Ministry of Healthcare and Nutrition

The Democratic Socialist Republic of Sri Lanka

IMPLEMENTATION REVIEW STUDY REPORT
ON
THE PROJECT FOR THE IMPROVEMENT OF CENTRAL FUNCTIONS OF JAFFNA TEACHING HOSPITAL
IN
THE DEMOCRATIC SOCIALIST REPUBLIC
OF
SRI LANKA

MARCH, 2010

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

YAMASHITA SEKKEI INC.

INTERNATIONAL TOTAL ENGINEERING CORPORATION

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Preface

Japan International Cooperation Agency (JICA) conducted the implementation review study on the project for the Improvement of Central Functions of Jaffna Teaching Hospital in the Democratic Socialist Republic of Sri Lanka.

JICA sent to Sri Lanka a study team from October 5 to October 20, 2009.

The team held discussions with the officials concerned of the Government of Sri Lanka, and conducted a field study at the study area. After the team returned to Japan, further studies were made, and as a result of this, 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 Sri Lanka for their close cooperation extended to the teams.

March 2010

Shigenari Koga
Director General, Financing Facilitation and Procurement Supervision Department
Japan International Cooperation Agency

March 2010

Letter of Transmittal

We are pleased to submit to you the implementation review study report on the project for the Improvement of Central Functions of Jaffna Teaching Hospital in the Democratic Socialist Republic of Sri Lanka.

This study was conducted by the Consortium of Yamashita Sekkei, Inc. and International Total Engineering Corporation, under a contract to JICA, during the period from October 2009 to March 2010. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of Sri Lanka 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,

Mineo Nagaoka

Project Manager,
Implementation Review Study Team on
the Project for the Improvement of Central Functions of Jaffna Teaching Hospital

The Consortium of
Yamashita Sekkei Inc. and
International Total Engineering Corporation

SUMMARY

SUMMARY

The Democratic Socialist Republic of Sri Lanka (hereinafter “Sri Lanka”) has a land area of 65,600 km^2, a population of 20.23 million (estimate for 2008), and a population growth rate of 1.1%. The 6-year development plan (1999-2004) of the Government of Sri Lanka targets the provision of appropriate medical services and district-level improvement of medical facilities. The National Health Policy (President’s Decree in 1997) of the Government of Sri Lanka calls for the provision of free-of-charge medical services to all citizens and the establishment of top-referral hospitals in each area. Yet the protracted conflict between the Government and Liberation Tigers of Tamil Elam (LTTE), a hostility which has continued for nearly 30 years, has considerably impeded development in the northeastern parts of the country.

Jaffna Teaching Hospital is the top-referral hospital in the city of Jaffna. It is the only tertiary medical facility in the northern region which includes not only the Jaffna District, but also the Kilinochi District and other adjacent districts. Most of the lower-level medical facilities in the region have been destructed and are not capable to properly function. Financial constraints and difficulties in deploying medical staff have considerably impeded efforts to improve these lower-level medical facilities. A large number of patients are treated at the Jaffna Teaching Hospital, a facility which also has to function as a primary and secondary level medical facility. Yet since no major capital investment were done during over 20 years of conflict, the facilities in the hospital are now decrepit and in ill repair. The hospital is unable to adequately perform its expected functions due to the lack of necessary facility and medical equipment.

The conflict resulted in a decrease in the population of the Jaffna District from 730,000 in 1981 to less than 480,000 in 2001. After that, the population has recovered to 550,000 in 2008. The end of conflict in 2009 has prompted the return of previous inhabitants to the Jaffna District. The population is expected to recover to the same level of 1981 in near future. The Hospital is hence expected to receive further increases in the number of patients until primary and secondary level medical facilities are sufficiently reorganized.

Jaffna Teaching Hospital has to regain its functions as a tertiary level teaching hospital and continue functioning as primary and secondary level medical facilities until the lower-level medical facilities are rehabilitated and reorganized.

Jaffna Teaching Hospital has started preparation of the reconstruction plan soon after the cease fire agreement in February 2002 and requested the grant aid from the Government of Japan, in July 2002, May 2003 and in June 2003. In addition, the Hospital also prepared a Master Plan for the overall

improvement during this period. In response to these three requests, the Government of Japan implemented the Preliminary Survey in September 2004. The positioning and priorities of the grant aid from the Government of Japan in the Master Plan were discussed in the Survey. As a result, the relevance of the grant aid was confirmed and it was agreed that the project would be implemented with focus on the central functions of the hospital (Operation Theater Complex, Central Laboratory Complex, Emergency Dept., and Outpatient Dept.)

In response to the above survey results, the Government of Japan determined to conduct a Basic Design Study and the Japan International Cooperation Agency (hereinafter "JICA") sent the Basic Design Study Team from February to March, 2005. The Basic Design Study Team organized the basic design for facilities and the equipment plan for the facilities in accordance with the analysis conducted after their return to Japan. Explanation of the draft of the Basic Design was held in July, 2005, and the Basic Design Study Report was finalized in August, 2005. Subsequently, Exchange of Notes (hereinafter "the E/N") for the execution of detailed design for the Project was signed on November 28, 2005 between the both governments.

After the conclusion of the consulting services agreement, detail design drawings, specifications and tender documents for the Project were prepared. These documents were explained to the Sri Lanka side and were approved in May, 2006.

However, since then, the signing of the E/N for the implementation of the Project has been postponed, due to the aggravation of security in Jaffna.

In August, 2009, the Government of Japan has decided to restart the Project, considering current conditions in Jaffna. In response to the change of situation, JICA has decided to conduct an Implementation Review Study and sent a study team to Sri Lanka in October, 2009.

As a result of the study, it was reconfirmed that the objective of the Project is relevant and urgent. This objective is to improve the medical care service in the northern region and to promote the reconstruction of the whole region by improving the central functions of Jaffna Teaching Hospital and thereby contribute to the restoration of the whole functions of the Hospital. Some minor changes were made to the Basic Design in consideration of current situation that is changed since 2005.

The outline of the Project for the improvement of central functions of Jaffna Teaching Hospital is as follows.

(1) Site : Within the premises of Jaffna Teaching Hospital

(2) Organization : Responsible Agency: Ministry of Healthcare and Nutrition

Implementing Agency: Jaffna Teaching Hospital

(3) Outline of the project: Construction of the Central Functions Building consisting of Central Facilities for Diagnostic Imaging, Operation Theater Complex, Central Supply & Sterilizing Department, Intensive Care Units and Central Laboratory Complex, and Procurement/ installation of the medical equipment for the Building

Outline of Facilities

					Elevated Water Tank
3rd Floor 30 m^2	(Space for Future Expansion of Rooms for Medical Education)			Space for Air Conditioner Outdoor Units	
2nd Floor 2,070 m^2	Operation Dept. Management Room	**ICUs** 20 ICU beds 2 Rooms for infections Total 22 beds		**Central Laboratory Complex** Clinical Pathology, Hematology, Biochemistry, Microbiology	
1st Floor 2,200 m^2	**Operation Theater Complex** 8 Operation rooms (incl. 2 for infections), Recovery Rooms			**Central Supply & Sterilizing Dept.**	
Ground Floor 2,370 m^2	**Central Facilities for Diagnostic Imaging** 4 Radiology Rooms, Dental X-ray, Mammography Endoscopy Room, Physiology Room (8 booths, ECG, EEG, Ultrasound)			Machinery Room, etc.	Generator
Total Floor Area 6,870 m^2					Water Reservoir, etc.

Building structure: Reinforced concrete structure

Outline of Equipment

Category	Main equipment
Central Laboratory Complex	Automatic biochemistry analyzer, Blood gas analyzer, ELISA reader, Microscope, Automatic blood cell analyzer, Hemoglobinmeter, etc. Total 36 items
ICUs	Central monitor, ICU bed, Patient monitor, Ventilator, etc. Total 26 items
Operation Theater Complex Central Supply and Sterilizing Department	Anesthetic apparatus, Ventilator, Instrument set, Operation lamp, Operation monitor, Operation table, Autoclave, Automatic disinfector, C-arm X-ray unit, etc. Total 60 items
Central Facilities for Diagnostic Imaging	X-ray system (Dental, Mammography, Simple, Mobile), Ultrasound scanner, Endoscope, EEG, ECG, etc. Total 29 items

The period required for the implementation of the project is estimated to be approximately 26 months, including 5 months for tendering and 21 months for construction works and equipment procurement/installation works. This period is calculated from consideration of the scale of the facilities, the construction conditions on site, the budgetary systems of the two countries and the

process for demolition of the existing buildings at the construction site. The estimated cost for the Project to be borne by Government of Sri Lanka is approximately Rs 672 million (excluding the cost for relocation of existing medical services/equipment which will be necessary before the demolition of the existing buildings in the construction site).

The operation and maintenance cost of whole Jaffna Teaching Hospital after the completion of the Project is estimated to be approximately Rs 522 million. This is an increase of 9% compared with the total expenditure of Jaffna Teaching Hospital in 2008. Jaffna Teaching Hospital is directly controlled by the Ministry of Health and Nutrition. Considering the scale of the budgetary balance of the Ministry, it is deemed that the operation and maintenance cost can be fully borne by the Sri Lanka side without particular problems in future.

The following direct effects are expected to result from implementation of the project:

1. Restoration of functions as a tertiary level medical facility

   The medical functions of the Jaffna Teaching Hospital as a tertiary level medical facility can be restored by improving the facilities and equipment of the Hospital that have been decrepit for the past over 20 years. Patients requiring high-level medical service, which the Hospital may not cope with, are transferred to Colombo, 425 km away from Jaffna, causing significant burden on the patients. Because the transportation costs are unaffordable, the poverty group cannot receive appropriate tertiary level medical service. The improving of facilities and equipment in the Project will enable prompt and appropriate provision of the high-level medical services needed in this region and permit the qualitative improvement of the medical service in the whole region.

2. Promote efficient medical service in the Hospital by centralization and integration of the central functions

   The efficiency of hospital functions can be improved by centralizing operation theaters and intensive care units that are dispersed in individual departments at present, and integrate them in the same building with the diagnostic imaging department and the laboratory department that are currently located separately. More specifically, such effects as improvement of utilization rate of operating theaters/ICU beds/X-ray rooms, shortening of patients' waiting time, shortening of moving distance of patients/staff, shortening of the time required for laboratory test results are expected. In addition, effective utilization of limited number of staff in operation department such as anesthesiologists, nurses skilled in surgery/operation and staff for sterilization surgical instruments and so on through the centralization of operation theaters is expected to result in improvement in efficient medical service.

3. Promoting the implementation of the Jaffna Teaching Hospital Master Plan

There is a great demand for Jaffna Teaching Hospital as the only advanced medical institution in the northern region with the bed occupancy rate amounting to 120%. To cope with the situation, the Hospital formulated a Master Plan for overall improvement, and started the implementation from 2004. The improvement of the central medical functions is the key focus of the Master Plan as it is integral to the overall efficient operation of the Hospital but is most difficult to improve by the Sri Lanka side. Once these functions have been improved, the improvement of mainly ward units, which are relatively easy to construct, can follow. Consequently, the Project implemented by Japanese grant aid will comparatively shorten the whole improvement period of the Hospital. The tertiary level medical services urgently needed in the northern region can be provided sooner.

4. Improvement of Maintenance Capabilities of Biomedical Engineering Services

Maintenance of medical equipment in Jaffna Teaching Hospital is conducted by Jaffna branch of Biomedical Engineering Services (hereinafter “BES”). However, due to lack of maintenance tools, available spare parts, and manuals, currently they cannot perform effective maintenance work. Under the Project, the supplier will provide operation and maintenance trainings as well as manuals at delivery of the equipment and tools sets and measuring instruments will be procured. In addition, soft component (technical assistance) on improvement of maintenance method of medical equipment for BES Jaffna branch will be implemented right after the completion of the equipment installation work for the Project, so it is expected that BES Jaffna branch will improve their maintenance capabilities and provide more effective maintenance services.

In addition, the following indirect effects are expected to result from the implementation of the Project:

1. Improvement in medical education functions

The Hospital is the teaching hospital for Jaffna University Medical Faculty, the only one medical faculty in the northern region. Provision of human resources to medical facilities in the region is chiefly entrusted to this Medical Faculty. The numbers of medical staff in most of the lower-level medical facilities are insufficient to provide appropriate medical services (the number of physicians in Jaffna District as of 2008 was 3.3 per ten thousand population against the national average number of physicians per ten thousand population being 6.0). It is expected that improvement in the central functions of Jaffna Teaching Hospital and restoration of the functions as a tertiary level medical facility by the Project will result in improvement in quality of the medical education of the region and increase in the number of physicians stationed in the region.

2. Promotion of reconstruction of the northern region

The northern region was largely affected by the conflict. The Project targets central functions of the tertiary level medical facility, in which full-fledged improvement will result in promotion of the reconstruction projects for the whole region. The improved tertiary level medical facility will benefit in stabilizing the social welfare of the people.

Recommendations

1. The project will centralize the Operation Theater Complex of Jaffna Teaching Hospital and therefore require acquisition of specialized management knowledge. To this end, appropriate education and training need to be provided to responsible anesthesiologists/nurses on the management of the Operation Theater Complex.

2. In order to restore the functions of the Hospital as a tertiary level medical facility on a full-scale basis, it is desirable that Emergency Department, Wards and the Outpatient Department be appropriately reconstructed in accordance with the Master Plan. In addition, as a teaching hospital, educational facilities need to be continuously improved in accordance with the Master Plan.

3. It is desirable that future reconstruction projects continuously improve the lower-level medical facilities as well, allow the effective referral system in health care to be restored and result in alleviation of the concentration of patients on Jaffna Teaching Hospital.

4. All the work related to medical equipment of governmental medical facilities in Sri Lanka is conducted by BES under the Ministry of Healthcare and Nutrition . It is desired to further strengthen the maintenance system to execute continuous and effective maintenance work through such measures as concluding maintenance contracts with the local agents of the manufacturers for the equipment which require complicated maintenance.

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Project Location Map

Scale 1:50,000

Perspective of the Project

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Abbreviations

ADB	Asian Development Bank
AFC	Anti Filaria Campaign
AIDS	Acquired Immunodeficiency Syndrome
AMC	Anti Malaria Campaign
AVR	Automatic Voltage Regulator
CSSD	Central Supply and Sterilization Department
BCG	Bacille Calmette Guerin
BES	Bio-Medical Engineering Services
BH	Base Hospital
BHN	Basic Human Needs
BS	British Standard
CD	Central Dispensary
CD & MH	Central Dispensary and Maternity Home
CEB	Ceylon Electric Board
CECB	Central Engineering Consultancy Bureau
COT	Central Operating Theatre
CT	Computerized Tomographic X-Ray Unit
CSSD	Central Sterile Supply Department
DFID	Department for International Development
DH	District Hospital
DP	Drain Pipe
DPDHS	Deputy Provincial Director of Health Service
DPT	Diphtheria, Pertussis, Tetanus Vaccine
ECG	Electrocardiogram
EEG	Electroencephalogram
ENT	Ear, Nose and Throat
EPI	Expanded Programme on Immunization
EPS	Electric Pipe Shaft
FORUT	Solidaritetesaksjon FOR UTvilking
GDP	Gross Domestic Products
GNI	Gross National Income
GNP	Gross National Product
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH
HIV	Human Immunodeficiency Virus
ICD	International Statistical Classification of Diseases and Related Health Problems
ICU	Intensive Care Unit
IEC	Information, Education, and Communication
IMR	Infant Mortality Rate
JBIC	Japan Bank for International Cooperation
JICA	Japan International Cooperation Agency
JTH	Jaffna Teaching Hospital
JVP	Janatha Vimukthi Peramuna
LTTE	Liberation Tigers of Tamil Elam
MCH	Maternity Child Health

MOH area	Medical Officer of Health area
MRI	Medical Research Institute
NECORD	North East Community Restoration and Development Project
NEERP	North East Emergency Reconstruction Project
NGO	Non-Governmental Organization
NICU	Neonatal Intensive Care Unit
NHS	National Institute of Health Science
O.P.D.	Out-Patient Department
OPEC	Organization of Petroleum Exporting Countries
ORT	Oral Rehydration Therapy
OT	Operation Theatre
PH	Provincial Hospital
PHC	Primary Health Care
PICU	Pediatric Intensive Care Unit
PS	Pipe Shaft
PU	Peripheral Unit
SCOPP	Secretariat for Co-ordinating the Peace Process
SIDA	Swedish International Development Agency
SIHRN	Sub-Committee on Immediate Humanitarian and Rehabilitation Needs in The North and East
SIRUP	Small Scale Infrastructure Rehabilitation and Upgrading Project
SLT	Sri Lanka Telecom
STD	Sexually Transmitted Diseases
UNDP	United Nations Development Program
UNFPA	United Nations Population Fund
UNHCR	Office of the United Nations High Commissioner for Refugees
UNICEF	United Nations International Children’s Fund
UPS	Uninterrupted Power Supply
USAID	The United States Agency for International Development
WB	World Bank
WHO	World Health Organization

Chapter 1 Background of the Project

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1-1 Background of the Project

Since the cease fire agreement in 2002, the Government of Sri Lanka has submitted requests for aid to the Government of Japan several times along with the Health and Medical Service Rehabilitation Project in the northern region. After receiving these requests, the Government of Japan implemented a Preliminary Survey in September 2004 and discussed the direction of cooperation with Jaffna Teaching Hospital. As a result, it was confirmed that the project will focus on the central functions

Table 1-1 Transition of the Application Form

№	Request Date	Request Amount	Description of Request
1	July 2002	US$16,887,100 (approximately 1.83 billion yen)	Renovation of the Obstetrics and Gynecology Ward, Pediatrics Ward, Surgical Ward etc. Request for 37 items of equipment.
2	May 2003	Rs.1,500million (approximately 1.83 billion yen)	Construction of the Laboratory Ward, Surgical Ward, Cardiac/Neurosurgery Ward, morgue and others. Request for 102 items of equipment
3	June 2003	US$33,432,813 (approximately 3.64 billion yen, including the equipment amount of approximately 1.36 billion yen)	Construction of the Outpatient Ward, Central Care Ward, Surgery & ICU Ward, Emergency Care Ward, Hospital Ward, kitchen, morgue and others based on the JTH Master Plan. No equipment list attached.

The details of facilities described in the final request submitted to the JICA office at the end of 2004 are as follows. Departments involved in the Master Plan, which was prepared by Jaffna Teaching Hospital, are also described on the side for reference.

Table 1-2 Detailed Description of the Request after the Preliminary Survey

	JTH Master Plan	Area ㎡	Request at the end of 2004	Area ㎡
Operation Theater Complex	Operation rooms: 11 rooms Recovery rooms: 30 beds ICUs: 20 beds Central Supply & Sterilizing Dept		Operation rooms: 14 rooms Recovery rooms: 15 beds M ICUs: 10 beds S ICUs: 6 beds P ICUs: 4 beds HDU: 10 beds Total 30 beds Central Supply & Sterilizing Dept	2,200 2,700 1,000
	Subtotal	6,194	Subtotal	5,900
Central Laboratory Complex	Pathology Testing		Microbiological Testing PathologyTesting Hematological Testing Biochemistrical Testing EEG ECG Endscopy Testing	500 500 500 500 200 200
	Subtotal	1,920	Subtotal	2,400

	JTH Master Plan	Area ㎡	Request at the end of 2004	Area ㎡
Central Facilities for Diagnostic Imaging	Diagnostic rooms Records management rooms	1,300 800	MRI CT: 2 rooms X-rays: 4 rooms Ultrasound diagnosis: 2 rooms Digital arteriogram room Dental x-ray room Mammography room SPECT nuclear medicine testing room Computer image processing room	
	Subtotal	2,100	Subtotal	3,300
Emergency Dept.	Outpatient surgery, ICUs, Recovery, total 15 beds Treatment-related rooms: 10 rooms Beds for monitoring: 80 beds Emergency Office Administrative division	748 140 840 280	Treatment rooms: 6 beds	300
	Subtotal	2,008	Subtotal	300
Administration Dept.			Office Administration Division Auditorium for 200 people Equipment maintenance room	
			Subtotal	2,500
Outpatienct Dept.			Treatment rooms: 5 rooms Diagnostic rooms: 8 rooms	
			Subtotal	2,000
Others			Physiotherapy	1,500
	Total	12,222	Total	17,900

In the Preliminary Survey, it was agreed that the scope of cooperation would be limited to the central functions. In the Basic Design Study, it was confirmed that the plan would be concentrated on the central functions, including only four departments: the Operation Theater Complex, the Intensive Care Unit, the Central Laboratory Complex and the Central Facilities for Diagnostic Imaging. It was confirmed that other functions in the above list, the Emergency Department, Administration Department, Outpatient Department and Physiotherapy Department, are of lower priority and will not be included in the central function building.

Moreover, it was requested that the contents basically conform to the Master Plan formulated by the Sri Lankan side. In the Master Plan, the Emergency Department was planned as an independent building from the beginning, and it was confirmed that the project is consistent with the Master Plan.

Basic Design Study Report was finalized in August 2005. Subsequently, the E/N for the execution of detailed design for the Project was signed on November 28, 2005 between the both governments.

After the conclusion of the consulting services agreement, detailed design drawings, specifications and tender documents for the Project were prepared. These documents were explained to the Sri Lanka side and were approved in May, 2006.

However, since then, the signng of the E/N for the implementation of the Project has been postponed, due to the aggravation of security in Jaffna.

In August, 2009, the Government of Japan has decided to restart the Project, considering current conditions in Jaffna. In response to the change of situation, JICA has decided to conduct an Implementation Review Study and sent a study team to Sri Lanka in October,2009.

1-2 Natural Conditions

1. Climate

The City of Jaffna is located at latitude of 9.47° north and longitude of 80.04° east. According to meteorological record , the lowest temparature was 17℃ ; the highest temparature, approx. 37 ℃; average relative humidity, 70 to 80 %; the largest daily precipitation 216mm (recorded on September 15, 2001), 90% of annual precipitation concentrate in October to December, and the highest wind velocity was 13.7m/s (recorded on June, 2001). The dominant wind direction is southwest from May to September and northeast from December to February. Because of the low latitude, the sun has a high culmination height.

2. Geology

According to the geological survey report, the ground of the project site at Jaffna Teaching Hospital consists of solid limestone at depth of 2.0m and below and clayey sand mixed layers deposited near the surface. Cementation has occurred in the sandstone layer from just above the limestone to a depth of approx. 1.5m. The strength of this layer (the cemented sandstone layer) falls between that of the two layers. According to the result of on-site plate bearing test and data in the literature, this layer has a long-term allowable bearing capacity of 250 kN/m^2.

3. Natural disaster

Jaffna area has no past record of earthquakes. While cyclones strike in the southern region in Sri Lanka every year, they are extreamly rare in Jaffna.

1-3 Environmental and Social Considerations

Central functions in the Project will include Diagnostic Imaging Department, Operation Theter Complex and Central Laboratory Complex whichi might discharge hazardous medical waste. Jaffna Teaching Hospital has installed an incinerator in 2000 to cope with such hazardous medical waste. Since then such medical waste has been incinerated properly at not less than 800 ℃ temparature.

Wastewater, discharged from the existing facilities, is treated at the Hospital's independent wastewater treatment plant located approx. 1.5 km away from the Hospital. The results of the water quality test conducted at the time of the Basic Design Study were tolerable. As building construction works progresses in the Hospital , the treatment load for the plant is anticipated to increase gradually in future. In this sence, the Sri Lankan side is expected to be alert to operate the treatment plant accurately, and to increase its treatment capacity in the long run.

At present, liquid developer, reagent,etc.,whichi might contain heavy metal, are collected individually at each discharged spot and their treatment is outsourced to private treatment companies. Same method will be adapted in the Project.

Chapter 2 Contents of the Project

Chapter 2 Contents of the Project

2-1 Basic Concept of the Project

- **Overall Goals and Project Purpose**

The Democratic Socialist Republic of Sri Lanka (hereinafter "Sri Lanka") has a land area of 65,600 km^2, a population of 20 million (estimate for 2008), and a population growth rate of approx.1.0%.

The 6-year development plan (1999-2004) of the Government of Sri Lanka targets the provision of satisfactory health care services and district-level improvement of medical institutions. The National Health Policy (President's Decree in 1997) of the Government of Sri Lanka calls for the provision of free-of-charge health care services to all citizens and the establishment of top-referral hospitals in each area.

Yet the protracted hostility between the Government and the Liberation Tigers of Tamil Elam (LTTE), which had continued for nearly 30 years, has considerably impeded development in the northwestern parts of the country.

Jaffna Teaching Hospital is the top-referral hospital in the city of Jaffna. It is the only tertiary level medical facility in the northern area, a part of the country which includes not only the Jaffna District, but also the Kilinochi District and other adjacent districts. Many of the lower-level medical facilities in the region have been destructed and are not capable to properly function. Financial constraints and difficulties in deploying medical staff have considerably impeded efforts to improve these lower-level medical facilities since the end of the conflict. A large number of patients are treated at the Jaffna Teaching Hospital, a facility which also has to function as a primary and secondary level medical facilities.

Considerable efforts have been made to establish and improve specialized departments at Jaffna Teaching Hospital and thereby ensure that it can serve its function as a tertiary level medical facility. The department of Orthopedics and the department of Oncology, have been in operation since January 2003 and December 2004, respectively, and the department of Cardiology has been started in 2008. Fourteen departments operate within the specialized care unit. Yet since no major capital investment were done more than 20 years, the facilities in these departments of the Hospital are now decrepit and in ill repair. The hospital is unable to adequately perform its expected functions due to the lack of necessary medical equipment.

The insufficient conditions of the facilities have also been preventing Jaffna Teaching Hospital from serving its functions as a training institution for medical students. As an added disadvantage, very few of the medical students trained at the Hospital remain there after graduation. Many of these graduates move out to Colombo, where working conditions and living conditions are generally more favorable.

The conflict resulted in a decrease in the population of Jaffna District from 730,000 in 1981 to less than 480,000 in 2001. After that, the population has recovered to 550,000 in 2008. The ending of conflicts in 2009 has prompted the return of previous inhabitants to the Jaffna District. The population is expected to recover to the same level of 1981 in near future. The Hospital is hence expected to receive further increases in the number of patients until lower-level medical facilities are sufficiently reorganized.

