


JAPAN INTERNATIONAL COOPERATION AGENCY

THE HASHEMITE KINGDOM OF JORDAN
MINISTRY OF HEALTH


No. 1

**BASIC DESIGN STUDY REPORT
ON
THE PROJECT FOR MEDICAL EQUIPMENT SUPPLY
IN
THE HASHEMITE KINGDOM OF JORDAN**

MARCH 1995

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PREFACE

In response to a request from the Government of the Hashemite Kingdom of Jordan, the Government of Japan decided to conduct a basic design study on the Project for Medical Equipment Supply in the Hashemite Kingdom of Jordan and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Jordan a study team headed by Mr. Itaru Hamakawa, Deputy Director, Second Project Management Division, Grant Aid Project Management Department, JICA and constituted by members of UNICO International Corporation, from November 24 to December 23, 1994.

The team held discussions with the officials concerned of the Government of Jordan, 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 Jordan in order to discuss a draft report, 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 Hashemite Kingdom of Jordan for their close cooperation extended to the teams.

March 1995



Kimio Fujita

President

Japan International Cooperation Agency

Mr. Kimio Fujita,
President
Japan International Cooperation Agency
Tokyo, Japan

March 1995

Letter of Transmittal

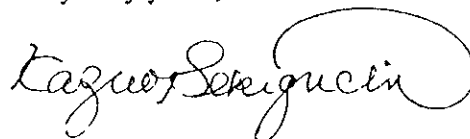
We are pleased to submit to you the basic design study report on the Project for Medical Equipment Supply in the Hashemite Kingdom of Jordan.

This study was conducted by UNICO International Corporation, under a contract to JICA, during the period November 17, 1994 to March 29, 1995. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of Jordan and formulated the most appropriate basic design for the project under Japan's grant aid scheme.

We wish to take this opportunity to express our sincere gratitude to the officials concerned of JICA, the Ministry of Foreign Affairs, and the Ministry of Health. We would also like to express our gratitude to the officials concerned of Directorate of Planning and Projects, the JICA Jordan office, the Embassy of Japan in Jordan for their cooperation and assistance throughout our field survey.

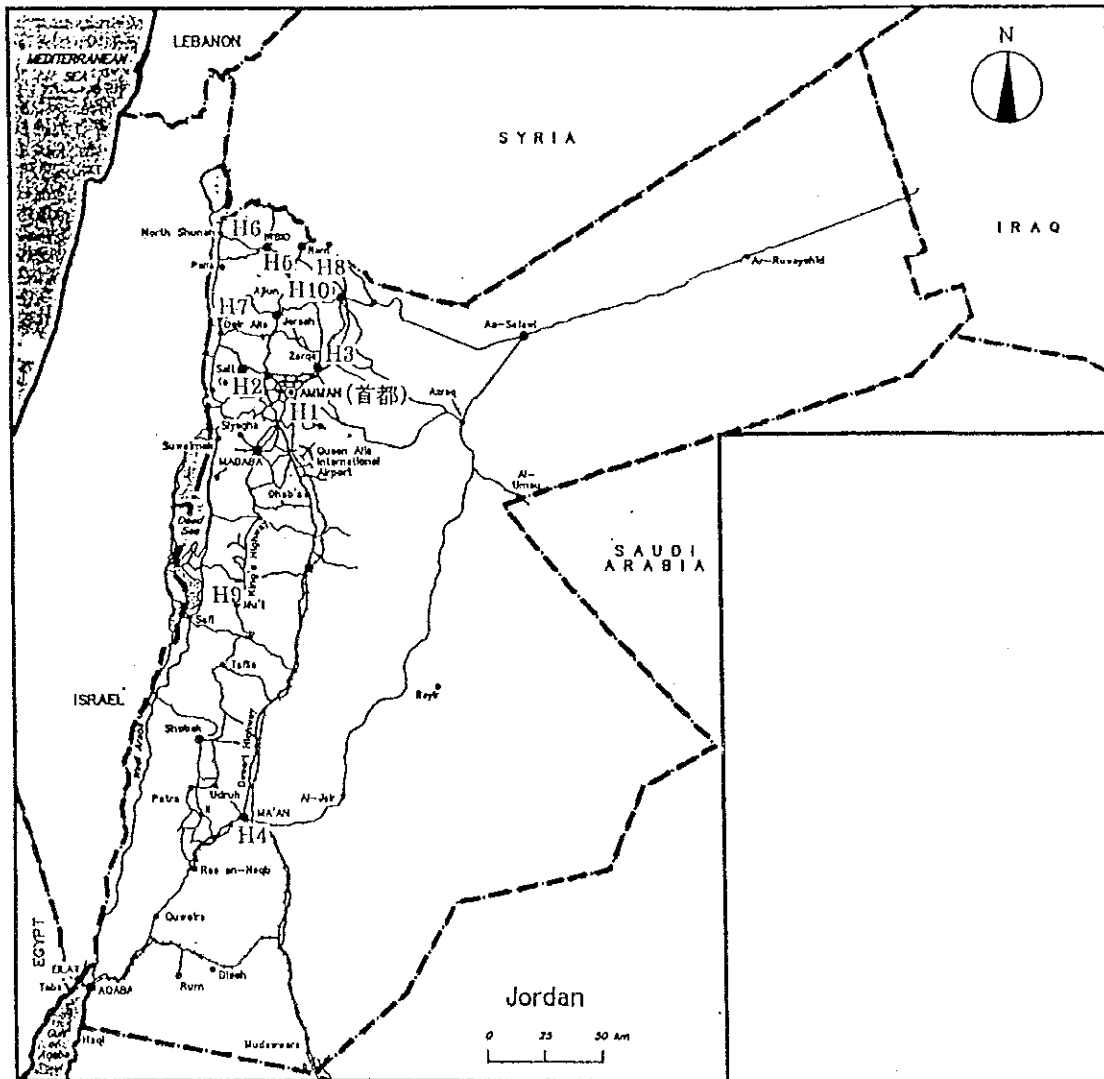
Finally, we hope that this report will contribute to further promotion of the project.

Very truly yours,



Kazuo Sekiguchi
Project manager,
Basic design study team on
the Project for Medical Equipment Supply
UNICO International Corporation

Location Map



- H1 : Al Bashir Hospital
- H2 : Al Hussein Hospital
- H3 : Al Zarqa Hospital
- H4 : Ma'an Hospital
- H5 : Princess Basma Hospital
- H6 : Moadh bin Jabl Hospital
- H7 : Abu Obeida Hospital
- H8 : Ramtha Hospital
- H9 : Karak Hospital
- H10 : Princess Badia Hospital

SUMMARY

Summary

The Hashemite Kingdom of Jordan covers an area of 89,000km² and the land is separated into the west area, mountain running from the north to the south, and the east area, the desert. The 80% of the land is desert. The population is approximately 4,010,000 as of 1992. The average growth rate of population was high at 7.5% between 1988 and 1992, primarily due to the influx of Jordanians who worked overseas, and returned after the outbreak of the Gulf War in August 1990.

The Jordanian economy has been plagued with series of troubles. The government budget deficits have grown rapidly since late 1988, and the Jordanian government adopted the middle-term structural improvement plan under recommendation of IMF by mutual consent. However, the Gulf War erupted in 1990 has forced the government to abandon the plan. Then in October 1991, the government embarked on "Economic Adjustment Program (1992-1998)" under the agreement with IMF. The present administration that inaugurated in June 1993 sets its priorities to economic policy and the peacemaking in the Middle East and has launched "Economic and Social Development Plan (1993-1997)". The plan forms embraces health care policy that emphasizes the importance of primary health care (PHC), which is also given of priority in the five-year health plan. The economic crises in the late 1980s, have adversely affected standards of living. Also, major cutbacks in the government expenditures have deteriorated public medical service significantly in terms of both quantity and quality. National hospitals and medical institutions are facing deterioration of facilities and equipment due to aging. In fact, deterioration goes on and if remained intact, it will affect the quality of basic medical service needed by Jordanian people.

Under these circumstances, the Ministry of Health of Jordan has decided to improve the quality of medical service provided by hospitals, and has developed plans to upgrade and replace equipment with mainly national hospitals. Then, the Government of Jordan requested the Government of Japan to provide grant aid for implementation of the project to supply medical equipment to eleven hospitals that serve as core facilities and should be given of high priority in improvement of medical service levels.

In response, the Government of Japan decided to conduct a basic design study,

and upon its request, JICA sent a basic design study team to Jordan from November 24, 1994, to December 23, 1994. The study team held discussions with the officials concerned of the Government of Jordan, and conducted a field survey at the study area. After the team returned to Japan, further studies were made. Then, a mission was sent to Jordan in order to discuss a draft report from January 27 and February 5, 1995, and as this result, the present report was finalized.

The result of the basic design study is summarized as follows.

10 hospitals which will receive medical equipment under the project (Of 11 hospitals in the original request, Muta Health Center was dropped from the list because equipment requested for the hospital was all removed due to the lack of compatibility with existing equipment) are located in the following areas:

- Northernmost region: Princess Basma Hospital, Princess Badia Hospital, Moadh bin Jabl Hospital, Abu Obeida Hospital, and Ramtha Hospital
- Northern region: Al Bashir Hospital, Al Zarqa Hospital and Al Hussein Hospital
- Central region: Karak Hospital
- Southern region: Ma'an Hospital

Note that geographical distribution of the hospitals generally reflects population distribution in the country and are concentrated in north. Measured by the number of beds and equipment, hospitals in the northern region have higher levels.

Medical equipment to be supplied under the project has been selected in accordance with the following criteria:

- 1) To focus on upgrading and replacement of medical equipment which supply is most needed and urgent because of growth of demand or deterioration due to aging, as well as general medical equipment used for treatment of common diseases; and

2) To follow the principles in equipment selection.

The equipment to be given high priority in the Project is;

- ① the equipment to be utilized for treatment of the common diseases and
- ② the equipment to be replaced with the existing equipment which is already deteriorated

While, the equipment to be given low priority in the Project is;

- ① the equipment with financial / marketing difficulties on the procurement of consumable and spare parts etc.,
- ② the equipment not required for health care services such as diagnosis, treatment and prevention
- ③ the simple equipment / furniture available locally
- ④ the most advanced equipment to be utilized for research activities
- ⑤ the equipment with some difficulties on installation/infrastructure conditions
- ⑥ the expensive equipment less utilized because of small number of testing / less number of patients
- ⑦ the equipment hazardous to environmental control and
- ⑧ the equipment only utilized with exclusive reagent kit available from the specific manufacture

The basic design proposal decided on the basis of the above evaluation and consideration is summarized as follows.

List of Planned Equipment

1. Al Bashir Hospital	Ultrasound, EEG, CT scanner, Mobile X-ray, Inverted microscope, Central monitoring system, Phase contrast microscope, Light microscope w/Camera, CO ₂ incubator, Tissue culture cabinet, Refr. centrifuge/Bench top, Auto-tissue processor, Multi-head microscope, Florescent microscope <p style="text-align: right;">Total 28 items</p>
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2. Al Hussein Hospital	Defibrillator w/monitoring, Dental Unit, Ultrasound, Mobile X-ray, Slide stainer, Blood chem stat analyzer, Cell counter >8 parameter Total 14 items
3. Al Zarqa Hospital	Laparoscopy, Defibrillator w/monitoring, Incubator / Transportable, Ultrasound, Mobile X-ray, Anaesthesia, Ventilators, Cytospin, Total 14 items
4. Ma'an Hospital	Defibrillator w/monitoring, Dental Unit, Incubator / Transportable, Ultrasound, Mobile X-ray, Anaesthesia Total 9 items
5. Princess Basma Hospital	Ultrasound, EEG, CT scan, Mobile X-ray, Freezer ffp, Platelet incubator, Cell counter >8 parameter, Multi-head microscope Total 17 items
6. Moadh bin Jabl Hospital	Defibrillator w/monitoring, Incubator / Transportable, Ultrasound, Mobile X-ray, Electro-surgical unit Total 11 items
7. Abu Obeida Hospital	Defibrillator w/monitoring, Incubator / Infant, Ultrasound, Mobile X-ray, Anaesthesia, Electro-surgical unit Total 10 items
8. Ramtha Hospital	Defibrillator w/monitoring, Incubator / Transportable, Sterilizers, Anaesthesia, Ventilators, Electro-surgical unit
9. Karak Hospital	Defibrillator w/monitoring, Incubator / Transportable, Sterilizers, Anaesthesia, Electro-surgical unit
10. Princess Badia Hospital	Ambulance, Incubator / Infant, Ultrasound, Mobile X-ray, Ventilators, Freezer ffp, Blood chem stat analyzer, Cell counter >8 parameter Total 14 items

If the project is implemented under grant aid of the Japanese government, the Jordanian side is expected to spend an estimated 56,000JD. After completion of the project, additional 172,400JD will be required annually to cover maintenance and spare parts costs, to which the Ministry of Health will give priority in the following year's budget. In addition, the consumable cost of 295,900JD will be required annually, which agrees with the amount estimated in the budget of the ministry. The project will take about 3 months for detailed design and 9 months for procurement and installation of equipment.

The project, if implemented under grant aid of the Japanese government, is expected to produce the following benefits.

First of all, supplying medical equipment used for treatment of common diseases, that needs to be urgently replaced or upgraded to meet demand, will enable the recipient hospitals to provide adequate primary medical care for a large number of people. At the same time, the deployment of CT scanners and mobile X-ray equipment, as included in the equipment list, will facilitate proper and timely treatment of emergency cases. The result perfectly serves one of the country's medical policy objectives, the improvement of quality of primary health care (PHC).

Provision of equipment for the obstetrics and gynecology department, including ultrasounds, incubators, and transportable incubators, will allow early detection of anomalous pregnancy and other ailments, thereby to help reduce deaths of pregnant and parturient women. The similar effect can be expected for other departments, including radiology, emergency, clinical examination, and surgical operation departments, and adequate diagnosis and treatment achieved by new equipment will contribute to reduction of deaths.

New equipment will serve as the effective means of revitalizing the recipient hospitals throughout the country, including those in rural regions. In particular, the equipment will enable all the medical staff, including doctors, nurses, and paramedics, to provide the highest practicable level of medical service at affordable costs. This way, the national hospitals will be able to serve local communities more effectively.

Measured by the number of patients to be treated additionally, the benefits of the project will amount to 220,000 outpatients and 120,000 inpatients at the ten recipient hospitals, totaling 340,000 patients annually, including 80,000 and 30,000 at Princess Basma Hospital, 50,000 and 40,000 at Al Bashir Hospital, 30,000 and 40,000 at Princess Badia Hospital, respectively.

The above benefits expected from the project and their overall analysis indicate that the project will contribute significantly to the improvement of quality of medical service in Jordan, which will help support people and their health, and eventually lead to stability and development of the country. Thus, it is appropriate to conclude that the project should be implemented under grant aid of the Japanese government.

