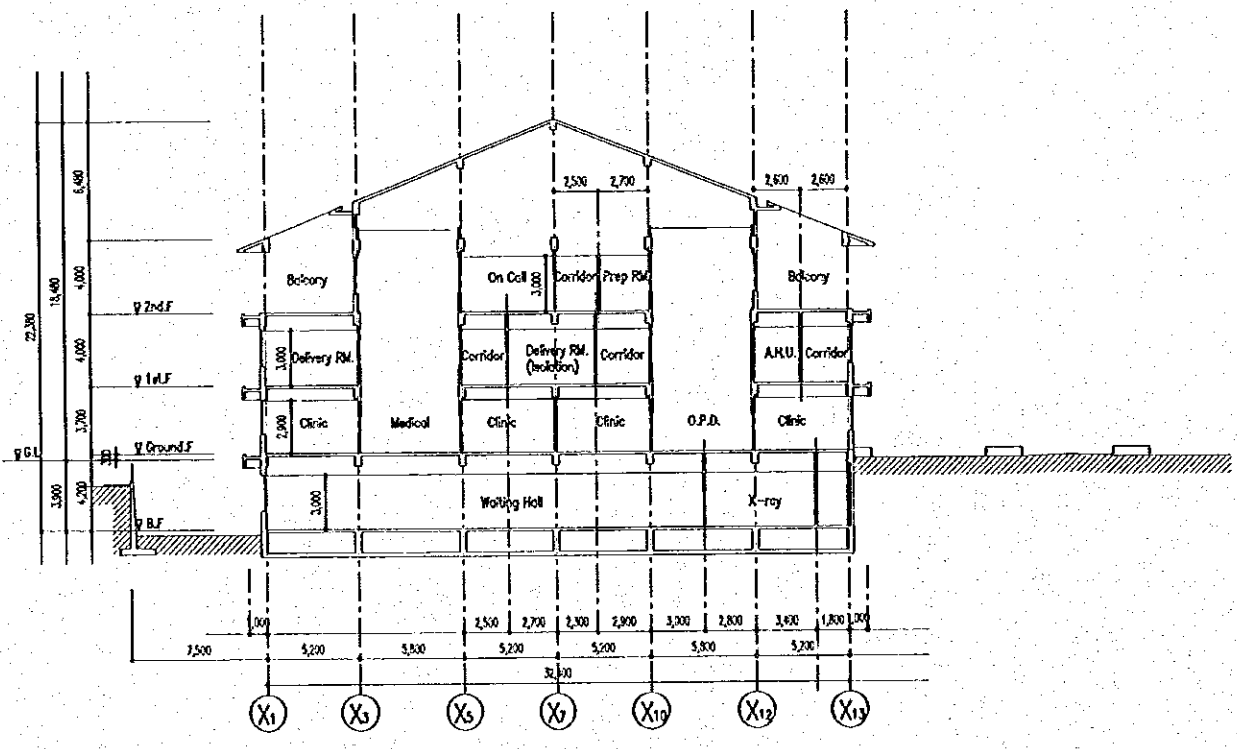
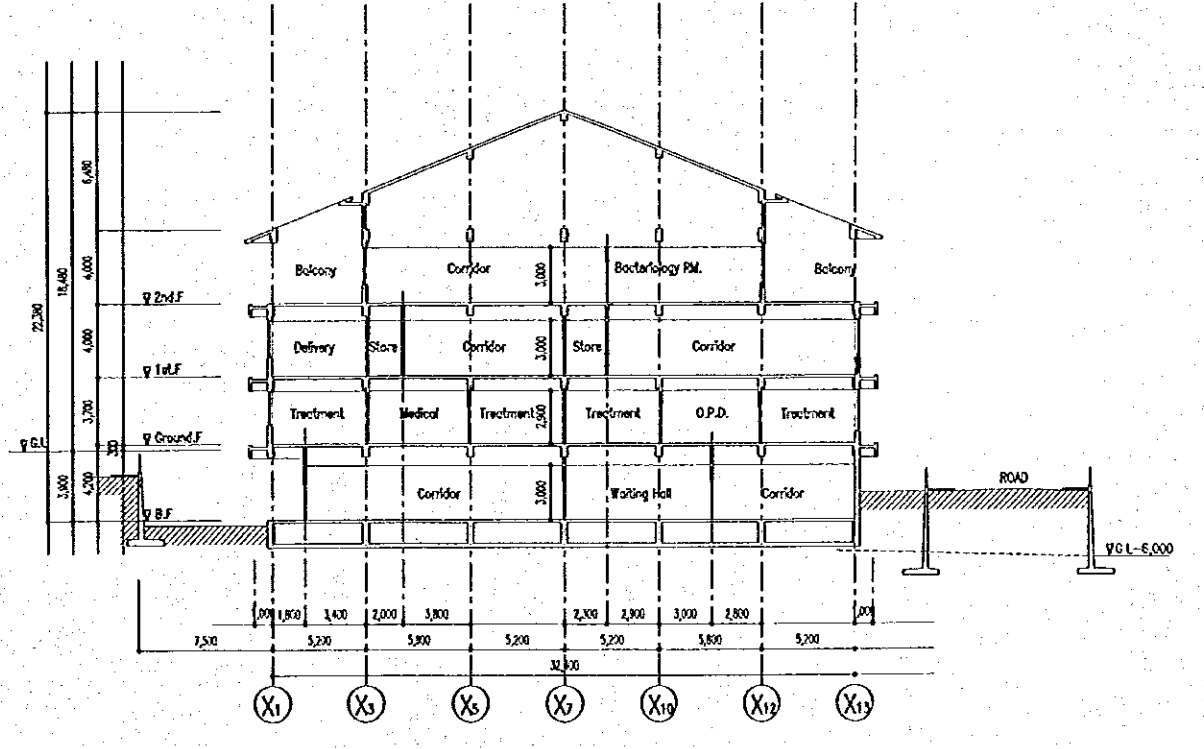


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## **Chapter 3 Implementation Plan**

## CHAPTER 3 IMPLEMENTATION PLAN

### 3-1 Implementation Plan

#### 3-1-1 Implementation Concept

##### (1) Implementation System

The Project will be implemented under Japan's grant aid system, after the decision by the Cabinet of the Government of Japan and the Exchange of Notes (E/N) on the Project with the Government of Sri Lanka. The Project's implementation system in Sri Lanka is shown in the Figure 3-1.

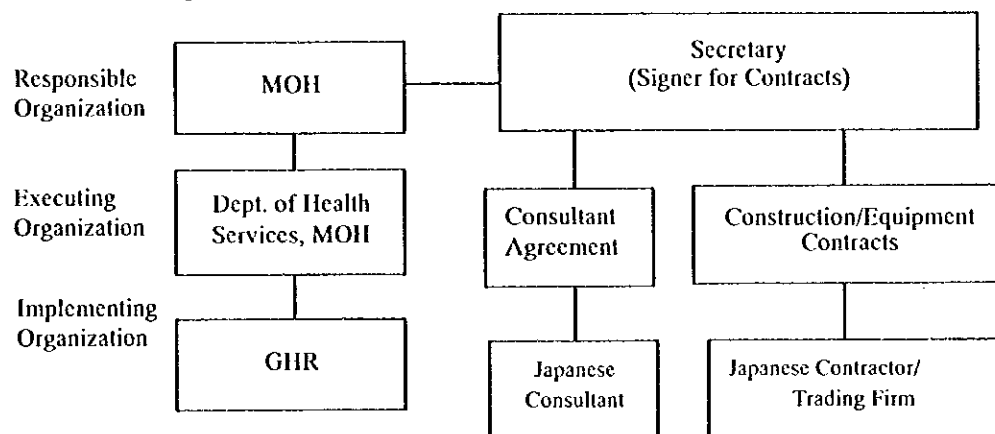


Figure 3-1 Implementing Organization

The Ministry of Health and Indigenous Medicine (MOH) will remain the agency of the Democratic Socialist Republic of Sri Lanka responsible for the implementation of the Project. The implementing organization is GHR. The contracting party on the Sri Lanka side, which is MOH (Secretary), will sign a consultant agreement and construction contracts concerning the Project, and will perform the Sri Lanka scope of work.

