Ministry of Health

The Former Yugoslav
Republic of Macedonia

BASIC DESIGN STUDY REPORT
ON
THE PROJECT
FOR
EQUIPMENT SUPPLY
FOR CITY HOSPITAL-SURGICAL CLINIC
IN
THE FORMER YUGOSLAV
REPUBLIC OF MACEDONIA

MARCH 1997

JAPAN INTERNATIONAL COOPERATION AGENCY
CRC OVERSEAS COOPERATION Inc.

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PREFACE

In response to a request from the Government of The Former Yugoslav Republic of Macedonia, the Government of Japan decided to conduct a basic design study on the Project for Equipment supply for City Hospital-Surgical Clinic and entrusted the study to the Japan International Cooperation Agency (JICA).

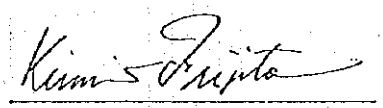
JICA sent to Macedonia a study team from October 27 to November 26, 1996.

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

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

I wish to express my sincere appreciation to the officials concerned of the Government of The Former Yugoslav Republic of Macedonia for their close cooperation extended to the teams.

March, 1997



Kimio Fujita
President
Japan International Cooperation Agency

March, 1997

Letter of Transmittal

We are pleased to submit to you the basic design study report on The Project for Equipment supply for City Hospital-Surgical Clinic in The Former Yugoslav Republic of Macedonia.

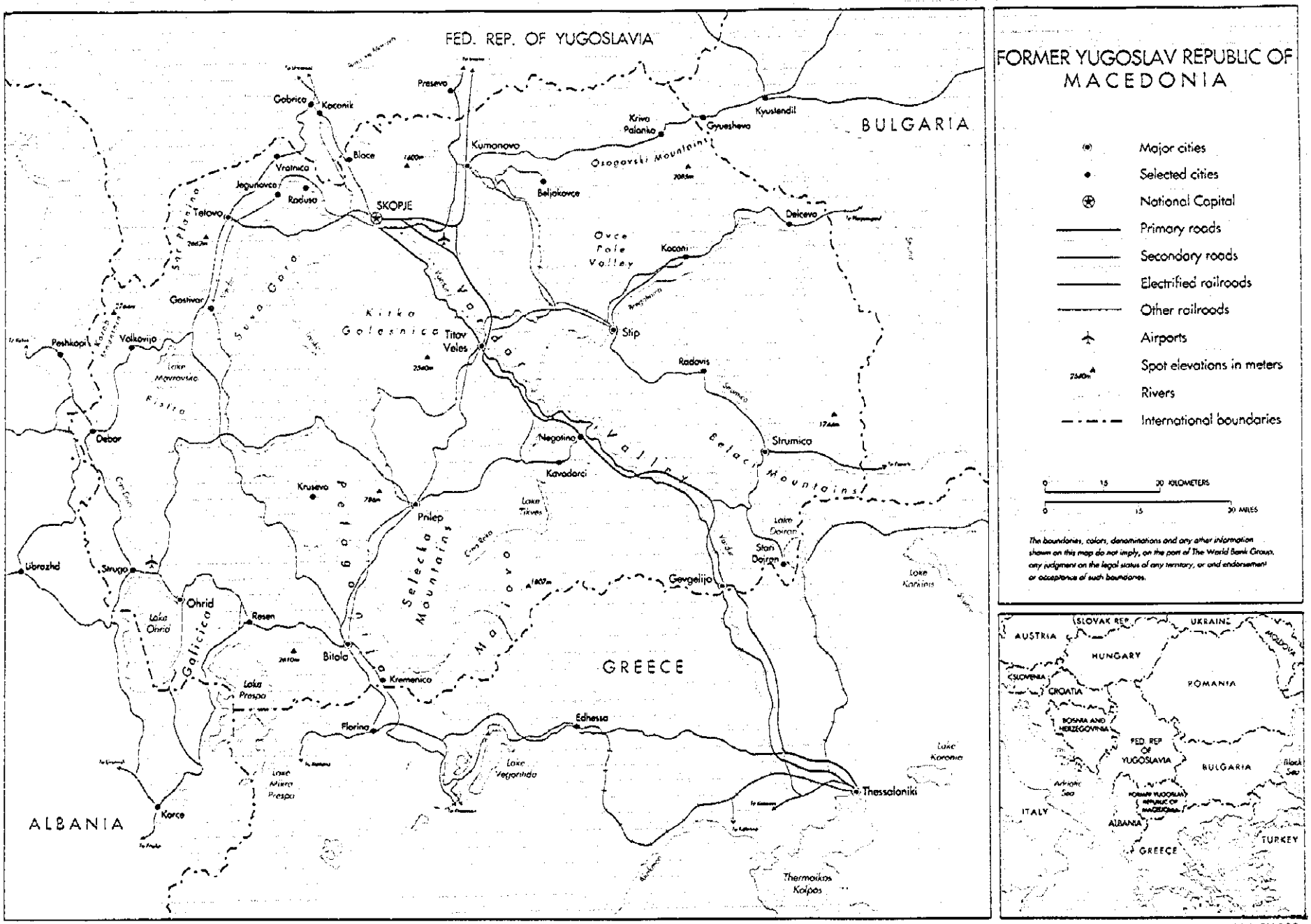
This study was conducted by CRC Overseas Cooperation Inc., under a contract to JICA, during the period from October 23, 1996 to March 31, 1997. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of Macedonia and formulated the most appropriate basic design for the project under Japan's grant aid scheme.

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

Very truly yours,

Keiji HIMURA

Project manager,
Basic design study team on
the Project for Equipment
supply for
City Hospital-Surgical Clinic
CRC Overseas Cooperation Inc.



FORMER YUGOSLAV REPUBLIC OF MACEDONIA

- Major cities
- Selected cities
- National Capital
- Primary roads
- Secondary roads
- Electrified railroads
- Other railroads
- Airports
- Spot elevations in meters
- Rivers
- International boundaries

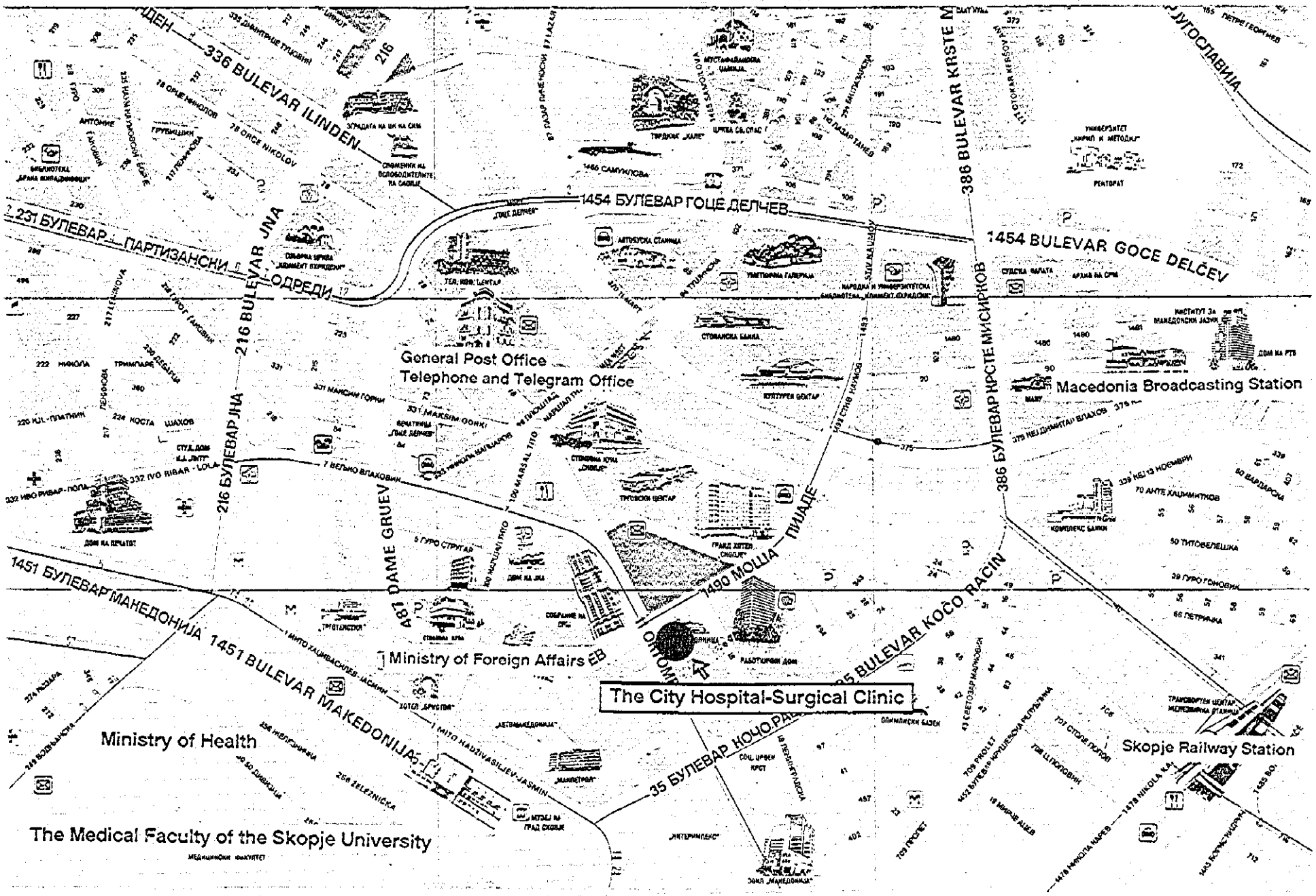
0 15 30 KILOMETERS

0 15 30 MILES

The boundaries, colors, denominations and any other information shown on this map do not imply, on the part of The World Bank Group, any judgment on the legal status of any territory, or any endorsement or acceptance of such boundaries.

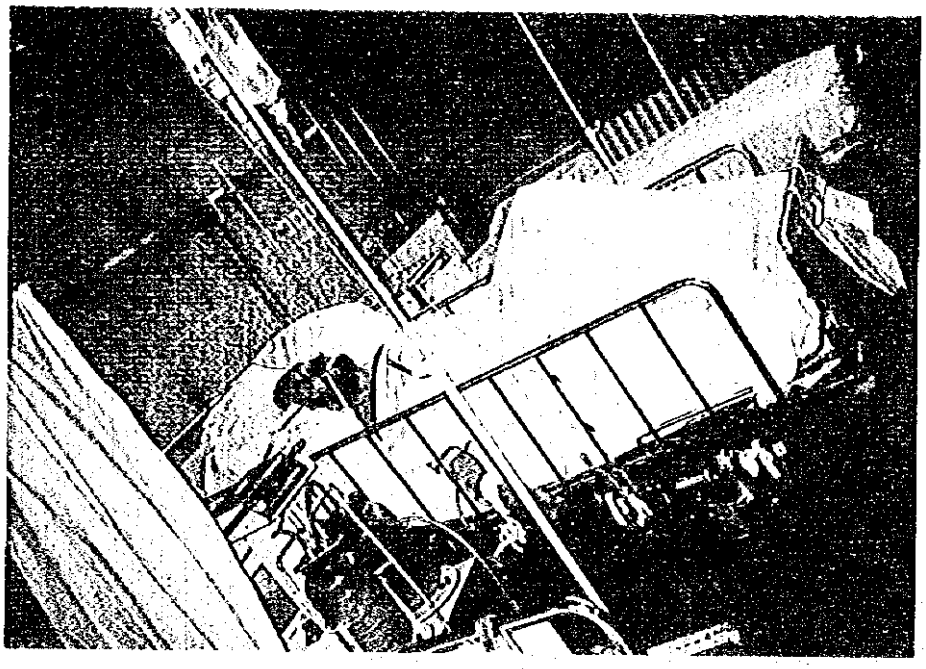
Map of the Republic of Macedonia

JANUARY 1994

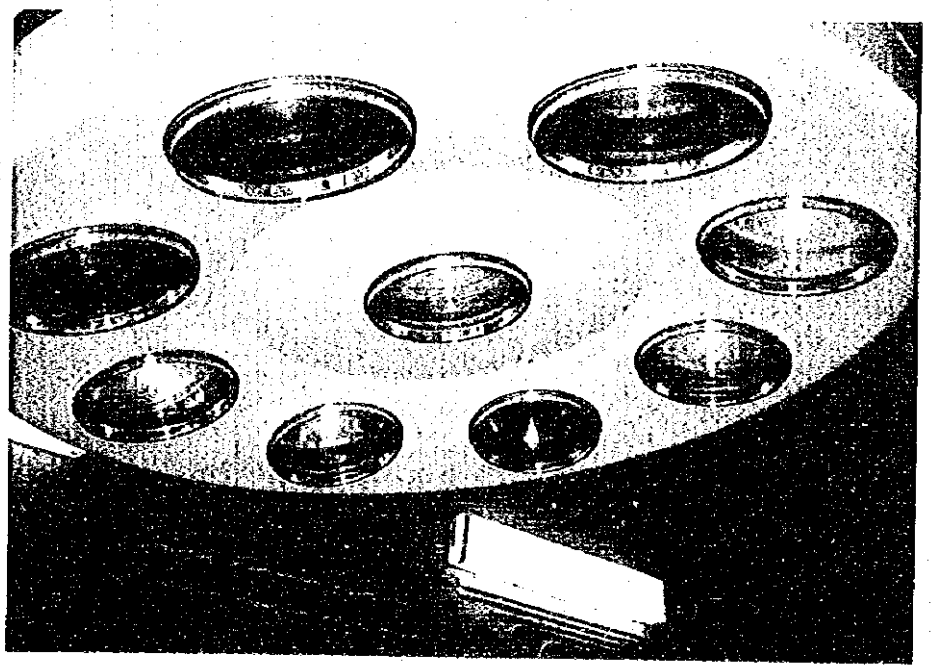


Location Map of the City Hospital-Surgical Clinic

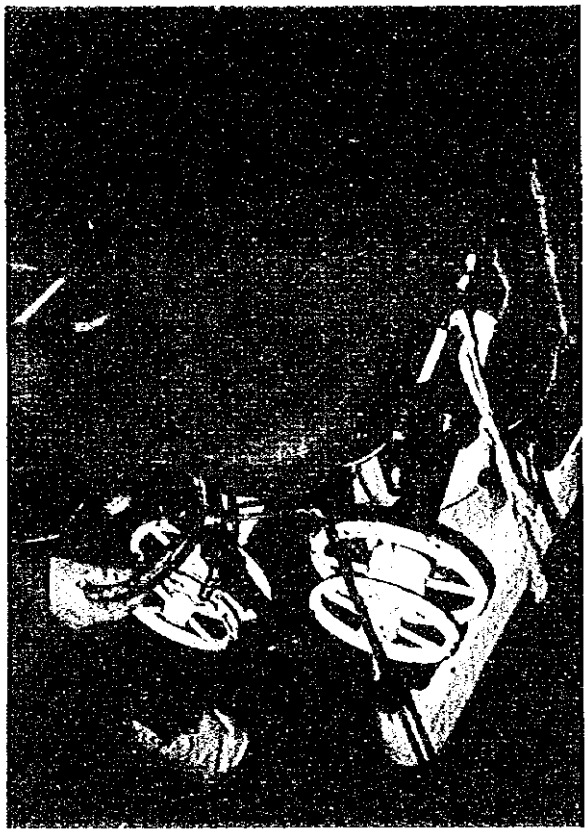
Photograph 1 Skopje City Hospital-Surgical Clinic