Jaffna Teaching Hospital has to regain its functions as a tertiary level teaching hospital and continue functioning as primary and secondary level medical facilities until these medical facilities are rehabilitated and developed. Unless its facilities are urgently improved, it is difficult to carry out such multiple functions. In specific terms, the Project seeks to improve the central functions, the core functions of the Hospital, in order to improve the medical services provided in the northern region and to facilitate the restoration of the region as a whole.

- **Outline of the Project**

The Project seeks to achieve the aforementioned goals by improving facilities and equipment and restoring the efficiency and functions of health care services. The implementation of the Project is expected to lead to the establishment of tertiary level medical services in the northern region, provide access to reliable medical services by the central government to the inhabitants in the region, and facilitate the restoration of the region overall. In specific terms, the Project will be consisted of the construction of facilities for the central functions of the hospital (Operation Theater Complex, Central Supply & Sterilizing Department (CSSD), Intensive Care Units (ICUs), Central Laboratory Complex, and Central Facilities for Diagnostic Imaging) and the procurement and installation of necessary medical equipment for these five departments.

2-2 Basic Design of the Japanese Assistance

2-2-1 Design Policy

- **Basic Policy**

1. The activities under the Project will conform closely with the Master Plan already developed by Jaffna Teaching Hospital. The major modification from the Master Plan will be a change in location of the central functions of the Hospital. The new facilities under the Project including the central operation complex will be located at the front (south) area of the Hospital site. This site was originally planned for the Cardiology Unit. The future Cardiology Unit will be planned in the north area originally reserved for the central operation complex.

2. Provision for extension of the facilities to accommodate the functions as a teaching hospital will be incorporated.

3. The Project contents will be well within the implementation in Japan's grant aid scheme. Under the formulated plans, the works to be conducted by the Sri Lankan side will be consistent with the works to be conducted by the Japanese side. Especially careful steps will be taken to ensure that the relocation of existing medical services/medical equipment and the demolition of the facilities in the planned construction site.

4. Consistency with other plans implemented at the Hospital will be ensured and avoid overlaps of equipment and other materials.

5. The Project contents will be well within the maintenance and management capabilities of the Hospital and the Ministry of Healthcare and Nutrition.

- **Policy on Natural Conditions**

In the design of the facilities, eaves and louver-like forms will be utilized to protect the operating theaters and other areas from strong sunlight and reduce the air-conditioning loads. The waiting lounge and related areas will be planned as open-corridor types, utilizing natural ventilation.

City water is not sufficient in Jaffna and local ordinances require that the rainwater be utilized. Jaffna Teaching Hospital is utilizing rainwater and well water to supplement the unstable supply of city water. The Project will also make use of city water, rainwater, and well water.

- **Policy on Socioeconomic Conditions**

The staff in medical facilities in Sri Lanka are generally classified into doctors, nurses, and minor staff. Lounges and changing rooms will be provided for each of these categories. The layout of the facilities of the Project will be based on the facilities of other teaching hospitals in Sri Lanka.

British style is influential in Sri Lanka and many Sri Lankan physicians have studied abroad. The operation departments are generally run by independent organizations consisting of specialist consultants. The Project will respect the independence of specialists with high-level expertise by encouraging the sharing and centralization of resources for the efficient provision of health care services.

- **Policy on Construction and Procurement Situations**

1. Construction Plan

Major construction materials will be procured in Sri Lanka. Procurement from Japan will be considered for fittings and finishing materials required for high standards for air-tightness, sanitation, chemical resistance, etc. Procurement from Japan will also be considered for electrical equipment and air-conditioning/ventilation equipment, all of which needs to be reliable and safe.

The transportation route for the imported items is assumed to use Colombo Port and inland transport from there to Jaffna.

Skilled workers and experienced technicians will be generally recruited in Colombo. The provision of temporary lodgings and other necessary measures for them will be considered in the general temporary works.

2. Equipment Plan

The equipment which require spare parts, consumables, and maintenance services shall be procured from the manufacturers which have local agents in Sri Lanka. In principle, the equipment to be procured under the Project shall be the products of Japan or Sri Lanka. However, if it is considered favorable in terms of price, maintenance and general availability in Sri Lanka, procurement of the products from third countries shall be considered.

The equipment procured from Japan or the third countries shall be shipped from each country and discharged at Colombo Port. The equipment shall be transported from the port to the construction site by containers.

- **Policy on the Operation and Management Abilities of the Implementing Agency**

1. Facility Plan

The facility maintenance department of Jaffna Teaching Hospital has an officer in charge of facility maintenance who directly oversees 9 members of maintenance staff (6 pump engineers, 1 plumber, 1 carpenter, and 1 mason). Two of them stay in the Hospital at night and on holidays to perform routine maintenance. The maintenance of air-conditioning facilities, the emergency generators, and sewerage treatment facilities is out-sourced to external entities. In view of this, the facilities constructed in the Project will be of a level that can be efficiently maintained and managed by the maintenance staff of the Hospital and available external entities.

2. Equipment Plan

Maintenance of medical equipment in Jaffna Teaching Hospital is conducted by BES Jaffna Teaching Hospital branch. In the branch office, currently 2 engineers who are dispatched from BES head office, and 1 assistant and 2 desk workers who are directly employed by Jaffna Teaching Hospital are in charge of the maintenance work of the medical equipment. They only perform relatively basic maintenance and repair work. The equipment which cannot be repaired by themselves are sent to BES head office in Colombo. For this reason, the equipment which require complicated maintenance shall be of a level appropriate to the present maintenance capabilities of the local agents and shall be procured from the manufactures which have local agents in Sri Lanka.

- **Policy on the Grading of Facilities and Equipment**

1. Facility Plan

Jaffna Teaching Hospital performed 24,655 operations in 2004, including 4,275 major operations, 5,132 intermediate operations, and 15,248 minor operations. Minor operations are far more frequent than major and intermediate ones. This, together with social and economic conditions in the target area, will form the basis of the level planned for the facilities as a whole.

In grading the facilities, the basic grade will refer to other medical facilities in Sri Lanka. The design standards will basically be Sri Lankan Standard and British Standards (BS), and some specifications will be covered by the supplementary use of Japanese Industrial Standard (JIS).

The major operations performed in 2004 included 42 neurosurgical procedures, high-level orthopedic operations such as osteotomy (about 100), and about 10 procedures involving the spinal cord. In addition, the Department of Oncology has been treating patients since December 2004 and the

Department of Cardiac Surgery has commenced treatment in 2008. These departments will require advanced operation theaters with a high degree of cleanness.

In the facilities plan, specifications meeting the requirements of advanced medical technologies will be provided in specific departments and rooms.

2. Equipment Plan

The grade of the equipment shall be planned according to medical services provided by the Hospital, status of the existing equipment, and experiences and technical level of the medical staff. Quantity of the equipment shall be minimum necessary according to the status of existing equipment.

- **Policy on Construction/Procurement Methods and the Term of Work**

In planning the term of construction work, the basic design will place the highest priority on safety, paying due consideration of the current situation in Jaffna. Considering conditions of inland transportation, certain amounts of construction materials will have to be secured near the construction site in order to prevent delays in the construction schedule.

The Jaffna district has had few large-scale public construction works, hence skilled workers are in short supply. This will make it necessary to avoid sophisticated construction methods in the construction plan. Common construction methods will have to be adapted whenever possible without any sacrifices in the quality of the work.

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

1. Construction Plan

(1) Design Policy

The following summarizes basic policy for the building facility design:

1) The flow lines of the staff and those of the patients will be kept separate to ensure that large numbers of patients can be efficiently cared for by a limited number of staff.

2) The number of basic building dimensions will be minimized to realize efficient structure and ease of construction.

3) Simple air-conditioning systems will be used in almost all areas to ensure that the facilities can be maintained and renewed properly by local contractors.

4) Electric power, city water, etc. will be installed as independent systems to the new building

to minimize the influence on other existing facilities.

5) Circulation plan and facilities plan will basically conform to the Master Plan of the Hospital as a whole.

(2) Departments Included in the Project

The Project will include the following departments:

Central Operation Theater (COT)	:	Operation rooms, Septic operation rooms (for infectious cases), Recovery Rooms
Central Supply & Sterilizing Department (CSSD)	:	Washing, Sterilization, Clean Store
Intensive Care Units (ICU)	:	Internal Medicine, Surgery, Infection
Central Laboratory Complex	:	Histopathology, Hematology, Biochemistry, Microbiology
Central Facilities for Diagnostic Imaging	:	Radiology, Endoscope Room, Physiology Rooms (ECG, EEG, Ultrasound)
Other Rooms	:	Office Rooms, Machinery Room, Etc.

As a teaching institution, the Hospital has been provided with training laboratories, students' lounges, and other facilities related to medical education. With the restoration of peace in the north region of Sri Lanka, the number of medical students of Jaffna University and their activities are expected to increase in the future. It is difficult to secure the land for horizontal expansion, as the Hospital is located in the city central district with limited land area. Thus, space for future expansion will be secured on the roof of the new building for teaching facility expansion.

(3) Layout and Floor Planning

The planned construction site faces the Hospital Street. The south side of the new building will be aligned in parallel with the section of the road adjacent to the premises to ensure that the building harmonizes well with the townscape. The building plan will seek to achieve the largest area possible with this parallel orientation. The Master Plan, in contrast, has an axis along another road adjacent to the Hospital premises. The northern side of the building will be aligned to this axis to ensure consistency with the Master Plan.

(4) Scale of the Project

The scale of the Project will be determined according to following data:

- The floor areas of the existing facilities of Jaffna Teaching Hospital
- Past records of medical practice in the existing facilities of Jaffna Teaching Hospital

■ **Operation Theater Complex**

Floor Area of the Existing Facility

Room	Floor Area (m^2)
Operation room 1	57
Operation room 2	52
Operation room 3	57
Instrument Store 1	37
Instrument Store 2	37
Prep Room 1	17
Prep Room 2	17
Staff Room (including lavatory)	18
Physicians' Room (including lavatory)	21
Changing Room for Women	21
Matron's Room	33
Nurses' Room	30
Changing Room for Men	29
Anesthesiologists' Room	7
Students' Room	10
Store Room	13
Operation room 4 (Ob-Gyn)	40
Staff Room	30
Store Room	40
Nurses' Room	40
Operation room 5 (Ophthalmology)	60
Prep Room and Store Room	60
Total Effective Floor Area	726

Determination of the Number of Operation rooms for the new building

In the year 2004, the surgeons at the Hospital performed 24,655 operations. Provided that operation rooms are used 365 days per year and minor operations are performed in the Emergency Unit, at least 8 operation rooms will be needed to sustain activity at this level.

Table 2-1 Actual Number of Operations in a Year

		2004	Days/Year	Cases/Day	Expected Cases/Room /Day	No. of Needed Operation rooms	Breakdown by Department
General Surgery	Major	674	280	2.41	3	0.8024	1.53
	Int.	1,597	365	4.38	6	0.7292	
	Minor	9,256	365	25.36	15	In Emergency Dept.	
Orthopedics	Major	598	280	2.14	3	0.7119	0.95
	Int.	519	365	1.42	6	0.2370	
	Minor	5,135	365	14.07	15	In Emergency Dept.	
Gynecology	Major	310	280	1.11	3	0.3690	0.53
	Int.	287	300	0.96	6	0.1594	
	Minor	411	365	1.13	15	In Emergency Dept.	
Obstetrics	Major	2,124	365	5.82	3	1.9397	2.12
	Int.	384	365	1.05	6	0.1753	
	Minor	37	365	0.10	15	In Emergency Dept.	
Urology	Major	195	280	0.70	3	0.2321	0.42
	Int.	303	300	1.01	6	0.1683	
	Minor	115	365	0.32	15	0.0210	
Plastic Surgery	Major	33	280	0.12	3	0.0393	0.15
	Int.	185	300	0.62	6	0.1028	
	Minor	23	365	0.06	15	0.0042	
ENT	Major	103	280	0.37	3	0.1226	0.27
	Int.	204	280	0.73	6	0.1214	
	Minor	161	365	0.44	15	0.0294	
Ophthalmology	Major	109	280	0.39	3	0.1298	0.13
	Int.	54	280	0.19	6	In existing units	
	Minor	73	365	0.20	15	In existing units	
Thoracic Surgery	Major	24	280	0.09	3	0.0286	0.06
	Int.	66	365	0.18	6	0.0301	
	Minor	33	365	0.09	15	0.0060	
Cerebral Surgery	Major	42	280	0.15	3	0.0500	0.05
	Int.	9	365	0.02	6	0.0041	
	Minor	3	365	0.01	15	0.0005	
Dentistry	Major	0	280	0.00	3	0.0000	0.00
	Int.	0	300	0.00	6	0.0000	
	Minor	1	365	0.00	15	0.0002	
Contraception (LRT)	Major	63	280	0.23	3	0.0750	0.92
	Int.	1,524	300	5.08	6	0.8467	
	Minor	0	365	0.00	15	0.0000	
Total (Major)		4,275	Total No. of Operations/Day		Total No. of Operation rooms required		
Total (Int.)		5,132	(in This Project)	30		7.14	
Total (Minor)		15,248					
Grand Total		24,655					

Floor Area Planned

Room	No.	Floor Area (m^2)	Basis for Determination
Operation room	8	312	6 general operation rooms and 2 operation rooms for infection
Prep Room	2	72	2 independent U.K. type prep rooms
Prep Room, Infection	1	40	Machinery for postoperative washing will also be installed
Operation Hall	1	334	Open-style with prep corner, scrub corner, and space for instruments arranged conveniently in the Operation Hall
Recovery Room	1	147	For 8 beds corresponding to 8 operation rooms, including space for instruments
Nurse Station	1	20	Also used for reception work and management of the recovery rooms
Drugstore	1	12	
Anesthesiologist	1	18	
Physicians' Room	1	18	Lounge
Changing Room for Physicians	2	36	Separate rooms for men and women, each including showers, lavatory, and lockers (for 20 workers in total)
Nurses' Room	1	36	Lounge
Changing Room for Nurses	2	24	Separate rooms for men and women, each including showers, lavatory, and lockers (for 20 workers in total)
Matron's Room	1	18	
Staff Room	1	36	Lounge
Staff Changing Room	2	24	Separate rooms for men and women, each including showers, lavatory, and lockers (for 15 workers in total)
Office	1	60	The administrative office of the Operation Theater Complex, assuming about 5 office workers
Chief	1	18	
Total Effective Floor Area		1225	

■ Central Supply & Sterilizing Department

Floor Area of Existing Facility

Room	Floor Area (m^2)
Repair and Sewing	20
Store Room	10
Preparation Room	51
Sterilization Room	40
Washing Room	10
Total Effective Floor Area	131

Floor Area Planned

Room	No.	Floor Area (m^2)	Basis for Determination
Changing Room for Washing	2	24	Also used as staff lounge. To accommodate 10 staff members instead of the current 6.
Receiving Office	1	27	Reception items from the Operation department and other departments, and record keeping
Washing	1	95	Space for the washing of carts, washing of instruments, and packing
Sterilization	1	11	According to the equipment layout
Clean Store	1	53	Storage for 30 operations/day
Clean Disposable	1	11	
Clean Changing Room	2	20	Separate rooms for men and women, assuming 6 workers in total

Room	No.	Floor Area (m^2)	Basis for Determination
Clean Issue	1	18	Issuance of sterilized instruments and sterilized disposables to other departments
Total Effective Floor Area		259	

■ Intensive Care Units

Floor Area of Existing Facility

Room	Floor Area (m^2)
ICU, Surgery (4 beds)	63
Prep Room	9
Lounge	14
Chief	15
Store Room	12
ICU, Internal Medicine (6 beds)	94
Store Room	43
Nurses' Lounge	15
Chief	10
Counseling	10
Medical Gas Room	10
Total Effective Floor Area	295

Determination of the Number of ICU Beds

The occupancy rate of beds is 100% for the 4 beds in the ICU for surgery and the 6 beds in the ICU for internal medicine. Ordinarily the patients in the observation beds in the Emergency Unit should be moved to the ICU within 24 hours. As things stand, however, they often remain in the Emergency Unit for nearly a week due to the full occupancy of the ICUs. According to experience, ICU beds should make up 2% of the total number of beds in the Hospital. As the Hospital currently has 1,100 beds, an ICU with 22 beds would meet this requirement (1,100 beds x 2% = 22 beds).

Floor Area Planned

Room	No.	Floor Area (m^2)	Basis for Determination
ICU	1	360	12 beds for internal medicine and 8 for surgery (20 in total). All beds are to be located in 1 room for efficient management.
ICU, Infectious	2	24	2 beds in separate rooms
Nurse Station	1	30	Central monitoring and recording
Preparation	1	12	Clean preparation
Sluice	1	10	
Linen Store/Storage	1	25	Linens, instruments, and disposables for 22 beds
Guests' Changing Room	1	9	Gowning room for the family entering the ICU
Nurses' Room	1	18	
Physicians' Room	2	36	2 physicians, internal medicine, and surgery
Changing Room	2	24	Separate rooms for men and women
Total Effective Floor Area		619	

■ Central Laboratory Complex

Floor Area of Existing Facility

Room	Floor Area (m^2)
Biochemistry 1	74
Biochemistry 2 (Histology)	74
Microbiology	99
Hematology	74
Histopathology	74
Training Laboratory	60
Office	24
Darkroom	10
Technicians' Room	49
Chief	24
Staff Room	19
Washing	24
Lounge	58
Total Effective Floor Area	663

Floor Area Planned

Room	No.	Floor Area (m^2)	Basis for Determination
Laboratory Clinical Pathology Hematology Biochemistry Microbiology Urinalysis Washing	1	330	Apart from microbiology lab, the laboratory is designed integrally as a single room in order to enhance the efficiency of the flow lines of the laboratory technicians. The efficient layout of instruments in the planned area will enable a reduction in the overall area compared with the existing facility (a reduction from 395 m^2 to 336 m^2). Including 2 washing rooms
Blood Collection	2	24	2 rooms (one for men and one for women)
Urine Collection	2	24	2 rooms (one for men and one for women)
Reception Office	1	8	
Chief	1	18	
Office	1	40	Existing number of laboratory technicians: 10. Used as working room for office work, for taking records, and as a lounge
Counseling	1	12	Used for multiple purposes, including patient counseling and worker meetings
Meeting Room	1	41	Training is conducted in the laboratory (no dedicated training laboratory is provided). Accordingly, a meeting room is provided for basic lectures on laboratory tests. This meeting room can be used for multiple purposes. Tables arranged in a box shape can accommodate 24 persons.
Storage	1	8	
Sluice	1	8	
Pantry	1	8	
Operation Preparation	1	16	Staircase room directly leading to Operation Dept.
Total Effective Floor Area		537	

■ Central Facilities for Diagnostic Imaging

Floor Area of Existing Facility

Room	Floor Area (m^2)
General Radiology 1	30
General Radiology 2	30
General Radiology & Dental X-ray 3	33
Darkroom 1	33
Darkroom 2 / Working Room	30
Ultrasound Room (2 booths)	33
Ultrasound Room (in separate building)	36
ECG Room (in separate building), 2 units	36
ECG, Stress Testing (in separate building)	36
EEG (in separate building)	24
EEG Prep Room (in separate building)	24
Endoscope Room (2 booths) (in separate building)	36
Endoscopy Prep Room (in separate building)	36
CT Room	33
CT Operation Room	33
CT Machinery Room	33
Office & Reception	33
Chief	33
Nurses' Lounge	64
Staff Lounge	49
Staff Changing Room	30
Instrument Store	33
Disposables Store	10
Total Effective Floor Area	768

Determination of the Number of Rooms Based on Actual Performance of Radiological Examinations

Monthly average from January to June 2004: 6,747 films/month

Assuming 3 films per patient in average: 6,747/3 = 2,249 pts/month

Assuming 15 minutes per person: 2,249 pts x 15 min = 562.25 hours/month

Work hours in a week: 8:00 to 16:00 (7 hours/day) on weekdays, 8:00 to 12:00 (4 hours/day) on weekends

Hence, 7 x 5 days + 4 x 1 day = 39 hours/week, 156 hours/month

Number of needed X-ray rooms: 562.25 hours/156 hours = 3.60 rooms → <u>4 rooms</u>

<u>Floor Area Planned</u>

Room	No.	Floor Area (m^2)	Basis for Determination
Radiology room	4	120	The number of rooms will be increased by 1 according to the above calculation. One of the 4 rooms will be for a fluoroscopy unit (Existing fluoroscopy unit with all attachments shall be relocated to this room by the Sri Lanka side).
Changing Room for Radiology	8	24	2 changing booths will be provided for each radiology room to improve the efficiency of examination.
Dental X-ray	1	18	Minimal space needed for installation of equipment
Mammography	1	20	Minimal space needed for installation of equipment

Room	No.	Floor Area (m^2)	Basis for Determination
CT Room	1	60	Existing CT unit with all attachments shall be relocated to the new CT room by the Sri Lanka side.
Endoscope Room	2	32	Separate rooms for men and women, as in the existing facility
Endoscopy Prep Room	1	30	Used for recording, washing, and storage
Physiology Room, 8 booths EEG ECG Ultrasound	1	170	8 booths in total, as in existing facility. Booths will be used instead of separate rooms, chiefly in order to facilitate management by limited numbers of persons. This arrangement will allow flexible modification when the number of units increases in the future.
Physiology Prep Room	1	36	Work preparation, recording, and storage
Darkroom	1	18	
Viewing Room	1	36	Including storage
Staff Room	1	36	Lounge for staff
Reception Office	1	36	Recording and sorting of patient charts, general reception work, etc.
Reception	1	18	Counter style
Chief	1	18	
Instrument Store	1	18	
Counseling	2	24	Multiple purposes, including patient counseling, department meetings, lectures to students, etc.
Office	1	36	
Total Effective Floor Area		750	

- Other Rooms

Planned Area

Room	No.	Area (m^2)	Basis for Determination
Generator Room	1	120	Emergency generator and low-tension receiving facility
Medical Gas Machinery Room	1	48	Gas cylinder storage and pump room for compressed air and aspiration
Water Pump & Fire Pump	2	36	Fire pump is housed in a separate partition.

					Elevated Water Tank
3rd Floor 30 m^2	(Space for Future Expansion of Rooms for Medical Education)		Space for Air Conditioner Outdoor Units		
2nd Floor 2,070 m^2	Operation Dept. Management Room	**ICUs** 20 ICU beds 2 Rooms for infections	**Central Laboratory Complex** Clinical Pathology, Hematology, Biochemistry, Microbiology		
1st Floor 2,200 m^2	**Operation Theater Complex** 8 Operation rooms (incl. 2 for iseptic), Recovery Rooms			**Central Supply & Sterilizing Dept.** 4 sterilizers	
Ground Floor 2,370 m^2	**Central Facilities for Diagnostic Imaging** 4 Radiology Rooms, Dental X-ray, Mammography Endoscopy Room, CT Room Physiology Room (8 booths, ECG, EEG, Ultrasound)			Machinery Room, etc.	Generator
Total Floor Area 6,870 m^2					Water Reservoir, etc.

Fig. 2-1 Outline of Facilities by Floor Level

(5) Vertical and Cross-sectional Plans

Many of the existing buildings were constructed in the colonial period. The high ceilings of these buildings secure sufficient air space, providing a comfortable room environment without the use of air conditioning. The cross-sectional plan for the Project will set a standard floor height of 4.8 m and high direct ceilings to ensure sufficient natural ventilation. The larger air space in rooms with high ceilings generally limits the efficiency of air conditioning. Though air conditioning is to be used in many rooms in the Project, it will only be used for cooling. Thus, the cooling efficiency can be secured by limiting the coverage of cooling to the spaces used by human beings and locating cool air outlets at a height of about 2.4 m. Ceiling boards will be used in clean areas such as operation rooms, and the space above ceiling boards will be used for ducts for efficient air conditioning and ventilation. As the Project covers central functions of the Hospital, the room partitioning is likely to require alteration in the future as medical technologies advance. Buildings with insufficient floor height would have little flexibility for such alteration and require frequent reconstruction, a process that would shorten the social service life of the building. The use of the standard floor height of 4.8 m will therefore be effective for prolonging the social service life.

Due to the relationship with existing buildings of the Hospital, the rooms requiring air conditioning, such as the operation rooms and ICUs, will be located along the southern side of the building. To reduce the air-conditioning load in these rooms, the vertical surface facing the south will be protected from direct sun by the use of lattice-type louvers. While the northern side also receives sunlight due to the low latitude, the waiting areas for families (open-corridor type) will be located

along the northern face to protect the air-conditioned rooms behind.

(6) Construction Material Plan

The main finishing materials will basically be selected from among the materials available in Sri Lanka. This will enable maintenance and repair by local contractors. The exterior finish of the building will be cement paint, most popular finishing materials in Jaffna.