In order for smooth implementation of the Project, the Project Steering Committee on the Sri Lanka side has been established. The members of the Committee are as follows:

- Ministry of Health & Indigenous Medicine
  - Secretary
  - Senior Assistant Secretary
  - Director General of Health Services
  - Deputy Director General for Medical Services
  - Deputy Director General for Logistics & Buildings
  - Deputy Director General for Planning
  - Deputy Director General for Finance

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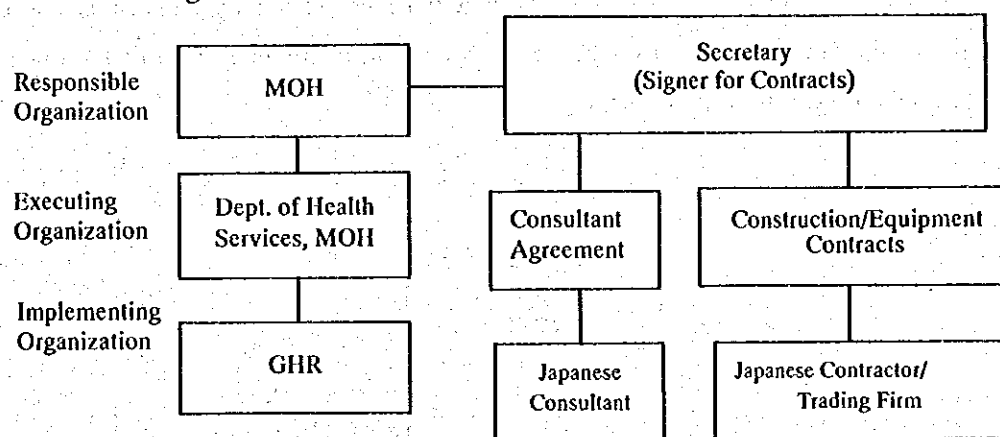


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  - Deputy Director General for Planning
  - Deputy Director General for Finance

Director of General Hospital Ratnapura  
 Director of Biomedical Engineering Services

- Ministry of Finance & Planning  
 Director (Japan Division) of Department of External Resources

The major functions of the Committee are as follows:

- Implementation of the Project, including Tender
- Getting tax exemption, building permission and other necessary permissions
- Provision of registered persons and fee in relation to the Project

Examination of the contents of tender documents (detailed design drawings, specifications, etc.) and inspection of construction work will be conducted by authorities concerned through the Project Steering Committee and MOH will finally make approval. Figure 3-2 shows the flow of these procedures.

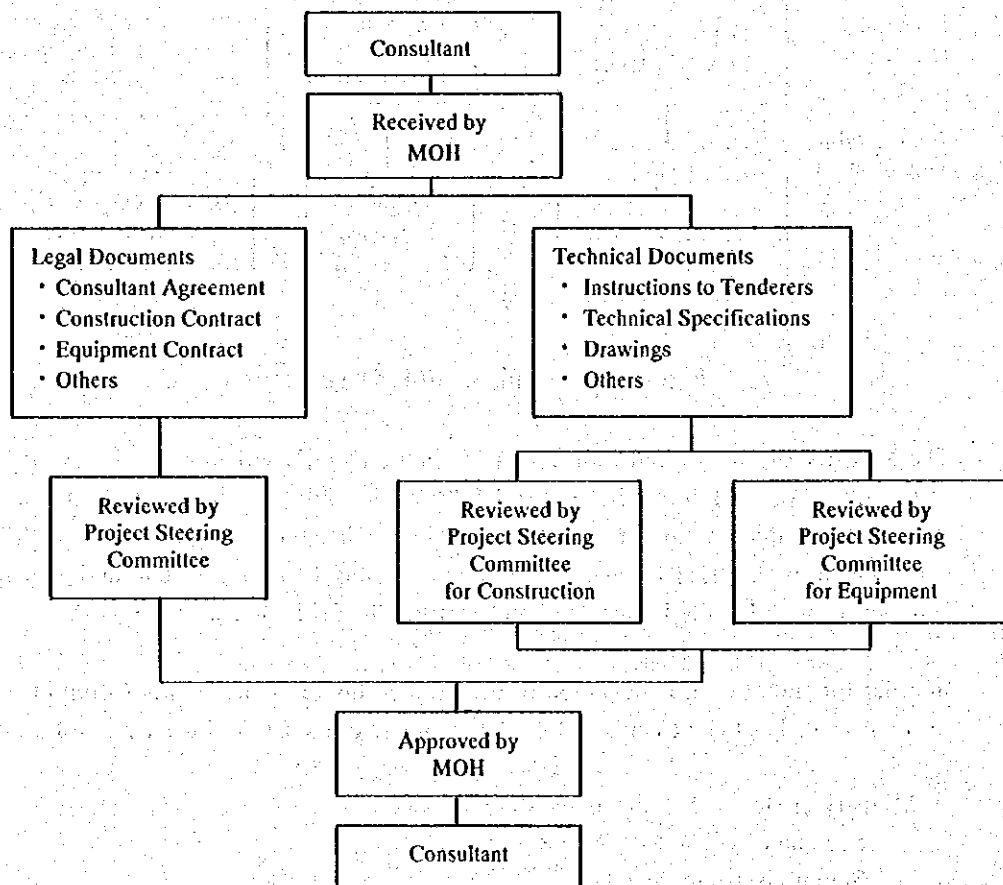


Figure 3-2 Approval Procedures

(2) Consultant

After the E/N is concluded, MOH concludes a consultant agreement with a Japanese consultant, regarding detailed design and construction supervision, and receives the Japanese government's verification of the agreement. For the smooth implementation of the Project, it is important to conclude a consultant agreement as early as possible after the conclusion of the E/N. After concluding the agreement, the consultant prepares detailed design drawings (Tender Documents) on the basis of the Basic Design Study Report and with the consent of MOH. Then MOH will make approval on tender documents, in accordance with the procedures mentioned above. The consultant carries out the assistant services of tender and the construction supervision services based on the agreement.

(3) Contractor

Construction work relevant to the Project includes construction work (building) and equipment work (procurement and installation). The contractors will be appointed from among qualified Japanese legal persons through the open competitive tender with restriction on tender's qualifications.

MOH will conclude contracts on construction and equipment works with the successful tenderers, and receives the verification on the contracts from the government of Japan.

(4) Use of Local Consultants

In Sri Lanka only five percent of the people advance to universities or colleges. Only very few of them graduate from engineering courses of highly regarded universities or colleges. The graduates as engineer or consultant, tend to find jobs abroad, in Singapore or in oil producing countries of the Middle East for example, where they are better working conditions than would be in Sri Lanka. It is said that those engineers working abroad are mainly working on construction drawings or construction supervise under the managers' instruction rather than be allowed to manage total construction work. These engineers consequently lack opportunities to develop ability to manage total construction; apparently, few consultants have become capable of managing total construction.

Under such a circumstance, it seems that local consultants will be retained in the Project as assistants to the Japanese supervisor dispatched by the consultant of the Project.

(5) Use of Local contractors and Dispatch of Japanese Engineers

Local contractor on principle have to become registered members of the Institute for Construction, Training and Development (ICTAD), an organization under the jurisdiction of the Ministry of Housing & Urban Development, before they can undertake construction business in Sri Lanka. About 200 construction companies were registered in ICTAD in 1998. The members are classified into M1 to M9 grades according to the yearly contract values of the members. Eight construction companies are classified in the highest class, whose yearly contract value stood at the most at about equivalent to 600 million yen. These companies are small-scale construction companies each employing 30 to 50 engineers. Independently, these companies can undertake only small-scale works. Other problems with these companies include insufficient availability of experienced workers over the entire range of trade, difficulty with maintaining quality workmanship and insufficient procurement ability.

