

No. 1

BASIC DESIGN STUDY
ON
THE PROJECT FOR REHABILITATION OF CENTRAL WORKSHOP
OF
THE MINISTRY OF PUBLIC WORKS AND HOUSING
IN
THE HASHEMITE KINGDOM OF JORDAN

FEBRUARY 1979

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JAPAN INTERNATIONAL COOPERATION AGENCY
CONSTRUCTION PROJECT CONSULTANTS, INC.

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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 Rehabilitation of Central Workshop of Road Construction and Maintenance Machinery and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Jordan a study team from August 16th to September 14th, 1998.

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 basic design, and as this result, the this 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.

February, 1999



Kimio Fujita

President

Japan International Cooperation Agency

February, 1999

Letter of Transmittal

We are pleased to submit to you the basic design study report on The Project for Rehabilitation of Central Workshop of Road Construction and Maintenance Machinery in The Hashemite Kingdom of Jordan.

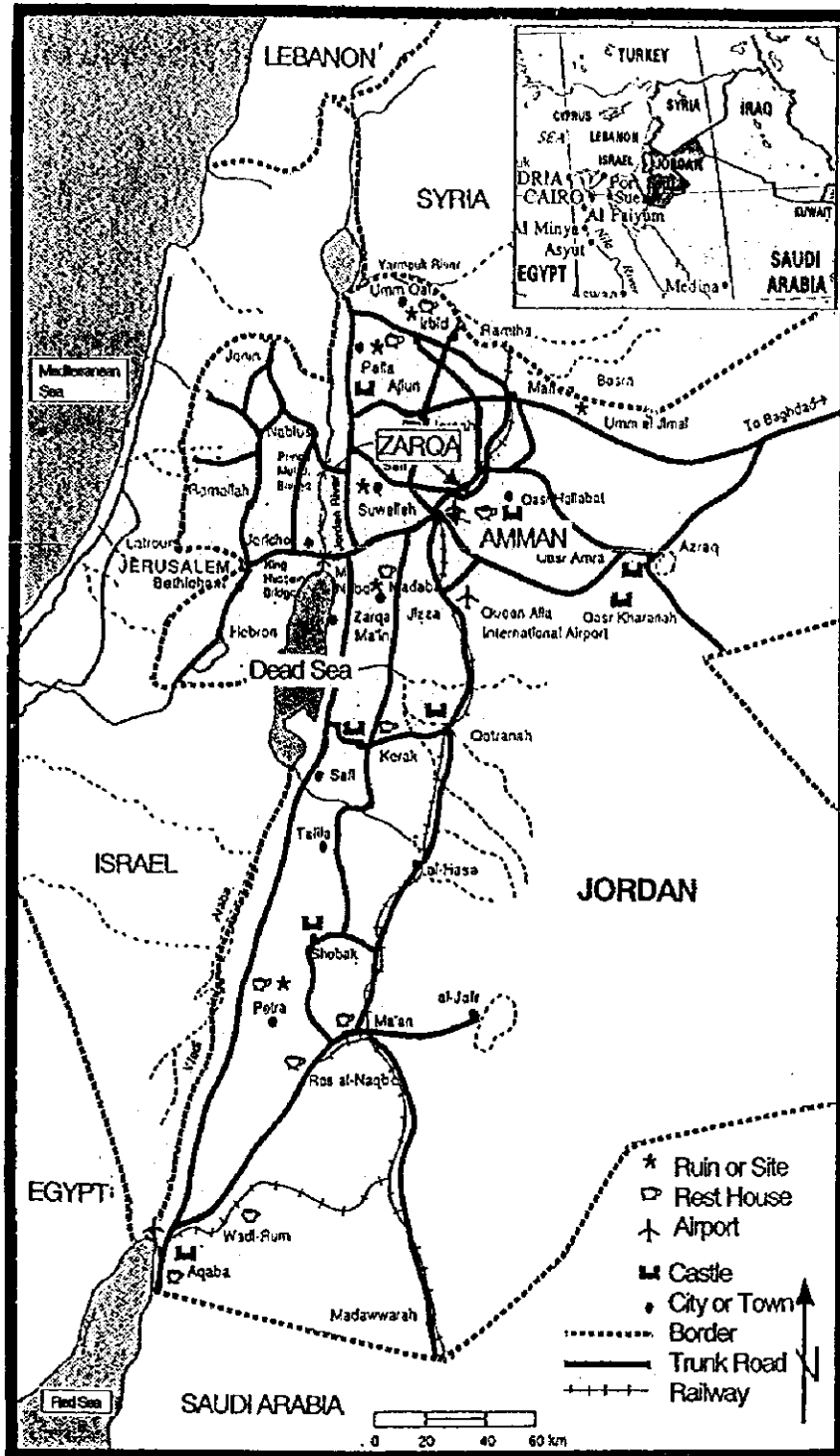
This study was conducted by Construction Project Consultants, Inc., under a contract to JICA, during the period from August 7, 1998 to February 26, 1999. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of Jordan and formulated the most appropriate basic design for the project under Japan's grant aid scheme.