Finally, for the interest of effective and efficient implementation of the project, the following recommendations are made:

(1) Reserving the replacement cost through depreciation

Deterioration of equipment used after the lapse of durable life may cause a wide range of services to be delayed or suspended. Depreciation is an important concept of accounting to allow planned replacement or upgrading of equipment. The recipient hospitals are recommended to fully utilize depreciation to reserve replacement costs for newly supplied equipment as well as old equipment. This way, the hospitals can use equipment in proper working order all the time.

(2) Revenues and expenditures control system

The critical element of hospital management is to properly monitor and control revenues and expenditures. Reserving the replacement cost through depreciation can be accomplished only when revenues and expenditures are properly accounted for. Fortunately, the government adopted decentralization policy in 1993, and along which the national hospitals will introduce the revenue and expenditure control system under the leadership of the Ministry of Health, which will serve the purpose if properly introduced and administered.

(3) Maintenance staff training

Princess Basma, Ma'an and Al Hussin hospitals are considering the establishment of their own maintenance plans, and it is recommended to develop a model staff training program for these hospitals.

(4) Introduction of the continuous financial management system

A proper financial management system is required for equipment that requires large amounts of maintenance service costs and consumable expenses. This should be accomplished by integrating management of maintenance fees and consumable expenses that are currently handled by different departments.

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CHAPTER 1 BACKGROUND OF THE PROJECT

Chapter 1 Background of the Project

1.1 Background of the Project

The Hashemite Kingdom of Jordan has population of 4,012,000 as of 1992. Recently, its population has grown rapidly, 7.5% on average between 1988 and 1992, largely because a large number of persons working in foreign countries have returned to the country after the Gulf War in August 1990, including 300,000 from Kuwait. (See Table 1-1)

In particular, high population pressure comes from Palestinian refugees from the third Middle East War in 1967, nearly 400,000, who still reside in refugee camps. The economic crisis in the late 1980s, including a drastic depreciation of the foreign exchange rate instigated in late 1988, has deteriorated standards of living of Jordanians considerably. At the same time, major cutbacks in government spending have significant negative impacts on public medical service in the country in terms of quality and quantity.

The country's medical service situation is partly depicted in official statistics comparing the numbers of physicians, nurses, and beds on an international basis. Current problems have two facets. While the number of physicians, and surgical operations including heart, kidney and cornea are world class levels, the numbers of nurses and beds are in short supply. Secondly, many physicians and hospitals are concentrated in urban areas, rural areas cannot have access to adequate medical service. (See Table 1-2)

Table 1-1 Recent Population Trends in the Hashemite Kingdom of Jordan

	(Thousand persons)				
Year	1988	1989	1990	1991	1992
Population	3,001	3,111	3,453	3,888	4,012

Source : Central Bank of Jordan, 1993

Table 1-2 International Comparison of Medical Service Levels

(Numbers of Physicians, Nurses, and Hospital Beds Per 10,000 Persons) (1988 - 1992)

	Physician	Nurse	Bed
Jordan	15.4	4.6	19
Average for development group countries in demography	7.8	7.0	20
World average	13.4	18.8	36

Source: The World Bank

Under such background, the Ministry of Health of Jordan planned a project to improve the selected 11 hospitals by renewing and supplementing medical equipment.

For this purpose, the Government of Jordan requested Grant Aid cooperation to the Government of Japan.

1.2 Outline of the Request and Main Components

The primary objective of the request is to provide medical equipment for diagnosis and treatment for medical organizations, mainly the 11 national hospitals, thereby to improve the public service system in the country on the middle and long-term basis.

The request covers as many as 43 items including the following:

- Ambulances
- Dental Unit
- CT scanner
- Mobile X - Ray
- Sterilizer
- Anaesthesia
- Incubator
- Ultrasound

The eleven hospitals for which the above items will be supplied are listed as follows:

- H1 : Al Bashir Hospital
- H2 : Al Hussein Hospital

- H3 : Al Zarqa Hospital
- H4 : Ma'an Hospital
- H5 : Princess Basma Hospital
- H6 : Moadh bin Jabl Hospital
- H7 : Abu Obeida Hospital
- H8 : Ramtha Hospital
- H9 : Karak Hospital
- H10 : Muta Health Center
- H11 : Princess Badia Hospital

1.3 Project and /or Program of Other Donors

Foreign aid projects currently under way are as follows.

(1) World Bank

- 1) Service improvement
- 2) Upgrading of health care facilities (general--purpose small equipment)
- 3) Installation of health management information system
- 4) Health budget and cost reimbursement
- 5) Long-term plans

(2) USAID

- 1) Comprehensive puerperal project
- 2) Family health service project
- 3) Family planning project

These projects are intended to maintain health of expectant and nursing mothers as well as infants.

(3) Germany (GTZ)

The project is designed to establish a maintenance system for the Ministry of Health. Princess Basma, Al Hussein, and Ma'an hospitals have been selected as the first phase, and reserve spaces for the project.

(4) France

In collaboration of Germany, France helps establish the maintenance system.

(5) Italy

New Karak Hospital has been completed. Medical equipment will be supplied by the Ministry of Health, although details have not been decided.

In addition to the above projects, WHO are implementing or planning a number of projects in the following 5 areas of priority:

- 1) Human resource development
- 2) Construction of health care facilities (general-purpose small equipment)
- 3) Promotion of public health and hygiene
- 4) Prevention of diseases
- 5) Dissemination of health and medical information

The detail list of above mentioned projects

- (1) Strengthening of Epidemiological Service
- (2) Organization of Health System Based on Primary Health Care
- (3) PHC for Promotion of School Health
- (4) Basic Minimum Needs Project
- (5) Family Health Programme
- (6) Public Information and Education for Health
- (7) Nutrition
- (8) Oral Health
- (9) Environmental Health in Rural and Urban Development and Housing
- (10) Control of Environmental Health Hazards
- (11) Clinical, Laboratory and Radiological Technology for Health System
- (12) Essential Drugs and Vaccines
- (13) Drug and Vaccine Quality, Safety and Efficacy
- (14) Vaccine Quality Control and Safety

- (15) Parasitic Disease Control
- (16) Control of Diarrhoeal Diseases
- (17) Tuberculosis Control
- (18) Other Noncommunicable Disease Prevention and Control Activities
- (19) Others

The above aid projects from other countries and international organizations mainly focus on technical assistance, primarily consisting of supply of general-purpose small equipment and technology transfer, and do not directly conflict with the proposed project.

CHAPTER 2 OUTLINE OF THE PROJECT

Chapter 2 Outline of the Project

2.1 Objectives of the Project

The objective and target of the project are summarized as follows:

- (1) To provide effective support for Jordan's economic development by designing and implementing the project in consistency with Economic and Social Development Plan (1993 – 1997) which constitutes an integral part of Economic Adjustment Program (1992 – 1998) and Five-Year Plan (1993 – 1997) of Ministry of Health. In particular, medical policy set forth in the economic and social development plan focuses on primary medical service, and so does the Five-year plan of Ministry of Health. Thus, the project should following these policy lines.
- (2) The level of public medical service covering the entire population of Jordan has deteriorated significantly, in terms of quality and quantity, due to the Middle East War, the Gulf War, and economic hardships. Thus, the project focuses on supply of medical equipment that helps improve public medical service for the country's citizens, particularly the poor and needy, while taking into account the disease structure in the country.
- (3) To check the need for medical equipment requested by Jordan in terms of urgency and rationale by assessing the positioning of recipient medical institutions in each region, and division of responsibilities among them, and to establish a sound maintenance system for the recipient hospitals by supplying required medical equipment under the project.
- (4) The project will cover 11 national hospitals under supervision of Ministry of Health, which are designated as priority facilities for renovation of national medical institutions and serve as regional medical centers throughout the country. By supplying medical equipment required for proper treatment at these hospitals, the project will serve the middle and long-term objective of promoting fundamental improvements in the medical service system in the country.

2.2 Study and Examination on the Request

The request made by the Government of Jordan to the Government of Japan for implementation of the Project for Medical Equipment Supply in the Hashemite Kingdom of Jordan is to provide 43 items of medical equipment including ambulances, dental units, CT scanners, mobile X-ray, sterilizers, anesthesia, incubators, and ultrasound for 11 national hospitals that serve as regional medical centers.

The request has been thoroughly reviewed and evaluated on the basis of the following criteria:

- 1) Design policy summarized in Section 3.1
- 2) Priority (high or low) setting rules adopted by the Government of Japan in equipment selection (as described in Minutes of Discussion dated on December 4, 1994 See Appendix 4)

The equipment to be given high priority in the Project is;

- ① the equipment to be utilized for treatment of the common diseases and
- ② the equipment to be replaced with the existing equipment which is already deteriorated

While, the equipment to be given low priority in the Project is;

- ① the equipment with financial / marketing difficulties on the procurement of consumable and spare parts etc.,
- ② the equipment not required for health care services such as diagnosis, treatment and prevention
- ③ the simple equipment / furniture available locally
- ④ the most advanced equipment to be utilized for research activities
- ⑤ the equipment with some difficulties on installation/infrastructure conditions
- ⑥ the expensive equipment less utilized because of small number of testing / less number of patients
- ⑦ the equipment hazardous to environmental control and
- ⑧ the equipment only utilized with exclusive reagent kit available from the

specific manufacture

The result of review and evaluation is summarized as follows.

43 items of medical equipment requested by the Government of Jordan have been reviewed on the basis of the above criteria. In the evaluation process, it has been revealed that some of equipment are designed or intended for special use or research purposes, rather than general treatment of common diseases – a primary purpose of the grant aid project, and some do not show high priority nor strong urgency. Then, an optimum allocation plan identifying equipment suitable for the project purpose and its quantity has been developed in consideration to priorities among the eleven hospitals as well as among various types of equipment in the entire supply list and at each hospital. As a result, it has been decided to partially revise the request in terms of equipment item and quantity.

The project itself is considered to be suitable for being implemented as grant aid of the Government of Japan in consideration to the request's conformity with grant aid policy, commitment of the Government of Jordan to the project and its ability to implement the project, and the anticipated effect of the project that is consistent with the intent and objective of Japan's grant aid program. Thus, it has been decided to develop a planning framework for the project and its basic design, as shown in the following sections, based on partial revision of the request.

2.3 Project Description

2.3.1 Execution Agency and Operational Structure

(1) Execution Agency and Operational Structure

For implementation of the project, the Jordanian side will reinforce and improve existing equipment maintenance organizations at the recipient hospitals. Many of the eleven hospitals have equipment maintenance personnel within their facility maintenance departments, 1 – 2 persons on average. The hospitals will upgrade maintenance techniques under leadership of the full-time personnel. According to organizational charts of the hospitals, the maintenance department is mostly supervised by administrative assistant or assistant director.

Table 2-1 Execution Agency

Hospital	Primary responsibility	Organization	No. of staff
Al Bashir Hospital	Administrative Assistant	Maintenance Dept.	2
Al Hussein Hospital	Administrative Assistant	Maintenance	4
Al Zarqa Hospital	Administrative Assistant	Maintenance Dept.	1
Ma'an Hospital	Administrator	Maintenance	2
Princess Basma Hospital	Assistant Director	Maintenance Dept.	4
Moadh bin Jabl Hospital	Administrative Assistant	Maintenance	1
Abu Obeida Hospital	Assistant Director	Maintenance	1
Ramtha Hospital	Administrative Assistant	Maintenance	1
Karak Hospital	Hospital Services Unit Assistant	Maintenance	1
Muta Health Center	--	--	--
Princess Badia Hospital	Assistant Director	Maintenance	1

At present, maintenance of medical equipment is mostly done by outside contractors, so that only a small number of maintenance staff is required at each hospital. Thus, so far as contract service continues to be used after the project is completed, the existing staff will suffice to maintain new equipment as well as existing equipment.

(2) Budget

- 1) The total budget allocated to Ministry of Health has been growing steadily over the past 5 years from 24 million JD in 1990 to 79 million JD in 1994. Of total, capital expenditures containing equipment procurement costs have been on the decline since 1992, current expenditures covering maintenance costs for medical equipment have been increasing yearly from 21 million JD in 1990 to 63 million JD in 1994. (See Table 2-2)

Table 2-2 Recent Trends in Ministry of Health Related Budget (1990-1995)

(JD)

Fiscal Year	Current expenditures	Capital expenditures	Total
1990	21,803,000	2,600,000	24,403,000
1991	48,350,000	9,277,000	57,627,000
1992	52,200,000	23,250,000	75,450,000
1993	57,949,000	19,000,000	76,949,000
1994	63,515,000	16,000,000	79,515,000

- 2) Maintenance costs for medical equipment (covering consumables) grew from 1,690,000 JD in 1991 to 2,320,000 JD in 1994. In 1995, they are expected to jump to 4.6 million JD. (See Table 2-3) The budget item accounts for large portions of maintenance costs, and in fact is given the highest priority in budget appropriation. The estimated cost for consumables related to medical equipment supplied under the proposed project, amounting to 0.3 million JD, has been presented to Ministry of Health, which has confirmed that the amount is consistent with the budget it anticipates.

Table 2-3 Recent Trends in Maintenance Cost (1991-1995)

(JD)

Fiscal Year	Maintenance spare parts	Consumables	Total
1991	582,369	1,692,000	2,274,369
1992	786,411	1,776,000	2,562,411
1993	855,899	2,295,000	3,150,899
1994	1,025,000	2,320,000	3,345,000
1995	1,122,000	4,600,000	5,722,000

- 3) Maintenance costs for medical equipment (maintenance as well as spare parts) increased steadfastly between 1991 and 1994, from 580,000 JD to 1 million JD. In 1995, they are estimated to reach 1,120,000 JD. (See Table 2-3) Availability of the maintenance budget is also applied to equipment requiring relatively large maintenance costs, such as CT scanners. In particular, Al Bashir and Princess Basma hospitals have secured maintenance costs for currently owned CT scanners required under the 5-year maintenance

agreement, amounting to US\$52,000 – 55,000. Again, the estimated maintenance cost related to medical equipment supplied under the proposed project (maintenance as well as spare parts), both newly allocated items and additional appropriation, amounting to 170,000 JD, has been presented to Ministry of Health, which has confirmed that the amount is consistent with the budget it anticipates.