In Sri Lanka, it is common that public corporations under the jurisdiction of the Ministry of Housing & Urban Development undertake large-scale public works projects as general contractors, presenting a circumstance unfavorable to the growth of private construction companies. In the Colombo Metropolitan Area, there are a number of high-rise buildings. Construction of these buildings was mostly contracted with foreign contractors, with the participation of local companies limited only to supply of labor or to small subcontracted works. It would be right to say, nevertheless, that the local construction companies' technology is improving as the joint-venture companies with the foreign capitals including Japanese capitals are being established.

The construction work of the Project will be undertaken by a contractor incorporated in Japan, which will employ local constructors. Some local constructors which have participated in the Japanese ODA projects as subcontractors seem to have acquired construction management technology through these works. In employing local constructors, technical instruction by Japanese engineers are essential, in such areas in particular as quality control in the construction of the operation theatres and repairing of 50-year-old existing masonry structures.

The Project is the new construction and renovation of the existing hospital while in operation. Those who undertake construction of the Project are naturally required of highly advanced implementation technologies. Necessity of dispatching professional experts from Japan or other advanced countries will be studied, particularly in such highly specialized areas as construction of the medical gas supply system, for example.

### **3-1-2 Implementation Conditions**

#### **(1) General Situation Surrounding Construction Works**

General construction materials, including imported ones, are normally procurable in Sri Lanka; however, supply is not necessarily stable and kinds of materials are limited. Since the construction market in Ratnapura, the city of the project site, is limited, procurement there would be difficult. Therefore, construction materials will be transported mainly from Colombo. There is no concrete plant there; therefore, the Project, being large in scale, has to build a batcher plant exclusively for construction of the Project near the construction site.

#### **(2) Major Considerations in Construction Work**

The Project is implemented in two stages and therefore the total construction period exceeds two years. The study team therefore discuss with the hospital authority selection of the sites of material storage and temporary office for construction so that these facilities may not interfere with the medical services of the hospital over such a long period.

Construction of such infrastructure as access roads, water supply facility and water piping will be done concurrently over the entire area of the hospital. The hospital is situated in the middle of a slope and therefore there are only few pieces of flat land in the area surrounding the construction site. Under such a constraint the sites of temporary facilities should be chosen so that traffic lines of the vehicles and people engaged in construction and those concerned with the hospital operation may not cross each other. The access road to the hospital will be relocated as a part of the Project. After the new access road is laid, the operation of the vehicles for construction should be carefully scheduled not to disturb the traffic of people and vehicles to and from the hospital for medical purpose.

Since the site of the new building is close to the existing one, installation of temporary facilities and construction of the building should be carefully planned to suppress noise, generation of dust and vibration. The study team considers it very important that the temporary facility plan be fully discussed and agreed between the study team and the director and staff of the hospital and the officers of Technical Service Bureau of the provincial government of Sabaragamuwa in charge of maintenance and management of GHR.



The renovation works of the existing facilities will start after completion of the new building. In other words, the renovation will be done on the vacated rooms of the existing building after their functions have been moved to the new building. In case the total functions of the rooms to be renovated cannot be moved to the expanded facilities at once, the study team envisages to divide the portion to be renovated into certain sections and renovate them one after another. If this is the case, the prime consideration is to develop a temporary installation plan and a construction plan which could minimize adverse effects on the existing medical services. Particular attention will be paid to securing safety in planning traffic lines of the patients to and from the consultation rooms providing medical services while the renovation work is underway.

### 3-1-3 Scope of Works

For the smooth implementation of the Project, it is important to define Japanese and Sri Lanka undertakings. The scope of works is mentioned in the Table 3-3.

**Table 3-3 Scope of Works**

Works to be borne by Japanese side	Works to be borne by Sri Lanka side
<ol style="list-style-type: none"> <li>1. Building construction work (Excluding standard fix furniture and fixtures, curtain inside the ward etc.).</li> <li>2. Landscape work Drive way and passage inside of Project site. Lighting poles and fixtures.</li> <li>3. Electrical Work Electrical system, Power and main wiring system, Lighting and Socket outlet system, Telephone system, Paging system, Lightning protection system and Automatic fire alarm system.</li> <li>4. Mechanical work Water supply system, Drainage system, Hot water supply system, Sanitary fixtures, and Fire protection system, Air conditioning and ventilation system.</li> <li>5. Special work Generator system, nurse call system, medical gas system, deep well, water treatment system, sewage treatment system, incinerator, renovation of drainage pipe line from existing hospital.</li> <li>6. Equipment work Procurement and installation of medical equipment</li> </ol>	<ol style="list-style-type: none"> <li>1. Demolition of existing structures inside Project site.</li> <li>2. Demolition of existing substructure/ Underground pipes inside Project site.</li> <li>3. Site clearance including Trees.</li> <li>4. Landscape work Gardening, planting. Drive way and passage outside of Project site. Gate, Fence and Guardhouse.</li> <li>5. Lead-in and connection works for M/E Lead-in and connection works for MDF. Each infrastructure such as electricity, back up water supply. Drainage.</li> <li>6. Furniture and utensils Curtain for windows (Curtain rail work will be done by Japanese side), blind, ordinary furniture.</li> <li>7. Move and installation of existing equipment to be used.</li> <li>8. Road and others. Road in outside of Project Site, Gate, Fence and Parking.</li> </ol>

### **3-1-4 Consultant Supervision**

The Japanese consultant concludes a consultant agreement with MOH, and conducts detailed design (Tender Documents) and supervision for the Project.

The purpose of supervision is to ascertain that construction work is in conformity with the drawings and specifications. The consultant will provide guidance and advice and coordinate work throughout the construction period, from a fair standpoint for the proper implementation of the contents of the contract, and thereby to raise the quality of construction work. As such, the consultant will carry out the services mentioned below.

**1) Cooperation in tendering and concluding a contract**

The consultant prepares the tender documents necessary for deciding contractors for construction work and equipment work, gives a tender notice, accepts applications for tendering, examines the applicants' qualifications, holds an explanatory meeting for tendering, deliveries tender documents, and accepts and evaluates tenders. The consultant gives advice to MOH and the successful tenderer on the conclusion of contracts.

**2) Guidance, advice and coordination for contractor**

The consultant gives guidance and advice to the contractor and coordinates works, by examining the construction process, the progress schedule, the construction material procurement plan, the medical equipment procurement and installation plan, etc.

**3) Inspection and approval of working drawings manufacture drawings, etc.**

The consultant examines the working drawings, the manufacture drawings and other documents presented by the contractor, and gives approval, with the necessary instructions.

**4) Confirmation and approval of construction materials and medical equipment**

The consultant confirms conformity between the contracts and the construction materials/medical equipment, which the contractors wish to procure. Then the consultant will approve the procurement plan.

5) Inspection of the work

The consultant attends, as necessary, inspections and test carried out in plants where construction materials and medical equipment are manufactured, in order to ascertain that they possess the required quality and performance.

6) Report on the progress of the works

The consultant reports the progress and conditions of the works to the parties concerned of both countries.

7) Completion inspection and trial run

The consultant conducts completion inspections on the buildings and ancillary facilities as well as medical installations, conducts trial runs to ascertain that the performances are secured as described in the contract, and hands in a certificate of the completion of inspection to MOH.

