of the hospital at the time of delivery, together with the technical data, the operation/maintenance manuals, the list of agent etc., which will be necessary for the maintenance.

・operating instructions (outline of equipment, procedures, points to be checked etc.)

・regular maintenance methods (cleaning/adjustments, repairs of minor malfunctions etc.)

In addition, as there are few English speaking personnel at the hospital, there may be a need to partially translate the operation manual into Khmer.

2-2-4-8 Implementation Schedule

1) Project Implementation Schedule

Implementation is carried out in two stages. One is the detail design stage in which the tender document is prepared and the main stage in which the tender and construction are executed. After signing of the Exchange of Notes (E/N) for the detail design stage, the tender document is prepared and after signing the E/N for the main stage, construction and equipment procurement works are carried out.

The table below shows the specific time schedule for each period.

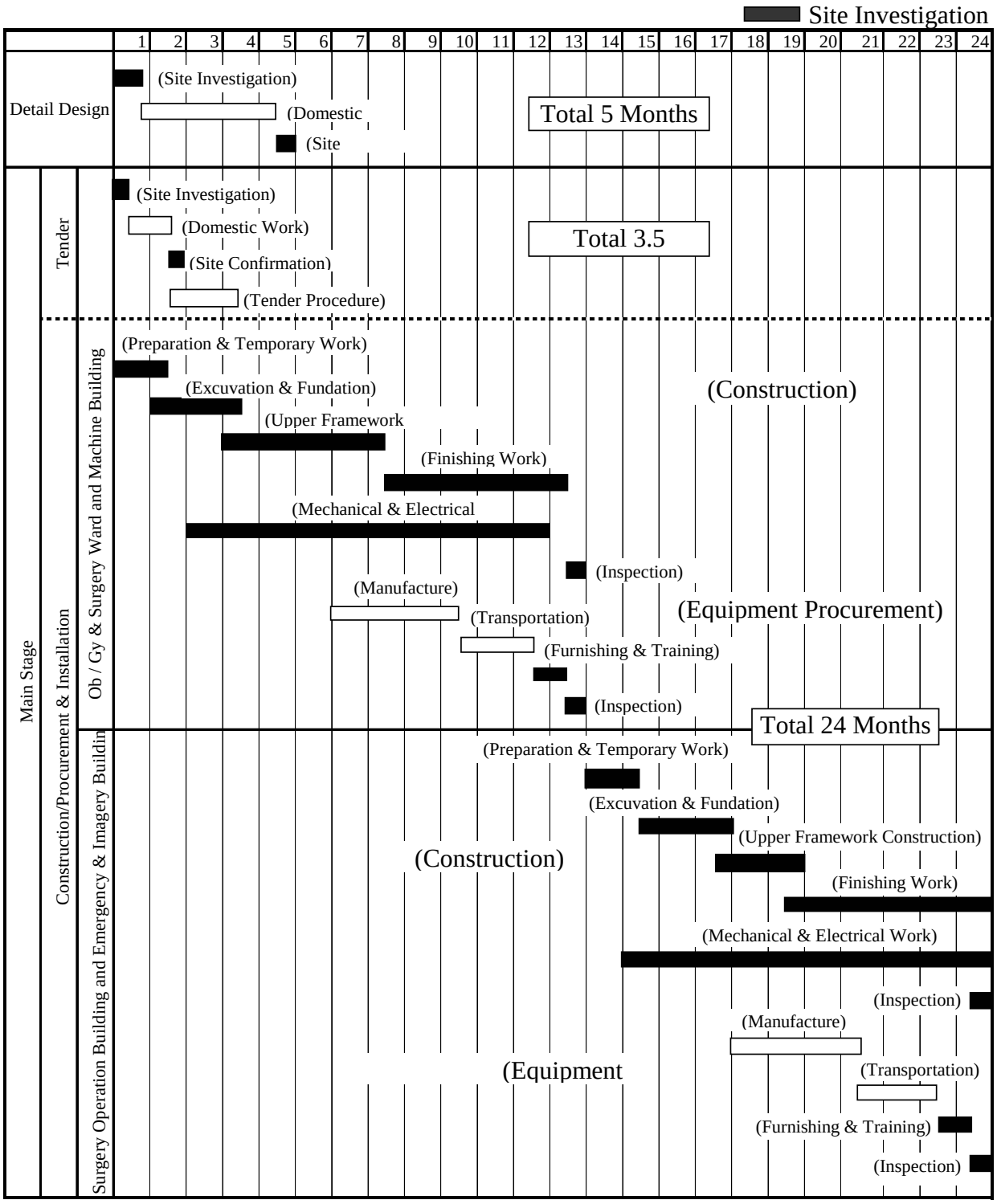
Table 2-24 Project Implementation Schedule

	Detail Design Stage	Main Stage
Detail Design Stage (Including field survey)	5.0 months	
Tender Stage		3.5 months
Construction / Procurement & Installation Stage		24.0 months
Total	5.0 months	27.5 months

2）Implementation Schedule

The following table shows the implementation schedule of this Project.

Table 2-25　Implementation Schedule



2-3 Obligation of the Recipient Country

The scope of works regarding to this project is described in "2-4 (3) Scope of Works". The outlines of the scope of works on the Cambodian side are as follows.

(1) Procedures

1) Acquisition of the site

The site is owned by the Government of Cambodia.