Photograph 2 Current status of ICU room



Photograph 3 Obsolete Operating Light:
(Light bulbs to replace dead ones are not available)



Photograph 4 Broken Operation Table

Photograph 5 Current situation of incompletely Surgical Operation Instrument Set

Photograph 6 Obsolete Sterilization Machine

Abbreviations

AVR	Automatic Voltage Regulator
CEE	Central and Eastern Europe
CT	Computed Tomography
DEN	Denar
DM	Deutsche Mark
EBRD	Europe Bank for Reconstruction and Development
ECG	Electrocardiogram
E/N	Exchange of Notes
EO	Ethylene Oxide
GDP	Gross Domestic Product
GSP	Gross Social Product
IC/R	Inception Report
ICU	Intensive Care Unit
IMF	International Monetary Fund
JICA	Japan International Cooperation Agency
M/D	Minutes of Discussion
MOD	Ministry of Development
MOH	Ministry of Health
MRI	Magnetic Resonance Imaging
OECD	Organization for Economic Co-operation and Development
PIP	Public Investment Program
UNICEF	United Nations Children's Fund
USAID	U.S. Agency for International Development
US$	U.S. Dollar
WHO	World Health Organizaiton

Contents

CONTENTS

Chapter 1

Background of the Project

Chapter 1 Background of the Project

1-1 Background

Recently, the Former Yugoslav Republic of Macedonia (hereinafter referred to as "the Recipient Country") has been faced with a difficult economic situation. Several factors have caused this situation, including its participation in UN sanctions against Serbia over the complex political tension in the Balkan Peninsula, and its confrontation with Greece over the naming of the country. Thus, the country has participated in limited foreign trade transactions. Its GDP(1990 cost basis) dropped to 367 million Denars in 1995 from 532 million Denars in 1991. This economic situation has inevitably delayed the implementation of the country's development projects as well as the establishment of a stable socio-economic infrastructure. In particular, the health sector has been greatly affected.

The City Hospital-Surgical Clinic (hereinafter referred as to "the Surgical Hospital"), founded in 1962, is the sole surgical hospital in Macedonia, and is also in charge of the emergency department of the Medical Faculty of Skopje University (hereinafter referred to as "the University Hospital"). The Surgical Hospital is supposed to cover half of the nation's area, and to look after the one million people living there. Approximately 130,000 patients received care at this hospital in 1995. About 4,500 of these patients required in-house care, with 2,800 of these receiving operations, 35% of which were emergency operations.

Despite its important role, the Surgical Hospital is so inadequately equipped that it can no longer fulfill its expected function satisfactorily as an emergency hospital. For example, it has no CT scanners, an important device for emergency treatment, and its clinical inspection equipment, including its X-Ray equipment, is completely obsolete. A 1994 USAID survey of its medical equipment reports that: 1) 71.7% is antiquated, i.e., at least ten years old, 2) 18.6% is out of order, 35.6% is unusable, and only 45.8% is usable in some way.

The government of the Recipient Country has decided that it is absolutely necessary to remedy this deplorable situation by replacing obsolete medical equipment and improving medical services. Accordingly, it has requested that the Japanese

government provide it with Grant Aid, so that it may obtain modern surgical equipment.

Based on this request, the Japanese government dispatched a JICA Basic Design Study Team to the Recipient Country from October 27 to November 26, 1996. This study team investigated the need for and suitability of medical equipment to be provided, and how to set up the basic details of Japanese Grant Aid. In the meantime, basic agreements were reached (There are summarized in the minutes of a discussion of the project), and signed by representatives of both parties on November 6 , 1996. After returning to Japan, the study team analyzed the data and information they had obtained in the Recipient Country, established the basic design for this project on the basis of said minutes, and drafted a of Basic Design Outline. The study team visited the Recipient Country again from December 15 to 25 of the same year to further clarify the details through consultations.

A study report on the basic design of the Project was drawn up by the study team based on their consultations with representatives of the government of the Recipient Country and on the information obtained from on-site surveys conducted by the study team. This report discusses the suitability of Japanese Grant Aid, the background, objectives, and contents of the project, a basic design for medical equipment, and anticipated costs, then provides a relevant assessment of all these factors.

Several appendices are attached to the back of the report, including member lists, a survey schedule, a list of parties concerned in the Recipient Country, and minutes of discussions.

1-2 Outline of the Project

(1)Request	:	A request was filed in February 1996
(2)Contents	:	Procurement and installation of medical equipment to be provided to the Emergency Center, the Surgical Hospital (Surgical Tables, Illumination apparatuses, CT scanner, X-Ray equipment, surgical microscope, and 70 other items).

(3)Authorities concerned : Ministry of Health

(4)Beneficiary : City Hospital · Surgical Clinic

Since the Surgical Hospital (annual patients : 130,000, inpatients : 4,500) is not an adequate emergency surgical hospital due to its obsolete medical equipment, it badly needs new equipment (75items) to provide proper emergency treatment, and better medical services. Table 3-2 shows the medical equipment to be procured by each department.

Chapter 2

Contents of the Project

Chapter 2 Contents of the Project

2-1 Objectives of the Project

The objective of "The Project for Equipment Supply for City-Hospital Surgical Clinic" (hereinafter referred to as "the Project") is to supply necessary medical equipment to the Surgical Hospital the area's main provider of emergency medical care. In the short term, the Project will supply sufficient medical equipment to permit the facility to function as an adequate emergency medical facility. In the mid and long term, the Project will improve medical services, and contribute to the establishment of a core medical facility which will cover half of the Recipient Country under its current referral system.

2-2 Basic Concept of the Project

2-2-1 Cooperation Policy

The Surgical Hospital takes care of 130,000 patients annually, including 4,500 in-patients. It has not, however, fulfilled its role as an emergency surgical hospital satisfactorily, due to its antiquated medical equipment, leading to deteriorated medical services. The Project aims at providing the hospital with 75 items of medical equipment necessary to provide emergency treatment, so that the hospital may recover its primary function.

2-2-2 Current Status of the City Hospital-Surgical Clinic

The Surgical Hospital's four-story building and basement accommodate a total of 200 beds. All staff members work in the Surgical Hospital, including 61 doctors, 169 nurses, and 59 technicians and administrators. Due to the country's poor economic conditions, most of the medical equipment for diagnostic examinations, treatment, and testing is old and unusable, as it has not been upgraded since it was first installed in 1962 when the Surgical Hospital was established. Thus, there is an urgent need for the replacement of equipment in many cases. Furthermore, the low inventories of pharmaceutical medicines, repair parts, and repair expenditures due to financial constraints have limited the availability or feasibility of badly needed emergency treatments.

According to a "Report on a Survey Inventory and Evaluation of Clinical Equipment in the Hospitals and Clinics of Macedonia" in 1994 conducted by USAID at the request of the Ministry of Health of the Recipient Country, medical equipment at the Surgical Hospital is in extremely poor condition;

- 71.7% of all medical equipment is more than ten years old and out of date,
- Only 45.8% of the equipment is in working order, while 18.6% is subject to malfunctions, and 35.6% is unusable.

The on-site study has confirmed that the situation is worse than it was at the time of the USAID study.

X-Ray Unit

The five types of equipment allocated to the unit, i.e., scanning equipment, Bucky X-Ray systems, Angiography system, Computer Tomography system, and Ultrasound system are rapidly aging, and are barely functional. The radiologists operate the systems and submit the pictures along with their reports. In 1995, there were 38,818 cases of simple X-Ray examinations, 3,974 ultrasound examinations, and 9,592 cases of angiographic and other examinations. However, due to the aging of the equipment, the numbers have fallen by about 50% from 1992 figures. In modern medicine, CT diagnosis has been widely practiced, and CT scanners are essential tools for providing emergency treatment. A CT scanner, installed at the University Hospital, has been used at full capacity, and is no longer available for patients requiring an examination. Thus, the patients have to wait for as long as 60 days to be diagnosed by a CT specialist.

Abdominal Surgery Unit

The ten doctors at the Abdominal Surgery Unit mostly specialize in the surgical treatment of patients with problems of the stomach, small and large intestines, and gall bladder. Outpatients number 1,200 to 1,300 annually, and some 800 of them are operated on at times when the average number of surgical procedures conducted daily reaches four to five cases. More than 90% of the beds in the Unit are occupied. The cases treated include malignant tumors in stomachs, large intestines, gastro occlusion, and gall bladder calculus. Due to insufficient equipment for diagnostic examinations, doctors are unable to provide adequate treatment for patients with liver and pancreas disorders.

Endoscopes are in short supply at the Abdominal Surgery Unit. The only available units, which are used for examinations of gall ducts, stomachs, and small and large intestines were procured under the "Project for Upgrading the Medical Equipment, 1995".

Vascular Surgery Unit

The Vascular Surgery Unit, a rather small Unit which treated 122 patients and performed 35 surgical operations in 1995, is staffed by three doctors, two of which are specialists. The operations conducted by this unit are mainly bypass operations for occlusive arterial sclerosis in the arteries of the lower limbs. Yet, this level of activity should be regarded as this Unit's maximum capacity, as the Unit depends merely on Doppler testing devices without conducting any diagnostic angiographies.

Pediatric Surgery Unit

The Pediatric Surgery Unit is engaged in the surgical treatment of infants in cooperation with Skopje City Hospital of Obstetrics and Gynecology. Unfortunately, however, the unit is unable to provide adequate medical services due the nonfunctional condition of its incubators. In view of its activities in 1995, when it treated 1,000 or fewer patients and conducted 800 surgical operations, the unit must be equipped to provide medical services on a fairly large scale. Two general incubators for newborn babies and one incubator for post-operative recuperation in requisition should improve surgical treatment for newborns with potential disorders.

Urology Unit

In 1995, this Unit handled 800 outpatients and 120 surgical operations. These already low figures have been cut by as much as 50% in the last two years. Since the level of medical skill is very high in this Unit, the cause for the dramatic decrease in the number of patients is the inadequacy of its equipment i.e. its old X-Ray systems and endoscope systems for urinary duct examinations. The hospital has no usable haemodialysis device. This is another factor that decreases its function and efficiency as an emergency hospital.

External Injury Unit

Patients come mostly with broken limbs and joint problems. As far as orthopedic surgery is concerned, total hip replacement, a procedure which requires very expensive parts, is carried out only if the patient purchases the parts from abroad. In 1995, 521 outpatients visited this Unit, and 290 surgical operations were performed. Operation tables have become obsolete and accessories insufficient, leading to degraded accuracy in operations conducted.

Plastic Surgery Unit

Three doctors at this Unit treat burns, post-injury keloids, and motor function failures. Treatment mainly focuses on the skin rather than on bone or muscle. The annual number of outpatients in 1995 totaled about 399, out of whom 377 received operations.

The hospital has no burnt patient support system. Because of this, seriously burnt patients cannot be properly treated. Over the past five years, 152 adult patients have been sent to Slovenia and Bulgaria for treatment.

Neurosurgery Unit

The Neurosurgery Unit treated about 360 patients in 1995. 45 cases were surgically treated for problems related to the vertebrae or spinal cord, and 15 received open-brain surgery. As in many other countries, vascular disorders such as cerebral hemorrhage and cerebral infarction are the number-one causes of death in the nation. Nevertheless, the Surgical Hospital does not have good Angiography systems to conduct the diagnostic examination necessary for surgical operations. This forces the doctors to limit their treatment to responding to the symptoms.

ICU Room/Anesthesia Department

About 4,000 patients a year are treated in the ICU rooms. With patient-monitoring systems installed through the "Project for Upgrading the Medical Equipment, 1995", the ICU rooms seem to have retained their original function, and work adequately despite the lack of basic equipment. Regarding anesthetic devices, work to install a central plumbing system along with nitrogen oxidule has been completed.

The hospital has no anesthetic device with a ventilator, except for four old and manual anesthetic devices and two other units procured under the "Project for Upgrading the Medical Equipment, 1995".

Biochemical Clinic Laboratory

The equipment in the Surgical Hospital's Biochemical Clinic Laboratory is in a state of ruin. Most of the testing devices are old and the only ones that can be used are a number of simple biochemistry analyzers, and electrolytes analyzers, which are subject to frequent breakdowns, and serveral blood cell counters which have been procured through the "Project for Upgrade the Medical Equipment, 1995". All testing for outpatients is handled by one biochemist and five testing specialists. Although the Unit's testing equipment is outdated and prone to

frequent breakdowns, new blood cell counters have been procured through the "Project for Upgrade the Medical Equipment, 1995", and the Unit conducts as many as 200,000 tests per year. In view of its status as the most poorly equipped Unit in the Surgical Hospital, a large-scale personnel transfer from the Biochemistry Research Institute of the University Hospital is planned after procurement.

Blood transfusion Unit

Set up independently of the Biochemical Clinic Laboratory in view of the Surgical Hospital's focus on surgery, this Unit checks blood types, screens blood donors, and stores frozen collected blood for supply to other Units. The existing medical refrigerator and freezer are now more than ten years old, and need to be replaced.

General

Two large-scale, high-pressure-steam sterilization machines manufactured by a now defunct Yugoslavian maker are currently installed, and are used with water softeners. Both machines are aging quickly and frequently break down; however, the maintenance contract is no longer valid. Despite the enormous space they take up, their chambers only measure 70cm^3, which is insufficient to meet the needs of the Surgical Hospital.

2-2-3 Results of Study on Request

In addition to collecting various data regarding diagnostic examinations and treatments, the study team directly interviewed doctors and related staff in each of the Surgical Hospital's units and carried out an on-site investigation of the facilities and medical equipment. The study results were analyzed, reviewed, and reported to the Ministry of Health. After discussions by the two sides, a prioritized list of equipment to be procured under the supply plan was prepared. From this list, a total of seventy(70) items, together with spare parts and consumables used in conjunction with the equipment in the Surgical Hospital's units, were designated as procurement items to be studied, even though seventy-five(75) items with spare parts and consumables were included in the original request submitted by the recipients. (refer to **Table 2-2**).

This prioritized list is based on the results of a detailed review of an assessment of each item carried out by defining positive and negative points. For CT (Computer

Tomography), a standard established by the WHO was used as a reference for review.