4) Extra budget for the project

Maintenance cost for main equipment: 172,400JD

Details	(1) CT scanner (2 units)	= 140,000JD
	• CT scanner (SR) (fee, spare parts)	= 60,000JD
	• CT scanner (RR) (fee, spare parts)	= 40,000JD
	• X-ray tube	= 40,000JD
	(2) New and additional	= 32,400JD
	• Mobile X-ray × 4	<div style="display: flex; align-items: center; justify-content: center;"> <div style="border-left: 1px solid black; border-right: 1px solid black; height: 100px; margin-right: 5px;"></div> <div style="border-top: 1px solid black; border-bottom: 1px solid black; width: 10px; margin-right: 5px;"></div> <div style="border-left: 1px solid black; border-right: 1px solid black; height: 100px; margin-left: 5px;"></div> </div>
	• Blood chemistry stat analyzer × 4	
	• Cell counter × 4	
	• Sterilizer × 2	
	• Ultrasound × 3	
	• Dental unit × 4	
		= 32,400JD

Consumables for main equipment: 295,900JD

Details	(1) CT scanner × 2	= 97,000JD
	• Films $0.084\text{JD} \times 144,000 \text{ exposures}$	= 12,000JD
	• Contrast and opaque media $0.25\text{JD} \times 144,000$	= 36,000JD
	• Development cost $0.0035\text{JD} \times 144,000$	= 500JD
	Total $48,500\text{JD} \times 2$	= 97,000JD
	(2) Mobile X-ray × 9	= 18,900JD
	• 1JD/person × 63 persons (9 units)/day × 300 days	= 18,900JD
	(3) Blood chemistry stat analyzer × 5	= 150,000JD
	• 1JD/person × 500 persons (5 units)/day × 300 days	= 150,000JD
	(4) Cell counter × 4	= 30,000JD
	• 0.25JD/person × 400 persons (4 units)/day × 300 days	

= 30,000JD

- 5) At present, Ministry of Health secures the budget required for equipment maintenance costs by hospitals in accordance with the following procedures:
- (a) Each hospital submits to Ministry of Health a "requirement list" containing "items and quantities" of equipment and consumables to be required in the next fiscal year. Procurement Department of the ministry tabulates and reviews the budget requests from all the hospitals.
 - (b) As for "maintenance costs," Service Department of the ministry tabulates and reviews the budget requests from the hospitals.
 - (c) The ministry summates requirement lists and budget requests submitted by various departments and decides on the total ceiling for the budget request by the ministry as a whole.
 - (d) Through negotiations between Ministry of Health and Ministry of Finance, the budget appropriated to the ministry in the next fiscal year is determined.
 - (e) The ministry allocates the appropriated budget to individual items based evaluation of the requirement lists and budget requests according to priority.
 - (f) General priority is given as follows:
 - a. Consumables (medicines, X-ray films, agents, etc.)
 - b. Maintenance costs for medical equipment (maintenance fee and spare parts)
 - c. Newly purchased equipment

2.3.2 Locations and Conditions of Project Site

(1) General

Geographically, the eleven hospitals are divided into 4 groups according to region they are located in. 5 (Princess Basma, Princess Badia, Ramtha, Abu Obeida, and Moadh bin Jabl) are located in the Irbid area in the northern part; 3

(Al Bashir, Al Zarqa, and Al Hussein) in Amman and its vicinities, Salt and Zarqa; 2 (Karak and Muta) in Karak in the central part; and 1 (Ma'an) in the south.

All but 2 hospitals (Abu Obeida and Moadh bin Jabl) are scattered in the plateau with elevation ranging from 600m to 1,000m. Abu Obeida and Moadh bin Jabl hospitals are situated in Jordan Valley, with elevation of 300m below sea level. As a result, some road sections from Amman to these hospitals run on gradient of 7%.

(2) Site and building conditions

1) Al Bashir Hospital

Location: Amman
Site conditions: The hospital faces 2 4-lane paved roads with heavy traffic, and a 2-lane road runs through the site. A main building, an outpatient clinic, a radiology lab, an obstetric department, and some other buildings are located on a flat area, while others are arranged on slope.
Total floor area: Approx. 100,000m²
Building structure: Reinforced concrete structure, 4 stories and 1 basement
Year of completion: Around 1950

2) Al Hussein Hospital

Location: Salt (25km northwest of Amman)
Site conditions: The site faces a light-traffic branch of an arterial road connecting Amman and Salt. 4 buildings are built on slope area.
Total floor area: Approx. 7,000m²
Building structure: Reinforced concrete structure, 6 stories
Year of completion: Around 1965

3) Al Zarqa Hospital

Location: Zarqa (20km northeast of Amman)

Site conditions: The site is located at a corner of a roundabout in the city center and has little space for expansion. The administration department, the laboratory, and the parking facility are located in different sites. The main site faces a 2-lane paved road that has heavy traffic because of its location near the roundabout.

Total floor area: Approx. 10,000m²

Building structure: Reinforced concrete structure, 5 stories

Year of completion: Around 1965

4) Ma'an Hospital

Location: Ma'an (210km south of Amman)

Site conditions: Located at an end of the city area, with little road traffic. The main building, the outpatient clinic, and the obstetric and pediatric department are arranged on a gently sloped area.

Total floor area: 5,440m²

Building structure: Reinforced concrete structure, 4 stories

Year of completion: Around 1965

5) Princess Basma Hospital

Location: Irbid (75km north of Amman)

Site conditions: Located at a corner of an intersection of a 3-lane road (one-way), with little space for expansion. The outpatient clinic is located in a different site.

Total floor area: Approx. 8,000m²

Building structure: Reinforced concrete structure, 3 stories and 1 basement level

Year of completion: Around 1955

6) Moadh bin Jabl Hospital

Location: Jordan Valley (110km north-north-west of Amman)

Site conditions: The hospital is located at an end of Town of Moadh.

The front road comes to an end near the site and thus has few traffic. Only the main building is located on a flat area. The hospital and Abu Obeida Hospital were constructed at the same time and are designed under the same plan.

Total floor area: Approx. 2,000m²
Building structure: Reinforced concrete structure, 1 story
Year of completion: 1980

7) Abu Obeida Hospital

Location: Jordan Valley (75km north–north–west of Amman)
Site conditions: The site faces a 2–lane arterial road running north and south through the valley. There is not much traffic on the road because traffic is restricted due to proximity to the border. Only the main building is build on flat land.
Total floor area: Approx. 2,000m²
Building structure: Reinforced concrete structure, 1 story
Year of completion: 1980

8) Ramtha Hospital

Location: Ramtha (75km north of Amman)
Site conditions: Located at the margin of the city and facing a 4–lane road. The main building, the outpatient clinic, and the emergency building are arranged on the flat area.
Total floor area: Approx. 2,500m²
Building structure: Reinforced concrete structure, 2 stories
Year of completion: Around 1975

9) Karak Hospital

Location: Karak (115km south of Amman)
Site conditions: Since the entire city is contained in a citadel and city streets are very narrow to make the passing of cars difficult. The site is located at an end of the citadel and

accommodates a main building and parking lots only.
Total floor area: Approx. 33,000m²
Building structure: Reinforced concrete structure, 2 stories and 1 basement
Year of completion: 1958

10) Muta Health Center

Location: Within the campus of Muta University in the suburbs of Karak (140km south of Amman)
Site conditions: Located within the campus of Muta University. Only the main building is built on a gentle slope area, separately from university buildings.
Total floor area: Approx. 2,000m²
Building structure: Reinforced concrete structure, 2 stories
Year of completion: 1994

11) Princess Badia Hospital

Location: Suburbs of Irbid (70km north of Amman)
Site conditions: The site is located on a hill in the suburbs of Irbid. To this date, 4 buildings have been completed, but only one building is operated with other 3 buildings being equipped with hospital facilities and equipment.
Total floor area: Approx. 7,300m² (when completed)
Building structure: Reinforced concrete structure, 3 stories
Year of completion: 1993

2.3.3 Outline of Equipment

The equipment requested are classified as the following categories.

- (1) The equipment to be utilized for treatment of the common diseases and/or replaced with the existing equipment which is already deteriorated

Ambulance, Dental unit, Laparoscopy, Defibrillator, Incubator, Ultrasound, Mobile X-ray, Sterilizer, Anaesthesia, Ventilator, Slide stainer, Electro-surgical

unit and others

- (2) The equipment to be utilized for the most advanced treatment and research

Auto micro-biol ana/bld, Delfia plate fluorometer, Mass spectrophotometer, Electron microscope, Flow cytometer

- (3) Equipment to be low priority and less utility

Multi-head microscope, Centrifuge for blood comp. prep, Water purification, Laminar flow, Automated coagulometer, Blood chem. main analyzer, Cell counter(20 parameter)

2.3.4 Operation and Maintenance Plan

The equipment maintenance systems adopted by the eleven recipient hospitals are classified into 3 types as follows:

- (1) Hospital engineers: 1 – 2 engineers are assigned to the maintenance department, depending upon on hospital size and future plan. The scope of service provided under the arrangement is limited.
- (2) Royal Scientific Society: Preventive maintenance service on an annual contract basis. Failed equipment is repaired on spot or sent to RSS for repair.
- (3) Private companies: Maintenance service on special equipment such as CT scanners

In principle, the Ministry of Health and RSS conclude maintenance service contract related to medical equipment, and RSS provides maintenance service for national hospitals under the minister. As for special equipment such as CT scanners, the ministry and a private contractor conclude maintenance service contract, under which the contractor service the equipment.

Annual maintenance fees for the RSS/Ministry of Health contract and private companies/Ministry of Health contract are as follows:

- | | |
|--|-----------|
| (1) Annual maintenance service under contract between RSS and Ministry of Health (including parts) | 763,000JD |
| (2) Annual maintenance service under contract between Ministry of Health and private companies (including parts) | 257,000JD |

Of the above total, annual maintenance service fee (including parts) for each of the eleven recipient hospitals is as follows:

Al Bashir Hospital	406,000 JD
Al Husscin Hospital	32,000
Al Zarqa Hospital	47,000
Ma'an Hospital	25,000
Princess Basma Hospital	120,000
Moadh bin Jabl Hospital	15,000
Abu Obeida Hospital	15,000
Ramtha Hospital	20,000
Karak Hospital	24,000
Muta Health Center	-
Princess Badia Hospital	5,000
Total	709,000

As discussed in the previous section, for maintenance service fees (including parts) on new and additional equipment amounting to 170,000JD, the Ministry of Health has confirmed that it will give priority to the item in the next year's budget allocation.

Finally, the Ministry of Health feels that RSS's maintenance service is relatively costly and takes a long period of time for repair, and considers the establishment of its own maintenance system.

2.4 Technical Cooperation

If the project is implemented under grant aid of the Japanese government, domestic and overseas training of engineers and technicians engaged in operation and maintenance of new medical equipment can be funded by the Ministry of Health under its own budget. The study team has explained to the Jordanian side that, although the

project does not include staff training, operation and maintenance methods and procedures will be fully explained to hospital staff at the time of equipment installation.

CHAPTER 3 BASIC DESIGN

Chapter 3 Basic Design

3.1 Design Policy

The request from the Government of Jordan to supply medical equipment to the national hospitals has been considered in accordance with basic policy for grant aid project set forth by the Government of Japan, which is summarized as follows:

- 1) To focus on improvement of selected functions of the hospitals, inspection, including treatment, research, training, and preventive and educational, to be identified in terms of actual need and urgency.
- 2) To ensure the efficient use of equipment to be supplied according to the positioning and division of responsibility for the eleven hospitals, that need to be clearly defined within the entire medical service network.
- 3) To focus on "general treatment for common diseases" in the areas where the facilities are located.

While there is a certain need for advanced medical treatment for special or rare diseases, its rationale and priority from the intent of the grant aid project is relatively low. Priority should be given to treatment of common diseases suffered by many people, thus to the large benefit.

- 4) Looking at individual fields of specialization, equipment related to cardiac surgery, should be given low priority.
- 5) From the standpoint of individual disease, equipment primarily used for diagnosis and treatment of non-infectious diseases, such as cancer and geriatric diseases, rank below that for infectious diseases including tuberculosis and hepatitis.

3.2 Study and Examination on Design Criteria

3.2.1 Evaluation of the Need for CT Scanners

CT scanners are requested for 3 hospitals. 2 hospitals, Al Bashir and Princess Basma, own CT scanners made by Picker, that are supplied by USAID in 1989. Al Bashir Hospital handles approximately 8,000 cases and Prince Basma Hospital 6,000 cases annually. Maintenance service is provided by a local agent of Picker under the maintenance contract with the Ministry of Health, with an annual maintenance fee of US\$55,000 and for a 5-year period. Also, other CT scanner manufacturers – Shimadzu, Hitachi, Siemens, GE and Philips – have agents in the country and have delivered products to various hospitals. The study team visited these agents and have found no problem in maintenance service for CT scanners in the country.

Thus, the request for CT scanners by Al Bashir and Princess Basma Hospitals seems to be approximate as judged from frequency of use, maintenance conditions, and the fact that the existing equipment is nearly 5 years old, close to its service life, provided that Ministry of Health will be required to conclude the similar maintenance contract with the local agent.

On the other hand, Ma'an Hospital is not a suitable facility to supply the CT scanner under the project because of a relatively small size and a low cost/benefit ratio, although the hospital serves as a medical center in the southern region and there is certain demand for CT scanner.

3.2.2 Environmental Protection Measures

(1) Radiation

CT scanners will be installed in Al Bashir and Princess Basma hospitals, and existing examination rooms will be used to accommodate the new equipment. Given the existing structure and fixture of these rooms (shown in Table 3-1), some radiation shielding work will be required.

Table 3-1 Existing Structure and Fixture of Examination Rooms

	Al Bashir Hospital	Princess Basma Hospital
Floor	Reinforced concrete	Reinforced concrete
Wall	Concrete block	Concrete block
Ceiling	Reinforced concrete	Reinforced concrete
Window	Plain glass	Plain glass
Door	Lead door	Wood door

* Floor and ceiling are at least 150mm thick each, and wall 200mm.

Comparing “Instruction Concerning the Shielding Required for the Diagnostic Radiology Rooms and Systems” in Jordan and “Enforcement Ordinance for the Medical Service Act” in Japan, Japanese regulations related to radiation shielding in buildings require higher standards for weekly dose than the Jordanian ones. Also, detailed structure of the relevant parts of the rooms is not known. In consideration to the above factors, the following structural reinforcement measures are proposed:

- ① No additional reinforcement will be required for floor.
- ② Walls and ceilings will be shielded by 1.5mm thick lead.
- ③ Windows will be removed and openings will be filled by concrete blocks.
- ④ The CT scanner room and the operation room will be separated by lead glass having lead equivalent of 1.5mm.
- ⑤ 1.5mm thick lead will be inserted into doors and frames, with care to overlay lead plates as far as possible to prevent radiation dose leakage.
- ⑥ Generally speaking, reinforced concrete structure of 150mm thick is equivalent to lead equivalent. Thus, existing walls and ceilings having 150mm or more thickness will be excluded from the reinforcement work, since lead equivalent of 1.5mm is assumed.

(2) Drainage (effluent)

Effluent discharged from laboratory equipment installed under the project is a very small amount compared to the total effluent discharge from the entire hospital, which is then much smaller than the total discharge of general waste water from the hospital. As a result, the effluent will be diluted and pollutants will

be reduced to below a concentration level identifiable at public water treatment plants. Nevertheless, it is desirable to devise appropriate measures for future increase in effluent, consisting of

- ① Since small hospitals account for a large percentage of the recipient hospitals, a common treatment plant will be constructed for centralized treatment.
- ② A purpose-built effluent tank will be provided at each hospital to collect effluent, instead of discharging into public sewers or waste water tanks.
- ③ The Ministry of Health will collect effluent from the tank regularly and send it to the treatment plant.

3.2.3 Planned Equipment

The planned equipments were selected on the basis of section 2.2, 3.1 and 3.2 (1). Furthermore the existing equipment and existing numbers were evaluated by the following criteria. The results of selections are summarized in Table 3-2~3-4.