2) Exemption from tax

When Japanese companies and building constructors working on this project procure construction materials and equipment within the country, or import from abroad to Cambodia for this project during the period of execution of construction, the exemptions from custom duty, consumption tax, other inclusive tax, surcharge and etc. will be required. And measures should be taken for the prompt landing procedures required for custom clearances.

3) Accommodation given to the imported materials and equipment from Japan or the third countries

The Ministry of Health will provide required accommodations for prompt custom clearances and inland transportation procedures concerning to the imported materials and equipment from Japan or the third countries.

4) Acquisition of Building Permission

The application and acquisition of building permission regarding to this project have to be completed without delay prior to the commencement of construction. The other applications and acquisitions required for the commencement of construction is the same.

5) Issuance of Banking Arrangement and Authorization to Pay

The Ministry of Health will be the contact person on this project, and promptly issue the Banking Arrangement and the Authorization to Pay based on the agreement of the consultant and the contract of the executing agency.

(2) Obligation of Cambodia

The obligations of the Cambodian side that is essential for smooth implementation of this project are outlined as follows.

1) Clearance of obstacles and grading work in the site

Structures such as Pharmacy building, Ob / Gy & Surgery Ward, Operation Theater, Seminar building, Patient toilet and underground pipes, overhead electric wire and utility poles, trees and others stand in the site, and need to be removed or transferred. There is a slight slope of about 1m from southwest to northeast, though the most part of the site is flat. Prior to the commencement of each stage of construction, the Cambodian side needs to clear these buildings, structures, trees and other obstacles as well as completing rough grading works in accordance with the designed ground of the site.

None of the above works does not cost high and require high technology, and certainly could be undertaken by the Cambodian side.

2) Infrastructure

① Electric Power

Currently, an electric power plant (of the capacity of 4,000K or so) is being constructed about 2.5km away from the project site, and the electricity will be supplied from the new power plant to the city in one year's time. By the time when the new power plan is open, the current power plant will have been converted to a transforming station. In addition, currently, an high-voltage service line of 6.9kv is laid on a road on the east of the project site, but the line will be updated to 22kv when this Project is completed, so that an overhead high-voltage 3-phase and 3-wire service line of 22kv-50Hz will be brought into the premises from an utility pole of the electricity company (EDC), while an H utility pole for transformer (with a transformer)with a switch will be installed within the premises. Having the switch as a demarcation point, the Cambodian side will be responsible for construction work up to the connection of the switch.

In order to avoid being influenced by the condition of current electric facilities of the ward buildings, and to prevent long power-cuts in the existing buildings during the construction period, the electricity for the Project will be supplied separately from the existing buildings.

②Medical gas

To supply oxygen to the operation room, postoperative room, ICU, observation room and delivery room, it is necessary to regularly supply oxygen cylinders in the Oxygen Room.

3） Transferring works of existing equipment and furniture

Transferring works of existing equipment and furniture and purchasing of necessary

equipment are in the range of works to be undertaken by the Cambodian side. These works can be accomplished by efforts of the Hospital staff, instead of having contractors, hence will not incur any additional cost.

Those works will be done right after the commencement of construction, though the specific timing will depend on the progress of the construction.

2-4 Project Operation Plan

2-4-1 Administration Plan

(1) Operation System and Organization

The supervisory authority and executing agency of this project is the Ministry of Health of Cambodia. But the Kampong Cham Hospital and the Provincial Health Department of Kampong Cham will undertake the management and maintenance after handover. The project aims at improving the healthcare services to be provided by the Kampong Cham Hospital, which are degrading in terms of both quality and quantity. Still, the project focuses on continuity of the existing departments, instead of creating new departments, and hence the present organizational system is sufficient to manage the post-project hospital.

(2) Staffing Plan

The total number of staff members at the Kampong Cham Hospital as of 2006 is 211 comprised of 28 medical doctors (including the hospital director), 9 medical assistants, 1 pharmacist, 1 dentist, 1 assistant dentist, 45 chief nurses, 34 nurses, 34 chief midwife, 1 assistant midwife, 2 nurses in charge of radiology, 3 nurses in charge of anesthesia, 6 physical therapists, 2 nurses in charge of Ophthalmology, 4 chief laboratory technician, 2 financial affairs, 1 driver, 2 worker and 33 other staff members. Since this project is to retain and continue with the existing departments, the present number of staff members is sufficient to run the post-project hospital.

2-4-2 Maintenance System

(1) Maintenance System of the Kampong Cham Hospital

There is no department of maintenance in the Ministry of Health and hence hospitals must cover the maintenance of facilities and equipment maintenance by themselves. Accordingly,

the Kampong Cham Hospital carries out the maintenance of its facilities and equipment by 4 technicians in charge of maintenance. As for the 4 person 2 technicians are the electricity charge, 2 technicians are medical equipment charge. However, what they can do at the moment is changing room lamps, painting, wooden work, etc and in the aspect of medical equipment, changing lamps for operation lighting, replacing fuse such as absorber, and the like.

In accordance with such circumstances, the hospital plans to register the two technicians in a program for maintenance and management of medical equipment (provided by JICA experts) which the Ministry of Health has been currently implementing, so as to have them acquire knowledge about maintenance of medical equipment.

Although the number of distributors of medical equipment is limited in Cambodia, support from distributors in neighboring Thailand and Vietnam is available.

