2-7 Background and Contents of the Request

2-7-1 Background of the Request and the Orientation of the Request

Sri Lanka's health and medical indices are relatively good. This is a result of the government's policies that place a high priority on the promotion of health and medical care. Specifically, the government actively promotes both medical personnel development and medical equipment procurement.

In Colombo and its vicinity, there are various specialized hospitals, e.g., Sri Jayawardenepura General Hospital, which has been constructed with a grant from the Japanese government, and Colombo General Hospital. In the provinces, Teaching Hospital, Peradeniya plays a role of providing tertiary medical care. This hospital was also constructed with a grant from Japan, and the construction was completed in 1980. After the construction, the hospital received technical assistance until 1984 and also received medical equipment until 1987.

However, there resulted a large difference between the quality of medical care provided at the hospitals around Colombo and the care provided at rural hospitals because of a lack of medical-equipment maintenance systems and geographical conditions. It has become an important issue to improve the systems providing medical care locally. For this reason, the Phase I Project was implemented with a grant from the Japanese government, which improved ten rural hospitals of the 28 provincial and base hospitals scattered throughout the country in 1986. Then, the government of Sri Lanka conceived of a project to improve the medical equipment of five rural hospitals which had not been included in Phase I and Maharagama Cancer Research Center as well as a similar project for the BES of the Line Ministry. The government of Sri Lanka requested the government of Japan for grant aid assistance to carry out those project in August, 1989.

In response to this request, the JICA dispatched a preliminary study team to Sri Lanka from October 27th to November 15th, 1990, and the team studied the interrelations and priority among the contents requested through field survey and meetings. The study resulted in a recommendation that priority should be given to the establishment of a system which facilitates proper use of medical equipment to be introduced and which enables the maintenance of the equipment as well. In accordance with this result, the Japanese government extended a grant aid assistance for the project that improved the facilities of the BES to strengthen the maintenance and management ability in dealing with medical equipment in 1991.

However, there has been no improvement in solving the shortage of medical equipment at the rural hospitals which were not included in Phase I Project, and the medical equipment of those hospitals is superannuated and worn out. In expecting the completion of the above mentioned facilities of the BES in March, 1993, the government of the Republic of Sri Lanka has currently requested the government of Japan for another grant aid to execute a recomposed project i,e,(Phase II Project), which will improve the medical equipment of eight rural hospitals, most of the equipment to be installed being maintainable at BES.

The provincial and base hospitals included in this Phase II Project are the central part of the rural medical-care structure of Sri Lanka, and they play important roles in the government's policies for health sevices. For example, Teaching Hospital, Peradeniya functions not only as a place for clinical education to the School of Medicine, Peradeniya University, but also as a facility to provide tertiary medical care. The hospital plays an important role with other provincial and base hospitals in achieving the goals of the National Health Development.

2-7-2 Contents of the Request

(1) Hospitals Requested in the Project

The hospitals included in the Phase II Project requested were at first the following eight hospitals. They had been selected in consideration of the priority in clinical necessity and urgency from the 25 hospitals which are the remain of 35 major hospitals located throughout the country after excluding the ten hospitals improved in Phase I Project.

However, the number of the hospitals included in the project was reduced to five in agreement with Sri Lankan government officials concerned with the project because of the current political instability in the north-eastern part of Sri Lanka. The hospitals excluded are Provincial Hospital, Batticaloa and Base Hospital, Trincomallee in Eastern Province and Base Hospital, Mannar in Northern Province. The five hospitals included are the ones listed with Numeral 1 through 5.

Those hospitals included in the project are: three base hospitals, which provide local medical care, one provincial hospital, which has a provincial-level referral function, and a teaching hospital, which receives patients from any part of the country and functions as an educational facility for medical personnel.

1. Teaching Hospital, Peradeniya
2. Provincial Hospital, Kalutara
3. Base Hospital, Nuwara Eliya
4. Base Hospital, Gampara
5. Base Hospital, Hambantota
6. Provincial Hospital, Batticaloa (Excluded)
7. Base Hospital, Trincomalee (Excluded)
8. Base Hospital, Mannar (Excluded)

(2) Equipment Requested

The items of medical equipment requested are as shown in Table 2-30. Some of those items are to renew damaged or worn-out equipment, and others are to suffice the quantities of items in short supply in order to meet the local medical demands. Those items range over eleven clinical divisions such as operation, sterilization, clinical examination, X-ray diagnostics, and rehabilitation. They also include new equipment which is to be util-

ized for expanding hospital facilities of Provincial Hospital, Kalutara. Especially, angiography X-ray unit and dialysis apparatus are included for Teaching Hospital, Peradeniya.

Ambulances requested are to supplement or renew the ambulances stationed at each of those hospitals in order to strengthen their referral systems. Two ambulances are requested for each of the five hospitals except for Teaching Hospital, Peradeniya.

Table 2-30 LIST OF MAIN REQUESTED EQUIPMENT

	DEPARTMENT	EQUIPMENT
1	OPERATING THEATER	Operating Table, Anesthetic Machine, Electrosurgery Unit, Defibrilator, Operation Microscope etc.
2	STERILIZATION	High Pressure Sterilizer, Bowl Sterilizer, Instrument Sterilizer etc.
3	DIAGNOSTIC. EXAMINATION	Centrifuge, Spectrophotmeter, Flamephotometer, Microscope, Hot Air Sterilizer, Water Distiller etc.
4	X-RAY	Angiography, Basic X-Ray Unit, Mobile X-Ray Unit, C-Arm X-Ray Unit, Film dryer etc.
5	PHYSIOTHERAPY	Interferencial Therapy Unit, Ultrasonic Therapy Unit, Shortwave Therapy Unit, Wax Bath etc.
6	OUT PATIENT	Slit Lamp, Visual Field Analyzer, Ultrasound Scanner, ECG, Spirometer, Echo Cardiogram
7	OBSTETRIC & GYNECOLOGY	Foetal Heart Monitor, Foetal Heart Detector, Vaccum Extractor, Infant Incubator, Neo-Natal Monitor, Phototherapy Unit, Infant Warmer etc.
8	ICU	Patient Monitor, Therapeutic Ventilator, etc.
9	HEAMODIALYSIS	Heamodialysis Unit
10	BLOOD BANK	Blood Bank Refrigerator
11	OTHER	Mortuary Refrigerator, Air Conditioner, Generator Abmulance etc.

Chapter 3 Outline of the Project

Chapter 3 Outline of the Project

3-1 Objectives

Upon instituting as an important policy the substantiation of rural hospitals (provincial hospitals and base hospitals), which function as the core of rural health services, the government of Sri Lanka has implemented the Phase I Project to rectify regional differences in the morbidity and mortality of the people throughout the country. The objective of this Phase II Project is to improve the quality of medical care provided to the people living in the vicinities of five rural hospitals. The objective is the improvement of health services for the inhabitants that are corered by the five hospitals, included in this Project, which are of high priority, by means of continouous improvement of medical equipment.

3-2 Study and Examination of the Request

3-2-1 Examination of Propriety and Necessity of the Project

Most of the medical facilities equipped with hospital beds, which are located throughout the country, are under the control of the Line Ministry in Sri Lanka. Accordingly, the Line Ministry is expected to provide the people with universal medical care. The hospitals included in this project, as a whole, are currently providing medical care to about 23% of the population of Sri Lanka even though they all together have 1,885 hospital beds, which is about 4% of the total number of beds installed in all the hospitals under the control of the Line Ministry. Therefore, it will be an enormous benefit that the great needs of rural medical care are satisfied by improving the medical equipment of those hospitals. Moreover, when the ten rural hospitals improved in Phase I Project implemented in 1986 are added to those five hospitals, all together they can provide medical care to about 70% of the nation's population. In this respect, the Project for Development of Rural Hospitals will greatly benefit the health and welfare of the people of Sri Lanka.

Among the five hospitals included in the project requested, Teaching hospital, Peradeniya is one of the seven teaching hospitals of Sri Lanka, and it plays an important role as an educational facility for developing medical personnel as well as a medical facility for providing tertiary care in Central Province. Provincial Hospital,Kalutara also plays an important role as an educational facility as well as a medical facility for providing tertiary care in Western Province. As for the other three hospitals, they are also important medical facilities as district hospitals, each providing secondary medical care in its respective province, i.e., Central Province, Western Province, and Southern Province.

By strengthening the functions of the five hospitals included in the project, disparities of the medical-care quality among facilities or regions can be rectified. In consequence, the regional differences in the morbidity and mortality of the people living in the vicinities of those hospitals are corrected for the better.

This project is exactly suitable for the Primary Health Care Program actively executed by the government of Sri Lanka as its major policy, and the project is expected to produce great results for the program. Therefore, it is determined that this project is highly appropriate and necessary.

3-2-2 Operational Plan of the Project

There will be no fundamental changes resulting from the implementation of the project in the staff arrangement of most hospitals included in this project. Only hospitals that have a plan to open a new department, linking to the implementation of the project, have a plan to increase their staffs. Those plans for staff increase are aimed at improving the departments that have been insufficient in meeting the ever increasing demands for better rural medical care. Personnel recruited in those plans are well suited to the facilities and clinical departments that are planned to be newly opened.

The budgetary allocation for new employment and the appointments of the new personnel have been already certified by the Line Ministry, so those staff increases will be surely carried out.

The following are the details of the staff-arrangement plan effective after the implementation of the project.

(1) Teaching Hospital, Peradeniya

Table 3-1 STAFF ARRANGEMENT PLAN

Department	Number to be increased		Situation of recruitment
ICU	Medical officer	3	Appointed
Anestetics	Medical officer	4	Appointed
Radiology	Medical officer	1	Appointed
Clinical Pathology	Medical officer	1	Appointed
Psychiatry	Medical officer Technician	1 4	Appointed Appointed
Blood Bank	Medical officer	1	Appointed
Out Patient Dept.	Medical officer Inturn EEG Technician	2 4 2	Appointed Appointed Appointed
Obstetrics	Medical officer	1	Appointed
Physiotherapy	Technician	2	Appointed
	Nurse	48	Appointed

(2) Provincial Hospital, Kalutara

Table 3-2 STAFF ARRANGEMENT PLAN

Department	Number to be increased		Situation of recruitment
Radiology	Radiologist	2	1 to be appointed by MOH
Operating Theater Outpatient Outpatient Ward	Medical Officer Surgeon Nurse Minor Emplayee	10 1 20 20	to be appointed by MOH
Mortuary	Junior Medical Officer Minor Employee	1 2	to be appointed from among the existing staff
C.S.S.D.	Nurse Skilled worker	5 6	to be appointed from among the existing staff
Outpatient Department	Medical Officer Junior Medical Officer Nurse Attendant Pharmacist Assistant Pharmacist	14 4 10 12 6 1	to be appointed from among the existing staff

(3) Base Hospital, Hambantota

Table 3-3 STAFF ARRANGEMENT PLAN

Department	Number to be increased		Situation of recruitment
Pediatrics	Consultant	2	Posted
Medicine	Consultant	2	Posted
Obstetrics	Consultant	2	Posted
Operating Theatre Surgical wards	Medical officer Anesthecist Nurse	5 2 24	appointed appointed posted
Wards	Nurse	26	posted

3-2-3 Relations to Other Similar Projects

Most of the existing equipment of the five hospitals included in the project has been procured by the government of Sri Lanka. However, some part of the equipment has been procured with foreign aid, as in the case of Base Hospital,Hambantotoa. The following are the details of the foreign aid currently received or received in the past by the hospitals included in this project.

(1) Teaching hospital, Peradeniya

Teaching hospital, Peradeniya was constructed through assistance provided by the Japanese government in 1980. Then, the hospital was provided with a technical assistance lasting from 1980 to 1984. The items of medical equipment procured at that time are as follows.

Equipment for Operating Theater	1 set
Equipment for Physiotherapy	1 set
Equipment for Clinical Pahtology	1 set
Equipment for Microbiology	1 set
Equipment for ICU	1 set
Equipment for Radiology	1 set
Equipment for Ultrasonic Diagnosis	1 set
Equipment for Mortuaty	1 set
Equipment for Paediatrics	1 set

Besides the above cooperation from Japan, the hospital has recently received the following foreign aid. In this aid, only supply of equipment is provided, and technical assistance is not included.

Doner	Equipment Donated	Quantity	Year
United States of America	Gamma Camera for Nuclea Medicine	1 No.	1990
UNDP	Drug Storage	1 set	1988

(2) Base Hospital,Hambantota

Base Hospital,Hambantota has carred out facility construction and equipment improvement with foreign aid received from Norway. The facilities that have been already completed are an administration ward, two nurse dormitories, and a garage for ambulances. They are constructed with a total cost of about 7.00 million rupees in 1988.

With a grant also provided by Norway, a ward for operation theaters is now under construction with a cost of about 3.00 million rupees, and it is expected to be completed at the end of 1992.

The following are the items of equipment provided by Norway.

Equipment Name	Q'ty	Delivery Time
Electro Cardiograph	1	September, 1984
Kidney Tray	2	January, 1984
Stainless Steel Pus Basin	3	January, 1984
Mackintosh Rubber Glove	20	February, 1983
Operating Light	2	February, 1983
Artery forceps	1	February, 1983
Dressing forceps	1	February, 1983
Catheter	2	February, 1983
Enamel Container	1	February, 1983
Measuring Glass Cylinder	3	February, 1983
Mayo Dressing Forceps	2	February, 1983

The items supplied are for general use, and they suffice the minimum requirement of the hospital. The aid from Norway has been terminated with this supply, and, at present, there isn't any plan to receive further foreign aid for the hospital.

As seen from the above description, no project cooperated by any foreign country exists to overlap with this project.

3-2-4 Examination of the Requested Items

(1) Summary of the Examination

The items of medical equipment requested can be categorized in eleven clinical divisions as described in 2-7-2. Most of those items are to replace the damaged or worn-out equipment of the hospitals included in the project. Except some sophisticated items such as angiography X-ray unit and dialysis apparatus, most items are fundamental medical equipment necessary for ordinary hospital operation and are appropriate and well suited to the current conditions of the hospitals included in this project. However, the quantities of some items such as rehabilitation apparatus, laboratory equipment, and patient monitors need to be adjusted as the quantities requested seem more than what is needed for the hospitals to meet the current demands of rural health services.

As for dialysis apparatus, it is not appropriate for such equipment to be procured in this project even though dialysis apparatus are necessary for treatment. The reason is that those hospitals are not prepared for dialysis treatment, e.g., they do not have a plan to secure personnel necessary to operate dialysis apparatus. The dialysis unit of Sri Jayawardenapura Teaching Hospital is not operated at present because of a lack of proper staff.

A total of eight ambulances are requested to four hospitals, two ambulances for each hospital. However, this request for ambulances should be totally eliminated because it is not appropriate as well as necessary. The Line Ministry purchased a total of about 170 ambulances in 1990 and 1991, so it proves that the procurement of ambulances can be carried out by the government of Sri Lanka alone. Furthermore, the ambulances stationed at the four hospitals are relatively well maintained and in good condition. They are sure to work several years more.

In addition to the above mentioned items, there are some items requested for building facilities, e.g., air-conditioners and power generators for emergency use. Since high temperatures and high humidities are experienced throughout the year in Sri Lanka and frequent power failures are hampering the functions of the hospitals, those items are definitely essential for the hospitals to provide secure and stable care.

The items requested for each hospital are examined in accordance with the following criteria, from a. through g., as policy of equipment selection.

a. Items are selected in the order of necessity and effectivity.
b. Items which require renewal are selected.
c. Items are selected in consideration of the technical abilities of the medical staff in operating medical equipment.
d. Items are selected in consideration of their ease of maintenance.
e. Items are selected in consideration of the conditions required for their installation at the hospital.
f. Items are selected so as not to overlap with others coming through another foreign aid.
g. Items which are hard to be procured in Sri Lanka are selected.

(2) Result of the Examination

The following lists, from 1) through 5), describes the determination of each major item procured for each hospital. The results of the determination of all the items requested are shown in Table 3-4, Result of Evaluation.

1) Determination of Major Items Requested for Teaching Hospital,Peradeniya

- X-ray unit;

There are two existing X-ray units in the radiology department, but only the unit for simple radiography is currently working. Though working, this unit needs to be renewed because it is almost worn out. The other one is planned to be replaced with a fluoroscope procured by the Line Ministry.

- C-arm Mobile X-ray unit;

Although there are three operation rooms at present and there is a plan to add more operation rooms, one unit of C-arm Mobile X-ray is considered to be enough. Therefore, it is determined appropriate for the hospital to procure only one unit out of the two requested.

- Angiography X-ray Unit;

At present, there is a demand of 400 patients a month for angiography, and angiography is performed by a radiologist of this hospital but with the facilities of another hospital. The requested unit for angiography is planned to be placed in the physiotherapy room on the first floor, and the conditions there do not seem to affect the performance of the

unit. Therefore, the request for one set of angiography X-ray unit determined appropriate.

- Central monitoring system;

At present, there are five beds in the ICU, and five more are planned to be added. Not only the existing central monitoring system but also other items of medical equipment are being utilized effectively. Therefore, it is determined that one set of central monitoring system is necessary as requested.

- Dialysis apparatus;

Although about 200 patients a year, who are treated at the hospital, require artificial dialysis, dialysis apparatus are determined not appropriate to be included in the equipment procured in this project. The reason is that the hospital does not have personnel necessary to operate dialysis apparatus effectively. Also, the determination is based on the fact that the dialysis unit of Sri Jayawardenapura Teaching Hospital is not being operated at present because of a shortage of a specialist and nurses to staff the dialysis unit.

- Fiber Optic Gastroscope(doubel channel,paediatric);

There is no double channel, paedeatric type of fiber optic gastroscope. The two sets requested are determined necessary for educating doctors and for improvement of health services.

2) Determination of Major Items Requested for Provincial Hospital, Kalutara

- Flame photometer;

There is one existing flame photometer in the hospital, and two flame photometers are requested. Considering the size of the hospital, two flame photometers will satisfy the workload of the hospital, so one unit is determined to be procured through the project.

- X-ray photograph unit;

Among existing 3 units, one is condemned, another is superannuated, often becomes out of order and not capable due to lowered capacity of the X-ray tube. The third, which is manufactured in Japan and has been istalled for a year, is most frequently used.

Considering the scale of this hospital which possesses 600 beds, normaly needed are 3 to 4 X-ray photograph units. Accordingly, the request of X-ray unit is determined necessary and appropriate.

- Ultrasonic Scanner;

At present, there is one unit of ultrasonic scanner in the obstetrics and gynecology department of the hospital. That unit is frequently used because there are 500 deliveries a month. The unit is also utilized for providing educational training to the staff coming from the National Institute of Health Sciences. Therefore, it is judged appropriate that the request includes one unit of ultrasonic scanner for the hospital.

- Patient monitor;

At present, there is no patient monitor in the ICU, so defibrillators equipped with monitors are used as substitutes. Therefore, it is necessary that four patient monitors requested should be procured for the hospital through the project.

- Microwave therapy unit and Microton-nerve stimulator;

The hospital has relatively new Microwave therapy apparatus and electric stimulators at present, and those items are not frequently used. Therefore, it is appropriate to procure one item through this project, though two are requested.

- Ambulances, weighing scale and vehicles for transportation;

Ambulances and vehicles can be easily procured by the government of the Republic of Sri Lanka. So, those items should be eliminated from the request.

- Generators for emergency use;

The hospital currently has two generators, but those generators do not have the capacity to satisfy the power need of the hospital. Even worse, they experience frequent breakdowns. Therefore, it is judged that one generator requested is necessary for the hospital.

- Equipment for accident services;

All of the requested equipment are major units for new accident services which will be newly established in the existing outpatient block after modified along with the construction of new outpatient block is being

constructed with a budget allocated by the Line Ministry. However, little funds is available for furnishing this new outpatient department, so the request includes main items of equipment to be used in the accident services of the new outpatient department. The hospital wants those items to be procured through this project, with a grant aid offered by the government of Japan. The items requested are all major medical equipment fundamentally necessary for any accident services. In considering the size and services of the hospital, all the equipment requested for the accident services is necessary, so this part of the request is determined appropriate. It is concluded that there is no problem about the modification as budgetary allocation is secured and the new outpatient department will be completed to satisfy the implementation of this project accoding to the schedule.

- Equipment for a new C.S.S.D.;

High pressure steam sterilizers are requested for a new C.S.S.D., which is constructed along with the above mentioned expantion of new outpatient ward and establishment of new accident services. High pressure steam sterilizers are the fundamental item essential for the central sterilization and supplies department, as is the equipment listed for the emergency department. Therefore, the two sterilizers requested are judged necessary.