Table 2-2 Finishes for the Main Rooms

	Room	Floor	Skirting	Wall	Ceiling
2F	Laboratory	Epoxy poured flooring	Tiles	Vinyl paint up to dado height of 2100, ready mixed paint above	Direct ceiling, ready mixed paint
	Blood Collection	Epoxy poured flooring	Tiles	Vinyl paint up to dado height of 2100, ready mixed paint above	Direct ceiling, ready mixed paint
	Urine Collection	Asphalt waterproofing, covering concrete, 150 square tiles		150 square wall tiles up to dado height of 2100, ready mixed paint above	Direct ceiling, ready mixed paint
	Chief	150 square floor tiles	Tiles	Vinyl paint up to dado height of 2100, ready mixed paint above	Direct ceiling, ready mixed paint
	Office	150 square floor tiles	Tiles	Vinyl paint up to dado height of 2100, ready mixed paint above	Direct ceiling, ready mixed paint
	Counseling	150 square floor tiles	Tiles	Vinyl paint up to dado height of 2100, ready mixed paint above	Direct ceiling, ready mixed paint
	Meeting Room	150 square floor tiles	Tiles	Vinyl paint up to dado height of 2100, ready mixed paint above	Direct ceiling, ready mixed paint
	ICU	Epoxy poured flooring	Tiles	Vinyl paint up to dado height of 2100, ready mixed paint above	Direct ceiling, ready mixed paint
	Prep Room	Asphalt waterproofing, covering concrete, 150 square tiles	Tiles	150 square wall tiles up to dado height of 2100, ready mixed paint above	Direct ceiling, ready mixed paint
	Sluice	Asphalt waterproofing, covering concrete, 150 square tiles		150 square wall tiles up to dado height of 2100, ready mixed paint above	Direct ceiling, ready mixed paint
	Linen store/ warehouse	150 square floor tiles	Tiles	Vinyl paint up to dado height of 2100, ready mixed paint above	Direct ceiling, ready mixed paint
	Nurses' Room	150 square floor tiles	Tiles	Vinyl paint up to dado height of 2100, ready mixed paint above	Direct ceiling, ready mixed paint
	Physicians' Room	150 square floor tiles	Tiles	Vinyl paint up to dado height of 2100, ready mixed paint above	Direct ceiling, ready mixed paint
	Changing Room Chief	Asphalt waterproofing, covering concrete, 150 square tiles 150 square floor tiles	 Tiles	150 square wall tiles up to dado height of 2100, ready mixed paint above Vinyl paint up to dado height of 2100, ready mixed paint above	Direct ceiling, ready mixed paint, paint finish on exposed pipes Direct ceiling, ready mixed paint
	Office	Asphalt waterproofing, covering concrete, 150 square tiles		Vinyl paint up to dado height of 2100, ready mixed paint above	Direct ceiling, ready mixed paint
1F	Operation Room	Epoxy poured flooring	Tiles	Vinyl paint	Waterproof plaster board, joint-less finish, vinyl paint
	Operation Hall	Epoxy poured flooring	Tiles	Vinyl paint	Waterproof plaster board, joint-less finish, vinyl paint
	Recovery Room	Epoxy poured flooring	Tiles	Vinyl paint	Waterproof plaster board, joint-less finish, vinyl paint

	Room	Floor	Skirting	Wall	Ceiling
	Nurse Station	Epoxy poured flooring	Tiles	Vinyl paint	Waterproof plaster board, joint-less finish, vinyl paint
	Drugstore	Epoxy poured flooring	Tiles	Vinyl paint	Waterproof plaster board, joint-less finish, vinyl paint
	Anesthesiologists' Room	Epoxy poured flooring	Tiles	Vinyl paint	Waterproof plaster board, joint-less finish, vinyl paint
	Matron	Epoxy poured flooring	Tiles	Vinyl paint	Plaster board, joint-less finish, vinyl paint
	Nurses' Room	Asphalt waterproofing, covering concrete, 150 square tiles		Vinyl paint up to dado height of 2100, ready mixed paint above	Plaster board, joint-less finish, vinyl paint
	Clean Corridor	Epoxy poured flooring	Tiles	Vinyl paint	Waterproof plaster board, joint-less finish, vinyl paint
	Changing Room for Washing	Asphalt waterproofing, covering concrete, 150 square tiles		150 square wall tiles up to dado height of 2100, ready mixed paint above	Waterproof plaster board, joint-less finish, vinyl paint
	Washing	Asphalt waterproofing, covering concrete, 150 square tiles		150 square wall tiles up to dado height of 2100, ready mixed paint above	Waterproof plaster board, joint-less finish, vinyl paint
	Receiving Office	Asphalt waterproofing, covering concrete, 150 square tiles		150 square wall tiles up to dado height of 2100, ready mixed paint above	Waterproof plaster board, joint-less finish, vinyl paint
	Clean Store	Epoxy poured flooring	Tiles	Vinyl paint	Waterproof plaster board, joint-less finish, vinyl paint
	Clean Changing	Asphalt waterproofing, covering concrete, 150 square tiles		150 square wall tiles up to dado height of 2100, ready mixed paint above	Waterproof plaster board, joint-less finish, vinyl paint
	Clean Issue	Epoxy poured flooring	Tiles	Vinyl paint	Waterproof plaster board, joint-less finish, vinyl paint
GF	Radiology	150 square floor tiles	Tiles	Vinyl paint up to dado height of 2100, ready mixed paint above	Direct ceiling, ready mixed paint
	CT Room	150 square floor tiles	Tiles	Vinyl paint up to dado height of 2100, ready mixed paint above	Direct ceiling, ready mixed paint
	Endoscope Room	150 square floor tiles	Tiles	Vinyl paint up to dado height of 2100, ready mixed paint above	Direct ceiling, ready mixed paint
	Physiology Room	150 square floor tiles	Tiles	Vinyl paint up to dado height of 2100, ready mixed paint above	Direct ceiling, ready mixed paint
	Physiology Prep Room	150 square floor tiles	Tiles	Vinyl paint up to dado height of 2100, ready mixed paint above	Direct ceiling, ready mixed paint
	Darkroom	150 square floor tiles	Tiles	Vinyl paint up to dado height of 2100, ready mixed paint above	Direct ceiling, ready mixed paint
	Viewing Room	150 square floor tiles	Tiles	Vinyl paint up to dado height of 2100, ready mixed paint above	Plaster board, joint-less finish, vinyl paint
	Office	150 square floor tiles	Tiles	Vinyl paint up to dado height of 2100, ready mixed paint above	Plaster board, joint-less finish, vinyl paint
	Chief	150 square floor tiles	Tiles	Vinyl paint up to dado height of 2100, ready mixed paint above	Direct ceiling, ready mixed paint
	Waiting Room	150 square floor tiles	Tiles	Vinyl paint up to dado height of 2100, ready mixed paint above	Direct ceiling, ready mixed paint
Common	Lavatory	Asphalt waterproofing, covering concrete, 150 square tiles		150 square wall tiles up to dado height of 2100, ready mixed paint above	Direct ceiling, ready mixed paint, paint finish on exposed pipes
	Corridor, etc.	150 square floor tiles	Tiles	Vinyl paint up to dado height of 2100, ready mixed paint above	Direct ceiling, ready mixed paint
	Waiting room	150 square floor tiles	Tiles	Vinyl paint up to dado height of 2100, ready mixed paint above	Direct ceiling, ready mixed paint

(7) Structure Plan

1) Outline of the Structure

This building is planned as a medical facility. The following outlines the building structure:

Number of floors	:	4 stories above ground
Floor height	:	4.8 m
Standard column spacing	:	6.0 m x 6.0 m
Type of structure	:	Reinforced concrete rigid frame structure, brick walls
Foundation	:	Spread footing (spot footing)

2) Foundation Plan

According to the geological survey report, the ground of this site consists of solid limestone at depths of 2.0 m and below and clayey sand mixed layers deposited near the surface. Cementation has occurred in the sandstone layer from just above the limestone to a depth of about 1.5 m. The strength of this layer (the cemented sandstone layer) falls between that of the two layers. According to the result of an on-site plate-bearing test and data in the literature, this layer has a long-term allowable bearing capacity of 250 kN/m^2. To optimize economic performance, the new building in the Project will use spread footing (spot footing) into this cemented sandstone layer. The space under the ground floor is to be used for piping installation. In order to assure adequate maintenance and future expansion, the beams supporting the ground floor (footing beams) will be floated above the ground to make sufficient space for (see the figure below).

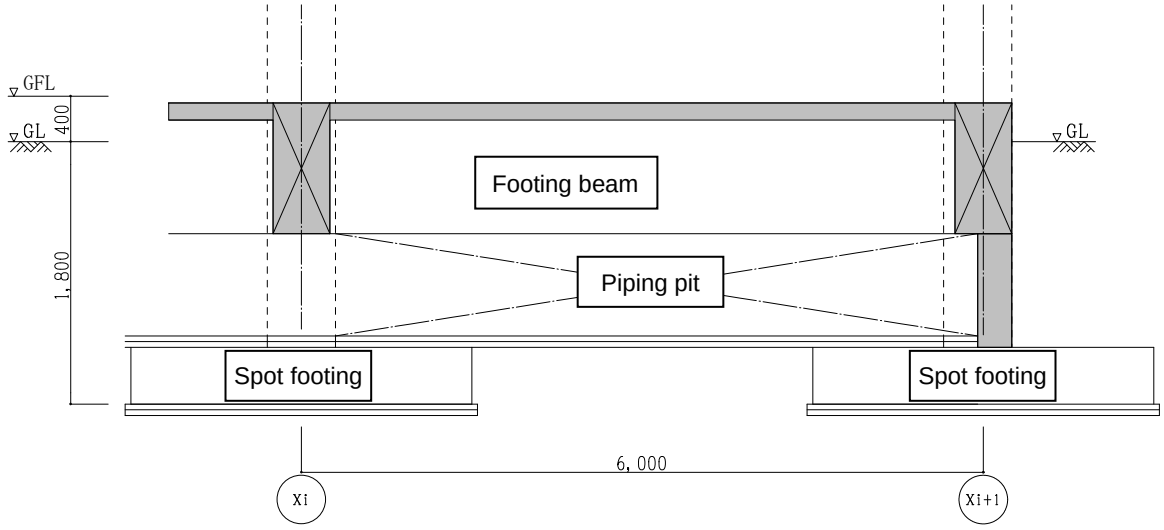


Fig. 2-2 Conceptual Drawing of Piping Pit

3) Superstructure Plan

Considering the standard column spacing of this building, the superstructure of will be a reinforced-concrete rigid-frame structure. Generally speaking, a column spacing of 5 to 6 m is appropriate for reinforced concrete structures and a column spacing of 6 to 9 m is appropriate for steel-framed structures. While the 6 m column spacing in this building is suitable for both types of structures, the reinforced-concrete rigid-frame type is more suitable for specific features of the planned construction site. Local contractors also have more experience in working with this type of structure.

4) Load and External Force

- Live load

The live load allowance of each room is defined according to the Building Code Law of Japan. The live load allowance of the main rooms is as shown below.

Office:	3000N/m^2	Radiology room:	3000N/m^2
Operation room:	4000N/m^2	Machinery room:	5000N/m^2
Lavatory:	1800N/m^2	Rooftop (for future expansion):	3000N/m^2

- Load from Earthquakes

The project area has no past records of earthquakes. Accordingly, load from earthquakes is not considered in the Project.

- Wind Load

While cyclones strike in the southern parts of Sri Lanka, they are extremely rare in Jaffna City. Thus, the wind load is calculated according to Article 87 of the Building Code of Japan. The standard wind velocity V_0 is set at 30 m/s.

5) Major Construction Materials

Concrete: For design, Fc=21 N/mm^2
For construction, Fc=27 N/mm^2
(21 N + 3 N for fluctuation allowance + 3 N for work quality; Correction for variability in quality will be considered separately based on actual performance.)

Steel bars: ft=345N/mm^2

(8) Electrical Facility Plan

1) Power Receiving Facility

As with the existing sub-station, an independent incoming line will be branched from the special high-voltage overhead distribution line of the Ceylon Electric Board (CEB) running along the Hospital Street facing the Hospital. An H-shaped private pole will be placed in an open area of land between the existing sub-station (Sub-station No. 1) and the Hindu temple, and a section switch will be installed on the pole.

2) Power Supply Facility

- Special High-voltage Receiving Facility

  As with the existing sub-station, an outdoor ground-based open-type sub-station (Sub-station No. 2) will be newly constructed under the H-shaped private pole. The main switchboard will be a standalone cubicle type, installed outdoors adjacent to the sub-station. This sub-station will subsequently supply low-voltage power to the facilities in this Project. Fences around the outdoor sub-station will be made to prevent entry of trespassers. The power supply meters of CEB will be installed in the outdoor stand-alone cubicle.

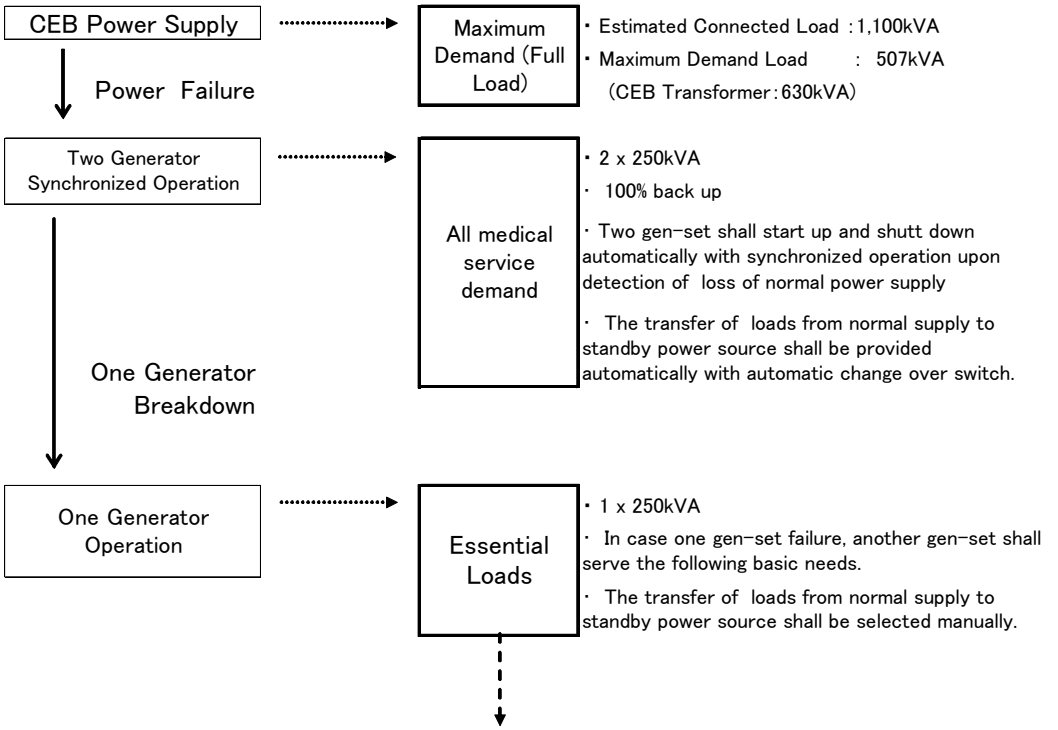
- Main Power Supply Facility

  Electric power will be supplied from the low-voltage panel board to the lighting distribution switchboard and power control board on each floor via electric power shafts. The main voltage will be 3-phase 4-line 415/240 V, 50 Hz. An alarm display board will be installed in the administration office to monitor abnormal conditions in the water reservoir, elevated water tank, pumps, power substation, transformer, emergency generators, etc.

- Emergency Power Generation Facility

  A diesel generator system will be installed as an emergency power supply to ensure that minimal central functions are maintained during power breaks, which occur almost daily in Jaffna City. The emergency generators will be installed in the generator room. The unit will be an indoor low-noise type with vibration insulation. The service tank will have enough capacity to sustain ongoing operation for about 12 hours. A space for storing fuel in drums will be provided outside the generator room.

  Two generators will be provided. Generator system shall be designed so that in case one generator fails, power supply to essential loads such as life supporting equipments, will be continued from the other running generator.



		Load selection under One Generator Operation			
		Lighting (GC)	Medical Equipment	HVAC	Power Supply
Whole Building		○			
Operation Theater	A～H (8rooms)	○	○	○	
Intencive Care Unit	20+2 beds	○	○		
Laboratory		○	○	○	
Fire Fighting Pump					○
Lift	2 nos.				○

○ : Applicable
(GC) : under generator circuit

- Automatic Voltage Regulator (AVR)

The measurement in the Hospital using a recording voltmeter at the time of Implementation Review Study indicated voltage fluctuations exceeding 10% : AC 210-252 V (see the measurement results in the figure below).

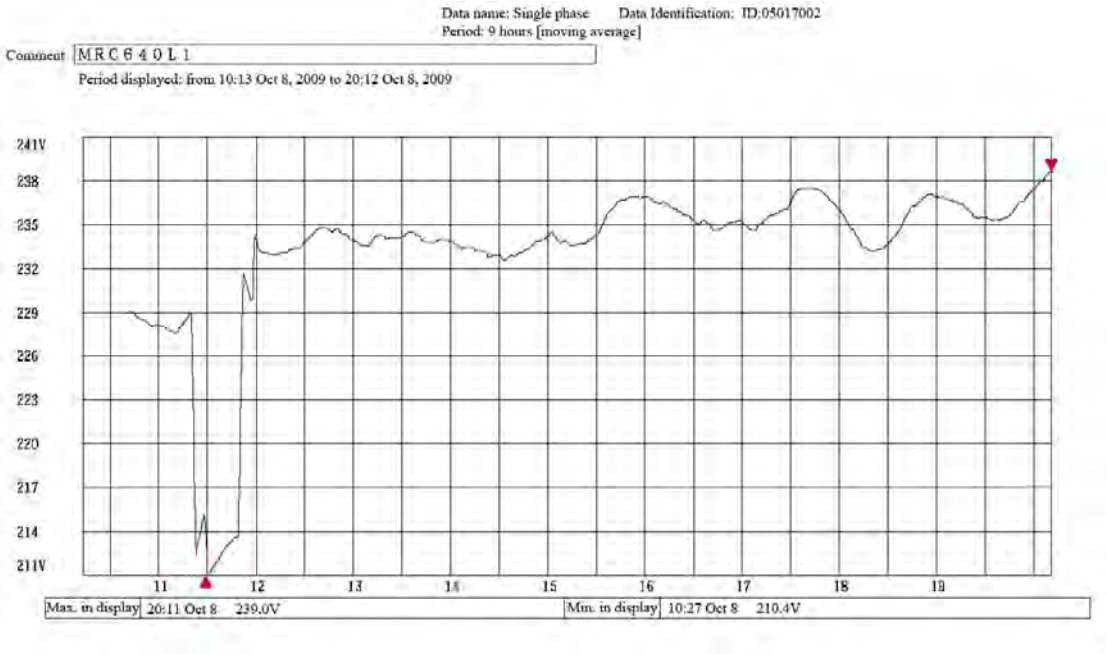


Fig.2-3 Record of voltage measurement

Therefore, an automatic voltage regulator (AVR) will be installed in the low-voltage main line to prevent troubles of medical equipment. In addition, portable uninterruptible power sources (UPSs) will be provided individually for medical equipment susceptible to malfunction due to sudden power failure. These UPSs will be covered in the medical equipment works.

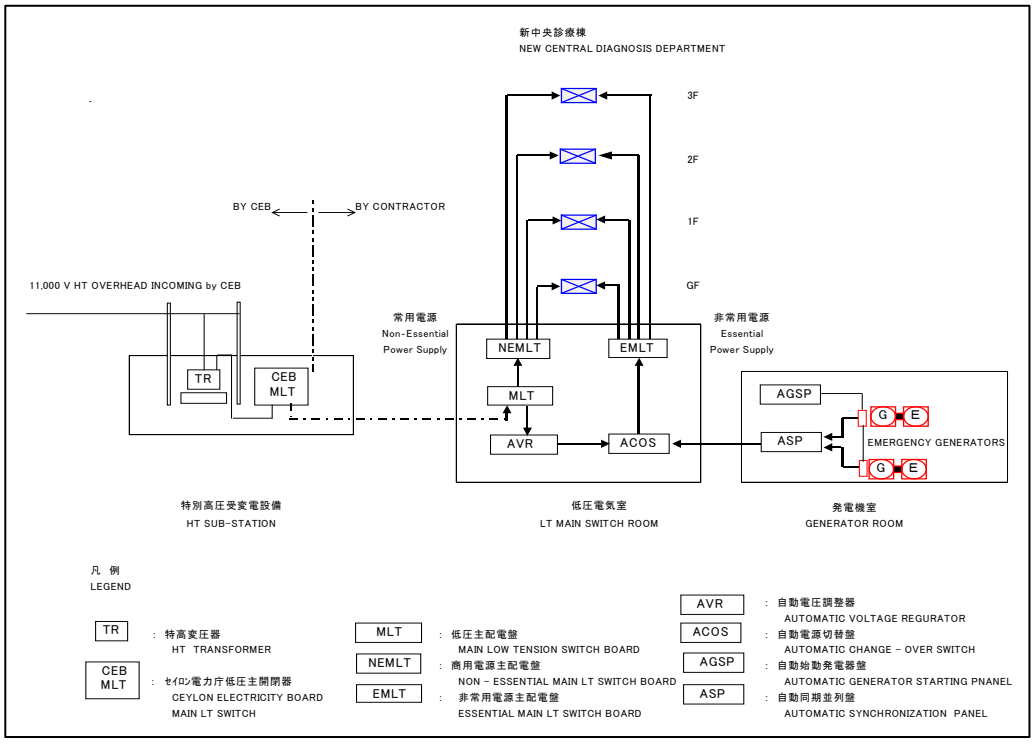


Fig. 2-4 Mains Power System Diagram

Table 2-3 Calculation of Power Demand

Power Supplied To	Expected Installed Capacity	Expected Rate of Demand	Max. Power Demand
Medical Equipment	Approx.300 kVA	15 %	Approx.45 kVA
Air-conditioning / Ventilation / Water Supply, Drainage & Sanitation Facilities	Approx.900 kVA	40 %	Approx.360 kVA
Lighting facilities / Receptacles Firefighting Facilities / Other Loads	Approx.150 kVA	60 %	Approx.90 kVA
Total	1,350 kVA		Approx.495 kVA

3) Lighting and Receptacle Facilities

A lighting distribution switchboard will be installed on each floor with an appropriate circuit configuration. Conduit wiring for secondary circuitry will run from the switchboard to the lighting fixtures and receptacles.

- Lighting Facilities

General lighting: Lighting fixtures mainly using fluorescent lamps will be selected. The circuitry will be designed to facilitate power saving by separating into small groups to enable individual control.

Special lighting facilities: Shadowless lamps in operation rooms and other medical lighting equipment will be included in the medical equipment works.

Emergency lighting facilities: Battery-powered wall-mount emergency lighting equipment will be provided in rooms which accommodate people.

Exit lights: Battery-powered light guide plate-type pictograph exit lights will be installed.

Table 2-4 Intensity of Illumination in the Main Rooms

Room	Intensity of Illumination
Operation room	750 lx
Examination room & laboratory	500 lx
Office	300 lx
Radiology room	200 lx
Lavatory, changing room, & instrument store	150 lx
Corridor & waiting room	100 lx

- Receptacles

Receptacles for general use will be 13A receptacles with switches and grounding terminals. The power sources for medical equipment will be configured to meet the required

power capacity considering the equipment layout. The receptacles receiving the backup from the emergency generator will be identified by red plates.

4) Public Address Facilities

A main public address equipment will be installed. This will facilitate paging of physicians, emergency evacuations, announcements, etc.

5) Interphone Systems

Independent interphone systems will provide telephone linkage between the Operation rooms and related rooms (i.e., the Nurse Station, CSSD, Physicians' Lounge, and Anesthesiologists' Room) and between the Radiology Rooms and related rooms (i.e., the equipment operation console in the corridor, Changing Room, Waiting Room, and Darkroom). A nurse-call interphone system will be installed between ICUs and Nurse Station.

6) Telephone Facilities

Telephone sets will be installed in the rooms that require telephones for the operation of the facilities. Existing general telephone lines are considered sufficient for use in the new building. Telephone cables will be installed from the telephone exchange room in the existing building (ENT CLINIC) to the main distribution frame (MDF) in the new building, in necessary numbers to service the numbers of telephone extensions required. Conduit wiring will then be run from the MDF to the terminal board on each floor, and from there to the telephone outlets. In addition, an empty conduit for future data networks will be installed from the MDF to the external wall of the building. This conduit will provide a route for feeding in the new line from Sri Lanka Telecom (SLT).

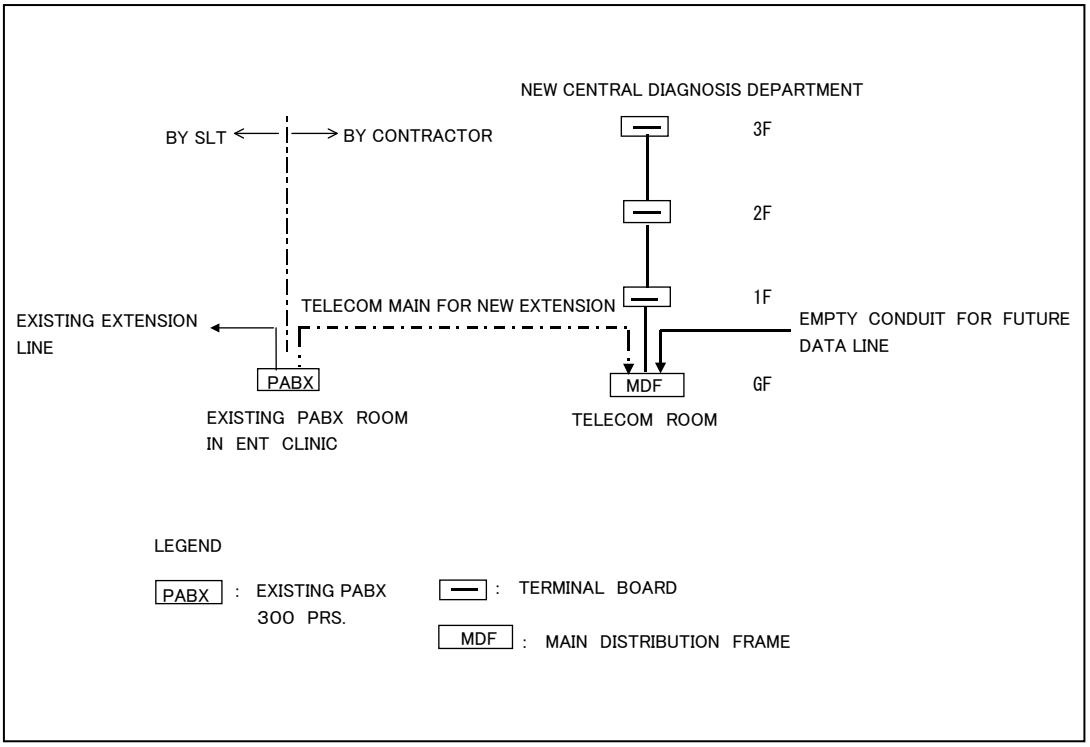


Fig. 2-5 Main Telephone Line System

7) Automatic Fire Alarm Facilities

A fire alarm system will be installed as required by ordinance of the Jaffna City Fire Department (1989). The basic design will use Japanese fire codes as a reference when planning the system in areas where no detailed local standards apply.