2-4-3 Financial Plan

(1) Budgets of the Ministry of Health and Kampong Cham Province

The following table summarizes the budgets of the Ministry of Health and Kampong Cham PHD. The budget of the Ministry of Health increases at around 12% in 5 years from 2001 to 2005. Although it slightly decreases in 2004, it is still at least 31% growth compared with 2001. Similarly, the budget of Kampong Cham PHD is increasing but not as rapidly as the Ministry. In addition, the budget of Kampong Cham PHD only accounts for 2% more or less of the Ministry's budget.

Table 2-26 Budgets of the Ministry of Health and Kampong Cham Province PHD

	2001	2002	2003	2004	2005
Ministry of Health (million Riel)	94,620.0	113,260.0	132,100.0	124,695.0	141,934.00
Increase rate (%)	16.8	19.7	16.6	-5.6	13.8
Kampong Cham PHD (million Riel)	5,945.19	7,091.34	7,031.27	7,051.81	8,165.54
Increase rate (%)		19.3	-0.8	0.3	15.8
Percentage of Kampong Cham PHD's budget in the Ministry's entire budget	6.3	6.3	5.3	5.7	5.8

Source: Ministry of Health

(2) Financial Situation of the Kampong Cham Hospital

The revenues of the Kampong Cham Hospital depend on budget allocation from the Ministry of Health and payment by patients. The budget from the Ministry accounts for approximately

72%~77% of the total revenue and the payment by patients 22%~28%. And the revenues of payment by patients are in the trend that increases every year.

The Surgery department is in high demand: judging from the fact that beds for patients are placed on corridors and in temporary huts on the roofs, an increased trend in incomes derived from medical practices is understandable. The implementation of this Project will lead to the upgrading and expansion of wards for the Surgery department, and to the improvement of the delivery rooms in the Obstetrics department and the subsequent improvement in the operating rate of beds in the department, so that the income from medical practices is expected to increase further.

The budget allocated by the Ministry of Health totaled some 1.7286 trillion Riel in 2005. The budget allocated to the hospital increased sharply in 2003, accounting for more than 77% of the revenue as a whole, but decreased to 72% or so in 2005: the total amount fell by 4% from the previous year, though the annual average growth rate of five years between 2001 and 2005 was 7.1%.

In 2005, the revenue from medical practices totaled 649,199,000 Riel, accounting for 27.3% of the revenue as a whole, its proportion being increasing every year. The year-on-year growth rate for 2005 was 11.0%, lower than the average growth rate for the previous five years, 14.6%.

(3) Projected Operation Cost of the Kampong Cham Hospital

The following table shows the transition of working budget of the Kampong Cham Hospital between 2001 and 2005.

Table 2-27 Analysis of Actual Budget of the Kampong Cham Hospital

	Year	2001		2002		2003		2004		2005		Growth rate 01~05 Average growth rate
	Item	Budget	Ratio %	Budget	Ratio %	Budget	Ratio %	Budget	Ratio %	Budget	Ratio %	2001~2002
Revenue	from MOH	1,311,258	77.7	1,175,795	72.4	1,688,364	77.4	1,798,395	75.5	1,728,121	72.7	75.1%
	YoY %			-10.3%		43.6%		6.5%		-3.9%		7.1%
	Clinic revenue	376,901	22.3	448,668	27.6	491,716	22.6	584,961	24.5	649,199	27.3	24.9%
	YoY %			19.0%		9.6%		19.0%		11.0%		14.6%
	Total revenue	1,688,159	100.0	1,624,464	100.0	2,180,080	100.0	2,383,356	100.0	2,377,319	100.0	
	YoY %			-3.8%		34.2%		9.3%		-0.3%		8.9%
endi	Labor cost	370,876	22.3	450,511	28.5	529,575	24.7	583,568	24.9	712,715	30.2	26.1%
	YoY %			21.5%		17.5%		10.2%		22.1%		17.7%

Medicines/ medical equipment	863,827	51.9	768,885	48.7	815,387	38.0	1,299,361	55.4	1,033,129	43.8	47.6%
	YoY %		-11.0%		6.0%		59.4%		-20.5%		4.6%
Consumables	33,393	2.0	37,492	2.4	62,712	2.9	54,163	2.3	65,195	2.8	2.5%
	YoY %		12.3%		67.3%		-13.6%		20.4%		18.2%
Maintenance of Equipment	91,399	5.5	23,463	1.5	419,553	19.5	23,738	1.0	32,294	1.4	5.8%
	YoY %		-74.3%		1688.2%		-94.3%		36.0%		-22.9%
Water, Electricity expense	134,001	8.0	110,002	7.0	37,651	1.8	90,171	3.9	151,724	6.4	5.4%
	YoY %		-17.9%		-65.8%		139.5%		68.3%		3.2%
Hospital management expenses	105,874	6.4	130,573	8.3	191,129	8.9	206,942	8.8	264,177	11.2	8.7%
	YoY %		23.3%		46.4%		8.3%		27.7%		25.7%
Fuel	6,314	0.4	4,563	0.3	8,050	0.4	7,226	0.3	16,250	0.7	0.4%
	YoY %		-27.7%		76.4%		-10.2%		124.9%		26.7%
Food service	54,707	3.3	46,980	3.0	77,895	3.6	73,665	3.1	68,791	2.9	3.2%
	YoY %		-14.1%		65.8%		-5.4%		-6.6%		5.9%
Contribution to government 1%	3,636	0.2	4,382	0.3	4,656	0.2	5,653	0.2	6,303	0.3	0.2%
	YoY %		20.5%		6.3%		21.4%		11.5%		14.7%
Communication expenses							1,437.90	0.1	5,854	0.3	0.2%
	YoY %								307.1%		307.1%
Total expenditure	1,664,027	100	1,576,852	100.0	2,146,608	100.0	2,345,924	100.0	2,356,434	100.0	
	YoY %		-5.2%		36.1%		9.3%		0.4%		9.1%
Balance	24,132		47,611		33,473		37,431		20,886		
	YoY %		97.3%		-29.7%		11.8%		-44.2%		8.8%