Priority	A (equipment to be provided in the project)	67
	A' (equipment to be provided in the project, after confirmation of financial resources for the operation and a maintenance service charge)	2
	B (equipment to be provided in case of the budget allowance)	6
	C (equipment be excluded from the project)	4
	Total	79

Discussions were held with the Ministry of Health according to the above-mentioned policy for the requested equipment. The following equipment, including CT-related equipment, was reviewed.

CT (Computed Tomography) Scanner

Despite its role both as a general surgery hospital and as the emergency medical department of the University Hospital, the country's highest medical institution, the Surgical Hospital was forced by financial constraints to forego replacing and repairing its equipment over the past ten years. Currently, most of its X-Ray diagnostic systems are outdated and remain unused because the manufacturers of spare parts have stopped producing the necessary items. Therefore, the Surgical Hospital's diagnostic system is extremely poor. The CT scanner now under review would undoubtedly prove very useful for a general surgical hospital such as the Surgical Hospital, which includes an emergency medical unit. Despite the high costs of procuring, installing and maintaining of a CT system, the following aspects of the procurement plan were studied in greater detail:

- Many emergency patients are transferred to the X-Ray Research Institute of the University Hospital for diagnosis and appropriate treatment, but the facility is plagued by chronically long waits due to its poor diagnostic equipment and the absence of state-of-the-art diagnostic equipment such as CT scanners, which are normally installed at surgical hospitals.
- Vascular disorders such as cerebral hemorrhage and cerebral infarction are the number-one causes of death in this country. Nevertheless, the emergency medical department of the Surgical Hospital lacks sufficiently powerful equipment such as CT scanners or decent angiography equipment to diagnose these types of illnesses. Moreover, the problem is further compounded by the near impossibility of conducting reliable

diagnoses for patients' surgical operations.

- It satisfies the CT scanner installation standard set by the WHO.

Table 2-1 WHO Standard for CT and Actual Situation of the Surgical Hospital

WHO Standard	Actual Situation of the Surgical Hospital
1. Activities of the X-Ray Department	
1) Number of Radiographs : 50,000 / a year	20,000 / a year (1995), halved in a few years due to the deterioration of equipment. More than 50,000 / a year is expected.
2) General including Topography	Being performed
3) Angiography	Being performed
4) Photographing of spinal column	Being performed
5) Ultrasound Diagnosis (Preferably performed in an X-Ray Unit)	Being Performed in an X-Ray Unit
6) Well-trained radiologist and engineer	3 radiologists including a professor who has CT experience. 6 well-trained engineers
2. Activities of Hospital	
1) 500 beds	220 beds (but the Surgical Hospital is an emergency hospital)
2) General Surgery	General Surgical Hospital
3) Diagnosis in Brain Surgery	Being performed
4) Out-Patient Service including Traumatology	Emergency Hospital
5) Technical Surgery (Cardio-Surgery, Vascular Surgery, Orthopedic Surgery, Urology)	Universal Surgery
6) Neuro-surgery	Being performed
7) Oncology Tumor Unit (Preferably treated by X-Rays)	Patients of Oncology are transferred to the Faculty
3. Infrastructure	
1) Stable Power Supply (Including Stabilizer, Compressor)	Applicable
2) Easy access to Air Conditioner	Applicable

(ref. : WHO Technical Report Series Vol 689, 1983.)

- There are five CT scanners in the Recipient Country - two at the University Hospital, one set up in the country's second largest city, Bitola, in 1996, and two at other private hospitals. The units at these sites are in full operation, and it is difficult to respond to the needs of emergency patients at the Surgical Hospital.
- As far as CT scanner maintenance is concerned, Skopje University has medical professors and doctors with many years of experience abroad in CT diagnostic treatment. Technically, there should be no problems with the support needed for newly procured CT scanners, and the transfer of these doctors from the University Hospital has been confirmed by the Surgical Hospital and the Ministry of Health.

2-3 Basic Design

2-3-1 Design Concept

(1) Policy concerning natural environment conditions

Most medical equipment under the plan cannot be expected to be directly influenced by the country's natural environment at their installation sites. With the continental and Mediterranean climates affecting this country, the temperature in Skopje rises to as high as 37℃ to 38℃ from July to August, and the temperature differences between daytime and nighttime are large. However, as few medical facilities at the Surgical Hospital are equipped with air conditioning, special considerations must be given to temperature management in installing equipment such as CT scanner.

(2) Policy concerning procurement from countries nationals other than Japan

Recipient country imports most of its medicine and medical equipment. When procured equipment has been delivered, the Ministry of Health is required to provide technical services immediately, and to purchase parts and expendable at a low cost and in the shortest time possible. Fortunately, neighboring European countries are capable of providing sate-of-the art medical equipment. In drawing up the project, Study team has assumed that such equipment can be procured from these third countries.

(3) Policy concerning the maintenance and management by the Recipient Country

The hospital has a sufficient number of physicians, engineers, and nurses. They are efficiently equipped with technical skills to maintain and control the procured equipment. They have been well-versed in medical skills after being trained in Japan and European countries, and have also gained a lot of experience domestically. They do not need any more specific training, except training to use CT equipment. Since the Surgical Hospital has no CT scanner of its own, the hospital staff must be supported by experienced personnel from the University Hospital, and must be provided with technical guidance by the manufacturer of the equipment for about two weeks.

(4) Policy concerning equipment planning

1) Policy for basic medical equipment

To avoid redundant installation of the same type of equipment at one site, the need for installation, justification for installation, and number of units required as basic

medical equipment will be studied. The criteria used in determining these factors will be based on the plan's objective of establishing a general surgical hospital that adequately fulfills all the functions of an emergency hospital. Determination of the level of quality required for the equipment will be based on consideration of the technical system for maintenance after procurement and the budgetary situation.

Water supply and drainage will be smooth, as every medical institution of the Hospital is connected with the facilities. However, the water contains a large percentage of calcium, and a water softener system is therefore required for equipment that uses a large quantity of water. Electricity is also supplied to all equipment items. The voltage actually measured during the study presented no problems. Problems caused by voltage drops were not experienced during the previous year, and there were no harmful effects on precision medical equipment. However, occasional power outages and voltage drops were experienced the year before last due to a shortage of power generation from hydraulic plants as a result of a drought. Therefore, an Automatic Voltage Regulator (AVR) may be needed for certain voltage-sensitive equipment.

2) Policy for X-Ray Systems and CT scanners

With the exception of two mobile x-ray systems, the policy stipulates that all of the x-ray systems installed in the Surgical Hospital be mutually linked in a network. According to the policy plan, the x-ray systems will ensure that the Surgical Hospital fully functions both as a general surgical hospital and as an emergency surgical hospital. To realize this plan, studies will be conducted on the status of the current x-ray systems, the number of doctor examinations with new systems and their purposes, the adequacy of utilities and other conditions in the x-ray rooms, the prevention of radiation leakage, and the need for auxiliary work required at the time of installation. With Bucky x-ray systems, the selection of a mobile, ceiling-type system may be considered in order to make the best use of limited space.

(5) Policy concerning inland transportation route

Four possible routes are currently being considered for inland transportation.

a) the route from Thessaloniki, Greece, to Skopje

b) the route through the Black Sea via the Port of Varna/Burgas, Bulgaria

c) the route via Germany/Austria/Hungary/FR Yugoslavia

d) the route via the port of Durece, Albania

The final decision for the route will be based on consideration of the loading port. At this point, route (a) from Thessaloniki, to Skopje is seen as the most favorable since it is shorter than the others and has good road and railway conditions. However, the diplomatic relationship between the Recipient Country and Greece has not yet fully recovered, and the potential risk of renewed tensions could conceivably result in a border closure. Since such an occurrence would preclude the use of route (a), changes in the international situation are being closely watched, and research and review of other routes, including route (b) through the Black Sea via the Port of Varna/Burgas, Bulgaria, the main route up until 1995, shall be continued.

(6) Policy for the Installation Work Period

Our general policy is to implement installation work within one fiscal year. A thorough study is being conducted on the time needed for transportation and inspection of the delivered equipment, as well as possible procurement from third countries to prevent any disruption with the implementation period. Refer to **Table 3-2** for more concrete details on the planning process.

2-3-2 Basic Design

(1)Total concept of the project

Since its independence in 1991, The recipient country has lost major export markets on account of external factors, and must now overcome a severe economic situation caused by ongoing macroeconomics innovations. Medical equipment, spare parts, and expendable cannot be sufficiently purchased under the framework of a tight budget. In order to effectively use limited cooperation funds, and to reconvert the hospital into an emergency surgical hospital, it is essential to provide medical equipment to the hospital and prevent a further decline in the quality of medical services it provides.

Prior to drawing up this project, study team has paid due consideration to the maintenance, storage, inspection, and repair of the equipment after its delivery. Moreover, study team has assumed how frequently the equipment would be used, and have estimated the quantity of parts and expendable that must be procured. In addition, study team has studied how to establish a possible procurement system of parts and expendable, together with a continuous supply system.

(2)Equipment Plan

Study team has reviewed each type of the equipment to be procured, in order to avoid redundant installation, to use the equipment effectively, and not to waste limited cooperation funds. Finally, study team has decided on the priority of equipment to be procured, and made up a list of 75 items (refer to **Table 2-2**). However, Acid-basal Status Analyzer, ICU system for 8 beds, and Blood Cell Counter were excluded from the list, as study team had already been procured under the "Project for Upgrading the Medical Equipment, 1995".

Table 2-2 List of Medical Equipment
(Original Request & Mutually Approved Items)

A : Equipment to be provided in the project
A' : Equipment to be provided in the project, after confirmation of financial resources for the operation and a maintenance service charge
B : Equipment to be provided in case of the budget allowance
C : Equipment be excluded from the project

Original Request Item		Q'ty		Point & Evaluation		Remarks
Abdominal Surgery Unit	Cholecystectomy Instrument Set	2	No alternation	P1, P2, P3	A	
	Endoscope Sonography System with TV Video	1	No alternation	P1, P3	A	
	Gastrectomy Instrument Set	1	No alternation	P1, P2, P3	A	
	Laparoscope Surgery Equipment	1	No alternation	P1, P3	A	
	Sigmoidscope	1	No alternation	P1, P3	A	
ICU (Anestesia Department)	Anesthetic Device with Ventilator	6	No alternation	P1, P2, P3	A	
	Sub-station for Central Nitrogen Oxidule	1	No alternation	P1, P2, (N8) P3	A	
Blood Transfusion Unit	Medical Freezer	1	No alternation	P1, P2, P3	A	
	Medical Refrigerator	1	No alternation	P1, P2, P3	A	
General	Aqua Cleaner	1	No alternation	P1, P2, P3	A	
	Compressor for Air and Vacuum	1	No alternation	P1, P2, P3	A	
	ECG	6	No alternation	P1, P2, P3	A	
	Ambulance Car	3	Alternated to be changed	P1, P2, P3	A	
	Hand Shower Machine	6	No alternation	P1, P2, P3	A	
	Sterilization Machine	3	No alternation	P1, P2, P3	A	1 for EO gas sterilizer (to sterilize plastic made equipment including such as fiberscope
	Washing Machine for Surgical Equipment	1	No alternation	P1, P2, P3	A	
ICU (Intensive Care Unit)	Acid-basal Status Analyzer (Blood Gas Analyzer)	1	Excluded	P1, P2, (N8) P3	C	Excluded because the equipment already provided
	Blood Warmer	5	No alternation	P1, P2, P3	A	
	Expired Gas Monitor	1	No alternation	P1, P2, P3	A	

	ICU System for 8 beds	1	Excluded	P1, P2, P3 (N8)	C	Excluded because the equipment already provided
	Mobile X-Ray for ICU	1	No alternation	P1, P2, P3 (N8)	A	
	Potable Set for Resuscitation	3	No alternation	P1, P2, P3	A	
	Respirator for all age with Monitor	3	No alternation	P1, P2, P3	A	
	Syringe Infusion Pump	8	No alternation	P1, P2, P3	A	
Biochemical Clinic Laboratory	Biochemical Analyzer	1	No alternation	P1, P2, P3 N8	A	To be procured upon confirmation of financial verificaton for maintenance and management
	Blood Cell Counter	1	No alternation	P1, P2, P3 (N8)	C	Excluded because the equipment already provided
	Blood Gas Analyzer	1	No alternation	P1, P2, P3 (N8)	A	
	Centrifuge	1	Additionally requested	P1, P2, P3	B	appropriate as current equipment is not functioning
	Electrolytes Analyzer	1	No alternation	P1, P2, P3 (N8)	A	
	Table-top Autoclave	1	No alternation	P1, P2, P3	B	appropriate as current equipment is not functioning
Neurosurgery Unit	Aspirator for Neurosurgical Operation	1	No alternation	P1, P2, P3	A	
	Neurosurgery Instrument Set	1	No alternation	P1, P2, P3	A	
Operating Theatres	Basic Flame Kit	3	No alternation	P1, P2, P3	A	
	Bipolar Diathermia	2	No alternation	P1, P2, P3	A	
	Cannulated Flexible Reamer Instrument Set	1	No alternation	P1, P2, P3	A	
	Cart Pass Box	12	No alternation	P1, P2, P3	A	
	Central Surgical Aspirator Unit	3	No alternation	P1, P2, P3	A	
	Clean Cabinet	6	No alternation	P1, P2, P3	A	
	Defibrillator	2	No alternation	P1, P2, P3	A	
	Elector-surgical Unit	6	No alternation	P1, P2, P3	A	

	Full Set Drill Machine	2	No alternation	P1, P2, P3	A	
	Hand Surgical Operation Instrument Set	3	No alternation	P1, P2, P3	A	
	Medical Cabinet for Operation Room	6	No alternation	P1, P2, P3	A	
	Medical Dry Cabinet	3	No alternation	P1, P2, P3	A	
	Micro-Neuro Surgery Operation Table	1	No alternation	P1, P2, P3	A	
	Monopolar Diathermia	6	No alternation	P1, P2, P3	A	
	Multi Purpose Operation Table	4	No alternation	P1, P2, P3	A	
	Operating Light	6	No alternation	P1, P2, (N8) P3	A	
	Operation Microscope	1	No alternation	P1, P2, P3	A	
	Orthopaedic Traction-Fluoroscopic Table	1	No alternation	P1, P2, P3	A	
	Over Table	7	No alternation	P1, P2, P3	A	
	Patient Monitor	6	No alternation	P1, P2, P3	A	
	Portable Suction Unit	8	No alternation	P1, P2, P3	A	
	Retractor Set	1	No alternation	P1, P2, P3	A	
	Spinal Flanie Kit	1	No alternation	P1, P2, P3	A	
	Sterillizer Table	7	No alternation	P1, P2, P3	A	
	Thyroidectomy Instrument Set	1	No alternation	P1, P2, P3	A	
	Universal Blade Kit	1	No alternation	P1, P2, P3	A	
	Mobile X-Ray with TV System for Operation Theater	1	No alternation	P1, P2, (N8) P3	A	
Pediatric Surgery Unit	Incubator	2	No alternation	P1, P2, P3	A	
	Incubator for Pediatric Surgery	1	No alternation	P1, P2, P3	A	
Plastic Surgery Unit	Air Dermatome	1	Additionally requested	P1, P3	B	appropriate for basic equipment for surgery unit where skin transplantation is done

