

### 2-2-3 Basic Design Drawing

The plot plan of the planned equipment is shown in the annex "Basic Design Drawings".

### 2-2-4 Implementation Plan

#### 2-2-4-1 Implementation Policy

This project is intended to provide the Royal Scientific Society (RSS) in Jordan with equipment for calibration and equipment for testing of industrial products. The executing agency, the Royal Scientific Society, will conclude a consultancy agreement with Japanese Consultants to execute implementation design, preparation of tender documents, evaluation of tenders, supervision of procurement, installation, etc. of the equipment. The Royal Scientific Society will conclude contracts with Japanese firms for procurement of the equipment. The firms will conduct procurement and installation of equipment, and give instructions on operation and maintenance. During the installation of the equipment, local manpower will be utilized for unpacking and installation under supervision of experts dispatched by the firms. After that, wiring, test operation, commissioning, and instructions on operation and maintenance will be done by the experts. The implementation organization is as per Figure 2-1.

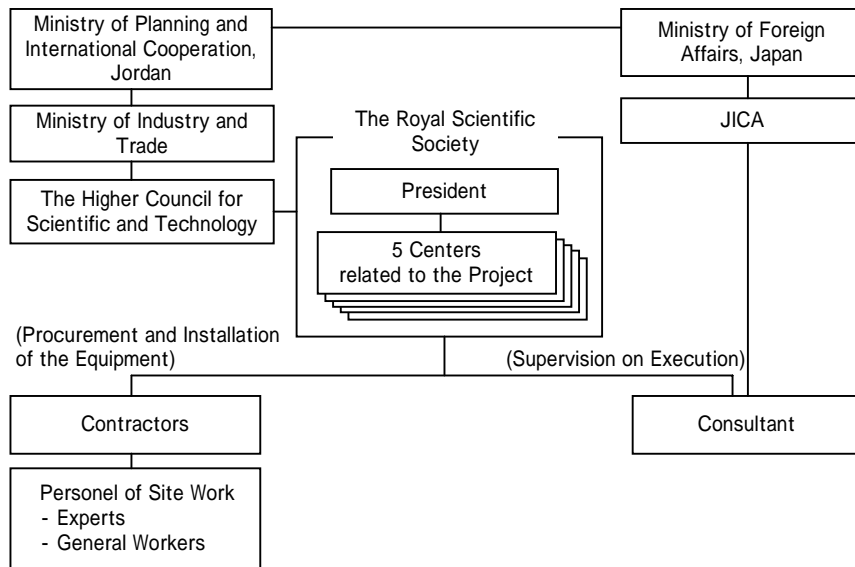


Figure 2-1. Implementation Organization

#### 2-2-4-2 Implementation Conditions

- (1) For promotion of the competition among vendors, it is necessary to consider separation of the equipment into a certain number of lots at the tender stage. As a practical matter in doing this, the preferable policy is to separate the equipment into calibration equipment and testing equipment. Furthermore, it is rational to separate the testing equipment into physical testing equipment and chemical testing equipment. In addition, mainly in the calibration equipment, there are some standard items which are made by only one manufacturer. It is necessary to consider separation of such items into individual lots in order to control competition in bidding in an optimum way.
- (2) The planned equipment will be installed in the existing buildings. In the same places, the staff of the Royal Scientific Society will be working at calibration, testing, research and development, etc. It is necessary to consider the safety of the staff of the Royal Scientific Society, experts and workers of contractors, and other personnel at the time of installation and subsequent test operation. For transportation, handling and installation of the equipment, it is necessary to make plans through sufficient discussions among the Royal Scientific Society, the consultants and the contractors.
- (3) For the schedule of the site work, i.e., installation of the equipment, instructions on operation and maintenance, etc., it is recommended to take into consideration both Eid El Adha and Eid El Fitr.
- (4) The equipment will be offloaded in Aqaba, and transported by trailer to the Royal Scientific Society in Amman. On the way to Amman, almost all of the area is desert, requiring necessary measures to protect the equipment against high temperature and airborne sand and dust.

### 2-2-4-3 Scope of Work

The scope of work of the Project for Jordanian side and Japanese side is as follows.

		Japanese side	Jordanian side
1.	Equipment		
	- Procurement of the equipment		
	- Transportation and installation of the equipment		
	- Secondary wiring		
	- Test operation and commissioning		
	- Instructions on operation and maintenance		
2.	Buildings and facilities		
	- Remodeling and interior work necessary for the equipment		
	- Primary wiring, supply and drain water		
	- Lighting		
	- Air-conditioning, ventilation and exhaust		
3.	Maintaining the storage area		
4.	Transportation of equipment, customs clearance		
	- Transportation to site		
	- Customs clearance		
	- Tax exemption (customs duties, VAT, etc.)		
5.	Banking arrangement, banking charge		
6.	Assisting in procedures for immigration and stay for personnel concerned.		
7.	Permission procedure necessary for the project		
8.	Bearing costs which are not included in the grant aid		

### 2-2-4-4 Consultant Supervision

#### (1) Basic Policy

In compliance with the "Guidelines of the grant aid cooperation of Japanese Government" and the consultancy agreement, the Consultants will conduct the implementation design, and the supervision of procurement of the equipment, and assist Jordanian side in technical matters.

#### (2) Consulting Services

- 1) Confirmation of detailed technical specifications
- 2) Preparation for tender documents
- 3) Notice of tender, distribution of the tender document, preparation of place of tender ceremony, evaluation of tenders
- 4) Inspection at works/warehouse, supervision of contractors' site work
- 5) Confirmation of implementation progress, reports, issuance of certificates
- 6) Inspection of the equipment in site, witnessing of acceptance

### (3) Staff of the Consultants

#### 1) Chief Engineer/Equipment Planning 1

- Leading the members of the Consultants
- Comprehensive management of overall duties of the Consultants
- Preparation of the tender documents
- Attending the tender ceremony, and evaluation of tenders
- Supervision of implementation
- Inspection of the equipment at the site, witnessing acceptance

#### 2) Calibration & Testing Planning/Operation & Maintenance Planning

- Confirmation of contents of the tender documents
- Attending the tender ceremony, and evaluation of tenders
- Supervision of procurement of the equipment

#### 3) Equipment Planning 2

- Implementation design for the equipment
- Supervision of procurement of the equipment

#### 4) Procurement Planning/Cost Estimation

- Re-estimation (confirmation) of project cost
- Re-confirmation of equipment of third-country origin

### 2-2-4-5 Procurement Plan

Much of the equipment is not produced in Jordan, and it will be products of Japan, the USA, Europe, etc. The Royal Scientific Society will receive after-sale service through local agents. It is planned that spare parts which are included in the planned equipment are to be those parts which shall be replaced periodically; or parts which shall be replaced at the time of trouble immediately, and in both cases quantities provided will be for about one year. Consumables shall be included in sufficient supply for test operation, the provision of instruction or training on operation and maintenance, etc. only. Further quantities and volumes of consumables such as may be required shall be prepared by the Royal Scientific Society. The guarantee period shall be one year after acceptance in accordance with general trading customs.

For a certain number of items among the planned equipment, procurement of third-country products (from the USA, Europe, etc.) is necessary for the following reasons:

It is not produced in Japan.

It is produced in Japan, but it is necessary to consider products of third-country origin too in the interests of assuring competitive bidding.

It is produced in Japan, but there is no service agent in Jordan, for which reason sufficient maintenance would be difficult.

The expected places of procurement are Japan, USA, and Europe. The equipment shipped from the USA and Europe will be transported through the Suez Canal, unloaded in Aqaba port which is at the southernmost tip of Jordan and faces the Red Sea. The equipment shipped from Japan is also to be unloaded in Aqaba port. Periods of ocean transportation are about one month from Japan or the USA, and about two weeks from Europe. It takes about 10 days for customs clearance in Aqaba port. From Aqaba port to the site in Amman, the equipment will be transported by trailers. Except for a short distance in Aqaba city and Amman city, a highway will be available, and inland transportation will require about one day. Pavement on the roads in Amman city are in good condition. The Royal Scientific Society has not only the main gate but also another wider gate for freight cars, and pavement on the roads at the Royal Scientific Society are also in good condition, so there no problem is anticipated for transportation with trailers. In the Royal Scientific Society, there are some large car parking areas which will be available for unloading of the equipment from the trailers. There is a large gate on the building of each center, then there is no problem for the transportation into the buildings.