8) Consultant supervision system

In addition, in view of the scale of the Project, the consultant assigns one (1) resident supervisor, who perform the above-mentioned activities. In addition, the consultant sends experts in relevant fields to the site, as necessary in the progress of the works, for discussions, inspections, guidance and coordination necessary for the Project implementation. The consultant is prepared to dispatch additional experts where necessary, and establishes a back-up system, by assigning experts also in Japan. The consultant reports to the parties concerned of the Japanese government on progress in the Project implementation and other necessary matters such as the procedure of payments and handing over upon completion.

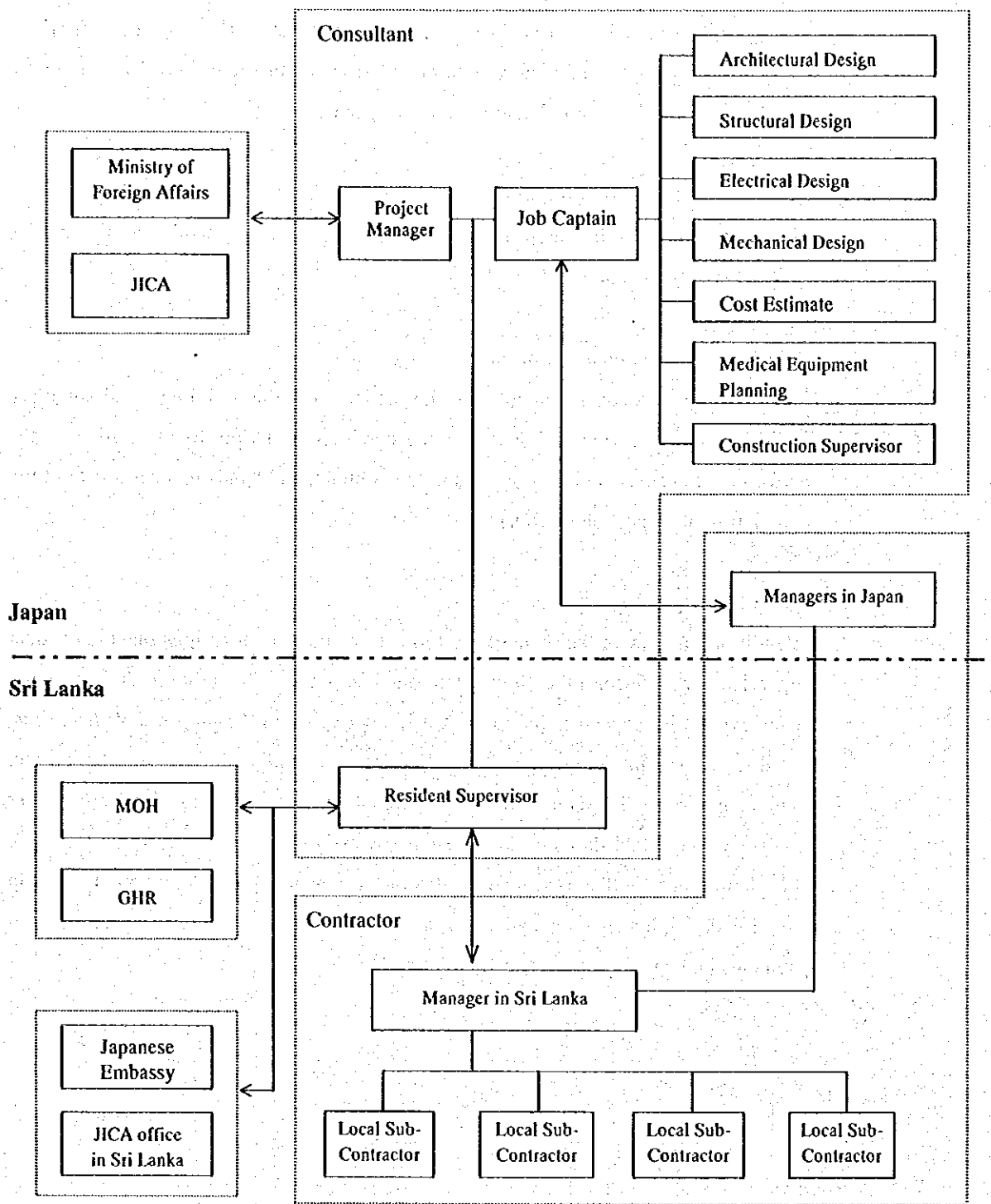


Figure 3-4 Supervision System

### **3-1-5 Procurement Plan**

#### **(1) Construction Material and Equipment**

The Project is a hospital project. The construction materials and equipment must be suited to hospitals; in other words, they should stay clean, easy to clean and sturdy. The construction materials and equipment that conform to BS, commonly accepted standards in Sri Lanka, will be chosen; however, those conforming to JIS will be also chosen in case the materials and equipment do not fall into BS. The following policy for procurement will be followed.

##### **1) Local Procurement**

Construction materials and equipment will be locally procured to the extent possible in order to facilitate repair, maintenance and management. However, the quality and availability of each item will be thoroughly checked to forestall any adverse effect on the construction schedule before it is chosen.

Such imported products as are generally available in the Sri Lanka market, or those products which do not have to be ordered or to go through import formalities in other words, are treated as local products as far as procurement is concerned.

##### **2) Procurement by Import**

Those materials and equipment which are considered to be difficult to obtain locally, to be locally available but not meeting the required quality standards or not to be sufficiently available locally are imported from Japan or third countries. In this case the construction contractor should see to it that all importation and customs clearance procedures be smoothly implemented by well coordinating with MOH.

Those materials and equipment of which the Japanese prices or third country prices plus transportation and packing charges turn out to be far lower than the local prices will also be imported.

##### **3) Transportation Plan**

Materials and equipment imported from Japan will be transported to the Port of Colombo by ship, from there to the construction site in Ratnapura by lorry. Some of the materials and equipment are susceptible to shocks, humidity and high temperature by which their functions may be damaged. Therefore, imported goods are well packed to protect the goods from such damages.

4) Procurement plan

Table 3-5 shows the main materials and equipment to be procured broken down into local procurement, third country procurement and Japanese procurement.

**Table 3-5 Procurement Plan for Major Construction Materials**

Works	Materials	Local	3rd Country	Japan	Comments
Concrete Work	Cement		○	○	Equivalent to BS or JIS
	Sand	○			
	Gravel	○			
	Deformed Bar		○	○	Equivalent to BS or JIS
	Form		○	○	According to specification
Steel Work	Steel		○	○	Equivalent to BS or JIS
Masonry Work	Concrete Block	○			
	Brick	○			
Water Proofing Work	Asphalt water Proof		○	○	According to specification
	Coating		○	○	According to specification
Plastering Work	Cement Mortar		○	○	Imported material
Tile Work	Ceramic Tile	○	○		Limited local quantity
	Porcelain Tile	○	○		Limited local quantity
Stone Work	Stone	○			Imported Material
	Terrazzo	○			
Carpentry Work	Timber	○	○		Limited Local Quantity
	Laminated Wood	○	○		Limited Local Quantity
	Plywood		○		According to specification, Cheaper
Metal Work	Light Gage Steel Stud		○		According to specification, Cheaper
	Expansion Joint			○	No local products
	Finish Hardware/hand rail		○	○	According to specification
	Roof Drain		○	○	
	Curtain Rail for Ward		○		
Doors & Windows Work (Wood)	Door and Frames		○		According to specification, Limited local quantity
Doors & Windows Work (Metal)	Aluminum Window		○		According to specification
	Steel Door & Window		○		No local product
	X-ray Proof Door			○	No local product
	Hardware	○	○	○	Imported goods
Glass Work	Plate Glass	○			
	Glass Block	○			
Painting Work	Interior Paint	○			
	Exterior Paint	○			