It is concluded that there is also no problem about the new construction for the same reason shown as for the new accident services.

- Equipment for a new Motuary;

Mortuary refrigerators are requested for a mortuary, the construction of which is already completed. This request is made for the same purpose as those for the above mentioned two new departments. In considering the size of the hospital, the request is judged appropriate.

3) Determination of Major Items Requested for Base Hospital,Nuwara Eliya

- Surgical microscope for ophthalmology;

There is no existing surgical microscope. There are 369 cases of ophtholmological surgery and number of the cases tend to increase year by year. A simple microscope is used and personally owned by adoctors. Therefore, one surgical microscope requested is determined necessary.

- High Pressure Sterilizer;

  Even though the hospital has two operation rooms, operations are carried out in only one room because of a small demand for operation. So is the demand for sterilization. Since the existing sterilizers can satisfy the demand for sterilization, the request for a High pressur sterilizer should be eliminated.

- Patient monitor;

  In considering the current condition of the ICU, two units of patient monitors can satisfy the needs of patient monitoring. Therefore, two units are determined necessary though four units are requested.

- X-ray photograph unit;

  There is one unit at the moment. Since this unit is worn out, it needs replacement.

- Interferential therapy unit;

  The present ECG room is planned to be converted to a physiotherapy room. However, the room does not have so much space as to accommodate the unit requested, and there is only one therapist. Therefore, the unit requested for interferential therapy should be eliminated.

- Infant incubator;

  There are four infant incubators in the NICU ward, which has been improved by a local private company. There isnt much space left in the NICU for accommodating the five infant incubators requested, so the quantity of the request is reduced to two, omitting three units from the five requested.

4) Determination of Major Items Requested for Base Hospital Gampaha

- Defibrillator;

  The hospital has two defibrillators at present. In considering the frequency of their use, one defibrillator should be procured, though five are requested.

- Cryo Machine (for ophthalmology);

There is no Cryo Machine in the hospital at present. In assuming the need for cryosurgery, one cryosurgery Machine should be procured, even though two are requested.

- Binocular microscope;

  There are two microscopes in the clinical examination department of the hospital at present. In considering the activities of the department, a total of four microscopes are enough to carry out the workload. Therefore, two microscopes out of four requested are determined to be included in the procurement of this project.

- X-ray photograph unit;

  There is one unit at the moment. Since this unit is worn out, it needs replacement.

- Ultrasonic therapy unit, short wave therapy unit, infrared lamp, electric stimulator, paraffin bath, and Interferantial therapy unit;

  The equipment installed in the rehabilitation department of the hospital is relatively new and well equipped. This condition is also seen in the rehabilitation departments of other hospitals. Those items listed in the request for the rehabilitation department already exist in the hospital, and they are not used so frequently. Therefore, those items requested should be eliminated. However, interferential therapy unit and a ultraviolet lamp are necessary as requested, one unit for each item, because the hospital does not have those two items.

- Ambulance;

  Ambulances can be procured by the government of Sri Lanka, so this item should be eliminated from the request.

5) Determination of Major Items Requested for Base Hospital, Hambantota

- Surgical microscope (ophthalmology), Cryo Machine (ophthalmology), bipolar electrocoagulator (ophthalmology), slit lamp, visual field tester, and indirect ophthalmoscope;

  There are about 50 patients a day coming for ophthalmological treatments. Nevertheless, the hospital has no such items as listed above, so necessary examinations and treatments are often not provided. Therefore, as requested, one unit for each of those items is determined

necessary for improving the ophthalmological treatments.

- Weighing scale and ambulance;
  Those items can be procured by the government of Sri Lanka, so this item should be eliminated from the request.

- Ultrasonic therapy unit, ultra-short wave therapy unit, infrared lamp, electric stimulator, paraffin bath, interferential therapy unit, ultraviolet lamp, and Microton-nerve stimulator;
  At present, the hospital does not have a rehabilitation department, and there is no specific plan for opening such a department. Therefore, those items requested for physiotherapy should be all eliminated.

- Blood refrigerator;
  The hospital currently has a new blood refrigerator, which has been provided through aid from another country. Therefore, this request for a blood refrigerator should be eliminated.

- Equipment for a new surgical ward for surgery;
  At present, a new surgical ward for a surgical department is under construction. The construction of the building is carried out with funds provided by the Norwegian Agency for Development (NORAD). However, the funds does not include the cost of furnishing the ward with equipment necessary for operation. As a result, equipment for this new department for surgery has been included in the request of this project, of which execution Sri Lanka side wishes with a grant aid from the government of Japan. The hospital does not have any surgical department at present, and the hospital itself has not achieved the functionality of a base hospital, even though it is called a "base hospital". Therefore, the equipment requested for this new department is determined necessary to improve the conditions of the hospital. Concerning the new construtution, it is concluded that there is no problem, since the completion will be made to satisfy the implementation of the Project according to the construction schedule.

The following table, Table 3-4 Results of Evaluation, shows the results of the determination carried out for each of the items requested for each hospital. As criteria for the determination, the following quantity evaluation standards a. through g. are utilized.

The mark "+" in the list indicates that the item determined does not fit into the quality evaluation standard checked with the mark in the lines of a. through g. Also, it indicates that the item checked with the mark has been reduced in its quantity or it has been totally eliminated during the determination.

The results of the determination are shown, each at the right edge of the table as the quantity determined for each item.

[Quantity Evaluation Standard]

a. Items are selected in the order of necessity and effectivity.
b. Items which require renewal are selected.
c. Items are selected in consideration of the technical abilities of the medical staff in operating medical equipment.
d. Items are selected in consideration of their ease of maintenance.
e. Items are selected in consideration of the conditions for their instalation at the hospital.
f. Items are selected so as not to overlap with others coming through another foreign aid.
g. Items which are hard to be procured in Sri Lanka are selected.

Table 3-4 RESULT OF EVALUATION

(1) TEACHING HOSPITAL, PERADENIYA

	Q'TY			SELECTION STANDARD							Q'TY
	EXISTING	OPERATING	REQUEST	a	b	c	d	e	f	g	EVALU-ATION
【OPERATING THEATER 】											
Anesthetic Machine	5	5	2								2
Anesthetic Ventiator	4	4	2								2
Pulse Oxymeter	2	2	4								4
Respiratory Gas Monitor	0	0	1								1
Surgical Diathermy	0	0	2								2
Operation Microscope, general	0	0	1								1
Defibrillator, portable	0	0	2								2
【STRILIZATION】											
High Pressure Sterilizer	3	3	2								2
Bowl Sterilizer	36	28	2								2
【DIAGNOSIS·EXAMINATION 】											
Water Distiller	3	1	1								1
Direct Reading Balance	3	3	2								2
Freezing Microtome	2	0	1								1
Spectrophotometer	7	6	1								1
2D Ultrasound Echocardiogram	0	0	1								1
Microspirometer	0	0	1								1
Colonoscope	1	1	2								2
E.C.G. Monitor	0	0	2								2
Oxygen Analyzer	1	1	2								2
Ultrasound Scanner	1	1	1								1

(1) TEACHING HOSPITAL, PERADENIYA

	Q'TY			SELECTION STANDARD							Q'TY
	EXISTING	OPERATING	REQUEST	a	b	c	d	e	f	g	EVALU-ATION
【X-RAY 】											
Basic X-ray System	1	1	1								1
C-Arm Mobile X-ray	0	0	2	+							1
Angiography X-ray Unit	0	0	1								1
Film Dryer	1	1	2								2
Automatic Film Processor	1	1	2		+						1
【REHABILITATION】											
Shortwave Theraopy Unit	1	1	1								1
Infrared Lamp	2	2	2								2
Muscle Stimulator	0	0	2								2
Interferential Therapy Unit	0	0	1								1
Ultravilet Unit	0	0	2								2
Microwave Therapy Unit	2	2	1								1
【OBSTETRIC·GYNECOLOGY】											
Infant Incubator	10	10	3								3
Phototherapy Unit	1	1	2								2
Vacuume Extractor	1	1	2								2
Foetal Heart Monitor	1	0	2								2
Infant Warmer with Resuscitator	1	1	2								2
Neo-natal Monitor	3	0	2								2
Obstetric & Delivery Table	9	7	1		+						0

(1) TEACHING HOSPITAL, PERADENIYA

	Q'TY			SELECTION STANDARD							Q'TY
	EXISTING	OPERATING	REQUEST	a	b	c	d	e	f	g	EVALU-ATION
【 ICU 】											
Central Monitoring System	0	0	6								6
Ventilator, (ICU) Adult	1	1	2								2
Ventilator, (ICU) Paediatric	4	1	2								2
Resuscitator	1	1	1								1
Infusion Pump	5	3	4								4
【HEAMODYALISIS 】											
Heamodyalisis Unit	0	0	2			+	+			+	0
【 BLOOD BANK 】											
Blood Bank Refrigerator	1	1	1								1
【 ADDITIONAL REQUESTED EQUIPMENT 】											
Fiber Optic Gastroscope, Paediatric	0	0	1								1
Fiber Optic Gastroscope, Double Channe	0	0	1								1

(2) PROVINCIAL HOSPITAL, KALUTARA

	Q'TY			SELECTION STANDARD							Q'TY
	EXISTING	OPERATING	REQUEST	a	b	c	d	e	f	g	EVALU-ATION
【OPERATING THEATER 】											
Anesthetic Ventilator	3	3	1								1
Electrosurgery Unit	6	6	1								1
Defibrillator	3	3	3								3
Suction, Apparatus (S/Jar)	23	19	4								4
Suction, Apparatus (D/Jar)	9	9	4								4
Operating Microscope (ENT)	0	0	1								1
Operating Microscope (EYE)	1	0	1								1
Paediatric Ventilator	0	0	1								1
Pulse Oxymeter	0	0	2								2
【DIAGNOSIS·EXAMINATION 】											
Laboratory Autoclave	1	1	2								2
Centrifuge	5	3	2								2
Colorimeter	6	4	2								2
Water Distiller	2	1	2								2
Flame Photometer	2	1	2	+	+						1
Weighig Scale	−	−	2							+	0
Hot Air Sterilizer	3	2	2								2
Water Bath	3	1	4								4
Microscope, Binocular	4	3	3								3
Electric Balance	3	2	2								2
Ultrasonic Liner Scanner	1	1	1								1
E.C.G. Recorder	1	1	2								2
E.C.G. Monitor	0	0	4								4

(2) PROVINCIAL HOSPITAL, KALUTARA

	Q'TY			SELECTION STANDARD							Q'TY
	EXISTING	OPERATING	REQUEST	a	b	c	d	e	f	g	EVALU-ATION
【 X-RAY 】											
Basic X-ray Unit	3	2	1								1
Mobile X-ray System	3	2	1								1
【 REHABILITATION 】											
Ultrasonic Therapy Unit	1	1	1								1
Shortwave Therapy Unit	1	1	2	+	+						1
Infrared Lamp	2	2	1								1
Muscle Stimulator	2	2	2	+	+						1
Wax Bath	1	1	1								1
Interferetial Therapy Unit	0	0	1								1
Microton-Nerve Stimulator	1	1	1								1
【OUT PATIENT 】											
Pluster Cutter	1	1	2								2
Slit Lamp	1	1	1								1
Visual Field Analyzer	0	0	1								1
【OBSTETRIC·GYNECOLOGY】											
Infant Incubator	4	3	4								4
Nebulizer	11	5	6								6
Phototherapy Unit	5	4	4								4
Vacuume Extractor	0	0	1								1
Foetal Heart Detector	2	1	2								2
Foetal Heart Monitor	0	0	1								1
【 ICU 】											
Therapeutic Ventilator	1	1	2								2

(2) PROVINCIAL HOSPITAL, KALUTARA

	Q'TY			SELECTION STANDARD							Q'TY
	EXISTING	OPERATING	REQUEST	a	b	c	d	e	f	g	EVALU-ATION
Infusion Pump	3	2	6								6
【BLOOD BANK】											
Blood Bank Refrigerator	2	2	1								1
【OTHERS】											
Air conditioner	3	3	4								4
Ambulance	2	2	2	+	+					+	0
1. EQIPMENT FOR NEW EMERGENCY SERVICE DEPT.											
(JULY 1992, STARTING CONSTRUCTION MARCH 1993, COMPLETED)											
Basic X-ray Unit	0	0	1								1
C-arm Mobile x-ray	0	0	1								1
Operating Room Table	0	0	2								2
Defibrillator with Monitor	0	0	1								1
Anesthetic Machine	0	0	2								2
Ventilator	0	0	1								1
Electrosurgery Unit	0	0	1								1
Suction Apparatus (D/Jar)	0	0	2								2
Bowl Sterilizer	0	0	2								2
Instrument Sterilizer	0	0	2								2
Mobile Operating Lamp	0	0	2								2
2. EQUIPMENT FOR NEW C.S.S.D.											
(JUNE 1992, STARTING CONSTRUCTIN SEPTEMBER 1993 COMPLETED)											
High Pressure Sterilizer	0	0	2								2
3. EQUIPMENT FOR MORTUARY UNIT											
Mortuary Refrigerator	0	0	6 bodies								6 bodies

(2) PROVINCIAL HOSPITAL, KALUTARA

	Q'TY			SELECTION STANDARD							Q'TY
	EXISTING	OPERATING	REQUEST	a	b	c	d	e	f	g	EVALU-ATION
4. ADDITIONAL REQUESTED EQUIPMENT											
Ward Spot Lamp	7	4	6								6
Resuscitator (Infant)	0	0	1								1
Resuscitator (Neonatal)	0	0	1								1
Ventilator	3	3	1								1
Laparoscope	0	0	1								1
In-direct Ophthalmoscope	0	0	1								1
Kerato meter	0	0	1								1
Lens meter	0	0	1								1
Bronchoscope	0	0	1								1
Dental X-ray Unit	1	0	1								1
Infant Weighing Scale	0	0	2								2
Instrument Sterilizer	3	0	4								4
Emergency Generator	2	1	1								1
Station Wagon	1	1	1	+						+	0

(3) BASE HOSPITAL, NUWARA ELIYA

	Q'TY			SELECTION STANDARD							Q'TY
	EXISTING	OPERATING	REQUEST	a	b	c	d	e	f	g	EVALU-ATION
【OPERATING THEATER 】											
Operating Room Table	2	1	1								1
Mobile Operating Lamp	1	1	2								2
Anesthetic Machine	3	1	2								2
Anesthetic Ventilator	0	0	2								2
Electrosurgery Unit	2	2	2								2
Defibrillator	1	1	2								2
Suction Apparatus (S/Jar)	4	4	4								4
Suction Apparatus (D/Jar)	0	0	2								2
Operating Microscope (EYE)	1	1	1								1
Paediatric Ventilator	0	0	1								1
Pulse Oxymeter	0	0	2								2
Respiratory Gas Monitor	0	0	1								1
【STERILIZATION 】											
High Pressure Sterilizer	2	2	1								1
【DIAGNOSIS･EXAMINATION 】											
Centrifuge	4	1	2								2
Colorimeter	1	1	2								2
Weighing Scale	1	1	2							+	0
Water Bath	2	0	2								2
Microscope Binocular	2	2	2								2
Electric Balance	1	1	1								1
E.C.G. Recorder	1	1	2								2
E.C.G. Monitor	0	0	4	+				+			2

(3) BASE HOSPITAL, NUWARA ELIYA

	Q'TY			SELECTION STANDARD							Q'TY
	EXISTING	OPERATING	REQUEST	a	b	c	d	e	f	g	EVALU-ATION
Mortuary Refrigerator, 2 Bodies	0	0	2								2
【 X-RAY】											
Basic X-ray System	1	1	1								1
Film Dryer	3	1	2								2
【REHABELITATION】											
Ultrasonic Therapy Unit	0	0	1								1
Muscle Stimulator	0	0	1								1
Interferential Therapy Unit	0	0	1			+	+	+			0
Ultraviolet Lamp	0	0	1								1
Microton-Nerve Stimulator	0	0	1								1
【 OUT PATIENT】											
Pluster Cutter	0	0	2								2
【OBSTETRIC·GYNECOLOGY】											
Infant Incubator	4	4	5					+			2
Nebulizer	1	1	8								8
Phototherapy Unit	0	0	2								2
Vacuume Extractor	1	1	1								1
Foetal Heart Detector	0	0	2								2
Foetal Heart Monitor	0	0	1								1
Infant Warmer with Resuscitator	0	0	2								2
【 ICU 】											
Therapeutic Ventilator	0	0	2	+		+	+				1
【 BLOOD BANK 】											
Blood Bank Refrigerator	1	1	1								1

(3) BASE HOSPITAL, NUWARA ELIYA

	Q'TY			SELECTION STANDARD							Q'TY
	EXISTING	OPERATING	REQUEST	a	b	c	d	e	f	g	EVALU-ATION
【 OTHER 】											
Air Conditioner	0	0	2		+						0
Ambulance	2	2	2							+	0
【 ADDITIONAL REQUESTED EQUIPMENT 】											
Ophthalmoscope In-direct	0	0	1								1
Instruments for Ophthalmology	1	1	1								1
(UNCOMPLETED SET)											
Bilirubinmeter	0	0	1								1
Laparoscope	0	0	1								1
Darkroom Lamp	1	1	1								1
Pass Box	1	1	1								1

(4) BASE HOSPITAL, GAMPAHA

	Q'TY			SELECTION STANDARD							Q'TY
	EXISTING	OPERATING	REQUEST	a	b	c	d	e	f	g	EVALU-ATION
【OPERATING THEATER 】											
Operating Room Table	3	3	2								2
Mobile Operating Lamp	5	3	2								2
Anesthetic Machine	3	2	2								2
Anesthetic Ventilator	2	2	2								2
Electrosurgery Unit	3	2	2								2
Defibrillator with Monitor	2	2	3	+							1
Suction Apparatus (S/Jar)	−	2	5								5
Suction Apparatus (D/Jar)	8	4	3								3
Operating Microscope (ENT)	0	0	1								1
Operating Microscope (EYE)	0	0	1								1
Paediatric Ventilator	0	0	1								1
Pulse Oxymeter	0	0	2								2
Respiratory Gas Monitor	0	0	1								1
Cryo Machine	0	0	2	+							1
【STERILIZATION 】											
High Pressure Sterilizer	1	1	1								1
【DIAGNOSIS･EXAMINATION 】											
Laboratory Autoclave	2	1	2								2
Centrifuge	2	1	2								2
Colorimeter	1	1	2								2
Water Distiller	1	1	1								1
Weighing Scale	0	0	2							+	0
Laboratory Incubator	1	1	1								1

(4) BASE HOSPITAL, GAMPAHA

	Q'TY			SELECTION STANDARD							Q'TY
	EXISTING	OPERATING	REQUEST	a	b	c	d	e	f	g	EVALU-ATION
Hot Air Sterilizer	1	1	1								1
Water Bath	1	1	2								2
Microscope Binocular	3	2	4	+							2
Electronic Balance	1	0	2								2
Ultrasond Liner Scanner	0	0	1								1
Microspirometer	0	0	1								1
E.C.G. Recoder	1	1	2								2
E.C.G. Monitor	0	0	2								2
【 X-RAY 】											
Basic X-ray System	1	1	1								1
Mobile X-ray System	1	1	1								1
【 REHABILITATION 】											
Ultrasonic Therapy Unit	1	1	1	+	+						0
Shortwave Therapy Unit	1	1	1	+	+						0
Infrared Lamp	1	1	1	+	+						0
Muscle Stimulator	1	1	1	+	+						0
Wax Bath	1	1	1	+	+						0
Interferential Therapy Unit	0	0	1								1
Ultraviolet Lamp	0	0	1								1
Microton-Nerve Stimulator	1	1	1	+	+						0
【 OUT PATIENT 】											
Pulster Cutter	1	1	2								2
Slit Lamp	1	1	1								1
Visual Field Analyzer	0	0	1								1

(4) BASE HOSPITAL, GAMPAHA

	Q'TY			SELECTION STANDARD							Q'TY
	EXISTING	OPERATING	REQUEST	a	b	c	d	e	f	g	EVALU-ATION
【 OBSTETRIC·GYNECOLOGY 】											
Infant Incubator	2	2	2								2
Nebulizer	4	0	8								8
Phototherpy Unit	1	1	3								3
Vacuume Extractor	0	0	1								1
Foetal Heart Detector	1	1	2								2
Foetal Heart Monitor	0	0	1								1
Infant Warmer with Resuscitator	0	0	2								2
【 ICU 】											
Thrapeutic Ventillator	0	0	2								2
【 BLOOD BANK 】											
Blood Bank Refrigerator	1	1	1								1
【 OTHER 】											
Air Conditioner	2	2	4								4
Ambulance	2	2	2		+					+	0