2-2-4-6 Implementation Schedule

The Implementation Schedule (Plan) for the scope of work to be performed by the Japanese side for the Implementation design and procurement is as follows.

Implementation Schedule

	1	2	3	4	5	6	7
Implementation Design	■ (Field Survey)						
	□ (Work in Japan)	■□ (Field Survey, Approval of Documents)	□ (Tender Notice, Tender, Evaluation)				
	(Total 4.5 months)						
Procurement	□ (Procurement of Equipment)						
				□ (Inspection)	▨ (Transportation)		
	(Total 6.5 months)		□ (Installation, Commissioning, etc.)		■		

## 2-3 Obligations of Recipient Country

### 2-3-1 Buildings and Facilities

#### (1) Re-modeling of Buildings

For installation and use of the planned equipment, the Jordanian side shall complete the works of necessary re-modeling of buildings before arrival of the equipment procured by the Contractor. New construction of buildings is not necessary, and the planned equipment will be installed in existing buildings. However, re-modeling of the building of Electronic Service and Training Center is necessary to locate the National Calibration Laboratory in the center. The room of the Standards and Calibration Division on the first floor is to be expanded to include its next-door rooms which are meeting rooms now. Together with a room which is now used by the Testing and Quality Control Division on the ground floor (It is now used for testing of lead acid car batteries.), it becomes the National Calibration Laboratory (as per annex "Basic Design Drawings"). Detail of the re-modeling work is as follows:

- 1) A door is to be installed between the room of the Standards and Calibration Division on the first floor of the Electronic Service and Training Center Laboratory (the areas marked as A. Electrical Calibration System, I. Speed Calibration System, and J. Light Calibration System in the annex "Basic Design Drawings") and a next-door meeting room (the areas marked as B. Temperature Calibration System and D. Mass Calibration System in the drawing, hereafter called "Meeting Room 1"). And, another door is to be installed between the Meeting Room 1 and a next-door, second meeting room (the areas marked as C. Length Calibration System and E. Pressure Calibration System in the drawing, hereafter called "Meeting Room 2").
- 2) For maintenance of an even temperature and prevention against sand and dust particles in the Meeting Room 1 and Meeting Room 2 the same as the room of Standards and Calibration Division, preservative rooms and air curtain facilities are to be installed at the doors of the Meeting Room 2 to corridor. The door of Meeting Room 1 to the corridor is to be capable of being shut tightly.
- 3) The area of the Mass Calibration System is enclosed with partition walls, and a door from the Meeting Room 1, a preservative room and air shower facility are to be installed.
- 4) The air-conditioner for the Mass Calibration System is to be equipped with air filters.

#### (2) Utilities, etc.

The Jordanian side shall provide facilities for electric power, water supply and drainage, air supply and exhaust, and air-conditioning necessary for the equipment procured in the project. Such facilities for

existing equipment will be available prior to installation of the planned equipment, and facilities newly required are listed below. The Jordanian side shall complete the facilities before arrival of the equipment procured by the Contractor.

- 1) Facilities for water supply and drainage for Water Distillation Apparatus for the Volume & Density Calibration System in the National Calibration Laboratory in the Electronic Service and Training Center
- 2) Facilities for air-conditioning for the National Calibration Laboratory (Meeting Room 1 and 2) in the Electronic Service and Training Center
- 3) Facilities for electric supply (150kW) for the Induction Furnace for the Casting Technology Unit in Mechanical Design and Technology Center
- 4) Facilities for air-conditioning and humidity control for the Measurement & Calibration Unit in the Mechanical Design and Technology Center
- 5) Facilities for exhaust (including ductwork) for the Gas Chromatography/Mass Spectrometer (GC/MS) for the Organic & Food Unit, and for the Atomic Absorption Spectrophotometer for the Inorganic Material Division in the Industrial Chemistry Center

### (3) Preparation for Installation of the Equipment

The Jordanian side is required to complete foundations etc. necessary for installation of the equipment before arrival of the equipment procured by the Contractor. Specifically, a foundation made with concrete is necessary for the Induction Furnace of the Casting Technology Unit in the Mechanical Design and Technology Center. In addition, existing equipment located where planned equipment will be installed shall be removed. That is the items which are marked as "replace" in the annex "List of Requested Equipment and Study Results."

#### 2-3-2 Necessary Arrangements

##### (1) Tax Exemption

The Jordanian side is required to take certain procedures necessary for exemption of customs duties and general sales tax for the equipment procured in accordance with verified contracts. Prior to applications for tax exemption, Cabinet approval by the Jordanian Government is necessary. Then, the Jordanian side shall take necessary procedures in accordance with the Exchange of Notes.



## (2) Banking Arrangement and Authorization to Pay

The Jordanian side is required to conclude a banking arrangement (B/A) with a bank in Japan, and open an account in the bank. In addition, after conclusion of an agreement with the Consultants or contracts with Contractors, the Jordanian side shall issue Authorization to Pay (A/P) in accordance with the B/A. The Jordanian side shall bear the cost of an advisory commission of an Authorization to Pay and payment commissions to the Bank.

## (3) Entry and Stay in Jordan

The Jordanian side is required to accord Japanese nationals, whose services may be required in connection with the supply of the products and services under the verified contracts, such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work.

## (4) Customs, Approval, License etc.

The Jordanian side is required to take procedures for customs clearance of the equipment procured in the project, as well as all permissions, licenses, etc. for execution of this project.

## (5) Expenses Which Are Not Borne by the Grant Aid

The Jordanian side is required to bear all the expenses, other than those to be borne by the Grant Aid.

### 2-3-3 Provision of Staff

The Jordanian side is required to assign the staff necessary for effective and proper operation and maintenance of the equipment, execute personnel training, and provide necessary budgets.

## 2-4 Project Operation Plan

### (1) Staff for Operation and Maintenance of the Equipment

The main bodies that will be responsible for operation and maintenance of equipment provided under this project are the 5 centers which are requesting the equipment, i.e., the Electronic Service and Training Center (ESTC), Mechanical Design and Technology Center (MDTC), Industrial Chemistry Center (ICC), Building Research Center (BRC), and Environmental Research Center (ERC). Staffing of each department or center of the Royal Scientific Society is shown in the following table.

Table 2-88. Staff of the Centers and a Plan of Staff Increase

#### At Present (a)

Center	Ph.D	M.A. M.Sc.	Diploma	B.Sc. B.A.	Engineer Grad	Communit y College	1 year after General Secondary	General Seconda ry	Below Seconda ry	Total
ESTC	-	5	1	32	1	8	-	6	14	67
MDTC	7	13	-	23	-	8	5	2	18	76
ICC	2	6	2	23	-	8	1	2	7	51
BRC	5	14	2	21	-	16	3	10	19	90
ERC	3	18	-	11	-	8	3	2	3	48
Total	17	56	5	110	1	48	12	22	61	332

#### After Implementation of the Project (b)

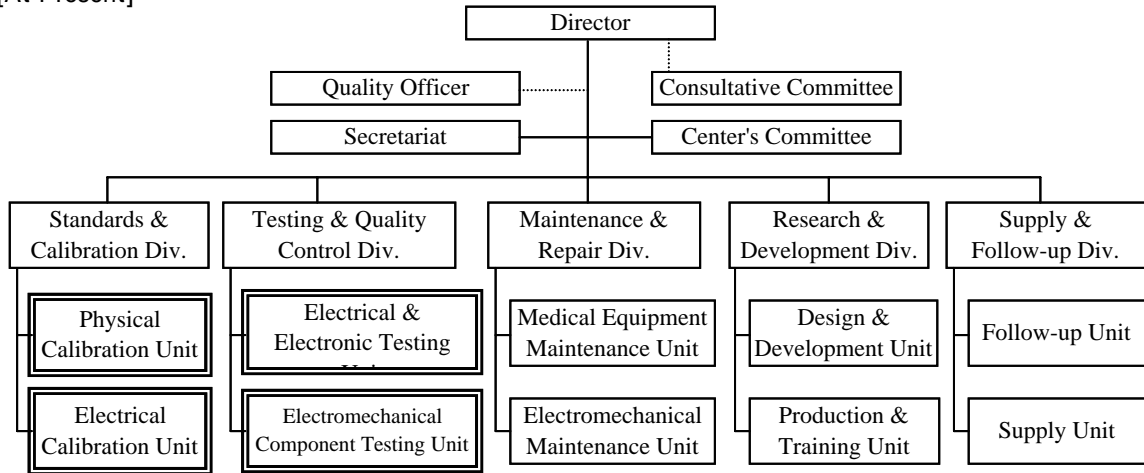
Center	Ph.D	M.A. M.Sc.	Diploma	B.Sc. B.A.	Engineer Grad	Communit y College	1 year after General Secondary	General Seconda ry	Below Seconda ry	Total
ESTC	-	5	1	43	1	8	-	6	14	78
MDTC	9	15	2	26	-	8	6	2	19	87
ICC	4	5	2	30	-	9	1	2	7	60
BRC	5	14	2	21	2	18	3	10	19	94
ERC	4	19	-	13	-	9	3	2	3	53
Total	22	58	7	133	3	52	13	22	62	372