Works	Materials	Local	3rd Country	Japan	Comments
Finishes	Gypsum Plaster Board	○			Imported Material
	Acoustic Tile		○		No local product
	Rock Wool Board		○		No local product
	Insulation Board		○		No local product
Miscellaneous	Laboratory Sink/Table	○	○		Depend on Quality and Delivery Schedule
	Cabinet	○	○		Depend on Quality and Delivery Schedule
	Sign plate		○	○	Depend on Quality and Delivery Schedule
Ext2erior Work	Paving Material (Asphalt)	○			
	Inter-locking Block	○			
	Flag Pole		○		No local product
	Grating		○		No local product
Mechanical Work	Air Conditioner		○	○	Depend on the Spec.
	Exhaust Fan etc.		○	○	Depend on the Spec.
	Air Diffuser	○		○	Depend on the Spec.
	Filter		○		No local Product
	Ducting Material		○		No local Product
	Pump		○		No local Product
	Sewage Treatment Plant			○	According to specification
	Incinerator			○	No local Product
	Sanitary Fixture		○	○	Depend on the Spec.
	Steel Pipes		○	○	Depend on the Spec.
	PVC Pipes			○	Depend on the Spec.
	Insulation Materials		○		No local Product
	Distinguishes		○		No local Product
Medical Gas system			○	Depend on the Spec.	
Electrical Work	Transformer		○		No local product
	Generator		○		No local product
	Switch Board		○		According to specification
	Conduit Pipe	○			
	Box		○		According to specification
	Wire		○		According to specification
	Cable		○		According to specification
	Lighting Fixture		○		According to specification
	Wiring Equipment		○		No local product
	Telephone Equipment			○	According to specification
	Public Address			○	According to specification
	Fire Alarm			○	According to specification
	Television Set			○	According to specification
	Nurse Call System			○	According to specification
Lightning Protection		○		No local product	
Elevator	Elevator		○		No local product



## **(2) Procurement of Medical Equipment**

### **1) Principle of Equipment Procurement**

In selecting medical equipment to be procured, local products, corresponding third countries' products and Japanese products are compared against the criteria of the local technical level and operation & maintenance system. Then the one most beneficial to Sri Lanka will be chosen for procurement by the Project.

### **2) Procurement of Local Products**

Local products will be preferentially chosen, provided that the quality and dependable supply not interfering with the Project schedule are assured. Such imported products as are generally available in the Sri Lanka market, or those products which do not have to be ordered or to go through import formalities in other words, are treated as local procurement.

### **3) Procurement of Third Countries' Products**

Procurement of a product other than Japanese origin is justified if the product is considered right from the standpoints of difficulty associated with procurement in Sri Lanka, the supplier's readiness for repair and for aftercare including supply of spareparts and consumables, its degree of acceptance in the Sri Lank market, and the price. Presence in Sri Lanka of an agent capable of smoothly maintaining the product constitutes a prerequisite for its procurement.

Table 3-6 shows equipment that should be procured from third countries.

**Table 3-6 Products Procurable from Third Countries**

Product	Reason for Third Country Procurement
Adult Ventilator	These third countries' models are generally accepted in Sri Lanka and the staff of GHR is accustomed to them.
Anaesthetic Ventilator (power driven)	
Neonatal Ventilator	
Portable Ventilator to Transport Patient	
Pulse Oximeter	
Orthopaedic Instrumentation Set	
Anaesthetic Machine	
Capnometer (EtCo2 analyzer)	
Autoclave Machine	
Defibrillator	
Table Top Autoclave	
Microtome	
Automatic Stainer	
Slit Lamp with Tonometer	
Visual Field Analyzer	
Laparoscope	Their consumables and spareparts are easier to procure than Japanese products.
Cysto-Urithroscope	
Cardiotocogramme	
Electrophoresis Machine	
Glucometer	
Syringe Pump	
PCA Pump	There is no local agent dealing with Japanese products and local procurement of third countries' products is possible.
Infusion Pjmp	
Electrophoresis Machine	
Adult Bed	Japanese products turn out to be more expensive with marine freight included.
Beds for High Dependency Ward	
Examination Couch	

### 3-1-6 Implementation Schedule

In accordance with the Japan's Grant Aid System, the implementation schedule is as follows.

(1) Detailed design stage

MOH and a Japanese consultant make an agreement on the consultant services for the Project. The verification of the agreement will be received from the Japanese government. The consultant will prepare documents of the detailed design in accordance with the results of this Basic Design Study Report. Following discussions with MOH, tender documents will be prepared, and approval from MOH will be obtained. The estimated terms necessary for detailed design stage are 2 months for Phase I, 3 months for Phase II.

(2) Tender stage

The estimated terms necessary for tender stage are 2 months for Phase I, 2 months for Phase II.

(3) Construction and equipment work

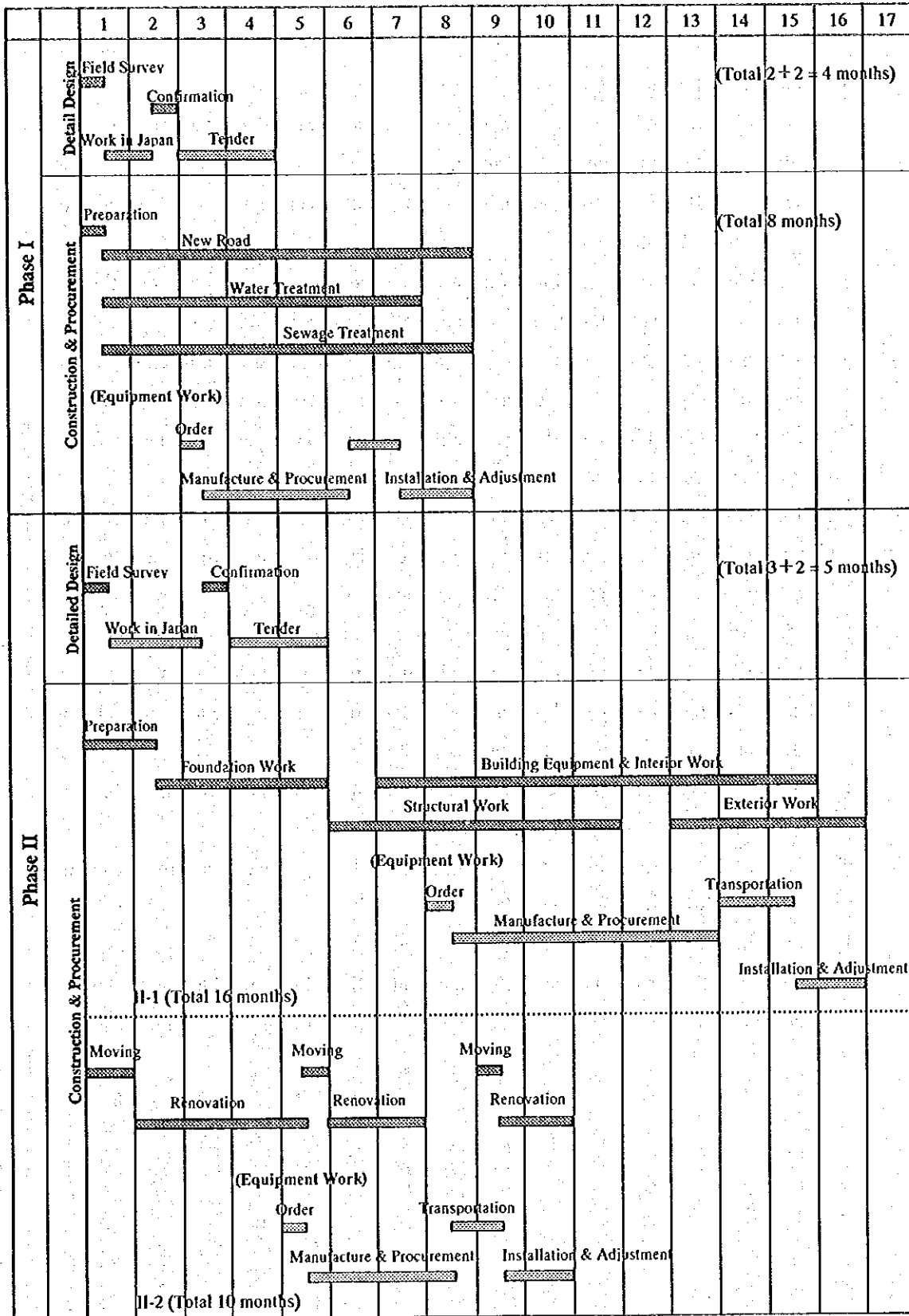
After the contracts are finalized, verification is obtained from the Japanese government, and then the works can begin. The consultant will carry out the supervision.