- a: Equipment currently owned and deteriorated significantly to require urgent replacement
- b: Equipment currently owned and demanded in excess of its capacity, thus requiring additional supply
- c: Equipment currently owned, which will require replacement in the next few years
- d: Equipment not currently owned and highly needed at present
- e: Equipment currently owned and having a few-year service life
- f: Equipment not currently owned and not needed at present

Table 3-2 Evaluation of Request (1)

H 1 : Al Bashir Hospital

No.	Equipment	Priority on request	Evaluation of Existing Equipment by						Decision
			a	b	c	d	e	f	
1	Ambulances	A		○					○
2	Lapcascopy	C					○		×
3	Defiberillator w/monitoring	A		○					○
4	Dental Unit	A			○				○
5	Incubator / Infant	A		○					○
6	Incubator / Transportable	A	○						○
7	Ultrasound	A	○						○
8	BEG	A		○					○
9	Surgical microscope for neurology	A				○			○
10	CT scan	A			○				○
11	Mobile X-ray	A	○						○
12	Sterilizes	A	○						○
13	Anesthesia	A	○						○
14	Ventilators	A	○						○
15	Inverted microscope	A				○			○
16	Teaching microscope w/video system	B						○	×
17	Centrifuge for blood comp prep	B					○		×
18	Water purification	C					○		×
19	Central monitoring system	A	○						○
20	Phase contrast microscope	B				○			○
21	Light microscope w/Camera	B		○					○
22	Auto micro-biol ana/BLD culture	C						○	×
23	Freezer ffp	B						○	×
24	Delfia plate fluorometer	C						○	×
25	CO2 incubator	B		○					○
26	Tissue culture cabinet	A	○						○
27	Lamina flow	A					○		×
28	Refr. centrifuge/ Bench top	B	○						○
29	Automated coagulometer	C						○	×
31	Slide stainer	A	○						○
32	Blood chem main analyzer	A						○	×
33	Mass spectrophotometer	A						○	×
34	Blood chem stat analyzer	A		○					○
35	Cytospin	A	○						○
36	Electron microscope	B						○	×
37	Auto-tissue processor	A		○					○
38	Flow cytometer	A						○	×
39	Cell counter >20 parameter	B						○	×
40	Cell counter >8 parameter	B		○					○
41	Multi-head microscope	B		○					○
42	Florescent microscope	B		○					○
43	Electro-surgical unit	A	○						○

H 2 : Al Hussein Hospital

No.	Equipment	Priority on request	Evaluation of Existing Equipment by						Decision
			a	b	c	d	e	f	
1	Ambulances	A					○		×
2	Lapscoscopy	B						○	×
3	Defiberillator w/monitoring	A		○					○
4	Dental Unit	A				○			○
5	Incubator / Infant	A		○					○
6	Incubator / Transportable	A		○					○
7	Ultrasound	A	○						○
11	Mobile X-ray	A	○						○
12	Sterilizers	A	○						○
13	Anaesthesia	A			○				○
14	Ventilators	A	○						○
23	Freezer ffp	C					○		×
31	Slide stainer	A				○			○
34	Blood chem stat analyzer	A				○			○
40	Cell counter >8 parameter	B					○		×
43	Electro-surgical unit	A	○						○

H 3 : Al Zarqa Hospital

No.	Equipment	Priority on request	Evaluation of Existing Equipment by						Decision
			a	b	c	d	e	f	
1	Ambulances	A					○		×
2	Lapscoscopy	A			○				○
3	Defiberillator w/monitoring	A		○					○
4	Dental Unit	B					○		×
5	Incubator / Infant	A		○					○
6	Incubator / Transportable	A		○					○
7	Ultrasound	A	○						○
8	EEG	B						○	×
11	Mobile X-ray	A	○						○
12	Sterilizers	A	○						○
13	Anaesthesia	A					○		×
14	Ventilators	A	○						○
23	Freezer ffp	C					○		×
31	Slide stainer	A				○			○
34	Blood chem stat analyzer	A				○			○
35	Cytospin	B				○			○
41	Multi-head microscope	B				○			○
43	Electro-surgical unit	A	○						○

H 4 : Ma'an Hospital

No.	Equipment	Priority on request	Evaluation of Existing Equipment by						Decision
			a	b	c	d	e	f	
1	Ambulances	A					○		×
3	Defiberillator w/monitoring	A		○					○
4	Dental Unit	B				○			○
5	Incubator / Infant	A		○					○
6	Incubator / Transportable	A		○					○
7	Ultrasound	A	○						○
10	CT scan	A						○	×
11	Mobile X-ray	A	○						○
12	Sterilizers	A	○						○
13	Anaesthesia	A	○						○
14	Ventilators	B					○		×
43	Electro-surgical unit	A	○						○

H 5 : Princess Basma Hospital

No.	Equipment	Priority on request	Evaluation of Existing Equipment by						Decision
			a	b	c	d	e	f	
1	Ambulances	A					○		×
2	Lapscoscopy	B						○	×
3	Defiberillator w/monitoring	A	○						○
4	Dental Unit	B					○		×
7	Ultrasound	A		○					○
8	EEG	A				○			○
10	CT scan	A			○				○
11	Mobile X-ray	A		○					○
12	Sterilizers	A	○						○
13	Anaesthesia	A					○		×
14	Ventilators	A		○					○
23	Freezer ffp	A		○					○
30	Platelet incubator	A		○					○
31	Slide stainer	A				○			○
34	Blood chem stat analyzer	A				○			○
35	Cytospin	A				○			○
39	Cell counter >20 parameter	B						○	×
40	Cell counter >8 parameter	B				○			○
41	Multi-head microscope	B				○			○
43	Electro-surgical unit	A		○					○

H 6 : Moad bin Jabl Hospital

No.	Equipment	Priority on request	Evaluation of Existing Equipment by						Decision
			a	b	c	d	e	f	
1	Ambulances	A					○		×
3	Defiberillator w/monitoring	A				○			○
4	Dental Unit	B			○				○
5	Incubator / Infant	A	○						○
6	Incubator / Transportable	A	○						○
7	Ultrasound	A		○					○
11	Mobile X-ray	A	○						○
12	Sterilizers	A	○						○
13	Anaesthesia	A	○						○
14	Ventilators	A				○			○
43	Electro-surgical unit	A				○			○

H 7 : Abu Obeida Hospital

No.	Equipment	Priority on request	Evaluation of Existing Equipment by						Decision
			a	b	c	d	e	f	
1	Ambulances	A					○		×
3	Defiberillator w/monitoring	A		○					○
4	Dental Unit	B			○				○
5	Incubator / Infant	A	○						○
6	Incubator / Transportable	A	○						○
7	Ultrasound	A		○					○
11	Mobile X-ray	A	○						○
12	Sterilizers	A	○						○
13	Anaesthesia	A	○						○
14	Ventilators	A				○			○
43	Electro-surgical unit	A	○						○

H 8 : Ramtha Hospital

No.	Equipment	Priority on request	Evaluation of Existing Equipment by						Decision
			a	b	c	d	e	f	
1	Ambulances	A					○		×
3	Defiberillator w/monitoring	A		○					○
6	Incubator / Transportable	A				○			○
12	Sterilizers	A		○					○
13	Anaesthesia	A	○						○
14	Ventilators	A				○			○
43	Electro-surgical unit	A	○						○

H 9 : Karak Hospital

No.	Equipment	Priority on request	Evaluation of Existing Equipment by						Decision
			a	b	c	d	e	f	
1	Ambulances	A					○		×
3	Defiberillator w/monitoring	A		○					○
6	Incubator / Transportable	A		○					○
12	Sterilizers	A			○				○
13	Anaesthesia	A	○						○
14	Ventilators	A					○		×
43	Electro-surgical unit	A	○						○

H 1 0 : Muta Health Center

No.	Equipment	Priority on request	Evaluation of Existing Equipment by						Decision
			a	b	c	d	e	f	
1	Ambulances	A					○		×
3	Defiberillator w/monitoring	A					○		×
4	Dental Unit	B						○	×
5	Incubator / Infant	A						○	×
11	Mobile X-ray	A						○	×
12	Sterilizers	A						○	×
40	Cell counter >8 parameter	C						○	×
41	Electro-surgical unit	A						○	×

H 1 1 : Princess Badia Hospital

No.	Equipment	Priority on Request	Evaluation of Existing Equipment by						Decision
			a	b	c	d	e	f	
1	Ambulances	A		○					○
3	Defiberillator w/monitoring	A		○					○
5	Incubator / Infant	A		○					○
6	Incubator / Transportable	A	○						○
7	Ultrasound	A	○						○
11	Mobile X-ray	A		○					○
12	Sterilizers	A					○		×
13	Anaesthesia	A		○					○
14	Ventilators	A				○			○
23	Freezer ffp	A				○			○
30	Platelet incubator	A		○					○
31	Slide stainer	A				○			○
34	Blood chem stat analyzer	A				○			○
40	Cell counter >8 parameter	B				○			○
43	Electro-surgical unit	A	○						○

Table 3-3 Evaluation of Request (2)

H1 : Al Bashir Hospital

No.	Equipment	Existing Q'ty	Requested Q'ty	Existing Condition	A	Detail		
						B	C	D
1	Ambulances	3	2	Shortage of on-board equipment	2		2	
2	Lapascopy	2	1	1 unit for operation and another for diagnosis (deteriorated)	0	-	-	-
3	Defibrillator w/monitoring	2	3		3		3	
4	Dental Unit	3	1	1 unit deteriorated	1	1		
5	Incubator / Infant	28	5		5		5	
6	Incubator / Transportable	2	1	All deteriorated	1	1		
7	Ultrasound	2	2	1 unit is deteriorated, another unit is small type	2	1	1	
8	BEG	1	1	Handling 6 persons per day (reservation)	1		1	
9	Surgical microscope for neurology	0	1		1			1
10	CT scan	1	1		1		1	
11	Mobile X-ray	2	2		2		2	
12	Sterilizes	6	3	All deteriorated	3	3		
13	Anesthesia	8	5	5 units deteriorated (there are 7 operation rooms)	4	4		
14	Ventilators	6	5	3 units deteriorated	3	3		
15	Inverted microscope	0	1		1			1
16	Teaching microscope w/video system	0	1		0	-	-	-
17	Centrifuge for blood comp prep	0	2		0	-	-	-
18	Water purification	1	1	Deteriorated	0	-	-	-
19	Central monitoring system	1	1	Central monitor unserviceable, other terminals deteriorated	1	1		
20	Phase contrast microscope	0	1		1			1
21	Light microscope w/Camera	0	1	1 unit without camera	1			1
22	Auto micro-biol ana/BLD culture	0	1		0	-	-	-
23	Freezer ffp	0	2		0	-	-	-
24	Delfia plate fluorometer	0	1		0	-	-	-
25	CO2 incubator	2	1	Both are old type and deteriorated	1	1		
26	Tissue culture cabinet	2	1	All deteriorated	1	1		
27	Lamina flow	0	2	All deteriorated	0	-	-	-
28	Refr. centrifuge/ Bench top	1	3	Deteriorated	3	1	2	
29	Automated coagulometer	0	1		0	-	-	-
31	Slide stainer	1	3	All deteriorated	1	1		
32	Blood chem main analyzer	0	1		0	-	-	-
33	Mass spectrophotometer	0	1		0	-	-	-
34	Blood chem stat analyzer	1	2		1	1		
35	Cytospin	2	2	1 unit deteriorated	1	1		
36	Electron microscope	0	1		0	-	-	-
37	Auto-tissue processor	3	1	1 unit deteriorated	1	1		
38	Flow cytometer	0	1		0	-	-	-
39	Cell counter >20 parameter	0	1		0	-	-	-
40	Cell counter >8 parameter	1	2		1		1	
41	Multi-head microscope	1	2		1		1	
42	Florescent microscope	1	1		1		1	
43	Electro-surgical unit	6	3	4 units deteriorated	3	3		

H2 : Al Hussein Hospital

No.	Equipment	Existing Q'ty	Requested Q'ty	Existing Condition	A	Detail		
						B	C	D
1	Ambulances	3	1	1 vehicle having necessary equipment, 2 vehicles used only for transportation purpose	0	--	--	--
2	Lapascopy	0	1		0	--	--	--
3	Defibrillator w/monitoring	2	1		1		1	
4	Dental Unit	0	1		1			1
5	Incubator / Infant	6	5		5		5	
6	Incubator / Transportable	0	1		1			1
7	Ultrasound	2	1	1 unit deteriorated	1	1		
11	Mobile X-ray	3	1	1 unit deteriorated	1	1		
12	Sterilizers	2	1	1 unit deteriorated	1	1		
13	Anaesthesia	3	2	3 units deteriorated (there are 5 operation rooms)	2	2		
14	Ventilators	2	4	1 unit deteriorated(9 beds in ICU)	2	1	1	
23	Freezer ffp	1	2	Deteriorated	0	--	--	--
31	Slide stainer	0	1		1			1
34	Blood chem stat analyzer	0	1		1			1
40	Cell counter >8 parameter	1	2		1		1	
43	Electro-surgical unit	3	1	1 unit deteriorated	1	1		

H3 : Al Zarqa Hospital

No.	Equipment	Existing Q'ty	Requested Q'ty	Existing Condition	A	Detail		
						B	C	D
1	Ambulances	4	2	3 vehicles having necessary equipment, 1 vehicle used only for transportation purpose	0	--	--	--
2	Lapascopy	1	1	Used for diagnosis	1	1		
3	Defibrillator w/monitoring	6	2	1 unit deteriorated	2	1	1	
4	Dental Unit	2	1	1 unit deteriorated	0	--	--	--
5	Incubator / Infant	13	5	4,000 deliveries/year	5		5	
6	Incubator / Transportable	2	1	All deteriorated	1	1		
7	Ultrasound	2	2	1 unit deteriorated	2	1	1	
8	EKG	0	1		0	--	--	--
11	Mobile X-ray	3	1	1 unit deteriorated	1	1		
12	Sterilizers	2	2	1 unit deteriorated	2	1	1	
13	Anaesthesia	10	3	6 operation rooms	1		1	
14	Ventilators	5	4		4	1	3	
23	Freezer ffp	1	2		0	--	--	--
31	Slide stainer	0	1		1			1
34	Blood chem stat analyzer	0	1		1			1
35	Cytospin	0	1		1			1
41	Multi-head microscope	0	1		1			1
43	Electro-surgical unit	6	2	3 units deteriorated	2	2		

H4 : Ma'an Hospital

No.	Equipment	Existing Q'ty	Requested Q'ty	Existing Condition	A	Detail			
						B	C	D	
1	Ambulances	3	1	2 vehicles having necessary equipment	0	-	-	-	
3	Defibrillator w/monitoring	1	1		1		1		
4	Dental Unit	0	1		1			1	
5	Incubator / Infant	6	3		2 units deteriorated	3	2	1	
6	Incubator / Transportable	1	1		Deteriorated	1	1		
7	Ultrasound	1	1		Deteriorated	1	1		
10	CT scan	0	1		0	-	-	-	
11	Mobile X-ray	0	1		1			1	
12	Sterilizers	2	2	2 units deteriorated	1	1			
13	Anaesthesia	2	1	1 unit deteriorated (2 operation rooms)	1	1			
14	Ventilators	3	2	1 unit deteriorated	0	-	-	-	
43	Electro-surgical unit	2	1	All deteriorated	1	1			