Source : Kampong Cham Hospital YoY : year-on-year growth rate

(4) Revenue Analysis and Perspectives After Handover

1) From the Ministry of Health

The budget allocation from the Ministry of Health accounted for 72 – 77% of the cost of operational expenses of the hospital as a whole, the annual average proportion of the governmental budget allocation in the previous five years (2001-05) being 75,1%. While the growth rate of the proportion of the budget allocated fell in 2002 and 2005, the annual average rate in the previous five years was 7.1%. Thus, it is expected that the growth rate will continue to be 7.1% on average in future.

2) Revenue from medical practices

The revenue from medical practices has been increasing every year, and that for 2005 was some 1.72 times as much as the level marked in 2001. This suggests some 14.6% of the annual growth rate. The revenue grew substantially in 2004, 19.0% higher than the previous year, the reason being, perhaps, that the repair work of the central building was completed in 2003, which resulted in an increase in the number of patients, thus an

increase in the revenue from medical practices. The revenue is likely to increase with the current number of staff numbers by 2012, thus, according to the revenue level in 2005, it can be assumed that the revenue from medical practices in 2011 will increase at the annual growth rate of 14.6% as recorded between 2001 and 2005. For this, the hospital is asked to strive for increasing the proportion of self-earned revenue by further revenues from medical practices.

(5) Expenses Analysis and Perspectives After Handover

Income from medical practices accounts for 22 – 27% of the total income of the hospital. Of the income from medical practices, 1% is paid to the Ministry of Health, 49% is spent to give an incentive to staff members, and the remaining 50% is spent for the operation and management of the hospital, such as the cost of maintenance of facilities and equipment and the payment to emergency procurement of medicines. The hospital and the Provincial Health Department are authorized to determine the intended use of revenues from medical practices.

A unique feature of the expenditure of the Kampong Cham Hospital lies in the fact that the labor cost and payment for pharmaceutical products and medical equipment account for some 70% or more of the expenditure items as a whole. In this section, each item of expenses among the budget of the hospital is reviewed so as to estimate the expenditure in the year (2011) following the handover of the Project. For this, the inflation rate will be set at 3.3%, which is the average inflation rate of the previous three years (2000-2003) in Kampong Cham as presented in the "National Institute of Statistics (NIS) of Cambodia.

In the meantime, the cost to be borne by the Cambodian side necessary for the implementation of this Project will be borne by the Ministry of Health and the PHD of Kampong Cham.

1) Labor Cost

Salaries for staff members comprise "salaries from the government" and "distribution of income of the hospital. The proportion of labor costs to the expenditure of the hospital as a whole had been on an upward trend, from 22.3% in 2001 to 30.2% in 2005. An increase in the labor cost in 2005 was chiefly attributable to the basic pay hikes because, in that year, the increase in the number of staff members was only one. At the same time, the hospital does not plan to increase the workforce substantially after the handover, and has decided, as a policy, to allocate an increment in the revenue from medical practices for the

increased payment of salaries in 2006 and later as well, as the Cambodian government has approved of the policy that the hospital may spend a maximum 49% of the revenue from medical practices on the payment of salaries. Therefore, the total amount of the salary in 2011 shall be the sum of the followings.

Allocation from the budget of the Ministry of Health:

Salary in 2005 minus 49 % of the revenue from medical practices, which shall be multiplied in accordance with 7.1% growth rate of the budget of the Ministry in the past 5 years. Allocation from the medical practice revenue:

49% of the revenue from medical practices in 2011, which is the revenue in 2005 multiplied in accordance with 14.6 % growth rate of the revenue in the past 5 years.

2） Cost of Medicines and Medical Equipment

The proportion of medicines and medical equipment costs to the expenditure as a whole fluctuates substantially within the range of 38.5% and 55.4%. A considerable increase in the expenditure in 2004 compared to the previous year was attributable to the purchasing of new equipment accompanying the repair of the central building. The expenditure in 2001 will be estimated with reference to the expenditure in 2005 and the annual average growth rate, 4.6%, between 2001 and 2005.

3） Consumable Goods

The proportion of expenditure for consumable goods to the expenditure as a whole is somewhere between 2.0% and 2.9%. A considerable increase in 2003, 67.3%, was due to the repair of equipment when the central building was repaired. Because of this, the annual average growth rate of the expenditures in 2001-05 is excessively large, 18.2%, so that the expenditure in 2011 will be calculated based on the figure marked in 2005 so as to keep it under the same growth rate as the revenue from medical practices, 14.6%.

4） Cost of Equipment Maintenance

The proportion of expenditure concerning the maintenance of equipment to the expenditure as a whole fluctuates considerably every year within the range of 1% - 19.5%, which is attributable to the repair of equipment which was implemented at the time the central building was repaired.