#### Increase (b) - (a)

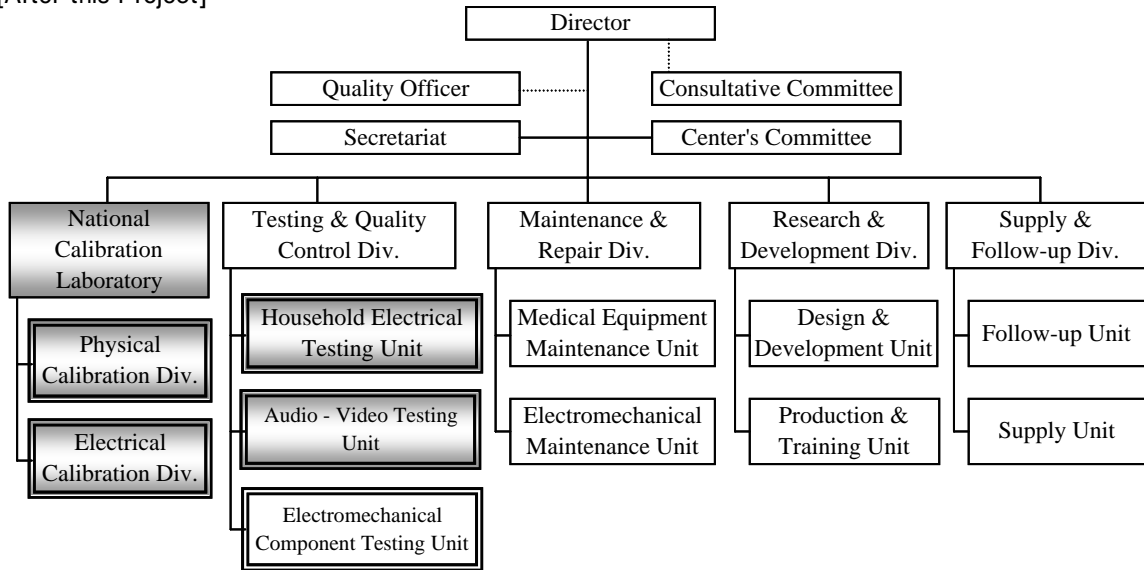
Department/ Center	Ph.D	M.A. M.Sc.	Diploma	B.Sc. B.A.	Engineer Grad	Communit y College	1 year after General Secondary	General Seconda ry	Below Seconda ry	Total
ESTC				11						11
MDTC	2	2	2	3			1		1	11
ICC	2	-1		7		1				9
BRC					2	2				4
ERC	1	1		2		1				5
Total	5	2	2	23	2	4	1		1	40

Organizations of the requesting centers at present and a plan of the organizations after implementation of the project are as follows:

[At Present]



[After this Project]



: sections concerned with requested equipment



: sections which will be re-organized for this Project

Figure 2-2. Organization of Electronic Services and Training Center

[At Present & After this Project]

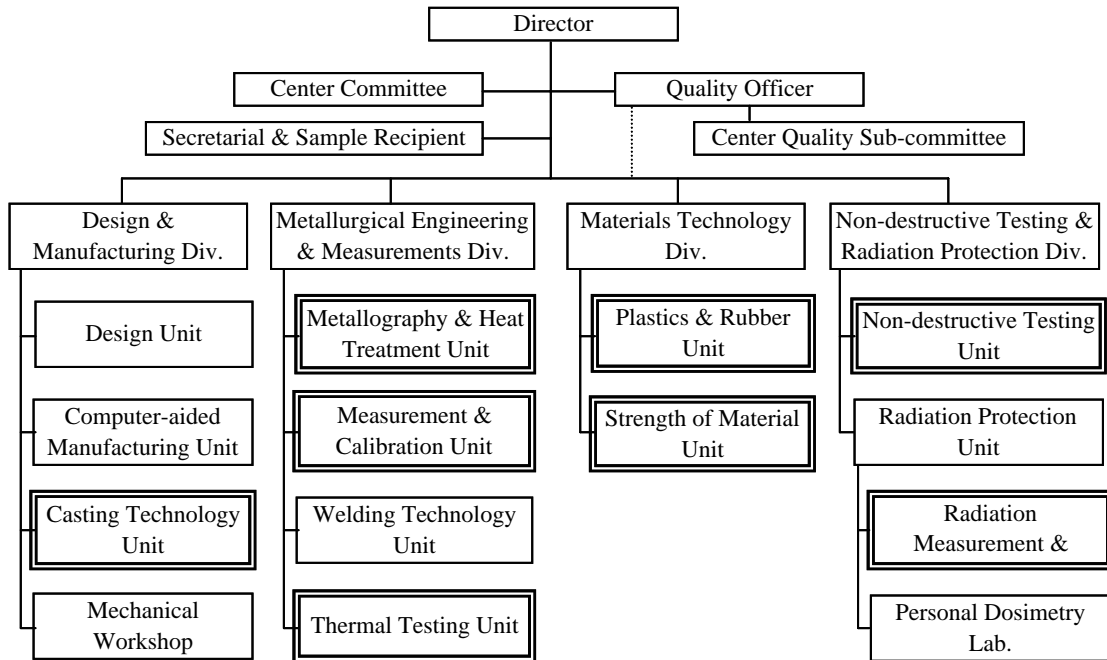
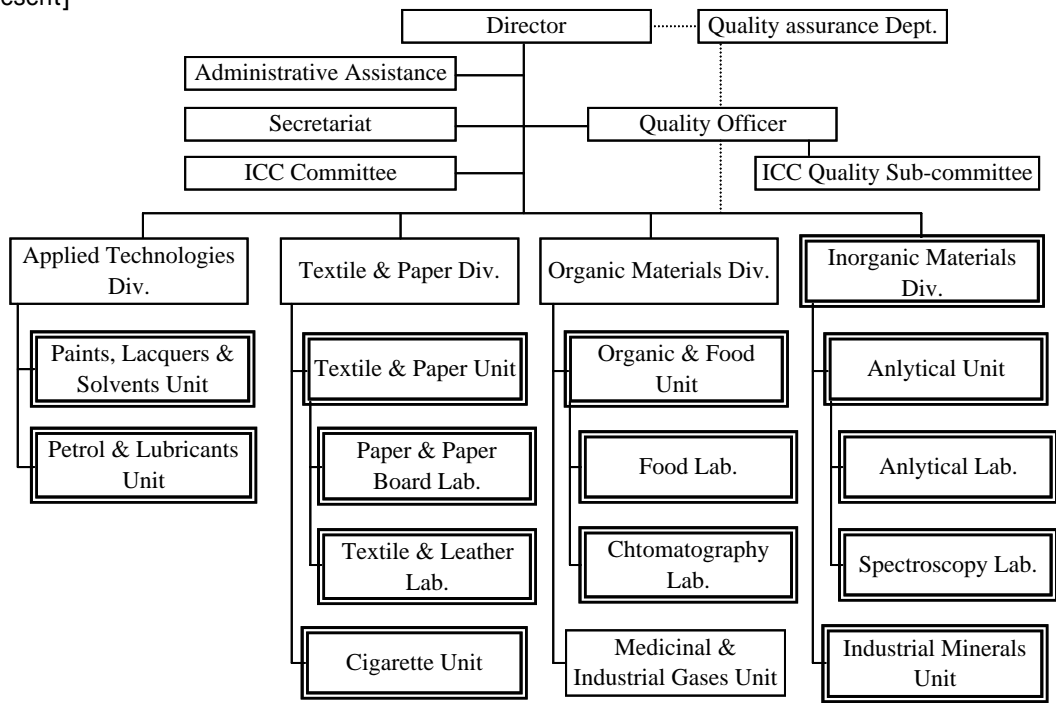