(5) BASE HOSPITAL, HAMBANTOTA

	Q'TY			SELECTION STANDARD							Q'TY
	EXISTING	OPERATING	REQUEST	a	b	c	d	e	f	g	EVALU-ATION
【OPERATING THEATER 】											
Mobile Operating Lamp	2	1	2								2
Electrosurgery Unit	2	0	2								2
Suction Apparatus (S/Jar)	2	2	3								3
Suction Apparatus (D/Jar)	2	2	2								2
Operating Microscope (EYE)	0	0	1								1
Cryo Machine	0	0	1								1
Sugical Diathermy	0	0	1								1
Portable Defibrillator	0	0	1								1
【STERILIZATION 】											
High Pressure Sterilizer	1	1	1								1
Bowl Sterilizer	0	0	1								1
【 DIAGNOSTIC·EXAMINATION 】											
Laboratory Autoclave	1	1	1								1
Centrifuge	2	2	1								1
Colorimeter	1	1	2								2
Water Distiller	1	1	1								1
Flame Photometer	0	0	1								1
Weighing Scale	1	1	2							+	0
Laboratory Incubator	1	1	1								1
Hot Air Sterilizer	3	3	1								1
Water Bath	1	1	2								2
Microscope Binocular	4	3	2								2
Electric Balance	1	1	1								1

(5) BASE HOSPITAL, HAMBANTOTA

	Q'TY			SELECTION STANDARD							Q'TY
	EXISTING	OPERATING	REQUEST	a	b	c	d	e	f	g	EVALU-ATION
Microspirometer	0	0	1								1
E.C.G. Recorder	1	1	2								2
E.C.G.Monitor	0	0	2								2
Ultrasound Liner Scanner	0	0	1								1
Mortuary Refregerator	0	0	2								0
【 X-RAY 】											
Mobile X-ray System	1	1	1								1
Film Dryer	1	1	1								1
【 REHABILITATION 】 (No future plan for REHABILITATION DEPT.)											
Ultrasonic Therapy Unit	0	0	1	+				+			0
Shortwave Therapy Unit	0	0	1	+				+			0
Infrared lamp	0	0	2	+				+			0
Muscle Stimulator	0	0	1	+				+			0
Wax Bath	0	0	1	+				+			0
Interferential Therapy Unit	0	0	1	+				+			0
Ultravilet Lamp	0	0	2	+				+			0
Microton-Nerve Stimulator	0	0	1	+				+			0
【OUT PATIENT 】											
Pulster Cutter	1	1	2								2
Slit Lamp	0	0	1								1
Visual Field Analyzer	0	0	1								1
【OBSTETRIC·GYNECOLOGY】											
Nebulizer	1	1	8								8
Phototherapy Unit	1	1	2								2

(5) BASE HOSPITAL, HAMBANTOTA

	Q'TY			SELECTION STANDARD							Q'TY
	EXISTING	OPERATING	REQUEST	a	b	c	d	e	f	g	EVALU-ATION
Vacuume Extractor	1	1	1								1
Foetal Heart Detector	0	0	1								1
Foetal Heart Monitor	0	0	1								1
Infant Warmer with Resuscitator	0	0	2								2
Obstetric Delivery & Operating Tabel	1	1	1								1
【 BLOOD BANK 】											
Blood Bank Refrigerator	1	1	0								0
	(not used)										
【OTHERS】											
Air Conditioner	3	2	4								4
ambulance	2	2	2		+					+	0
【EQUESTED EQUIPMENT FOR NEW OPERATION BUILDING 】											
Anesthetic Machine	0	0	1								1
Anesthetic Ventilator	0	0	2								2
Defibrillator	0	0	1								1
Operating Microscope (ENT)	0	0	1								0
Operating Room Table	0	0	1								1
Paediatric Ventilator	0	0	1								1
Pulse Oxymeter	0	0	2								2
Respiratory Gas Monitor	0	0	2								2
Therapeutic Ventilator	0	0	2	+							1
【ADDITIONAL REQUESTED EQUIPMENT】											
Glucose Meter	0	0	1								1
Ophthalmoscope (indirect)	0	0	1								1

3-2-5 Examination of the Need for Technical Cooperation

Most of the medical equipment procured in Phase I Project was made in Japan. Besides that, since Colombo General Hospital, Sri Jayawardenapura General Hospital, and Teaching Hospital, Peradeniya were constructed through grant aid assistance offered from the government of Japan, those hospitals have received technical assistance for many years. At those hospital facilities, sessions of medical equipment training are periodically held for the personnel working at rural hospitals, which include those five hospitals to be improved in Phase II Project. Accordingly, it is safely assumed that a large part of the medical personnel working at the five hospitals are accustomed to the operation of ordinary medical equipment made in Japan. In addition, there are not many sophisticated items of medical equipment in this project, and most items procured are to replace the old ones operating at the hospitals now. In addition, operational techniques and daily maintenance work necessary for operating the equipment can be learnt from the training provided by Japanese engineers at the time of the installation of the equipment in the project. Therefore, there is no need of technical assistance in this project.

However, the implementation of some technical cooperation is recommended for the BES, which is directly involved in this project. Techniques for maintaining medical equipment as well as for managing the maintenance service system of the BES should be provided in technical cooperation as detailed in Chapter 5.

3-2-6 Basic Policy of Japanese Grant Aid Assistance

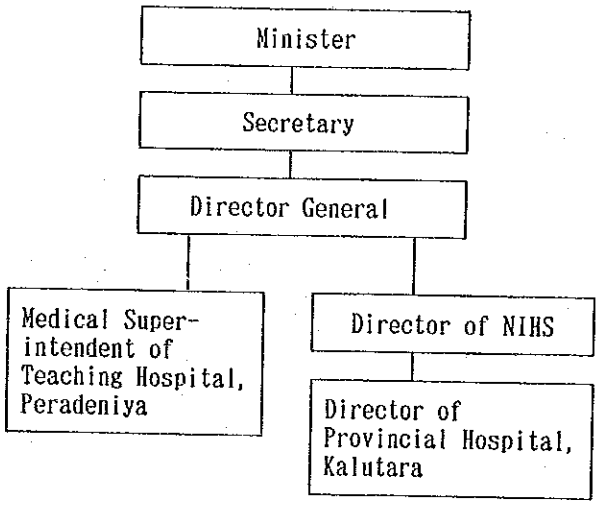
As a result of the above-mentioned examination of the request, the practicality of the project, the ability of the government of Sri Lanka to implement the project, etc. have been determined, and the project has been ascertained to be suitable for Japanese grant aid assistance . Thus, it has been judged appropriate to implement the project in the form of grant aid assistance provided from the government of Japan. Consequently, on the assumption that the project is implemented under Japanese grant aid assistance, the outline of the project will be determined in the following, and then its basic design will be carried out in the following chapter.

3-3 Outline of the Project

3-3-1 Executing Agency and Management System

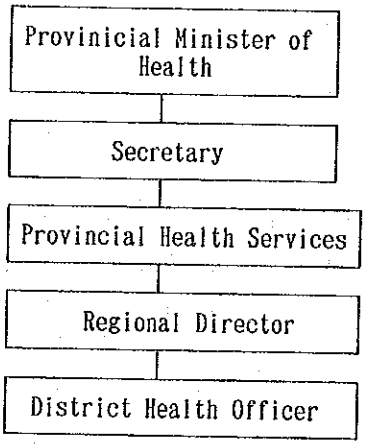
The Line Ministry is to take charge of the implementation of this project. The hospitals included in the project are categorized in two groups: one group which is under the control of the line ministry and the other which is under the control of their respective provincial ministries of health where the hospitals are located. The managing system of each group is described in the following.

Fig. 3-1 ORGANIZATION CHART FOR THE HOSPITALS UNDER THE LINE MINISTRY



Note : NIHS:National Institute of Health Sciences

Fig. 3-2 ORGANIZATION CHART FOR THE HOSPITALS UNDER PROVINCIAL GOVERNMENTS



- Base Hospital, Gampaha
- Base Hospital, Hambantota
- Base Hospital, Nuwara-Eliya

3-3-2 Outline of the Equipment

This project is to be implemented for one teaching hospital and one provincial hospital which are under the control of the Line Ministry and three base hospitals which are under their respective provincial ministry of health. Major part of the equipment included in the project comprises of items used in the medical divisions of operation, sterilization, examination and diagnosis, X-ray, rehabilitation, labor, neonate, and ICU. The following list describes major items of medical equipment used in each division.

(1) Operating Theatre

CO2 monitor:

This equipment analyzes the CO2 concentration of the respiration, and it is used for monitoring the respiration of a patient in the operation room or in the recovery room. It is also used to monitor the proper operation of artificial respirators.

Cryo Machine:

This equipment uses liquid nitrogen, carbon dioxide, or nitrous oxide to rapidly freeze and destroy diseased tissues without significant harm to normal adjacent structures. It is applied for a variety of treatments, e.g., treating cataract, blue cataract, skin cancer, etc.

Bipolar electrocoagulator:

This equipment is used to stop capillary bleeding through coagulation induced by the passage of high frequency currents.

(2) Sterilization

High Pressur Sterilizer:

A High Pressure Sterilizer sterilizes the medical instruments made of metals, glass, and rubber that are placed inside its tank by vacuuming the air in the tank first and then introducing pressurized steam into the tank.

(3) Examination and Diagnosis

Flame photometer:

This equipment uses propane gas to measure in a very hot flame the concentrations of metallic elements such as sodium and potassium in the blood serum or urine by analyzing the intensity of the emission spectra of those elements vaporized.

2D Ultrasound Echocardiogram:

This apparatus uses ultrasound to delineate structure and motion of the heart and is used for diagnosing heart diseases such as various heart valve disorders, for evaluating heart functions, as well as for measuring the blood flow.

Fiber Optic Gastroscope, double channeled :

This instrument allows the use of two biopsy forceps at the same time, enabling complex operations.

(4) X-Ray

Angiography X-ray Unit:

This apparatus visualizes the blood vessel arrangement of the head, legs, arms, etc., by injecting a contrast medium into the body part being observed while the quantitative measurements of the blood pressure and blood flow are carried out. This helps the analysis of the conditions of cardiovascular system.

(5) Rehabilitation

Interferential therapy unit:

This apparatus produces interference fringes between the two wave trains of electricity having different frequencies, and those interference fringes are utilized for preventing paralyzed muscles from immobile shrinkage as well as for improving blood circulation.

(6) Outpatient

Visual field Analyzer:

This equipment tests the visual functions involving the retina and all the way up to the optic center of the nervous system. It is used for detecting blue cataract, retinal and optic nervous diseases, brain tumors, etc. as well as for observing their progress.

(7) Obstetrics and Gynecology

Phototherapy apparatus:

This apparatus is used for treating icterus neonatorum. The apparatus utilizes white or bluish white light rays of fluorescent lamps, which rays are absorbed by bilirubin in the visible spectrum.

Laparoscope:

This is a hard-sheath type endoscope of straight or slant visualization. It is used for detecting and treating abdominal tumors, infertility, and endometriosis in obstetrics and gynecology, as well as for detecting and treating hepatitis, cirrhosis, and diseases of the gallbladder.

(8) ICU

Central monitoring system for six beds:

This system allows the central and collective monitoring of the electrocardiograms, blood pressures, heart rates, body temperatures of six patients.

Therapeutic ventilator:

This respirator is used for treating respiratory insufficiency and various shocks as well as for providing patients with artificial respiration after the operation.

3-3-3 Maintenance and Operation Plan

As previously mentioned, the BES is responsible for the maintenance of the medical equipment installed in the hospitals under the control of the Line Ministry. The BES will be also maintaining the medical equipment procured in this project. For carrying out the maintenance work smoothly and effectively, the problems of the current maintenance system should be solved in order to establish an efficient and effective maintenance system as described in the following.

(1) Replacement Part Supply System

The BES purchases, collectively, replacement parts necessary for the maintenance of medical equipment of all the hospitals. Suppliers should be obliged to provide replacement parts for payment for a period of at least seven years after the expiration of the guarantee period. Suppliers should be also obliged to submit to the BES written cost-estimates of the parts that require frequent replacement. With those cost estimates submitted by suppliers, the BES should estimate the total cost required for the purchase of replacement parts for the year and then take action to receive a sufficient budgetary allocation.

(2) Consumable Supply System

Consumables are supplied in the following manner. At first, the hospitals make requests to their respective supervisory agencies, e.g., the Department of Health Services. Then, the Medical Supply Department (MSD) of the Line Ministry makes a purchase from suppliers in accordance with those requests, and the consumables requested are supplied to the hospitals. In the same way as the above mentioned replacement parts, suppliers should be obliged to provide consumables for payment for a period of at least seven years after the expiration of the guarantee period. Suppliers should be also obliged to submit to the hospitals written cost-estimates of necessary consumables. With those cost estimates received from suppliers, the hospitals and their supervisory agencies should estimate the total cost required for the purchase of consumables for the year and then take action to acquire a sufficient budgetary allocation.

(3) Maintenance Personnel Development

At the time of equipment installation, the supplier should dispatch an engineer to teach the person assigned to each item of the equipment proper operation, daily maintenance, simple trouble shooting, etc. At the same time, the engineer dispatched by the supplier should carry out a training session to teach BES engineers more sophisticated trouble shooting techniques. For those training sessions, the suppliers must provide the trainees with necessary operational manuals and maintenance manuals (including electrical circuit diagrams) written in English.

(4) Maintenance Planning

Each hospital should organize a maintenance committee, and the committee should plan the implementation of daily maintenance. Then, the committee should also keep track of the operational conditions of the equipment and submit a report on the conditions of the equipment periodically to the administration of the hospital.

In parallel with the activities carried out by the committee of each hospital, the BES should make a plan of annual periodical checking including such items as X-ray apparatus and laboratory equipment and carry it out.

(5) Technical Assistance System

As for such sophisticated equipment as ultrasonic diagnostic units, it is necessary for the BES to have an agreement to receive periodical checking services from a local agency of the manufacturer. It is also recommended that equipment should be procured through a local agency who has a specialized engineer.

3-3-4 Budget

(1) Budgetary Allocation for the Project

Most items of the equipment procured in this project are to replace the old items currently operated at the hospitals, so the project itself does not require any major staff increase. However, a staff increase is planned by three hospitals in relation to the implementation of this project, and the Line Ministry has already made in the development budget a budgetary allocation for the payroll increase expected from those staff increases. Specifically, about 240 thousand rupees is allocated to Base Hospital,Hambantota and about 90 thousand rupees to Provincial Hospital,Kalutara in accordance with the staff arrangements shown in Tables 3-2 and 3-3.

The Line Ministry has also allocated 48 million rupees (about 148.8 million yen) a year for the maintenance of medical equipment (including replacement parts, consumables, expenses for periodical checking, etc.), and the equipment procured in this project will be also maintained with part of this budget.

Since most items of the equipment procured in this project are to renew the items currently operated at the hospitals, the project does not seem to burden the ministry's budget.

(2) Maintenance Cost Estimation

1) Expenditures for the Procurement of Consumables

In this project, most items of the equipment are procured for the renewal of the items currently operated at the hospitals. The increased amount of expenses for the procurement of consumables, which requires an additional budgetary allocation, can be accounted for by adding the expenses for the consumables necessary for the items of medical equipment newly introduced through the project. Such new items that require consumables are listed with the estimated annual expenses for the consumables in the following.

Here, consumables are defined as recording sheet used with monitors, X-ray films, carbon dioxide and nitrous oxide gases used for cryo machine units, gases and reagents used for flame photometers, etc. The annual expenses are calculated for each item by estimating the amount of each consumable consumed a year assuming that those items are operated eight hours a day, and then by multiplying the consumed amount with the local price of the consumable.

Table 3-5 ANNUAL CONSUMABLES COST FOR THE EQUIPMENT TO BE PROCURED NEWLY

Hospital Name	Equipment Name	Q'ty	Consumables Cost (yen/year)
Teaching Hospital, Peradeniya	CO_2 Monitor	1	¥391,200
	Fibre Optic Gastroscope, Paediatric	1	¥254,000
	Fibre Optic Gastroscope, double channel	1	¥277,500
	Ultrasonic Scanner	1	¥13,000
	C-arm Mobile X-ray	2	¥600,000 x2
	Angiography X-ray Unit	1	¥2,500,000
	Spirometer	1	¥104,000
Provincial Hospital, Kalutara	Basic X-ray Unit	1	¥3,000,000
	C-arm X-ray Unit	1	¥600,000
Base Hospital, Gampaha	CO_2 Monitor	1	¥391,200
	Cryo Machine	1	¥60,000
	Ultrasonic Scanner	1	¥23,000
	Spirometer	1	¥104,000
	Patient Monitor	1	¥67,800
Base Hospital, Hambantota	Cryo Machine	1	¥60,000
	Flame Photometer	1	¥820,800
	CO_2 Monitor	2	¥391,200 x2
	Therapeutic Ventilator	2	¥64,000 x2
Annual cost for consumables necessary for the Equipment to be procured newly (A)		1	¥10,776,900

2) Cost of Periodical Checking

The equipment procured in this project includes some complex items which require periodical checking performed by engineers besides daily maintenance. This periodical checking will be performed mostly by BES engineers. However, concerning some highly sophisticated items which require special checking, it is desirable that checking be conducted by a trained specialist dispatched from the local agencies of the manufacturers of those items. The following table lists those sophisticated items necessary for their checking.

Table 3-6 EQUIPMENT NECESSARY FOR PERIODICAL CHECKING

Hospital Name	Equipment Name	Quantity	Estimated Cost of Equipment (Yen)
Teaching Hospital, Peradeniya	Ultrasonic Scanner	1	¥3,160,000 × 1
	C-arm Mobile X-ray	2	¥7,200,000 × 2
	Angiography X-ray Unit	1	¥63,480,000 × 1
	2D Ultrasound Echocardiogram	1	¥5,470,000 × 1
	Central Monitor	1	¥5,802,000 × 1
Provincial, Hospital Kalutara	Basic X-ray System	1	¥5,400,000 × 1
	C-arm Mobile X-ray	1	¥7,200,000 × 1
Base Hospital, Nuwara-Eliya	Ultrasonic Scanner	1	¥3,160,000 × 1
Base Hospital, Gampara	Ultrasonic Scanner	1	¥3,160,000 × 1
Total		10	¥111,232,000

The cost of periodical checking and maintenance is calculated by estimating the contract amount with local agencies. The work of the periodical checking and maintenance carried out for those items by a specialist is to be performed by using such measuring equipment as oscilloscopes, multimeters, and circuit analyzers to specify troubling parts. The hire for those measuring equipment is to be included in the estimated amount of the contract. The annual commission paid to the supplier for periodical checking and maintenance services is around 8% of the cost of equipment, which is the average of the commissions charged by the local agencies. There are a total of three such agencies to be signed on: one agency for X-ray unit, another one for ultrasonic scanner, and the last one for patient monitors.

As seen in Table 3-6, above, calculated is the total cost of the equipment necessary for the periodical checking and maintenance.
Thus, the cost for technical services is calculated by multiplying the percentage, or 6% with the total cost of the above mentioned equipment, resulting in the following estimation.

Total Cost of the equipment necessary for Periodical Checking and Maintenance

111,232,000yen x 0.06 = 6,673,920yen (Rs. 2,153,000).....(B)

When checking and maintenance are performed, replacement parts may be required. The cost for such replacement parts can be calculated by totaling the local prices of the replacement parts that are expected to be renewed for the year basing on the information provided by the manufactures of the above mentioned items. The following are the account of the cost for replacement parts.

Table 3-7 ANNUAL COST FOR SPAREPARTS ON THE EQUIPMENT NEWLY PROCURED

Hospital Name	Equipment Name	Quantity	Parts Cost (Yen/Year)
Teaching Hospital, Peradeniya	Ultrasonic Scanner	1	¥513,000
	C-arm Mobile X-ray	2	¥797,000 X2
	Angiography X-ray Unit	1	¥2,624,000
	2D Ultrosound Echocardiogram	1	¥874,000
	Central Monitor	1	¥310,000
Provincial Hospital, Kalutara	Basic X-ray System	1	¥1,137,000
	C-arm Mobile X-ray	1	¥797,000
Base Hospital, Nuwara-Eliya	Ultrasonic Scanner	1	¥513,000
Base Hospital, Gampara	Ultrasonic Scanner	1	¥513,000
Total (C)			¥8,875,000

Thus, the following is the estimated amount of increase caused from the implementation of this project in the whole maintenance cost of the medical equipment of the hospitals.