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

Very truly yours,



Akira Shima
Project manager,
Basic design study team on
The Project for Rehabilitation of
Central Workshop of Road Construction
and Maintenance Machinery
Construction Project Consultants, Inc.



NATIONAL ROAD NETWORK

ABBREVIATIONS

A/P	-	Authorization to pay
E/N	-	Exchange of Notes
JD	-	Jordanian Dinar
MPWH	-	Ministry of Public Works and Housing

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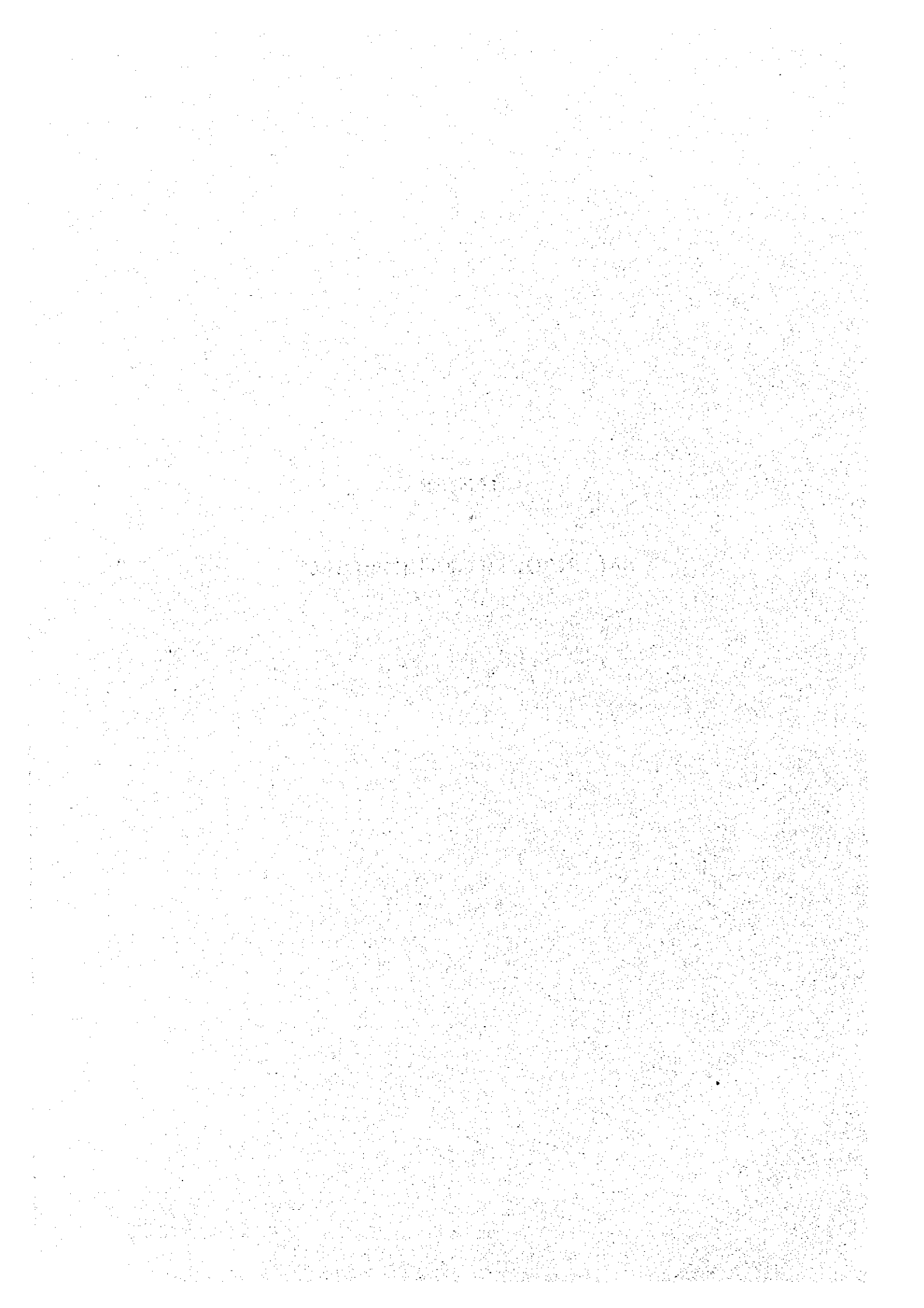
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CHAPTER 1

BACKGROUND OF THE PROJECT



Chapter 1. Background of the Project

With the signing of the peace treaty between Jordan and Israel in October 1994, transactions between the two countries have since then become active in such areas as trade and investments in tourism. When peace is established in the Middle-East in the future, Jordan which is situated at the crossroad point linking Israel and Arab countries will play a more important role. Therefore, the construction of roads as a basic trade infrastructure will become increasingly important.