The outlay in 2011 will be calculated based on the expenditure in 2005, taking into account the growth rate of Clinic revenue, 14.6%, plus the maintenance cost of equipment

to be newly procured (that is, excluding equipment upgraded).

5) Water and Electricity Expenses

The level of expenses for water supply and sewerages, and electricity fluctuated within the range of 1.8% and 8.0% during 2001-05. The level of expenses increased at an annual average rate of 3.2% between 2001 and 2005, though it considerably grew in 2004 and 2005. The water and electricity expenses in 2011 will be calculated by multiplying the expenditure in 2005 by the annual average growth rate of Water and Electricity Expenses, 3.2%, and adding the cost for the facilities to be newly constructed but subtracting that for the existing facilities to be removed.

6) Cost of Hospital Management

It accounts for some 8% of the total expenditure, though it accounted for a somewhat large proportion, 11.2%, in 2005. Since the annual growth rate of the cost between 2001 and 2005 averaged fairly large, 25.7%, the cost of maintaining the hospital in 2011 will be calculated based on the expenditure in 2005, so as to keep it under the same growth rate as the revenue from medical practices, 14.6%.

7) Fuel Cost

The outlay concerning the fuel cost between 2001 and 2005 was somewhere between 0.3% and 0.7% of the total expenditure. In 2005, partly due to inflated fuel prices, the expenditure was more than twice as much as the previous year, but is unlikely to increase further: the fuel cost in 2011 will be calculated based on the level of 2005 plus fuel costs of power generators to be newly constructed.

8) Cost of Catering Services for Patients

The cost of catering services for patients has been increasing, though the level for 2005 fell slightly. The proportion of the expenditure for the catering services to the expenditure as a whole averaged 3% or so during 2001-05. After the implementation of this Project, the number of hospital beds will increase in practice by 20 – that is, from the current 124 to 144 beds (30 beds at the Obstetrics and Gynecology department , 100 beds at the Surgery department, 8 beds in ICU and recuperation rooms, and 6 beds in emergency observation rooms) – but the increased number will account for a mere 8% of the total number of beds in the hospital, 260.

Thus, the cost of catering services for patients in 2011 will be calculated based on the

level of 2005, taking into account the annual growth rate between 2001 and 2005, 5.9%.

9） Contribution to the Government

The hospital is asked to contribute 1% of the revenue from medical practices to the government as stipulated by the regulations of the Cambodian government, thus 1% of estimated revenue in 2001 will be earmarked.

10）Communication Expenses

The communications expenses had not been recorded before 2003 because fixed-line telephones were not used. Since the use of facsimile and Internet connections is expected to increase in future, the communications costs will be calculated based on the level in 2005, so as to keep it under the same growth rate as the revenue from medical practices, 14.6%.

2-4-4 Operation and Maintenance Expense

The expenses in year 2011 are assumed as follows based on the prospect after the handover described previously in the facility maintenance expense section.

Table 2-28 Estimation of Expenses in FY2011 of the Kampong Cham Hospital

(Unit：Thousand Riel)

		2005 Budget	2011 Estimate	Percentage (%)	Remarks
Revenue	from MOH	1,728,121	2,614,587	64.0	Assumed to increase at the rate of 7.1%, average growth rate in the previous five years
	Clinic revenue	649,199	1,467,583	36.0	Assumed to increase at the rate of 14.6%, average growth rate in the previous five years
	Total revenue	2,377,319	4,082,170	100.0	Increased by 71.7% of the level of revenue in 2005
Expenditure	Labor cost	712,715	1,290,163	32.4	Salary in 2005 minus 49 % of medical practice revenue then multiplied in accordance with the growth rate of 7.1% + 49% of the estimated revenue from medical practices in 2011-Note 1
	Medicines/Medical equipment	1,033,129	1,351,283	33.3	Calculated in accordance with the average growth rate between 2001 and 2005, 4.6%
	Consumables	65,195	147,681	3.6	Calculated in order to make its growth rate the same as the annual growth rate of revenue from medical practices, 14.6%
	Maintenance of Equipment	32,294	134,030	3.3	Based on the expenditure in 2005, taking into account the growth rate of Clinic revenue, 14.6%, plus the maintenance cost of equipment to be newly procured (that is, excluding equipment upgraded)

	Water, Electricity expense	151,724	369,628	9.1	Based on the expenditure in 2005, taking into account the growth rate of Water and Electricity expense, 3.2%, plus the proportion of expenditure to be spend for spaces newly created (excluding expenditure spent for areas to be removed)
	Hospital management expenses	264,177	598,416	14.8	Calculated in order to make its growth rate the same as the annual growth rate of revenue from medical practices, 14.6%
	Fuel	16,250	16,970	0.4	Adding fuel cost of power generators to be supplied under this construction work to the cost paid in 2005
	Food service	68,791	97,000	2.4	Calculated in accordance with the average annual growth rate until 2005, 5.9%
	Contribution to government 1%	6,303	14,676	0.4	1% of estimated revenue from medical practices in 2001 to be earmarked
	Communication expenses	5,854	13,260	0.3	Based on the level in 2005 and calculated in order to make its growth rate the same as the annual growth rate of revenue from medical practices, 14.6%
	Total expenditure	2,356,434	4,057,588	100	Increased by 72.2% of the level of expenditure in 2005
Balance		20,886	24,582		

Note 1. The Ministry of Health approves that maximum 49% of medical practice revenue is allocated for the staff salary.