Increase in Maintenance Cost = Annual Cost for Consumables (A) + Annual Cost for Technical Services in Periodical Checking (B) + Annual Cost for Replacement Parts (C) = 26,325,820 yen (Rs. 8,492,000)

Chapter 4 Basic Design

Chapter 4 Basic Design

4-1 Design Policies

4-1-1 Policies Concerning Equipment Selection

The medical equipment is selected in consideration of the following design criteria as policy of equipment selection for the procurement of this project.

(1) Items are selected in consideration of their necessity and efficiency.

- The items should be needed for a certain treatment and should be effective in the treatment.
- The items should be used frequently to benefit many patients.
- The items should be used in a certain clinical department existing in the hospital at present, or the hospital must have a definite plan to add the department where the items will be used in the future.

(2) Items necessary for the renewal of the worn-out equipment are selected.

- The main purpose of this project is to replace the equipment which is worn out or out of order and not repairable yet needed for medical examination and treatment. For requested items to be selected, there must be old ones in the hospital for the items to replace.
- The quantities of the items should be reasonable to match the size of the department where they are used.

(3) Items are selected in consideration of the technical ability of the hospital staff in the operation of medical equipment.

- The items should have specifications equivalent of a little superior to those of the old ones which they are replacing so that the staff can learn their operation easily.

(4) Items with easy maintenance are selected.

- The items should be maintainable by the BES or local agencies of the manufacturers of the items and should not be technically difficult to maintain.
- Their replacement parts, consumables, reagents, etc. should be easily obtainable in Sri Lanka and should be not expensive to avoid unnecessary burden to the maintenance budget.

(5) For items to be selected, places suitable for their installation must be prepared by the hospital.

- Suitable space should be secured for the equipment installation.
- There should be power supply, water supply, drainage, etc. necessary for the equipment installation.

(6) Items are selected so that they will not overlap with other equipment coming through foreign aid provided by another country.

- The items selected should not be included in other plans of procurement, e.g., other aid programs.

(7) Items which are difficult to be procured in Sri Lanka are selected.

- The items selected should be something not cheaply or easily procured in Sri Lanka.

4-1-2 Policies Concerning Natural Conditions

Each of the five hospitals included in this project, excluding Base Hospital,Nuwara Eliya are located in the region where it is hot and humid and there are frequent appearances of monsoons. Accordingly, the buildings, except some rooms like operation theaters, are designed in an open structure in order to have natural ventilation by letting in winds, as mentioned previously. For the equipment selection, careful consideration should be given to these weather conditions and the structural designs of the buildings.

4-1-3 Policies Concerning Facility Conditions

The power rating in Sri Lanka is 230 volts or 400 volts at 50 hertz. The conditions of power supply are not very good, and the deviation of voltage is about 10% in the cities, and it is close on 20% in the countries. Accordingly, power failures are often experienced. For protecting delicate equipment which is easily affected from the fluctuation of voltage, laboratory equipment and machines having compressors should be accompanied by an automatic voltage stabilizer.

It is necessary for fixed X-ray units to be surrounded by glass, plates, or doors impregnated with lead for the blockage of X-ray radiation for safety. Those materials for radiation blockage are not manufactured in Sri Lanka, so the X-ray units procured in this project should be accompanied by a lead shield for protecting the operator at the control.

4-1-4 Policies Concerning Local Manufacturers and Locally Available Materials and Equipment

For establishing a maintenance system as well as a technical assistance system, it is essential that there should be cooperation between the BES, which is responsible for maintaining the medical equipment procured through this project, and local agencies of the manufacturers of the equipment. Therefore, for an item of equipment to be procured, not only there must exist a local agency of the manufacturer of that item, but also such local agency must be capable of supplying replacement parts and consumables as well as of providing technical assistance.

Most items of the medical equipment currently used in Sri Lanka are made

in Japan, and the staffs of the hospitals included in this project are well accustomed to operating Japanese medical equipment. Therefore, all the items of equipment should be procured from Japan, and there should be no acquisition from other countries.

4-1-5 Policies Concerning Executing Agencys Ability for Maintenance

There should be a training session provided for BES engineers and the hospital staff who are assigned for the operation of the equipment procured in this project. This training should be held within the scope of the system of Japanese Grant Aid Assistance, for the following skills:

- How to operate, adjust, and maintain the equipment,
- How to discern and repair problems encountered by the equipment,
- How to use or file effectively the manuals of the equipment, and
- How to manage the inventory of replacement parts and consumables.

As there would be some possibility that if the equipment encounters troubles which can not be dealt with by the BES engineers, it is desirable that the local agency responsible for the equipment possess some specialists to give technical and repair service. For this reason, sophisticated items of the equipment procured in this project, the maintenance of which is quite complex, should be, in principle, supplied from the manufacturers who have their agencies in Sri Lanka with sufficient maintenance capability. Those sophisticated items include X-ray units, ultrasonic diagnostic units, central monitor,endoscope, etc.

4-1-6 Policies Concerning Equipments Range and Grade

The equipment is selected in consideration of the conditions of medical care provided in each area of Sri Lanka in accordance with the above mentioned basic design policies. However, for determining the ranges and grades of the items composing the equipment, the following points should be considered.

(1) The basic design should include, in the items procured in the project, replacement parts and consumables expected necessary for the next two years after the procurement of the equipment in order to ease the cost of main-

tenance afterward.

(2) The basic design should include items such as voltage stabilizers which are necessary for proper operation of the equipment, beside the main items of the equipment.

(3) The items of the medical equipment procured in this project should meet the standard of medical care in Sri Lanka, and the selection of those items should be made in order not to burden technically the maintenance work carried out in each hospital.

(4) In this project, the operation manuals and maintenance manuals of the equipment written in English should be provided to each hospital included in the project as well as to the BES. As for replacement parts and consumables, their procurement should be facilitated by establishing a network which enables for the BES to contact with the persons dealing with parts and consumables at the local agencies of manufacturers, by clearly indicating their names in the network.

4-1-7 Policies Concerning Work Schedule

The hospitals included in this project are all currently existing medical facilities, but two of the hospitals are currently expanding their facilities to open new departments, where some equipment procured in this project is planned to be installed.

Sri Lankan side responsible for this project should manage to facilitate the construction work of those facilities so that the new facilities will have been completed before the implementation of the project.

The project is implemented for five hospitals, which are quite far apart from one another. For the execution of the installation work, local conditions of the project sites should be taken into consideration in the planning of an efficient installation-work schedule, which will effectively minimize the number of days required for installation work.

It is estimated that a period of seven months is necessary for the implementation of the project after the signing of a contract with the supplier who will carry out the procurement. The details of the implementation schedule will be described in a table of work schedule in the following chapter.

4-2 Basic Design Criteria

Upon considering such essential points as the uses, operational requirements, surrounding conditions, etc. of the equipment, the basic design criteria have been set as the following.

(1) Medical Equipment

1) Thus, no consideration is given to medical equipment produced in other countries. Procurement of parts and consumables seem easily procured in Sri Lanka for all the item of the equipment to be procured in this project, concerning the equipment which are supplied from Japan.

2) Parts and consumables should be available to the items selected, for at least eight years after the procurement.

3) Technical guidance (through real operation of the equipment or lectures) should be provided to the medical staff by the manufacturers of major items or by the supplier.

4-3 Basic Plan

4-3-1 Equipment Plan

Most items of the equipment procured in this project are to replace the old ones currently used in the hospitals included in the project. Therefore, the items and their quantities are determined in consideration of the equipment procured in Phase I Project as well as in accordance with the determination results of the requested items described in 3-2-4 Examination of the Requested Items. Each item to be procured for each hospital of this project is listed with its quantity in Table 4-2 Equipment Distribution Plan. Major specifications of each main item of the equipment are described in the following under its respective clinical category.

(1) Operation Theater

Equipment	Characteristic	Reason of procurement
Cryo Machine	Gases : N_2O Liquid CO_2	necessary for surgical of catract
Puls Oxymeter	SaO_2 range: 60~100% Puls Ferquency:40~200 %	Ncessary for monitoring the safty of patients under a anesthetic
CO_2 Monitor	CO_2Parcial press:0~10 % Respiratory rate:0~60 %	same as above
Operating Microscope	Electromotive 5 sets objective achraomat Magnification: 10x Hlogen lamp	used for general surgery

(2) Sterilization

Equipment	Characteristic	Reason of procurement
High Pressure Sterilizer	Chamber capa : 280 ℓ equipted with a steam generator Steam generator 28kw Capacity	to be equipped in a new building and for renewal of the worn-out equipment automatically operated doors

(3) Examination & diagnosis

Equipment	Characteristic	Reason of procurement
Flame photometer	Item : Na、K Analysis range Na :50~200 m mol/ℓ serm K : 1~ 8 m mol/ℓ serm	used very common all over the country and cost lower in maintenance than electrode type
2D ultarasound echo cardiogram	Scanning : sector, linear Mode : B、M、D、	to treat patients increase for heart diseases of leumatiur
Ultrasonic scanner	Scanning : Sector, convex linear Mode : B、M、	high necessity in obstetrics
Freezing Microtome	Temp. : -5～-30 ℃ thickness : 0～20μ	to renew equipment out of oder
Fiber optic gastroscope	colonoscope, paediatric double channel	to renew worn-out equipment

(4) X-ray

Equipment	Charasteristic	Reson of Procurement
X-ray unit	incorporated bucky unit 40 - 125KVA, 500MA	to renew worn-out equipment
Angiography X-ray unit	Ceiling x-ray tube Flouroscopy, automatic film changer manual control type 40 - 150KVP, 800 mA max.	of high demand for angiography as an easier type of angio unit isworking in other hospitals, there is no difficulty in maitenance
C arm X-ray unit	Voltage Short time: 100KV、20mA Long time : 100KV、 2mA	of high necessity for emergency operation wich will be made in the new surgical ward

(5) Obstetric & Gynecology

Equipment	Characteristic	Reason of procurement
Laparoscope	tracar tube, automatic gas insufflator, halogen light source, CO^2 cylinder	of high demand in obstetrics & gynecology for the diagnosis of acysis and endonetritis

(6) ICU

Equipment	Characteristic	Reason of procurement
Central Monitor	Display : heart rate vpc, st	to install in new ICU
Ventilator	Respiration rate : 2-600cycles/min. Minute Volume : 2 - 20ml/min. Tidal Volume : 200-100ml	to renew worn-out equipment

(7) Others

Equipment	Characteristic	Reason of procurement
Generator	80KVA	to make up shortage of capacity of existing equipment

4-3-2 Equipment Distribution Plan

To conclude the selection of items and determination of their quantities in accordance with the determination results of the requested items, the following list describes the items to be procured for each hospital included in the project.

Table 4-1 ALLOCATION LIST OF EQUIPMENT

ITEM NO	EQUIPMENT NAME	(1) Peradeniya Teaching Hospital	(2) Kalutara Provincial Hospital	(3) Nuwara-Eliya Base Hospital	(4) Gampaha Base Hospital	(5) Hambantota Base Hospital	Total
【OPERATING THEATER】							
A 1	Operating Room Table		2	1	2	1	6
A 2	Mobile Operating Room Lamp		2	2	2	2	8
A 3	Anesthetic Machine (Large)	2	2	2	2	1	9
A 4	Anesthetic Ventilator	2	1	2	2	2	9
A 5	Electrosurgery Unit		1 1	2	2	2	8
A 6	Defibrillator with Monitor		3 1	2	1	1	8
A 7	Suction Apparatus (S/Jar)		4	4	5	3	16
A 8	Suction Apparatus (D/Jar)		4 2	2	3	2	13
A 9	Operating Microscope (ENT)		1		1		2
A 10	Operating Microscope (EYE)		1	1	1	1	4
A 11	Paediatric Ventilator		1	1	1	1	4

* □ For new building * AA, BA ;Additional requested equipment

Table 4-1 ALLOCATION LIST OF EQUIPMENT

ITEM NO	EQUIPMENT NAME	(1) Peradeniya Teaching Hospital	(2) Kalutara Provincial Hospital	(3) Nuwara-Eliya Base Hospital	(4) Gampaha Base Hospital	(5) Hambantota Base Hospital	Total
A 12	Pulse Oxymeter	4	2	2	2	2	12
A 13	Respiratory Gas Monitor	1		1	1	2	5
A 14	Cryo Machine				1	1	2
A 15	Surgical Diathermy	2				1	3
A 16	Operating Microscope (For General Surgery)	1					1
A 17	Portable Defibrillator	2				1	3
AA18	Ventilator		1 1				2
	【STERILIZATION】						
B 1	High Pressure Sterilizer	2	2	1	1	1	7
B 2	Bowl Sterilizer	2	2			1	5
BA 3	Instrument Sterilizer		4 2				6
	【DIAGNOSIS・EXAMINATION】						
C 1	Laboratory Autoclave		2		2	1	5
C 2	Centrifuge		2	2	2	1	7
C 3	Colorimeter		2	2	2	2	8

* □ For new building * AA, BA ;Additional requested equipment

Table 4-1 ALLOCATION LIST OF EQUIPMENT

ITEM NO	EQUIPMENT NAME	(1) Peradeniya Teaching Hospital	(2) Kalutara Provincial Hospital	(3) Nuwara-Eliya Base Hospital	(4) Gampaha Base Hospital	(5) Hambantota Base Hospital	Total
C 4	Water Distiller	1	2		1	1	5
C 5	Flame Photometer		1			1	2
C 7	Laboratory Incubator				1	1	2
C 8	Hot Air Sterilizer		2		1	1	4
C 9	Water Bath		4	2	2	2	10
C 10	Microscope Binocular		3	2	2	2	9
C 11	Electronic Balance		2	1	2	1	6
C 12	Direct Reading Balance	2					2
C 13	Freezing Microtome	1					1
C 14	Spectrophotometer	1					1
C 15	2D Ultrasound Echocardiagram	1					1
C 16	Ultrasonic Linear Scanner	1	1		1	1	4
C 17	Microspirometer	1			1	1	3
C 19	Fibre Optic Colonoscope	2					2
C 20	E.C.G. Recorder		2	2	2	2	8

* □ For new building * AA, BA ;Additional requested equipment

Table 4-1 ALLOCATION LIST OF EQUIPMENT

ITEM NO	EQUIPMENT NAME	(1) Peradeniya Teaching Hospital	(2) Kalutara Provincial Hospital	(3) Nuwara-Eliya Base Hospital	(4) Gampaha Base Hospital	(5) Hambantota Base Hospital	Total
C 21	E.C.G. Monitor	2	4	2	2	2	12
C 22	Oxygen Analyzer	2					2
C 23	Mortuary Refrigerator, 2 bodies		3	2			5
CA25	Fibre Optic Gastroscope (double channel)	1					1
CA26	Fibre Optic Gastroscope (paediatrics)	1					1
CA27	Glucose Meter					1	1
CA28	Bronchoscope		1				1
CA29	Ward Spot Lamp		6				6
	【X-RAY】						
D 1	Basic X-ray system	1	1 1	1	1		5
D 2	Mobile X-ray System		1		1	1	3
D 3	C-arm Mobile X-ray	1	1				2
D 4	Angiography X-ray Unit	1					1
D 5	X-ray Drying Cabinet	2		2		1	5
D 6	Automatic Film Processor	1					1

* □ For new building * AA, BA ;Additional requested equipment

Table 4-1 ALLOCATION LIST OF EQUIPMENT

ITEM NO	EQUIPMENT NAME	(1) Peradeniya Teaching Hospital	(2) Kalutara Provincial Hospital	(3) Nuwara-Eliya Base Hospital	(4) Gampaha Base Hospital	(5) Hambantota Base Hospital	Total
DA 8	Dark Room Lamp			1			1
DA 9	Pass Box			1			1
	【REHABILITATION】						
E 1	Ultrasonic Therapy unit		1	1			2
E 2	Shortwave Therapy Unit	1	1				2
E 3	Infrared Lamp	2	1				3
E 4	Muscle Stimulator	2	1	1			4
E 5	Wax Bath		1				1
E 6	Interferential Therapy Unit	1	1		1		3
E 7	Ultraviolet Lamp	2		1	1		4
E 8	Microton-nerve Stimulator		1	1			2
E 9	Microwave Therapy Unit	1					1
	【OUT PATIENT】						
F 1	Plaster Cutter		2	2	2	2	8
F 2	Slit Lamp		1		1	1	3

* □ For new building * AA, BA ;Additional requested equipment

Table 4-1 ALLOCATION LIST OF EQUIPMENT

ITEM NO	EQUIPMENT NAME	(1) Peradeniya Teaching Hospital	(2) Kalutara Provincial Hospital	(3) Nuwara-Eliya Base Hospital	(4) Gampaha Base Hospital	(5) Hambantota Base Hospital	Total
F 3	Visual field analyzer		1		1	1	3
FA 5	Ophthalmoscope(indirect)		1	1		1	3
FA 6	Keratometer		1				1
FA 7	Dental Unit		1				1
FA 8	Lens Meter		1				1
FA 9	Instruments for Eye Operation			1			1
	【OBSTETRICS・GYNECOLOGY】						
G 1	Infant incubator	3	4	2	2		11
G 2	Nebulizer		6	8	8	8	30
G 3	Phototherapy Unit	2	4	2	3	2	13
G 4	Vacuum Extractor	2	1	1	1	1	6
G 5	Foetal Heart Detector		2	2	2	1	7
G 6	Foetal Heart Monitor	2	1	1	1	1	6
G 7	Infant Warmer with Resuscitator	2		2	2	2	8
G 8	Neo-natal monitors	2					2

* □ For new building * AA, BA ;Additional requested equipment

Table 4-1 ALLOCATION LIST OF EQUIPMENT

ITEM NO	EQUIPMENT NAME	(1) Peradeniya Teaching Hospital	(2) Kalutara Provincial Hospital	(3) Nuwara-Eliya Base Hospital	(4) Gampaha Base Hospital	(5) Hambantota Base Hospital	Total
G 9	Obstetrics Delivery & Operating Table					1	1
GA10	Billirubin Meter			1			1
GA11	Laparoscope		1	1			2
GA12	Infant Resuscitator		1				1
GA13	Neonatal Resuscitator		1				1
GA14	Electronic Weighing Scale		2				2
	【ICU】						
H 1	Central Monitoring System, 6 beds	1					1
H 2	Therapeutic Ventilator		2	1	2	1	6
H 3	Ventilator, (ICU) Adult	2					2
H 4	Ventilator, (ICU) Peadiatrics	2					2
H 5	Resuscitator	1					1
H 6	Infusion Pump	4	6				10
	【BLOOD BANK】						
J 1	Blood Bank Refrigerator	1	1	1	1		4

* □ For new building * AA, BA ;Additional requested equipment

Table 4-1 ALLOCATION LIST OF EQUIPMENT

		(1) Peradeniya Teaching Hospital	(2) Kalutara Provincial Hospital	(3) Nuwara-Eliya Base Hospital	(4) Gampaha Base Hospital	(5) Hambantota Base Hospital	Total
ITEM NO	EQUIPMENT NAME						
【OTHER】							
K 1	Room Air Conditioner		4		4	4	12
KA 4	Generater		1				1

* □ For new building * AA, BA ;Additional requested equipment

4-3-3 Construction of Building Facilities for Equipment Installation

As for Provincial Hospital,Kalutara and Base Hospital,Hambantota, some items of the equipment procured in this project are planned to be installed in buildings which are under construction or still on the drawing board at present.

1. Provincial Hospital,Kalutara

	Scheduled Commencement	Scheduled Completion
1) New Outpatient Department and Accident Service(Modification of present Outpatient Department)	November,1992	September, 1993
2) New Sterilization Department	October,1992	February, 1993
3) New Mortuary	completed in July, 1992	

A new mortuary was completed, but other construction plans are not started yet. However, since the budgetary allocations for those construction plans have been certified by the Department of building sevices of the Line Ministry, the construction of those buildings is sure to be completed as scheduled before the equipment installation, in the case that this project is implemented. Please refer to the appendices at the end of this report for details of the construction plan of the three new buildings listed in the above table.