Figure 2-3. Organization of Mechanical Design and Technology Center

[At Present]



[After this Project]

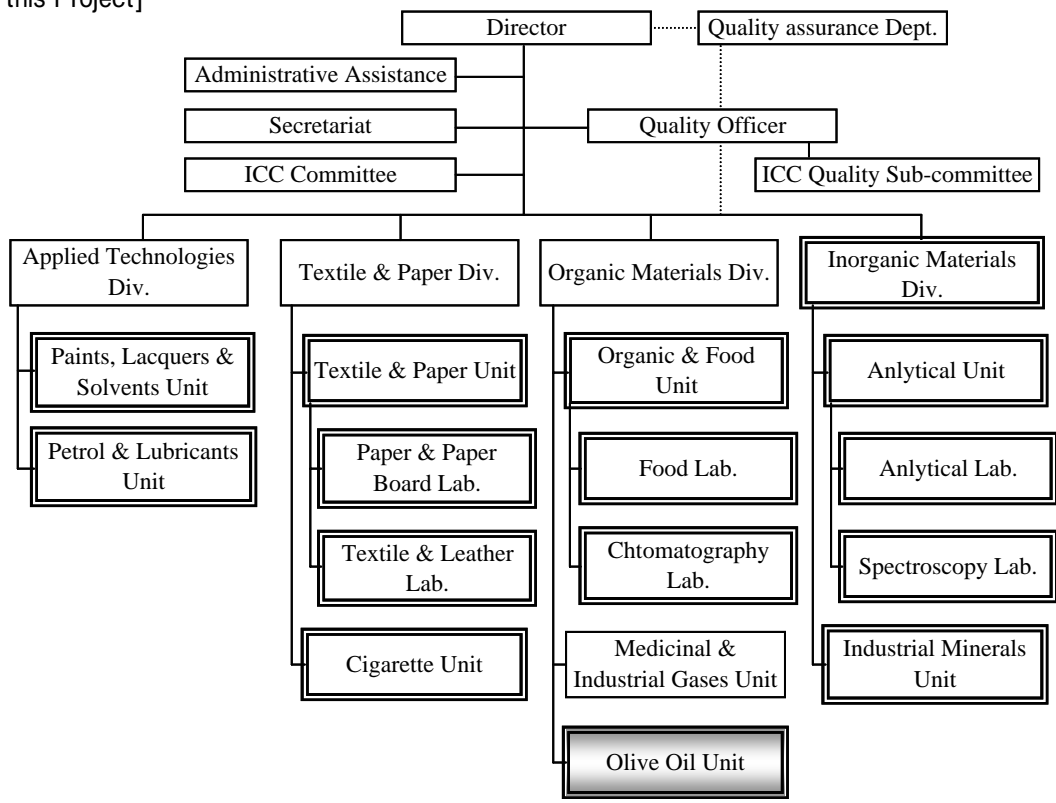


Figure 2-4. Organization of Industrial Chemistry Center

[At Present & After this Project]

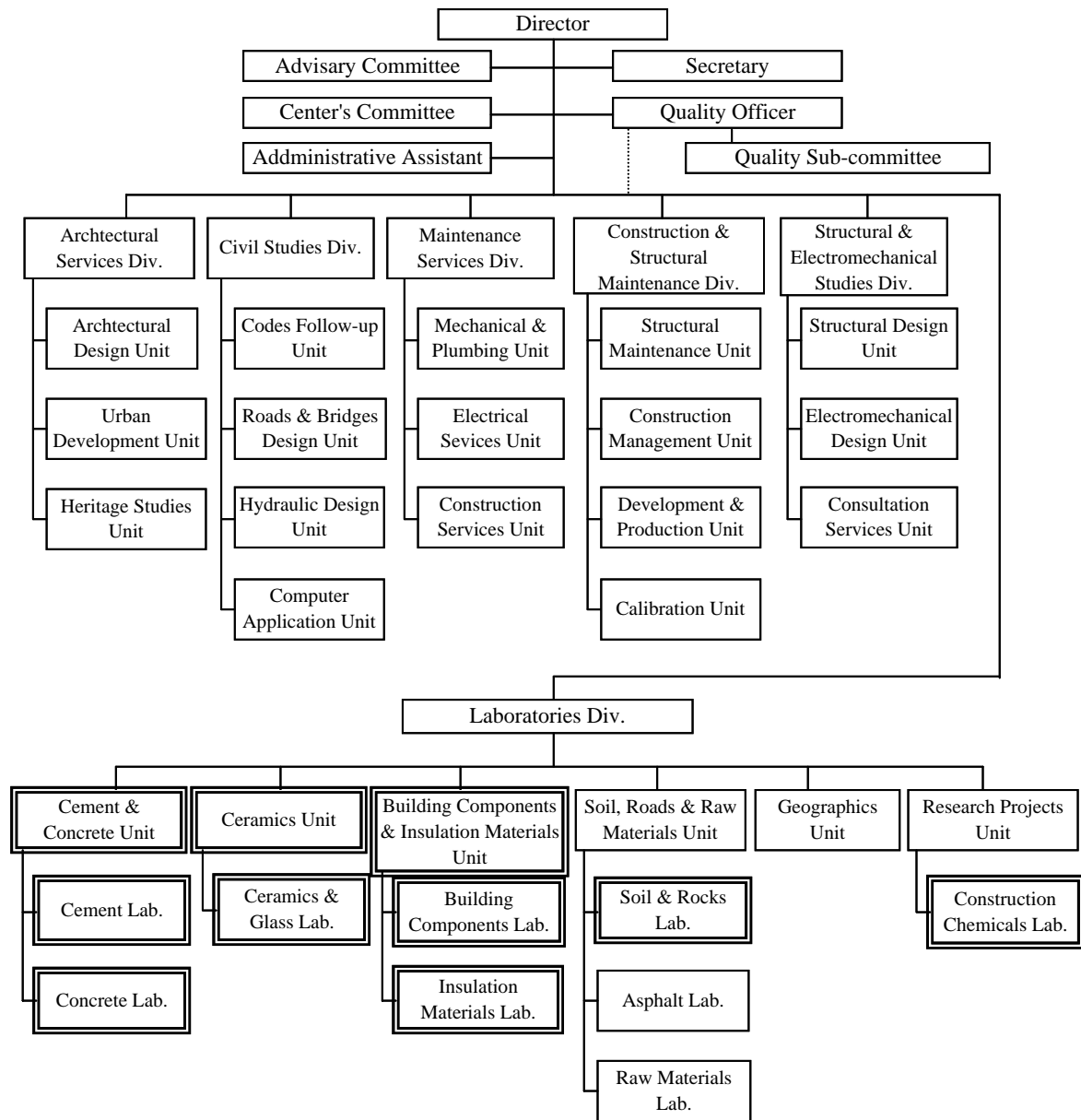


Figure 2-5. Organization of Building Research Center

[At Present & After this Project]