As the road transport is playing the principal part in the transport sector, the government of Jordan is making efforts for the road network development by allocating the largest part (13%) of the national investment budget (327 million JD in 1997) to the Ministry of Public Works and Housing (hereinafter called MPWH). The main road network in Jordan is classified into three categories: "primary road" equivalent to the national road, "secondary road" connecting the primary roads and "village roads" branching off from the primary and secondary roads, all of which are called "classified roads" and the total length of which at the end of 1996 was 7,558 km. Besides the classified roads, there was, at the end of 1996, 8,407 km of local roads (agricultural roads) serving as production and social infrastructure.

The road development and maintenance in Jordan is the responsibility of the MPWH, which carries out on force account the routine maintenance of national road network and construction of the local roads. The MPWH owns road construction machinery and a workshop for the maintenance of these construction machines. The workshop was built in 1945 under the U.S. Marshal plan, and has a floor space of 4,900 m². The workshop is staffed with the necessary engineers and technicians but is not operating efficiently as the limited budget is deferring the rehabilitation of the aged workshop and its maintenance equipment as well as the procurement of spare parts.

In order to improve the maintenance capacity of the workshop for construction machinery, the government of Jordan has decided to construct a new workshop for the maintenance of construction machinery and vehicles in the eastern suburb of Zarqa city located at a distance of 42 km in the north-west of Amman, the capital city, and has applied to the Japanese government for a grant aid for the procurement of equipment for replacing the deteriorated units and for supplementing the equipment required for the proper functioning of the maintenance workshop. The main items of the requested equipment is listed on Table 1-1.

Table 1-1 Principal Equipment of Request

No.	Contents of Request			
	Equipment	Specification	Quantity	
Underearriage	1	Track Shoe Bolt Wrench	20 - 360 kgm	1 s
	2	Roller Idler Press	100 ton	1 s
	3	Track Press	200 ton	1 s
	4	Roller Idler Welder	DC44V, 650A	1 s
	5	Jib Crane for Roller Idler Welding	0.5 ton	1 s
	6	Roller Idler Preheating Box	9 KW, 3 phase	1 s
	7	Automatic Welding Flux Changer	4.5 m ³ /min	1 s
	8	Truck Shoe Rebuilder	DC44V, 650A	1 s
	9	Track Shoe Welder	DC44V, 650A	1 s
Engine	1	Valve Seat Grinder	Seat dia. 38 - 160mm	1 s
	2	Valve Refacer	Dia.: 100mm	1 s
	3	Valve Seat Refacer	Dia.: 20 - 60mm	1 s
	4	Engine Dynamometer	300PS	1 s
	5	Fuel Injection Pump Tester	8 cylinders	1 s
Hydraulic and Power Train	1	Hydraulic Cylinder Repair Bench	4,000 kgf-m	1 s
	2	Universal Hydraulic Tester	220PS	1 s
	3	Curved Surface Lapping Machine	150 ϕ × 180mm	1 s
	4	Plane Surface Lapping Machine	300 × 75mm	1 s
Tyre	1	Tyre Changer	16-23", 25-35"	each 1 s
	2	Tyre Removing and Repair Tools	25-35"	1 s
	3	Tyre Thermo Press	16-33"	1 s
	4	Wheel Balancing Machine	10-23"	1 s
Chassis of Construction Machinery	1	Mobile Floor Crane	2 ton, 3 ton	each 1
	2	Sling Chain Kit	—	1 s
	3	Wire Rope	—	1 s
	4	Parts Cleaning Machine	20 ltr/min	1
Electrics	1	Starter Generator Test Bench	Starter: 25kW	1
	2	Silicon Quick Changer	24 - 200AH	1
	3	Water Distiller	10 ltr/min	1
Machine-Tool	1	Crank Shaft Grinding Machine	Between centers 2,300mm	1 s
	2	Cylinder Boring Machine	Dia.: 35 - 350mm	1 s
	3	Cylinder Honing Machine	Dia.: 35-250mm	1 s
	4	Surface Grinding Machine	1,500 × 340mm	1 s
	5	Connecting Rod Rebuilding Machine	Dia. 20 - 120mm	1 s
	6	Electric Balancing Machine	3 - 300kg	1 s
	7	Lathe	2m	1 s
	8	Milling Machine	Universal type	1 s