The estimated expenditure in fiscal 2011 is 4.057588 billion Riel as shown in Table 2-22, which is an increase by 72.2% of the expenditure in 2005, or 9.4% of the annual average growth rate. This rate is slightly higher than the annual average growth rate of the previous five years, 9.1%.

The total revenue in 2011 will be approximately 4.082170 billion Riel, or an increase of 71.7% if it is assumed that the subsidy from the Ministry of Health is calculated in accordance with the annual average growth rate, 7.1%, of the previous five years, and that the revenue from medical practices will grow at an annual rate of 14.6%. Thus, it can be concluded that the hospital will be able to afford all the estimated expenditure in 2011.

(1) Facility Running Cost

Expenses for electricity and fuel are estimated as follows.

① Electricity expense

i. New Facilities

Electricity consumption: {150KW(Planned contract unit price) × 0.4(daytime demand

factor) × 8Hr(hour of use) + 150KW× 0.1(nighttime demand factor) × 16Hr(hours of use)} × 365 days = 262,800KWH/year

Electricity charge: 262,800KWH/year x 940Riel/KW

=247,032,000 Riel/year

ii. Removed Building

The maximum electricity amount to be used is assumed to be 50kW in accordance with the floor area of the facilities to be removed and the conditions of the current facilities.

{50KW(Planned contract unit price) × 0.4(daytime demand factor) × 8Hr(hour of use) + 50KW× 0.1(nighttime demand factor)

× 16Hr(hours of use)} × 365 days = 87,600KWH/year

Electricity charge: 262,800KWH/year x 940Riel/KW = 247,032,000 Riel/year

iii. Added electricity charge after completion of the Project

New buildings - Removed buildings = 82,344,000 Riel/year

② Water expense

60.66t×365days×1,000 Riel/t＝22,140,900 Riel/year

The water supplied to the facilities to be removed is taken from water wells at the moment, thus no water charges arises.

③ Fuel expense (new buildings)

Fuel consumption (at the time when the power failure occurs): 20L/Hr (fuel consumption) × 3Hr/time (blackout occurrence) × 3 times/year=180L/year

Fuel charge (for trial operation): 20L/Hr (fuel consumption) × 0.5 (due to no-load running) × 0.5Hr/month (due to no-load running)× 12 month = 60 Riel/year

Total fuel charge: (180L/year + 60L/year) × 3,000 Riel/L = 720,000 Riel/year

(2) Equipment Running Cost

Expenses for maintenance of medical equipment to be provided under this cooperation project are described in Attached Documents-5 “Operation and Maintenance Fee for the Equipment”.

2-5 Project Cost Estimation

The total project amount if this project were to be implemented through grant aid cooperation from Japan is estimated to be 1,069 million yen. Also, this cost estimate is provisional and would be further examined by the Government of Japan for the approval of the Grant.

① Cost Estimation to be borne by the Japanese side

Cost Estimation **App. 1,063.3 million Japanese Yen**

Table 2-29 Cost Estimation to be bone by Japan side

(total floor area 4,613.2m^2)

Item		Cost Estimation (million Japanese Yen)		
Building	Obstetrics/Gynecology Building	387.7	812.2	930.3
	Operation Theater Building	140.1		
	Emergency & Imaging Building	111.0		
	Mechanical Room	75.6		
	Connection corridor	23.3		
	Landscaping	74.5		
Equipment		118.1		
Detail Design, Supervising & Technical Cooperation				133.0

② Cost Estimation to be borne by the Cambodian side

Table 2-30 Cost Estimation to be bone by Cambodia side

Item	Cost Estimation (million Japanese Yen)	
1) Clearance of existing facilities and Grading works at the site	US$ 28,700	(App. 3.40 million Japanese yen)
2) Transfer of underground pipe and electric poles	US$ 6,400	(App. 0.75 million Japanese yen)
3) Landscaping Work	US$ 9,600	(App. 1.13 million Japanese yen)
4) Power receiving expense	US$ 1,900	(App. 0.23 million Japanese yen)
Total	US$ 46,600	(App. 5.51 million Japanese yen)

③ Condition of Cost Estimation

1) Time of Cost Estimation　From November 2005 to April 2006 (half year average rate)

2) Exchange rate　US$1 = 118.55 Japanese yen

3) Construction term

It is estimated that the project would be implemented in a single fiscal year, and a period of detailed design, construction and procurement of equipment is identified in the implementation schedule.

4) Other

This project will be implemented through the system of the grant aid cooperation by the Government of Japan.

2-6 Other Relevant Issues

In order for this hospital in Kampong Cham Province which has the largest population of the country to operate its business stably, it seems crucial need to pay attention about the following point.

(1) To keep the current number of staff.

(2) To make an effort to the revenue increase of the medical treatment fee in the future.

(3) To raise continually of assignment of the finance to the hospital by the Ministry of Health

(4) To make effort the improvement of maintenance control technology and the proper maintenance control cost every year as the fixed charge.