8) Conduits for Computer Network

To allow for future connection via computer local area network (LAN), a conduit will be installed from the shaft on each floor to the vicinity of the rooms requiring LAN. The various devices and cables required for the computer network will not be covered under the Project.

9) Lightning Protection Facility

The facility will be installed for lightning protection of the elevated water tank using specifications according to BS 6651 (British Standard Code of Practice for Protection of Structures Against Lightning).

10) Grounding of Medical Equipment

Grounding facilities will be installed for operation rooms and for X-ray units.

(9) Mechanical Work Plan

1) Air Conditioning Facilities

Operation rooms will be equipped with air-cooled, package-type, floor-standing, direct-flow air conditioners. Air cleaner units will be installed to maintain cleanness. The target level of cleanness will be class 10,000.

Other rooms for medical care will be equipped with individual air-cooled, split-type air conditioners. Other general rooms such as office rooms will have ceiling fans only.

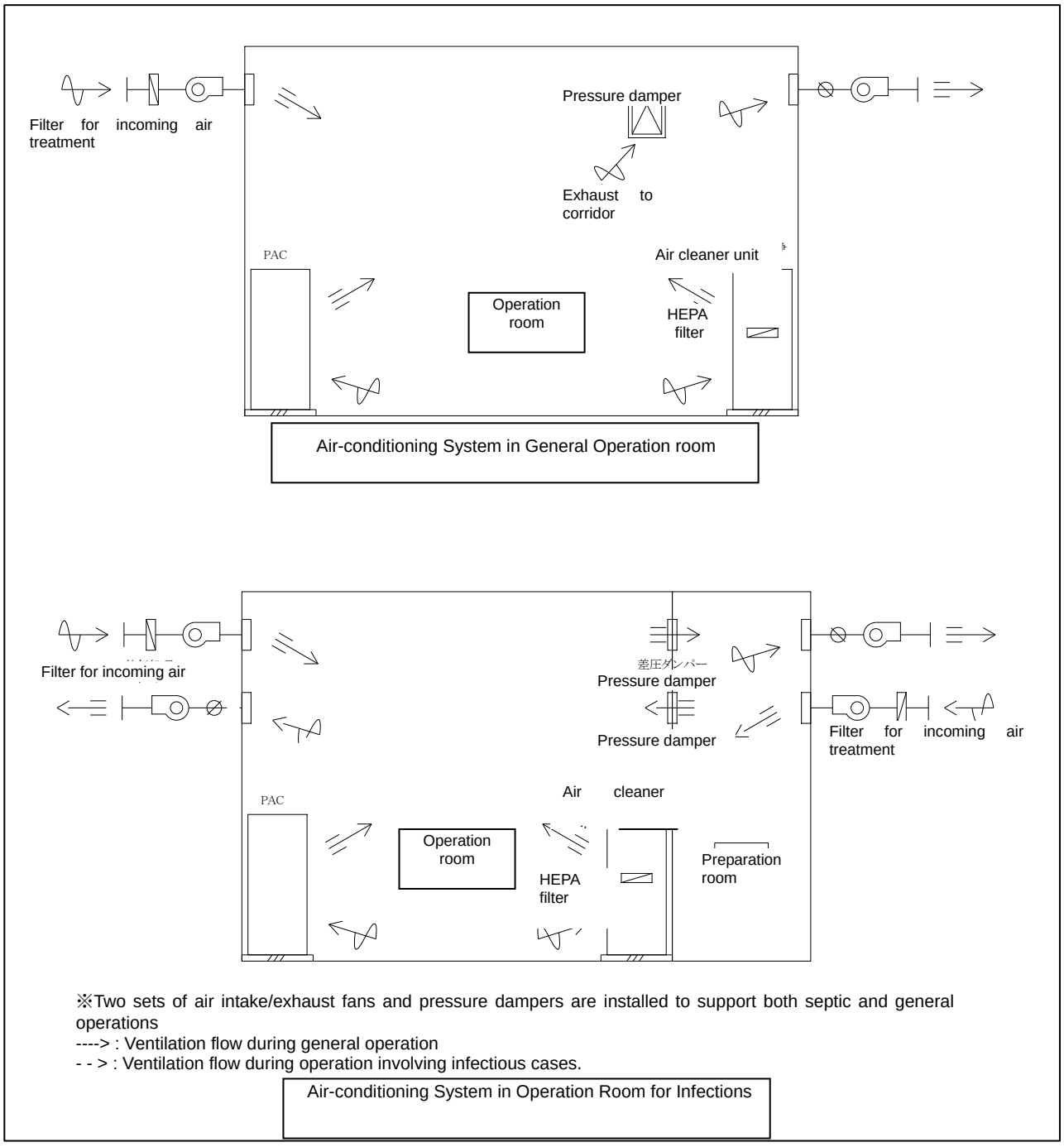


Fig. 2-6 Conceptual Drawing of Air-conditioning Systems

2) Ventilation Facilities

General offices and public areas will be equipped with ceiling fans.

Each operation room will have an independent ventilation system to prevent cross contamination between rooms. In addition, a pressure damper will be installed in clean area rooms to maintain positive pressure and ensure cleanness. In the rooms for the treatment of patients with infections, however, the room will be kept under negative pressure to prevent the leakage of harmful contaminated air.

Mechanical ventilation will also be equipped in storage, sluice, toilets, etc.

3) Sanitation Facilities

Appliances complying with local customs will be installed. Hand showers will be provided for lavatory cubicles.

4) Water Supply Facilities

City water will be used as tap water for general uses such as hand washing. Well water and rainwater will be used as non-potable water for uses such as toilet flushing.

- Tap Water

  City water will be taken from the city water mains buried under the Hospital Road to the south of the premises and stored in the water reservoir. A water softener will be installed, as water quality tests conducted during the Basic Design Study showed that the city water has high hardness.

  The water stored in the water reservoir will be pumped up to the elevated water tank and then supplied to points of use by gravity. This water will be sterilized using a UV sterilizer to maintain the cleanness required for the central functions of the Hospital.

- Non-potable Water

  The existing well and rainwater will be used as the source of non-potable water. Because direct water supply from the well to the elevated water tank will affect adversely the supply to other existing buildings, the well water will be stored in the water reservoir in the same manner as tap water. To maintain the quality of rainwater, rain falling on wall surfaces and ground surfaces will not be used as a water source. The water will be pumped up to the elevated water tank and then supplied to points of use by gravity.

  The materials used will be PVC pipes. Galvanized steel pipes will be used for pumping the water up to the elevated water tank.

- Estimated Water Supply

The estimated water supply in this facility is estimated as follows:

Persons in the facility:

Number of staff in the new building	Approx. 150 persons (120 L/day/person)
Outpatients (including family)	Approx. 1,500 persons (15 L/day/person)

Daily water supply:

150 persons x 120 L/day/person + 1,500 persons x 15 L/day/person ≒40,000 L/day

(40 m^3/day)

As the Project involves two water supply systems, tap water and non-potable water, the water supply must be calculated for each of these systems. According to Air Conditioning and Sanitation Technology Handbook (13th Edition), the ratio between tap water and non-potable water in a hospital is generally in the range of 60-66% : 40-34%. As the Project has no kitchens, the ratio is assumed to be 50 : 50. In this case, the quantity of water supply for each system will be as follows:

Tap water:	40 m^3/day x 0.5 ≒ 20 m^3/day
Non-potable water:	40 m^3/day x 0.5 ≒ 20 m^3/day

- Reservoir Capacity

Tap water reservoirs in Japan usually have a capacity equal to about 50% of the water quantity supplied daily. The tap water reservoir in this Project will have a capacity equal to 150% of quantity supplied daily, in view of the unstable supply of city water.

The reservoir for non-potable water will also have a capacity equal to 150% of the quantity supplied daily.

Tap water reservoir (underground pit)	30 m^3 (effective capacity)

- Elevated Water Tank Capacity

The capacity will be equal to about 20% of water quantity supplied daily.

Elevated water tank for tap water (made of concrete;)

5 m^3 (effective capacity)

20 m^3/day x 0.2 ≒ 5 m^3, dimensions: 2.5 m x 2.5 m x 1 m (H)

Elevated water tank for non-potable water (made of concrete;)

5 m^3 (effective capacity)

20 m^3/day x 0.2 ≒ 5 m^3, dimensions: 2.5 m x 2.5 m x 1 m (H)

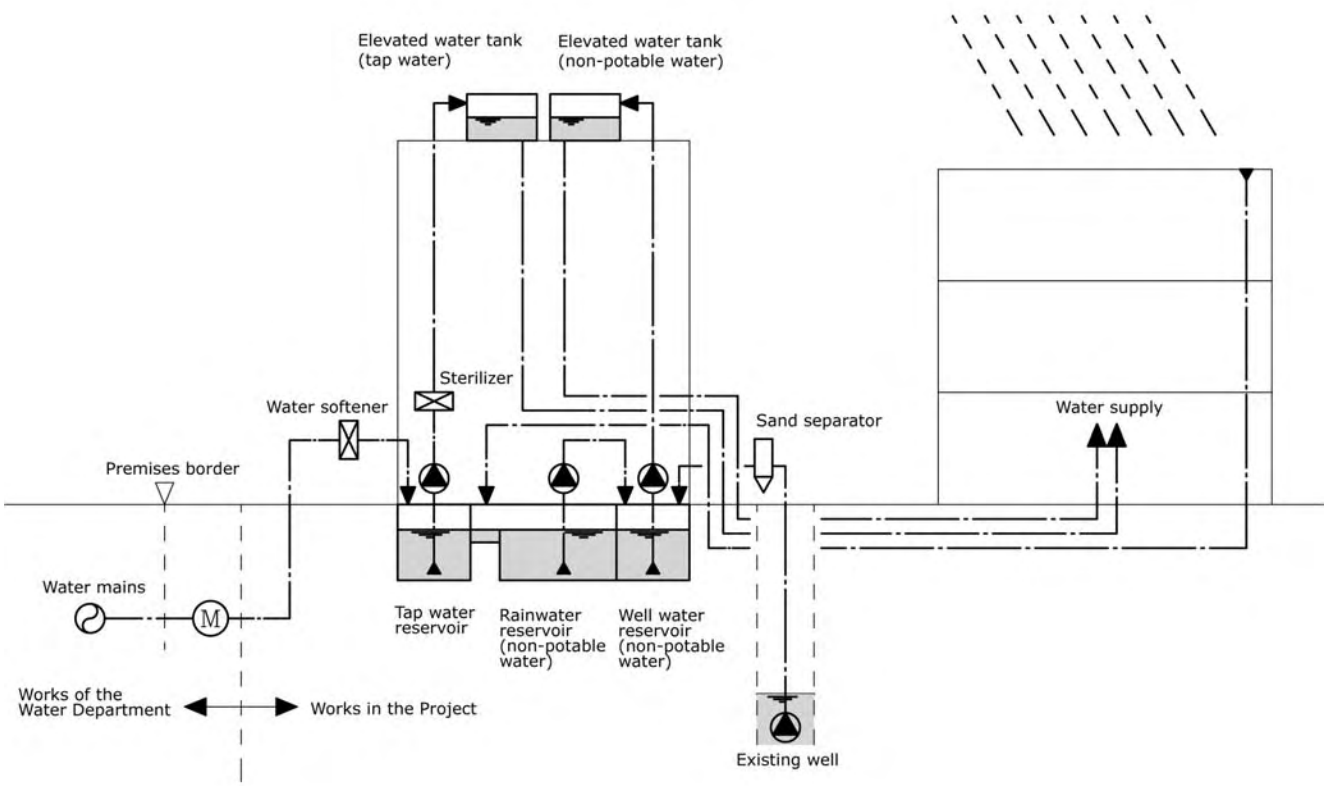


Fig. 2-7 Water Supply Flow Chart

5) Drainage Facilities

- Wastewater

Wastewater discharged from each building of the Hospital is treated at the Hospital's wastewater treatment plant, a facility located about 1.5 km from the premises, and then discharged into a lagoon. The results of the water quality tests conducted during the Basic Design Study were tolerable. Wastewater from the new building will be connected to the existing collection tank on the premises and treated at the existing Hospital's wastewater plant.

Laboratory wastewater and infectious wastewater will be connected to this wastewater system after neutralization treatment and sterilization treatment, respectively. The capacity of each tank will be about the same as the daily discharge quantity. The neutralization tank will also receive wastewater from the general wastewater system in order to mix the laboratory water with general wastewater for dilution and neutralization (due to the pH differential between these two types of wastewater).

- Capacity of the Sterilization Tank

3 hand scrub units * 25 L/use * 2 uses/h * 10 h = 1.5 ≒ 2 m^3

- Capacity of the Neutralization Tank

9 sinks * 25 L/use * 0.5 use/h * 10 h = 1.5 ≒ 2 m^3

Chemicals from X-ray film developer, fixer, etc. will be collected at the source in containers.

- Rainwater

All rainwater not collected for use will be discharged directly to the ditch along the road (Hospital Street) to the south of the premises.

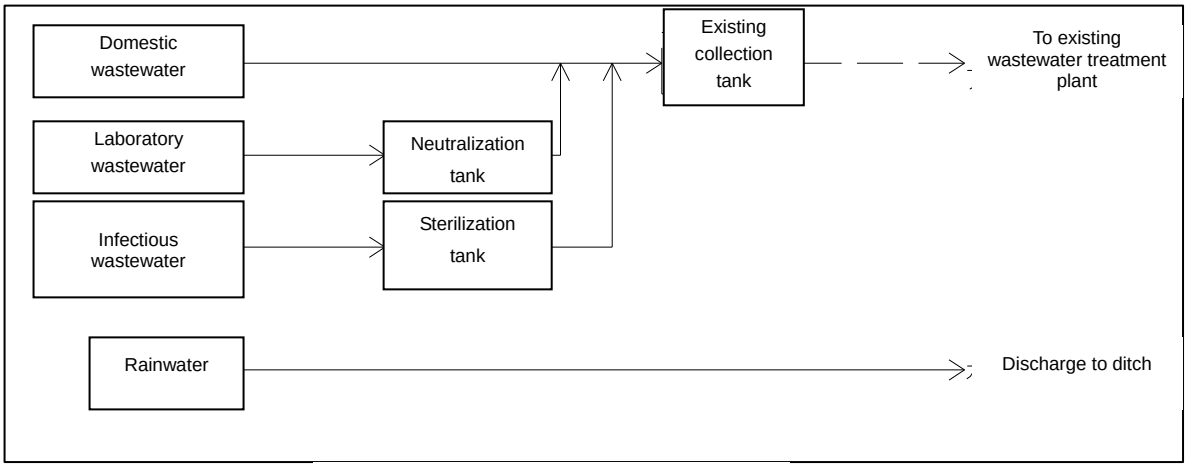


Fig. 2-8 Drainage Flow Chart

6) Hot Water Supply Facilities

Solar water heating panels will be installed on the rooftop of the building to supply hot water to points of use.

7) Firefighting Facilities

Indoor fire hydrants and connected water supply pipes will be installed.

Capacity of the Firefighting Water Tanks

18.2 m^3/floor x 4 floors ≒ 72.8 m^3

The fire department connection will be installed on the boundary wall facing the road to the south of the premises. Two sets of firefighting pumps will be provided in total, as advised by the Fire Department of Jaffna Municipality. Fire extinguishers will be placed on each floor.

8) Medical Gas Facilities

Centralized gas piping facilities for oxygen, nitrous oxide, compressed air, and vacuum will be installed.

The outlets currently used in the Hospital employ the diameter-indexed safety system

complying with British Standard (BS). The same type will be used in this Project.

Table 2-5 Medical Gas Installation Plan

	Oxygen (O^2)	Nitrous Oxide (N^2O)	Vacuum	Compressed Air	Scavenging	LPG	
Operation room	○	○	○	○	○	×	Installed on walls and ceiling
Preparation room	○	○	○	○	○	×	Installed on walls and ceiling
Recovery room	○×2	×	○	×	×	×	1 set/bed
ICU	○×2	×	○	×	×	×	1 set/bed
Laboratory	×	×	×	×	×	○	8 outlets

9) Incinerator Facility

The existing incinerator (made in 2000; combustion temperature of 800°C or more) will be used as is in operation condition.

10) Well Facility

The existing well (diameter 5 m, depth 8 m) will be used continuously.

11) Other

The autoclaves to be procured for the Central Supply & Sterilizing Department will be package-type units with electric steam boilers. Accordingly, no central steam boilers will be installed for the Project.

2. Equipment Plan

（1）Policy on Equipment Selection

Basis of the equipment plan will not be changed from the Basic Design Study in 2005. However, the items which were judged unnecessary or resulted in a reduction in quantities because the existing equipment could be used shall be reconsidered according to the current status of the equipment. Addition to the equipment plan or increase in the quantities shall be considered to the extent of the original request by Ministry of Health and Nutrition, for the equipment that broke after the Basic Design Study or these that would become too old to be used by the time of the completion of the construction work of the Project,

On the other hand, equipment that has become discontinued model, or those that the manufactures are extremely limited because of technology innovation, shall be excluded from the equipment plan.

Design policies of the equipment are as follows;

1) The level of equipment should be compatible with the current technical level of the recipient.

2) The equipment which are consistent with the maintenance and management capabiliteis of the Hospital and the Ministry of Healthcare and Nutrition.

3) The equipment which are cost-effective.

(2) Examination of Requested Equipment

Based on the design policies, necessity and relevance of the requested equipment were examined as follows. The result of the examination of each item is shown in Appendix-6.

1) Classification

a. Renewal: Equipment to be renewed.

b. New: Equipment to be newly procured which is not currently used.

c. Addition: Items similar to existing equipment which will be procured to replenish existing equipment.

2) Equipment Selection Criteria

Points to be examined	Contents of Examination	
①Purpose of use	○	Basic equipment suitable for the activities of the target facility
	△	Equipment that can be replaced by simpler alternatives, equipment that should be considered separately from the request.
	×	Equipment unsuitable for the activities of the target facility.
②Necessity	○	Equipment considered indispensable for the activities of the target facility.
	×	Equipment not strongly required for the activities of the target facility and with limited benefit; equipment whose main functions can be provided by existing equipment.
③Technical level	○	Equipment compatible with the current technical level.
	×	Equipment requiring a high degree of technical skill which may be difficult to acquire in the future.
④Operation	○	The facility already has or is expected to have the staff to operate the equipment.
	×	The facility is not expected to have the staff to operate the equipment.
⑤Maintenance	○	The equipment can be maintained easily and appropriately by the current staff. The manufacturer provides appropriate maintenance services, or consumables and spare parts are easily available locally.
	×	The equipment is difficult to maintain and maintenance burden is expected to cause problems after introduction of the equipment. Equipment requiring consumables and spare parts which are difficult to procure locally.
⑥Operation and maintenance cost	○	The equipment requires only low operation/maintenance cost, or the renewal of existing equipment will not impose a heavy burden in the budget allocation.
	×	New or added equipment requires high operation/maintenance cost and is expected to impose a heavy burden in budget allocation.
⑦Overall decision	○	Equipment considered appropriate and included in the Project.
	×	Equipment not included in the Project.

(3) Examination of Equipment for Each Department

1) Operation Theater Complex

The existing equipment which could be used at the Basic Design Study in 2005 have become old and some items of equipment were already out of order. In the year 2004, more than 24,500 operations were performed. The number of operations decreased in 2006 and 2007, but it started to increase again and about 23,200 operations were performed in 2008. The number of the operations is expected to increase more in the future.

Table2-6 Number of Operations in Jaffna Teaching Hospital

	2002	2003	2004	2005	2006	2007	2008
Major Operation	2,556	3,415	4,275	6,092	4,826	4,780	5,786
Int. Operation	4,671	5,726	5,132	4,902	2,766	1,950	3,300
Minor Operation	13,140	13,628	15,248	16,889	13,690	13,303	14,143
Total	20,367	22,769	24,655	27,883	21,282	20,033	23,229
Average in a day	55.8	62.4	67.5	76.4	58.3	54.9	63.6

As a result of the study, it was confirmed that the equipment which were relatively new and expected to be used after the completion of the construction work for the Project have already become old. The items of equipment which need to be added to the plan are as follows;

- C-arm X-ray unit: The existing equipment which is made in India in 2003 is already decrepit and renewal is needed.

- Instrument set (20 kinds): Few instrument sets had been renewed since the Basic Design Study stage. Most of instruments have nicked edge, rusted and deformed, so renewal is needed. 20 kinds instrument sets are planned (1 set each).

- Instrument table (3 kinds): Same as instrument set, instrument tables had not been renewed since the Basic Design Study stage. Most of the existing tables are deformed and casters are not working because of rust, so renewal is needed. 3 types of instrument tables are planned for each operation room.

- Operation chair: Operation chair also had not been renewed since the Basic Design Study stage and have become decrepit and deformed. 1 unit is planned for each operation room.

- Patient monitor: Patient monitor is requested for use in recovery room. At the Basic Design Study, it was planned that the existing patient monitor which was used in ICU would be moved to recovery room after the completion of the construction work for the Project. However, it has become too old and will not be able to use continuously. The capacity of the new recovery room is 8 patients, but it will not always be occupied by the serious patients who require these patient monitors. So 4 units, which is the half number of the capacity, are planned.

Ventilator was requested for Operation Theater Complex, but it is used in ICU and is not necessary in Operation Theater Complex. So it shall be excluded from the Project.

2) Intensive Care Units (ICUs)

Same as Operation Theater Complex, the equipment in ICU had not been renewed since the Basic Design Study stage. Most of ventilators which could be used at the Basic Design Study are out of order and simple ventilators are currently used as alternatives. In addition, the beds in ICU are always occupied and improvement of the equipment in ICU is an urgent matter. The equipment which need to be added to the plan are as follows;

- Suction unit, wall mount type: At the Basic Design Study, 7 units were planned out of 22

beds since the existing equipment could be used, however, the existing equipment are already too damaged to be used, so another 15 units shall be added to the plan.

- Syringe pump: It is usual that more than 1 syringe pump are used for 1 patient in ICU. At the Basic Design Study, 10 units were planned out of 22 beds, however, the existing equipment are too damaged to be used, so at least 22 units, which are the same number of the beds, need to be planned.

- Ventilator for adult: At the Basic Design Study, 7 units were planned out of 22 beds since the existing equipment could be used, however, the existing equipment are already too damaged, and simple ventilators are currently used as alternatives. Simple ventilators are for anesthetic apparatus and usually not used in ICU. However, they are now used in ICU because there are no options. The Hospital cannot provide adequate medical services with this situation. So 6 ventilator units need to be renewed.

- Emergency trolley: 1 unit each for surgical ICU and medical ICU are planned due to damage and deformation of the existing equipment.

3) Central Laboratory Complex

Same as other departments, the existing equipment have become old since renewal of the equipment had not been done for long time. Many of the existing equipment are already out of order and they are forced to perform the test manually or some tests cannot be performed. The equipment which need to be added to the plan are as follows;

- Automatic blood cell analyzer: 2 units which could be used at the basic design study became out of order in 2006 and they are unrepairable. After that, 1 unit was donated in 2008, but it is currently out of order. This donated one can be repaired, so 1 new unit is planned for the Project.

- Hemoglobinmeter: The equipment which could be used at the Basic Design Study became out of order in 2007 and it is unrepairable. Currently ELISA reader is used as an alternative, but ELISA reader itself is too damaged and not functioning well, so 1 unit is planned for the Project.

The following equipment planned at the Basic Design Study are excluded from the Project.

- Request No. LA-12, Flamephotometer: This item is used to examine metabolic status by analyzing electrolyte in blood or urine. Measurement method of this item is getting out of

date and the manufactures are extremely limited, so this item shall be excluded from the plan. The function of analysis of electrolyte shall be added to Blood gas analyzer (Request No. LA-06), which is planned to this department.

- Request No. LA-20, Micro plate viewer: This item is used to perform simple screening of the samples in micro plate by the naked eyes, but the manufactures of this item no longer exist, so this item shall be excluded from the plan. Screening of the samples can be performed by ELISA reader (Request No. LA-10) which is planned to this department.

4) Central Facilities for Diagnostic Imaging

During this Study, CT scanner was requested by the Sri Lanka side because the existing CT scanner which was donated from the Government of India in 2003 has become old. However, it turned out that the Ministry of Healthcare and Nutrition had a plan to renew the CT scanner by loans from the French Government, so CT scanner shall be excluded from the Project. In addition, regarding Request No. RA-13, X-ray system, fluoroscopy which was planned at the Basic Design Study, the Ministry of Healthcare and Nutrition had also a plan to renew it by the budget of the Sri Lanka Government, so X-ray system, fluoroscopy shall be excluded from the Project.