2. Base Hospital,Hambantota

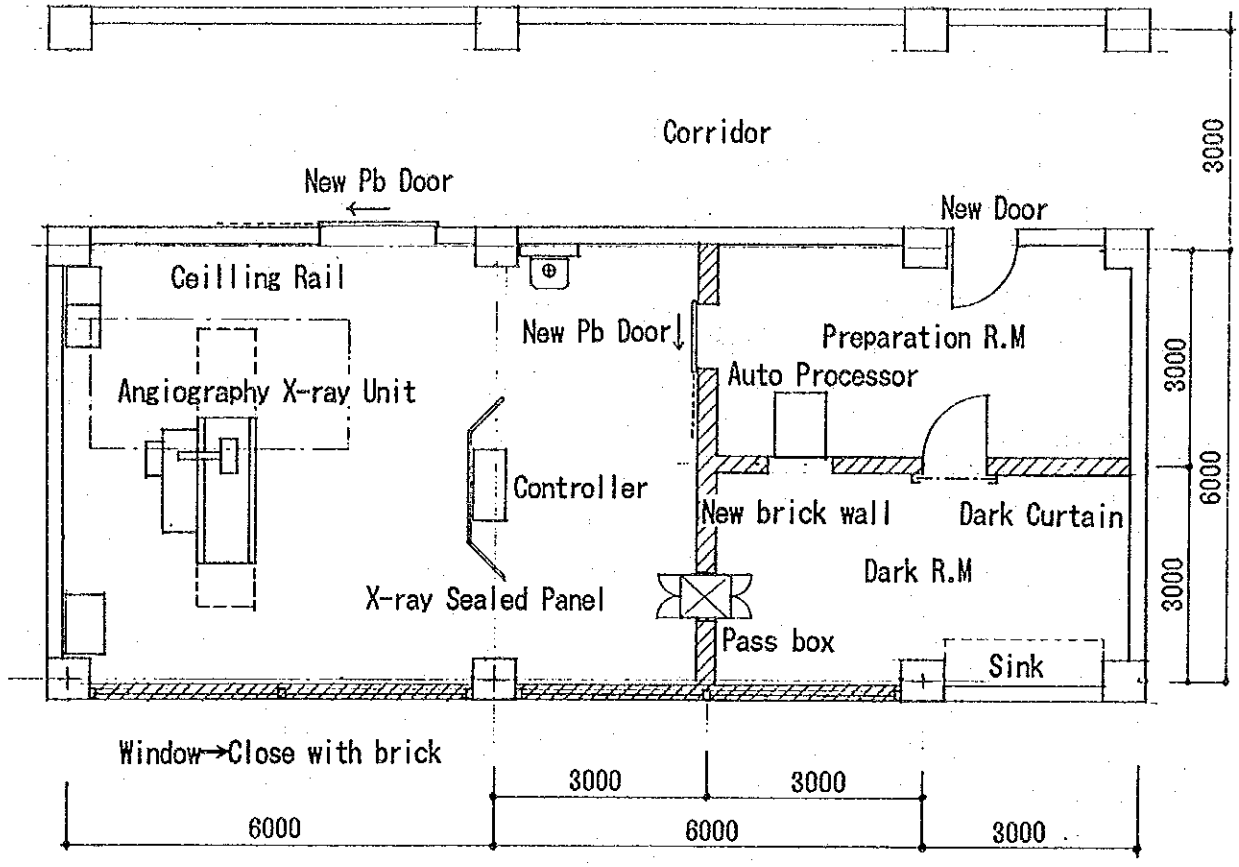
1) New Operating Theater; under construction End of 1992
Note; Refer to the layout plan attached to Appendix.

As for other hospitals, Teaching Hospital,Peradeniya does not have enough space, to accommodate an angiography X-ray unit, in the two rooms of its radiology department. To install the angiography apparatus which is procured in this project, the hospital is planning to evacuate the

physiotherapy room adjacent to those two X-ray rooms and to renovate the evacuated room for angiography. Also, Base Hospital,Nuwara Eliya is planning to transfer its blood bank division to another room and to renovate the evacuated room as a X-ray room in order to install the X-ray apparatus procured in this project.

For the installation of those apparatus, their evacuated rooms should be renovated as described in Figs.4-1 and 4-2.

The expense necessary for the modificaiton is estimated at Rs.160,000 (0.5 million Yen), which is considered bearable enough for the Line Ministry to cover.



NEW ANGIOGRAPHY ROOM DETAIL S 1:50

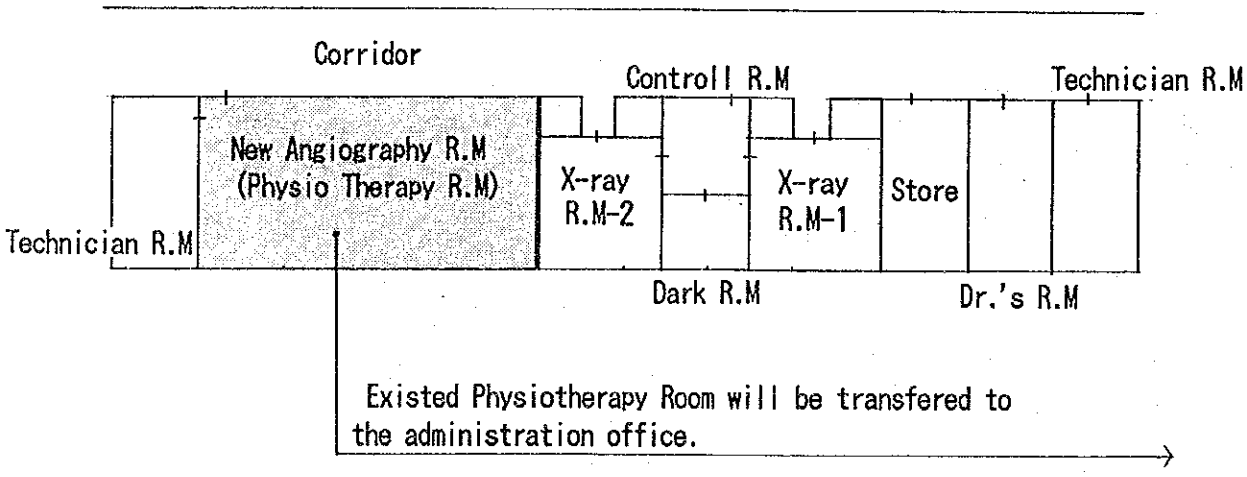
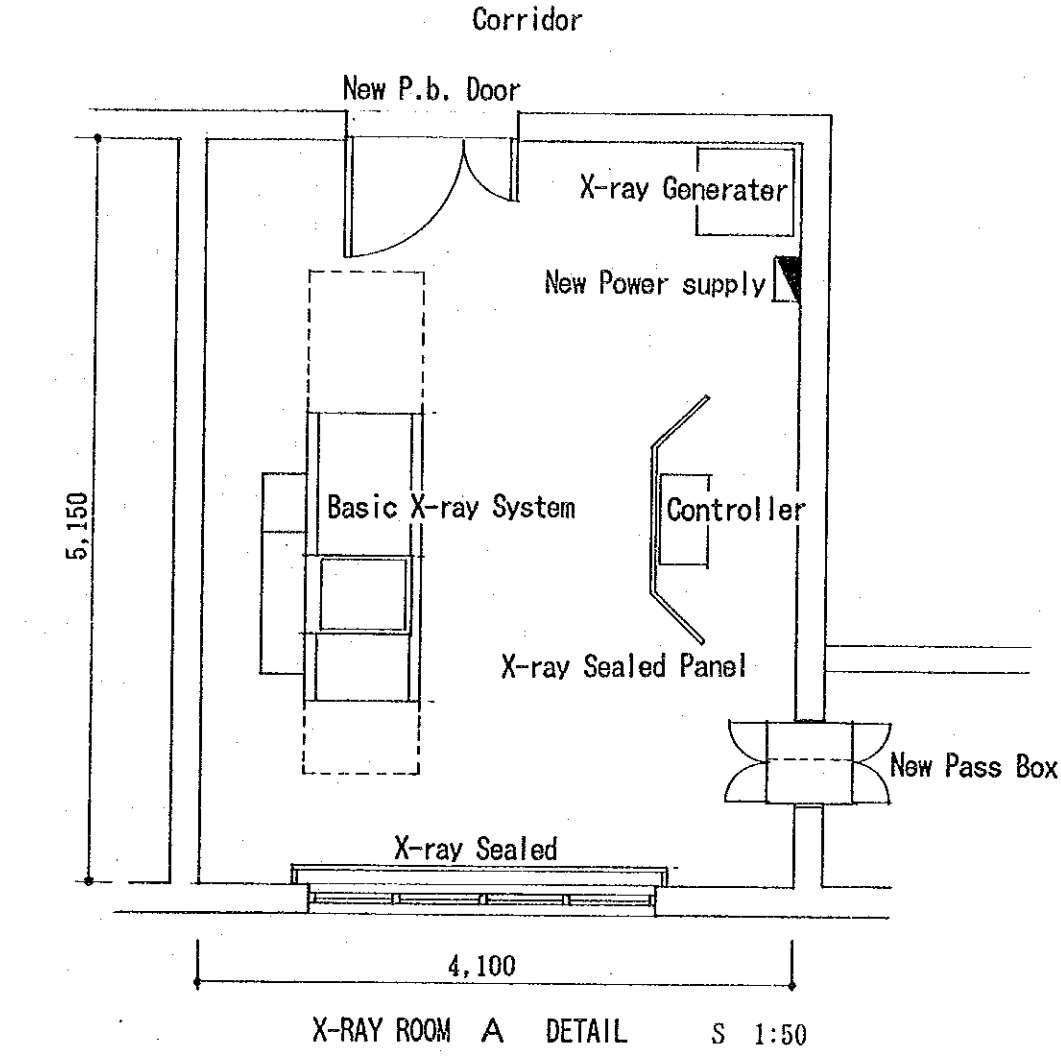


Fig. 4-1 TEACHING HOSPITAL PERADENIYA MODIFICATION OF NEW ANGIOGRAPHY ROOM



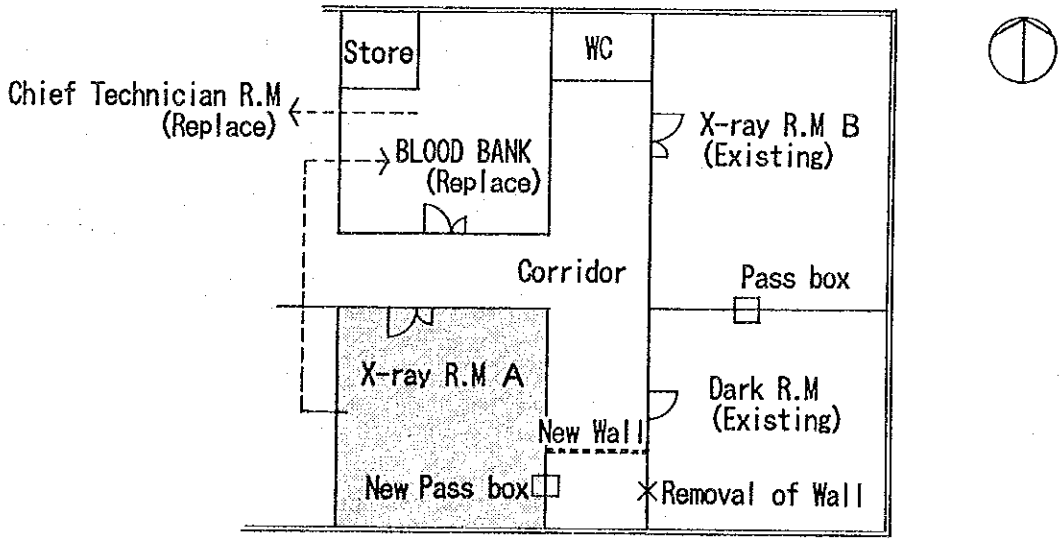


Fig. 4-2 BASE HOSPITAL NUWARA ELIYA X-RAY ROOM PLAN

4-4 Implementation Plan

4-4-1 Implementation Policy

This project is implemented in accordance with the system of the Japanese Government's Grant Aid Assistance.

The grant aid assistance for this project will be commenced formally after its approval in a cabinet meeting of the government of Japan and the signing of an Exchange of Notes (E/N) by the governments of both countries. Upon receiving this grant, the government of Sri Lanka will select a Japanese consultant firm which will carry out the detailed designing of this project. After preparing tender documents, a bidding will be held to select a Japanese supplier, who will carry out the procurement, installation and commissioning of the equipment for the project.

The following are the elements or matters essential for the implementation of the project.

(1) Executing Agency

The Line Ministry is the supreme agency responsible for this project, so the office of Director General Health Services of the Line Ministry supervise the project. For carrying out the project, the Biomedical Engineering Services (BES) is assigned as the specific executing agency.

(2) Consultant

Immediately after the signing of the above mentioned Exchange of Notes (E/N), the Line Ministry of Sri Lanka is to conclude a consulting service agreement with the Japanese consultant firm which participated in the basic design study on this project, in accordance with the formalities of the system of the Japanese Grant Aid Assistance. In compliance with this agreement which becomes effective on verification of the government of Japan, the consultant will execute the following affairs.

1) Detailed design stage: preparing detailed design specifications and other technical material.

2 Tender stage: assisting Sri Lankan side in the selection of a supplier, who will carry out the equipment procurement, and in the signing of a procurement agreement with the supplier.

3) Procurement stage: supervising the work of the equipment procurement and installation as well as the training of the medical staff on the equipment operation and maintenance.

(3) Supplier

The supplier who is selected through a bidding will conclude the contract with the Sri Lankan side. This contract also will become effective on the verification of the government of Japan. The supplier will carry out the procurement of the equipment and provide technical guidance for Sri Lankan side to carry out the installation, operation, and maintenance of the equipment, in compliance with the contract. The supplier will establish a maintenance system which will enable Sri Lankan side to receive spare parts and consumables as well as technical guidance even after the handing-over of the equipment.

(4) Implementation Plan

The implementation plan of the project will be discussed between the consultant and the project staff of Sri Lankan side during the designing period. In the discussion, when to start each of the work items assigned to both Japanese side and Sri Lankan side will be ascertained along with the plan for executing it in accordance with the implementation schedule of the project described in this report. This discussion is to ensure the smooth execution of the work assigned to Sri Lankan side and thereby the smooth execution of the project itself. The work assigned to Sri Lankan side must be completed as scheduled before the installation work of the equipment.

(5) Necessity of Sending Engineers

It is very important for the staffs of the five hospitals to master proper operation and maintenance of the equipment procured in this project in order to keep the equipment always in good condition as well as to ensure exact diagnoses and treatments using the equipment. Therefore, as for sophisticated items of the equipment, it is necessary for their manufacturers to dispatch engineers to those hospitals in order to provide guidance for the installation work as well as to provide training (for mas-

tery of operation techniques, simple repair techniques, inspection methods, etc.) on the equipment.

(6) Detailed Designing and Supervisory Work

The consultant will perform the detailed designing and supervisory work of this project in compliance with the agreement concluded with Sri Lankan side. The detailed design work consists of determining the detailed specifications of the equipment in accordance with this basic design study; preparing the tender document, which is composed of tender instructions, a draft document for the procurement contract, the equipment specifications, etc.; and estimating the total cost required for the procurement.
The supervisory work consists of verifying whether the work carried out by the supplier is in conformity with the agreement or not in order to ensure proper execution of the contents of the agreement and providing guidance, advice, and adjustments in unprejudiced manner to facilitate the implementation of the project. The work of the consultant includes the following matters:

1) Execution of the formalities and bidding necessary for the selection of a supplier, who will carry out the equipment procurement, and attendance at the conclusion of a contract with the supplier,
2) Examination and approval of the execution drawings, equipment specifications and other documents submitted by the supplier,
3) Inspection and approval of the quality and performance of the equipment to be supplied,
4) Supervision of the equipment delivery and installation and the training session,
5) Reporting on the progress of the work, and
6) Attendance at the handing-over of the equipment.

In addition to the execution of those duties, the consultant will report to the officials concerned with the project, of the Japanese government, on the progress, payment procedures, completion and handing-over, etc., of the project.

4-4-2 Execution Management Plan

In accordance with the principles of the Japanese Government Grant Aid Assistance, the consultant will organize a consistent project execution team concerning the detailed designing work in order to execute the work smoothly in conformity with the purpose set forth by this basic design study.
Policies of Execution Management.

(1) In keeping close contact with the staffs of the agencies concerned with the project, of both the countries, the equipment will be procured and installed without delay.

(2) Proper guidance and advice will be offered to the parties related to the execution of the project quickly from an impartial position.

(3) Proper guidance and advice should be offered on the management of the equipment after its installation and handing-over.

(4) Upon confirming the execution of the contractual conditions after the installation of the equipment, the consultant will attend at the handing-over of the equipment and complete its work by receiving an approval of acceptance from Sri Lankan side.

4-4-3 Procurement Plan

Method of Equipment Procurement

(1) Method of Supplier Selection and Contract Conclusion

The supplier to take charge of this procurement must be selected through the evaluation of the tender documents presented in a public bidding, to which invited are corporations having Japanese nationality either as individual or as juridical person.

The contractual system shall be a one-lot sales contract which specifies the models of the equipment in the contractual document. The suppliers duties include manufacturing and supplying the equipment and providing guidance on the installation, adjustment and test operations as well as providing technical assistance on the operation and maintenance of the equipment.

(2) Equipment Procurement

As all the equipment to be procured in this project seems available as made in Japan, so parts and consumables necessary for those items will be easily procured. Therefore, in principle, all the equipment should be procured from Japan, so no consideration is given to procurement of medical equipment from other countries.

(3) Method of Transportation

The equipment will be transported by truck within the territory of Japan, then by boat from a Japanese port to the Port of Colombo in Sri Lanka. From the Port of Colombo to each project site, the transportation will be by truck again.

4-4-4 Implementation Schedule

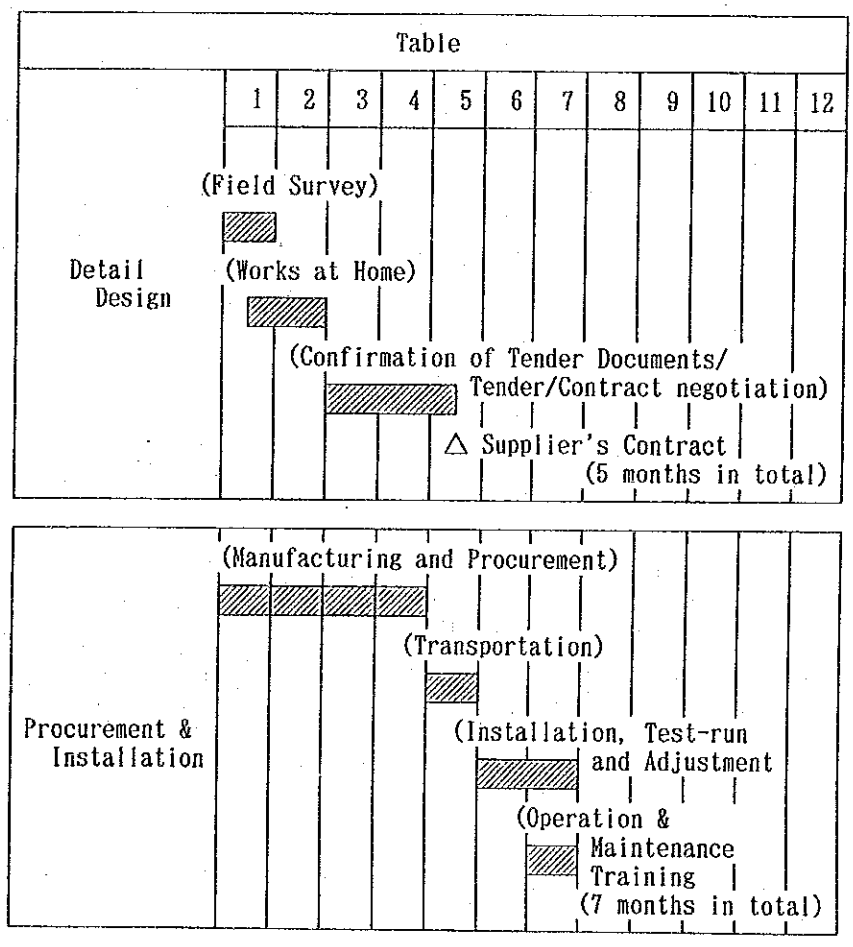
After the conclusion of the Exchange of Notes by the Government of Sri Lanka and the Government of Japan concerning the implementation of this assitance, the following processes have to follow in order to implement the material procurement for the Project.

(1)Equipment Manufacturing and Procurment	4 months
(2)Transportation	1 months
(3)Installation/Test-run and Adjustment	2 months
(4)Operation and Maitenance Training	1 months
Total	7 months

(Operation and Maintenance Training period is oerrapped with Installation/Test-run and Adjustment period)

The above mentioned proces is show as the following.