No.	Contents of Request			
	Equipment	Specification	Quantity	
Cleaning and Painting	1	High Pressure Hot Water Cleaner	800 ltr/h	1
	2	Steam Cleaner	800 ltr/h	1
Welding	1	Arc Welder	50 - 300A	1
	2	Gas Welder	--	1
	3	Hydraulic Press	100 ton	1
	4	Hand Shear	6.5 mm	1
Vehicles	1	Gasoline Engine Analyzer	8 cylinders	1
	2	Wheel Alignment Tester	13 - 20"	1
	3	Spark Plug Cleaner	9 kgf/cm ²	1
	4	Two Pillars Lift	6 ton	1
Tools	1	Disassembling and Assembling	--	1 set
	2	Measuring	--	1 set
Parts Warehouse	1	Computer	with printer	1 set
Support Equipment	1	Lubrication Truck	4×4	1
	2	Mobile Workshop	4×4	2
	3	Wrecker	25 ton	1
	4	Forklift	3 ton	2

CHAPTER 2

CONTENTS OF THE PROJECT

Chapter 2. Contents of the Project

2-1 Objectives of the Project

- (1) The road construction machinery and vehicle owned by the MPWH.**

The MPWH owns at present the construction machinery and vehicles as shown in Table 2-1.

Table 2-1 Road Construction Machinery and Vehicles Owned by the MPWH

a) Number of Construction Machines

Type of machine	Wheel Loader	Motor Grader	Bulldozer	Vibration Roller	Hydraulic Excavation	Portable Compressor	Total
Zone							
Irbid	20	8	12	36	4	11	91
Amman	26	9	13	37	0	8	93
Ma'an	21	8	8	25	0	9	71
Total	67	25	33	98	4	28	255

(Units)

b) Number of Vehicles

(Units)

Management Area	Passenger Car	4WD	Bus	Micro-Bus	Single Cabin 4WD	Double Cabin 4WD	Dump Truck	Water Sprinkler	Trailer Truck	Fuel Tanker	Lubrication Truck	Mobile Workshop	Asphalt Tanker	Forklift Truck	Total
Irbid	1	18	-	1	5	36	14	8	1	6	-	-	6	-	96
Amman	27	71	19	5	12	64	25	10	4	5	1	-	2	2	247
Ma'an	-	16	-	1	6	26	17	8	1	5	-	-	2	-	82
Total	28	105	19	7	23	126	56	26	6	16	3	3	10	2	425

(2) Road Network and Road Development and Maintenance Programme

The main road network in Jordan is classified into three categories: the primary road equivalent to the national road, the secondary road connecting the primary roads and the village roads branching off from the primary and secondary roads. These roads are called "classified roads", the total length was 7,558 km at the end of 1996, of which 95% was paved. Besides the classified road there were 8,407 km of local roads (agricultural roads) at the end of 1996, of which 50% were paved and serve as the productive and social infrastructure of the rural zone.

Of road development and maintenance programme, construction, rehabilitation and periodic maintenance of the classified roads are subcontracted to private contractors, and the MPWH undertakes on force account the routine maintenance of the whole road network and the construction of the local roads.

1) Road Construction

In 1997, about 200 km of each category of classified roads and 455 km of local roads (agricultural roads) were constructed. The road network at the end of 1997 and the construction plan for 1998 are shown in Table 2-2.

Table 2-2 Road Network and Construction Plan

Unit: km

	Road Network (end of 1996)	Construction Achieved in 1997	Construction Plan for 1998
(Classified Road)			
Primary Road	3,031	211	-
Secondary Road	2,041	264	-
Village Road	2,483	201	-
Agricultural Road	8,427	455	*240

* Achieved in Jan. ~ Aug. 1998

Besides the existing road network shown above the construction of 70 km of primary road and 58 km of secondary road is progressing towards its completion in 2000. The construction of local roads (agriculture road) is undertaken by the MPWH on force account, about 450 km per year is being planned for future undertakings.

2) Road Maintenance

The road maintenance achieved in 1997 and the maintenance programme for 1998 and 1999 are shown in Table 2-3.