The equipment which need to be added to the plan are as follows;

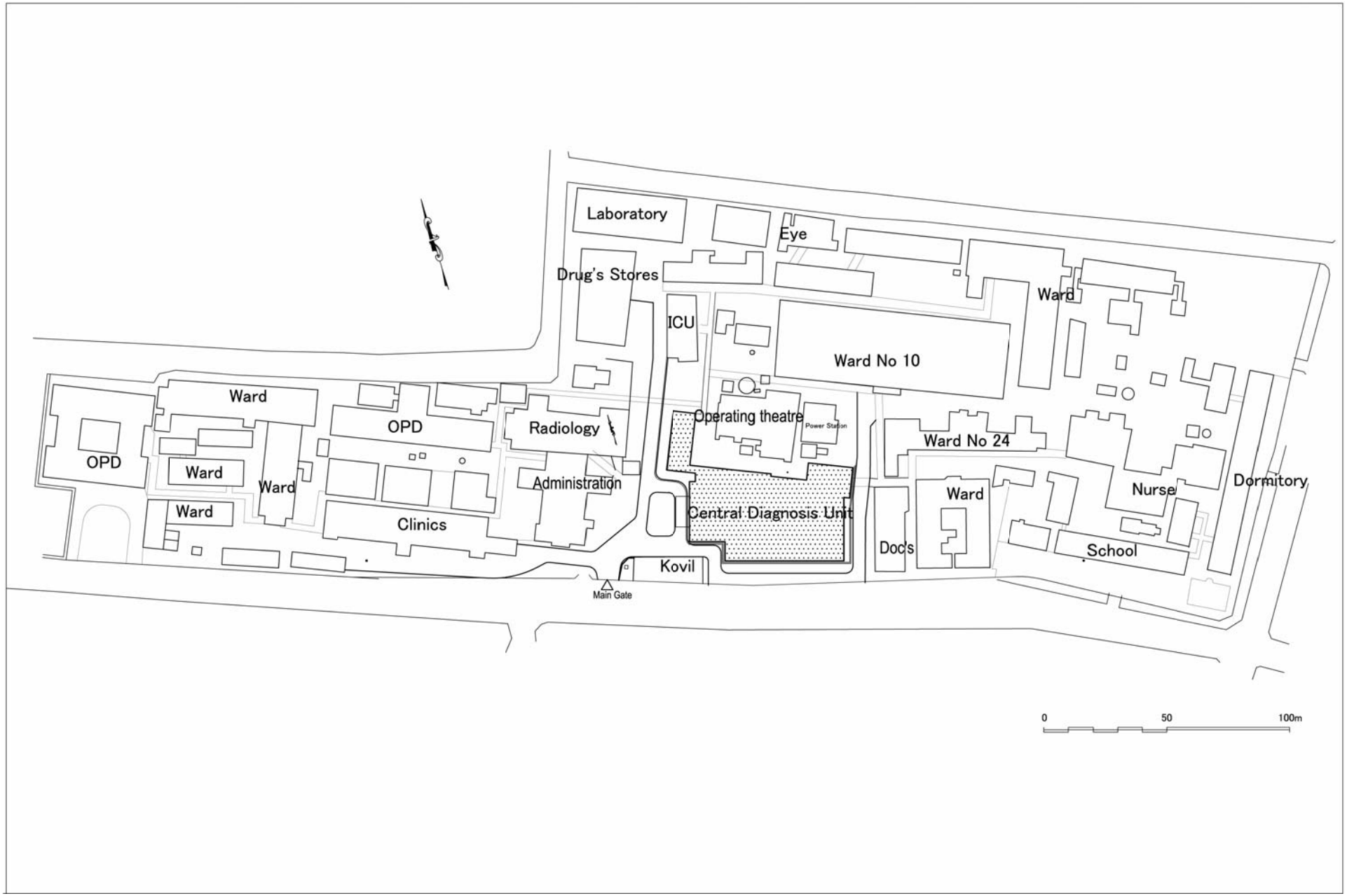
- Ambubag for adult: The existing equipment is too old to be used, so 2 units shall be renewed.

- Ambubag for pediatrics: The existing equipment is too old to be used, so 1 unit shall be renewed.

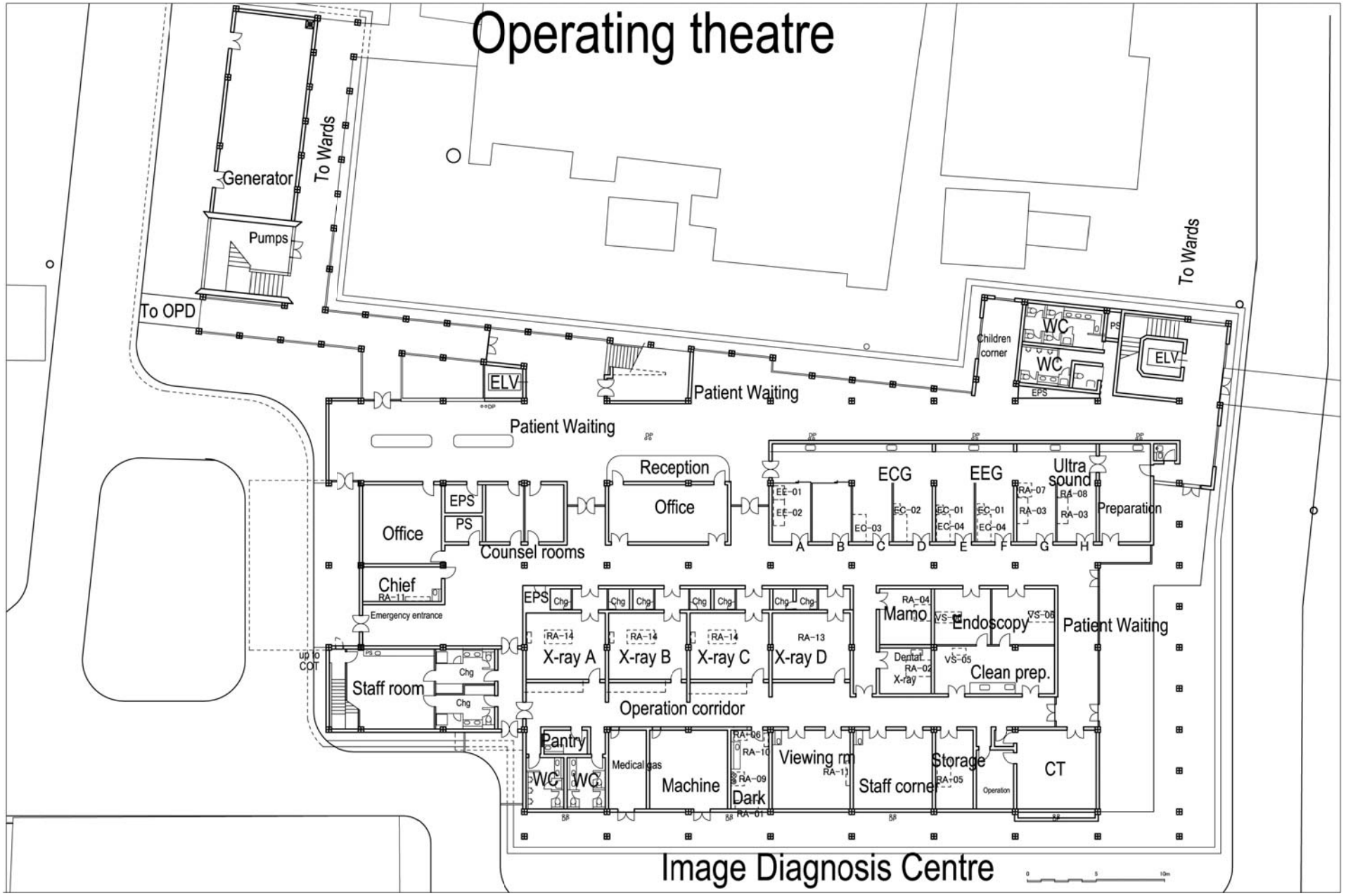
Stretcher: The existing equipment is too old to be used, so 1 unit shall be renewed.

2-2-3 Basic Design Drawings

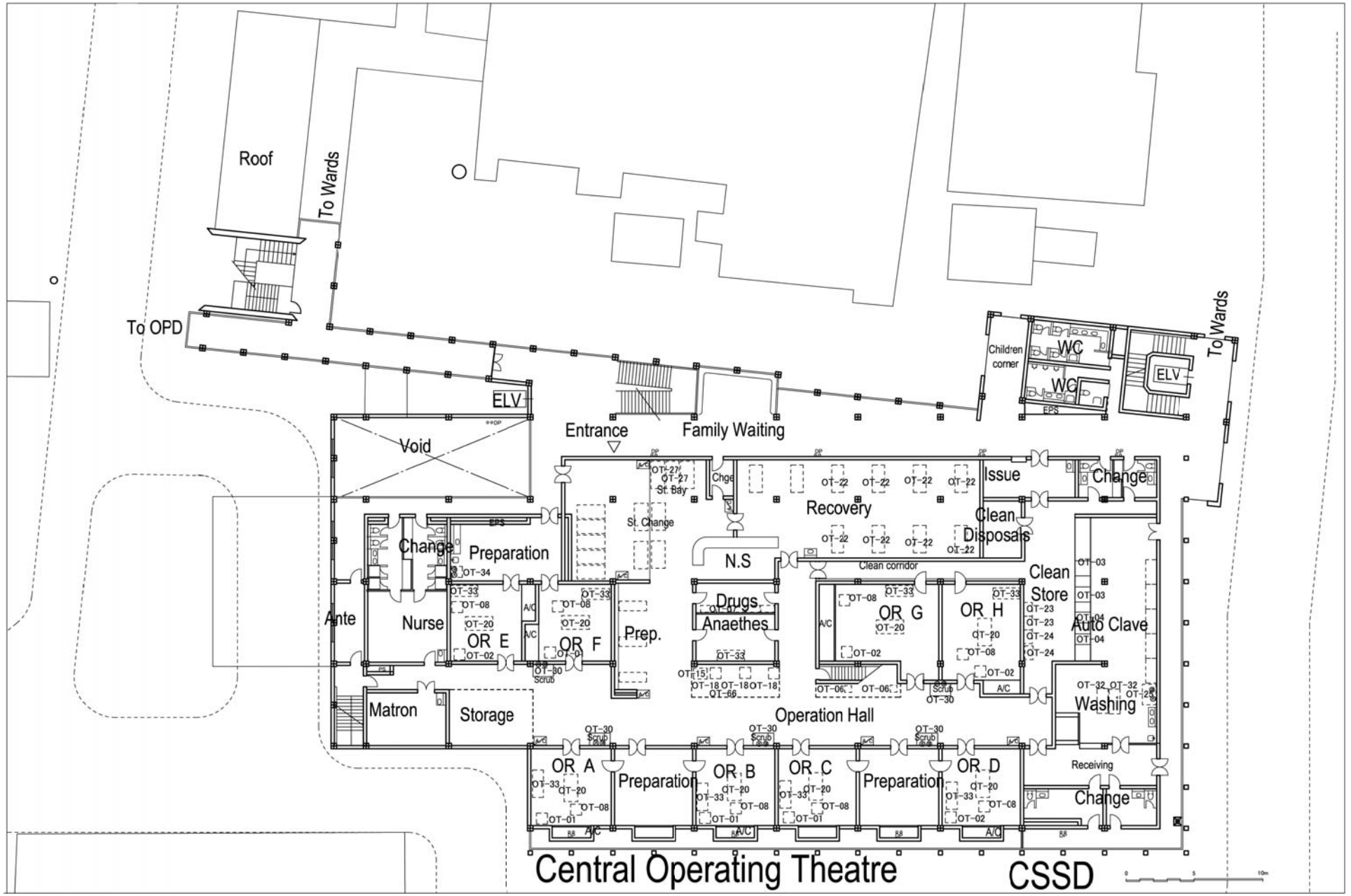
1. Site Plan
2. Ground Floor Plan
3. 1st Floor Plan
4. 2nd Floor Plan
5. 3rd Floor Plan
6. Elevations
7. Elevations
8. Sections
9. Future Plan


Laboratory
Eye
Drug's Stores
Ward
ICU
Ward No 10
Ward
OPD
Radiology
Operating theatre
Power Station
Ward No 24
OPD
Ward
Ward
Administration
Ward
Nurse
Dormitory
Ward
Central Diagnosis Unit
Clinics
Doc's
School
Kovil
Main Gate
0
50
100m

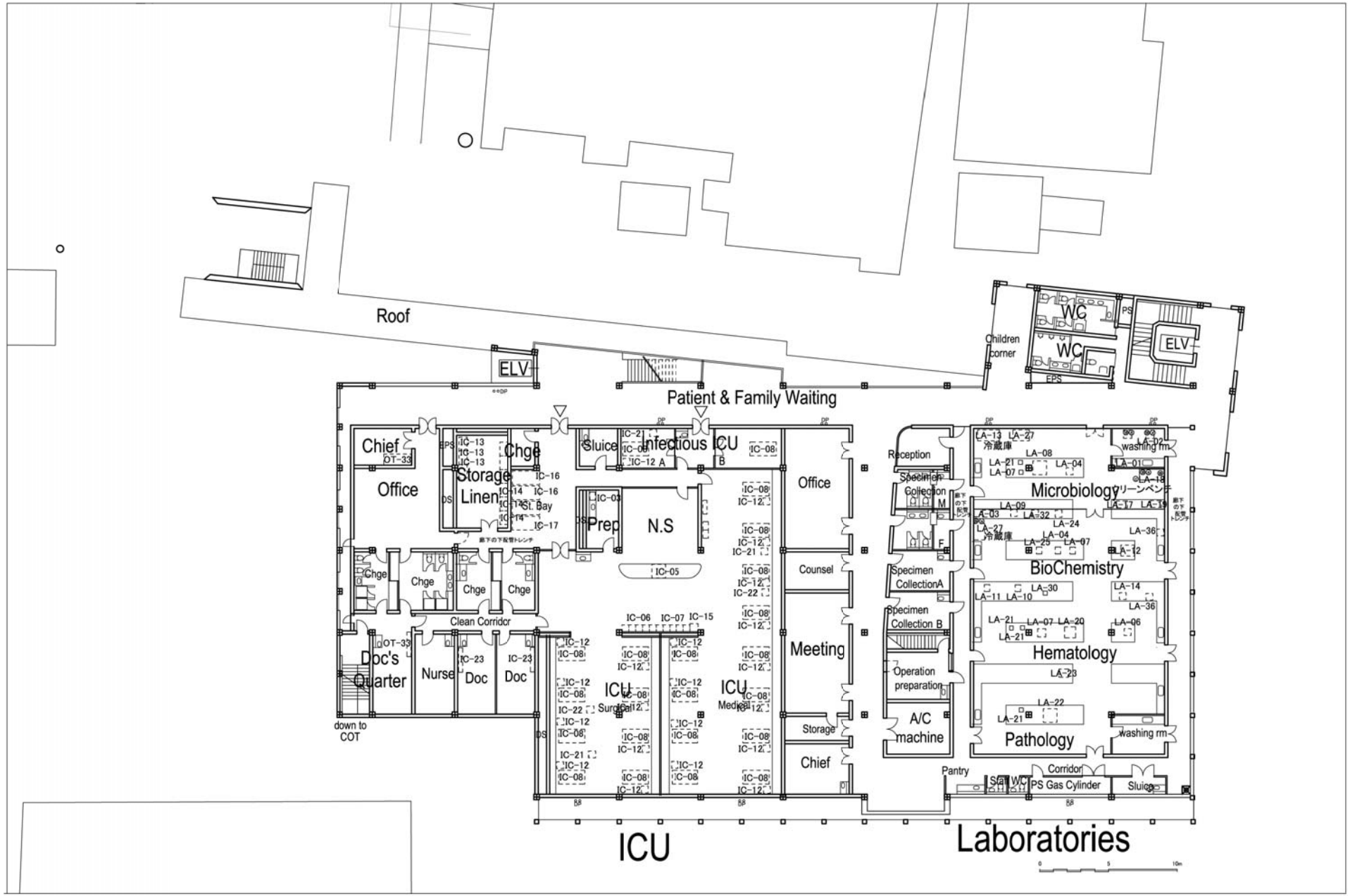
SITE PLAN



GROUND FLOOR PLAN



1st FLOOR PLAN



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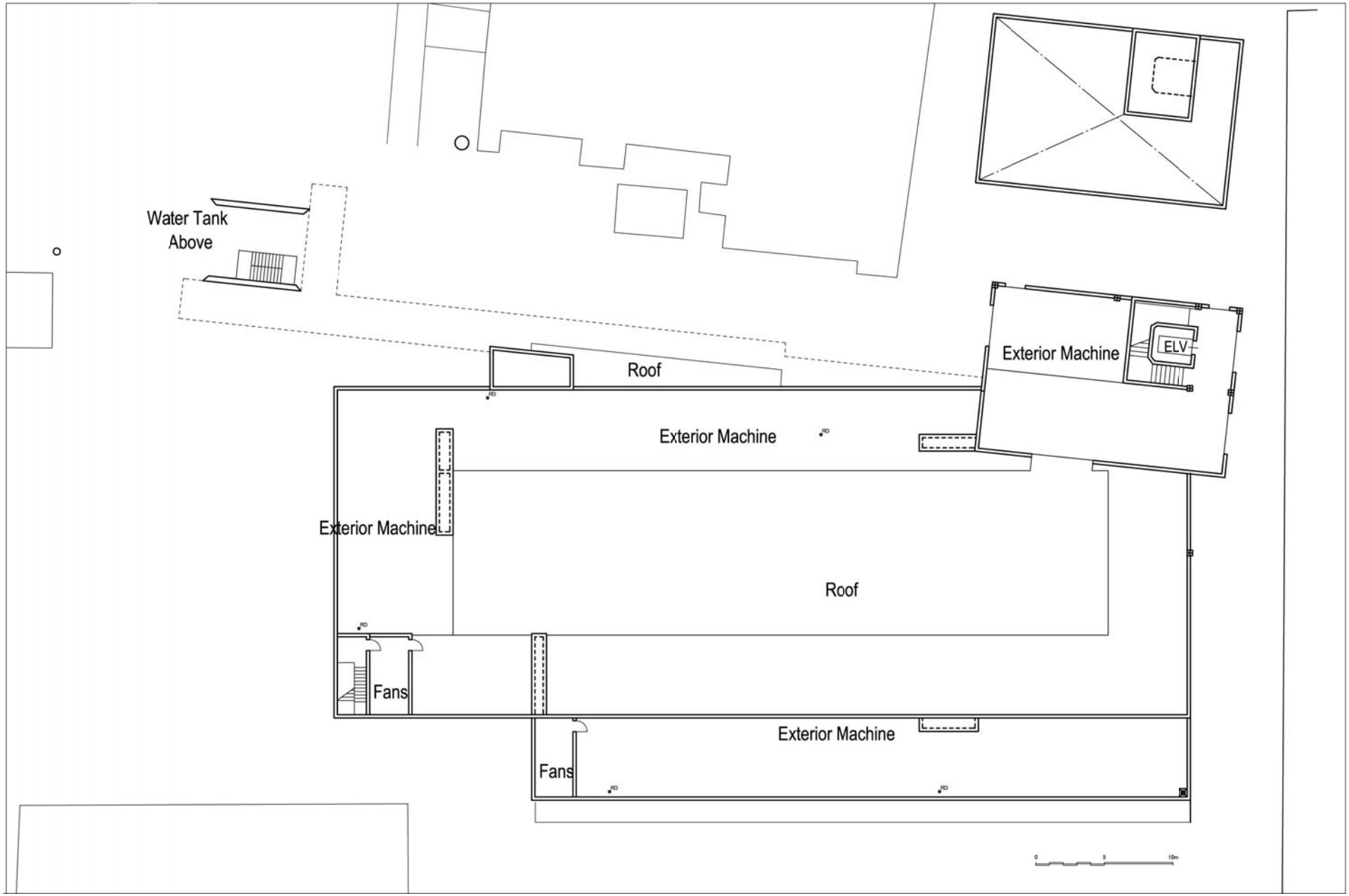

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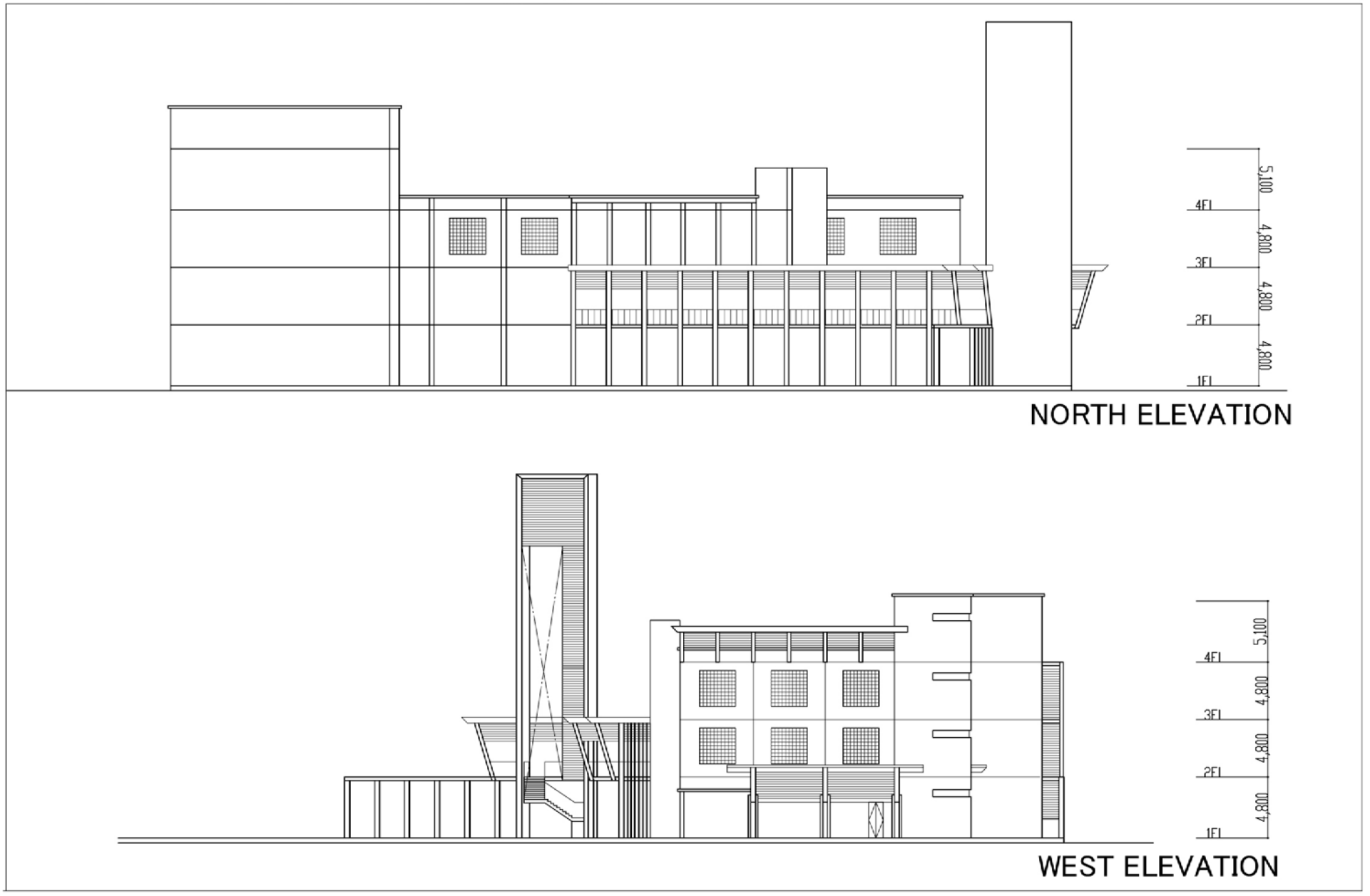
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3FL
4,800
2FL
4,800
1FL
NORTH ELEVATION
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2FL
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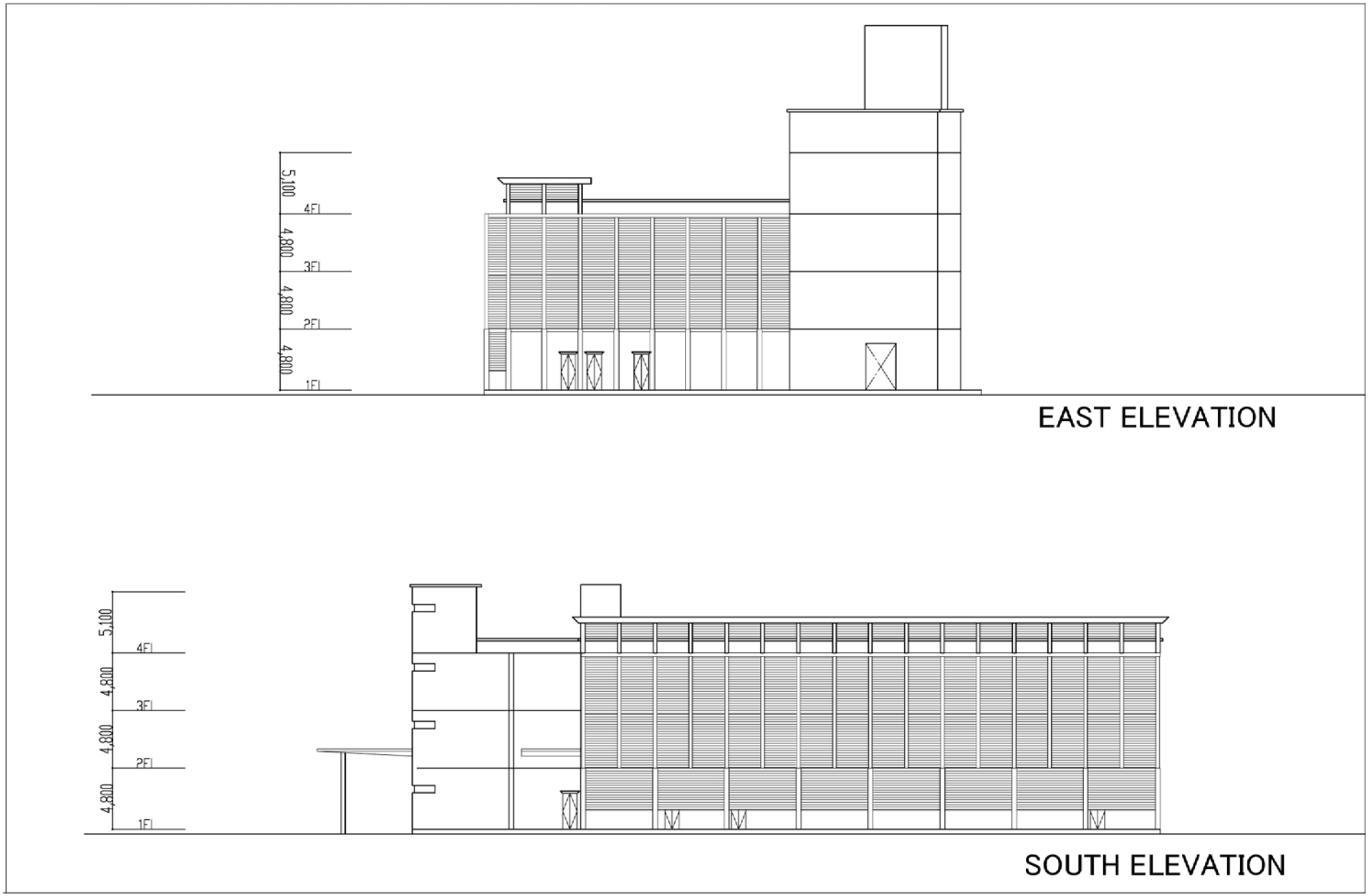
1FL
WEST ELEVATION