Fig. 4-3 EXECUTION PROCESS



4-4-5 Cost Estimation

(1) Scope of Operation

The operation of the Project will be executed by mutual cooperation between Japan and Sri Lanka following frame work of the Japanese Grant Aid. The following are the operations to be carried out under Grant Aid from the Japanese Government and those to be executed under the budget and responsibility of the Government of Sri Lanka.

1) Operation to be carried out by the Japanese Government

1. Procurment of Project equipment which is described as scope of operations to be carried out by the Japanese Govenment in the this Basic Design Report.

2. Related procedures and works
Transportation of equipment and materials to be exported from Japna to Sri Lanka and inland transportation from the unloading port to the hospitals coverd by the Project

3. Guidance on installation/adjustment for test run and explanation of and guidance on the methods of operation and maintenance control of the Project equipment.

2) Operation to be carried out by the Sri Lanka side

The Sri Lanka side will perform the following work relating to equipment installation and tax exemption, etc., of the Project equipment not icluded in the scope of work of the Japanese Govenment.

1. Preparation of the place of installation of the medical equipment and materials.
2. Completion of work for improvement of facilities necessary for the installtion of equipment and materials.
-Installation of electric wiring up to the place of equipment installation and mounting of power outlets.
-Installtion of water piping up to the place of installation and mounting of water outlets.
3. Exemption or payment of import duties, domestic taxes and other financial surcharges which are usually imposed in Sri Lanka on the

import of the Project equipment("financial surcharges" as meant here also includes indirect costs incurred in relation to forign produsts adopted in Sri Lnaka.)

4. Eusuring quick customs clearance and inland transportation of the materials and equipment imported from Japan.
5. Providing a storage place for the Project equipment up to the time of installation work.
6. providing conveniences necessary for the Japaneseentering and staying in Sri Lanka to accomplish their duties in ralation to implementation of the operations.
7. Granting, under the law of the Government of Sri Lanka, licences, tax exemption and other permission, etc., required for the execution of the Project.
8. Bearing all necessary expenses other than those to be borne by the Japanese side.

(2) Approximate Operation cost

1) Operation expenses to be borne by Japan

The operation cost to be borne by Japan is as follows:

1. Equipment cost
2. Design and management cost

The operation costs to be borne by the Japanese side are calculated under the conditions provided in 3) hereunder.

2) Operation costs to be borne by the Sri Lanka side

1. Procedural work expense

Commissions for bank arrangement and issueing letter of Authorization to Pay: about Rs. 190,000 (600,000 yen)

2. Facilities modification cost for the installation of equipment: about Rs.160,000 (500,000 yen)

3) Conditions and Calculation

1. Time of calculation: July,1992
2. Exchange rate : US$1 = 130.26 yen
3. Excution period : 12 months
4. Others : This Project will be executed according to the

system of Grant Aid of the Government of Japan. Accordingly, any Japanese firm related to the Project and Project equipment will be totaly exemped from inland taxation such as impor tax and business tax.

Chapter 5 Project Evaluation and Conclusion

Chapter 5 Project Evaluation and Conclusion

5-1 Expeected Effects Resulting from the Project

The following effects and improvements can be brought in as effects resulting from the Project on condition that the Sri Lanka side conducts the proper management of the Project.

(1)-1 The current situation and problems

Though 10 rural hospitals were strengthened and improved in diagnostic functions through the Phase I Project, there are sill great regional differences in medical care and facilities due to the shortage of equipment and to equipment worn out, which is big obstacle to carry out PHC program that the Govenment of sri Lanka has been promoting.

(1)-2 Countermeasures adopted in the Project

Basic diagnostic functions will be improved through the procurement of equipment necessary for proper diagnosis in 5 rural hospitals.

(1)-3 Effects of the Project and the extent of improvemnet

As the regional differance in facilities and in medical care will be rectified PHC program is expected to be promoted. Major medical institutions are composed of 7 teaching hospitals and 21 base hospitals i,e, 35 hospitals in total. 14 % of those 35 hospitals will be improved in facility function. (adding 10 hospital strenghened through Phase I Project, 43 % of major hospitals will have been improved.) Population enjoying the benefit resulting from the hospitals in th Project is eatimated to be 23 % of the whole nation. 70 % of the whole nation will have been enjoying the benefit adding the number of people enjoying the benefit of Phase I Project, which is the great benefit to the Sri Lankan nation.

(2)-1 The current situation and problems

The ratio of "unknown" in diagnosis is so high as 7 to 9 % in major desease and mortality statistics, which indicates that the medical care standard is low and so is diagnostic tecniques. Therfore, of urgent necessity is improvment of manpower engaged in the medical field in capability.

(2)-2 Countermeasures adopted in the Project

Among the hospitals included in the Project, teaching hospital,Peradeniya and provincial hospital,Kalutara posess the teaching functions for the medical staff. Accordingly, by strengthening these two hospitals, teaching functions of them wil be improved.

(2)-3 Effects of the Project and the extent of improvemnet

Training for and improvment in capability of medical staff will be conducted by improvment of teaching functions of the two hospitals, which is expected to promote the improvment of health services for patients.

5-2 Propriety Determination of the Project

(1) The medical care system of the Republic of Sri Lanka comprises of 7 teaching hospitals as tertiary care facility at its top and 7 provincial hospitals and 21 teaching hospitals as secondary care facility, all together, comprising of a total of 35 hospitals as high level care facility. This project includes five hospitals of high level care facility, which are selected from among those hospitals that have not been improved in Phase I project. Therefore, the five hospitals selected for the project occupy important positions in the medical care system of the country.

Those five hospitals, as a whole, have a total of 1,885 hospital beds, which account for about 9.3% of the total number of hospital beds installed in the 35 high level care facilities, the total number being about 20,166. If the hospital beds of the ten hospitals improved in Phase I project are added to those of the five hospitals, then the share of those 15 hospitals, which are improved in the Project for Development of Rural Hospitals, comes to be about 40%.

Also, those five hospitals provide medical care to about 23% of the population of Sri Lanka under their jurisdictions, together. Again, if the share of the population taken care of by the hospitals improved in Phase I project is added to that of the five hospitals, the sum of the shares is about 70%. Because of those sheer numbers, the improvement made in the medical equipment of those hospitals through this project will surely benefit the people of Sri Lanka as a whole.

(2) The improvement made in the medical care functions of those five hospitals through this project will rectify differences in the medical care among regions and facilities so as to contribute to the promotion of the Primary Health Care Program, which is carried out by the government as an important policy.

(3) Most items of the equipment improved in this project are to renew the equipment which is being dilapidated in those hospitals. However, there are some items which are newly introduced to the hospitals, yet those items are all suitable to the current medical care demands of Sri Lanka as well as to the technical level of the staffs of the hospitals. Therefore, the implementation of the project does not require any large increase in their staffs. The increase in the

equipment maintenance cost is estimated at about 20 million yen a year, which is only about 13% of the maintenance cost spent a year by the Line Ministry in the past. This amount does not seem to burden the national budget. Moreover, there will be no problem in the maintenance of the equipment since the BES, which will be improved through a grant offered by the government of Japan, is in charge of the execution of maintenance work.

5-3 Conclusion and Recommendation

(1) Conclusion

This project is to rectify differences in the medical care among regions and facilities, by improving the medical care functions of five rural hospitals; to facilitate the substantiation of the Primary Health Care Program, which is carried out by the government as an important policy; and to be a second step in the realization of the World Health Organizations Alma-Ata Declaration (the first step being Phase I project). At the same time, the project is to contribute to the health of all the people of Sri Lanka. Therefore, it is judged appropriate to implement this project through a grant offered by the government of Japan.

(2) Recommendation

The following recommendations are presented so not only that the project can be carried out smoothly but also that the medical equipment can be operated continuously in good condition.

1)Budgetary Allocation

In considering the circumstance that the supply of replacement parts is not easily proceeded for the equipment procured in Phase I Project, some preparatory arrangements should be made with the supplier to secure future procurement of replacement parts for the equipment of this project. For example, the supplier can be made obliged to supply replacement parts and consumables for payment, for a period of five years following the expiration of the one year guarantee period. On the other hand, the Line Ministry should reallocate about Rs.6.5 million, an increase in the budget, for the purchase of those parts and consumables.

In addition to that, it is also necessary that some budgetary arrangement over a long period be made in consideration of the depreciation of the equipment, in preparation for a future equipment procurement, for the equipments service life is considered to be from 5 to 6 years.

2)Maintenance of the Equipment

Since the BES is the agency in charge of all the aspects concerning the medical equipment under the Line Ministry, including the deter-

mination of specifications, the execution of a bidding, and the maintenance of the equipment, it is clear that the BES will play an extremely important role in the implementation of this project.

However, as the BES does not seem to be staffed well or equipped sufficiently, as previously mentioned, to play such a role, the Project for Rehabilitaiton of BES is being currently implemented to improve the maintenance system which takes care of the medical equipment of not only the hospitals of this project but also other public medical facilities. This Rehabilitation Project is planned to be completed in March, 1993. From the discussion held with BES engineers during this basic design study, it is assumed that three years will be required for the BES to acquire the level of maintenance ability which is expected by that project.

After the expiration of the one year guarantee agreement, it is the BES that will carry out maintenance work for the equipment procured in this project. Therefore, efforts should be made by the BES to shorten the above mentioned three-year period for improving its ability. Also, technical assistance should be provided from the government of Japan by sending engineers to the BES for the improvement of their technical ability. In summary, it is desirable for the government of Japan to support the establishment of a medical-equipment maintenance system that covers all of Sri Lanka. In addition, it is necessary that staff increase be carried out in accordance with the personnel arrangement plan of the Rehabilitation project because it is not possible for the BES to meet an increase in the amount of equipment to be maintained by them in the future.

3)Technical Assistance

Most items of the equipment procured in this project are to renew the existing equipment, so there isn't any need of technical assistance with respect to the operation of the equipment. However, the implementation of technical cooperation by the government of Japan is necessary for the BES, which is the key element for the success of this project. This technical cooperation should include transfer of not only techniques for maintaining medical equipment (for hardware) but also skills for managing the system of the BES itself (for software). It is essential for the above technical cooperation to be executed in order to achieve the objective set forth at the beginning of this project, the objective being the improvement of

the health services of Sri Lanka.

Apppendix

1. MEMBER LIST OF THE FIELD SURVEY TEAM

(1) Basic Design Study Team (May 6 ~ June 9, 1992)

Noriaki ONO

Leader
Director,
Department of Medical Engineering Service,
Mitsui Memorial Hospital

Susumu NAKATA

Hospital Management
Department of International Cooperation,
National Medical Center Hospital
Ministry of Health and Welfare

Yukio SASAKI

Grant Aid Planner
Planning & Survey Division
Emigration Department, JICA

Kazuhiko IYOGI

Chief Consultant and Medical Equipment Planner I
Manager,
Second Economic Cooperation Department,
International Total Engineering Corporation

Hiroshi TASEI

Medical Equipment Planner II
Assistant Manager,
Second Economic Cooperation Department,
International Total Engineering Corporation

Kazumi AKITA

Facilities Planner
Senior Architect,
General Manager,
Hospital Engineering Department
International Total Engineering Corporation

Ryoji HARADA

Operation & Maintenance Planner
Assistant Manager,
First Economic Cooperation Department,
International Total Engineering Corporation

Akira SATO (Domestic Work)

Cost Estimator
Deputy General Manager,
Overseas Project Division
International Total Engineering Corporation

(2) Explanation of Draft Final Report (Sept. 24 ~ Oct. 3, 1992)

Noriaki ONO

Leader
Director,
Department of Medical Engineering Service,
Mitui Memorial Hospital

Shinya SUZUKI

Grant Aid Planner
Bureau of Economic Cooperation
Ministry of Foreign Affairs

Kazuhiko IYOGI

Chief Consultant and Medical Equipment Planner I
Manager,
Second Economic Cooperation Department,
International Total Engineering Corporation

Ryoji HARADA

Operation & Maintenance Planner
Assistant Manager,
First Economic Cooperation Department,
International Total Engineering Corporation

2. SURVEY SCHEDULE

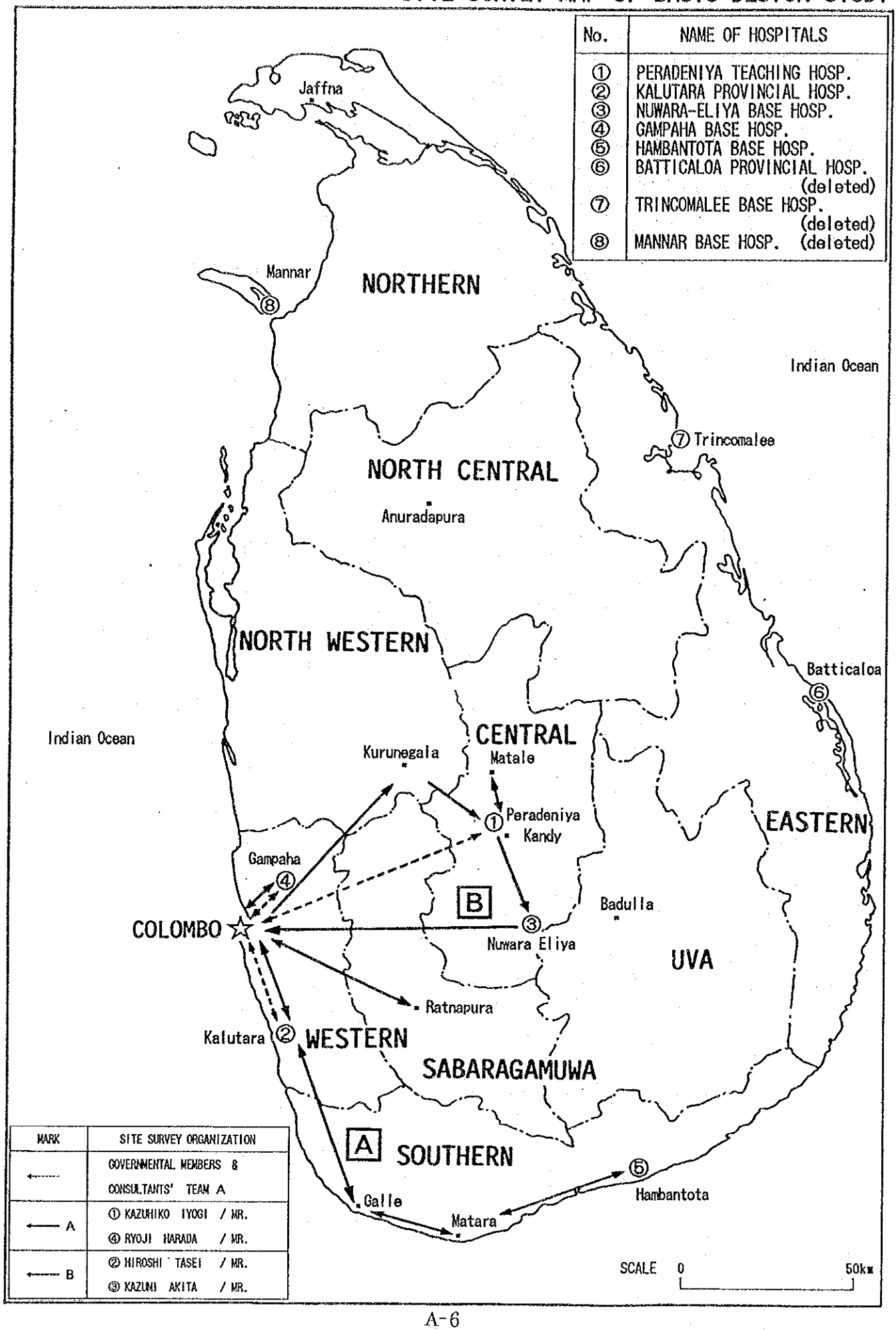
(1) Basic Design Study (MAY 6 ～ June 9, 1992)

No.	DATE	Schedule	
1	May 6 (Wed)	Lv. Tokyo (Mr. Ono, Dr. Nakata, Mr. Sasaki Mr. Iyogi, Mr. Harada) Ar. Colombo	
2	7 (Thu)	Meeting at JICA Courteasy call to Embasy of Japan Meeting at Department of External Resource Meeting at MOH Meeting at BES	
3	8 (Fri)	Meeting at MOH Meeting at BES	Dr. Nakata 10:30 Survey at Nawaroka Hospital 14:30 Survey at Colombo GH
4	9 (Sat)	Lv. Colombo Ar. Colombo	Survey at BH Gampaha
5	10 (Sun)	Lv. Colombo for Kandy	
6	11 (Mon)	Survey at GH Peradeniya Lv. Colombo for Kandy	
7	12 (Tue)	Lv. Colombo for Kalutara Survey at PH Kalutara Ar. Colombo	B Team (Mr. Akita, Mr. Tasei) Lv. Tokyo Ar. Colombo
8	13 (Wen)	Meeting at BES Discussion on the Minutes Survey at Sri-Jayawardena GH. Meeting with Reactivation Expert Team	
9	14 (Thu)	Join to Seminor of Reactivation team Signing of Minutes of Discussion at MOH Reporting to Embassy of Japan Reporting to JICA	
10	15 (Fri)	Team Meeting Lv. Colombo for Tokyo (Mr. Ono, Dr. Nakata, Mr. sasaki)	
11	16 (Sat)	Arrangement of Survey data Team Meeting	
12	17 (Sun)	Team Meeting	
13	18 (Mon)	A team (Mr. Iyogi, Mr. Harada) Lv. Colombo Ar. Colombo	B team (Mr. Akita, Mr. Tasei) Lv. Colombo Ar. Kandy
14	19 (Tue)	Meeting at USAID Meeting at FINNIDA Arrangement of Survey data	Lv. Kandy for Matale Lv. Matale for Kandy Survey at BH Motale

No.	DATE	Schedule	
		A Team	B Team
15	20 (Wen)	Lv. Colombo for Hambantota	Survey at TH Peradeniya
16	21 (Thu)	Survey at BH Hambantota	Survey at TH Peradeniya
17	22 (Fri)	Survey at BH Hambantota Lv. Hambantota for Matora.	Survey at TH Peradeniya Lv. Kandy for Nuwala Eliya
18	23 (Sat)	Survey at Bh Matara Meeting on Regional Director's Office Lv. Matara for Hikedua	Survey at BH Nuwala Eliya
19	24 (Sun)	Team Meeting	Team meeting
20	25 (Mon)	Lv. Hikadua for Galle Survey at GH Galle Meeting at Provincial Ministry of Health Lv. Galle for Hikedua	Survey at BH Nuwala Eliya Lv. Nuwala Eliya for Colombo
21	26 (Tue)	Lv. Hikadua for Kalutara Survey on GH Kalutara Lv. Kalutara for Colombo	
22	27 (Wen)	Meeting at BES and USAID	
23	28 (Thu)	Lv. Colombo for Kalutara Survey at BH Kalutara Lv. Kalutara for Colombo	Survey at GH Colombo Survey at Local Agent
24	29 (Fri)	Lv. Colombo to Gampaha Survey at BH Gampaha Lv. Gampaha for Colombo	Survey at GH Sri Jeyawardenepura Survey at Local Agent
25	30 (Sun)	Team meeting	
26	31 (Sat)	Analysis of data	B Team Lv. Colombo for Tokyo
27	June 1 (Mon)	Reporting to MOH and BES Survey at Local Agent	
28	2 (Tue)	Lv. Colombo to Gampaha Survey at BH Bampaha Lv. Gampaha to Colombo	
29	3 (Wen)	Meeting on BES	
30	4 (Thu)	Survey at MSD Meeting at MOH	

No.	DATE	Schedule
31	June 5 (Fri)	Meeting at BES Meeting at MOH Reporting to JICA Meeting at MOH
32	6 (Sun)	Team meeting, Arrangement of data
33	7 (Sun)	Team meeting, Arrangement of data
34	8 (Mon)	Lv. Colombo for Tokyo
35	9 (Tue)	Ar. Tokyo

SITE SURVEY MAP OF BASIC DESIGN STUDY



(2) Explanation of Draft Final Report (Sept. 24 2 ～ Oct. 3, 1992)