The estimated terms necessary for construction and equipment work are 8 months for Phase I, 26 months for Phase II.

**Table 3-7 Phasing of Construction Work**

	Phase I	Phase II	
		II - 1	II - 2
<b>Building</b>	<b>Infrastructure</b> New Approach Road Sewage Treatment Water Supply and Treatment Incinerator Outdoor Waiting Space (220 m <sup>2</sup> )	<b>New Building</b> 3F: Laboratory, Bio-medical Engineering Services Rm, others 2F: Operation Theatre, Delivery Rm, CSSD, others 1F: OPD BF: X-ray Rm, Ultra-sound Rm, Mechanical Rm, others	<b>Renovated Area</b> 2F: Premature Baby Rm, Maternal High Dependency Rm, others 1F: OPD, Pharmacy Rm, others
<b>(Floor Area)</b>	<b>(515 m<sup>2</sup>)</b>	<b>(4,875 m<sup>2</sup>)</b>	<b>(2,570 m<sup>2</sup>)</b>
<b>Medical Equipment</b>	<b>Basic Medical Equipment for Existing Building (ICU, Clinics, ECG, Physiotherapy)</b>	<b>Basic Medical Equipment for New Building (Operation Theatres, Delivery Rooms, Clinics, X-ray Ultra Sound)</b>	<b>Basic Medical Equipment for Renovated Area (PBU, MHD, Clinics)</b>

Table 3-8 Implementation Schedule



### **3-1-7 Obligations of Recipient Country**

The following items are major undertakings by the Sri Lanka side.

- 1) Exemption of the taxes relevant to the Project.
- 2) Application for and acquisition of the government approval of the construction of buildings and facilities under the Project.
- 3) Issuance of Banking Arrangement (B/A) and Authorization to Pay (A/P), and the bearing of the fees for them.
- 4) Guarantee of the prompt landing of materials and equipment at the port of destination, tax exemption and customs clearance, and overland transportation.
- 5) To accord Japanese nationals whose services may be required in connection with the supply of the products and the services under the verified contract such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work.
- 6) To exempt Japanese nationals from custom duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the verified contracts.
- 7) Budgetary measures for the effective operation, maintenance and management of the facilities built and the equipment procured under Japan's grant aid system.
- 8) Removal of the existing facilities and obstacles from the construction site including basement level, and leveling of ground.
- 9) Laying of main cable for electric power, water main, and a main telephone line and construction of a sewer up to the project site.
- 10) Removal and installation of the equipment which are to be transferred from the existing facilities to the new facilities.
- 11) Procurement and installation of general furniture.
- 12) Bearing of all expenses necessary for items other than those provided under Japan's grant aid system.

### 3-2 Project Cost Estimation

The breakdown of expenses to be borne by the Government of Sri Lanka is estimated in the Table 3-9.

#### (1) Expenses borne by the Government of Sri Lanka

**Table 3-9 Expenses borne by the Sri Lanka Government**

Items	Expenses
1. Demolition of existing structure	1 million Rs.
2. Demolition of existing substructure including pipes	8 million Rs.
3. Site clearance	2 million Rs.
4. gardening, planting, gate and fence	5 million Rs.
5. Lead-in and connection work such as electricity, telephone, water supply and drainage	6 million Rs.
6. Furniture and utensils	1 million Rs.
7. Move and installation of existing equipment to be used	1 million Rs.
8. Road (including walkway)	6 million Rs.
Total	30 million Rs.

#### (2) Estimate Condition

- a. Time : October 1999
- b. Exchange rate : 1 US\$ =115.0 yen  
1 Rs. =1.62 yen (average rate between Jan. – Oct. 1999)
- c. Construction period : The construction period is to consist of 2 phases.  
The periods required for detailed design and construction work are as shown in the implementation schedule.
- d. Others : The Project is to be executed under Japan's grant aid system.

### 3-3 Operation and Maintenance Costs

#### (1) Maintenance and Management System

##### 1) Facilities

The existing facilities are maintained and managed in the manner explained below, which will be applied to the new Building and Renovated Area.

##### a. Buildings and furniture

A workshop belonging to GHR will take care of minor repairs of the buildings and furniture. The workshop is manned by a few permanently employed experts.

##### b. Electric facilities and air-conditioning facilities

These are maintained and managed totally and exclusively by Ceylon Electricity Board.

##### c. Telephone facilities

These are maintained and managed totally and exclusively by the telephone company.

##### d. Water supply and drainage facilities

Experts of Technical Service Bureau of the provincial government of Sabaragamuwa permanently stationing at GHR maintain and manage the water supply and drainage facilities.

Figure 3-10 shows the organization chart of Technical Service Bureau of the provincial government of Sabaragamuwa which indicates that engineers in charge of Ratnapura area are directly responsible for GHR.