ELEVATIONS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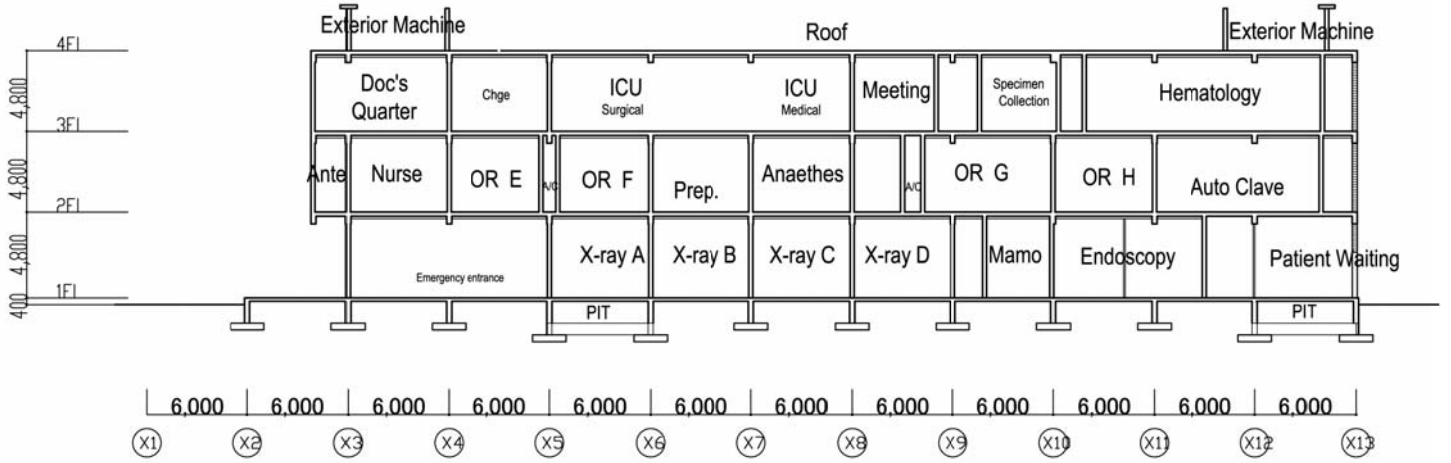
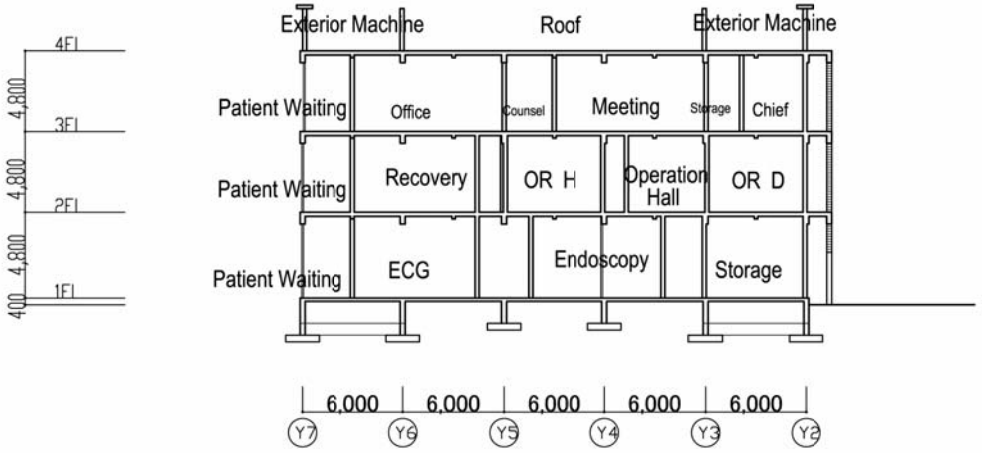
SOUTH ELEVATION

ELEVATIONS

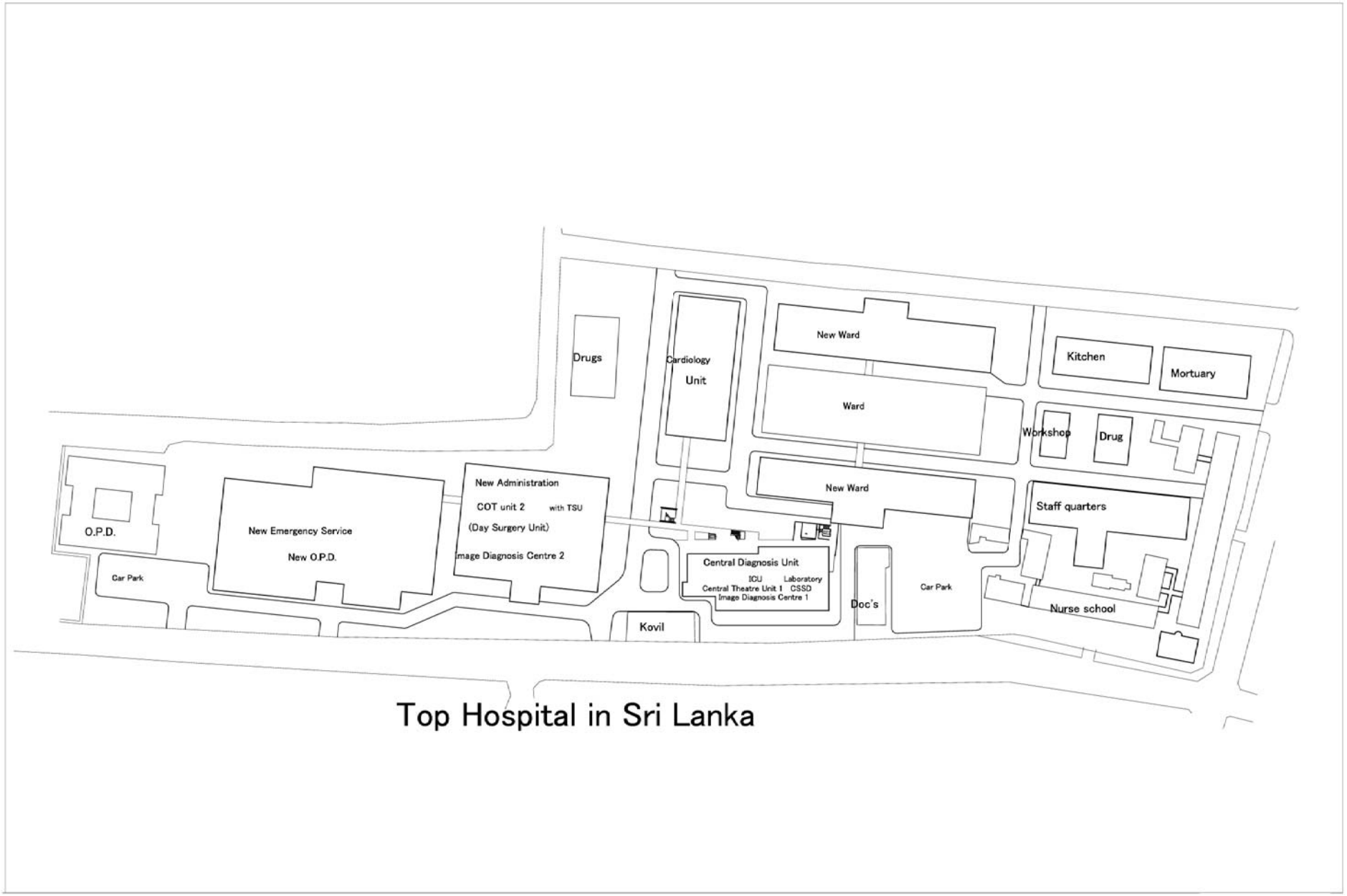


SECTION 1



SECTION 2

SECTIONS


Drugs
Cardiology
Unit
New Ward
Kitchen
Mortuary
Ward
Workshop
Drug
New Ward
Staff quarters
New Administration
COT unit 2 with TSU
(Day Surgery Unit)
Image Diagnosis Centre 2
O.P.D.
New Emergency Service
New O.P.D.
Car Park
Central Diagnosis Unit
ICU Laboratory
Central Theatre Unit 1 CSSD
Image Diagnosis Centre 1
Doc's
Car Park
Nurse school
Kovil
Top Hospital in Sri Lanka

FUTURE PLAN

2-2-4 Implementation Plan

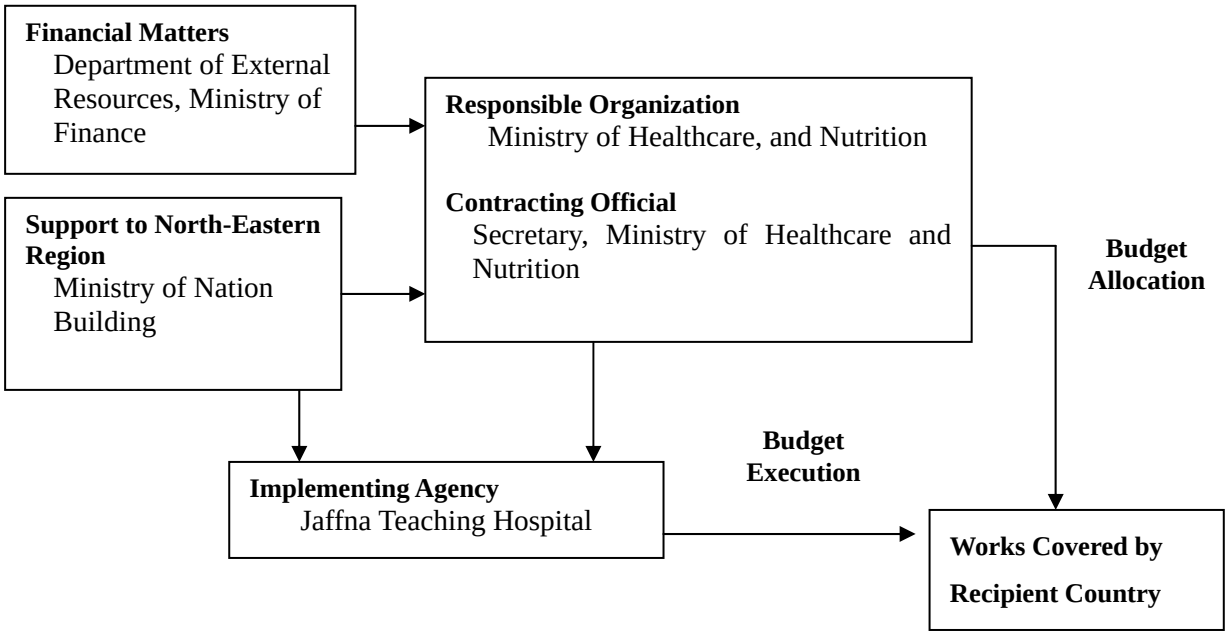
2-2-4-1 Implementation Policy

After the Project is approved by the Cabinet of Japan, the E/N will be signed between the government of Japan and the government of the recipient country to make a pledge for assistance, which is followed by the conclusion of Grant Agreement (hereinafter "the G/A") between JICA and the government of the recipient country to define the necessary articles to implement the Project.

The following section outlines the basic matters concerning construction of the facilities and procurement and installation of equipment in the Project.

2-2-4-1-1 Organizations in Recipient Country

The following organizations in the recipient country are involved in the Project implementation:



2-2-4-1-2 Contract Package

The Project consists of construction works and equipment works. It will be appropriate to contract them separately, given that the two categories of works are not closely related to each other, and that the construction companies that will be responsible for the construction works are generally not familiar with the procurement, installation and testing of medical equipment.

2-2-4-1-3 Consultant

After the signing of the G/A by both governments, the Ministry of Healthcare and Nutrition will conclude a consulting services agreement with a consultant in Japan and obtain verification of JICA. The consultant will prepare tender documents, assist in tendering, and execute construction and procurement/installation supervision, based on the Implementation Review Study Report on the Project and detailed design documents of the Project.

2-2-4-1-4 Contractors

The contractor undertaking construction works and the contractor undertaking equipment works will be selected from Japanese firms as prescribed under the grant aid system. The construction contractor will be selected by prequalification and tendering, and the equipment contractor will be selected by tendering. Based on the result of tendering, Ministry of Health and Nutrition will conclude a construction work contract and an equipment work contract with the lowest tenderers as a general rule, then obtain verification of JICA. Depending on the contents of works, the Japanese contractors may use subcontractors in Sri Lanka mainly for the purposes of labor, procurement of local materials, customs clearance, etc. however, the subcontractors must have a certain level of general capacity to satisfy the requirement of the contract documents.

There are contractors for the construction of residential buildings in Jaffna. However, none of them can perform construction of large-scale public facilities, as no major developments were undertaken in the area during the civil war. Thus, most local contractors will need to be found in Colombo. Private hospitals are constructed actively in Colombo for these years, and local contractors have enough experience with this type of project. However, tasks requiring more sophisticated construction method, have usually been handled by technicians from other countries, such as Singapore. In the Project, technicians will need to be dispatched from Japan or third countries to handle medical gas works, fixture works requiring high air-tightness, flooring requiring flat finishing, works related to power supplies for medical equipment, air-conditioning works requiring a high level of cleanliness etc.

2-2-4-2 Implementation Conditions

2-2-4-2-1 Procurement of Materials

The contractors will need to procure almost all local construction materials from Colombo and other areas in Sri Lanka. Imported materials will be disembarked at Colombo Port, cleared through customs, and transported northward along A-9 Road. This road is the only route for both domestic and

imported materials to pass through the northern region. From a logistical perspective, the development of meticulous procurement plans and sufficient inventories of construction materials near the construction site will be crucial to prevent delays in the construction progress schedule. For this purpose, a site for the storage of construction materials must be secured near the construction site.

2-2-4-2-2 Construction Works on the Hospital Premises

As the construction site is adjacent to the Hospital Road, construction vehicles will be able to directly enter the site without passing through the premises of the Hospital. The construction vehicles will have to share the road with patients and medical staff in automobiles and ambulances traveling to and from other hospitals, as only one road has access. Thus, traffic safety watchmen and other safety measures will be required for the control of the use of the Hospital Road by the construction vehicles.

A Hindu temple is located next to the construction site within the premises of the Hospital. Contractors and others will have to be considerate of temple worshipers on a daily basis. Care must also be taken to remember the dates of festivals and religious events, and accommodate them however possible.

The existing Operation Theater Building is also located next to the construction site. Therefore, special attention must be paid to vibration and dust generated by construction works.

2-2-4-2-3 Security Measures

Although the hostility between the government and LTTE has ended, it is necessary to work on the basis of safety first, taking measures such as constant information collection concerning the security in the northern region and interruption of works as needed at the time of disorder.

2-2-4-3 Scope of Works

The construction, procurement, and installation works will be implemented through the cooperation between the Governments of Japan and Sri Lanka in the framework of Japanese grant aid. The following summarizes the contents of works and tasks to be covered by each country.

1. Works Covered by Grant Aid from the Government of Japan

(1) Works Related to Facilities

- Construction of the building described in the Implementation Review Study Report on the Project (including electrical, air-conditioning, sanitary and plumbing facilities)
- Water facilities needed in the building constructed in the Project (including water reservoir

and elevated water tank)

- Drainage facilities to the point of connection to the sewer on the premises (including neutralization tank and sterilization tank)
- Provision of temporary office, workers' lodgings, materials yard, etc.

(2) Works Related to Equipment

- Procurement and installation of medical equipment described in the Implementation Review Study Report on the Project.

(3) Infrastructure Works

- New electrical, water supply, and drainage facilities in the construction site

(4) Exterior Works

- Pavement of walkways, exterior lamps, and border fences facing the road in the construction site

(5) Related Procedures

- Transportation of materials and equipment from Japan and/or a third country to Sri Lanka, and procedures related to the transportation of materials and equipment
- Inland transportation within Sri Lanka

2. Works Covered by the Government of Sri Lanka

(1) Works Related to Premises and Exterior

- Relocation of hospital functions in the construction site; renovation of existing buildings as needed
- Rerouting of existing connecting corridors in the construction site
- Demolition of existing buildings, existing border fences, trees, and other obstacles, and leveling of the ground
- Rerouting of existing electricity conduits, water pipes, and other utility lines in the construction site
- Exterior works, including planting and landscaping

(2) Infrastructure Works

- Provision of an electric power line to the site and payment of levies
- Provision of a telephone line to the site and payment of levies
- Provision of water supply and drainage connections and payment of levies

(3) Works Related to Preparation for Construction

- Provision of a piece of land for temporary office, workers' lodgings, materials yard, etc. near to the premises of the Hospital

(4) Works Related to Equipment, Furniture, and Fittings

- Moving and installation of existing equipment to be relocated to the building constructed in this Project
- Procurement and installation of the equipment, furniture and fittings, etc. not covered by the Government of Japan

(5) Procedures and Bearing of Costs

- Costs related to Banking Arrangement (B/A) and Authorization to Pay (A/P).
- Costs related to tax exemption procedures
- Prompt execution of customs clearance
- Procedures required in relation to inland transportation
- Exemption of Japanese nationals engaged in the implementation of the Project (based on verified contracts) from customs duties, internal taxes, and fiscal levies which may be imposed in Sri Lanka
- According the said Japanese nationals with such facilities as may be necessary for their entry into Sri Lanka and stay therein
- Maintenance costs for appropriate and effective operation of the facility and equipment
- Cost of various procedures related to construction, including but not limited to, building permission, inspection and building usage permission.
- All the expenses, other than those covered by the Japanese Grand Aid, necessary for the Project.

2-2-4-4 Consultant Supervision

In accordance with the grant aid system of the Government of Japan, the Japanese consultant firm will conclude a consultant agreement with the responsible organization of the Government of Sri Lanka and execute the supervision of construction/equipment works. The purpose of the supervision is to confirm whether or not the works are implemented according to contract documents; provide instruction, advice, and coordination during the work period from a fair position to ensure appropriate execution of the work contract; and to monitor the quality of work. The works of the consultant include the following:

1. Assistance in the Tendering and Construction Contract and Equipment Contract

The consultant will prepare tender documents and other materials needed for tendering to

select the Japanese contractors undertaking construction works and equipment works; assist the Sri Lanka side in carrying out tender including tender announcement, receiving of tender applications, prequalification, distribution of tender documents, acceptance of tenders, and evaluation of tenders; and provide assistance for the conclusion of contracts between the responsible organization of Sri Lanka and the contractors.

2. Instruction, Advice, and Coordination to Contractors

The consultant will review work schedules, work plans, plans for procurement of construction materials and machinery, plans for equipment procurement and installation, etc., and provide instruction, advice, and coordination to contractors.

3. Inspection and Approval of Working Drawings, Production Drawings, etc.

The consultant will inspect the working drawings, production drawings, and other documents, submitted by contractors, and provide approval after giving instructions or making corrections where necessary.

4. Confirmation and Approval of Construction Materials and Machinery and Medical Equipment

The consultant will confirm that the construction materials and machinery and medical equipment to be procured by the contractors are in conformity with the construction contract documents, and approve the use of such items.

5. Plant Inspection

As needed, the consultant will attend the inspections of the production processes of construction parts and medical equipment to verify product quality and performance.

6. Reporting of the Progress of Work

The consultant will keep track of the work processes and the situation of the project sites and report the progress of work to the pertinent organizations of both countries.

7. Completion Inspection and Test Operation

The consultant will conduct completion inspection and test operation of facilities and equipment, confirm the conformity with the contract documents, and submit inspection reports to the Sri Lanka side.

In view of the scale of the Project, the consultant will assign one engineer as a resident supervisor to Sri Lanka throughout the whole work period. Specialized engineers will also be dispatched to the project site as appropriate, according to the progress of works to perform necessary inspection, instruction, and coordination. Engineers in charge of the Project will also be assigned in Japan in order

to establish lines of communication between the project site and backup personnel in the head office. These engineers stationed in Japan will report on the progress of the Project, payment procedures, completion and transfer, and other issues to the relevant officials of the Government of Japan.

2-2-4-5 Quality Control Plan

Prior to the commencement of construction works, the consultant will direct the Japanese contractor to prepare work manual, including inspection parameters, control values, contents of inspection, test methods, curing methods, work methods, applicable standards, etc. as listed below, and perform quality control.

Table 2-7 Quality Control Plan

Work Type	Control Parameter	Control Value	Test Method	Quality Standards	Frequency of Measurement	Treatment of Results
Earth work	Bearing capacity of ground	Ra=250kN/m^2 or more (long-term)	Plate bearing test	JGS1521-1995	2 locations or more	Test report
	Slope angle	Within planned range	Gauge, visual	JIS	As needed	Photos, documents
	Bedding accuracy	Within +0～-5cm	Level, visual	〃	〃	〃
	Foundation work height	Within +0～-3cm	〃	〃	〃	〃
	Thickness of replaced soil	+5cm～0	〃	〃	〃	〃
Reinforcement bars	Reinforcement cover thickness	Places not in contact with soil: 30m/m Places in contact with soil: Footing 60m/m Other 40m/m	Visual, measurement	BS,JIS Specifications	As needed	Photos, documents
	Processing accuracy	Stirrup, hoop ±5m/m Other ±10m/m	〃	〃	〃	〃
	Tensile test	Standard strength or more	On-site sampling or sampling at shipping	BS, JIS	1 test on 3 test pieces per 300t of steel bars with given diameter*	Test result report
Concrete work (on-site mixing)	Compressive strength	Designed strength 27N/mm^2 or more	Attending at test site (any time)	BS, JIS	3 or more test pieces for each placing and per 50m^3	Test result report
	Slump value	15cm±2.5cm	Attending at work site		For each placing	Photos, documents
	Chloride content	0.3kg/m^3 or less	Test pieces, attending at work site		〃	〃
	Air content	45% ±1.5%	Attending at work site		For each placing	Photos, documents
	Concrete temperature	35 deg. or less	Attending at work site		For each placing	Photos, documents
Masonry	Compressive strength of concrete blocks	40～70kg/cm^2	Attending at test site after selection of manufacturer		Once before shipment from factory	Test result report
Plastering Painting Roof waterproofing Fixtures	Materials, storage methods, work methods, mixing, coating thickness, curing, work accuracy	According to separate specifications	Same as left	Same as left	As needed	Photos, documents
Water supply & drainage	Water supply pipes	〃	Pressure test	BS, JIS	On completion of pipe laying, for each system	Test result report
	Drainage pipes		Water filling test			
Electrical work	Cables	〃	Insulation test	BS, JIS	〃	〃
			Conductivity test			

* The test may be omitted if an Mill Sheet is available for confirmation

2-2-4-6 Procurement Plan

1. Policies Concerning Procurement of Materials and Equipment

The materials and equipment used in the Project will be procured in accordance with the following policy. Products complying with Sri Lankan Standards and/or British Standards (BS), the prevailing standards used in the recipient country, will be procured. If above-mentioned standards for particular items are unavailable or inappropriate, Japan Industrial Standard (JIS) will be applied.

(1) Local Procurement

To facilitate maintenance and repair after the completion of the facilities, materials and equipment will be procured locally whenever possible. Products which are normally imported to the recipient country and available in the market will be regarded as local products.

(2) Procurement by Importation

If imported products cannot be procured locally in sufficient quantities, such products will be imported from Japan and/or a third country.

2. Procurement Plans for Materials and Equipment

The plans for procurement of main materials and equipment used in construction works and in equipment works are as shown below.

Table 2-8 Plan for Procurement of Construction Materials and Equipment

Work Type	Item	Source			Remarks
		Local	Japan	third country	
Construc-tion work	Cement	○			BS-compliant products normally available in the local market.
	Sand	○			River sand is regulated and the supply is unstable.
	Gravel	○			Will be procured from Colombo or other areas.
	Reinforcement bar	○			Local products are available.
	Form panels	○			Local products are available.
	Terrazzo tile	○			Local procurement is possible.
	Tile	○			Imported products are available locally.
	Epoxy poured flooring		○		Japanese are advantageous both in quality and price.
	Glass	○			Imported products are available locally.
	Timber	○			Local procurement is possible.
	Aluminum sash	○			Local procurement is possible.
	Doors for operation rooms and X-ray rooms		○		Japanese are advantageous both in quality and price.
	Wood fixture	○			Produced locally.
	Fitting for fixture	○			Imported products are available locally.
	Paint	○			Same as above..
Plumbing/ Mechanical work	Pump	○			Local procurement is possible.
	Fan	○			Same as above.
	Sanitary wares	○			Same as above.
	Sanitary wares for handicapped	○			Same as above.
	PVC pipe	○			Same as above.
	Galvanized steel pipe	○			Same as above.
	Fire hydrant	○			Same as above.
	Fire extinguisher	○			Same as above.
	Solar panel heater	○			Same as above.
	Electric water heater	○			Same as above.
	Medical gas system		○		Japanese are advantageous both in quality and price.
	Air conditioners	○			Local procurement is possible.
	Air cleaners	○			Same as above.
	Ducts	○			Same as above.
	Copper pipings	○			Same as above.
Electrical work	Main Distribution Board, switchboard	○			Local procurement is possible.
	Emergency generator	○			Same as above.
	Lighting fixture	○			Same as above.
	Alarm bell facility	○			Same as above.
	Conduit (PVC pipe)	○			Same as above.
	Power supply facility for medical equipment		○		Japanese are advantageous both in quality and price.

3. Equipment Procurement Plan

(1) Procurement Plan

In principle, the equipment to be procured under the Project shall be the products of Japan or Sri Lanka. However, if it is considered favorable in terms of price, maintenance or widespread use in Sri Lanka, procurement of the products from the third countries is also accepted. For acceptance of the products from the third countries, the approvals from the both countries are necessary after deep consideration of the following conditions. Regarding procurement of the products of Japan or Sri Lanka, reliability of

delivery time and price advantages shall be considered.