Table 2-3 Road Maintenance Achievement and Programme (Classified Roads)

Unit: km

	1997	1998 (plan)	1999 (plan)
Periodic Maintenance			
Primary Road	242	138	520
Secondary Road	15	28	244
Village Road	133	100	58
Routine Maintenance			
Primary Road	477	335	501
Secondary Road	443	310	465
Village Road	448	311	470

The road management policy will place more emphasis on road maintenance and rehabilitation rather than construction. More recently constructed roads will be requiring maintenance, and routine maintenance will become necessary for about 500 km of each category of road every year.

For undertaking the necessary maintenance work and the construction of agricultural roads according to the above road programme, MPWH is required to maintain its road construction capacity.

For this purpose, MPWH needs to strengthen its road construction capacity by reinforcing its construction machinery. Therefore, in order to use the existing construction machinery efficiently, MPWH needs to raise the work efficiency of the construction machinery by improving their maintenance.

However, MPWH's existing maintenance workshop is more than 50 years old, and its repair equipment has deteriorated to the extent that the construction machinery cannot be repaired properly now. Consequently, about one fourth of the 680 units of existing construction machines and vehicles are awaiting repair and maintenance services, and moreover the results of these repair services are not satisfactory. Consequently, the low operating rate of construction machinery has lowered the road construction and maintenance capacity.

The poor maintenance has also shortened the machine life from about 10 years on average to 7 years, incurring larger expenses for the repair works subcontracted to private workshops. Thus, the reduced maintenance capacity of workshops is hampering MPWH's performance in both the execution and financing of road development and maintenance.

Against the above background, the present project consisting of the rehabilitation of the equipment for the maintenance workshop for construction machinery, which is to be removed from Amman to Zarqa (at 42 km north-east of Amman, the capital city), aims to improve the maintenance capacity for construction machinery so as to raise machine operating efficiency, to extend machine life and to reduce subcontracted repair costs, and eventually to expand road development and maintenance operation and to strengthen the operating capacity financially.

2-2 Basic Concept of the Project

The present project is aimed at rehabilitation of the workshop equipment for the maintenance of MPWH's construction machinery and vehicles as listed in Table 2-1. The repair equipment to be planned shall be those adapted to the maintenance of construction machinery and vehicles of the specifications given in Table 2-4.

The designed grade of maintenance shall be the same as that of private maintenance workshops in Jordan. The contents of repair works can be divided into three levels - light, medium, heavy repairs as shown in Table 2-5: light and some medium repairs are carried out at work sites of the construction machinery and heavy and some medium repairs at the workshop.

Table 2-4 Construction Machinery and Vehicles to be serviced by the Workshops

Designation	Main Specifications	Number
Wheel Loader	80 - 170HP	67
Motor Grader	135 - 200HP	25
Bulldozer	70 - 400HP	33
Vibration Roller	2.5 - 10 ton	98
Hydraulic Excavator	20 ton	4
Portable Compressor	120 - 180 CFM	28
Passenger Car	1,600 - 3,000 cc	28
Passenger Car (4WD)	2,000 - 4,000 cc	105
Micro-bus	8 persons	7
Bus	22 -23 persons	19
Single Cabin	2,200 - 3,000 cc	12
Double Cabin	2,200 - 2,800 cc	122
Dump Truck	4 - 8 m ³	56
Water Sprinkler	10 - 12 m ³	26
Fuel Tanker	2 - 8 m ³	16
Asphalt Tanker	6,000 - 16,000 ltr	10
Trailer Truck	30 ton, 50 ton	6

Table 2-5 Contents of Repair by Repair Level

Category	Contents of repair
Light repair	<p>Gas welder: For the plate correction and reinforcement</p> <p>Tools: For the replacement of small parts</p>
Medium repair	<p>Gas welder: For the plate correction and reinforcement, gas welding of cracks, and preparation of metal patch</p> <p>Diesel generator: For the repair and reinforcement of racks, machines rebuilding and for using electric tools</p> <p>Air compressor: For charging air in tyre, cleaning and painting, and for using electric tools.</p> <p>Working bench with vise: For repair of hydraulic control valves, small components, etc.</p> <p>Crane: For the disassembling and assembling of hydraulic unit, bucket, etc. and for unit changing</p> <p>Hydraulic press: For inserting bush and pin.</p> <p>Battery charger: For battery charging.</p>
Heavy repair	<ol style="list-style-type: none"> 1) Overhaul 2) Inspection before disassembling, inspection and adjustment after assembling 3) Rebuilding of component parts 4) Rebuilding of undercarriage 5) Other repair:

In addition to the repair shops to be transferred from the existing workshop in Amman, the new workshop in Zarqa will be provided with new repair shops for undercarriage and hydraulic transmission. These new repair shops shall be included with the objective of rehabilitating equipment as both of them can be operated and maintained with the technical capability of the present workshop. They will reduce the man-hours for repairs, increase the operation rate of construction machinery through the prolongation of their life and will enable to reduce the expenditure for repairs by the inhouse undertaking of repair works which had to be contracted out despite the risk to the reliability of the delivery and quality of works.