	Scaled Patient Support System	2	Additionally requested	P1, P2, P3	B	appropriate for basic equipment for emergency treatment of scaled patient
X-Ray Department	Bucky Radiographic System	1	No alternation	P1, P2, P3 (N8)	A	
	CT/Computer Tomography	1	No alternation	P1, P2, P3 N8	A	To be procured upon confirmation of financial verification for maintenance and mangement
	Remote Control Fluoroscope X-Ray System for Abdominal	1	No alternation	P1, P2, P3 (N8)	A	
	Ultra Sound System	3	No alternation	P1, P2, P3 (N8)	A	
Urology Unit	Haemodialysis	1	No alternation	P1, P2, P3 (N8)	A	
	Resectoscope Set	1	No alternation	P1, P2, P3	A	
	Uretroscope Set	1	No alternation	P1, P2, P3	A	
	Urodinamic Equipment	1	Additionally requested	P1	C	Not in urgent need for emergency / low frequency of usage
Vascular Surgery Unit	Doppler for Vascular Diagnosis	1	No alternation	P1, P2, P3	A	
	Microvascular Surgical Instrument Set	1	No alternation	P1, P2, P3	A	
	Mobile Light for Vascular Diagnosis	1	No alternation	P1, P2, P3	A	
	Vascular Surgical Instrument Set	1	No alternation	P1, P2, P3	A	

With the exception of the CT-related equipment, the 75 types of equipment to be studied for grant aid cooperation funding are mostly intended to replace outdated equipment in order to adequately fulfill the diagnostic and treatment functions required of an emergency surgical hospital. There are a sufficient number of doctors, medical technicians, and nurses to operate the newly installed equipment, with many of the doctors having been trained abroad. Their knowledge and skills are commensurate with international standards, and no difficulties are anticipated in the handling of the equipment. As the emergency medical facility runs under the country's highest medical establishment, the Surgical Hospital has been guaranteed support in the form of personnel transfers from the University Hospital regarding the use and maintenance of the new equipment after installation. The sites, handling, and maintenance system for the newly procured equipment are not foreseen to have any problems .

The reasons for procurement of the main equipment are shown below.

a) CT (Computer Tomography)

Currently, the Abdominal Surgery Unit in the Surgical Hospital is unable to carry out any surgical operations due to a lack of diagnostic equipment for liver and pancreas disorders. For a similar reason, the Neurosurgery Unit is only able to perform about 15 open-brain surgeries per year, despite the fact that vascular diseases such as cerebral hemorrhage and cerebral infarction are among the leading causes of death in the Recipient Country, just as in many other European countries. The physicians thus have no choice but to respond to the symptoms of the diseases rather than the causes. Even in the Vascular Surgery Unit, operations are limited to by-pass surgery operations for occlusive artery sclerosis in the lower limb artery and abdominal main artery below the kidney artery. Needless to say, the situation is a harsh one for both the physicians and their patients.

Insufficient diagnostic equipment has caused the above situation at the hospital. In modern medicine, CT diagnosis has been widely practiced, and CT scanners are essential tools for providing emergency treatment. A CT scanner, installed at the University Hospital, has been used at full capacity, and is no longer available for patients requiring an examination. Thus, the patients have to wait for as long as 60 days to be diagnosed by a CT specialist. A CT scanner, when introduced, will significantly reduce patients' waiting time and improve the accuracy of the examination and treatment. The patients will then be properly taken care of. Based on these facts, study team has concluded that the CT scanner would be essential at the surgery hospital to provide better medical services both in terms of the number of patients and quality of treatment.

b) Ultrasound System

At present, the X-Ray Unit has only one outdated ultrasound system with a partially broken probe. As this equipment plays a central role in diagnostic examinations for the abdominal and circulatory organs, there is a high demand for its use in the Abdominal Surgery Unit, the Urology Unit, and other Units of the Surgical Hospital. The system was used in over 4,000 examinations in 1995, and more than double this number of patients remain on a waiting list year-round. Judging from this severe backlog, a

minimum of three Ultrasound Systems is regarded as a basic necessity.

c) Resectoscope, Urological Endoscope, Hemodialysis Equipment

Presently, the number of operations being performed at the Urology Unit is decreasing due to declines in the quality of hospital services resulting from the lack of adequate equipment. The newly procured resectoscope and urological endoscope (together with auxiliary treatment tools) will play a substantial role in recovering the normal medical activities of the Urology Unit. Another factor prompting the decision to procure this equipment was its minimal maintenance cost. The hemodialyzer currently existing in the Surgical Hospital is old and out of service. This equipment is regarded as essential not only in the emergency hospital's Urology Unit, but also in the treatment of patients with acute kidney failure, and must therefore be replaced.

d) Sterilization Machine

Although the Surgical Hospital performed as many as 2,800 operations annually, the total capacity of its current sterilizers is very limited at a level of 70cm3 , and is hardly capable of satisfying all the needs of the hospital. Thus, surgeons are forced to use operation tools that are incompletely sterilized. Study team has concluded that large sterilizers, essential tools to ensure safe operations, must be procured. Since some equipment, such as fiberscopes, cannot be thoroughly sterilized with current high-pressure and steam-type sterilizers, one of the three sterilizers to be procured should be EO-gas type. Fortunately, study team has learned that EO-gas can be easily purchased locally.

e) Anesthetic Device with Ventilator, Operation-Monitoring Equipment

The Surgical Hospital has no anesthetic device with a ventilator. The facility currently has four outdated manual anesthetic devices which are ready to be replaced, and two newer devices procured in the last fiscal year through the "Project for Upgrading the Medical Equipment, 1995" Thus, there is an urgent need to replace the manual devices with new anesthetic devices equipped with ventilators. As the Surgical Hospital also lacks operation-monitoring equipment, procurement of this essential equipment should bring about considerable improvements to the safety and efficiency of surgical operations.

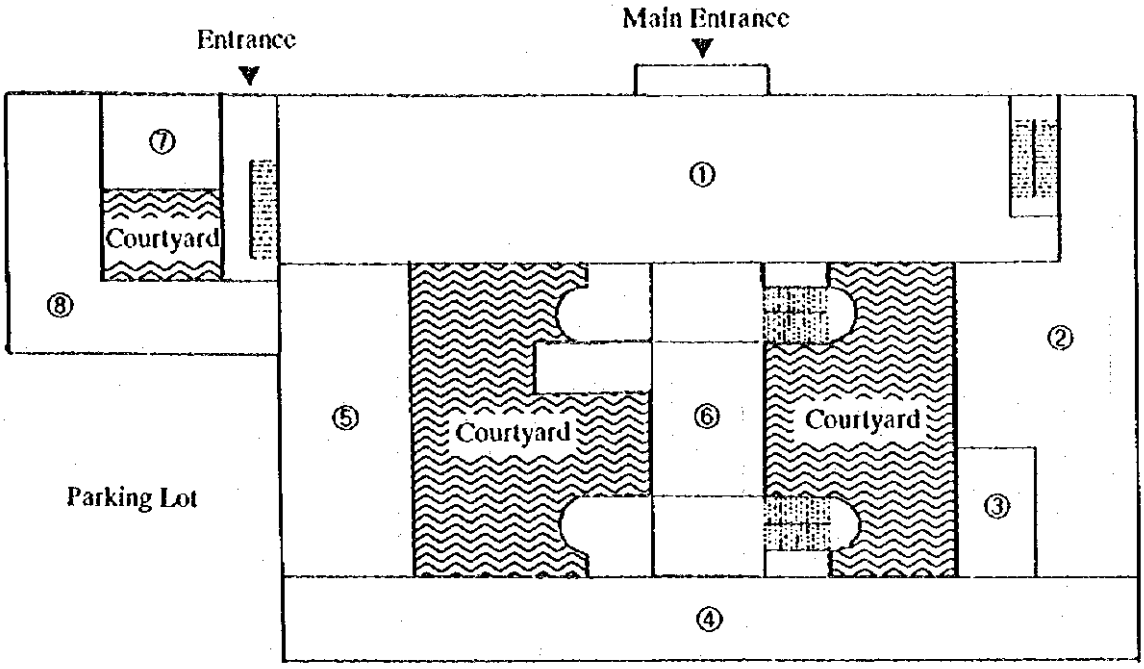
f) Scaled Patient Support System

Emergency treatment of scaled patients requires seven to ten days on average. Statistics over the past five years reveal that scaled patients amount to 30 people per year, or 300 mandays a year. In several cases, more than one scaled patient must be simultaneously treated. Thus, a scaled patient support system, equipped with two beds, must be established.

(3) Plan of the surgical hospital

A plan of the Surgical Hospital is shown in **Fig2-1**.

The hospital building is a durable one which survived the great earthquake of 1963. However, it was not originally designed to serve as a hospital, and was later remodeled for medical use. It therefore has narrow lifts and corridors in various places. Accordingly, great care will be needed in installing large equipment on above-ground floors. Currently, renovation of some consulting rooms, doorways, and lifts is being planned, but it is unknown whether work will be completed prior to the installation of the equipment. To ensure smooth delivery and installation of the equipment to be procured, partial renovation of the building is being planned separately.



	Floor	Department
①	1F	Outpatients Department
	2F	Operating Theaters, Endoscopic Laboratory, Sterilizing Room
	3F	Ward
②	1F	X-ray Department
	2F	Vascular Surgery Unit
	3F	Ward
③	1F	Urology Unit
	2F	Ward
	3F	Ward
④	1F	Pharmacy
	2F	Abdominal Surgery Unit, External Injury Unit, Neurosurgery Unit
	3F	Ward
	4F	Plastic Surgery Unit, Pediatric Surgery Unit
⑤	1F	Biochemical Clinic Laboratory
	2F	Ward
	3F	Ward
⑥	1F	Hall
	2F	ICU (Intensive Care Unit)
⑦	1F	Ambulance Garage
	2F	Storehouse
	3F	Library
⑧	1F	Blood Transfusion Unit
	2F	Storehouse
	3F	Dean's Office, Secretary's Office, Library

Figure 2-1 Plan of the Surgical Hospital

2-4 System for Implementation Project

2-4-1 Organization

Figure 2-2 shows the relationship between the Ministry of Health and the Surgical Hospital in recipient country. **Figure 2-3** shows the organization of the Surgical Hospital, which consists of 12 units/departments and Biochemical Clinic Laboratory. **Table 2-3** shows the number of staff and patients of the Surgical Hospital. Together with a gynecology and obstetric hospital, institution of children respiratory diseases, and center for medical rehabilitation located in Skopje, the Surgical Hospital is the Skopje General Hospital under the direct control of the Ministry of Health. It is also in charge of the emergency department of Clinical Center of the University Hospital, the supreme medical institute in Recipient country.

Table 2-3 Number of Staff and Patients in the Surgical Hospital

Unit	Number of Doctors	Number of Staff incl. Nurses (concurrent in blank)	Number of Patients (number of operations) in 1995
X-Ray department	5	Radiation Engineer 6	52,384 (incl. Ultra Sound Diagnosis)
Abdominal Surgery	10		1,169* (814)
Vascular Surgery Unit	3		122* (35)
Pediatric Surgery Unit	6	15	984* (795)
Urology Unit	7	15	776* (457)
Trauma Unit	4		521* (286)
Plastic Surgery Unit	3		399* (374)
Neurosurgery Unit	3		365* (45)
Intensive Care Unit/ Anesthesia	10	9	3,984*
Operating Theatres	Doctor in charge1 others 1		
Outpatient Department	Full-time surgeon 1 concurrent with other units		129,055
Biochemical Clinic Laboratory	–	Biochemist 1 Examiner 5	188,099 samples
Blood Transfusion Unit	2	5	39,388
Intern	5	–	
Total	61	228	

*number of inpatient
(ref. : Surgical Hospital)

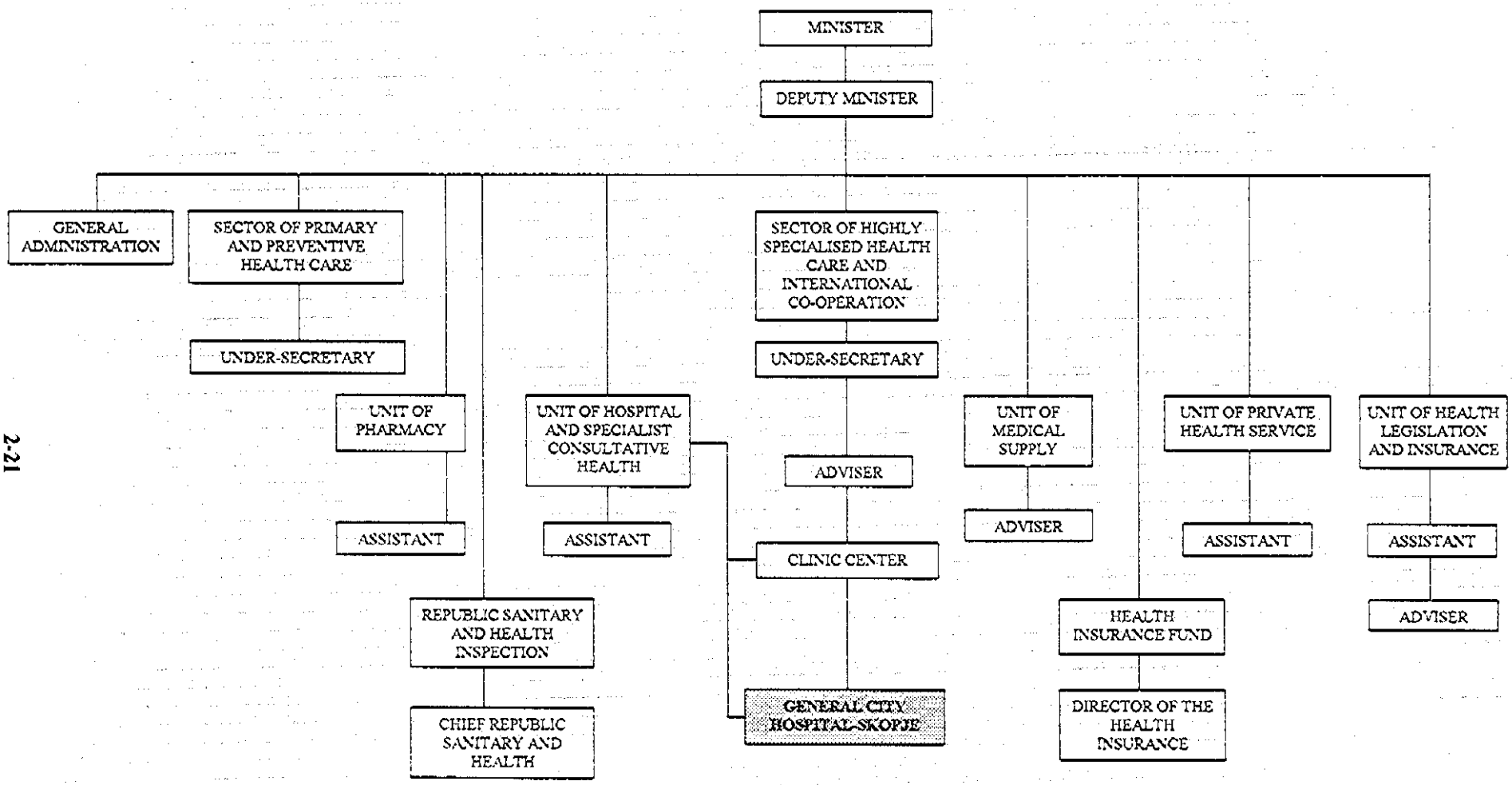


Figure 2-2 The Relationship between the Ministry of Health and the Surgical Hospital