- The manufacturer has a branch office or local agent in Sri Lanka so that maintenance services are easily available.
- Failure and other troubles are rare and maintenance cost is low.
- There is no product of Japan or Sri Lanka or it does not meet the specifications.
- Only easy maintenance is required and maintenance system of manufacturer is well-established.
- The products are widely used in Sri Lanka.
- The products can be delivered within the time limit of the G/A.

The equipment which have the possibility of third country origin are as follows;

Table 2-9 Equipment which have the possibility of third country origin

Item No.	Description
OT-01	Anesthetic apparatus
OT-02	Anesthetic apparatus with ventilator
OT-03	Autoclave, large size
OT-04	Autoclave, medium size
OT-06	Defibrillator
OT-10	Laryngoscope set
OT-15	Neonatal resuscitator with over head warmer
OT-16	Operation lamp, complete type
OT-17	Operation lamp, simple type
OT-18	Operation lamp, mobile with battery back up unit
OT-19	Operation monitor
OT-31	Syringe pump
OT-34	Automatic disinfector
OT-41	Instrument set for eye surgery
OT-50	Instrument set for skin grafting
OT-59	Operation chair
OT-60	Patient monitor
IC-05	Central monitor
IC-06	Defibrillator
IC-08	ICU bed
IC-09	Infusion pump
IC-10	Laryngoscope set
IC-11	Ophthalmoscope
IC-12A	Patient monitor A
IC-12B	Patient monitor B
IC-12C	Patient monitor C
IC-15	Spot lamp
IC-17	Stretcher, radiotransparent
IC-20	Syringe pump
IC-21	Ventilator for adult
IC-22	Ventilator for pediatrics

Item No.	Description
IC-24	Emergency trolley
LA-03	Automatic biochemistry analyzer
LA-04	Electronic balance
LA-05	Bilirubinmeter
LA-06	Blood gas analyzer
LA-10	ELISA reader
LA-11	ELISA washer
LA-13	Deep freezer
LA-17	Incubator
LA-18	Laminar flow cabinet
LA-21	Microscope
LA-22	Microscope with CCD camera and monitor
LA-23	Microtome, rotary type
LA-24	Osmometer
LA-25	PH meter
LA-26	Plate incubator
LA-30	Semi automated coagulation analyzer
LA-32	Spectrophotometer
LA-38	Hemoglobinmeter
RA-01	Dark room accessories
RA-04	Mammography unit
RA-06	Pass box
RA-09	X-ray film processor
EE-01	EEG
EC-02	ECG, holter testing
EC-03	ECG, stress testing
CO-01	Multimedia projector

4. Transportation Plan

(1) Equipment procured from Japan or the third countries

- Ocean transportation

The equipment procured from Japan or the third countries shall be packed in damp-proof packing and shipped from each country and discharged at Colombo Port. Regular liner service is available and it takes about 1 month from Yokohama to Colombo.

- Inland transportation

After custom clearance, the equipment shall be transported from Colombo Port to the construction site by containers, taking A-9 Road via A-1 and A-6 Road, which is approx. 425km away from Colombo.

(2) Equipment procured locally

Most of local agents are located in Colombo. Generally, the equipment procured from local agent shall be delivered to the construction site by the local agent.

2-2-4-7 Operational Guidance Plan

The supplier shall implement the following trainings for medical staff of each department and staff of BES Jaffna Teaching Hospital branch so that the equipment procured under the Project will be appropriately used and maintained.

- Operation training (explanation of outline of the equipment, operation instructions, precautions in operation etc.)
- Maintenance training (guidance of daily and periodical check method, trouble shooting etc.)

In addition, necessary documents for operation and maintenance, such as manuals and contact information of manufacture/agent shall be supplied by the supplier.

2-2-4-8 Soft Component (Technical Assistance) Plan

All the work related to medical equipment of governmental medical institutions in Sri Lanka is conducted by BES. However, current management system of the maintenance work is paper based and all the related documents are written by hand.

In BES Jaffna Teaching Hospital branch, currently 2 engineers are dispatched from BES head office. They have little chance to get any training, and is difficult to improve the maintenance skill for the latest electronic medical equipment.

In Jaffna Teaching Hospital, there are few medical staff who are familiar with preventive maintenance method. Without this preventive maintenance, medical equipment will break up much earlier than expected life time. Moreover, medical staff does not layout the equipment properly and they keep the broken equipment.

To solve these problems, soft component related to technical assistances for improvement of management system of maintenance work, for learning of maintenance method of the equipment and how to organize the workspace based on 5S principles (Sort, Set, Shine, Standardize, and Sustain) is planned under the Project.

Details of the soft component are shown in Appendix-12.

2-2-4-9 Implementation Schedule

When the Governments of Sri Lanka and Japan sign the E/N, and the Government of Sri Lanka and JICA sign the G/A concerning the implementation of the Project, the construction of the facility and the procurement / installation of equipment will be conducted in the stages outlined below.

1. Tender

The consultant will start the tender procedures after the conclusion of the consulting agreement for supervision services. Construction works and equipment works will be ordered separately, and the contractor undertaking each category of work will be determined by tender. The works related to tender procedure will take about 5.0 months.

2. Construction Works and Equipment Works

The work term of this stage is expected to be about 21.0 months.

In view of the contents and scale of the Project, local situations concerning construction and equipment procurement, and other factors, the Project will be implemented over a period of three fiscal years. Tender for construction works will be held in the first year, subsequently construction works will start. On the other hand, tender for equipment works will be held in the second year and procurement and installation of equipment will be conducted from the second year onward.

Considering the above factors, the implementation schedule of the Project from the E/N and the G/A to completion of work will be as shown below. This schedule does not include any period of interruption of works due to security reasons. In such cases, completion date of the Project will be delayed accordingly.

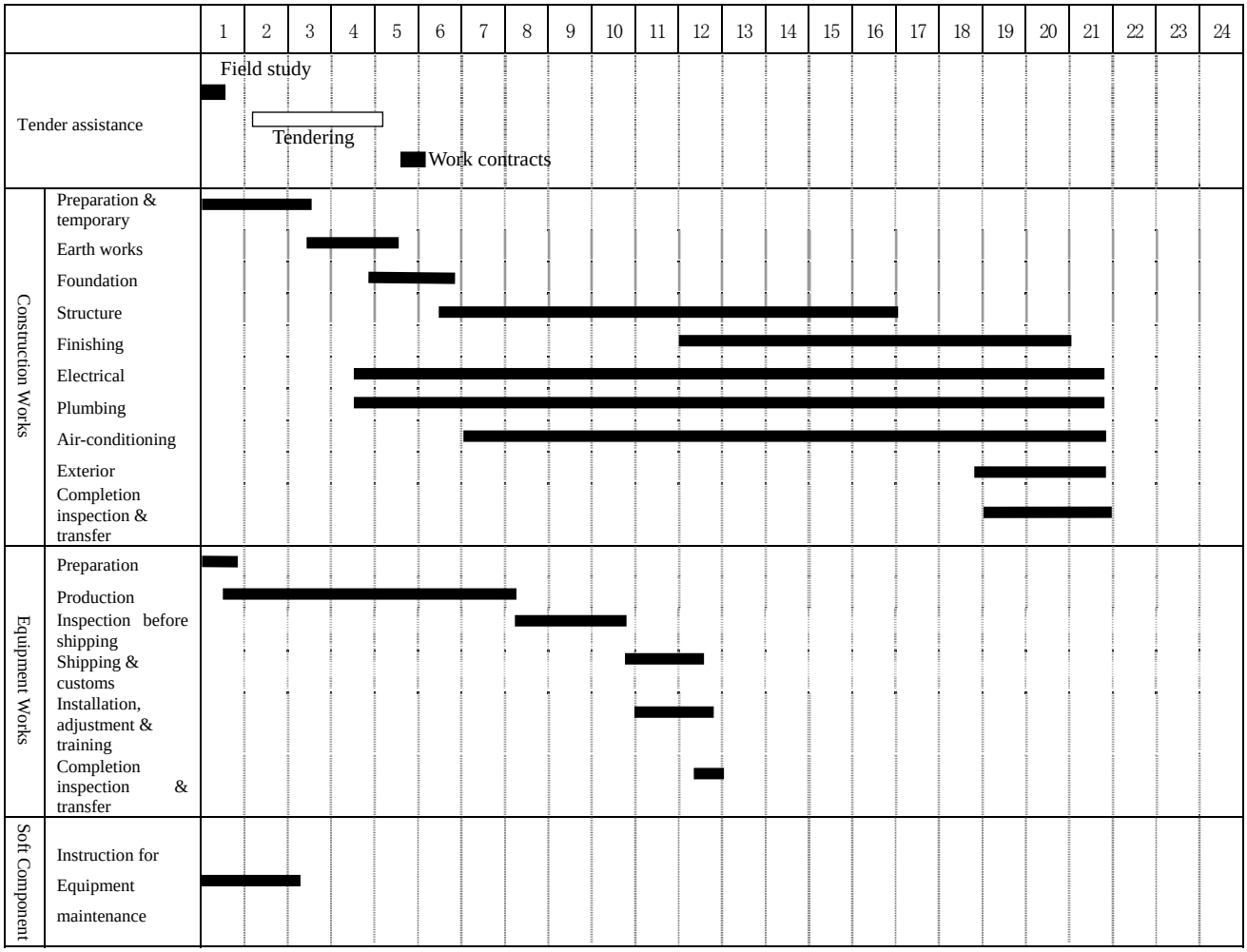


Fig. 2-9 Implementation Schedule

2-3 Obligations of Recipient Country

The Project corresponds to the early stage of a Master Plan to redevelop the existing Hospital on the same premises. Prior to the Project, Jaffna Teaching Hospital has already commenced the construction of a ward building, kitchen and mortuary buildings.

The following lists the existing buildings to be demolished in the construction site for the Project.

Table 2-10 Existing Buildings at the Construction Site

Building	Structure	Floor Area (㎡)	Remarks
Garage	RC, metal roof	180	
Bicycle Garage	RC, metal roof	140	
Surgery Ward (Ward 16 for women)	One-story, brick	440	Over 100 years old
Surgery Ward (Ward 23 for women)	One-story, brick	460	Over 100 years old
Dermatology Department	One-story, brick	450	
Wards 17 and 18 (Ob-Gyn, Orthopedics, ENT, Dentistry)	Two-story, brick	1000	Over 100 years old
Lavatory	One-story, brick	50	
cecb Field Office	One-story, brick	50	
Dining Hall	One-story, brick	210	
	Total	2980	

These buildings now contain 162 beds, about 13% of all beds in the Hospital. These beds are to be moved to the new ward building which has been almost completed. The Master Plan envisions an eventual consolidation of all wards in the Hospital into 3 buildings.

Redevelopment such as the relocation of medical services/medical equipment from the existing buildings at the construction site should be conducted in conjunction with other steps included in the Master Plan. Accordingly, it will not be appropriate to include the relocation cost for these services and equipment under the scope of obligation of Sri Lanka side for the Project. The estimated project cost will therefore include direct costs such as the cost for the demolition of the buildings at the construction site. Relocation of medical services and medical equipment must be covered by super-ordinate plans.

In the Minutes of the Discussions on Implementation Review Study, the Sri Lanka side agreed to assume the responsibility for performing all activities required to meet the important requirements stated in the text and the general requirements of Japanese grant aid when the Project is implemented.

Important Issues Stated in the Minutes of Discussions

1. Right for Using land (or Owner of the Land) for the Project

Both sides confirmed that the land for the Project is secured by the Sri Lanka side for the Project.

2. Land Clearance

The Sri Lanka side agreed to relocate the existing hospital services, clear the land through demolition of the existing buildings at the construction site and relocate the infrastructure no later than six months after the signing of the E/N by both governments.

3. Relocation of Equipment

The Sri Lanka side agreed to relocate the equipment under usage at the existing buildings to the new facility upon necessity.

3. Works related to Preparation for construction

The Sri Lanka side agreed to provide land for temporary office, workers' lodgings, materials yard, etc. outside the premises of the Hospital.

5. Securing Budget and Human resources for the Project

The Sri Lanka side agreed to allocate enough budgets and human resources to manage Jaffna Teaching Hospital, to operate the equipment supplied by the Project, and to cover the provision of spare parts, consumables, reagents, and periodical maintenance contracts.

4. Custom Duties, Internal Tax and Other Fiscal Charges for the Project

The Sri Lanka side shall bear, without using the Grant, custom duties, internal taxes and other fiscal charges, and also shall take necessary measures to exempt Value Added Tax (VAT) which may be imposed in Sri Lanka on Japanese nationals who will be engaged in the Project with respect to the supply of product and services supplied under the verified contract.

General Requirements of Japanese Grant Aid

1. To secure the land necessary for the Project;

2. To clear and level the site for the Project prior to the commencement of the construction ;

3. To provide a proper access road to the Project site;

4. To provide facilities for distribution of electricity, water supply, a telephone trunk line, drainage,

and other incidental facilities outside the site;

5. To undertake incidental outdoor works, such as gardening, fencing, exterior lighting, and other incidental facilities in and around the Project site, if necessary;

6. To ensure prompt unloading, tax exemption, and customs clearance of the products purchased under the Japanese Grant Aid at ports of disembarkation in the Recipient Country;

7. To exempt Japanese nationals from customs duties, internal taxes, and fiscal levies which may be imposed in the Recipient Country with respect to the supply of the products and services under the verified contracts;

8. To accord Japanese nationals whose services may be required in connection with the supply of the products and services under the verified contracts such facilities as may be necessary for their entry into the Recipient Country and stay therein for the performance of their work;

9. To bear commissions, namely advising commissions of an Authorization to Pay (A/P) and payment commissions, due to the Japanese foreign exchange bank for the banking services based upon the Banking Arrangement (B/A);

10. To provide necessary permissions, licenses, and other authorization for implementing the Project, if necessary;

11. To ensure that the facilities constructed and equipment purchased under the Japanese Grant Aid are maintained and used properly and efficiently for the Project; and

12. To bear all expenses, other than those covered by the Japanese Grant Aid, necessary for the Project.

2-4 Project Operation Plan

- **Operation Plan**

The Project is the renewal and improvement of existing facilities in the Hospital, consequently current medical staff will take charge of the operation of the Central Functions Building after the completion of the construction/ equipment works for the Project.

- **Maintenance Plan**

1. Present Situation of Facility Maintenance

The facility maintenance department of the Hospital employs one official responsible for heading facility maintenance, under whom 9 maintenance technicians (6 pump technicians, 1 plumber, 1 carpenter, and 1 mason) perform routine maintenance. Two of these technicians work night shifts.

Facilities that cannot be managed by the facility maintenance department are entrusted to external contractors. An engineering firm called CECB (a semi-governmental organization) now stations personnel at the Hospital to handle such works.

The repair, renovation, demolition, and construction of buildings conducted by CECB are commissioned on a piecework basis, as opposed to yearly contract. The commission fee is 10% of the amount of work contracted. The total amount of work has increased year by year, rising from about 20 million rupees in 2003 to an estimated 50 million rupees in 2005. The Hospital itself can pay up to 2 million rupees. Payments in larger amounts must be approved in advance by the Ministry of Healthcare and Nutrition.

Maintenance of air conditioners is outsourced to Auto Cooling Service, emergency generators to Brown & Company, and wastewater treatment plant to CECB.

2. Present Status of Medical Equipment Maintenance

The maintenance of medical equipment is handled by two departments and outsourced agency.

(1) Department for Repair of Simple Medical Instruments and Furniture

There is a workshop attached to the Orthopedics Department. Three experienced technicians here to manufacture and repair crutches, wheelchairs, beds, etc.

(2) Medical Equipment

All the work related to medical equipment in Jaffna Teaching Hospital is conducted by BES Jaffna Teaching Hospital branch. In the branch office, currently 2 engineers who are dispatched from BES head office, and 1 assistant and 2 desk workers who are directly employed by Jaffna Teaching Hospital are in charge of the maintenance work of the medical equipment. However, it is difficult to maintain all the equipment in Jaffna Teaching Hospital only by 2 engineers.

Their main tasks are to replace fuses, light bulbs, and troubleshooting. Due to lack of tools, measuring instruments, and available spare parts, they only perform relatively simple maintenance and repair work. While they are experienced in this type of repair, their performance is undermined since most of the equipment are very old and maintenance manuals are not available. Furthermore, recent medical equipment are computerized, so it is difficult to repair the latest electronic medical equipment with the tools and measuring instruments they own. The equipment which cannot be repaired in BES Jaffna Teaching Hospital branch are sent to BES head office in Colombo, but it takes long time and sometimes secondary defect happens during transportation. In addition, some equipment cannot be repaired even in BES head office.

(3) Outsourcing

Equipment that cannot be repaired by Jaffna branch or BES headquarters in Colombo (X-ray equipment, laboratory equipment, etc.) is entrusted to the agencies of the manufacturers.

3. Maintenance Plan

(1) Facility Maintenance Plan

The facility to be constructed under the Project does not include interior or exterior finishes requiring special maintenance method. The Project is an early stage of the Master Plan developed by the Hospital, and construction works of wards and other buildings will continue after the Project is completed. Accordingly, the engineering firms (CECB) now stationed at the Hospital will presumably stay on after the completion of the Project and implement the next phase of the Master Plan. Consequently, the maintenance of the facilities provided in the Project can be performed properly under the guidance of this engineering firm (CECB).

Elevators, air conditioners and emergency generators are the only components of equipment of the Project to require the outsourcing of maintenance, as with existing same type of equipment. While high-performance filters (HEPA filters) are planned for the air conditioning of operation theaters, these filters are also incorporated in existing air conditioning facilities for operation theaters. Therefore, the

technical level of the current outsourcing contractors is assumed to be sufficient for the maintenance of the new systems. The various types of pumps to be used for the sanitation facilities can be properly maintained by the current staff. To ensure proper maintenance of the neutralization tank and sterilization tank, the current maintenance staff will need to be instructed on the feeding of chemical solutions and other maintenance methods before the completion of the Project.

(2) Medical Equipment Maintenance Plan

The supplier shall implement the operation and maintenance trainings and provide the manuals at delivery of the equipment, so that the equipment procured under the Project will be appropriately maintained. In addition, tool sets and measuring instruments will be procured under the Project, so it is expected that engineers of BES Jaffna Teaching Hospital branch can improve their skills and repair the electrical medical equipment. Furthermore, by implementing soft component right after the completion of the installation work for BES head office, BES Jaffna Teaching Hospital branch, and Jaffna Teaching Hospital, it is also expected that management system and skill of maintenance work will be improved.

Meantime, equipment which cannot be repaired in BES, such as radiology and laboratory equipment etc. require contract based maintenance system with the local agents. The items which require maintenance contract are shown in Appendix-10.

2-5 Project Cost Estimation

2-5-1 Initial Cost Estimation

1. Estimated Project Cost to be Borne by the Government of Sri Lanka

• Premises Preparation Works		
- Demolition of existing buildings and leveling of ground	Rs	7,450,000
• Preparation for Construction		
- Rerouting of existing connection corridors	Rs	11,375,000
- Rerouting and Temporary provision of electricity	Rs	5,000,000
- Rerouting and Temporary provision of telephone	Rs	200,000
- Rerouting and Temporary provision of city water	Rs	1,500,000
- Rerouting and Temporary provision of drainage facilities	Rs	14,165,000
• Infrastructure Works		
- Construction of outdoor sub-station	Rs	2,880,000

- Provision of telephone trunk line	(Existing)	
- Provision of city water	Rs	1,000,000
• Exterior Works		
- Planting	Rs	500,000
• Design and supervision fee for above works	Rs	2,089,500
• Furniture and Fixtures (excluding medical equipment)	Rs	18,000,000
• Relocation of Existing Equipment		
CT scanner	Rs	1,500,000
X-ray system, fluoroscopy	Rs	1,000,000
Sub Total	Rs	66,659,500
Tax	Rs.	9,998,925
Total	Rs.	76,658,425
• Custom duties ,VAT , other fiscal levies and commission charges of banks for the works of the Japanese side	Rs	595,782,001
Grand Total	Rs	672,440,426

The above cost estimation does not include the cost for relocation of medical services/medical equipment which will be necessary before the demolition of the existing buildings in the construction site for the Project and cost for procuring/renting necessary land for temporary offices, worker's lodgings, building materials stock yard, etc. for the Japanese works near to the Jaffna Teaching Hospital.

2-5-2 Operation and Maintenance Cost

1. Estimated Budget

The following Table shows the result of estimation concerning the operation and maintenance costs after the implementation of the Project.

Item	Cost (Rs)	Remarks
Personnel expenses	373,315,825	Same as in 2008
Drugs/ Medical supplies	3,895,754	Twice the amount in 2008
General consumables	4,363,271	Same as in 2008
Meals	12,781,042	Same as in 2008, as the number of beds is unchanged
Transportation	369,578	Same as in 2008
Utilities	41,499,430	See details
Security & cleaning	22,635,754	See details
Equipment maintenance	58,153,790	See details
Total	517,014,444	

2. Basis for Cost Calculation

Operation and maintenance costs are estimated based on the assumptions described below. The subsidies from Ministry of Health and Nutrition and similar revenues of the Hospital are assumed to be unchanged from the levels of 2008. Price escalations are not considered.

(1) Operation Cost

1) Personnel Expenses

The Project aims to enable more effective provision of medical services through consolidation and improvement of the central functions which are now dispersed in the existing facilities. Jaffna Teaching Hospital has contemplated the hiring of more numbers of personnel, particularly nurses, in the future to compensate for shortages in its cadre. However, it is not possible to estimate how many will be actually assigned. Consequently, an increase in personnel costs has not been considered.

2) Medical Care Activities

An increase in medical activities mainly results in increases in hospitalization costs, costs related to surgery / operation theater, laboratory testing costs, etc. However, the number of beds in the Hospital will remain unchanged, as this is not to be covered under the Project. Thus, the higher costs generated by the increase in medical care activities after the Project is completed will be primarily limited to drugs, laboratory testing costs and medical supply costs related to surgery/ operation theater. There are 8 operation rooms at present. Five of them will continue to be used for emergency and minor operations (2 emergency rooms and 3 ophthalmology rooms) and 8 will be newly constructed, bringing the total up to 13. The ICU will expand from the current 10 beds to 22 beds. As a result, the cost related to medical care activities is assumed to be double that incurred in 2008. The cost related to laboratory tests is estimated separately.

(2) Utility Cost

The estimated utility costs in the newly constructed facility are presented below.

1) Electricity Charge Rs 10,972,800/year

Assumption on contract demand: Contract demand is assumed to be about 60% of the transformer capacity of the power receiving/transforming facility.

Transformer capacity 630 kVA x 0.6 = 378 kVA

Table 2-11 Calculation of Power Demand

Power Supplied To	Expected Installed Capacity	Expected Demand Rate	Max. Power Demand	Remark
Medical Equipment	210 kVA	15 %	31.5 kVA	X-ray units, 210 kVA
	360 kVA	40 %	144 kVA	
Air-conditioning/ Ventilation Facilities	280 kVA	80 %	224 kVA	
Water Supply, Drainage & Sanitation Facilities	60 kVA	20 %	12 kVA	
Lighting Facilities	110 kVA	80 %	88 kVA	
Receptacles	30 kVA	20 %	6 kVA	
Other Loads	10 kVA	20 %	2 kVA	
Firefighting Facilities	30 kVA	0 %	0 kVA	
Total	1,100 kVA		507.5 kVA	

- Assumption on power consumption: From "Max. Power Demand" in the Table of Calculation of Power Demand,

  Weekday 500 kW x 0.3 (mean demand rate) x 10 hours x 20 days = 30,000 kWh/month

  Holiday 500kW x 0.1 (mean demand rate) x 10 hours x 10 days = 5,000 kWh/month

- Annual electricity charge

  Base rate (fixed): Rs 3,000/month x12 months = Rs 36,000 ·····i)

  Max. demand charge:

  378 kVA x Rs 750/kVA·month x 12 months = Rs 3,402,000/year ····· ii)

  Electricity charge:

  35,000 kWh/month x Rs 13.8/kWh x 12 months = Rs 5,796,000/year ····· iii)

  i) +ii) +iii) = Rs 10,972,800/year

2) Telephone Charge Rs 153,300/year

Number of subscriber lines: 2 lines, newly installed

- Assumption on call charge:

  Assumed number of outside calls per subscriber line: 10 calls/line day

  Length of call: 5 min/call

- Annual telephone charge

  2 lines x 10 calls/line x 5 min x 365 days = 36,500 min/year

  A half of the above time is assumed to be local calls and the other half is assumed to be long-distance (mostly domestic) calls.

  Local calls: 36,500 min/year x 0.50 x Rs 2.8 = Rs 51,100 ·····i)

  Long-distance calls: 36,500 min/year x 0.45 x Rs 4.0 = Rs 65,700 ·····ii)

International calls: 36,500 min/year x 0.05 x Rs20.0 = Rs 36,500 ·····iii)

i) +ii) +iii) = Rs 153,300/year

3) City Water Charge Rs 584,000/year

City Water Consumption in the new facility

The expected water supply is as follows:

Numbers of persons in the facility:

Staff	About 150 persons (120 L/day·person)
Outpatients (including family)	About 1,500 persons (15 L/day·person)

150 persons x 120 L/day·person + 1,500 persons x 15 L/day·person ≒ 40,000 L/day

As the ratio between potable and non-potable water is 50 : 50, the city water supply is calculated as follows:

Potable water 40 m^3/day ×0.5 ≒ 20 m^3/day--------7,300m^3/ year

The charge for city water will be approximately:

7,300m^3/year x 80 Rs/m^3 ≒ 584,000 Rs/year

4) Fuel Cost for Emergency Generator Rs 1,432,080/year

- Emergency generator: 250kVA, fuel consumption 60L/h

Power outages are assumed to last about 3 hours per week.