No.	Date	Schedule
1	Sept. 24 (Thu)	Lv. Tokyo Av. Colombo
2	25 (Fri)	Courtesy Call to and Meeting at JICA Courtesy Call to Embassy of Japan Meeting at Department of External Resource Meeting at MOH and BES
3	26 (Sat)	Lv. Colombo for Hambantota Survey at New Surgical Wards and Operating theater at BH Hambantota
4	27 (Sun)	Lv. Hambantota for Kalutara Survey at New Emergency, CSSD and Mortuary Building Lv. Kalutara for Colombo
5	28 (Mon)	Explanation and discussion of Draft Final Report at MOH
6	29 (Tue)	Study at MOH and at BES Lv. Colombo for Singapore (Mr. Suzuki)
7	30 (Wed)	Discussion on and confirmation of the Minutes Study at BES and collection of data from other Souces
8	Oct. 1 (Thu)	Signing of Minutes of Discussion at MOH Reporting to Embassy of Japan and JICA
9	2 (Fri)	Lv. Colombo for Tokyo
10	3 (Sat)	Ar. Tokyo

3. ATTENDANT'S LIST

(1) Basic Design Study

(Embassy of Japan)

1. M.D. Masakazu FURUHATA	:	Second Secretary

(JICA Sri Lanka office)

1. Mr. Yoshiaki SAKAMAKI	:	Director/Resident Representative
2. Mr. Kiichiro KUNO	:	Deputy Director
3. Mr. Mitsuyoshi KAWASAKI	:	Assistant Resident Representative

(Department of External Resource, Ministry of Finance)

1. Mr. S. Weerapana	:	Deputy Director

(Ministry of Health and Women's Apfaires)

1. Dr. George Fernando	:	Director General Health Services
2. Dr. S.M. Goonesekera	:	Deputy Director General (Laboratory Services)

(BES-Biomedical Engineering Services)

1. Dr. (Mrs.) Indira. S. Jayawardene	:	Director
2. Mr. J.L.M.K. Jayatilaka	:	Engineer
3. Mr. S. Ratnayake	:	Engineer
4. Mr. Nimal Colombage	:	Foreman
5. Mr. N. Hendavitharana (Nima)	:	Foreman
6. Mr. W.G. Nandasena	:	Foreman (BES - Galle Branch)
7. Mr. A.G.A.R. De Silva	:	Foreman
8. Mr. P.L. Perera	:	Foreman (O.T. Section)

(Regional Director Office of Health Services-Gampaha)

1. Dr. H.R.U. Indrasiri	:	Regional Director of Health Service

(Base Hospital Gampaha)

1. Dr. M.R. Samarasinghe	:	District Medical Officer
2. Dr. M.U. Damayaulhe	:	House Officer
3. Dr. H. Pahalawakearchchi	:	House Officer
4. Dr. L.V.S.He	:	House Officer

5. Dr. Udaya Alagoda	:	House Officer
6. Mr. R.K.J. Rajapaksa	:	Pharmacist

(Teaching Hospital Peradeniya)

1. Dr. J. Jayawardana	:	Director
2. Dr. (Ms.) C. Gunathelake	:	Deputy Director
3. Dr. C. Ratnatunga	:	Surgery
4. Dr. L. Jayasena	:	Paediatrician
5. Dr. A.S.B. Wijekoon	:	Paediatrician
6. Dr. U. Illangesekera	:	Physician
7. Dr. H.J. De Silva	:	Physician
8. Prof. Nimal Senaneyake	:	Professor of Medicine
9. Dr. P. Amerasinghe	:	Radiologist
10. Dr. Jayantha Sirisena	:	Senior Lecturer of OBS & gynaecologist

(Provincial Hospital Kaleetara)

1. Dr. R. Wimal Jayantha	:	Deputy Director
2. Dr. B.G.A. Vidyatilake	:	Obstetrician and Gynaecologist

(Provincial Ministry of Health-Southern Province)

1. Mrs. Darine Cynf	:	Director
2. Mr. G. Hewaviterana	:	Secretary
3. Mr. D.G. Punchihewa	:	Deputy Secretary
4. Mr. H.K. Dayapene	:	Accountant

(Base Hospital Hambartota)

1. Dr. P. Ekanayake	:	District Medical Officer
2. Mr. P. Wijesekera	:	Chief Clerk

(Regional Director Office of Health Services - Hambantota)

1. Dr. P.H.U. de Zoyea	:	Regional Director of Health Service

(Base Hospital Nuwara Eliya)

1. Dr. P.M. RATHWAYAKE	:	District Medical Officer
2. W. Warsakoon	:	Adiminis Trative Officer

3. Dr. V. Shivantiha	:	Eye Surgeon
4. Dr. P. Pitigalarachchi	:	Surgeon
5. Dr. N.S. Manoratne	:	Dental and Maxillo facial susgeon
6. Dr. A.D.T. du Zoysa	:	Obstetrician Gyacologist
7. Dr. K. Efiakumbura	:	Acting Paediatrician
8. Mrs. P. Senevirathna	:	Medical Laboratory Technologist
9. Mr. C.S. Herath	:	Physiotherapist
10. L.L.G.De Zilva	:	Radiographer
11. D.M. Srazyani Renzikc	:	Electrocrdiographer
12. M.M.R.U. Trueacle	:	Pharmasist
13. S.A.R.K. Jayasooiaya	:	Nursing Officer
(Base Hospital Matale)		
1. Dr. P.G. Mahipala	:	District Medical Officer
(Base Hospital Matara)		
1. Dr. G.A. Bertinus	:	District Medical Officer
2. Dr. S.P. Welceawa	:	General Surgeon
3. Dr. G.A. Ronatanua	:	Obsterician and Gynaecologist
4. Mr. M.S.S.N. Kakunartne	:	Administrative Officer
(Provincial Hospital Kurunegara)		
1. Dr. D.A.K. Gunaschera	:	Medical Superintendent
2. Mr. P.M. Podirathna	:	Pharmacist
(Office of the Provincial Director of Health (Southern) Galle)		
1. Mr. A.K.G. Jayasiri	:	Planning and Programming Officer
2. Mrs. Melamie G. Vithana	:	Clerk Officer
(Teaching Hospital Galle)		
1. Mr. M.K. Dikkson	:	Coordinator
(Provincial Hospital Retunapura)		
1. Dr. G. Sauharayana	:	Medical Supt.
(USAID - U.S. Agency for International Development)		
1. Mr, David J. Garms	:	Chief Office of Program

(FINNIDA - Embassy of Finland)

1. Mrs. Irma-Lüsa Perttunen	:	Counsellor-Resident Head of Mission

(Delmege Forsyth & Co. Ltd.)

1. Mr. Sunil J. Kodituwakku	:	Departmental Director (Electronics Department)

(Reactivation Team for Rocal Hospital)

1. Mr. Ken MATSUMOTO	:	MEDISUN CO., LTD.
2. Mr. Yoshiakira NAGAO	:	MEDISUN CO., LTD.
3. Mr. Takeshi MATSUO	:	MEDISUN CO., LTD.

(Yamashita Sekkei Inc.)

1. Mr. Satoshi OKAMOTO	:	Resident Architect

(2) Explanation of Draft Final Report

(Embassy of Japan)

1. M.D. Masakazu Furuhata : Second Secretary

(JICA Sri Lanka Office)

1. Mr. Yoshiaki Sakamaki : Director / Resident Representive
2. Mr. Mitsuyoshi Kawasaki : Assistant Resident Representive
3. Miss Ogasawara : Medical Cordinator

(Department of External Resource, Ministry of Finance

1. Mr. S. Weerapana : Deputy Director
2. Mr. M. S. Samarasekera : Director Buildings Dept.

(BES - Biomedical Engineering Service)

1. Dr. (Mrs.) Indira. S. Jayawardene : Director
2. Mr. J.L.M.K. Jayatilaka : Engineer

(Teaching Hospital, Peradeniya)

1. Dr. J. Jayawardana : Director

(Provincial Hospital, Kalutara)

1. Dr. R. Wimal Jayantha : Deputy Director

(Base Hospital, Nuwara-Eliya)

1. Dr. L.M.S. Mululents : Representative the DMO

(Base Hospital, Gampaha)

1. Dr. M.R. Samarasinghe : District Medical Officer

(Base Hospital, Hambantota)

1. Dr. P. Ekanayake : District Medical Officer

4. MINUTES OF DISCUSSIONS

(1) Basic Design Study

MINUTES OF DISCUSSIONS

ON

THE BASIC DESIGN STUDY ON THE PROJECT FOR

THE DEVELOPMENT OF RURAL HOSPITALS (PHASE II)

IN

THE DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA

In response to a request from the Government of the Democratic Socialist Republic of Sri Lanka, the Government of Japan decided to conduct a Basic Design Study on the Project for the Development of Rural Hospitals(Phase II) (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Sri Lanka a study team, which is headed by Ph.D. Noriaki ONO, Director, Department of Medical Engineering Service, Mitsui Memorial Hospital from May 6 to June 8, 1992. The team had a series of discussions with the officials concerned of the Government of Sri Lanka and conducted a field survey at the study area.

As a result of discussions and field survey, both sides have confirmed the main items described in the attached sheets. The team will proceed to further works and prepare the Basic Design Study Report.

Colombo, May 14, 1992

Ph.D. Noriaki Ono
Leader,
Basic Design Study Team,
Japan International
Cooperation Agency

Dr. George Fernando
Director General of
Health Services,
Ministry of Health
& Women's Affairs
Sri Lanka

ATTACHMENT

1. Objective

The objective of the Project is to improve the medical services at the Rural Hospitals by procurement of the necessary medical equipment.

2. Locations of the Project sites

The Location of the Project sites is listed in Annex I.

3. Executing agency

The Ministry of Health and Women's Affairs is responsible for administration and execution of the Project.

4. Items requested by the Sri Lanka side

The items finally requested by the Sri Lanka side are shown in Annex II in order of her priority.

5. Comments by the Japanese side on the requested items mentioned in 4. above

5.1 The Japanese side will review the necessary equipment for the Project according to the priority order proposed by the Sri Lanka side based on the discussion between both sides and the result of the study conducted by the team.

5.2 The final components of the Project may differ, when considered necessary after further studies in Japan.

6. Selection Criteria of Equipment

The following criteria will be taken into consideration in the selection of equipment.

6.1 Proper maintenance

1) Increased capability of BES after the completion of its Rehabilitaion Project financed by Japan

2) Appropriateness with the view to the recurrent cost and available financial resources

3) Procurement of the spare parts and consumables

6.2 Frequent use

6.3 Priorities in the needs of the target population and the expected roles of the hospitals

7. Japan's Grant Aid system

7.1 The Sri Lanka side understands the system of Japan's Grant Aid as explained by the team.

7.2 The Sri Lanka side will take necessary measures, as described in Annex III for the smooth implementation of the Project on condition that the Grant Aid by the Government of Japan is extended to the Project.

8. Other relevant issues

On condition that the Grant Aid by the Government of Japan is extended to the Project,

8.1 the Ministry of Health and Women's Affairs will assure the adequate provision of funds for maintenance and operation of the equipment in the recurrent budget.

8.2 the Ministry of Health and Women's Affairs will maintain adequate performance and compile utilization reports on the major items of the equipment included in the Project. And these reports will be submitted annually to the Japanese side.

9. Schedule of the Study

9.1 The consultants will proceed to further studies in Sri Lanka until June 8, 1992.

9.2 Based on the Minutes of Discussions and the results of the study, JICA will compile a draft final report and dispatch a mission in order to explain its contents in September 1992.

9.3 Upon approval of the said draft final report by the Sri Lanka side, JICA will complete the final report and submit it to the Government of Sri Lanka and the Government of Japan around November 1992.

Annex I

The Location of the Project sites

1. General Hospital, Peradeniya
2. General Hospital Kalutara
3. Base Hospital Nuwara-Eliya
4. Base Hospital Gampaha
5. Base Hospital Hambantota

Annex II

Items requested by the Sri Lanka side

1. Equipment for Operating Theatre
2. Equipment for Sterilization Department
3. Equipment for Laboratory Department
4. Equipment for Radiology Department
5. Equipment for Physiotherapy Department
6. Equipment for Outpatient Department
7. Equipment for Gynecology and Obstetrics Department
8. Equipment for Intensive Care Unit
9. Equipment for Renal Department
10. Others

Annex III

Necessary measures to be taken by the Government of Sri Lanka on condition that Japan's Grant Aid is extended:

1. To provide the land for temporary site office, warehouse and stock yard during the implementation period

2. To ensure prompt unloading, tax exemption, customs clearance at the port of disembarkation in Sri Lanka, and prompt internal transportation of imported materials and equipment for the Project

3. To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in Sri Lanka with respect to the supply of the products and services under the verified contracts

4. To accord Japanese Nationals, whose services may be required in connection with the supply of products and the services under the verified contracts, such facilities as may be necessary for their entry into Sri Lanka and stay therein for the duration of their work

5. To use and maintain properly and effectively all the equipment purchased under the Grant

6. To bear all the expenses other than those to be borne by the Grant, necessary for the procurement of the equipment as well as for the transportation and the installation of the equipment

(2) Explanation of Draft Final Report

MINUTES OF DISCUSSIONS
ON
THE BASIC DESIGN STUDY ON THE PROJECT FOR
THE DEVELOPMENT OF RURAL HOSPITAL (PHASE II)
IN
THE DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA
(CONSULTATION ON DRAFT REPORT)

In May 1992, the Japan International Cooperation Agency (JICA) dispatched a Basic Design Study Team on the Project for the Development of Rural Hospital (Phase II) (hereinafter referred to as "the Project") to the Democratic Socialist Republic of Sri Lanka, and based on the discussions with the Sri Lanka side and the examination of the results of the field survey, JICA has prepared the draft report of the study.

In order to explain and discuss the contents of the draft report, JICA sent to Sri Lanka a study team, which is headed by Ph.D. Noriaki ONO, Director, Department of Medical Engineering Service, Mitsui Memorial Hospital from September 24 to October 2, 1992.

As a result of discussions, both sides have confirmed the main items described in the attached sheets.

Colombo, October 1, 1992

Ph.D. Noriaki Ono
Leader,
Draft Report Explanation Team
Japan International
Cooperation Agency

Dr. George Fernando
Director General of
Health Services,
Ministry of Health
& Women's Affairs
Sri Lanka

ATTACHMENT

1. Contents of the Draft Report

The Sri Lanka side has agreed and accepted in principle the contents of the Draft Report proposed by the team.

2. Japan's Grant Aid System

2.1 The Sri Lanka side understands the system of Japan's Grant Aid as explained by the team.

2.2 The Sri Lanka side will take necessary measures described in Annex for the smooth implementation of the Project on condition that the Grant Aid by the Government of Japan is extended to the Project.

3. Other relevant issues

On condition that the Grant Aid by the Government of Japan is extended to the Project,

3.1 the Ministry of Health and Women's Affairs will assure the adequate provision of funds for maintenance and operation of the equipment in the recurrent budget.

3.2 the Ministry of Health and Women's Affairs will maintain adequate performance and compile utilization reports on the major items of the equipment included in the Project. And these reports will be submitted annually to the Japanese side.

4. Schedule of the Study

JICA will complete the final report with the confirmed items, and submit it to the Government of Sri Lanka and the Government of Japan around November 1992.

N. Ono

Annex

Necessary measures to be taken by the Government of Sri Lanka on condition that Japan's Grant Aid is extended:

1. To provide the land for temporary site office, warehouse and stock yard during the implementation period

2. To ensure prompt unloading, tax exemption, customs clearance at the port of disembarkation in Sri Lanka, and prompt internal transportation of imported equipment for the Project

3. To ensure exemption of customs, internal taxes, value added taxes and other fiscal levies for unloading, customs clearance, internal transportation of imported equipment for the Project

4. To conclude a Banking Arrangement (B/A) with an authorized Japanese foreign exchange bank and bearing the necessary commissions to the Japanese foreign exchange bank for the banking services based upon the B/A

5. To issue necessary Authorization(s) to Pay (A/P) and bearing the necessary payment commissions for A/P based upon the B/A

6. To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in Sri Lanka with respect to the supply of the products and services under the verified contracts

7. To accord Japanese Nationals whose services may be required in connection with the supply of products and the services under the verified contracts, such facilities as may be necessary for their entry into Sri Lanka and stay therein for the duration of their work

8. To use and maintain properly and effectively all the equipment purchased under the Grant and bearing the increase of necessary maintenance cost amounting to around Rs.8.5 million (26.4 million yen) annually including spare parts and consumables

9. To bear all the expenses other than those to be borne by the Grant, necessary for the procurement of the equipment as well as for the transportation and the installation of the equipment

10. To complete the following modifications before October 1993 and bearing the necessary budget amounting to around Rs. 0.16 million (0.5 million Yen) in total

10.1 The existing physiotherapy room will be modified to the room for Angiography X-ray unit at Teaching Hospital, Peradeniya.

10.2 The existing Blood Bank will be modified to the room for X-ray unit at Base Hospital, Nuwara Eliya.

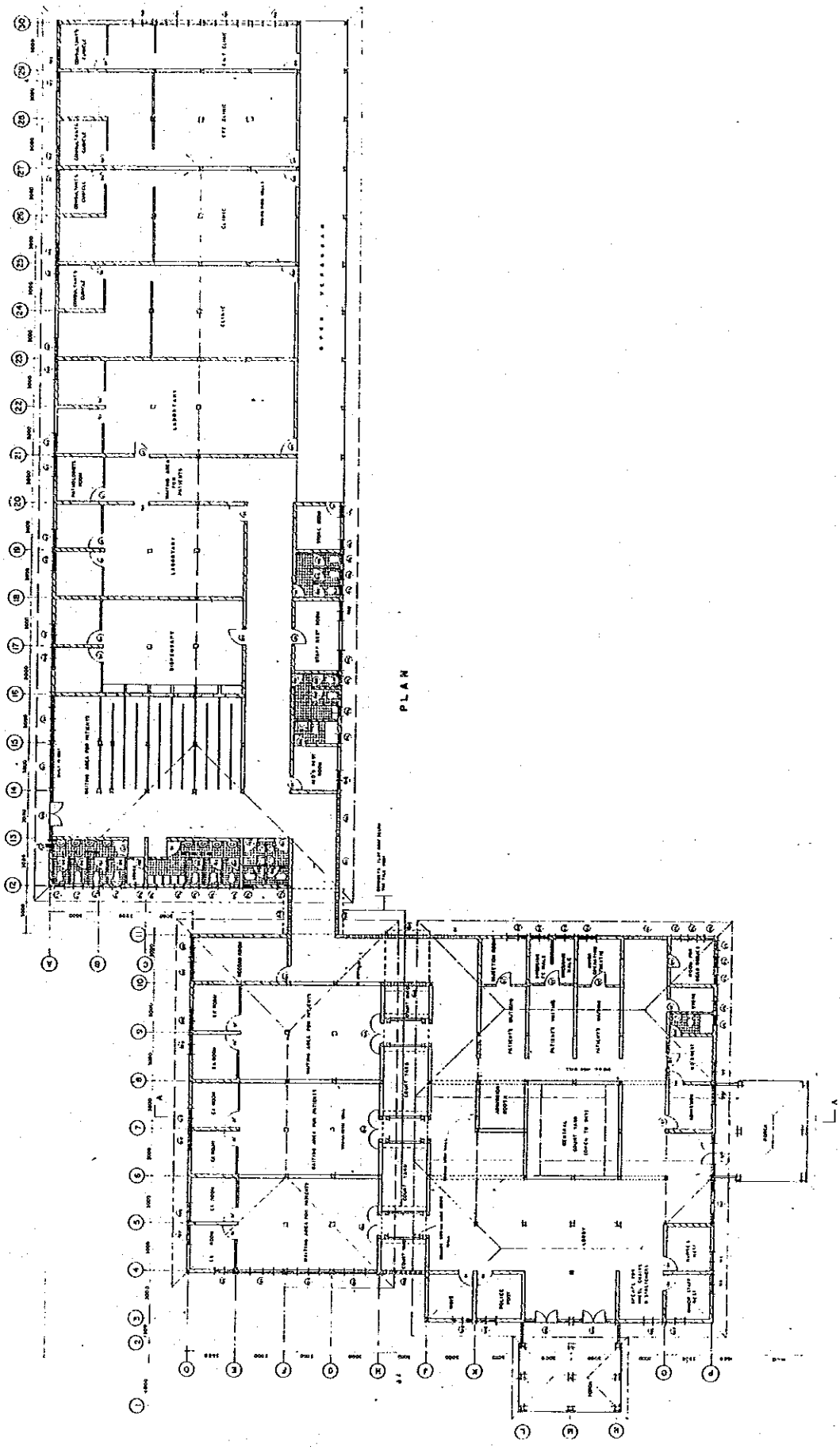
11. To complete the construction of the new facilities as shown in the following construction schedule :