H5 : Princess Basma Hospital

No.	Equipment	Existing Q'ty	Requested Q'ty	Existing Condition	A	Detail		
						B	C	D
1	Ambulances	3	1	1 vehicle having necessary equipment	0	-	-	-
2	Lapscoscopy	0	0		0	-	-	-
3	Defibrillator w/monitoring	2	2	Both deteriorate	2	2		
4	Dental Unit	4	1	1 unit deteriorated (requested for operation)	0	-	-	-
7	Ultrasound	1	1		1		1	
8	EEG	0	1		1			1
10	CT scan	1	1		1		1	
11	Mobile X-ray	4	1	1 unit deteriorated	1	1		
12	Sterilizers	2	1	Both deteriorated	1	1		
13	Anaesthesia	5	3	Monitor required	1		1	
14	Ventilators	2	3		2		2	
23	Freezer ffp	2	1	1 unit deteriorated	1	1		
30	Platelet incubator	0	2		2			2
31	Slide stainer	0	1		1			1
34	Blood chem stat analyzer	0	1		1			1
35	Cytospin	0	1		1			1
39	Cell counter >20 parameter	0	1		0	-	-	-
40	Cell counter >8 parameter	0	1		1			1
41	Multi-head microscope	0	1		1			1
43	Electro-surgical unit	4	1	1 units deteriorated	1	1		

H6 : Moad bin Jabl Hospital

No.	Equipment	Existing Q'ty	Requested Q'ty	Existing Condition	A	Detail		
						B	C	D
1	Ambulances	1	0	Deteriorated	0	-	-	-
3	Defibrillator w/monitoring	0	1		1			1
4	Dental Unit	1	1		1		1	
5	Incubator / Infant	2	3	1 unit deteriorated	3	1	2	
6	Incubator / Transportable	1	1	Deteriorated	1	1		
7	Ultrasound	1	1	Deteriorated	1	1		
11	Mobile X-ray	1	1	Deteriorated	1	1		
12	Sterilizers	2	1	Both deteriorated	1	1		
13	Anaesthesia	2	1	Both deteriorated (2 operation rooms)	1	1		
14	Ventilators	0	1		1			1
43	Electro-surgical unit	0	1		1			1

H7 : Abu Obeida Hospital

No.	Equipment	Existing Q'ty	Requested Q'ty	Existing Condition	A	Detail		
						B	C	D
1	Ambulances	2	0	1 vehicle deteriorated, 1 vehicle used for transportation only	0	-	-	-
3	Defibrillator w/monitoring	1	1		1		1	
4	Dental Unit	1	1		1		1	
5	Incubator / Infant	2	3	1 unit deteriorated	3	1	2	
6	Incubator / Transportable	1	1	Deteriorated	1	1		
7	Ultrasound	1	1	Deteriorated	1	1		
11	Mobile X-ray	1	1	Deteriorated	1	1		
12	Sterilizers	2	1	Both deteriorated	1	1		
13	Anaesthesia	2	2	Both deteriorated (2 operation rooms)	1	1		
14	Ventilators	0	1		1			1
43	Electro-surgical unit	1	1	Deteriorated	1	1		

H8 : Ramtha Hospital

No.	Equipment	Existing Q'ty	Requested Q'ty	Existing Condition	A	Detail		
						B	C	D
1	Ambulances	3	0	2 units deteriorated, no on-board equipment	0	-	-	-
3	Defibrillator w/monitoring	1	1		1		1	
6	Incubator / Transportable	0	1		1			1
12	Sterilizers	1	1		1		1	
13	Anaesthesia	2	2	1 unit deteriorated (2 operation rooms)	2	1	1	
14	Ventilators	0	1		1			1
43	Electro-surgical unit	1	1	Deteriorated	1	1		

H9 : Karak Hospital

No.	Equipment	Existing Q'ty	Requested Q'ty	Existing Condition	A	Detail		
						B	C	D
1	Ambulances	3	1	1 vehicle having necessary equipment, 2 vehicles used for transportation only	0	-	-	-
3	Defibrillator w/monitoring	1	1		1		1	
6	Incubator / Transportable	1	1		1		1	
12	Sterilizers	2	1		1	1		
13	Anaesthesia	2	4	1 unit deteriorated	2	1	1	
14	Ventilators	3	3	1 unit deteriorated	0	-	-	-
43	Electro-surgical unit	1	1		1		1	

H10 : Muta Health Center

No.	Equipment	Existing Q'ty	Requested Q'ty	Existing Condition	A	Detail		
						B	C	D
1	Ambulances	1	1	Used for transportation only	0	-	-	-
3	Defibrillator w/monitoring	0	1		0	-	-	-
4	Dental Unit	1	1		0	-	-	-
5	Incubator / Infant	0	2		0	-	-	-
11	Mobile X-ray	0	1		0	-	-	-
12	Sterilizers	0	1		0	-	-	-
40	Cell counter >8 parameter	0	1		0	-	-	-
41	Electro-surgical unit	0	1		0	-	-	-

H11 : Princess Badia Hospital

No.	Equipment	Existing Q'ty	Requested Q'ty	Existing Condition	A	Detail		
						B	C	D
1	Ambulances	1	1	Deteriorated	1		1	
3	Defibrillator w/monitoring	1	1		1		1	
5	Incubator / Infant	12	6		6		6	
6	Incubator / Transportable	1	2	Deteriorated	2	1	1	
7	Ultrasound	1	1	Deteriorated	1	1		
11	Mobile X-ray	1	1		1		1	
12	Sterilizers	2	1		0	-	-	-
13	Anaesthesia	2	1		1		1	
14	Ventilators	0	1		1			1
23	Freezer ffp	1	1		1		1	
30	Platelet incubator	0	2		2			2
31	Slide stainer	0	1		1			1
34	Blood chem stat analyzer	0	1		1			1
40	Cell counter >8 parameter	0	1		1			1
43	Electro-surgical unit	1	1	Deteriorated	1	1		

Note: A, B, C and D in the list show the following quantity :

A = Total quantity, B = Replacement, C = Additional, D = New

Table 3-4 List of Planned Equipment Classified by Hospital

No.	Equipment	Total No.	Final No.											
			H1	H2	H3	H4	H5	H6	H7	H8	H9	H10	H11	
M- 1	Ambulances	3	2	0	0	0	0	0	0	0	0	0	0	1
M- 2	Lapscoscopy	1	0	0	1	-	0	-	-	-	-	-	-	-
M- 3	Defiberillator w/monitoring	14	3	1	2	1	2	1	1	1	1	1	0	1
M- 4	Dental Unit	5	1	1	0	1	0	1	1	-	-	-	0	-
M- 5	Incubator / Infant	30	5	5	5	3	-	3	3	-	-	-	0	6
M- 6	Incubator / Transportable	10	1	1	1	1	-	1	1	1	1	1	-	2
M- 7	Ultrasound	10	2	1	2	1	1	1	1	-	-	-	-	1
M- 8	EEG	2	1	-	0	-	1	-	-	-	-	-	-	-
M- 9	Surgical microscope for neurology	1	1	-	-	-	-	-	-	-	-	-	-	-
M- 10	CT scan	2	1	-	-	0	1	-	-	-	-	-	-	-
M- 11	Mobile X-ray	9	2	1	1	1	1	1	1	-	-	-	0	1
M- 12	Sterilizers	12	3	1	2	1	1	1	1	1	1	1	0	0
M- 13	Anaesthesia	16	4	2	1	1	1	1	1	2	2	-	-	1
M- 14	Ventilators	15	3	2	4	0	2	1	1	1	0	-	-	1
M- 15	Inverted microscope	1	1	-	-	-	-	-	-	-	-	-	-	-
M- 16	Central monitoring system	1	1	-	-	-	-	-	-	-	-	-	-	-
M- 17	Phase contrast microscope	1	1	-	-	-	-	-	-	-	-	-	-	-
M- 18	Light microscope w/Camera	1	1	-	-	-	-	-	-	-	-	-	-	-
M- 19	Freezer ffp	2	0	0	0	-	1	-	-	-	-	-	-	1
M- 20	CO2 incubator	1	1	-	-	-	-	-	-	-	-	-	-	-
M- 21	Tissue culture cabinet	1	1	-	-	-	-	-	-	-	-	-	-	-
M- 22	Refr. centrifuge/ Bench top	3	3	-	-	-	-	-	-	-	-	-	-	-
M- 23	Platelet incubator	4	-	-	-	-	2	-	-	-	-	-	-	2
M- 24	Slide stainer	5	1	1	1	-	1	-	-	-	-	-	-	1
M- 25	Blood chem stat analyzer	5	1	1	1	-	1	-	-	-	-	-	-	1
M- 26	Cytospin	3	1	-	1	-	1	-	-	-	-	-	-	-
M- 27	Auto-tissue processor	1	1	-	-	-	-	-	-	-	-	-	-	-
M- 28	Cell counter >8 parameter	4	1	1	-	-	1	-	-	-	-	-	0	1
M- 29	Multi-head microscope	3	1	-	1	-	1	-	-	-	-	-	-	-
M- 30	Florescent microscope	1	1	-	-	-	-	-	-	-	-	-	-	-
M- 31	Electro-surgical unit	13	3	1	2	1	1	1	1	1	1	1	0	1

- H1 : Al Bashir Hospital
- H2 : Al Hussein Hospital
- H3 : Al Zarqa Hospital
- H4 : Ma'an Hospital
- H5 : Princess Basma Hospital
- H6 : Moadh bin Jabl Hospital
- H7 : Abu Obeida Hospital
- H8 : Ramtha Hospital
- H9 : Karak Hospital
- H10 : Muta Health Center
- H11 : Princess Badia Hospital

3.3 Basic Plan

3.3.1 Site Condition

(1) Environmental Conditions

Environmental conditions of rooms accommodating CT scanners and other equipment assumed for equipment design are described as follows.

1) CT scanner room

The air-conditioning systems for the CT scanning room, the operation room, and the machine room will be separated from those of the hospital facility. The air-conditioning systems will be installed by the Jordanian side and are expected to have the ability to maintain temperature and humidity conditions shown in Table 3-5.

Table 3-5 Temperature and Humidity Requirements

Room	Temperature	Relative Humidity
CT scanning room	20~26°C±2°C	20~70%
Operation room	10~28°C	20~70%
Machine room	10~28°C	20~70%

2) Other rooms

Rooms other than the CT scanning room are in principle equipped with heating systems, while the cooling system will be provided for the X-ray room only. Temperature and humidity conditions for rooms accommodating medical equipment other than CT scanners are as follows:

Temperature: 0~40°C

Relative humidity: 30~80%

(2) Buildings

The CT scanner room will be designed and constructed by the Jordanian side in accordance with laws, regulations and standards enforced in Jordan, in the relevant areas including medicine, radiation, building, fire-proofing, and environment. Also, the CT scanning room has to withstand heavy load of 1,600 kg per 1m² of floor area, and if it exceeds the current maximum allowable load, reinforcement will be required, which will also be responsibility of the Jordanian side. The detailed construction plan will be developed and agreed among the Jordanian side (Ministry of Health and related organizations), equipment suppliers and manufacturers, and the consultant.

(3) Utilities

1) Power Supply

Supply system:	3-phase, 4-line 220/380V±5%
Frequency:	50Hz±0.5Hz
Receiving voltage:	3,300V
Plug type:	The BS-conformed BF type is most widely used, with B3 and B types being used in some buildings and rooms. Details need to be checked at the time of equipment manufacture.
Supply circuit:	A separate circuit will be provided from the receiving transformer to the CT scanner.
Grounding:	Again, separate grounding for the CT scanner, with grounding resistance of 100Ω or less, will be provided. Grounding with other sources must be avoided under any circumstances.

Details will be decided by the Jordanian side (Ministry of Health and related organizations), equipment suppliers and manufacturers, and the consultant, after selection of equipment.

2) Water Supply

Water pressure: 0.3~0.5Mpa
 Quality: pH 6.5~9.0
 Hardness (CaCO₃): 500mg/liter

3.3.2. Equipment Plan

The equipment selected based on the Section 3.1 and 3.2 are listed as follows. The numerical values in specifications are just for reference and give only rough ideas.

Table 3-6 List of Equipment

No.	Equipment Name	Q'ty	Major Specification / Configuration
M-1	Ambulances	3	4WD type with stretcher, medical instrument Package
M-2	Laparoscopy	1	Laparoscopic set for diagnostic set and operative surgery (cholecystectomy, appendicotomy and vagotomy) Configuration 1. Endoscopic TV system 2. Endoscopic TV Monitor 3. Xenon light source 4. Telescope : 0°, 10 mm 5. Electro surgical unit 6. High flow insufflator etc.
M-3	Defibrillator w/ monitoring	14	Defibrillator and 1-channel ECG large CRT monitor Portable type, fixed unit with a built - in recorder battery type with cart with selftest capability
M-4A	Dental unit (A)	2	Main unit with chair, air compressor
M-4B	Dental unit (B)	2	Dental unit (A) with Mobile X-Ray unit
M-4C	Dental unit (C)	1	(60kvp) Dental unit (A) with treatment set for operation

No.	Equipment Name	Q'ty	Major Specification / Configuration
M-5	Incubator (Infant)	30	Microprocessor based servo controlled type with flat touch type controls
M-6	Incubator (Transportable)	10	Double wall hood transportable type with collapsible cart and built – power pack
M-7A	Ultrasound (A)	2	High resolution main unit with printer and Doppler with electronic probes (3 types) more than 9–inch CRT monitor, more than 128 element
M-7B	Ultrasound (B)	8	Main unit with printer with electronic probes (2 types) More than 9–inch CRT monitor, more than 128 element
M-8	EEG	2	Microprocessor based, Channel : 16 ch, with cart
M-9	Surgical microscope for Neurology	1	Mobil type
M-10A	CT scanner (A)	1	Specification <ul style="list-style-type: none"> 1. Whole body, Slip Ring Type 2. Scan time : ≤ 1.5 sec. 3. Slice thickness : ≤ 2 mm 4. Heat capacity : ≤ 2 MHU 5. Gantry aperture : ≤ 65 cm (spiral scan : option)
M-10B	CT scanner (B)	1	Specification <ul style="list-style-type: none"> 1. Whole body, R/R Type 2. Scan time : ≤ 2.0 sec 3. Gantry aperture : ≤ 65 cm