Chapter 3 PROJECT EVALUATION AND RECOMMENDATIONS

Chapter 3 PROJECT EVALUATION AND RECOMMENDATIONS

3-1 Project Effect

Kampong Cham Hospital is positioned as the top referral hospital in Kampong Cham Province and is the only hospital in the province that can perform surgical operations. In the province, whereas there are still many respiratory cases, the number of patients injured in traffic accidents has increased, in accordance with the increased number of traffic accidents, and it ranks the second after the number of delivery cases. It is therefore most probable that the needs for the surgery and operation departments, including Caesarean sections, will keep rising. However, it is increasingly difficult for the hospital to satisfy its expected functions due to deterioration and limitation of the facilities and equipment.

The implementation of this project will enable improvement of the environment of medical services in the surgery-related departments as well as the obstetrics/gynecology-related departments at the hospital. The hospital accepts not only the inhabitants in Kampong Cham Province, approximately 1.61 million (as estimated in 1998), but also people in the neighboring provinces. Therefore, the benefits of the project will spread in a wider range.

The implementation of the project is expected to bring about the following effects.

Table 3-1 Effects of implementation of the project and the degree of improvement

Status quo and current issues	Measures to be taken in the grant-aid assistance project	Effects of the project and degree of improvement
While the medical needs are increasing in accordance with the number of traffic accidents, the population growth, the environmental degradation, etc., the medical services at Kampong Cham Hospital are deteriorating both qualitatively and quantitatively, due to the severe aging of the facilities, structural dangers, and use of medical equipment over its lifetime.	Construction of facilities and provision of medical equipment at the hospital mainly in the Surgery Ward, Ob/Gy Ward, Operation Theater, Emergency Building, surgery-related sections including X-ray room, and obstetrics and gynecology-related sections including delivery and prevention of mother-to-child transmission.	・Upgraded and improved facilities and equipment shall contribute to the increase in the number of surgery and obstetrics/gynecology patients and hence to the improvement of the bed occupancy rate. ・Qualitative and quantitative improvement of the surgical operation functions will lead to a higher level of countermeasures against hospital infection. ・Establishment of a PMTCT room to be dedicated to the obstetrics/gynecology department shall bring about benefits in the area of maternal and child health. ・Optimization of radioactive protection in the general X-ray room will ensure an improved safety.

The environment of medical services shall be improved in the Ob/Gy & Surgery Ward, Operation Theater, and Emergency & Imaging Building by improving the facilities and equipment that are now severely deteriorated or have structural dangers. It is expected to consequently bring further positive effects on the bed occupancy rate and the number of operations in the obstetrics/gynecology and surgery departments. Outcome indicators that represent the purpose of the project (project objectives) are given in the following table. The timing of evaluation is suggested as 2011 or later when all the facilities and equipment are completely handed over and start to actually operate.

Table 3-2 Outcome indicators

Outcome indicators		2005	2007 and later
No. of inpatients	Surgery	2,346 persons	increase
	Ob	2,414 persons	increase
	Gy	487 persons	increase
No. of surgical operations		1,669 cases	increase
No. of electrocardiogram diagnoses		525 cases	increase
No. of radiographic diagnoses		2,561cases	increase
No. of ultrasonic diagnoses		1,565cases	increase

(i) No. of inpatients

An increase in the number of inpatients is expected as a result of refurbishment of the building and enrichment of equipment of the Obstetrics/Gynecology & Surgery ward

(ii) No. of surgical operations

Rebuilding of the Operation Theater that is currently severely superannuated and renewal of surgical equipment shall expectedly clarify traffic lines of patients, hospital staff and medical goods, thereby enhancing the efficacy of prevention of hospital infection as well as the number of surgical operations and the operation environment.

(iii) No. of electrocardiogram diagnoses

Procurement and replacement of the electrocardiograms that are currently aged shall expectedly contribute to more accurate performance of diagnostic examination of patients with heart failure or other heart diseases and postoperative testing after surgical

operations, thereby raising both the accuracy and the number of diagnoses.

(iv) No. of radiographic diagnoses

Procurement and replacement of the radiography equipment that is currently superannuated shall expectedly expand the number of patients with multiple injuries caused by traffic accidents, etc., to be imaged and also enable more accurate imaging during orthopedic or urological operations, thereby enhancing the diagnostic accuracy.

(v) No. of ultrasonic diagnoses

Installation of ultrasonic diagnosis equipment in the Imaging department shall expectedly realize more accurate examination and diagnosis in the abdominal area and the urology, obstetrics and gynecology related regions and increase the number of diagnoses. Further, the improved diagnostic accuracy is expected to upgrade the medical services at Kampong Cham Hospital as a whole by enabling the hospital to carry out adequate treatment during operations of bladder stones, etc. that the hospital undertakes.

In addition to the above, the implementation of the project is expected to bring about the following direct and indirect effects to Kampong Cham Hospital.

(i) Direct effects

- The improvements that shall take place in the Obstetrics/Gynecology & Surgery Ward, Operation Theater and Emergency & Imaging Building will strengthen the respective departments, thereby avoiding structural risks that the existing buildings are potential of due to aging and improving qualitative functions of the departments. As a result, the project shall enable the hospital to provide sufficient healthcare services as the top referral hospital.
- By improving the Obstetrics/Gynecology & Surgery Ward, Operation Theater and Emergency & Imaging Building, the traffic lines of patients shall be streamlined in the hospital and also the functions of the facilities, such as testing, diagnosis, treatment, etc., shall expectedly lead to an increase in the number of both inpatients and outpatients (in the surgery, obstetrics, and gynecology departments)(5,247 patients per year: as of 2006), the number of surgical operations (1,669 cases per year: as of 2006), and the number of diagnoses using radiographic and ultrasonic devices, electrocardiograms, etc. (4,651 cases

per year: as of 2006).