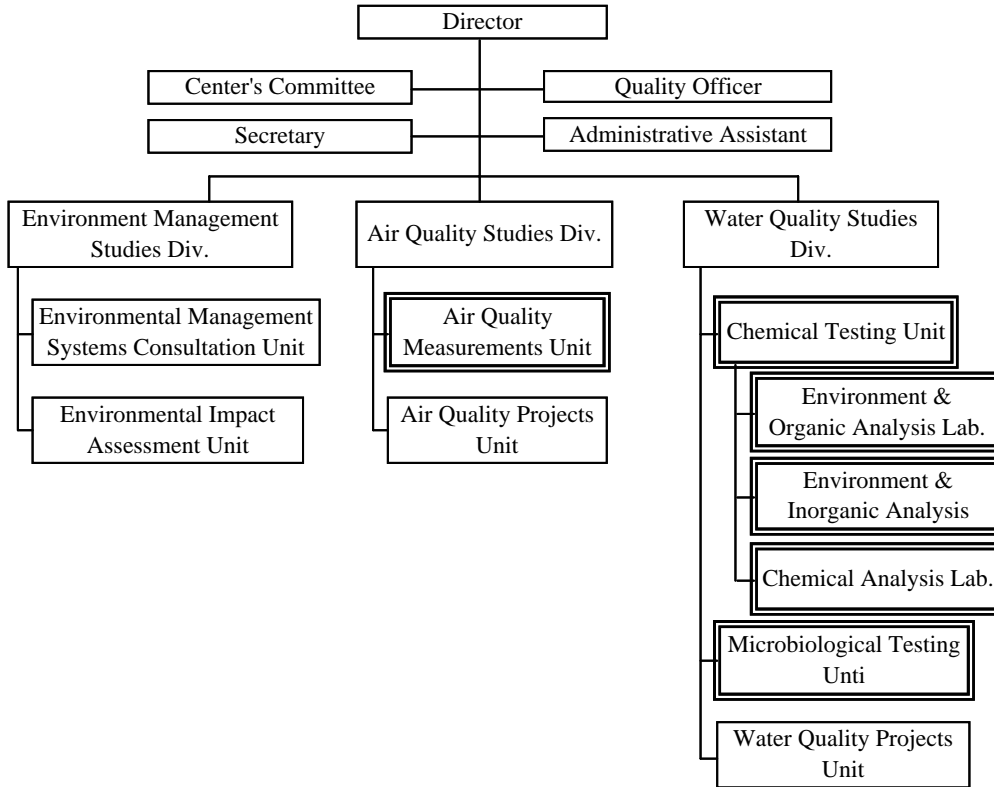


Figure 2-6. Organization of Environmental Research Center

The number of staff of the requesting divisions, units and laboratories, and a plan of the number of staff are shown below (source: Answers to questionnaires to the RSS). For divisions, units and laboratories which are to be equipped with new or additional equipment, increases in the number of staff are planned. And, almost all additional staff members planned are holders of master's or bachelor's degrees, who can take part in actual operation and maintenance of the equipment. It is supposed that there is no problem in regard to the number of personnel, provided that the plan for increasing staff is carried out.

Table 2-89. Electronic Service and Training Center - Plan of Staff Increase

At Present (a)

Name of Division.	Ph.D	M.A. M.Sc.	Diploma	B.Sc. B.A.	Engineer Grad	Community College	1 year after General Secondary	General Secondary	Below Secondary	Total
Standards and Calibration Div.				5	1	2	1			9
Testing and Quality Control Div.				6		2			1	9

After Implementation of the Project (b)

Name of Division.	Ph.D	M.A. M.Sc.	Diploma	B.Sc. B.A.	Engineer Grad	Community College	1 year after General Secondary	General Secondary	Below Secondary	Total
National Calibration Lab. (NCL)				11	1	2	1			15
Testing and Quality Control Div.				11		2			1	14

Increase (b) - (a)

Name of Division.	Ph.D	M.A. M.Sc.	Diploma	B.Sc. B.A.	Engineer Grad	Community College	1 year after General Secondary	General Secondary	Below Secondary	Total
Standards and Calibration Div. / NCL				6						6
Testing and Quality Control Div.				5						5



Table 2-90. Mechanical Design and Technology Center - Plan of Staff Increase

At Present (a)

Name of Unit/Lab.	Ph.D	M.A. M.Sc.	Diploma	B.Sc. B.A.	Engineer Grad	Community College	1 year after General Secondary	General Secondary	Below Secondary	Total
Plastics & Rubber Unit		1	1	3						5
Strength of Materials Unit	1		1							2
Measurement & Calibration Unit		1	2	1						4
Metallography & Heat Treatment Unit	1		1	2						4
Thermal Testing Unit		1	1							2
Non-Destructive Testing Unit		1	1	2						4
Radiation Measurement and Calibration Lab.		1		1						2
Casting Technology Unit		1							2	3

After Implementation of the Project (b)

Name of Unit/Lab.	Ph.D	M.A. M.Sc.	Diploma	B.Sc. B.A.	Engineer Grad	Community College	1 year after General Secondary	General Secondary	Below Secondary	Total
Plastics & Rubber Unit	1	1	1	4						7
Strength of Materials Unit	1		1	1						3
Measurement & Calibration Unit		1	2	1						4
Metallography & Heat Treatment Unit	2		1	3						6
Thermal Testing Unit		1	1							2
Non-Destructive Testing Unit		1	2	3						6
Radiation Measurement and Calibration Lab.		2	1							3
Casting Technology Unit		2					1		3	6

Increase (b) - (a)

Name of Unit/Lab.	Ph.D	M.A. M.Sc.	Diploma	B.Sc. B.A.	Engineer Grad	Community College	1 year after General Secondary	General Secondary	Below Secondary	Total
Plastics & Rubber Unit	1			1						2
Strength of Materials Unit				1						1
Measurement & Calibration Unit										
Metallography & Heat Treatment Unit	1			1						2
Thermal Testing Unit										
Non-Destructive Testing Unit			1	1						2
Radiation Measurement and Calibration Lab.		1	1	-1						1
Casting Technology Unit		1					1		1	3

There is no staff increase for the Measurement & Calibration Unit and Thermal Testing Unit, as few or no equipment is planned for the units.

Table 2-91. Industrial Chemistry Center - Plan of Staff Increase

At Present (a)

Name of Unit/Lab.	Ph.D	M.A. M.Sc.	Diploma	B.Sc. B.A.	Engineer Grad	Community College	1 year after General Secondary	General Secondary	Below Secondary	Total
Textile & Paper Unit		1		1		2				4
Cigarettes Unit				1		1				2
Organic & Food Unit	2		1	10				1	1	15
Petrol & Lubricants Lab.		1		3				1		5
Paints, Lacquers & Solvents Lab.			1	1					1	3
Inorganic Material Div.	1	1	1	6		1		1		11

After Implementation of the Project (b)

Name of Unit/Lab.	Ph.D	M.A. M.Sc.	Diploma	B.Sc. B.A.	Engineer Grad	Community College	1 year after General Secondary	General Secondary	Below Secondary	Total
Textile & Paper Unit		1		1		2				4
Cigarettes Unit				2		1				3
Organic & Food Unit	2		1	12				1	1	17
Petrol & Lubricants Lab.	1	1		5		1		1		9
Paints, Lacquers & Solvents Lab.			1	2					1	4
Inorganic Material Div.	2		1	7		1		1		12

Increase (b) - (a)

Name of Unit/Lab.	Ph.D	M.A. M.Sc.	Diploma	B.Sc. B.A.	Engineer Grad	Community College	1 year after General Secondary	General Secondary	Below Secondary	Total
Textile & Paper Unit										
Cigarettes Unit				1						1
Organic & Food Unit				2						2
Petrol & Lubricants Lab.	1			2		1				4
Paints, Lacquers & Solvents Lab.				1						1
Inorganic Material Div.	1	-1		1						1

Although there is no staff increase for the Textile & Paper Unit, but it is supposed that there is no problem because the equipment is mostly for replacement of old existing equipment.

Table 2-92. Building Research Center - Plan of Staff Increase

At Present (a)

Name of Unit/Lab.	Ph.D	M.A. M.Sc.	Diploma	B.Sc. B.A.	Engineer Grad	Community College	1 year after General Secondary	General Secondary	Below Secondary	Total
Cement and Concrete Unit	1			1		2	1		1	6
Ceramic Unit	1	1				1	1			4
Building Components & Insulation Materials Unit	1	1				2				4
Soil, Roads & Raw Materials Unit	1	1				2				4
Construction Chemicals Lab.	1									1

After Implementation of the Project (b)

Name of Unit/Lab.	Ph.D	M.A. M.Sc.	Diploma	B.Sc. B.A.	Engineer Grad	Community College	1 year after General Secondary	General Secondary	Below Secondary	Total
Cement and Concrete Unit	1			1	1	3	1		1	8
Ceramic Unit	1	1				2	1			5
Building Components & Insulation Materials Unit	1	1			1	2				5
Soil, Roads & Raw Materials Unit	1	1				2				4
Construction Chemicals Lab.	1									1

Increase (b) - (a)

Name of Unit/Lab.	Ph.D	M.A. M.Sc.	Diploma	B.Sc. B.A.	Engineer Grad	Community College	1 year after General Secondary	General Secondary	Below Secondary	Total
Cement and Concrete Unit					1	1				2
Ceramic Unit						1				1
Building Components & Insulation Materials Unit					1					1
Soil, Roads & Raw Materials Unit										-
Construction Chemicals Lab.										-

There is no staff increase for the Soil, Roads & Raw Materials Unit, as no equipment is planned for the unit.