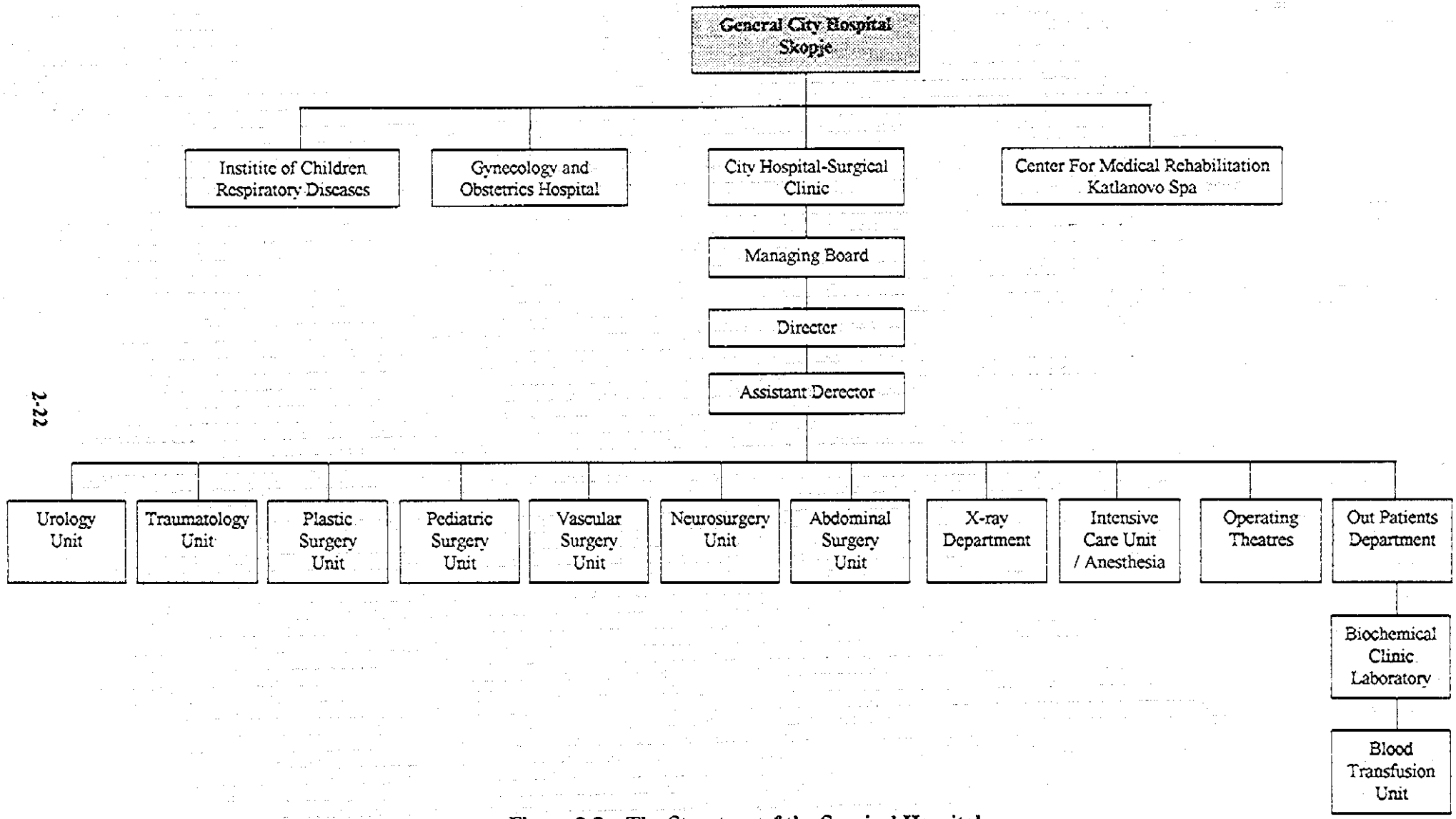


Figure 2-3 The Structure of the Surgical Hospital

2-4-2 Budget

Table 2-4 shows the revenue and expenditure conditions of the Surgical Hospital over the past four years (1993 - 1996 (first half)). The Surgical Hospital has been in continuous deficit operation throughout these years, except for 1994. In 1995, it incurred a loss of 32,701,076 Denar which is equivalent to 30% of the expected revenue. These losses were the result of a consultation fee system unable to pay the required costs. The more frequently consultations are made, the larger the losses will become. Fortunately, however, there have been no delays in payment, since the losses have immediately been covered by the Health Insurance Fund.

Table 2-5 shows the revenue and expenditure conditions of the Health Insurance Funds that have financially supported the Surgical Hospital. Clearly, the results have gradually improved over the past three years, with little fluctuation. Now that the World Bank and WHO have helped restructure the Health Insurance Fund, the Fund is expected to operate stably in the future.

Table 2-4 Revenues and Expenditures of the Surgical Hospital

Unit: Denar

Year	Revenue	Expenditure	Loss
1	2	3	4 (2-3)
1993	57,830,500	59,948,879	2,118,368
1994	104,517,619	104,517,619	-
1995	111,448,606	144,149,682	32,701,076
1996 (Jan.-Jun.)	49,188,681	68,403,090	19,214,409

(ref.: Macedonia, Health Insurance Fund)

Table2-5 Revenues and Expenditures of the Health Insurance Fund

Unit: million Denars

	1994	1995	1996
Total Revenue	8,863	8,483	9,295
1. Health Insurance Funds	5,985	5,832	5,918
2. Pension funds	1,882	2,102	2,310
3. Others	996	549	1,067
Total Expenditure	8,754	8,761	9,295
1. Primary Health Protection	3,264	2,826	2,937
2. Hospital Clinic	2,528	2,626	2,694
3. Others	2,853	3,587	3,664
Deficit-surplus	109	-278	0

(ref. : Ministry of Development, Macedonia)

2-4-3 Financial Analysis

It is deplorable that the Surgical Hospital, despite financial support of the Health Insurance Fund, has remained in the red. It is very important that a more appropriate consultation fee system be established, enabling the Surgical Hospital to be operated at a sound operations. A financial analysis of the medical equipment, requested in order to assess whether such equipment, supplied by Japanese Government under the Grant Aid System, could be implemented without placing any burden on the Surgical Hospital, will be conducted. This analysis will be conducted to confirm that the Surgical Hospital would not sustain any related expenses, as well as the ways in which the equipment would contribute to the improved operations of the Surgical Hospital.

(1) Requirements for assessment

- Assessment period:	10 years from 1998 - 2007
- Cost base:	1998 price (obtained by multiplying the 1996 costs by a projected price increase ratio of 12%)
- Consultation fee:	Fees applied at the Surgery Hospital in 1996 (Because the fees are not linked with price increases, an escalator system is not employed.)
- Depreciation:	Medical equipment supplied under Japanese Grant Aid is excluded.
- Operation ratio of the equipment:	First year: 50%; Second year: 70%; Third year: 90%; Fourth year and later: 100% In setting the operation ratio at 100% for 2001, the study team have considered the following factors: - Current operation ratio of beds (less than 80%)at the Surgery Hospital; - Status of the Health Insurance Fund currently under revision.
- Equipment to be renewed:	Operation costs for new equipment to replace that already in existence are not listed as new costs.
- Exchange rate:	US$ 1.00 = Yen 110.00 DM 1.00 = Yen 70.44 US$ 1.00 = den 40.00 DM 1.00 = den 27.20

- Fee collection ratio: 80%
  the study team have set this ratio as collectable from the revenue to be derived from the equipment supplied, in consideration of the following factors:
  - The financial report of the Surgery Hospital for 1994 and 1995 reveals that, of the total costs for medicine and consumables (59,581,788 Denar), only 12% was collected from patients, though that figure should have been 20%. **(Table 2-6)**
  - The elderly, children, and pregnant women are legally exempted from paying consultation fees.
  - In addition, several low-income patients were unable to pay their fees. **(Table 2-8)**

- Maintenance costs: Inexpensive maintenance services are to be regularly provided to major facilities in Skopje and neighboring areas.

- Financial analysis scheme: Because initial investment is conducted under the Japanese Grant Aid system, it is not listed as a cost.
  Existing staff members will be in charge of operations, and new fixed costs will not be generated.

Table 2-6 Expenditure Status of Surgical Hospital

Unit: Denar

	Item	1994	1995
1)	Total Expenditure	104,517,619	144,149,682
2)	Drags/Consumable	36,254,054	59,581,788
3)	Total Revenue	104,517,619	111,448,606
4)	Participation by Patients	4,700,794	6,925,037
	4) / 2)	12.9%	11.6%

(ref. : Surgical Hospital)

(2) Revenue forecast

It is hoped that newly introduced medical equipment not owned by the Surgery Hospital will generate revenue. The demand for consultation greatly exceeds the supply at the surgery and radiation departments of the University Hospital (an extremely high-quality medical institution), with patients receiving insufficient care. This indicates that when new medical equipment is introduced in the Surgical Hospital, the equipment will be operated at 100% immediately after installation. A variety of equipment has already been

implemented by the "Project for Upgrading Medical Equipment, 1995" is in full occupied status. Based on this example, it can be assumed that the Surgery Hospital will be operated at 100% immediately after the equipment is installed. Peripheral factors such as the length of time necessary for doctors in charge to become accustomed to the use of said medical equipment have also been considered. Accordingly, the operation ratios mentioned earlier have been set at 50% for 1998, 70% for 1999, 90% for 2000, and 100% for 2001 and later.

Table 2-7 shows the revenue forecast when the Surgical Hospital is operated at 100% after the equipment has been fully installed. These values were obtained by multiplying the unit consultation fees (applicable in 1996, Surgical Hospital) by the number of consultation cases concerned. **Table 2-8** shows the trend of annual revenues similarly obtained. For example, the revenue forecast for 2001 and later can be obtained as follows:

66,690,000 x 100% (operation ratio) x 80% (fee collection ratio) = 53,352,000 Denar.

Table 2-7 Expected Revenue due to the Installation of New Medical Equipment (in full-operation, Base Year:1996)

	Items	Growth of the number of treatment per year	Unit price of the each treatment in Denar	Expected Annual Revenue from the treatment in million Denars
1	CT/Computar Tomography	7,500	3,100	23.25
2	Mobile X-Ray for ICU	300	1,215	0.36
3	Biochemical Analyzer	250,000	32	8.00
4	Blood Gas Analyzer	25,000	40	1.00
5	Electrolites Analyzer	75,000	40	3.00
6	Mobile X-Ray for Operation Theater	1,250	1,215	1.52
7	Bucky Radiographic System	12,500	1,560	19.50
8	Remote Control Fluoroscope X-Ray System for Abdominal	5,000	1,430	7.15
9	Ultra Sound System	10,000	490	2.45
10	Haemodialysis	100	4,624	0.46
	Total	---	---	66.69

Table 2-8 Expected Increase in Revenue

Unit: Denar

	Operation Ratio	Collection Ratio	Total
1998	50%	80%	26,680,000
1999	70%	80%	37,350,000
2000	90%	80%	48,020,000
2001-	100%	80%	53,352,000

(3) Expenditure forecast

The introduction of new equipment inevitably increases maintenance costs, operation-related costs such as those for consumables, etc. Taking into consideration the current operation status of expensive medical equipment at the University Hospital, it has been assumed that the equipment requiring regular maintenance would be supplied by a manufacturer with its agent located in Skopje, and that inexpensive maintenance services and consumables would be obtained.

CT (Computer Tomography) equipment to be introduced will greatly increase operational costs (12,330,000 Denar annually in 2001 and later). One particularly expensive spare part is the X-Ray tube (2,470,000 Denar). Although the initial costs can be covered by said Japanese Grant Aid, the Surgery Hospital will have to raise operating funds. The Surgical Hospital will be thus faced with the difficult problem of how to procure expensive spare parts. The study team have calculated the operation costs on a one-tube-per-year basis.

Tables 2-9 and **2-13** show the operational costs for 10 major pieces of equipment. These costs fluctuate because some spare parts must be changed every three years. **Table 2-9** shows the values for 2004, when the operation costs are expected to be at their peak (**Table 2-13** shows the details for each piece of equipment). As the Surgery Hospital employs a sufficient number of doctors and other staff members, increases in personnel will not be necessary when the new equipment is introduced and installed.

Table 2-9 Expenditure Projection in 2004

due to the Installation of New Medical Equipment (Base Year:1998)

Unit: million Denars

	Items	Maintenance Cost	Drugs/ Consumables	Others	
1	CT/Computer Tomography	4.59	7.74	0.2	
2	Mobile X-Ray for ICU	0.00	0.01	0.2	
3	Biochemical Analyzer	0.18	0.18	nil	
4	Blood Gas Analyzer	0.05	0.05	nil	
5	Electrolites Analyzer	0.00	0.13	nil	
6	Mobile X-Ray for Operation Theater	0.00	0.005	0.2	
7	Bucky Radiographic System	0.63	0.49	0.2	
8	Remote Control Fluoroscope X-Ray System for Abdominal	0.63	0.58	0.2	
9	Ultra Sound System	0.14	1.78	nil	
10	Haemodialysis	0.17	0.13	nil	Total
	Total	8.26	13.92	1.00	23.18

(4) Results of Financial Analysis

Table 2-10 shows the evaluation results for the Project, in which the study team have applied current consultation fees and set the collection ratio at 80%. As is clear from the table, constant profits are expected throughout the assessment period. Subsidies from the Health Insurance Fund are not required to remedy the shortage of funds. Clearly, there are no problems with funding. Profits of 22,700,000 Denar are forecast for the initial year, with profits of 284,550,000 Denar expected over the entire evaluation period (10 years), indicating stable financial conditions.