The workshop shall be composed of the repair and service shops for; under carriage, electrical components, hydraulic and transmission, engine, radiator and tyre; machining, welding, washing, lubrication, vehicle repair. The equipment for the present project has been selected taking into account the quantity, specification and grade of the construction machinery and vehicle to be repaired.

As a result of discussions, the following items have been eliminated from the equipment requested by Jordan side.

- 1) Equipment which is not used either at the present workshop or by any private workshop, and which is not economical from a price and frequency of use view point.
 - a. Equipment for roller idler and track shoe
 - b. Curved and plane surface lapping machine
 - c. Universal hydraulic tester
- 2) Equipment advisably to be purchased with internal funds.
 - a. Computer
- 3) Equipment which has been excluded for reasons of high price and infrequent use, and of which services can be requested of private firms if necessary.
 - a. Wrecker
 - b. Gasoline engine analyzer
- 4) The equipment destined to the regional branches has been excluded as the objective of the project is to furnish the new central workshop with equipment and facilities.
 - a. Lubrication truck

After further discussions with Jordan side, it has been concluded that the workshop could perform better by adding a few supplementary equipment, and Jordan side expressed its strong desire to procure these equipment.

It has, therefore, been decided to include the following equipment in the procurement items.

1. Disassembling and assembling tools for master pin

2. Disassembling and assembling tools for sprocket
3. Disassembling and assembling tools for car lift
4. Hydraulic hose joints locking units
5. Motor with hook for the overhead crane
6. Jib-crane
7. Upright drill
8. Small drill
9. Metal saw

The results of discussion are summarized in Table 2-6.

Table 2-6 Alteration of the Content of the Principal Equipment of Request

		Contents of Request			Contents Confirmed	
Equipment		Specification	Quantity	Specification	Quantity	
Undercarriage	1	Roller Idler Welder	DC 44V, 650A	1 s		0
	2	Jib Crane for Roller Idler Welder	0.5 t	1 s		0
	3	Roller Idler Preheating Box	9 kW, 3 phase	1 s		0
	4	Automatic Welding Flux Changer	4.5 m ³ /min.	1 s		0
	5	Track Shoe Rebuilder	DC 44V, 650A	1 s		0
	6	Track Shoe Welder	DC 44V, 650A	1 s		0
	7	Master Pin Assembling Tool			CAT, KOMATSU, FIAT	1 s
	8	Sprocket Assembling Tool			CAT, KOMATSU, FIAT	1 s
	9	Electric Welder			24 kVA	1 u
Engine	1	Injector Nozzle Rebuilder				1 u
	2	Gas Exhaust Hose Reel			For the exhaust gas of diesel engine	2 u
	3	Two Posts Car Lift			3 ton	1 u
Hydraulic and Power Train	1	Curved Surface Lapping Machine	150 φ × 180 mm	1 s		0
	2	Plane Surface Lapping Machine	300 × 75 mm	1 s		0
	3	Hydraulic Hose Joints Locking Unit				1 s
	4	Universal Hydraulic Tester	380V, 90-95kW	1 s		0
Chassis of Construction Machinery	1	Universal Joint Repair Set			For assembling and disassembling	1 s
	2	Motor with Hook for the Overhead Crane			5 ton, 7.5 ton	Ea. 1s
Machine Tools	1	Upright Drilling Machine			Drill φ 50	1 u
	2	Small Lathe			1,000 mm between centers	1 u
	3	Jib-Crane			1 ton	3 u
	4	Shaping Machine			Stroke max. 700 mm	1 u
	5	Metal Saw			Cutting dia. max. 200 mm	1 u
	6	Bench Drill			700~750W	1 s
Welding	1	Pipe Bender (Manual)			Manual type	1 s

	Contents of Request			Contents Confirmed	
	Equipment	Specification	Quantity	Specification	Quantity
Tractor	1 Gasoline Engine Analyzer	4 cycles, 12V	1 u		0
	2 Tractor Lift			6 ton	3 s
Tools and Measuring Instruments	1 Torque Wrench (Large size), Tools for Construction Machinery	6,000~10,000 kg	2 u		1 u
			6 s		3 s
Parts Warehouse	1 Computer	with printer	1 u		0
Support Equipment	1 Mobile Lubrication Truck (with rear hydraulic lift)	4X4	1 u		0
	2 Wrecker	25 t	1 u		0
	3 Generator	125 kVA			1 u

2.3 Basic Design

2.3.1 Design Concept

(1) Design Concept

Concept of the Natural Conditions

The construction site of the maintenance workshop is located in a bore land area with a gentle undulation in Zarqa city (altitude 750 m) situated at 42 km in the north-east of Amman city. It has a Mediterranean climate with the highest average temperature at 25°C (max. 33.6°C - Min. 14.0°C) and the lowest average temperature 11°C (max. 18.4° - min. 3.3°C). Dry season is from May through October, hot in the daytime but cool in the evening, and the rainy season starts from the end of October till the next spring. Other than occasional snowfalls there are no other specific remarks to be made about the natural condition.