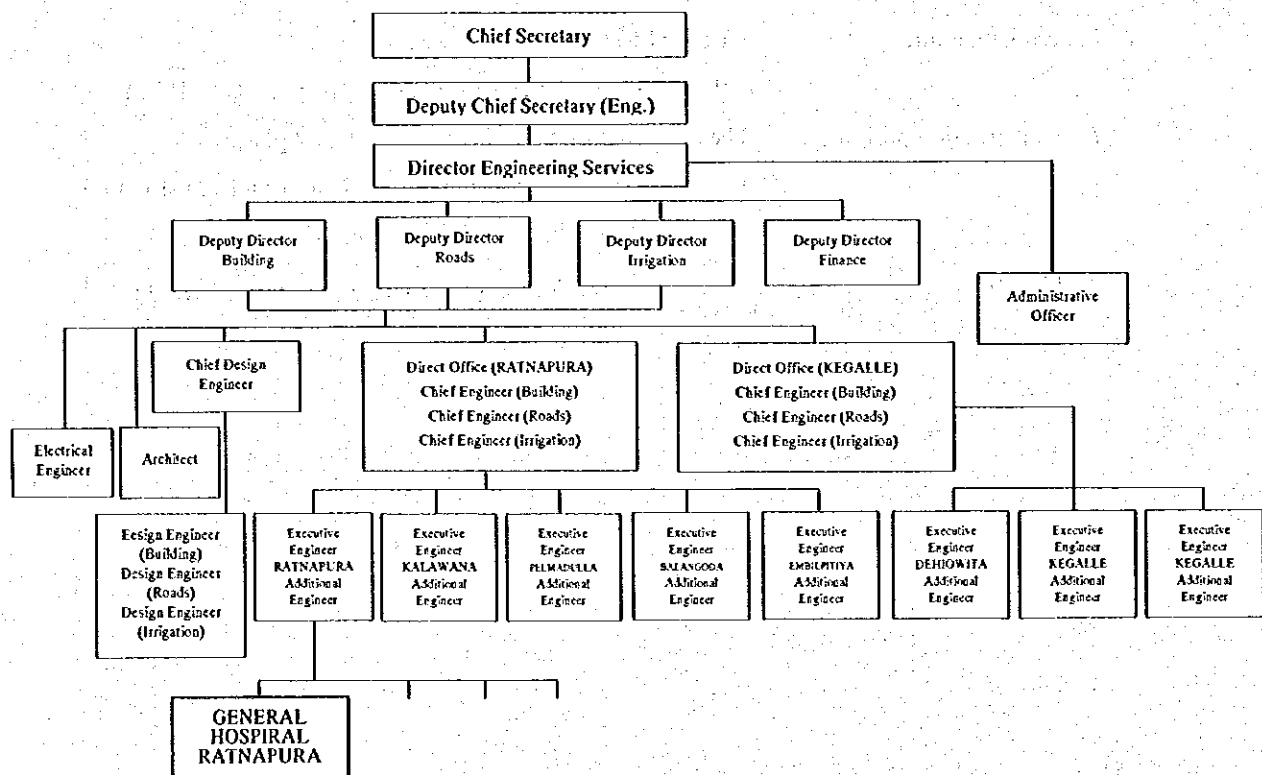


Figure 3-10 Organization of Sabaragamuwa Provincial Council

## 2) Medical Equipment

Systematic maintenance and management of medical equipment in Sri Lanka reportedly began when a permanent staff was assigned in 1946 to the first X-ray equipment in Sri Lanka installed in the Colombo General Hospital. As the activities of the staff expanded, Electromedical Technologist Division was organized to maintain other pieces of basic medical equipment than mere X-ray equipment. This organization was renamed to Electro Medical Engineering Services in 1948.

In 1982 the Electro Medical Engineering Services was reorganized into the Biomedical Engineering Services (BES) under the Ministry of Health & Indigenous Medicine. BES now has established a system whereby BES orders, accepts, keeps, installs, maintains, repairs and scraps almost all medical facilities and equipment owned by national medical institutions. BES's staff is capable of repairing basic medical facilities, although BES consigns repairing of advanced equipment to the private sector. Recently, however, BES has become too overloaded to smoothly discharge their duties, because too many minor repair works are brought to BES. The ministry is revising the system so that medical facilities and equipment under the jurisdiction of provincial governments may be maintained and managed by the respective provinces.

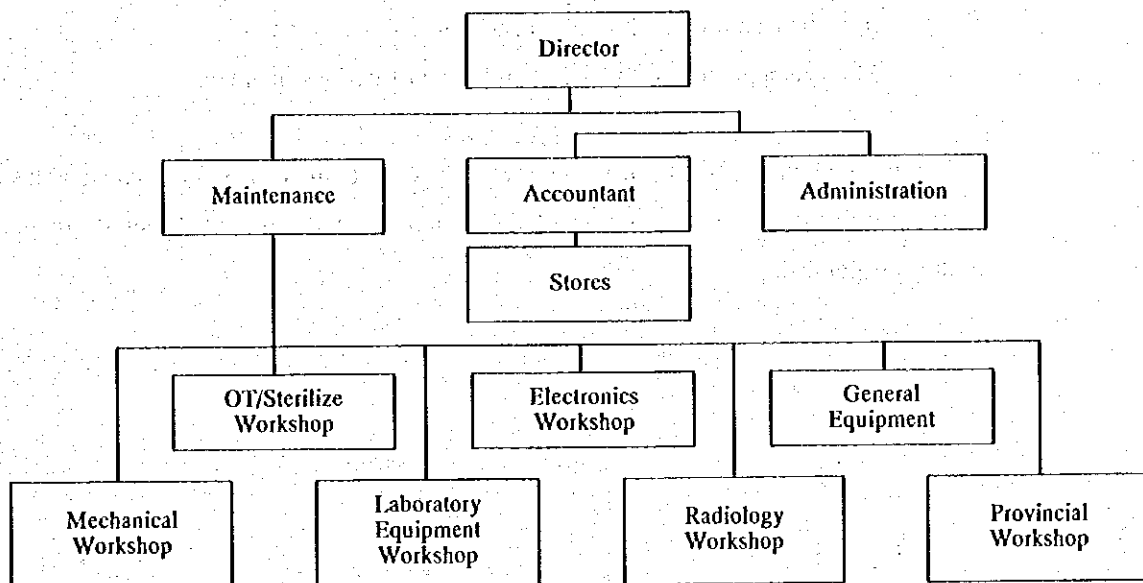


Figure 3-11 BES Organization Chart



GHR had been a provincial hospital of Sabaragamuwa until July 1996 when the hospital became one of national hospitals directly under the control of the Ministry of Health & Indigenous Medicine. Being a national hospital, GHR will continue to receive maintenance and management services of BES for its medical facilities and equipment, irrespective of the revision of the BES's system now underway.

Today, BES's staff is not stationed in GHR but the staff of BES's headquarters in Colombo visit two or three times a month to make routine checks of the facilities and equipment. In addition, GHR receives emergency service of BES to repair the equipment as necessary.

Under such a circumstance, the facilities and equipment provided by the Project will be maintained and managed by BES. On transferring the facilities and equipment to the Sri Lanka side, the study team will discuss and agree not only with GHR but also with BES on maintenance and management of the facilities and equipment, thereby assuring that the facilities and equipment will be duly maintained and managed after formal transfer to the Sri Lanka side.

- Routine maintenance and management methods (cleaning, adjustment and detection of minor failures)
- Inventory control method of consumables and spareparts
- Management, arrangement and archiving of various manuals

It is important that GHR have some inventory of the spareparts and consumables frequently needed so that operation of these facilities and equipment would not be unduly suspended.

(2) Operation and Maintenance Cost

The estimated operation and maintenance cost after completion of the Project is as shown in Table 3-12

Table 3-12 Operation and Maintenance cost

	First year	Second year	3-5 year
1. Electricity	3,210,000	3,210,000	3,210,000
2. Telephone	455,000	455,000	455,000
3. Fuel for generator	324,000	324,000	324,000
4. Fuel for incinerator	486,000	486,000	486,000
5. Water	0	0	0
6. Medical gas	895,000	895,000	895,000
7. Building maintenance	0	546,000	546,000
Facility maintenance Cost (1~7)	5,370,000	5,916,000	5,916,000
Medical Equipment Cost (8)	6,220,000	6,220,000	6,220,000
1-8 Total	11,590,000	12,136,000	12,136,000

a. Electricity Charge 3,210,000 Rs./year

According to the power supply rules of Ceylon Electricity Board, electricity charge structure applicable to the proposed facilities is as follows.

Section 3 Late L-2 (receiving voltage over 11. KV)

basic charge : Rs. 115.00. KVA

usage charge : Rs. 2.4 KWhr

In light of the sizes of the proposed facilities, the contract load capacity for the proposed facility is estimated at 350 KVA. Average electricity usage is estimated at about 75 percent of the load capacity (about 263 kW).

Shown below is the numerical formula for the calculation of the annual amount of electricity charges.

$$\begin{aligned} \text{Basic charge} &= 115.00 \text{ Rs./KVA} \times 350 \text{ KVA/month} \times 12 \text{ months/year} \\ &= 483,000 \text{ Rs./year} \end{aligned}$$

$$\begin{aligned} \text{Usage charge} &= 2.4 \text{ Rs./KWh} \times 263 \text{ KW} \times 12 \text{h} \times 30 \text{ day} \times 12 \text{ month/year} \\ &= 2,727,000 \text{ Rs./year} \end{aligned}$$

Therefore the annual amount of electricity charges is estimated at 3,210,000 Rs./year.

b. Telephone Charges ..... 455,000 Rs./year

The telephone charge paid to telephone company was 790,740 Rs. with 6 mainlines in 1998 year (April 1998 – March 1999). After completion of the Project, 3 mainlines will be added. And use of telephone circuits will be increased by almost 15%. Telephone charge is estimated as follows.

$$\begin{aligned} 790,740 \text{ Rs./year} \div 6 \text{ lines} \times 3 \text{ lines} \times 1.15 &= 454,676 \text{ Rs./year} \\ &\rightarrow 455,000 \text{ Rs./year} \end{aligned}$$

- c. Generator Fuel Expenses ..... 324,000 Rs./year  
 According to CEB, it is assumed that there will be 5 times of power offs in and a month and each will last about 5 hours. Diesel oils is to be used as the fuel for the emergency generator.