It should be noted, however, that initial and fixed costs (personnel expenditures, general expenses, etc.) are not included in the financial analysis. If the initial investment were to be covered by its own funds, the project would be unprofitable, incapable not only of recouping its investment but also of maintaining operation of Surgical Hospital. Thus, the initial investment must be funded under the Japanese Grant Aid. Even when fixed costs, calculated in proportion to forecast revenues, are included in the financial analysis, the funds are insufficient and problems arise to disrupt the sound operation of the new equipment. Current consultation fees are insufficient to cover fixed costs.

It should also be noted that the Health Insurance Fund must cover 80% of the revenue to be gained. This amount would be 43,000,000 Denar in 2001, when the instrument to be introduced will be in fully operation. As shown in **Table 2-5**, the financial condition of the Fund is firmly balanced for 1995. Therefore, it is hoped that a financial scheme can be implemented that would place no more of financial burden on the Fund. It can be assumed that the Project, to be made under the Japanese Grant Aid system, would help reduce the burden on the Fund, as operation costs for the equipment can be covered by the revenue to be gained.

Table 2-10 Evaluation Results for the Project

Unit: million Denars

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Increasing Revenue from Diagnosis and Treatment	26.68	37.35	48.02	53.36	53.36	53.36	53.36	53.36	53.36	53.36
Expenditures										
Maintenance	0.00	7.32	7.37	8.20	7.37	7.32	8.25	7.32	7.37	8.20
Consumables, etc.	3.48	9.74	12.53	13.92	13.92	13.92	13.92	13.92	13.92	13.92
Others	0.50	0.70	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Total Expenditures	3.98	17.76	20.80	23.12	22.29	22.24	23.17	22.24	22.29	23.12
Profit and Loss	22.70	19.59	27.22	30.24	31.07	31.12	30.19	31.12	31.07	30.24

(5) Financial forecast for the Surgery Hospital

As previously mentioned, it is anticipated that the Project itself would produce profits for the Surgical Hospital, but to what extent does it influence the operation of the Surgical Hospital ? The future financial conditions of the Surgical Hospital have been forecast on the basis of the following assumptions:

Forecast period:	10 years (1998 - 2007)
New investment:	No future investment after the Project is being considered .
Cost base:	1998 costs to be applied. Values obtained by multiplying 1996 costs by an projected inflation ratio of 12%. No further escalator system is considered from 1998 and later.
Revenue and subsidies from the Health Insurance Fund:	Increases in the subsidies related to an increased number of patients are not considered, because the equipment will be fully used in the Surgical Hospital in 2001 and later. The subsidies in 1998 from the Fund are obtained through the use of the projected inflation ratio (12%), and on the basis of actual costs for the first half of 1996.

Expenditure:	The value obtained by multiplying the reference value (the actual value for the first half of 1996) by the projected inflation ratio (12%)
Depreciation:	Since further investment is not made after the implementation of the Project, the study team assumed that depreciation will be completed within 10 years for all existing equipment based on the reference value (the depreciation cost for 1995).

(6) Results of the financial projection

Table 2-11 shows the financial projection thus conducted based on the above conditions. The Profit/Loss and cash flow indicate that the introduction of new medical equipment favorably influences financial conditions. A profit is projected for the eighth year, eliminating the necessity for subsidies from the Health Insurance Fund to cover losses.

Since the depreciation was conducted during the seven years while the Health Insurance Fund provided the subsidies, an amount equivalent to the depreciated amount was listed in the cash flow. Therefore, there was a positive cash flow during the entire financial forecast period. The accumulated cash flow amounted to 40,304,000 denar over said ten year period.

Said cash should be reserved at the Surgical Hospital for equipment renewal, not to be used for any other purposes.

These results clearly indicate that, when a fund-procurement scheme based on the Japanese Grant Aid is applied to the Project, the introduction of the new medical equipment will be very effective in improving the deficit operation of the Surgical Hospital.

Table 2-11 Financial Projection

Unit: million Denars

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
<Revenues>										
Revenues from existing equipment	147,627	147,627	147,627	147,627	147,627	147,627	147,627	147,627	147,627	147,627
Revenues from new equipment	26,678	37,350	48,021	53,357	53,357	53,357	53,357	53,357	53,357	53,357
Total Revenues	174,306	184,977	195,648	200,984	200,984	200,984	200,984	200,984	200,984	200,984
<Expenditures>										
Wages and Salaries	91,915	91,915	91,915	91,915	91,915	91,915	91,915	91,915	91,915	91,915
Consumables	23,765	23,765	23,765	23,765	23,765	23,765	23,765	23,765	23,765	23,765
Drugs	50,974	50,974	50,974	50,974	50,974	50,974	50,974	50,974	50,974	50,974
Others	9,153	9,153	9,153	9,153	9,153	9,153	9,153	9,153	9,153	9,153
Depreciation /Amortization	6,946	6,174	5,403	4,631	3,859	3,087	2,315	1,544	772	0
TTL Expenditure of existing equipment	182,753	181,981	181,210	180,438	179,666	178,894	178,123	177,351	176,579	175,807
TTL Expenditure of new equipment	3,980	17,760	20,796	23,118	22,288	22,235	23,171	22,235	22,288	23,118
Total Expenditures	186,733	199,741	202,006	203,556	201,954	201,129	201,294	199,586	198,867	198,925
Profit/Loss	-12,427	-14,764	-6,358	-2,572	-970	-145	-310	1,398	2,117	2,058
Loss covered by HIF	12,427	14,764	6,358	2,572	970	145	310	0	0	0
P/L A.Loss covered	0	0	0	0	0	0	0	1,398	2,117	2,058
Depreciation /Amortization	6,946	6,174	5,403	4,631	3,859	3,087	2,315	1,544	772	0
Cash Flow	6,946	6,174	5,403	4,631	3,859	3,087	2,315	2,942	2,889	2,058

Source: the study team

Table 2-12 shows the income expenditure conditions of the health medical sector as reported by the World Bank. The Sector was continuously in the red from 1991 to 1995, producing a shortage of 10% - 20% in total revenue. Thus the sector is required to improve its medical services and achive financial independence. In other words, the Surgery Hospital must provide medical services to maintain the nation's health, and simultaneously ensure its sound operation by fortifying its operation base. When conducted under the Grant Aid system, the initial investment from the project will ensure the sound operation of the Surgical Hospital, and help it establish its self-contained treatment system through the use of newly installed equipment, thereby greatly improving its consultation system.

Table 2-12 Revenues and Expeditures of Medical Sector

Unit: thousand Denars

	1991	1992	1993	1994	1995
Revenue	81,315	845,222	4,436,749	9,710,745	10,415,654
Expenditure	103,397	986,526	4,835,428	10,420,690	11,391,071
Balance	-22,082	-141,304	-398,679	-709,945	-975,417

(ref.: World Bank)

(7) Operation and Maintenance Cost

Table 2-13 shows the Operation and Maintenance Cost for main equipment.

Table 2-13 The Operational and Maintenance Cost for Main Equipment

Unit: Tousand Yen

Items	Q's	Operation days	No. of Patients	Annual cost					
				1st	2nd	3rd	4th	5th	6th
CT/Computer Tomography	1	250days	30/day	-	34,900	34,900	34,900	34,900	34,900
Mobile X-ray for ICU	1	50weeks	6/week	-	28	28	28	28	28
Biochemical Analyzer	1	250days	1,000/day	-	1,015	1,015	1,015	1,015	1,015
Blood Gas Analyzer	1	250days	100/day	-	135	285	135	285	135
Electrolites Analyzer	1	250days	300/day	-	360	360	360	360	360
Mobile X-ray for Operation Theater	1	250days	5/day	-	14	14	14	14	14
Bucky Radiographic System	1	250days	50/day	-	2,200	2,200	3,200	2,200	2,200
Remote Control Fluoroscope X-ray System for Abdominal	1	250days	20/day	-	2,450	2,450	3,950	2,450	2,450
Ultra Sound System	2	250days	20/equip/day	-	5,228	5,228	5,228	5,228	5,228
Haemodialysis	1	50weeks	2/week	-	840	840	840	840	840

2-4-4 Staff and Technical Levels

With the exception of CT-related equipment, the 75 types of equipment to be studied for Japanese grant aid are mostly intended to replace outdated equipment in order to adequately fulfill the diagnostic and treatment functions required of an emergency surgical hospital. There are sufficient numbers of doctors, medical technicians, and nurses to operate the newly installed equipment, with many of the doctors having been trained abroad. Their knowledge and skills are commensurate with international standards, and no difficulties are anticipated in the handling of the equipment. As the emergency medical facility run under the country's highest medical establishment, the Surgical Hospital has been guaranteed support in the form of personnel transfers from the University Hospital regarding the use and maintenance of the new equipment after installation.

Chapter 3

Implementation Plan

Chapter 3 Implementation Plan

3-1 Implementation Plan

3-1-1 Implementation Concept

Implementation of the Project will be carried out after the signing of the Exchange of Notes (E/N) by the governments concerned, and a consulting corporation of Japanese national will manage and control all works on behalf of the Ministry of Health by contract, beginning with the study and selection of equipment to be procured, the preparation of Tender Documents, the submission and evaluation of tenders, the management and control of a transport/installation process schedule, the completion of installation and test/inspection, and delivery.

The Surgical Hospital which is the target of the Project has favorable conditions for implementing the Project, including its location at the center of Skopje, the capital city of the Recipient Country, and convenient traffic and communication services.

In selecting the equipment to be procured, the convenience of operation, maintenance, inspection and repair work after delivery should be fully taken into consideration. At the same time, the quantity of spare parts and consumables needs to be estimated. (The quantity referred to hereinabove shall be determined by assuming that the Ministry of Health will require a minimum of 6 to 10 months for the delivery of spare parts/consumables from their date of order. A test run will be conducted and operational instruction will be given with the delivery of the equipment. The type and quantity of each item will be determined taking into account its frequency of use, conditions, and consumption. As for CT(Computer Tomography) scanner, x-ray tubes shall be examined as a possible spare part.) Manufacturers shall be held responsible for the trial run and guidance of operation for certain types of equipment, while maximum care will be taken to ensure that factory tests and inspection prior to shipment will be fully carried out.

Personnel including laborers required for the installation of equipment shall be secured in Skopje in principle, while engineers will be dispatched in principle from Japan and other countries to supply equipment that requires special skills and techniques.

Physicians, engineers, and other staff of the Surgery Hospital must be fully provided with technical guidance before the trial run, actual operation, and maintenance of the procured equipment begin. Deliberations should be made in advance over when to provide the guidance, etc. As mentioned earlier, the Surgical Hospital has no CT scanner. Therefore, the persons in charge must be supported by the experienced staff of the University Hospital, and must be provided with technical guidance by the manufacturer for two weeks or so. Study team has allocated one month and a half as the period during which time an X-Ray specialist will be dispatched to provide the necessary guidance.

The hospital building is strong, but it was not originally designed to serve as a hospital building. Some portions of the corridor and doorways to each room and lifts have narrow frontage, and this should be taken into account when installing large equipment on above-ground floors. Currently, partial renovation of the hospital is being planned. When renovation is implemented, sufficient care should be given to the implementation of the improvement plan of the project. Most of the equipment to be procured under the Project will replace the old system. Swift removal of the existing equipment is required prior to delivery of the new one. It is impossible to lift large equipment using the existing lift to upper floors. This will require delivery of the equipment through a large window pane with the help of a crane, as was previously done for the delivery of the existing system. Temporary removal of the window pane and some restoration work will be necessary.

Major items for renovation are as follows:

1) Installation of CT (Computer Tomography)

The room for the CT, which is to be newly introduced to the hospital, is on the ground floor, which is durable enough for the installation of the equipment and has a spacious floor area of more than 25m^2 and a ceiling of more than 2.2m high. It is currently used as an examination room for patients. The walls are not radiation shielded (lead shielded), and new construction work for shielding of the walls of the operation room

(including lead glass panes, shielding with lead glass or shielding plate for the windows on the road side), and other works for cable pits and the expansion of the doorway for stretchers (around 1.8m wide, 2.2m high) will be required. Also, an air conditioner for the computer equipment is necessary. The doorway for the CT shall be at least 1.6m x 2.1m wide. An examination on the route for carrying in the equipment showed that the planned installation site is at the end of the room for x-ray radiography and that the delivery of the equipment through the front door of the hospital would be impossible. The following plan is designed to cope with this problem. The equipment will be carried in with a crane through a space in the wall on the road side, which will be made by temporarily removing the large window pane. The removed window pane will need renovation to restore its present appearance. In addition to the above work, supplementary work, including installation of a power source, will be needed. For this reason, delivery of the equipment, and installation time and procedure should be fully discussed beforehand among the parties concerned.

2) Installation of the Bucky Radiographic System

The room which is to be installed with the above equipment is currently used as an examination and treatment room for urinary outpatients, which will require further construction work on radiation shielding walls. The route for delivery of the equipment is viable, including the size of the doorway, but construction work for radiation shielding walls (lead shield) and supplementary work for a power source will be needed. Accordingly, full discussions will have to be conducted among the parties concerned beforehand with regard to the delivery of the equipment and the installation time and procedure.

3) Installation of the Remote-Control Fluoroscope X-Ray System for Abdominal Examinations

The equipment will be installed after the existing x-ray system is removed. The room was designed and constructed in conformity with international standards applicable to x-ray radiography rooms. Therefore, no special construction work for radiation shielding is required. However, construction work on the inside walls of the operating room, including lead glass window pane, will be necessary, as a remote-control system has been requested by the hospital. Also, the existing x-ray

radiographic equipment will have to be removed prior to the delivery of the equipment. Accordingly, the delivery of the equipment and the installation time and procedure will have to be discussed in detail beforehand by and between the parties concerned.

The party responsible for the implementation of the Project, the Consultant, and work concerning the procurement of equipment shall be as follows:

(1) Party responsible for the implementation of the Project

The responsible party of the Recipient Country is the Ministry of Health. The Ministry of Health will act as the contracting party of the Recipient Country. The organization in charge of implementing the Project will be the Hospital Management Department of the Ministry. While the Ministry of Health will have to cooperate with regard to the selection of persons in charge of every medical institution concerned, unpacking, delivery, assembly/trial runs of the equipment, and the cooperation of every medical institution concerned will be ensured with regard to the following:

- Preparation of a work schedule for technology transfer concerning trial runs/guidance and the operation/troubleshooting of the equipment.
- Appointment of officials in charge of the above.
- Establishment of a system to accept the equipment, including the appointment of personnel in charge of supply of utilities.

The Minister in charge of Aid Coordination shall be responsible for customs clearance, inland transportation, and so forth.

(2) Consultant

After the signing of the Exchange of Notes (E/N) between the governments concerned, the Ministry of Health shall sign a Consultation Agreement with a consulting corporation of Japanese national with regard to the implementation design of the equipment to be procured under the Project and work associated with the tendering and management of the installation. The agreement will be validated subject to approval by the Japanese Government. The Consultant shall be responsible for implementation of the following work under the Agreement:

1) Design phase

Preparation of implementation design documents; including design drawings, technical specifications, and other technical documents; preparation of the tender procedure; and preparation of contract documents.