No.	Equipment Name	Q'ty	Major Specification / Configuration
M-11	Mobile X-Ray	9	<p>Configuration</p> <ol style="list-style-type: none"> 1. capacitor discharge or inverter-type high voltage unit 1 2. X-Ray tube unit 1 3. Collimator 1 4. Cart 1 <p>Specifications</p> <ol style="list-style-type: none"> 1. Microprocessor type 2. Tube voltage (high) : 125 3. Power supply : Automobile battery (Anatomical program : option)
M-12	Sterilizer	12	Microprocessor controlled free stand type, Multi programmed
M-13	Anaesthesia	16	<p>Configuration</p> <ol style="list-style-type: none"> 1. Built-in anesthetic ventilator 2. Two vaporizer, fluothane and enflurane 3. Spirometer 4. Oxygen monitor 5. Large scale B.P. meter 6. Patient monitor etc.
M-14	Ventilator	15	<p>Specifications</p> <ol style="list-style-type: none"> 1. Sophisticated, microprocessor controlled type 2. Built-in driving air generator 3. Re-usable type breathing circuit and disposable breathing circuit
M-15	Inverted microscope	1	<p>Configuration</p> <ol style="list-style-type: none"> 1. Microscope stands (including 50 W halogen illuminator) 2. Binocular observation tube 3. Objectives 4X, 10X, 20X, 40X (each 1) 4. Eyepiece 10X

No.	Equipment Name	Q'ty	Major Specification / Configuration
M-16	Central monitoring system	1	Configuration 1. Central monitor : 1 2. Bedside monitor : 6 Specification 1. CRT monitor 2. ECG, NIBP, IBP, temperature, respiration (Color bed side monitor : option)
M-17	Phase contrast microscope	1	Research microscope (binocular version) with phase contrast, darkfield attachment
M-18	Light microscope with camera	1	Research microscope (binocular version) with automatic photomicrographic system
M-19	Freezer ffp	2	Specifications 1. Inner capacity : more than 350 litter 2. Temperature : approx. -85°C
M-20	CO ₂ Incubator	1	Specifications 1. Inner capacity : more than 150 litter 2. Automatic control of O ₂ , CO ₂ content 3. Number of door and shelf : more than 6
M-21	Tissue culture cabinet	1	Specifications 1. Laminar flow type 2. Sterilizing lamp and gas burner 3. Dimensions : width more than 1900mm
M-22	Refr. centrifuge with bench top	3	Configuration 1. Rotor : 4 types (50 ml × 8, 15 ml × 48, 10 ml × 84, microplate type) Specifications 1. Maximum speed : approx. 8000rpm 2. Type : refrigerated type
M-23	Platelet incubator	4	Blood collecting bottle more than 30 pieces type
M-24	Slide stainer	5	Specifications 1. Slide capacity : 60 slides

No.	Equipment Name	Q'ty	Major Specification / Configuration
M-25	Blood chemistry stat analyzer	5	Specifications 1. Parameter : BUN, Glucose, Sodium, Potassium, Total protein, Creatinine, Calcium, ALT, AST, CPK
M-26	Cytospin	3	Specifications 1. Number of specimens processed at a time max. 12 specimens speed : 500 – 2500rpm
M-27	Auto-tissue processor	1	Specifications 1. Glass beaker : 1200 cc x 10 2. Paraffin pot : more than 1000 cc x 2
M-28	Cell counter (8 parameter)	4	Specifications 1. Parameters (WBC, RBC, HGB, HCT, MCV, MCH, MCHC, PLT, Auto dilutor and built-in printer)
M-29A	Multi-head microscope(A)	2	Research microscope (biocular version) with multi viewing attachment
M-29B	Multi-head microscope(B)	1	Research microscope (biocular version) with dual viewing attachment
M-30	Fluorescent microscope	1	Research microscope (biocular version) with reflected light fluorescence attachment
M-31	Electro-surgical unit	13	Type : cutting, coagulation, mixture, bipolar

Table 3-7 Quantity in each Hospital

No.	Equipment	Total Quantity	Quantity										
			H1	H2	H3	H4	H5	H6	H7	H8	H9	H10	
M- 1	Ambulances	3	2	0	0	0	0	0	0	0	0	0	1
M- 2	Lapcascopy	1	0	0	1	-	0	-	-	-	-	-	-
M- 3	Defiberillator w/monitoring	14	3	1	2	1	2	1	1	1	1	1	1
M- 4A	Dental Unit(A)	2	-	-	-	-	-	1	1	-	-	-	-
M- 4B	Dental Unit(B)	2	-	1	-	1	-	-	-	-	-	-	-
M- 4C	Dental Unit(C)	1	1	-	-	-	-	-	-	-	-	-	-
M- 5	Incubator / Infant	30	5	5	5	3	-	3	3	-	-	-	6
M- 6	Incubator / Transportable	10	1	1	1	1	-	1	1	1	1	1	2
M- 7A	Ultrasound(A)	2	1	-	-	-	1	-	-	-	-	-	-
M- 7B	Ultrasound(B)	8	1	1	2	1	-	1	1	-	-	-	1
M- 8	EEG	2	1	-	0	-	1	-	-	-	-	-	-
M- 9	Surgical microscope for neurology	1	1	-	-	-	-	-	-	-	-	-	-
M- 10A	CT scan(A)	1	1	-	-	-	-	-	-	-	-	-	-
M- 10B	CT scan(B)	1	1	-	-	-	-	-	-	-	-	-	-
M- 11	Mobile X-ray	9	2	1	1	1	1	1	1	-	-	-	1
M- 12A	Sterilizers(A)	3	2	-	-	-	1	-	-	-	-	-	-
M- 12B	Sterilizers(B)	3	1	1	1	-	-	-	-	-	-	-	-
M- 12C	Sterilizers(C)	6	-	-	1	1	-	1	1	1	1	1	-
M- 13	Anaesthesia	16	4	2	1	1	1	1	1	2	2	2	1
M- 14	Ventilators	15	3	2	4	0	2	1	1	1	0	1	1
M- 15	Inverted microscope	1	1	-	-	-	-	-	-	-	-	-	-
M- 16	Central monitoring system	1	1	-	-	-	-	-	-	-	-	-	-
M- 17	Phase contrast microscope	1	1	-	-	-	-	-	-	-	-	-	-
M- 18	Light microscope w/Camera	1	1	-	-	-	-	-	-	-	-	-	-
M- 19	Freezer ffp	2	0	0	0	-	1	-	-	-	-	-	1
M- 20	CO2 incubator	1	1	-	-	-	-	-	-	-	-	-	-
M- 21	Tissue culture cabinet	1	1	-	-	-	-	-	-	-	-	-	-
M- 22	Refr. centrifuge/ Bench top	3	3	-	-	-	-	-	-	-	-	-	-
M- 23	Platelet incubator	4	-	-	-	-	2	-	-	-	-	-	2
M- 24	Slide stainer	5	1	1	1	-	1	-	-	-	-	-	1
M- 25	Blood chem stat analyzer	5	1	1	1	-	1	-	-	-	-	-	1
M- 26	Cytospin	3	1	-	1	-	1	-	-	-	-	-	-
M- 27	Auto-tissue processor	1	1	-	-	-	-	-	-	-	-	-	-
M- 28	Cell counter >8 parameter	4	1	1	-	-	1	-	-	-	-	-	1
M- 29A	Multi-head microscope(A)	2	1	-	-	-	1	-	-	-	-	-	-
M- 29B	Multi-head microscope(B)	1	-	-	1	-	-	-	-	-	-	-	-
M- 30	Florescent microscope	1	1	-	-	-	-	-	-	-	-	-	-
M- 31	Electro-surgical unit	13	3	1	2	1	1	1	1	1	1	1	1

- H1: Al Bashir Hospital
- H2: Al Hussein Hospital
- H3: Al Zarqa Hospital
- H4: Ma'an Hospital
- H5: Princess Basma Hospital
- H6: Moadh bin Jabl Hospital
- H7: Abu Obeida Hospital
- H8: Ramtha Hospital
- H9: Karak Hospital
- H10: Princess Badia Hospital

Note: Code number on Princess Badia Hospital is changed from H11 to H10.

3.3.3 Basic Design Drawing

The space for CT-Scanners are shown in Figure 3.1 and 3.2 because those equipment ought to be installed in the specified structure.

Al Bashir Hospital

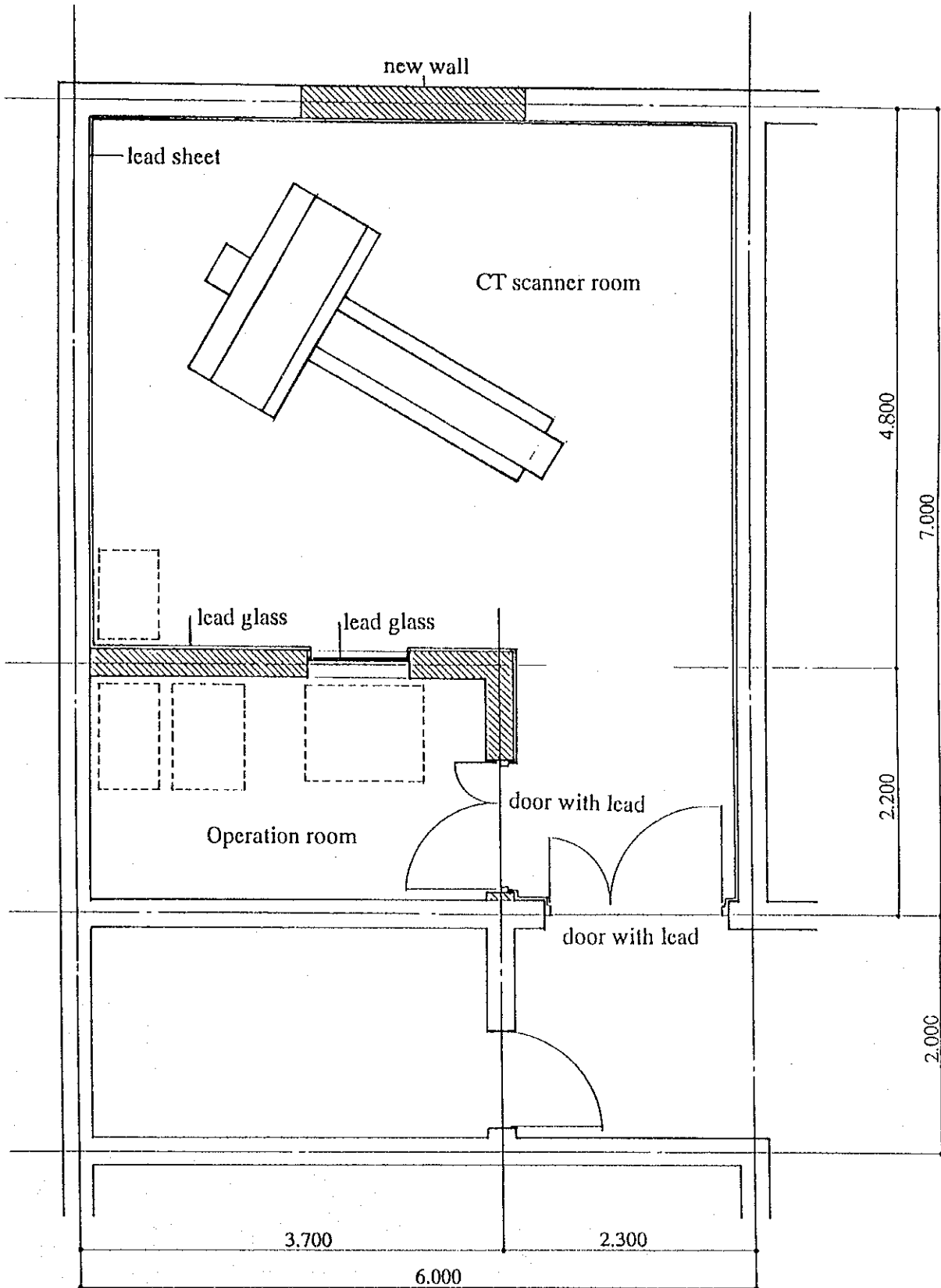


Fig. 3-1 Layout Plan - 1

Princess Basma Hospital

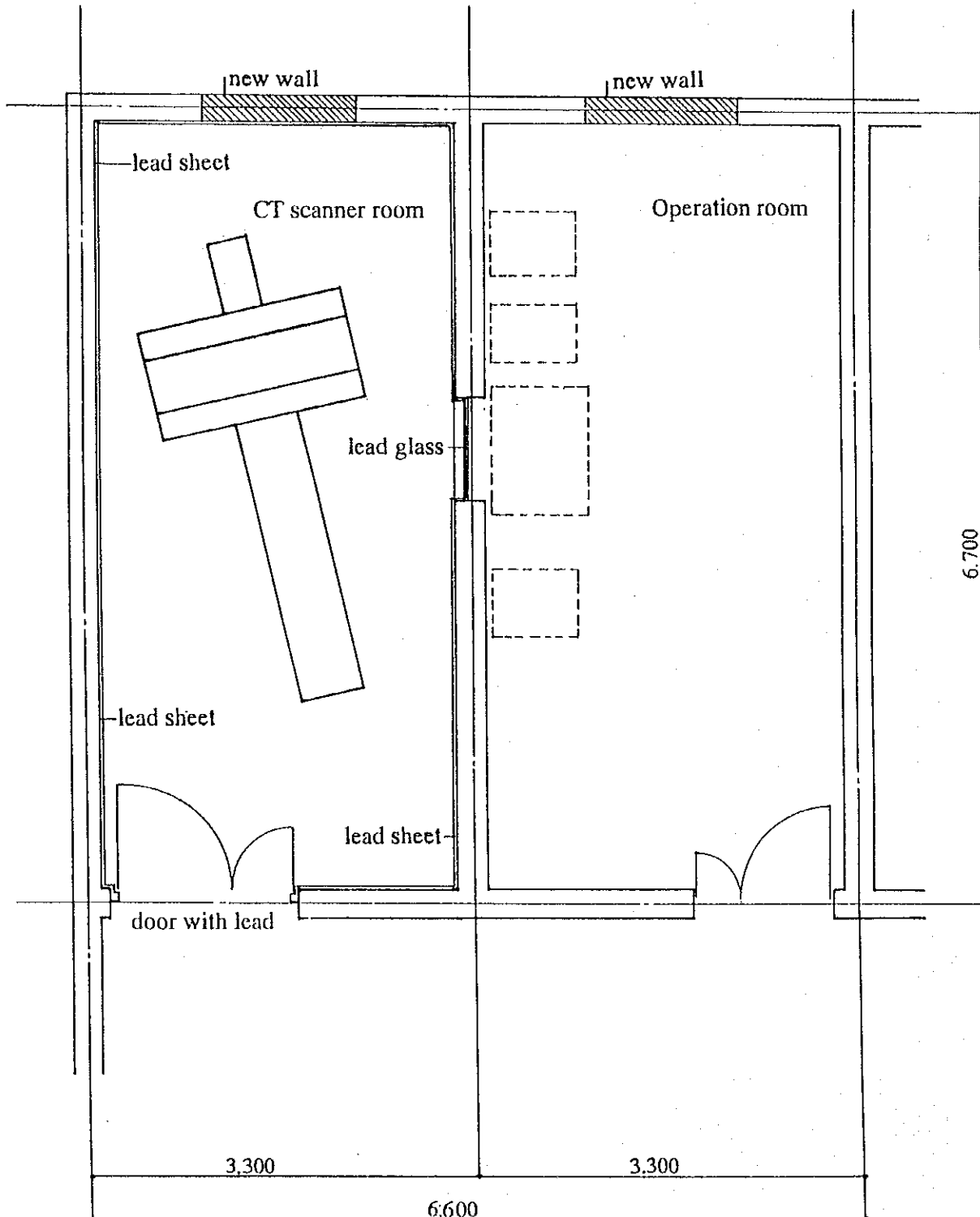


Fig. 3-2 Layout Plan - 2

3.4 Implementation Plan

3.4.1 Planning Framework

The project will consist of construction work related to the addition and remodeling of buildings and equipment to be conducted by the Jordanian side, and procurement of medical equipment under grant aid of the Japanese government. Directorate of Planning and Project, Ministry of Health, Jordan, will retain a Japanese consultant to perform detailed design, preparation of tender documents, tender evaluation, and contract administration and supervision in cooperation and continuous consultation with Technical Committee appointed by His Excellency Ministry of Health headed by His Royal Highness Prince Firas Bin Ra'ad including the installation of equipment on its behalf. The implementation organization is shown in Fig.3-3.