The unit price of diesel oil is 13.5 Rs./litter. And consumption of fuel is estimated 80 litter/h with 300 KVA generator engine.

Shown below is the calculation of the annual amount of generator fuel expenses.

$$13.5 \text{ Rs./litter} \times 80 \text{ litter/h} \times 5 \text{ h/time} \times 5 \text{ times/month} \times 12 \text{ month} \\ = 324,000 \text{ Rs./year}$$

Therefore, annual fuel expenses → 328,000 Rs./year

- d. Incinerator Fuel Expenses ..... 486,000 Rs./year  
 Waste from the hospital is divided into general waste and medical waste. It is assumed that the incinerator will be used mainly to incinerate infectious medical waste. The estimated daily quantity of medical waste will be about 500 kg and daily diesel oil consumption is estimated at 100 litter. Oil charge is 13.5 Rs./litter.

$$\text{Monthly oil charge } 13.5 \text{ Rs./litter} \times 100 \text{ litter/day} \times 30 \text{ days} \\ = 40,500 \text{ Rs./month}$$

$$\text{Therefore, annual oil charge } 40,500 \text{ Rs./month} \times 12 \text{ months/year} \\ = 486,000 \text{ Rs./year}$$

- e. Water Charges ..... 0  
 As the water source on the Project will be river water instead of city water, water charges will not be needed.

- f. Medical Gas Charges ..... 895,000 Rs./year  
 The medical gases used at the hospital are oxygen gas and nitrous oxide gas, and the consumption is estimated to be 12 m<sup>3</sup> for oxygen gas and 1.2 m<sup>3</sup> for nitrous oxide gas. Unit rate of oxygen gas is 180 Rs./m<sup>3</sup> and nitrous oxide gas 270 Rs./m<sup>3</sup>.

Monthly usage

$$\text{Oxygen gas } 12 \text{ m}^3/\text{day} \times 30 \text{ days/month} = 360 \text{ m}^3/\text{month} \\ \text{Nitrous oxide gas } 1.2 \text{ m}^3/\text{day} \times 30 \text{ days/month} = 36 \text{ m}^3/\text{month}$$

Therefore the monthly amount of medical gas charges is calculated as follows.

$$\text{Oxygen gas } 180 \text{ Rs./m}^3 \times 360 \text{ m}^3/\text{month} = 64,800 \text{ Rs./ month} \\ \text{Nitrous oxide gas } 270 \text{ Rs./m}^3 \times 36 \text{ m}^3/\text{month} = 9,720 \text{ Rs./ month}$$

Therefore the annual amount of medical gas charges is calculated as follows.

$$(64,800 \text{ Rs./ month} + 9,720 \text{ Rs./ month}) \times 12 \text{ months} = 894,240 \text{ Rs./year} \\ \rightarrow 895,000 \text{ Rs./year}$$

- g. **Building Maintenance Expenses** ..... 546,000 Rs./year  
 Interior and exterior finishing materials with easy maintenance and management were chosen for the proposed facilities. Exterior finish is mostly durable spray paint so that it would be maintained only by cleaning. Interior finish for floors is flooring sheet, terrazzo and ceramic tile, and for walls is mostly enamel paint or anti-mold emulsion paint so that they would be maintained only by cleaning. This design will minimize building maintenance expenses. It is assumed that building maintenance expenses, including the expenses for interior/exterior finish and repair work of electrical equipment, plumbing equipment and air-conditioners, will be 70 Rs./ m<sup>2</sup>/year. This is about one third of maintenance cost in Japan.

$$70 \text{ Rs./ m}^2/\text{year} \times 7,800 \text{ m}^2 = 546,000 \text{ Rs./year}$$

- h. **Management Cost of Equipment** ..... 6,220,000 Rs./ year  
 The major part details of operation and maintenance cost of medical equipments are X-ray films, electrode of bedside monitor and E.E.G machine, reagent of laboratory equipment and consumables , spare parts of anaesthetic machine and ventilator. Consumables are necessary to be acquired from the first year, by Sri Lanka Government because Japanese side supplies consumables necessary for the trial operation period. On the other hand, spare parts will be covered by the Manufacturer's warranty for one year. After first year, Sri Lanka Government must procure them.

Regarding X-ray Machine, maintenance contract with manufacturer is necessary.

1. ECG Monitor (Electrode • Paper)	11 units	2,200 Patients x @400	=	Y880,000
2. EMG Machine (Electrode • Needle • Paste • Paper)	1 unit	1,600 Patients x @1,000	=	Y1,600
3. Anesthesia (Sodasorb • Endotracheal tube & cuff • Connection)	4 units	1,600 Patients x @1,600	=	Y2,560,000
4. Ventilator (Filter • Endotracheal tube & cuff)	9 units	800 Patients x @1,800	=	1,440,000
5. X-ray Machine (Film • Developer & Fixer)	1 unit	9,000 Files x @250	=	Y2,250,000
6. Ultrasound System (Gel, paper)	1 unit	10,000 Patients x @150	=	Y500,000
7. Electrolyte Analyser (Electrode • House & Tube • Reagent)	2 units	9,000 Patients x @150	=	Y1,350,000
			Total:	Y10,580,000
			(1 Rs. ≈ 1.7 yen)	Rs. 6,220,000

(3) Financial Conditions

Operation and maintenance cost after completion of the Project is estimated at 12,136 thousand rupees, consisting of 5,916 thousand rupees of facility maintenance cost and 6,220 thousand rupees of equipment maintenance cost.

The medical equipment of GHR are being maintained by BES. MOH earmarks two to three percent of purchase price of equipment to BES's budget for its maintenance. Although the above calculated maintenance cost of equipment is slightly exceeding three percent (5,500 thousand rupees) of the equipment price, the study team has been informed by MOH and GHR that the necessary budget will be prepared.

The estimated maintenance cost of facility corresponds to about 4.2 percent of the total GHR's budget (142,082 thousand rupees for 1999) and about 54.0 percent of the total operation and maintenance cost (10,998 thousand rupees for 1999). GHR has been under the jurisdiction of MOH for only two years or so; therefore, it would not be right to forecast future financial conditions from the past rate of increase. MOH and GHR intend to increase the budget (exclusively used for the Project) for GHR by five percent on completion of the Project and this would be sufficient to cover the incremental maintenance cost arising from the new building and renovated area.

Table 3-13 MOH & GHR Budget

(Unit : Million Rs.)

Budget	Year	1995	1996	1997	1998	1999
MOH Budget		10,533	11,421	15,003	11,097	12,465
To Previous year		-	8.4%	31.3%	△ 26.0%	12.3%
GHR Budget		-	(36)	122	141	142
To Previous year		-	-	-	15.5%	0.7%

The GHR Budget of 1995 and 1996 are provided by the Provincial Office, 1997 to 1999 are provided by MOH.

This project calls for addition of three operation rooms which will require seven doctors (anesthetists) and 26 nurses to staff.

Presently, GHR has 13 anesthetists and will have another two of them. Reportedly, GHR will be able to cope with requirement of anesthetists by rescheduling the present manning. Regarding nurses, GHR needs reinforcement. Some of GHR's nurses working in the wards have already been trained for works in the operation room. The study team has been informed by MOH and GHR that GHR will be able to secure required nurses by the

time the project will complete, both by rescheduled manning of the existing nurses and by recruiting new ones.

The study team explained necessity of training the staff working in such clean areas as operation rooms and PBU on the subject of maintenance of clean environment. MOH and GHR agreed with the study team and said they would conduct such training.