2) Tendering phase

Evaluation of the contents of the Tender and assistance up to the conclusion of the contract.

3) Implementation phase

Supervision of project implementation, including checking/approval of implementation drawings, inspections based on design documents, control of work schedule, issuance of certificates and the like, and coordination/liaison work.

(3) Vendors of the equipment

Based on the Exchange of Notes (E/N) and in accordance with the "Guideline of Procurement" under Japan's Grant Aid Scheme, the Ministry of Health shall sign the Procurement Agreement with the vendors of Japanese national which shall be determined on the basis of open tenders on the equipment to be procured. The Agreement shall be validated subject to approval by the Japanese Government. The vendors shall implement the following under the Agreement:

1) Procurement, transportation and delivery of the equipment.
2) Installation work of the equipment, and technical guidance concerning operation, maintenance, and repair.

In addition, the vendors shall be responsible for assistance with maintenance and parts procurement, as well as for the provision of technical assistance during the free-of-charge warranty period after delivery.

3-1-2 Implementation Conditions

With regard to the installation work for large equipment and to restoration work for the hospital building, special care should be given to the preservation of this historic structure and full discussions should be held on this matter among the parties concerned.

Vendors of the equipment to be procured must be instructed appropriately with regard to the implementation of all work involved and should be requested to submit a schedule for the dispatch of their engineers.

3-1-3 Scope of Works

The work needed to implement the Project by the Recipient Country and Japan shall be divided as follows:

(1) Work to be carried out by the Recipient Country

- The preparation of installation sites for large equipment by removing existing equipment.
- Work to supply water, drainage, and electricity required for the operation of equipment to be procured up to the designated points of connection.
- Preparation of storage area for the equipment to be procured until the time of installation.
- Bearing of all required expenses other than those covered by Japanese Grant Aid.

(2) Work to be covered by Japanese Grant Aid

- Procurement of medical equipment
- Transport of medical equipment to the Surgical Hospital
- Delivery, installation, and trial run of the medical equipment
- Technical transfer on the operation and maintenance of the medical equipment
- Window frame work for installing the medical equipment
- Repair work at the installation site

3-1-4 Consultant Supervision

The Consulting Corporation of Japanese national shall provide fair guidance, advice, and coordination throughout the design phase, tendering phase, and implementation phase of the project, and shall carry out whatever is required in order to ensure smooth implementation of the project in accordance with the Grant Aid Scheme of the Japanese Government and based on the Basic Design Study Report.

(1) Details of Implementation Supervision

1) Design phase

Preparation of implementation design documents, preparation for tendering, preparation of contract documents.

2) Tendering phase

Implementation of tendering, evaluations of the contents of the tender, conclusion of contract.

3) Implementation phase

Implementation supervision (inspection/approval of equipment specifications, inspection/approval of equipment, shipment, supervision of ocean transportation, inland transportation, guidance/supervision of installation, supervision of works to be carried out by the counterpart), report on the state of progress, the issuance of certificates, and so forth.

4) Completion of work

The Consultant will be deemed to have completed its work by completing installation of the equipment, confirming that all conditions of the contract have been met, witnessing the official delivery of the equipment, and obtaining the approval of the Recipient Country.

(2) Personnel Plan

The consultants required for the supervision of detailed design/implementation shall be as follows:

1) Project Manager One (1)

The superintendent shall be responsible for the comprehensive supervision of all works.

2) Equipment Planner (I) One (1)

The person shall be responsible for the examination of the equipment to be procured and the preparation of specifications.

He shall be in charge of confirming on-site facilities and supplementary matters during the Basic Design Study.

He shall be responsible for the supervision of procurement work, including bidding and installation.

3) Equipment Planner (II) One (1)

The person shall be responsible for the analysis and preparation of specifications.

He shall be in charge of examining on-site facilities and supplementary matters during the Basic Design Study.

He shall be responsible for the supervision of procurement work including bidding and installation.

4) Equipment Planner (III) One (1)

The person shall be responsible for the inspection from the viewpoint of a medical doctor of all equipment to be installed .

He shall provide technical guidance whenever necessary.

5) Interpreter One (1)

The person shall be responsible for interpretation in the recipient country.

3-1-5 Procurement Plan

(1) Selection of Venders

Vendors of the equipment shall be determined by way of an Open Tender process participated by corporations of Japanese nationals. The successful tenderer shall be determined based on the lowest tender among all tenderers that have fulfilled the provisions and conditions of the tender and the tender documents. The contract shall be a lump sum contract in accordance with the conditions set forth in the tender documents. The contract shall cover everything concerning supply, manufacture, delivery and installation of the equipment, guidance of the adjustment/trial run thereof, as well as technical guidance concerning maintenance and repair thereof.

(2) Procurement of the equipment

Procurement of the equipment under the Project shall take place within Japan in principle, though certain equipment items that will require regular maintenance may be procured from other sources, as detailed in item (3) hereunder.

(3) Procurement from third countries

Most medical equipment in the Recipient Country is procured from foreign countries. Accordingly, a procurement plan for medical equipment shall be formulated to prefer

procurement either from manufacturers that operate through agents capable of providing technical services (repair and maintenance services), and located either in the Recipient Country or in neighboring states, or from vendors that operate through agents capable of carrying a sufficient stockpile of spare parts/consumables. Special care should be taken regarding the following equipment.

CT(Computer Tomography)

This equipment requires regular periodic inspection tree to four times a year after delivery. X-Ray tubes require replacement almost annually, though the exact period depends on the usage frequency. As there is no other hospital that possesses equivalent equipment, technical problems with the equipment could result in a life-threatening situation. The availability of prompt repair service should therefore be mandatory. Accordingly, it is important the satisfy said conditions, which will be clearly indicated in the technical specifications of the tender document.

The procurement of equipment from third-country manufacturers (including OECD member countries, such as Germany and neighboring nations) who are capable of providing the above-mentioned services will be studied.

Other equipment equivalent in performance to the equipment procured from Japan may be procured from third countries, especially if they are less expensive well supported by prompt maintenance and technical repair services, and spare parts/consumables are promptly available.

A survey on the procurement of materials from third countries was consigned to a German consultant in Dusseldorf as part of the Basic Design Study and 22 items related to the Project were examined. According to the results of the survey, manufacturers of the target items in neighboring countries include 55 in Germany and 27 in Austria. All the manufacturers surveyed were asked to make estimations on the planned items, and answers were obtained from 35 manufacturers, as shown in Table 3-1. When the equipment is supplied by manufacturers who have tendered the lowest estimate costs, 70 items will be procured from Japan, and five items from other countries.

Table 3-1 Summary of the Survey on Procurement from Third Countries

	Items	No. of Makers	After Sales Services Available in Skopje No. of Makers
1	Cholecystectomy Instrument Set	4	None: 1)
2	Thyroidectomy Instrument Set	3	None: 1)
3	Gastrectomy Instrument Set	2	None: 1)
4	Hand Surgical Operation Instrument Set	4	None: 1)
5	Spinal Flame Kit	2	None: 1)
6	Basic Flame Kit	0	* Mostly made in Eastern Europe
7	Universal Blade Kit	0	* Mostly made in Eastern Europe
8	Canulated Flexible Reamer Instrument Set	2	None: 1)
9	Vascular Surgical Instrument Set	4	None: 1)
10	Microvascular Surgical Instrument Set	2	None: 1)
11	Elector-surgical Unit	2	None: 1)
12	Full Set Drill Machine	2	None: 1)
13	Micro-Neuro Surgery Operation Table	2	None: 2)
14	Multipurpose Operation Table	2	None: 2)
15	Orthopaedic Traction-Fluoroscopic Table	2	None: 2)
16	Operating Light	3	One: 2)
17	CT	4	Three
18	Mobil X-Ray with TV System for Operation Theater	5	Three
19	Remote Control Fluoroscope X-Ray System for Abdominal	4	Three
20	Bucky Radiographic System	5	Three
21	Ultra Sound System	7	Five
22	Fully Equipped Ambulance Car	1	One

1) No after services are required, basically
2) After services are available from 3rd countries

(4) Inland transportation route

The routes for transportation of the equipment to be procured have been confirmed as follows:

1) Across the Black Sea and via the Port of Varna/Bulgas, Bulgaria
2) Across the Adriatic Sea and via the Port of Durece, Albania
3) Via Germany/Hungary/Romania/Bulgaria
4) Across the Aegean Sea and via the port of Thessaloniki, Greece
5) Air Cargo leading directly into the Recipient Country

Route (2) is not suitable for inland transportation in view of the unfavorable conditions of roads, bridges, and port facilities. Although route (5) is the most reliable and quickest, the cost of transport would be too high to be justified. Therefore, routes (1), (3) and (4) are currently available. Route (4) would be the most suitable, as it was opened in accordance

with the U.S.-mediated agreement between the Recipient Country and Greece. The route is 250 km from Skopje to Thessaloniki, and it will take about 12 hours to transport equipment with good road conditions, including time for customs clearance. Equipment was transported via the route in October 1996, under the Project for Upgrading the Medical Equipment, 1995.

With regard to the transportation of humanitarian materials, they will be given priority in unloading at the port of Thessaloniki, customs clearance, inland transportation and border crossing, under the agreement between the Recipient Country and Greece. Also, the system for receipt on the part of the Recipient Country is expected to provide required conveniences by a special order of the Minister in charge of Aid Coordination as soon as the Grant Aid Scheme has been approved. However, the dispute with Greece over the name of the country has not been settled yet, and there is some concern about the closing of the border depending on the reaction of Greece. It will be necessary to examine the transportation route based on up-to-date information. The cost for inland transportation will be estimated on the assumption that (1) is the most feasible route.

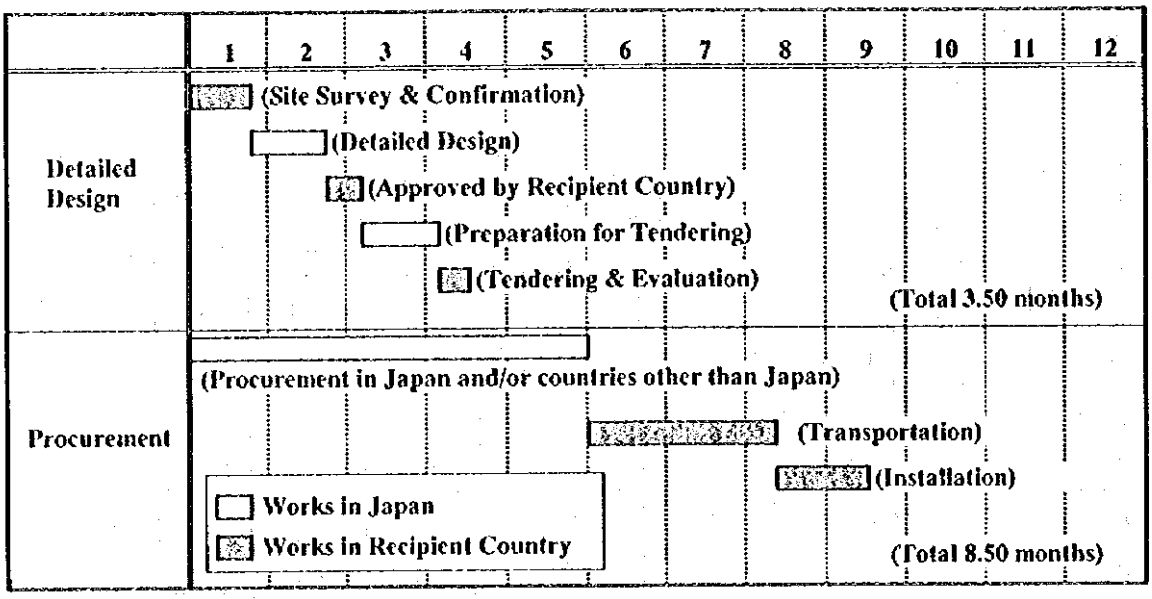
As most of the equipment to be procured consists of precision instruments and requires measures to prevent damage from moisture and special packing methods shall be designated to ensure that proper care is taken for long-distance inland transportation.
Length of time required for transport will be:
From Japan to the Port of Thessaloniki..... about 45 to 50 days
From the Port of Thessaloniki to Skopje..... about 1 to 7 days
From Germany to Skopje via inland route ..... about 7 to 9 days.

3-1-6 Implementation Schedule

The implementation schedule to materialize the project will go through the following procedures beginning with the Exchange of Notes (E/N) through the tendering for equipment, and up to the completion of delivery. At any phase of the project, the Ministry of Health, the Surgical Hospital, the Consultant, Equipment Vendors, and any other parties concerned will have to cooperate closely with each other and take whatever actions are required in order to implement the Project as smoothly as possible.

The Project implementation schedule is given in Table 3-2.

Table 3-2 Project Implementation Schedule



3-1-7 Obligations of the Recipient Country

The Recipient Country shall implement the following in accordance with the Exchange of Notes (E/N) in order to implement the Project:

1) To exempt customs duties, internal taxes, and other fiscal levies that may be imposed in the Recipient Country with respect to the supply of products and services under the verified contracts;
2) To ensure prompt customs clearance in the Recipient Country and a procedure for internal transportation therein of products purchased under the Grant Aid Scheme.
3) To provide Japanese nationals and third-country engineers working on the Project with every convenience to facilitate their entry into the Recipient Country and stay therein.
4) To ensure the issuance of permits required by the laws of the Recipient Country for the implementation of the Project and other permits, including tax exemption.
5) To ensure that the equipment procured under the Grant Aid Scheme be maintained and used properly and effectively for the Project.
6) To confirm that the Recipient Country shares all costs arising from the Project, after subtracting the funds allotted by the Japanese government.

3-2 Project Cost Estimation

(1) Expenses borne by Recipient country

Expenses for the removal of existing equipment : approx. DM 9,000

Water supply, drainage and electric work costs : approx. DM 1,000

(2) Condition of cost estimation

Exchange rate : US$ 1.00 = Yen 110.0

: DM 1.00 = Yen 70.0

: MKD 1.00 = Yen 2.75

Implementation schedule : refer to Table 3-2

3-3 Operation and Maintenance Cost

As stated in **1-4-4 Staff and Technical Level**, medical doctors and other staff at the Surgical Hospital have been trained in European countries and have much experience with the Recipient Country. The size of the staff will be sufficient. The Clinical Center, the University Hospital has respective the maintenance staff and technicians of the equipment, that can support the Surgical Hospital. The supplier will offer maintenance and repair work for equipment that requires specialized technical knowledge. The operation and maintenance costs are estimated in **Table 3-4**.