- By providing a delivery room and a dedicated PMTCT room in the Obstetrics/Gynecology & Surgery Ward, the obstetrics and gynecology departments shall be strengthened with expectedly exerting effects of preventing mother-to-child transmission. Further, in the Operation Theater, the sanitary environment with respect to surgical operation shall be improved by connecting the recovery room and ICU individually with the operation room via dedicated passages as isolated zones. As a result, it is expected to improve the effects of preventing hospital infection as well as enabling adequate nursing services. Additionally, the installation of a dedicated control room in the general imaging room at the Emergency & Imaging Building shall provide radiation protection for the hospital staff.
- Refurbishing the Emergency & Imaging Building and constructing a minor operation room and a dedicated observation room therein shall enable the hospital to promptly respond to and urgently diagnose patients from traffic accidents on therapid rise in the project area and other emergency patients.

(ii) Indirect effects

- By improving the surgery department and obstetrics and gynecology department that are the core of Kampong Cham Hospital, the project shall restore the functions of the hospital as the top referral hospital and thereby contribute to improvement of the referral system within the province.
- It is expected to magnify benefits for the residents in the surrounding areas of the project site who were not able to access healthcare services due to geographical and financial constraints, etc.
- The function as the training hospital for the Kampong Cham Nursing School will be facilitated, leading to fostering of higher quality co-medicals, including nurses and midwives. Furthermore, it is expected to improve various community healthcare activities through these higher-level co-medicals.

3-2 Recommendations

(1) Issues and recommendations

It is vital that the Cambodian side implements its undertakings, such as removal of the existing

structures, land creation, relocation of buried pipes and electric poles, preparation of exteriors, etc., at due timing for commencing the grant-aid assistance project,. Furthermore, in order to maximally leverage the facilities and equipment to be provided under the project and to exert and sustain the resulting effects, it is imperative for the government of Cambodia to tackle with the following issues.

(i) Effective use of revenue from consulting fees

It is expected that the improvement of facilities and equipment to be implemented under the project will increase revenues from consulting fees of Kampong Cham Hospital. It is therefore necessary to effectively utilize these revenues in upgrading operation and maintenance of the facilities and equipment and facilitating procurement of medicines and medical supplies, so as to strive to provide higher-level healthcare services.

(ii) Strengthening operation and maintenance of the facilities and equipment

Four maintenance engineers are staffed at Kampong Cham Hospital. Of these, two are in charge of electricity and the other two in charge of medical equipment. However, their present maintenance activities are limited to replacement of light bulbs, painting, woodworks, and the like, and they are not taking care of medical equipment, except for fairly simple works, such as replacement of examination light bulbs, replacement of fuses, etc. Although the project plans are designed to match with the technical level of the current maintenance personnel, in terms of operation and maintenance of the facilities, and to select equipment that requires minimum maintenance cost, with an aim to suppress running cost to a lower level, it is essential to improve the level of maintenance technology and earmark an adequate level of maintenance cost as a fixed budget every year. Moreover, the study team recommends registering the two maintenance engineers in charge of medical equipment to the medical equipment maintenance program initiated by the Ministry of Health, for them to build knowledge on medical equipment.

(iii) Expansion of in-house training

Since the project improves and also significantly changes the method of managing the surgical operation department as well as the imaging department, it is called for to upgrade and expand in-house training from the current standard in order to make use of the improved environment.

(iv) Strengthening of maternal and child healthcare

At the obstetrics and gynecology departments, it is essential to lead safe delivery through health education of women, examination of pregnant women, perinatal care, and PMTCT, and at the same time, to provide maternal and child healthcare services on a comprehensive scale by a combination of examination of new-born babies and infants, immunization, nutrition guidance, family planning, etc. It is called for to further

strengthen the obstetrics and gynecology departments, in the form of, for example, protection of patients' privacy to allow patients to visit the hospital with ease of mind.

(2) Coordination with other technical assistance and donors

This project plans to relocate the core medical service sections, such as the surgery and obstetrics and gynecology ward, the Operation Theater, the emergency department and the Imaging department. That means, the project is based on transfer of the existing departments instead of newly setting up new ones. Therefore, it is possible for Kampong Cham Hospital to continue to operate with the same number of staff members even after the handover of the project. There is no problem foreseen with regard to the equipment to be procured under the project, too. Thus, it is deemed unnecessary for the government of Japan to extend further technical cooperation in particular; nevertheless it is favorable that the equipment maintenance engineers will actively participate in technical cooperation projects related to improvement of maintenance skills on medical equipment in rural hospitals.

On the other hand, Kampong Cham Hospital largely accepts assistance from NGOs, French and Belgian official organizations, WHO and other international institutions. Especially, the Belgian assistance implementing agency, BTC, conducts assessment concerning improvement of health and medical care services. Thus, it is expected that the hospital will further enhance improvement of medical service quality and efficiency of hospital management after the implementation of the project. In addition, as the current Emergency Building was constructed by MSF, a French NGO specialized in the healthcare sector, it was explained to the NGO that the emergency department would be relocated under the project and converted into the dermatology department. MSF agreed to and approved the plan.