Member of Technical Committee:

- ① Prince Firas Bin Ra'ad (Advisor)
- ② Dr. Fuad Al-Ayed (Director of Planning & Projects)
- ③ Dr. Sameh Al-Sharo (Director of Maintenance)
- ④ Ihsan Farkouh (Bio-Med engineer)
- ⑤ Iyad Malkawa (Bio-Med engineer)

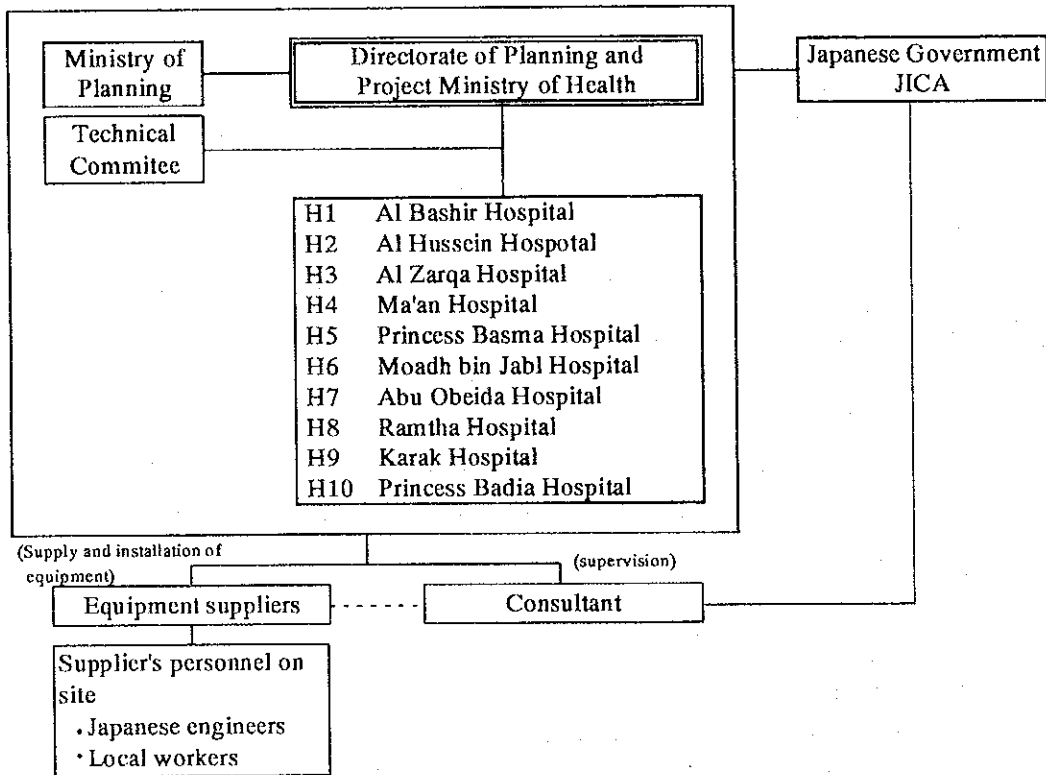


Fig. 3-3 Project Implementation Organization

3.4.2 Major Considerations in Project Planning

In planning and implementing the project, the following factors will require special attention.

- (1) Need for careful preparation work to ensure smooth implementation within a relatively short period of time

Considering that transportation of equipment and tax exemption procedures will require more than one month each, prior study and preparation will be critical.

- (2) Execution of construction work without interrupting hospital operation

Al Bashir and Princess Basma hospitals will require partial remodeling of existing buildings to accommodate CT scanners. The remodeling work will likely

produce noise and dust, so that prior discussions with contractors and hospital staff will be required to make detailed arrangements to avoid the adverse effect on hospital operation, including the construction period and the selection of appropriate construction methods.

- (3) Development of an implementation plan to ensure the efficient use of resources for geographically scattered sites

The hospitals are scattered in a wide area extending 110km north and 210km south, and efficient resource mobilization including transportation, installation and inspection of equipment, the dispatching of engineers will be required for successful implementation of the project.

- (4) Fasting (Ramadan)

The plan should minimize construction and other activities during the month.

3.4.3 Supervision Plan

The consultant will organize a project execution team responsible for detailed design of the project and supervision on its progress so as to complete the project within a specific period of time, all in compliance with the grant aid policy of the Japanese government, terms and conditions of the consulting agreement, and the intent and objective of the basic design. In the supervision process, in particular, the consultant is expected to ensure smooth implementation of the project by sending its engineers, as required, for approval of shop drawings of equipment, attendance at factory inspection, attendance at field installation, and inspection upon delivery. At the same time, the consultant will monitor the progress of construction work executed by the Jordanian side to see if it is performed at a pace to allow scheduled delivery of equipment, and if any delay is found, the consultant will recommend necessary measures to the Jordanian side and see to it that the entire project progresses according to the predetermined schedule.

3.4.4 Equipment Procurement Plan

(1) Method of procurement

Equipment to be supplied under the project will be procured under a lump sum contract following a tender procedure participated by equipment suppliers (trading companies). All the equipment will be delivered on a full turn-key basis and should preferably be made in Japan, except for third country's products that satisfy the following conditions.

- CT scanner

Products have agents with well-established technical service and support in Jordan.

- Laparoscopy
- Incubator/Infant
- Incubator/Transportable
- Ultrasound
- Mobile X-ray
- Anaesthesia
- Ventilator
- Blood chem stat analyzer

Products meet the specification on quality and performance. Also, consumables and spare parts are readily available in Jordan.

(2) Method of transportation

Procured equipment will be shipped from a port near the place of manufacture, in a single shipment or several shipments, and will be landed at Aqaba Port located at the southern end of Jordan. Transportation will take approximately one month if shipped from Yokohama. From Aqaba, equipment will be transported by truck to each hospital. The longest transportation distance from the port to Moadh bin Jabl Hospital at the northern end is approximately 400km, which will run on fully paved roads.

3.4.5 Implementation Schedule

The project, if implemented under Japan's grant aid, will be proceeded in the following manner.

(1) Detailed Design

Based on the Basic Design Study report, detailed specifications for equipment will be determined, and tender documents will be prepared to obtain approval of related organizations. The process will take about 3 months.

(2) Manufacturing and Installation

The supply contractor will prepare working drawings for approval and shop drawings, and manufacture and ship equipment to Jordan. The contractor will also be responsible for all the delivery work in Jordan, from unloading, inland transportation, and installation to completion of test run at each site.

(3) Completion and acceptance

Upon installation, each equipment will be test run in the presence of personnel of Ministry of Health, the consultant, and related parties to check that it conforms to design specifications, and will be delivered to the Jordanian side to complete the project. The certificate of completion will be issued to the contractor by the Jordanian side. If all the works progress smoothly, the entire work up to equipment delivery and installation will take about 9 months.

The implementation schedule is summarized in Fig.3-4.

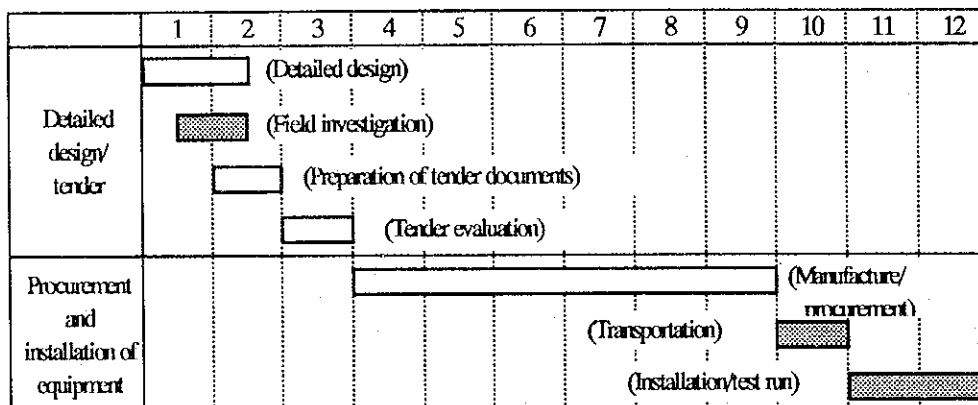


Fig. 3-4 Implementation Schedule

3.4.6 Scope of Work

(1) Scope of the Work of Japanese Side

- 1) Procurement, transportation, delivery, and installation of equipment at the sites;
- 2) Test run and adjustment of equipment, and instruction for maintenance;
- 3) Wiring from equipment to outlets, provided that outlets will be provided near equipment by the Jordanian side, including wiring from power sources; and
- 4) Consulting service related to detailed design, preparation of tender documents, tender evaluation, and supervision related to installation of equipment.

(2) Scope of the Work of Jordanian Side

- 1) Securing of a warehouse and temporary storage during the equipment installation period;
- 2) Unloading and landing of equipment at the port of import, and securing of necessary approvals and permits related to customs clearance;

- 3) Assistance in immigration procedures for Japanese personnel visiting the country in connection with the project, including entry, exist, and stay;
- 4) Adequate and effective operation and maintenance of equipment to be supplied under the grant aid program;
- 5) Bearing of all costs and expenses not covered by the grant aid program;
- 6) Payment of banking service fees to foreign exchange banks authorized by the Japanese government;
- 7) Construction of buildings and equipment required for operation and installation of equipment to be supplied, including:
- 8) Allocation of manpower required for operation and management of the project;
 - Foundation work and pit construction required for equipment installation
 - Electrical work required by equipment
 - Water supply and drainage work required by equipment- Gas supply work required by equipment
 - Air-conditioning work required by equipment
 - Lighting and ventilation work required by equipment
- 9) Procurement of fixtures and equipment not included in the equipment list; and
- 10) Procurement of chemical agents and consumables.

3.4.7 Preliminary Project Cost

If the project is implemented under Japan's grant aid, the Jordanian side is expected to bear the total estimated cost amounting 56,000JD (8.0 million yen). The breakdown is as follows:

(1) Construction Work

- Remodeling, repair, foundation work: 18,000JD
- Glazing work (lead glass): 8,000JD

(2) Utility Work

- Power supply work: 10,000JD
- Air conditioning work 20,000JD

CHAPTER 4 PROJECT EVALUATION AND CONCLUSION

Chapter 4 Project Evaluation and Conclusion

4.1 Major Benefits

Major benefits that can be accomplished or expected from implementation of the project are summarized in Table 4-1.

Table 4-1 Major Benefits of the Project and Improvements

	Current state and Issues	Measured Taken by the Project	Major Benefits and Improvements
1.	Deterioration or shortage of medical equipment often prevents proper treatment of common diseases with emphasis on primary health care.	To supply equipment that shows high levels of need and urgency in terms of ability to treat common diseases and meet the objective of focusing on primary health care.	Supplying medical equipment used for treatment of common diseases, that shows high levels of need and urgency, will facilitate proper and timely treatment of emergency cases. The result perfectly serves one of the country's medical policy objectives, the improvement of quality of primary health care (PHC).
2.	Deterioration of equipment due to the use exceeding service life may affect or disturb with many types of diagnosis services. For instance the deterioration or shortage of ultrasound adversely affects services at obstetrics and gynecology, radiology, emergency, clinical examination, and surgical operation departments.	To upgrade aged equipment including ultrasound at related departments including the obstetrics and gynecology department, and to supply incubators and mobile incubators for the obstetrics and gynecology department.	Provision of equipment for the obstetrics and gynecology department, including ultrasound incubators, and mobile incubators, will allow early detection of anomalous pregnancy and other ailments, thereby to help reduce fatalities of pregnant and parturient women. The similar effect can be expected for other departments, including radiology, emergency, clinical examination, and surgical operation departments, and adequate diagnosis and treatment achieved by new equipment will contribute to reduction of fatalities.
3.	Deterioration or shortage of equipment at hospitals in urban and rural areas	To supply medical equipment to hospitals in urban and rural areas.	New equipment will serve as the effective means of revitalizing the recipient hospitals throughout the country, including those in

<p>tends to demoralize medical staff including doctors, nurses, and paramedics, resulting in often substandard levels of medical service.</p>		<p>rural regions. In particular, the equipment will enable all the medical staff, including doctors, nurses, and paramedics, to provide the highest practicable level of medical service at affordable costs, thereby enabling the national hospitals to serve local communities more effectively.</p>
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Measured by the number of patients to be treated additionally, the benefits of the project will amount to 220,000 outpatients and 120,000 inpatients at the ten recipient hospitals, totaling 340,000 patients annually, including 80,000 and 30,000 at Princess Basma Hospital, 50,000 and 40,000 at Al Bashir Hospital, 30,000 and 40,000 at Princess Badia Hospital, respectively.

4.2 Validity of the Project

The major objective of the project is to supply medical equipment “primarily used for treatment of common diseases” in the country, as selected according to the levels of need and urgency.

The recipient hospitals handle a total of 1,050,000 outpatients annually (including 230,000 at Al Bashir Hospital, 150,000 at Princess Basma Hospital, and 40,000 at Princess Badia Hospital). New equipment is expected to benefit additional 220,000 (50,000 at Al Bashir Hospital, 80,000 at Princess Basma Hospital, and 30,000 at Princess Badia Hospital). Similarly, the recipient hospitals treat 440,000 inpatients annually (including 180,000 at Al Bashir Hospital, 50,000 at Princess Basma Hospital, and 50,000 at Princess Badia Hospital), and new equipment will benefit additional 120,000 (40,000 at Al Bashir Hospital, 30,000 at Princess Basma Hospital, and 40,000 at Princess Badia Hospital). Thus, the project will benefit 340,000 patients in total, in addition to 1,490,000 patients treated at present.

On the other hand, since equipment to be supplied the project will upgrade or replace existing equipment and thus can be operated with ease by applying currently available manpower and knowledge. The maintenance cost will be fully funded by the Ministry of Health, which has secured the maintenance cost (consumables) for major equipment amounting to 295,900JD (42 million yen) and an additional maintenance

cost of 172,400JD (24 million yen) (maintenance and spare parts). Thus, new equipment will be operated and maintained smoothly after installation.