11.1 Provincial Hospital, Kalutara

		Scheduled Commencement	Scheduled Completion
(1)	New Outpatient Department and Accident Service (Modification of present Outpatient Department)	November 1992	September 1993
(2)	New Sterilization Department	October 1992	February 1993
(3)	New Mortuary	Completed in July 1992	

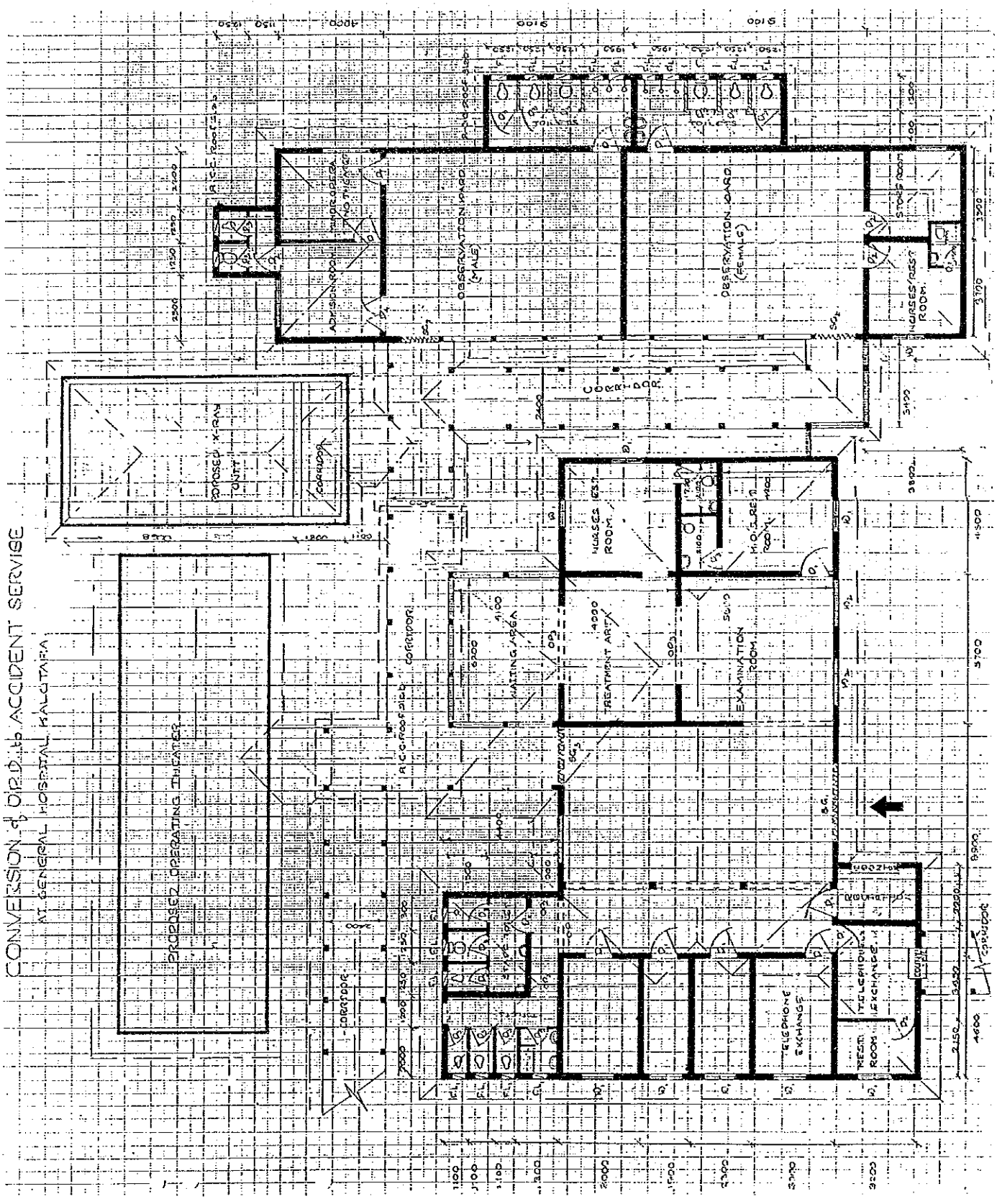
11.2 Base Hospital, Hambantota

	New Operation Theatre	Under Construction	End of 1992



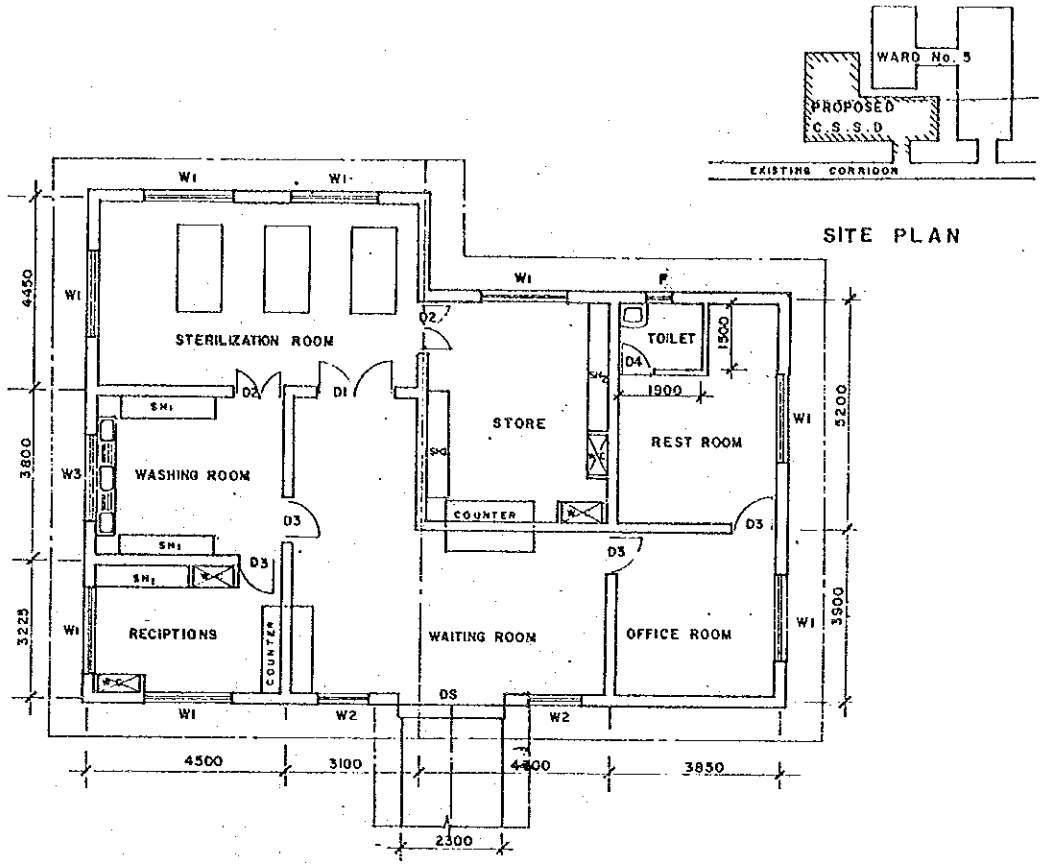
5. PROVINCIAL HOSPITAL, KALUTARA EXPANTION PLAN

Fig. 5-1 NEW O.P.D. PLAN



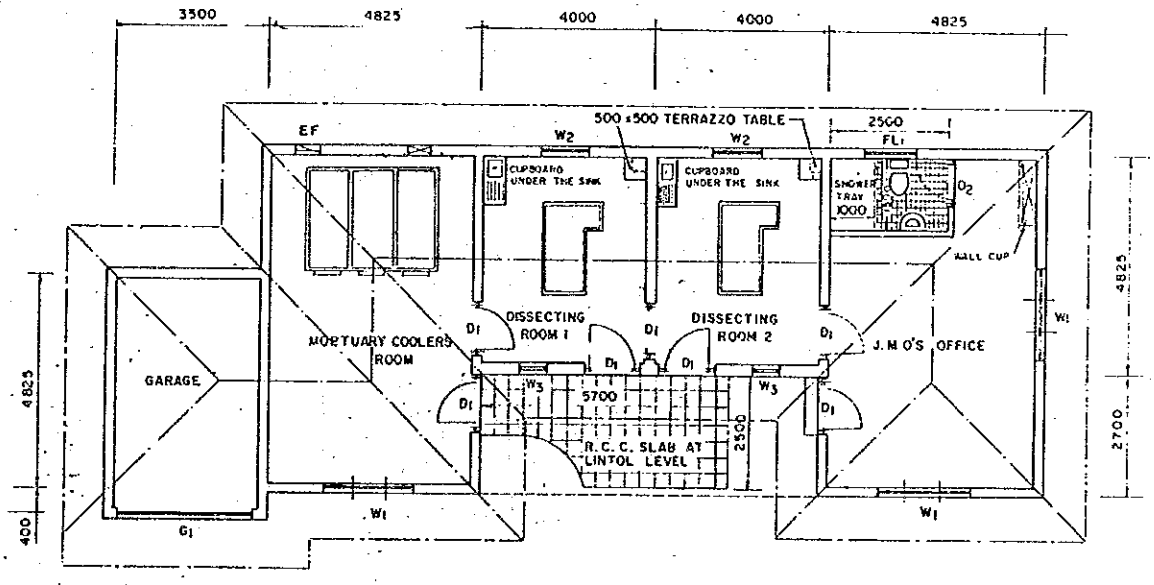
5. PROVINCIAL HOSPITAL, KALUTARA EXPANTION PLAN

Fig. 5-2 MODIFICATION PLAN : OLD O.P.D. → NEW EMERGENCY UNIT



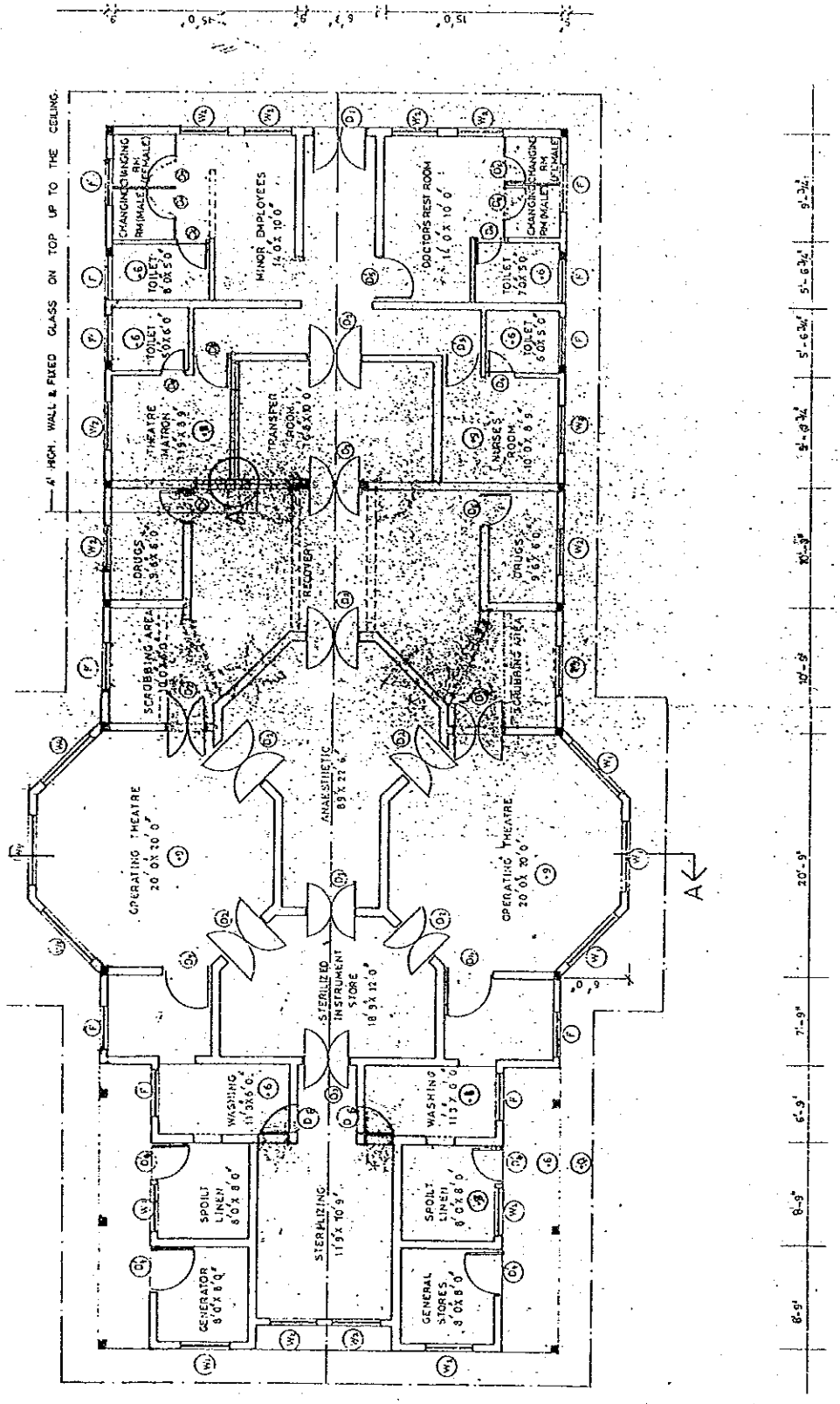
5. PROVINCIAL HOSPITAL, KALUTARA EXPANTION PLAN

Fig. 5-3 NEW C. S. S. D PLAN



5. PROVINCIAL HOSPITAL, KALUTARA EXPANTION PLAN

Fig. 5-4 NEW MORTUARY UNIT PLAN (AS-BUILT)



6. BASE HOSPITAL, HAMBANTOTA EXPANTION PLAN

Fig. 6-1 NEW OPERATION THEATRE PLAN

7. COLLECTED DATA & DOCUMENT

① ANNUAL HEALTH BULLETIN (1990)·····MINISTRY OF HEALTH (MOH)

② PUBLIC INVESTMENT (1990-1995) ··DEPARTMENT OF NATIONAL PLANNING
MINISTRY OF POLICY PLANNING & IMPLEMENTATION

③ NATIONAL HEALTH DEVELOPMENT PLAN (1992)····· MINISTRY OF STATE FOR HEALTH

④ ANNUAL PROVINCIAL HEALTH DEVELOPMENT PLAN (1992 SOUTHERN PROVINCE)·····

·····BY OFFICE OF THE PROVINCIAL DIRECTOR OF HEALTH SERVICES, FORT-GALLE

⑤ ANUUAL DISTRICT HEALTH PLAN 1992 (NUWARAELIYA DISTRICT)·····NUWARAELIYA

⑥ PROVINCIAL HEALTH PLAN 1992 (WESTERN PROVINCE)·····WESTERN PROVINCE

⑦ DISTRICT HEALTH DEVELOPMENT PLAN 1992 (GAMPAHA DISTRICT)····GAMPAHA DISTRICT

⑧ RECOMMENDED LIST OF MAJOR EQUIPMENT FOR HEALTH INSTITUTIONS
UNDER THE MINISTRY OF HEALTH(NOVEMBER, 1988)·····MINISTRY OF HEALTH (MOH)

8. WATER ANALYSIS REPORT (1/2)

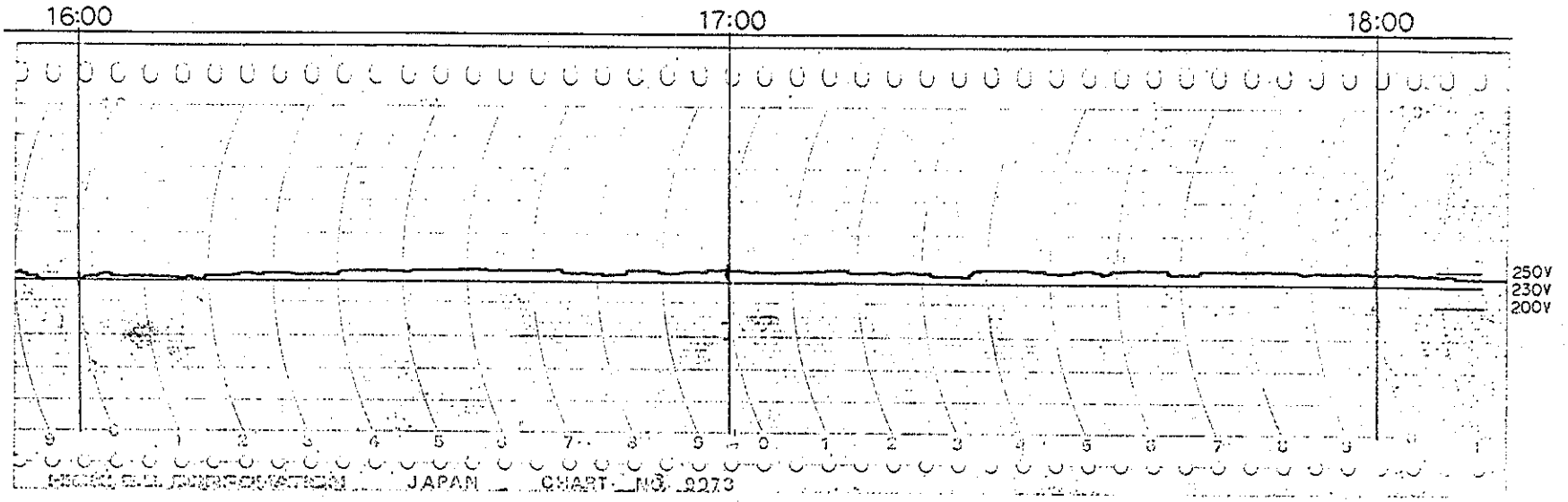
Sample No.	1	2	3
Sampling Place	TH Peradeniya	PH Kalutara	BH Nuwara Eliya
Sampling date	'92 · 5 · 11	'92 · 5 · 26	'92 · 5 · 25
Wrdition condition	Colorless	Slightly turbide & Brown color	Slightly turbide & Brown color
Analysis date	'92 · 6 · 17	'92 · 6 · 17	'92 · 6 · 17
pH (25℃)	7.20	5.78	6.56
Electric Conducting (25℃)	75	137	16.0
Turbidity	below 1	2	1
Hydrogencakbonic(mg $CaCO_3/\ell$)	17.6	10.0	6.0
Hydrogencakbonic(mg $CaCO_3/\ell$)	0.0	0.0	0.0
Total Hardness (mg $CaCO_3/\ell$)	18.6	19.8	1.4
Calcium (mg $CaCO_3/\ell$)	11.3	13.4	0.7
Magnesium Ion (mg $CaCO_3/\ell$)	7.3	6.4	0.7
Chlorine Ion (mg Cl/ℓ)	4.5	22.6	1.7
Total Ion (mg Fe/ℓ)	below 0.05	0.07	0.13
Silica (mg SiO_2/ℓ)	7.85	8.83	8.60
Drygen Consumption (mg OCL)	below 1	1.2	2.5
Color level	1	1	5
Sulfuric Acid Ion (mg SO_4/ℓ)	0.4	5.1	below 2
Nitric Acid Ion (mg NO_3/ℓ)	1.4	13.4	below 1

8. WATER ANALYSIS REPORT (2/2)

Sample N o .	4	5
Sampling Place	BH Gampaha	BH Hambantota
Sampling date	'92 · 5 · 9	'92 · 5 · 21
Wrdition condition	colorless	Slightly turbide & Brown color
Analysis date	'92 · 6 · 17	'92 · 6 · 17
pH (25℃)	6.55	7.42
electric conductiving 25℃)	62.5	430
Turbidity	below 1	4
Hydrogencakbonic(mg $CaCO_3/\ell$)	7.0	133
Hydrogencakbonic(mg $CaCO_3/\ell$)	0	0
Total Hardness (mg $CaCO_3/\ell$)	16.2	133
Calcium (mg $CaCO_3/\ell$)	12.6	79
Magnesium Ion (mg $CaCO_3/\ell$)	3.6	54
Chlorine Ion (mg Cl/ℓ)	6.7	22.3
Total Ion (mg Fe/ℓ)	0.05	0.24
Silica (mg SiO_2/ℓ)	10.1	15.9.
Orygen Consumptive (mg OCL)	below 1	3.6
Color level	2	4
Sulfuric Acid Ion (mg SO_4/ℓ)	10.9	47.2
Nitric Acid Ion (mg NO_3/ℓ)	2.6	1.7

9. RECORD OF VOLTAGE FRUCTUATION

(1) BASE HOSPITAL, NUWARA ELIYA MAY 24(Sun)



(2) TEACHING HOSPITAL, PERADENIYA MAY 21 (Thu)