Concept of the maintenance and management capacity of the implementing agency

Technical level of personnel is high: of the 147 mechanics, 42 belong to the category 1 (experience more than 15 years) and 54 the category 2 (experience 10-14 years). 24 mechanics are to be newly employed, but they can be trained efficiently through OJT (on the job training) by the skilled technicians presently working in the workshop. In addition, the training to be provided by the equipment suppliers at the time of delivery of equipment will also help early acquisition of repair technology. Employing additionally 24 technicians should not cause particular problems as the grant aid project will lead to reduction of the expenditure for procurement and repair of construction machinery.

Concept of selection of equipment

The specifications of the construction machinery and vehicles constituting the project items are described in Table 2-3 (P.8). The repair level shall be designed to be of the same level as the general maintenance workshop in Jordan.

The contents of maintenance are medium repairs to be carried out mostly at work sites of construction machinery and heavy repairs to be done at the workshop.

- ① The equipment for cleaning and painting, and for plate work and welding shall be designed for general purpose use.

- ② The equipment for the repair of engines, hydraulic and transmission, under-carriage, for machining and for the repair of vehicles shall be designed for preventive maintenance of construction machinery and vehicles, and for the rebuilding of parts and components.

Concept of the procurement source of equipment

Considering quality, price and after-service, in principle, Japanese products shall be the object of procurement. However, European and U.S. products of acceptable quality and price as well as those which are not obtainable in Japan shall also be admitted for procurement from a third country. Detailed explanation is in Chapter 3 (3.1.5 Procurement Plan).

Concept of the implementation schedule

The implementation of procurement programme shall be completed within (1) fiscal year of Japan.

Concept of the delivery of equipment

The final delivery point of equipment shall be the maintenance workshop in Zarqa city. The equipment shall be unloaded at Aqaba, shall clear customs there, then shall be transported by the supplier to MPWH's new workshop to be constructed in Zarqa.

The equipment transported to the Zarqa workshop shall be brought into the workshop building and installed at each layout position by the supplier of the equipment.

The equipment shall be delivered to Jordan side after the supplier has carried out the start-up running of the installed equipment and has provided maintenance guidance to MPWH's equipment operators.

The supplier shall take responsibility for storage and installation of equipment during the whole period from the transport of equipment to the workshop until the completion of delivery.

(2) Location

1) Reasons for site selection

Located in close proximity to the capital, about 40 km, and, bordered by a highway, the project site is convenient for communicating with MPWH headquarters and for the transport of workers. It is located at a strategic transportation point, and geographical conditions are very good for servicing construction machines working all over the country.

2) Form of land

The project site is on a gentle slope with a 20 m difference in height between the highest and lowest point. MPWH will prepare the building ground by levelling off the ground to three flat levels.

(3) Infrastructure

Utilities such as water, electricity and telecommunication are already available at the site as there are buildings (warehouses) on the neighbouring lots. A highway passing alongside provides good transport conditions.

(4) Condition of land

The land is rocky with gravel. There is no specific problems hindering the building of the workshop.

2.3.2 Basic Design

(1) General Equipment Plan

The new maintenance workshop shall be constructed completely by Jordan side. The project is a grant aid by the government of Japan for the procurement of equipment for the maintenance workshop to be constructed by the Ministry of Public Works and Housing of Jordan. The equipment shall be installed at each repair shop for under-carriage, engine, hydraulic and transmission, tyre, chassis, electrical components, machining, washing and painting, welding and vehicle maintenance. The layout of the new workshop under project is shown in Fig. 2-1.