Table 2-93. Environmental Research Center - Plan of Staff Increase

At Present (a)

Name of Unit/Lab.	Ph.D	M.A. M.Sc.	Diploma	B.Sc. B.A.	Engineer Grad	Community College	1 year after General Secondary	General Secondary	Below Secondary	Total
Chemical Testing Unit		7		4	1	3				15
Microbiological Testing Unit	2	2		1		1				6
Air Quality Measurements Unit		2		2		3				7

After Implementation of the Project (b)

Name of Unit/Lab.	Ph.D	M.A. M.Sc.	Diploma	B.Sc. B.A.	Engineer Grad	Community College	1 year after General Secondary	General Secondary	Below Secondary	Total
Chemical Testing Unit	1	8		5	1	4				19
Microbiological Testing Unit	2	2		2		1				7
Air Quality Measurements Unit		2		2		3				7

Increase (b) - (a)

Name of Unit/Lab.	Ph.D	M.A. M.Sc.	Diploma	B.Sc. B.A.	Engineer Grad	Community College	1 year after General Secondary	General Secondary	Below Secondary	Total
Chemical Testing Unit	1	1		1		1				4
Microbiological Testing Unit				1						1
Air Quality Measurements Unit										-

There is no staff increase for the Air Quality Measurements Unit, as no equipment is planned for the unit.

## (2) Consumables and Parts, and Calibration of the Equipment

Frequency of use of the planned equipment is expected as shown in the annex, "List of Requested Equipment and Study Results." It will be necessary to calibrate the planned equipment in the frequencies and methods mentioned in the annex to maintain accuracy etc. of the equipment.

Major consumables and parts for the operation and maintenance of the equipment are listed below. Volumes of the consumables, quantities of parts, and those costs are estimated in accordance with the frequency of use shown in the annex, "List of Requested Equipment and Study Results." The Jordanian side shall prepare sufficient consumables and spare parts necessary for operation and maintenance of the equipment.

A part of the calibration equipment (standard) shall be calibrated by outside international standards institutions. In addition, some of the testing equipment shall be calibrated by outside international standards institutions or manufacturers even after procurement of the planned equipment. Those are also shown in the below table. The costs are estimated in accordance with the frequency of calibration shown in the annex "List of Requested Equipment and Study Results." The Standards and Calibration Division of the Electronic Service and Training Center spends about JD10,780 per year for calibration of existing equipment by outside institutions. It will be possible to calibrate the existing equipment internally after provision of the planned equipment.

In the table below, the planned equipment is marked as new, addition, or replacement. For the new or additional equipment, consumables, parts, and outside calibration are newly required, and provision of a budget allocation is necessary on the Jordanian side.

Table 2-94. Major Consumables, Parts, and External Calibration

No.	Description	Q'ty	Consumables (annual)		Parts (annual)		Calibration /JD
			Items	Cost/JD	Items	Cost/JD	
I. Electronic Service and Training Center							
NCL- A-1	Direct Voltage Reference Standard	1	-	-	-	-	1,400
NCL- A-2	Resistance Standards (complete set, all range)	1	-	-	-	-	700
NCL- A-8	Power Meter Calibrator	1	-	-	-	-	490
NCL- A-10	High Voltage Probe	1	-	-	-	-	280
NCL- A-11	1000A DC Current Source	1	-	-	-	-	350
NCL- A-19	Standard Capacitances (1pF - 1000pF, 4 kinds)	1	-	-	-	-	1,120
NCL- A-20	Decade Capacitor	1	-	-	-	-	280
NCL- A-21	Standard Inductance (6 kinds)	1	-	-	-	-	1,680
NCL- A-22	Global Positioning System with Time Interval Counter	1	-	-	-	-	700
NCL- B-7	Triple Point of Water Cell	1	-	-	-	-	350
NCL- B-9	Freezing Point of Indium Cell	1	-	-	-	-	350
NCL- B-11	Freezing Point of Aluminum Cell	1	-	-	-	-	350
NCL- B-12	Freezing Point of Tin Cell	1	-	-	-	-	350
NCL- B-14	Freezing Point of Copper Cell	1	-	-	-	-	350
NCL- B-20	Humidity/Temperature Recorder	1	-	-	-	-	560
NCL- C-1	Gauge Block Set (1-100mm)	1	-	-	-	-	233
NCL- C-2	Gauge Block Set (125-500mm)	1	-	-	-	-	333
NCL- C-3	Gauge Block Set (0-5 inch)	1	-	-	-	-	700
NCL- C-4	Gauge Block Set (5-20 inch)	1	-	-	-	-	700
NCL- C-5	Angle Block Set (0-360°)	2	-	-	-	-	700
NCL- C-16	Bore Gauges	2	-	-	-	-	1,120
NCL- C-31	Special Gauge Block Set for vernier caliper with control ring for inner diameter and height calibration	1	-	-	-	-	490
NCL- D-1	Weight Sets E1 Class with accessory kits	2	-	-	-	-	700
NCL- E-1	Dead Weight Tester Complete with	1	-	-	-	-	233
NCL- F-2	Digital Force Read Out	1	-	-	-	-	350
NCL- F-4	Load Cell / Compression & Tension	1	-	-	-	-	175
NCL- F-5	Load Cell / Compression & Tension	1	-	-	-	-	175
NCL- F-6	Load Cell / Compression & Tension	1	-	-	-	-	175
NCL- F-7	Load Cell / Compression & Tension	1	-	-	-	-	175
NCL- F-8	Load Cell / Compression & Tension	1	-	-	-	-	175
NCL- F-9	Load Cell / Compression	1	-	-	-	-	175
NCL- G-3	Standard Flask	1	-	-	-	-	280
NCL- G-7	Standard Hydrometer	1	-	-	-	-	140
NCL- G-8	Specific Gravity Meter	1	-	-	-	-	210
NCL- G-14	Pycnometer	1	-	-	-	-	350
NCL- G-16	Hydrometer	1	-	-	-	-	280
NCL- H-1a	Reference Standard Flow Meters (Fluid)	1	-	-	-	-	350
NCL- H-2a	Reference Standard Flow Meters (Air)	1	-	-	-	-	350
NCL- H-2b	Reference Standard Flow Meters (Air)	1	-	-	-	-	350
NCL- J-1	Reference Standard Luxmeters	1	-	-	-	-	350
NCL- J-2b	Reference Standard UV-meter	1	-	-	-	-	350
ESTC- 1-4	Spring operated impact hammer	2	-	-	-	-	1,000
ESTC- 1-5	Needle flame test apparatus	1	butane gas 1000L	500	-	-	
ESTC- 1-6	Water pressure apparatus	1	recording 300 sheets, pen 5 pcs	257	-	-	
ESTC- 1-8	Proof tracking test apparatus	1	electrode 6 pcs	381	-	-	
ESTC- 1-17	Digital Power Meter	1	-	-	-	-	500
ESTC- 2-3	Steam pressure measuring apparatus	1	-	-	packing 40pcs, fuse 2pcs, sensor 1set etc.	1,333	
ESTC- 3-2	Pendulum impact test apparatus-mechanism	1	-	-	-	-	500
ESTC- 4-4	Digital kWh Meter	2	recording 300 sheets	52	-	-	1,000
				Sub-total (a)	1,190	1,333	21,930
Calibration cost for existing equipment in Standards and Calibration Division (b)							10,780
Total of the Electronic Service and Training Center (a)-(b)				1,190		1,333	11,150