Overall consideration of the above factors indicates that the project will produce major benefits shown above, contribute to the improvement of quality of medical service in the country, and provide proper medical service for a large number of population, thereby supporting the stability and growth of the country as a whole. For these areas, the study team has concluded that it is appropriate to implement the project under grant aid of the Japanese government.

4-3 Recommendations

As discussed earlier, the project is expected to bring significant benefits and contributes greatly to the improvement of public medical service covering the entire population in the country. Therefore, implementing the project under Japan's grant aid is justifiable and serves the program's intended purpose to a full extent. To maximize the effect of the project, however, initiatives on the Jordanian side are critical in the following areas.

(1) Short term recommendation

1) Organization and manpower

- a) For accurate and efficient inventory control of medicines and consumables, inventory records in ledger or other forms need to be made and maintained.
- b) Inspection and repair records need to be made and maintained.
- c) To train engineers with the ability to understand, prepare, and act according to maintenance manuals, operation manuals, and block diagrams in a continuous manner.
- d) To ensure that hospital staff responsible for operation and maintenance of medical equipment understand warranty conditions offered by manufacturers, including precaution where certain equipment cannot be eligible for warranty repair if unauthorized repair is made on the user side.

(Basically, sophisticated equipment cannot be repaired by the user, and can only be repaired by the manufacturer with fee)

2) Financial plan

- a) Financial management of national hospitals is controlled by Ministry of Health. Although the shift to autonomous management is being felt in response to the government's decision to adopt decentralization policy in 1993, strong government support is required to promote initiatives, including;
 - Continued subsidy; and
 - Subsidy for personnel expenses
- b) Need to develop financial plans and at least monitor monthly cash flow
- c) Need to conclude a maintenance contract on sophisticated equipment (with a fixed or variable maintenance fee), with budget allocation in the financial plan, particularly:
 - The annual maintenance cost for the CT scanner of standard type (including spare parts) ranging between 140,000JD should be allowed for.

(2) Middle and Long-term recommendation

1) Organization and manpower

- a) There is the shortage of nurses, laboratory technicians, and administrative staff compared to the facility size and the number of physicians available. In particular, the shortage of nurses compared to the number of physicians is rampant, and 124 – 310 nurses (2 – 2.2 times the total number of physicians) need to be added to the hospitals.
- b) The education and training system for physicians, laboratory technicians, nurses, and engineers does not satisfy present and potential demand, and improvement measures such as the establishment of the project focusing on promotion of professional education training need to be devised and

implemented.

- c) To ensure the effective use of a limited number of equipment, the centralized equipment management system needs to be established with a particular emphasis on the following areas:
 - Prevention of private use or unauthorized use during off-business hours; and
 - Efficient use of equipment to avoid duplication in various departments.

- d) To establish the hospital operation monitoring system for the following purposes:
 - To monitor operations of individual departments, the increase or decrease in the number of patients handled, and efficiency in management measured by various indicators, and to set up inspection and supervision items;
 - To clearly define division of responsibilities and authorities among individual departments, as well as incentives for improved operation; and

- e) To analyze the disease structure, and consider alternative measures to prevent or control the disease at source, including:
 - Vaccination
 - Prevention of injuries from traffic accidents through the improvement of transportation facilities.

2) Financial plan

- a) To supervise each hospital on financial plan
 - Provision of tax incentives
 - Subsidy

- b) To monitor that inspection and treatment fees are established at levels allowing reasonable recovery of initial investment, including efforts to effectuate:
 - Adjustment of the remuneration system according to inflation
 - Revision of inspection and treatment fees with price increases in

imported chemical agents, medicines and consumables due to the fluctuation of foreign exchange rates

- c) Measures to assure collection of remuneration
- d) Need to devise measures to provide medical service for the needy, including:
 - Expansion of the health insurance system
 - Establishment of the remuneration system according to income level
- e) Need to provide reserves for replacement of equipment in consideration to service life and deterioration due to aging, by applying the depreciation concept.
- f) Need for saving and adequate allocation of labor cost, in particular reconsideration of the remuneration system for paramedics who are in short supply
- g) Need to establish the cash flow control system in each hospital

APPENDICES

Appendix-1 Member List of Survey Team

1.1 Basic Design Survey Team

- | | |
|----------------------------------|---|
| 1. Mr. Itaru HAMAKAWA | Leader
Second Grand Aid Management Division,
Grant Aid Management Department,
JICA |
| 2. Dr. Takeki SHIINA, M.D.,Ph.D. | Technical Adviser
Bureau of International Cooperation,
International Medical Center of Japan,
Ministry of Health and Welfare |
| 3. Mr. Kazuo SEKIGUCHI | Project Manager
UNICO International Corporation |
| 4. Mr. Jun IKEDA | Facility Planner
UNICO International Corporation |
| 5. Mr. Hiroaki NAKATANI | Equipment Planner
UNICO International Corporation |

1.2 Explanation of Basic Design Draft Report Team

1. Dr. Takeki SHIINA, M.D.,Ph.D. Leader
Bureau of International Cooperation,
International Medical Center of Japan,
Ministry of Health and Welfare
2. Mr. Masaaki IWAI Project Coordinator
Third Training Division
Training Affairs Department,
JICA
3. Mr. Kazuo SEKIGUCHI Project Manager
UNICO International Corporation
4. Mr. Jun IKEDA Facility Planner
UNICO International Corporation
5. Mr. Hiroaki NAKATANI Equipment Planner
UNICO International Corporation

Appendix-2 Survey Schedule

2.1 Basic Design Survey Team (Nov.24,1994 to Dec.23,1994)

11/24	(Thu)	Narita (JL407) to Frankfurt (Sekiguchi, Ikeda, Nakatani)
11/25	(Fri)	Narita (JL407) to Frankfurt (Hamakawa, Shiina) Market Survey in Frankfurt (Sekiguchi, Ikeda, Nakatani)
11/26	(Sat)	Frankfurt (RJ122) to Amman
11/27	(Sun)	Meeting with JICA and Embassy of Japan Meeting with Ministry of Planning and Ministry of Health (MOH)
11/28	(Mon)	Surveying Al-Bashir Hospital and Al-Hussein Hospital
11/29	(Tue)	Surveying Princess Basma Hospital, Ramtha Hospital and Al-Zarqa Hospital
11/30	(Wed)	Surveying the Islamic Hospital and Arab Center for Heart and Special Surgery
12/1	(Thu)	Explanation of Minutes of Meeting
12/2	(Fri)	Internal Meeting
12/3	(Sat)	Discussion on Minutes of Meeting at MOH
12/4	(Sun)	Signing of Minutes of Meeting at MOH Meeting with JICA and Embassy of Japan Amman (RJ135) to Damascus (Hamakawa)
12/5	(Mon)	Amman (RJ111) to London (Shiina) Meeting with Directorate of Maintenance, MOH Surveying Abu Obaida Hospital and Ma'ad Bin Jabl Hospital
12/6	(Tue)	Surveying Karak Hospital and Mu'tah Health Center
12/7	(Wed)	Surveying Ma'an Hospital
12/8	(Thu)	Meeting with Directorate of Planning, MOH
12/9	(Fri)	Internal Meeting
12/10	(Sat)	Surveying Al Bashir Hospital
12/11	(Sun)	Meeting with Directorate of Planning and Information Center, MOH
12/12	(Mon)	Surveying Princess Basma Hospital, Princess Badia Hospital and Ramtha Hospital

12/13	(Tue)	Meeting with Directorate of Supply, MOH Surveying Al Hussein Hospital Meeting with Directorate of Planning, MOH
12/14	(Wen)	Surveying Al Zarqa Hospital Meeting with Directorate of Finance, MOH Meeting with WHO
12/15	(Thu)	Meeting with Directorate of Planning and Directorate of Maintenance
12/16	(Fri)	Internal meeting
12/17	(Sat)	Meeting with Directorate of Environment, MOH Meeting with Al-Bashir Hospital
12/18	(Sun)	Meeting with Directorate of Planning, MOH Surveying Medical Equipment Supplier
12/19	(Mon)	Meeting with Directorate of Planning, MOH Surveying Medical Equipment Supplier
12/20	(Tue)	Meeting with MOH JICA Embassy of Japan
12/21	(Wen)	Amman (RJ117) to London (Sekiguchi, Ikeda, Nakatani)
12/22	(Thu)	London (JL402) to Tokyo
12/23	(Fri)	Tokyo

2.2 Explanation of Basic Design Draft Report (Jan.27,1995 to Feb.5,1995)

1/27	(Fri)	Narita (JL407) to Frankfurt
1/28	(Sat)	Frankfurt (RJ122) to Amman
1/29	(Sun)	Meeting with JICA Meeting with Ministry of Health (MOH)
1/30	(Mon)	Meeting with Ministry of Health
1/31	(Tue)	Meeting with Ministry of Health
2/1	(Wen)	Meeting with Ministry of Health
2/2	(Thu)	Meeting with JICA and Embassy of Japan
2/3	(Fri)	Amman (RJ117) to London
2/4	(Sat)	London (NH202) to Narita
2/5	(Sun)	Tokyo

Appendix-3 Member List of Party Concerned in the Recipient Country

1. Ministry of Health

Firas Bin Ra'ad	Prince
Dr. Aref Batayneh	Minister of Health
Dr. Fuad Al – Ayed	Director of Planning & Projects
Teif Zuheir	General Director of Technical Affairs
Dr. Taissir Fardous	Directorate of Planning, Community Health & Project Management
Amin Munayer	Director of Finance Affairs
Ismail Al Saadi	Director of Supply
Hatem Said	Directorate of Supply
Hussain Alkhamdak	Head of Water Monitoring Division, Directorate of Environment
Dr. Khuloud Khayyat	Specialist, Community Health & Protect Management
Ihsan Farkouh	Consultant, Bio – Med engineer
Iyad Malkawi	Consultant, Bio – Med engineer
Dr. Sameh Al – sharo	Consultant, Director of Maintenance
Dr. Reyad A. Akar	Chief of Projects Department
Ahmed Ghawanmeh	Bio – Med engineer
Ratib Hinnawi	Chief of Health Planning
Manal Anani	Architect

2. Ministry of Planning

Salem Ghawi	Assistant Secretary General
Dr. Nael Al – Hajaj	Head of Officer, Bilateral Section
Tharwat Al – Awamleh	Resercher

3. The Royal Scientific Society

Tareq A. Hasan	Head of Maintenance and Repair Section
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4. Al – Bashir Hospital

Dr. Mahmoud Awad	General Director
Dr. Yousef Damen	Chief, Outpatient Clinic
Dr. Mohamad Shraideh	Chief, X – Ray Department
Dr. Mahamad Kilani	Vice Chief of Surgecal
Eid Baiwan	Chief, Nurse Officer
Dr. Odeh Al – Taleb	Chief, Nuclear Medicine Department
Dr. Sameer Al – Kayed	Chief, Radiotherapy Department
Dr. Idital Zaidan	Chief, Laboratory Department
Dr. Musa Hakous	Chief, Casualty Department
Dr. Ibrahim Oloom	Chief, Anesthesiology Department
Dr. Mohamad Shruicheh	Head, Radiolgy Department
Dr. Hateem Q. Al–Rimawi	Acting Chief of Laboratory Department
Dr. Abu – Sheikh Salam	Pediatrician
Rihab Halough	Medical Physicist
Ahmad Koshebye	Neurology Department
Dr. Janiet Merza	Director, National Blood Bank

5. Al – Hussein Hospital

Dr. Osama Samawi	Director of Salt Hospital
Jroh Akkawi	Bio – medical Engineer
Dr. Salah Saleh	Chief, X – ray department
Ibrahim Alyasori	Laboratory Technical

6. Princess Basma Teaching Hospital

Dr. N. Alzuobi	Director
Dr. Fuad Ammari	Chief of Staff
Dr. H. Omari	Radiology Chairman
Dr. R. Batshon	Microbiology Laboratory
Dr. Raymard Batch	Director, Laboratory
Dr. Kanaf Gharaibeh	Surgeon
Dr. Abbas F. Al – Chalabi	Anesthetist

7. Princess Badia Teaching Hospital

Dr. Farouk Al – Homoud Administrator
Dr. Mohid Rawashdeh Chief of Staff
M. Al – Sheyyab Chairman, Pediatric Department

8. Ramthe Hospital

Farouk Debajeh Director
Dr. Mahmud Kailani Specialist for Anesthesia
Dr. Amin Khoyri Chief, Surgeon

9. Al–Zarqa Hospital

Dr. Magairah. M. Director
Dr. Alkhatib. M. Assistant Director
Dr. Al – Khaiat Quality Assurance
Dr. Hanandah A. Chief of Physical Medicine & Rehabilitation Unit
Dr. Said Alazab Senior Pediatrician
Darwish Mohmad Director, Laboratory

10. Abu Obeida Hospital

Dr. Jathhi Ikour Assistant Director
Hanan Mahlwf Head of Nurse

11. Ma'ad Bin Jabal Hospital

Shnei Kat Director
Haithom Neoreth
Dr. Mohamed Jaladat
Dr. Obeidat Mohamund

12. Mu'tah University

A. Attyatt President
Hennai Hi Vice president

13. MOH in Mu'tah University

Dr. A. Oran	Depty director of the clinic
Dr. H. Tantawe	Director of engineering office
Dr. N. Katamine	President's office
T. Dataunel	Cline nurse
Dr. T. Habashneh	Clinic
Nabeclah	Engineer office

14. Karak Hospital

Dr. Saad Madanat	Director
Dr. M. Abdulraheem	Ophth
Dr. Kh Abuhdeh	
Dr. A. Saleh	Ent
Dr. Anton Khoury	Surgeon
Dr. M. Mustafa	Peadiatric
Rihab Halasa	Mutron
D. sultan Tarewneh	

15. Arab Center for Heart and Special Surgery

Dr. Daoud Hanania	Director General
Dr. Fott Khamis	Consultant
Dr. Mahmoud Fayad	Head of Radiology Department
Adel Adeeb	Radiology Department

16. The Islamic Hospital

Dr. Ali Al Hawadeh	Director Genetal
Khabil Katawneh	Director of Administration
Dr. Abdih -- Salan Zumeili	Chief of Medical Staff
Ziad Abu El -- Itomas	Chief of Phamacy Department

17. Ma'an Hospital

Dr. Taiseer Kreeshan	Director
Dr. Isam Khawta	Pediatrics
Dr. Walid Suria	Ansthyisia
Dr. Walid Rwad	G.P.
Moh'd Ied	Nursing Chief

18. WHO

Dr. Omer Sulieman	Representative for Syria and Jordan
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19. Embassy of Japan

Yuji Ikeda	Ambassador of Japan
Hidco Shibuya	Second Secretary

20. JICA

Yasuyuki Mori	Resident Representative
Yuji Shirata	Assistant Resident Representative
Hani H. Alkurdi	Reseach Coordinator

21. JOCV

Yoko Sogabe	Ramtha Hospital
Ritsuko Katagiri	Ma'an Hospital
Fukiko Ito	Karak Hospital