As stated in **1-4-3 Financial Analysis**, recurrent costs for new medical equipment can be covered by the incoming revenue. The expenses that will arise before the operations in 1998 should be covered by the Surgical Hospital, the Ministry of Health, and/or the Health Insurance Fund.

Table 3-4 Projection of Operation and Maintenance Cost

Unit: Thousand of Denars

	1998	2001
Total Expenses	4,038	23,170
Building repair cost	58	0
Maintenance/Spare Parts	0	8,250
Consumables	3,480	13,920
Others	500	1,000
Expected Revenue	26,680	53,360

Chapter 4

Project Evaluation and Recommendations

Chapter 4 Project Evaluation and Recommendation

4-1 Project Effect

Based on the results of this study, the following effects can be expected from the realization of this project.

(1) Upgrading of Diagnosis & Treatment Functions and the Emergency Medical System at the Surgical Hospital

The medical equipment at the Surgical Hospital has not been renovated since its establishment in 1962. Therefore, the lamentable condition of this equipment necessitates its immediate replacement, and until such replacement takes place, the Surgical Hospital will be unable to fulfill its functions as an emergency hospital. Further, the number of emergency patients, including victims of traffic accidents, has been increasing, and many patients are pouring into the University Hospital due to the poor and inadequate medical services they would be likely to receive at the Surgical Hospital. As a result, the University Hospital, the country's top medical institution, is faced with an abundance of patients requiring primary treatment. This situation prevents the University Hospital from pursuing its original medical activities and has put even the referral system at risk. Much of the requested medical equipment for the Surgical Hospital is scheduled for replacement. The Surgical Hospital satisfies all required conditions for procurement in terms of installation sites, personnel technical standards, and standards for operational skills and management of the requested equipment. Once the Surgical Hospital's medical functions are upgraded, it will be able to provide adequate medical services as the main emergency hospital for treating of the people of Skopje.

(2) Improvement of Medical Services

Although the number of doctors and their medical skills meet international standards according to Japanese doctors, the lack of reliable medical equipment renders them unable to provide sufficient medical service. As a result, the deteriorating quality of the Hospital's medical services is becoming a problem. Despite its intended function as an emergency surgical hospital, it has no CT, a powerful device for the examination and treatment of disorders and injuries to the head and other organs. Once the medical equipment requested under the project is installed, surgical treatment of the head, liver, and

pancreas will be dramatically improved, and diagnoses and treatments of patients based on the gravity of their condition will be made possible. The project will contribute greatly to emergency surgeries as well as to the country's overall quality of medical service.

(3) Future Development of the Medical Center

With cooperation from international organizations and others, the Ministry of Health in the Government of the Recipient Country is working to reform its medical system and organization to improve the country's health and medical services. As part of this reform plan, efforts are under way to realize the Medical Centers described in its future vision as based on a WHO suggestion. To respond to people's needs for better medical services, the plan has divided the country into two parts and plans to set up a Medical Center for each. The Government of the Recipient Country has placed a high priority on the project, as its Ministry of Health foresees the use of the improved Surgical Hospital as one of these Medical Centers discussed in the plan. By upgrading the Surgical Hospital, the project will thus contribute substantially to the country's vision.

(4) Contribution to Healthy Hospital Management through Newly Procured Equipment

As described in **Table 1-6**, Japanese grant aid for the project will improve not only the quality of medical services in the Recipient Country, but also the Surgical Hospital's financial standing and hospital management.

4-2 Technical Cooperation, Collaborating with Other Donors

Most of requested medical equipment for the project is intended to replace outdated equipment. The current staff's skills and technical abilities to operate the new equipment is seen as sufficient. Nevertheless, due to the speed of upcoming technical advances and changes in medical equipment, constant upgrading of their skills will be necessary. For this reason, in addition to a technical transfer at the time of installation, the Recipient Country side has indicated that technical training for the Surgical Hospital's personnel in Japan would also promote the more effective use of the procured equipment.

Aid in the form of medical equipment, pharmaceutical drugs, and consumables is coming into the Recipient Country from the WHO, EU, Germany, and international organizations.

Many of these articles could be used together with the equipment procured through this project. Thus, well-thought-out talks addressing the possibility of joint efforts with other donors will be necessary.

4-3 Recommendations

1) In order to effectively and efficiently utilize the equipment procured through this project, a horizontal liaison within the Surgical Hospital, centering on the Operating Rooms themselves, should be strengthened. Equipment that can be allocated for joint use shall be listed and fully utilized. Effective methods should be found for the efficient use of the procured equipment. For example, a steering committee could be set up to improve the horizontal communication among the Operating Rooms, X-Ray Unit, and Clinical Testing Unit, all of which share similar functions.

2) According to the mortality statistics of the Recipient Country, although strokes such as cerebral hemorrhage are great in number, the Neurosurgery Unit, which by all accounts is supposed to remain active and busy, actually performs only a limited number of open-brain surgery procedures due to the lack of diagnostic equipment at the hospital. With CT, which is effective in examining heads for cerebral hemorrhage, early-stage open-brain surgery will become possible. A comprehensive emergency medical system should be drawn up by reviewing the current personnel system.

3) Every item requested for the project is a basic necessity. For the Surgical Hospital to work up to its full functions as a general surgical hospital, there are many other types of equipment which should be installed, particularly in the Operating Rooms, X-Ray Unit, and Biochemical Clinic Laboratory. The building facilities of the Surgical Hospital are limited in space, and an addition as well as further renovations and upgrades are required. With the existing facilities, the installation of large equipment will be difficult, and the main building is not laid out well to serve as a hospital.

4) The Surgical Hospital's technical staff can be relied upon for equipment maintenance, but their capabilities regarding equipment repair are not comprehensive. Therefore, the facility has to depend on outside equipment manufacturers for actual repair work.

Considering the country's harsh economic conditions, it is quite understandable that the expenses required for equipment maintenance have become a major factor in the difficult financial situation of the Surgical Hospital. On the other hand, from a geographical point of view, there is a limit to how quickly these manufacturers can respond to problems. This sort of situation could one day shut down all of the Surgical Hospital's medical activities. To counter this risk, we think it is necessary for the Surgical Hospital to set up a workshop to carry out not only maintenance work for general equipment, but also to repair basic medical equipment in collaboration with the University Hospital, with a system for mid- and long-term maintenance in mind.

5) In order to continue its equipment renewal project on its own, the Surgical Hospital must clearly stress the importance of depreciation to its accounting system. Any nomenclature would be acceptable, e.g., "a reserve for equipment renewal". In any case, "An Equipment Renewal Plan" must be created that focuses on the necessity of procuring a large amount of money for renewal work. Unless relevant financial preparations are immediately made and renewal funds are secured, it would be impossible to renew the equipment currently introduced once it becomes obsolete. It should be noted that all 75 pieces of equipment currently introduced become superannuated at the same time and need to be renewed now. Admitting that the Surgical Hospital is facing tight financial and legal conditions, the study team proposes that a financial structure be established how to ensure that equipment gets renewed periodically.

Appendices

Appendices-1 Member List of the Survey Team

(1) Field Survey

Mr. Masahiro ATSUMI	Leader	Grant Aid Division, Bureau of Economic Cooperation, Ministry of Foreign Affairs
Mr. Yuji TAKASAKI, MD. Ph.D.	Technical Adviser	Tokai University, School of Health Science
Mr. Keiji IIMURA	Chief Consultant/ Maintenance & Operation Planner	CRC Overseas Cooperation Inc.
Prof. Shoji MATSUOKA, MD. Ph.D.	Equipment Planner	CRC Overseas Cooperation Inc.
Mr. Yoshiharu HIGUCHI	Facilities Planner	CRC Overseas Cooperation Inc.
Mr. Tomoyuki KURODA	Cost Planner	CRC Overseas Cooperation Inc.

(2) Explanation of Draft Report

Mr. Michio TSUDA, MD. Ph.D.	Leader	School of Medicine, Tokai University
Mr. Yasuto TAKEUCHI	Coordinator	Austria Office, JICA
Mr. Keiji IIMURA	Chief Consultant/ Maintenance & Operation Planner	CRC Overseas Cooperation Inc.
Mr. Tsuguhisa ISA, MD. Ph.D.	Equipment Planner	CRC Overseas Cooperation Inc.
Mr. Yoshiharu HIGUCHI	Facilities Planner	CRC Overseas Cooperation Inc.

Appendices-2 Survey Schedule

(1) Field Survey

No.	Date	Movement	Accommodation	Activities
1	Oct.28 (Mon.)	Arrive to Skopje	Skopje	
2	Oct.29 (Tue.)		Skopje	City Hospital
3	Oct.30 (Wed.)		Skopje	- do -
4	Oct.31 (Thu.)	Arrive to Vienna*	Skopje Vienna*	- do -
5	Nov.1 (Fri.)		- do -	Courtesy call on the Embassy of Japan and JIC office*
6	Nov.2 (Sat.)		- do -	Review of collected data
7	Nov.3 (Sun.)	Arrive to Skopje*	Skopje	
8	Nov.4 (Mon.)		- do -	Courtesy call on the MOF, MOD, MOH Kick off meeting with MOH
9	Nov.5 (Tue.)		- do -	City Hospital
10	Nov.6 (Wed.)		- do -	Discussion of IC/R
11	Nov.7 (Thu.)		- do -	Making of M/D
12	Nov.8 (Fri.)		- do -	Signing of M/D
13	Nov.9 (Sat.)		- do -	Review of collected data
14	Nov.10 (Sun.)	Arrive to Vienna*	Vienna* Skopje	official team leave for Vienna* City Hospital
15	Nov.11 (Mon.)		- do -	The Embassy of Japan and JICA office* City Hospital
16	Nov.12 (Tue.)	Leave for Tokyo*	Skopje	City Hospital
17	Nov.13 (Wed.)	Arrive to Tokyo*	- do -	- do -
18	Nov.14 (Thu.) -1 (Sat.		- do -	- do -
19	Nov.17 (Sun.)	Leave for Frankfurt[B]	Skopje[A]	two consultants leave for Tokyo[B] (Equipment Planner and Cost Planner) City Hospital[A]
20	Nov.18 (Mon.)	Leave for Tokyo[B]	- do -	City Hospital[A]
21	Nov.19 (Tue.)	Arrive to Tokyo[B]	- do -	- do -
22	Nov.20 (Wed.) -2 (Sat.		- do -	- do -
23	Nov.24 (Sun.)	Leave for Vienna (Project Manager) Leave for Dusseldorf (Facilities Planner)	Vienna (Project Manager) Dusseldorf (Facilities Planner)	
24	Nov.25 (Mon.)	Leave for Tokyo[B]		Report on the study in the Republic of Macedonia (Project Manager) Supplementary Survey for Agent in Dusseldorf (Facilities Planner)
25	Nov.26 (Tue.)	Arrive to Tokyo[B]		

*Official Team
[A] Project Manager, Facilities Planner
[B] Equipment Planner, Cost Planner
City Hospital : City Hospital-Surgical Clinic

(2) Explanation of Draft Report

No.	Date	Movement	Accommodation	Activities
1	Dec. 15 (Sun.)	Arrive to Vienna	Vienna	
2	Dec. 16 (Mon.)	Arrive to Skopje	Skopje	
3	Dec. 17 (Tue.)		Skopje	Courtesy call on the Ministry of Foreign Affairs, the Ministry of Health
4	Dec. 18 (Wed.)		Skopje	Meeting at the Ministry of Health and the City Hospital
5	Dec. 19 (Thu.)		Skopje	Meeting at the Ministry of Health and the City Hospital
6	Dec. 20 (Fri.)		Skopje	Signing of M/D
7	Dec. 21 (Sat.)		Skopje	Meeting with the survey team
8	Dec. 22 (Sun.)	Arrive to Vienna	Vienna	
9	Dec. 23 (Mon.)		Vienna	Visit the Embassy of Japan and JICA office
10	Dec. 24 (Tue.)	Leave for Tokyo		
11	Dec. 25 (Wed.)	Arrive to Tokyo		

Appendices-3 List of Party Concerned in the Recipient Country

Position & Specification	Name
Ministry of Health	
Undersecretary	Dr. Ilija PETRUSEVSKI
Assistant to Minister	Mr. Zarko SHUTINOVSKI
Health Insurance Fund	Mr. Gero TRENCEVSKI
World Bank , Resident Advisor	Ms. Ninez PONCE
Ministry of Foreign Affairs	
Head of Far East Department	Mr. Krume EVTIMOVSKI
Ambassodor, Chief of the coordination Aid Unit	Mr. Mito PEJORSKI
Third Secretary, Asia and Middle East Department	Mr. Dusko UJUNOVSKI
Ministry of Development	Mr. Sasha SHINDILOSKI
Faculty of Medicine Skopje University	
Institute of Radiology	Prof. Vrcakovski MIODRAG
Institute for Protection of Cultural Monument of Skopje, Skopje City	Mr. Afrodita Tanevska
Skopje Surgical Hospital	
Department of Urological Surgery	Prof. Dr. Metodij G. GEORGIEV
	Prim. Dr. Ljuben DEREBANOV
	Ass. Dr. Slabodan RISTOVSKI
	Dr. Branka TRAJCEVSKA
Department of Abdominal Surgery	Prim. Dr. Slavko STEVKOVSKI
	Prim. Dr. Vasil ZAHARIEV
	Dr. Ljuben ARSENKOV
	Dr. Nikola GRUEV
	Dr. Stojan PAVLOVSKI
	Dr. Stojanco JOVANOV
	Dr. Ivan SPIROVSKI
	Dr. Gjorgji GRUPCEV
Department of Plastic and Reconstractive Surgery	Dr. Greta MARCIKIK
	Dr. Spiro JOVEVSKI
	Ass. Dr. Dobrila ANDONOVSKA
Department of Pediatric Surgery	Dr. Elizabeta ASENOVA
	Dr. Masis KUDJAN
Department of Traumatology	Dr. Angel MAJSTOROV
Department of Radiology	Prof. Dr. Gjorgji TOLOVSKI
	Ass. Dr. Elizabeta BABUSKU
	Ass. Dr. Dragan BACEV

Position & Specification	Name
Skopje Surgical Hospital	
Department of Anestheology and Intensiv Care	Prim. Dr. Rade KALINIKOV
	Ass. Dr. Miriana SOSOLCEVA
	Ass. Dr. Slavco KRSEVSKI
	Ass. Dr. Tanja TROIC
Financial Director	Mrs. Milica Boskovska
Genneral Surgeon	Ass. Dr. Emilia ATANASOVA
Chief of Operation Theatres	Ass. Dr. Aleksandar KARADZINOV
Department of Blood Transfusion	Prim. Dr. Ksenije TODOROVA
	Prim. Dr. Julija TOSEVSKA
Department of Vascular Surgery	Prim. Dr. Tome JOVANOVSKI
	Dr. Branko JORDANOVSKI
Laboratory	Prim. Ms. Olivera TAENCEVA
Director of Hospital	Dr. Blagoja PETOKOVSKI