No.	Description	Q'ty	Consumables (annual)		Parts (annual)		Calibration /JD
			Items	Cost/JD	Items	Cost/JD	
<b>2. Mechanical Design and Technology Center</b>							
MDTC- 2-4	Impact testing machine	1	-	-	-	-	350
MDTC- 4-1-1	Scanning Electron Microscope with X-ray Analyzer	1	recording 300 sheets, pump oil etc.	1,200	filament of electron gun 60 pcs	1,200	
MDTC- 4-2	Cutting Machine	1	coolant 300L etc.	200	blade 2 pcs	500	
MDTC- 4-3	Grinding and polishing machines	1	polisher 10L etc.	200	-	-	
MDTC- 4-5	Portable Spectrometer	1	-	-	halogen lamp 2pcs, Deuterium lamp 1pc etc.	391	
MDTC- 6-3	Digital Ultrasonic Flow Detectors with probes	2	-	-	battery 1pc	200	
MDTC- 7-3	Portable Gamma Spectroscopy System	1	liquid-N 200L	1,000	-	-	
MDTC- 9-3	Mobile Sand Testing Laboratory for foundry industry	1	fuel 2000L etc.	800	car parts (engine oil 40L, filter 1pc etc.)	1,000	
Total of the Mechanical Design and Technology Center				3,400		3,291	350
"New" and "Add" only				800		1,391	350
<b>3. Industrial Chemistry Center</b>							
ICC- 1-8	Tensile machine	1	-	-	-	-	1,000
ICC- 2-1	Linear Smoking Machine	1	-	-	halogen lamp 1pc, tube 1set, sensor 1 set etc.	1,000	5,000
ICC- 2-2	Gas Chromatograph	1	column 50pcs, filler for 600times, recording 600 sheets, carrier gas etc.	4,000	-	-	
ICC- 3-1	Gas Chromatography/Mass Spectrometer (GC/MS) & Accessories	1	inlet liner 10pcs, column 50pcs, filler for 600times, recording 600 sheets, carrier gas etc.	4,800	-	-	
ICC- 3-2	Gas Chromatography/Flame Ionization (GC/FID)	1	column 150pcs, filler for 1800times, recording 1800 sheets, carrier gas etc.	12,000	-	-	
ICC- 3-3	High Performance Liquid Chromatography (HPLC) (Semi-Preparative)	1	column 50pcs, filler for 2000times, recording 2000 sheets, filter 2000pcs, solvent etc.	3,000	tube 1set, connector 1set etc.	207	
ICC- 3-4	Automatic Kjeldahl Nitrogen Analyzer	1	reagents for 20000 times	5,000	-	-	
ICC- 3-7	Meat Analyzer	1	standard soln.2 kinds	127	-	-	
ICC- 3-9	Amino Acid Analyzer	1	reagents for 600 times	6,000	-	-	
ICC- 6-1	Sequential Plasma Emission Spectrometer (ICP)	1	-	-	D2 lamp 1pc, O-ring 1set, tube 1 set etc.	1,200	
ICC- 6-2	Sequential Plasma Emission Spectrometer (ICP)	1	Si standard sample	93	-	-	
ICC- 6-3	Sequential Plasma Emission Spectrometer (ICP)	1	-	-	Torch 2pcs, tube 1set etc.	2,333	
ICC- 6-4	Sequential Plasma Emission Spectrometer (ICP)	1	ion-exchange resin etc.	800	filament 2 pcs etc.	1,467	
Total of the Industrial Chemistry Center				35,820		6,207	6,000
"New" and "Add" only				31,927		1,000	5,000
<b>5. Environmental Research Center</b>							
ERC- 6	Gas Chromatograph/ Electron Capture Detector (GC/ECD)	1	column 50pcs, filler for 600times, recording 600 sheets, carrier gas etc.	4,000	-	-	
Total of the Environmental Research Center				4,000		-	
Total of the five centers				44,410		10,831	28,280
"New" and "Add" only				37,917		3,724	16,500

## 2-5 Project Cost Estimation

### 2-5-1 Project Cost

The total costs of the project when it is carried out under the grant aid cooperation program of Japan is estimated at approximately 914 million yen. In accordance with the conditions for the estimation provided in article (3) below, the breakdown of the costs borne by the Japanese and Jordanian side sides will be as follows:

(1) Estimated cost borne by Japanese side: approximately 905 million yen

Items		Estimated cost (million yen)
Equipment	National Calibration Laboratory in the Electronic Service and Training Center	305
	Testing and Quality Control Division in the Electronic Service and Training Center	143
	Mechanical Design and Technology Center	158
	Industrial Chemistry Center	235
	Building Research Center	20
	Environmental Research Center	15
Implementation Design and Supervision		29

This cost estimate is provisional and is subject to further examination by the Government of Japan for approval of the Grant.

(2) Estimated cost borne by Jordanian side: approximately JD55,000 (8.7 million yen)

- |  |          |                           |
|--|----------|---------------------------|
| 1) Costs for re-modeling of the building:              | JD30,000 | (approx. 4.7 million yen) |
| 2) Costs for facilities of electric power:             | JD2,000  | (approx. 0.3 million yen) |
| 3) Costs for facilities of water supply and drainage:  | JD1,000  | (approx. 0.2 million yen) |
| 4) Costs for facilities of air supply and ventilation: | JD2,000  | (approx. 0.3 million yen) |
| 5) Costs for facilities of air-conditioning:           | JD6,000  | (approx. 0.9 million yen) |
| 6) Costs for foundation of the equipment:              | JD4,000  | (approx. 0.6 million yen) |
| 7) Banking charge                                      | JD6,000  | (approx. 0.9 million yen) |
| 8) Customs clearance charge                            | JD4,000  | (approx. 0.6 million yen) |

(3) Conditions of the Cost Estimation

- 1) Estimation point of time February 2004



- 2) Exchange rate                      1 US\$ = 112.14 yen  
   1 JD = 158.12 yen
- 3) Implementation period            As shown in the implementation schedule
- 4) Other                                    The project is to be implemented in accordance with the grant aid procedures of the Government of Japan.

## 2-5-2 Cost Estimation for Operation and Maintenance

### (1) Personnel Expenses

Based on the above-mentioned number of staff in 2002, personnel expenses, and staff increase plan, yearly cost increase of personnel expenses for operation and maintenance of the equipment is shown in the table below. It is estimated with the assumption that the cost for one person is an average of the costs of existing staff in the each center. The cost increase is calculated from the costs for one person multiplied by the number of increased personnel.

Table 2-95. Personnel Cost Increase

Centers	Staff	Personnel Cost/JD	Increase	Cost increase/JD
Electronic Service and Training Center	67	775,077	11	127,251
Mechanical Design and Technology Center	76	692,101	11	100,173
Industrial Chemistry Center	90	351,975	9	35,198
Building Research Center	51	873,328	4	68,496
Environmental Research Center	48	374,872	5	39,049
Total five centers	332	3,067,353	40	370,167

### (2) Costs for Consumables and Parts, Calibration of the Equipment

As mentioned above, based on the frequency of use shown in the annex "List of Requested Equipment and Study Results", annual costs for consumables and parts, and calibration of the equipment which are newly required are as follows:

Table 2-96. Costs of Consumables, Parts and External Calibration

Centers	Costs of consumables and Parts /JD	Costs of external calibration /JD
Electronic Service and Training Center	2,523	11,150
Mechanical Design and Technology Center	2,191	350
Industrial Chemistry Center	32,927	5,000
Building Research Center	-	-
Environmental Research Center	4,000	-
Total five centers	41,641	16,500

### (3) Comparison with Past Expenses

As mentioned above, the annual additional costs for operation and maintenance of the planned equipment are approximately JD370,167 for personnel expenses, approximately JD41,641 for consumables and parts, and approximately JD16,500 for calibrations by outside institutions etc., totaling JD428,308 . Those costs

are compared with actual expenditure in 2001-2003.

Income and expenditure of the Royal Scientific Society in the past three years are as follows (source: Answers to questionnaires to the Royal Scientific Society):

Table 2-97. Income and Expenditure in 2001 (US\$)

	All RSS	ESTC	MDTC	ICC	BRC	ERC	Total Five Centers	
I	1) R & D	2,239,104	451,121	210,575	430,626	268,051	577,407	1,937,780
	2) Technical service	6,284,914	1,296,486	592,135	452,138	1,180,417	249,551	3,770,727
	3) From HCST	589,507	-	-	-	-	-	-
	4) Others	1,503,209	-	300,525	10,463	-	-	310,988
	Total income (i)	10,616,734	1,747,607	1,103,235	893,227	1,448,468	826,958	6,019,495
E	1) Personnel	7,096,014	731,169	860,568	474,845	1,105,976	452,048	3,624,606
	2) Consumables & parts	585,741	211,930	53,508	54,309	65,718	61,643	447,108
	3) Repair	1,976,413	149,974	122,912	88,868	139,059	95,232	596,045
	4) Furnishing	16,650	2,194	260	5,193	409	3,914	11,970
	5) Equipment	259,876	43,189	4,648	30,408	41,544	49,632	169,421
	6) Travel	192,793	26,620	12,948	5,852	15,504	21,689	82,613
	7) Books	20,461	-	-	-	-	-	-
	8) Construction	93,656	15,886	-	-	47,069	4,267	67,222
	9) Others	295,155	24,159	-	-	-	-	24,159
Total Exp. (e)	10,536,759	1,205,121	1,054,844	659,475	1,415,279	688,425	5,023,144	
Difference (i) - (e)	79,975	542,486	48,391	233,752	33,189	138,533	996,351	