Annual fuel cost:

60 L/h x 3 hours x 2 generators x 52 weeks x Rs76.5/L = Rs 1,432,080/year

From the above results, the utility cost in the new building will be:

Electricity charge	10,972,800	Rs/year
Telephone charge	153,300	Rs/year
City water charge	584,000	Rs/year
Fuel cost for emergency generator	1,432,180	Rs/year
Total	13,142,180	Rs/year

Utility cost of Jaffna Teaching Hospital (2008)	28,357,250	Rs/year
Total after completion of the new building	41,499,430	Rs/year

5) Security and Cleaning Cost

Cost for maintenance of paint and other finishes for the new building:

200 Rs/m^2/year × 6,750 m^2 = 1,350,000 Rs/year

2 elevators will be installed in the new building. As annual maintenance cost by a maintenance service agency is 200,000Rs/ 1 unit, 400,000Rs will be necessary for 2 units.

While the cost of facility maintenance is not reported as an accounting item, repair of finishes is assumed to be included in the cleaning cost. Therefore, the above amount is added to the current amount of security and cleaning cost.

Maintenance cost of the new facility		1,750,000	Rs/year
Security and cleaning cost (2008)		20,885,754	Rs/year
	Total	22,635,754	Rs/year

6) Building facility and Medical Equipment Maintenance Cost

a. Air conditioning system maintenance cost

The maintenance cost for air conditioning system after the implementation of the Project will include maintenance contract cost with mechanical maintenance service agencies and the cost for periodical exchange of HEPA filters. See the Appendix 11 for details.

Maintenance contract fee	4,286,062 Rs/year
HEPA filter maintenance	535,714 Rs/year
Total	4,821,776 Rs/year

b. Medical Equipment Maintenance Cost

The maintenance cost for medical equipment after the implementation of the Project will include the cost for the purchase of consumable supplies and spare parts for equipment and the maintenance contract fees paid to the agencies of the manufacturers of medical equipment. See the Appendix 9 and 10 for details.

Consumable and spare parts	45,790,039 Rs/year
Maintenance contract fee	7,541,975 Rs/year
Total	53,332,014 Rs/year

Total: 58,153,790 Rs/year

3. Expected Budgetary Balance after Implementation of the Project

As an institution under the direct control of Ministry of Health and Nutrition, Jaffna Teaching Hospital is operated by subsidies from the Ministry. The following table compares the estimated balance after Project implementation compares with the balances in 2004 and 2008.

Table 2-12 Budgetary Balance of Jaffna Teaching Hospital

		2004 (Rs.)	2008 (Rs.)	After the Completion (Rs.)
Incomes	Operation cost from Ministry	303,540,000	521,800,000	521,800,000
	Investment cost from Ministry	67,500,000		
	Medical certificate fee	221,589	116,058	116,058
	Employment promotion subsidy	537,365	-	-
	Rent income	51,096	426,152	426,152
	Carry over	39,446,622	-	-
	Total	411,296,672	522,342,210	522,342,210
Expenses	Personnel cost	171,722,518	373,315,825	373,315,825
	Drugs/Medical supplies	13,999,990	1,947,877	3,895,754
	General consumables	2,897,937	4,363,271	4,363,271
	Meals	7,362,205	12,781,042	12,781,042
	Transportation	2,468,983	369,578	369,578
	Utilities	30,008,555	28,357,250	41,499,430
	Security & cleaning	7,644,217	20,885,754	22,635,754
	Equipment maintenance	-	-	58,153,790
	Sub-total	236,104,405	442,020,597	517,014,444
	Other (including investment)	139,626,901	33,579,761	5,327,766
	Total	375,731,306	475,600,358	522,342,210

Source;: Jaffna Teaching Hospital

The actual and planned balance of Ministry is as shown in Table 2-12. The budget for fiscal 2007 is projected to increase to 1.8 times that of 2004, and further increase is expected by 2013, the year scheduled for project completion. With the increase in the budget of the Ministry, the budget allocated to each hospital is also expected to increase. The budget allocated from the Ministry to Jaffna Teaching Hospital is also expected to increase.

Table 2-13 Actual and Projected Balance of the Ministry of Health and Nutrition

Department/ Project	Actual 2003 Rs:'000	Projected 2004	Projected 2005	Planned 2006	Planned 2007
Ordinary expenses	13,359,156	15,139,485	19,027,921	20,538,880	22,600,842
Regional development			6,000	6,287	6,538
General health care	2,903,672	3,213,857	8,817,212	9,607,962	10,864,670
Hospitals	9,236,619	10,213,432	9,353,166	10,031,893	10,793,892
Public health	1,127,079	1,611,606	771,573	809,278	848,944
Research and development	91,786	100,590	79,970	83,460	86,798
Capital investment	4,339,585	6,178,400	10,856,817	13,930,090	17,397,879
Regional development		9,700	266,000	259,600	337,380
General health care	446,048	283,330	277,650	637,380	826,700
Hospitals	3,879,261	5,135,100	7,947,500	9,611,200	12,296,880
Public health	14,276	658,170	2,360,867	3,415,670	3,928,807
Research and development		4,800	4,800	6,240	8,112
Total amount	17,698,741	21,317,885	29,884,738	34,468,970	39,998,721

Source: Ministry of Health and Nutrition

Note: The budget for teaching hospitals is included in the item of “Hospitals”

2-6 Other Relevant Issues

Following matters are required for the implementation of the Project.

1. A Project Coordination Unit comprised of members from both Ministry of Health and Nutrition and Jaffna Teaching Hospital is to be set up immediately after signing of the E/N and the G/A for the Project. The unit will be responsible to coordinate authorities concerned such as ERD of Ministry of Finance, Ministry of Nation Building & Estate Infrastructure Development, Ministry of Defense, Bank of Ceylon etc. for smooth implementation of the Project.

2. Almost all the construction materials/ medical equipment for the Project will be transported to Jaffna via A-9 Road. And, if necessary, Japanese staff/ including third country's staff required for the Project will have to go through the Road. The Sri Lanka side is requested to take best measures to assist Japanese juridical persons, in case pass-permissions for the Road are required by Ministry of Defense and/or other authorities.

3. The Sri Lanka side is requested to reallocate the existing hospital services, clear the land through demolition of the existing buildings and relocate the infrastructure in the construction site, no later six months after the signing of the E/N by both governments.

4. Government of Sri Lanka is to allocate appropriate budget and staff for proper operation and maintenance of the facilities/ equipment of the Project.

Chapter 3 Project Evaluation and Recommendation

Chapter 3 Project Evaluation and Recommendations

3-1 Project Effects

1. Expected direct effects

The following direct effects are expected to result from implementation of the Project:

(1) Restoration of functions as a tertiary level medical facility

The medical service functions of Jaffna Teaching Hospital as a tertiary level medical facility can be restored by improving the facilities and equipment of the Hospital that have been decrepit with no appropriate capital investment for the past 20 years or more. Patients requiring high-level medical service, which the Hospital may not cope with, are transferred to Colombo, 425 km away from Jaffna, causing significant burden on the patients. Because the transportation costs are unaffordable, the poverty group cannot receive appropriate tertiary medical services. The improvement of facilities and equipment in the Project will enable prompt and appropriate provision of the high-level medical services needed in this region and permit the qualitative improvement of the medical services in the whole region.

(2) Promote efficient medical service in the Hospital by centralization and integration of the central functions

The efficiency of Hospital functions can be improved by centralizing operation theaters and intensive care units that are dispersed in individual departments at present, and integrate them in a same building with the diagnostic imaging department and the laboratory department that are currently located separately. More specifically, such effects as improvement of utilization rate of operating theaters/ICU beds/X-ray rooms, shortening of patients' waiting time, shortening of moving distance of patients/staff , shortening of the time required for laboratory test results are expected. In addition, effective utilization of limited number of staff in operation department such as anesthesiologists and nurses skilled in surgery/ operation, and staff for sterilization of surgical instruments and so on through the centralization of operation theaters is expected to result in improvement in efficient medical service.

(3) Promoting the implementation of the Jaffna Teaching Hospital Master Plan

There is a great demand for the Jaffna Teaching Hospital as the only advanced medical institution in the northern region with the bed occupancy rate amounting to 120%. To cope with the situation, the Hospital formulated a Master Plan for overall facilities improvement, and started the implementation

from 2004. The improvement of the central functions is the key focus of the Master Plan as it is integral to the overall efficient operation of the Hospital but is most difficult to implement by the Sri Lanka side. Once these functions have been improved, the improvement of mainly ward units, which are relatively easy to implement, can follow. Consequently, the Project implemented by Japanese grant aid scheme will comparatively shorten the whole improvement period of the Hospital. The tertiary level medical services urgently needed in the northern region can be provided sooner.

(4) Improvement of Maintenance Capabilities of BES

Maintenance of medical equipment in Jaffna Teaching Hospital is conducted by Jaffna branch of BES. However, due to lack of maintenance tools, available spare parts, and manuals, currently they cannot perform effective maintenance work. Under the Project, the supplier will provide operation and maintenance trainings as well as manuals and tools sets and measuring instruments will also be procured. In addition, soft component (technical assistance) on improvement of maintenance method of medical equipment for BES Jaffna branch will be implemented right after the completion of the equipment installation work for the Project. So it is expected that BES Jaffna branch will improve their maintenance capabilities and provide more effective maintenance services.

2. Indirect effects

(1) Improvement in medical education functions

The Hospital is the teaching hospital for Jaffna University Medical Faculty, the only one medical faculty in the northern region. Provision of human resources to medical facilities in the region is chiefly entrusted to this Medical Faculty. The number of medical staff at most of the lower-level medical facilities are insufficient to provide appropriate medical services (the number of physicians in Jaffna District as of 2008 was 3.3 per ten thousand population against the national average number of physicians per ten thousand population being 6.0). It is expected that improvement in the central functions of Jaffna Teaching Hospital and restoration of the functions as a tertiary level medical facility by the Project will result in improvement in quality of the medical education of the region and increase in the number of physicians stationed in the region.

(2) Promotion of reconstruction of the northern region

The northern region was largely affected by the conflict. The Project targets central functions of the tertiary level medical facility, in which full-fledged improvement will result in promotion of the reconstruction projects for the whole region. The improved tertiary level medical facility will benefit in stabilizing the social welfare of the people.

3-2 Recommendations

1. The Project will centralize the Operation Theater Complex of Jaffna Teaching Hospital and therefore require acquisition of specialized management method. To this end, appropriate training needs to be provided to responsible anesthesiologists/nurses on the management of the Operation Theater Complex.

2. In order to restore the functions of the hospital as a tertiary level medical facility on a full-scale basis, it is desirable that Emergency Department, Wards and Outpatient Department be appropriately reconstructed in accordance with the Master Plan. In addition, the educational facilities as a teaching hospital need to be improved in accordance with the Master Plan.

3. It is desirable that future reconstruction projects continuously improves the lower-level medical facilities as well, allow the effective referral system in health care to be restored and result in alleviation of the concentration of patients on Jaffna Teaching Hospital.

4. All the work related to medical equipment of governmental medical institutions in Sri Lanka is conducted by BES under the Ministry of Health and Nutrition. It is desired to further strengthen the maintenance system to execute continuous and effective maintenance work through such measures as concluding maintenance contracts with the local agents of the manufacturers for the equipment which require complicated maintenance.

[APPENDICES]

1. Member List of Study Team
2. Study Schedule
3. List of Parties Concerned in Sri Lanka
4. Minutes of Discussions (M/D)
   (1) Implementation Review Study
   (2) Explanation of Draft Report (for reference)
   (3) Basic Design Study (for reference)
5. Technical Notes (Implementation Review Study)
6. Examination of Requested Equipment
7. Equipment List
8. Outline of Main Equipment
9. Annual Operation and Maintenance Cost of Equipment
10. Annual Contract Fees for Maintenance of Equipment
11. Annual Maintenance Cost for Air Conditioners
12. Soft Component (Technical Assistance) Plan
13. Soil Investigation Report
14. Water Quality Test Report

1. Member List of Study Team

1. Member List of Study Team

1.	Mr. Hideya KOBAYASHI	Team Leader	Director Grant Aid Project Management Division 2 Financing Facilitation and Procurement Supervision Department Japan International Cooperation Agency
2.	Mr. Takayuki UCHIYAMA	Project Coordinator	Assistant Director Grant Aid Project Management Division 2 Financing Facilitation and Procurement Supervision Department Japan International Cooperation Agency
3.	Mr. Mineo NAGAOKA	Project Manager	Yamashita Sekkei Inc.
4.	Mr. Masaru FUJINUMA	Chief Architect	Yamashita Sekkei Inc.
5.	Mr. Masatsugu SUZUKI	Mechanical Engineer	Yamashita Sekkei Inc.
6.	Mr. Yasuhiro HIRUMA	Equipment Planner	International Total Engineering Corporation
7.	Mr. Kenji ISHIDA	Equipment Planner	International Total Engineering Corporation
8.	Mr .Shingo KURODA	Construction Planner/Cost Surveyor	Yamashita Sekkei Inc.

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2. Study Schedule

2. Study Schedule

- Implementation Review Study (October 5, 2009 ~ October 20,2009)

	Date	Place	JICA Team Leader OBAYASHI Hide	JICA Project Coordinator CHIYAMA Takay	Project Manager NAGAOKA Mineo	Chief Architect FUJINUMA Masaru	Mecanical Engineer SUZUKI Masatsugu	Equipment Planner HIRUMA Yasuhiro	Procurement Planner /Cost Surveyor ISHIDA Kenji	Construction planner / Cost Surveyor KURODA Shingo
1	Oct. 5 Mon		Lv. Tokyo →Bangkok→ Ar.		Lv. Tokyo →Singapore→ Ar. Colombo					
2	Oct. 6 Tue	Colombo	Meeting at JICA Office Courtesy call on Embassy of Japan (EOJ) Discussion with MOH				Survey on construction (mechanical) cost	Same as project manager	Survey on equipment agent	Survey on construction cost
3	Oct. 7 Wed	Jaffna	Lv. Colombo Ar. Jaffna (by air)							
4	Oct. 8 Thu	Jaffna	Discussion with JTH Survey on existing conditions of JTH					Existing equipment survey		Same as projecy manager
5	Oct. 9 Fri	Jaffna	Lv. Jaffna Ar. Colombo (by air) Lv. Colombo Ar. Anuradhapura (by vehicle)		Discussion with JTH		Reconfirmation on existing facilities	Reconfirmation on detailed specification		Same as mechanical engineer
6	Oct. 10 Sat	Colombo Jaffna	Lv. Anuradhapura Ar. Colombo (by vehicle)		Lv. Jaffna Ar. Colombo (by air)	Discussion with JTH Project site survey	Project site survey Infrastructure reconfirmation	Lv. Jaffna Ar. Colombo (by air)	Discussion with JTH on detailed specification	Construction plan survey Infrastructure reconfirmation
7	Oct. 11 Sun	Colombo Jaffna	Internal meeting		Internal meeting	Survey on construction conditioins in Jaffna		Internal meeting		Same as chief architect
8	Oct. 12 Mon	Colombo Jaffna	Discussion on the draft minites of discussion(M/D) at MOH Disccusion on the draft of M/D at Ministry of Nation Building Signing of M/D at MOH			Discussion with JTH Survey on Jaffna University	JTH Survey Reconfirmaition on Infrastructure related authorities	Same as project manager	Discussion with JTH on soft component / BES branch	Same as mechanical engineer
9	Oct. 13 Tue	Colombo	Signing of M/Dat ERD Report to EOJ, JICA Office			Lv. Jaffna Ar. Colombo (by air) Lv. Colombo Ar. Anuradhapura (by vehicle)	←	Same as project manager	Lv. Jaffna Ar. Colombo (by air)	←
10	Oct. 14 Wed	Colombo Anuradhapura	Lv. Colombo →Bangkok→ Ar. Tokyo		Survey on construction cost Additional survey at MOH, BES	Survey on construction conditions in Anuradhapura	←	Survey on equipment cost	←	Construction cost survey
11	Oct. 15 Thu	Colombo			Meeting at JICA Office Survey on construction cost	Lv. Anuradhapura Ar. Colombo (by vehicle)	←	Additional survey at MOH / BES / soft component Survey on equipment cost		Construction cost survey Meeting at JICA
12	Oct. 16 Fri	Colombo			Discussion with MOH		Construction cost (mechanical) survey	Same as project manager	Survey on equipment cost	Construction cost survey
13	Oct. 17 Sat	Colombo			Survey on construction conditions		Survey on local mechanical engineering	Review on specification of equipments	←	Construction site survey
14	Oct. 18 Sun	Colombo			Internal meeting	Lv. Colombo → Singapore→ Ar. Tokyo	Internal meeting	Internal meeting	Lv. Colombo → Singapore→ Ar. Tokyo	Internal meeting
15	Oct. 19 Mon	Colombo			Signing of Technical Notes(T/N) Survey on sub-contractors		Construction cost (mechanical) survey	Discussion with BES on equipment maintenance Survey on Logistic provider		Construction cost survey Analysis of collected data
16	Oct. 20 Tue				Lv. Colombo→ Singapore→Ar. Tokyo		←	←		←

3. List of Parties Concerned in Sri Lanka

3. List of Parties Concerned

1. Ministry of Healthcare and Nutrition

Hon Minister Nimal Siripala de Silva	Honorable Minister
Dr. Athula Kahandaliyanage	Secretary
Dr. Sarath Samarage	DDG (Planning)
Dr .S.C.Wickramasinghe	Director Planning
Dr. V. Jeganathan	Consultant
Dr. H. A. Ariyadasa	Additional Secretary (Administration)
Mr. Muditha Jayatilaka	DDG, BES
Mr. Wasantha Jayawardena	Programme Co-ordinator, HSRI
Mr. Sougo Kanamori	JICA expert on Medical Services Administration

2. Ministry of Finance

Ms. D. C. W. Hapugoda	Director, ERD
Mr. K. T. I. Premaratne	A. Director, ERD

3. Ministry of Nation Building and Estate Infrastructure Development

Mr. W. K. K. Kumarasiri	Secretary
Mr. M.S. Jayasinghe	Senior Advisor
Mr. R. Tharmakulasingam	Additional Secretary (Planning & Development)
Mr. M.I.S. Ahmad	Additional Secretary (Project)
Mr. Shunsuke Kurihara	Advisor, Project Coordination/RehabilitationDevelopment

4. Government Agent, Jaffna

Mr. K. Ganesh	Government Agent, Jaffna
Mr. V. Visuvalingam	Deputy Project Director, WB Re-Awaking Project

5. Jaffna Teaching Hospital

Dr. E. Devanesan	Director
Dr. K. Rajasekaran	Assistant Director
Dr. S. Raviraj	Consultant Surgeon
Dr. S. Premakrishna	Consultant Anaesthetist
Dr. K. Sivasethambaram	Consultant Radiologist
Mr. R. Pathmanathan	Chief Administrative Officer
Mr. N. Mohanadas	Administrative Officer
Mr. R. Palhonaucheese	Administrative Officer
Mr. N. Gengeltharan	Statistician
Mr. E. Mayooran	Medical Development Assistant

6. Regional Directorate of Health Services, Jaffna

Dr. A. Ketheeswaran	Deputy Provincial Director of Health Service

7. Faculty of Medicine, Jaffna University

Dr. K. Sivapalan	Dean

8. CECB（Central Engineering Consultancy Bureau）

Mr. M.M. Joseph	Additional General Manager
Mr. P. Ganeshalingam	Deputy General Manager
Mr. R. Catnaknran	Engineer
Mr. S. Ketheeswaran	Engineer
Mr. S. Vaheesan	Engineer

9. CEB (Ceylon Electricity Board)、Jaffna

J. Amalendran	Electrical Engineer (Planning Section)
K. Lingaralan	Electrical Engineer (Construction Section)

10. Fire Service, Municipal Council, Jaffna

S. Anandarajah	Officer in charge, Fire Service, Jaffna

11. Water Works Department, Municipal Council, Jaffna

Y. S. Sivaprakagam	Engineer, WWD, Municipal Council, Jaffna

12. SLT (Sri Lanka Telecom)

S. Janaethanan	Sub Agent Administrator, SLT, Jaffna
S. Rathanathan	Sub Agent Engineer, SLT, Jaffna
S. Baskaran	Assistant Engineer, SLT, Jaffna

13 Embassy of Japan

Ms. Kayo Imamura	Second Secretary, Economic Corporation Section

14. JICA Sri Lanka Office

Mr. Akira Shimura	Chief Representative
Mr. Akihiko Sasaki	Deputy Director
Ms. Kotohi Inoue	Assistant Resident Representative
Mr. Akihide Takeo	Assistant Resident Representative
Mr. Tsuneo Oishi	Program Coordination Advisor

4. Minutes of Discussions (M/D)

(1) Implementation Review Study

MINUTES OF DISCUSSIONS
ON THE IMPLEMENTATION REVIEW STUDY
ON THE PROJECT FOR
THE IMPROVEMENT OF CENTRAL FUNCTIONS OF JAFFNA TEACHING HOSPITAL
IN THE DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA

Based on the results of the Basic Design Study in 2005, the notes on the grant aid for the Project for the Improvement of Central Functions of Jaffna Teaching Hospital (hereinafter referred to as "the Project") were exchanged on November 28, 2005, between the Government of the democratic Socialist Republic of Sri Lanka (hereinafter referred to as "Sri Lanka") and the Government of Japan. However, due to the security situation the Project could not enter into the construction stage.

In order to promote the realization of the Project, the Government of Japan decided to conduct an Implementation Review study (hereinafter refereed to as "Study") on the Project and entrusted the Study to the Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA sent to Sri Lanka the Implementation Review Study Team (hereinafter referred to as "the Team"), which is headed by Mr. Hideya Kobayashi, Director, Grant Aid Project Management Division 2, Financing Facilitation and Procurement Supervision Department, JICA, and is scheduled to stay in the country from October 5th to October 20th, 2009.

The Team held discussions with the officials concerned of the Government of Sri Lanka and conducted a field survey at the study area.

In the course of discussions and field survey, both parties have confirmed the main items described on the attached sheets. The Team will proceed to further works and prepare the Implementation Review Study Report.

Colombo, October 12th, 2009

Hideya KOBAYASHI
Leader
Implementation Review Study Team
Japan International Cooperation Agency

Dr. Athula Kahandaliyanage
Secretary
Ministry of Healthcare and Nutrition

W.K.K. Kumarasiri
Secretary
Ministry of Nation Building & Estate
Infrastructure Development

D. Chrishanthi W. Hapugoda
Director
Department of External Resources
Ministry of Finance & Planning

ATTACHMENT

1 Objective of the Project

The objective of the Project is to improve the Central Functions of Jaffna Teaching Hospital through construction of facilities, procurement/installation of equipment and necessary activities.

2 Project site

The site of the Project is the premises of Jaffna Teaching Hospital, Jaffna District.

3 Responsible and Implementing Agency

3-1 The Responsible Agency is the Ministry of Healthcare and Nutrition (MOH).

3-2 The Implementing Agency is the Jaffna Teaching Hospital.

3-3 Ministry of Nation Building & Estate Infrastructure Development will provide necessary support for the successful implementation of the project.

4 Items requested by the Government of Sri Lanka

After discussions with the Team, the requested items described in Annex-1 and Annex-2 were confirmed by Sri Lankan side. JICA will assess the appropriateness of the request, and make recommendation to the Government of Japan for approval.

5 Japan's Grant Aid Scheme

5-1 The Sri Lanka side understands the Japan's Grant Aid Scheme explained by the Team, as described in Annex-3.

5-2 The Sri Lanka side will take the necessary measures, as described in Annex-4, for smooth implementation of the Project, as a condition for the Japanese Grant Aid to be implemented.

6 Schedule of the Study

6-1 The consultants will proceed to further studies in the Sri Lanka until October 20th, 2009.

6-2 JICA will complete the Final Report in accordance with the confirmed items and send it to the Government of Sri Lanka by March 2010.

7 Other relevant issues

7-1 Scope of the Project

The Team conducted the Study basically in line with the scope of the Project set by the previous basic design and the detailed design, and both sides confirmed that the major scope of the project has not been changed since the Basic Design Study Report for the Project was submitted to the Government of Sri Lanka in August 2005. However, the Team explained that the scope might be changed, if necessary, considering following factors:

(1) The implementing schedule and cost estimation need to be revised; and

(2) The Project should go through the approval process of the Government of Japan again, which retains the possibility of modification due to government's policies and financial situation.

7-2 Right for Using Land (or Owner of the Land) for the Project

Both sides confirmed that the land for the Project shown in Annex-5 is secured by the Sri Lanka side for this Project.

7-3 Land Clearance

The Sri Lanka side agreed to reallocate the existing hospital services, clear the land through demolition of the existing buildings at the construction site and relocate the infrastructure no later than six months after the signing of the Exchange of Notes by both governments.

7-4 Relocation of Equipment

The Sri Lanka side agreed to relocate the equipment under usage at the existing buildings to the new facility upon necessity.

7-5 Works Related to Preparation for Construction

The Sri Lanka side agreed to provide land for temporary office, workers' lodgings, materials yard, etc. outside the premises of the Hospital.

7-6 Securing Budget and Human Resources for the Project

The Sri Lanka side agreed to allocate enough budgets and human resources to manage Jaffna Teaching Hospital, to operate the equipment supplied by the Project, and to cover the provision of spare parts, consumables, reagents, and periodical maintenance contracts.

7-7 Custom Duties, Internal Taxes and Other Fiscal Charges for the Project

The Sri Lanka side shall bear, without using the Grant, custom duties, internal taxes and other fiscal charges, and also shall take necessary measures to exempt Value Added Tax (VAT) which may be imposed in Sri Lanka on Japanese nationals who will be engaged in the Project with respect to the supply of product and services supplied under the verified contract.

7-8 Confidentiality of the Project

Both sides confirmed that the detailed specification of the drawings, equipment and other technical information shall not be released before the tender to be held in the implementation stage of the Project.

7-9 Soft Component

The Sri Lanka side requested technical assistance for equipment maintenance and management. The Team would convey the request to the Government of Japan.

Annex-1: Requested Items (Facilities)
Annex-2: Requested Items (Equipment)
Annex-3: Japan's Grant Aid Scheme
Annex-4: Major Undertakings to be taken by Each Government
Annex-5: Map of the Construction Site

ANNEX-1

Requested Items (Facilities)