HCST : The Higher Council for Science and Technology, I: income, E: Expenditure

Table 2-98. Income and Expenditure in 2002 (US\$)

	All RSS	ESTC	MDTC	ICC	BRC	ERC	Total Five Centers	
I	1) R & D	3,010,714	581,428	289,285	494,285	426,714	681,428	2,473,140
	2) Technical service	5,430,000	1,582,857	670,715	474,285	1,260,000	298,572	4,286,429
	3) From HCST	642,857	-	-	-	-	-	-
	4) Others	1,845,715	-	321,428	7,142	-	-	328,570
	Total income (i)	10,929,286	2,164,285	1,281,428	975,712	1,686,714	980,000	7,088,139
E	1) Personnel	7,628,357	1,092,858	975,863	496,285	1,231,392	528,570	4,324,968
	2) Consumables & parts	709,428	317,428	53,642	59,714	92,715	72,428	595,927
	3) Repair	792,785	17,143	26,427	31,500	78,715	36,142	189,927
	4) Furnishing	11,142	1,428	285	714	1,428	714	4,569
	5) Equipment	318,571	117,857	8,142	62,928	35,357	50,000	274,284
	6) Travel	670,285	166,142	15,427	11,000	22,714	26,142	241,425
	7) Books	34,142	4,286	2,857	2,142	1,714	2,143	13,142
	8) Construction	54,571	-	-	-	27,643	3,143	30,786
	9) Others	710,000	82,858	52,857	37,142	45,464	46,428	264,749
Total Exp. (e)	10,929,281	1,800,000	1,135,500	701,425	1,537,142	765,710	5,939,777	
Difference (i) - (e)		364,285	145,928	274,287	149,572	214,290	1,148,362	

Table 2-99. Income and Expenditure in 2003 (US\$)

	All RSS	ESTC	MDTC	ICC	BRC	ERC	Total Five Centers	
I	1) R & D	2,664,151	583,906	95,592	261,934	384,982	860,811	2,187,225
	2) Technical service	4,195,821	1,373,256	702,809	570,742	795,400	178,476	3,620,683
	3) From HCST	281,469	-	-	-	-	-	-
	4) Others	1,626,615	-	331,534	8,297	-	-	339,831
	Total income (i)	8,768,056	1,957,162	1,129,935	840,973	1,180,382	1,039,287	6,147,739
E	1) Personnel	6,638,745	986,858	875,518	455,162	1,033,946	530,986	3,882,470
	2) Consumables & parts	617,989	220,356	38,648	54,191	110,406	87,818	511,419
	3) Repair	1,610,650	164,002	128,478	84,188	129,329	109,657	615,654
	4) Furnishing	2,615	-	690	420	-	705	1,815
	5) Equipment	329,406	158,358	34,700	24,185	28,787	45,103	291,133
	6) Travel	195,742	80,013	10,465	3,672	22,175	18,310	134,635
	7) Books	19,218	-	-	-	-	-	-
	8) Construction	159,197	-	-	-	39,458	-	39,458
	9) Others	651,093	-	-	-	-	-	-
Total Exp. (e)	10,224,655	1,609,587	1,088,499	621,818	1,364,101	792,579	5,476,584	
Difference (i) - (e)		347,575	41,436	219,155	-183,719	246,708	671,155	

Comparison of additional personnel expenses with the average of personnel expenses in 2001-2003 is shown in the table below. It is about a 14-19 percent increase. These additional personnel expenses will be covered by the income from the testing services using the new of additional equipment, i.e., except for replacement equipment. It is supposed that income of the Royal Scientific Society will be increased by about 30%, therefore, there will be no problem to cover the cost.

Table 2-100. Comparison of Personnel Expense

Center	Average of personnel expense in 2001-2003 /JD (a)	Additional personnel expense /JD (b)	Ratio (b) / (a) / %
Electronic Service and Training Center	664,512	127,251	19.1
Mechanical Design and Technology Center	641,123	100,173	15.6
Industrial Chemistry Center	337,185	35,198	10.4
Building Research Center	797,001	68,496	8.6
Environmental Research Center	357,353	39,049	10.9
Total five centers	2,797,174	370,167	13.2
Total RSS	5,050,382	370,167	7.3

Comparison of additional costs for consumables and parts with the average of costs for consumables and parts in 2001-2003 is shown in the table below. Except for the Industrial Chemistry Center, the increase is about several percent or less. For the Industrial Chemistry Center, an 80% increase is expected. However, costs for consumables and parts are generally charged to applicants, i.e., enterprises or others, together with the charge of testing services. In addition, it is about a 10% increase at the total of five centers. Therefore, there will be no problem to cover the cost.

Table 2-101. Comparison of Costs for Consumables and Parts

Center	Average of costs for consumables and parts in 2001-2003 /JD (a)	Additional costs for consumables and parts expense /JD (b)	Ratio (b) / (a) / %
Electronic Service and Training Center	177,237	2,523	1.4
Mechanical Design and Technology Center	34,468	2,191	6.4
Industrial Chemistry Center	39,767	32,927	82.8
Building Research Center	63,555	-	0.0
Environmental Research Center	52,456	4,000	7.6
Total five centers	367,483	41,641	11.3
Total RSS	452,283	41,641	9.2

Costs for calibration are included in the expenditure for equipment in the tables of "Income and Expenditure." Comparison of additional costs for outside calibration with the average of costs for equipment in 2001-2003 is shown in the table below. The increase is about 18 percent or less for each center. In addition costs for calibration also are generally charged to the applicants together with the charge for testing services, therefore, there will be no problem to cover the cost.

Table 2-102. Comparison of Costs for External Calibration

Center	Average of costs for equipment in 2001-2003 /JD (a)	Additional costs for external calibration /JD (b)	Ratio (b) / (a) / %
Electronic Service and Training Center	75,509	11,150	14.8
Mechanical Design and Technology Center	11,227	350	3.1
Industrial Chemistry Center	27,783	5,000	18.0
Building Research Center	24,985	-	0.0
Environmental Research Center	34,216	-	0.0
Total five centers	173,720	16,500	9.5
Total RSS	214,622	16,500	7.7

#### (4) Renewal of the Equipment in Future

The Royal Scientific Society has not charge costs for replacement and updating of the existing equipment for calibration and testing in order to provide its services at low prices for the development of industry. In this opportunity of the project, the Royal Scientific Society decided to include a part of the costs in the service charge, and the Royal Scientific Society is revising the price formula of the services.

Periods of durability of the equipment are expected as follows:

##### 1) Electrical Calibration Equipment

Such equipment is replaced about every five years in advanced nations etc. Considering the situation of the existing equipment, such equipment can be used for seven to ten years in the Royal Scientific Society.

##### 2) Physical Calibration Equipment

Weights could be used permanently. Primary standards of length can be used for several decades. The other physical calibration equipment can be used for about fifteen years.

##### 3) Electrical Testing Equipment

Considering the situation of the existing equipment and availability of parts from manufacturers, such equipment can be used for about ten to fifteen years.

##### 4) Physical Testing Equipment

Considering the situation of the existing equipment and availability of parts from manufacturers, such equipment can be used for about fifteen years.

##### 5) Chemical Testing Equipment

Considering the situation of the existing equipment and availability of parts from manufacturers, such equipment can be used for about fifteen years.

## 2-6 Other Relevant Issues

### (1) Execution of Scope of Work of Jordanian Side

Jordanian side shall complete the work set forth in the article 2-3-1 before arrival of the equipment such as re-modeling of buildings, preparation of utilities and foundations, and removal of existing equipment to be replaced. In addition, arrangement mentioned in the article 2-3-2 will take certain amount of costs. Therefore, Jordanian side shall secure sufficient budget necessary for the work in advance.

### (2) Packing and Transportation

A lot of items of the equipment is weak against fluctuation of temperature and humidity, wet conditions, dust, vibration, impacts, etc. Therefore, Contractors shall consider protection of the equipment at the time of packing and transportation.

### (3) Transportation in site, Installation etc.

The Royal Scientific Society has been doing the activity of calibration, testing research and development, education etc. In addition, the Higher Council for Science and Technology has been working in the same site. In order to minimize influence on their activity and surroundings, Contractors shall make plans for transportation, installation, test operation, commissioning etc. through discussions with the Royal Scientific Society and Consultants in advance.