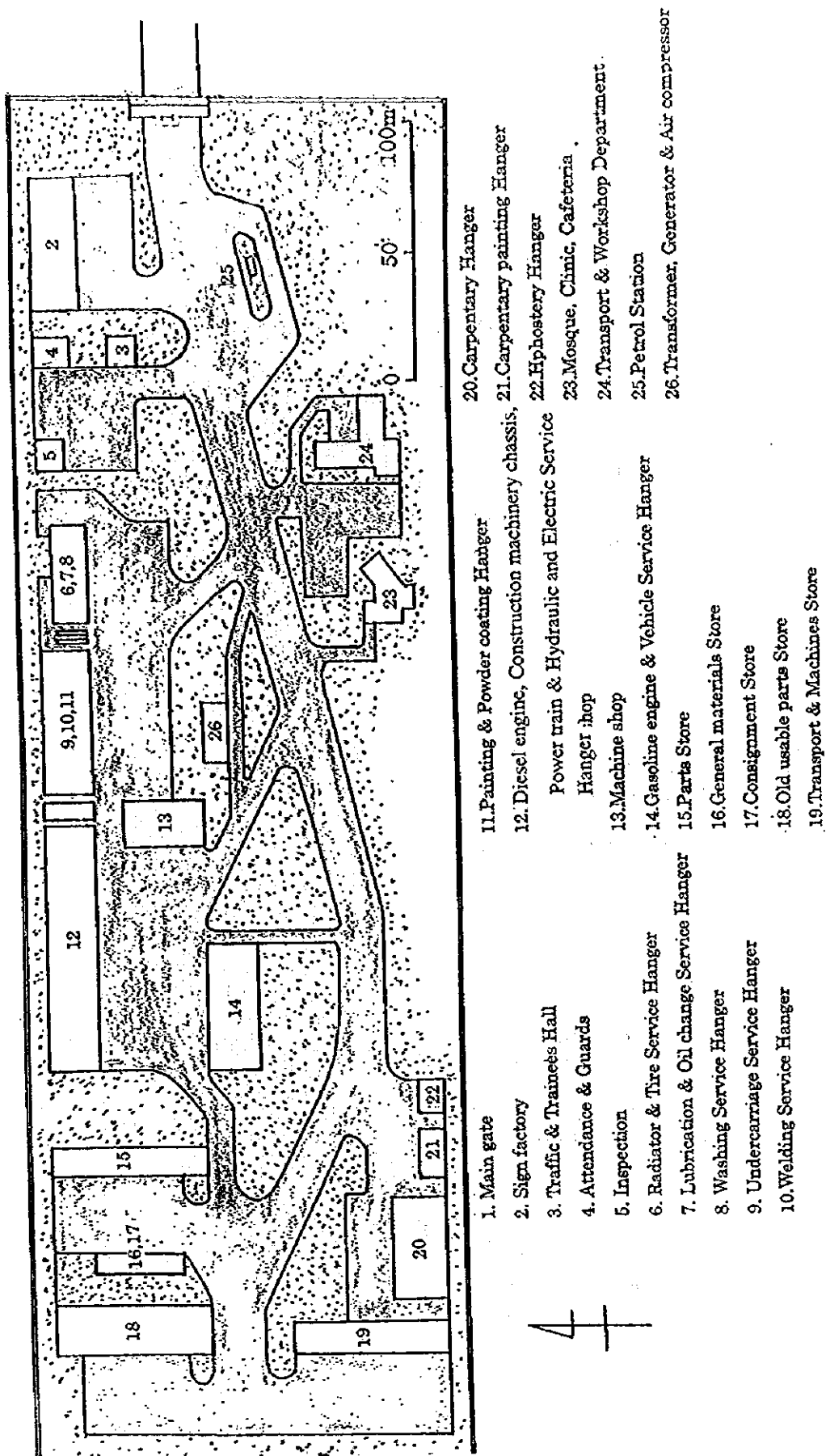


Fig. 2-1 Layout of the New Workshop (Zarqa)

(2) Equipment Plan

Repair works targeted by the present project shall be carried out at three levels: light, medium and heavy repairs as described in Table 2-7.

Table 2-7 Contents of Repairs

Category	Contents of repair	Annual repair (unit)	Operating conditions	Annual operating days (Average)
Light repair	<p>Gas welder: Rebuilding and reinforcement of chassis and attachment of construction machines.</p> <p>Tools: Replacement of electrical parts, bolts, bucket teeth, etc.</p>	500	<p>Round trip: average 250km/trip</p> <p>Number of days required: average 2 days/trip</p> <p>Operating repair units: 4</p>	$500 \text{ units} \times 2 \text{ days} \div 4 \text{ units} = 250 \text{ days}$
Medium repair	<p>Gas welder: 1) Rebuilding and reinforcement of chassis and attachment of construction machine. 2) Preparing metal patch.</p> <p>Diesel generator: 1) Rebuilding and reinforcement of chassis and attachment of construction machine. 2) For using electric tools.</p> <p>Air compressor: 1) Charging air in tyre 2) Cleaning and painting. 3) For using electric tools.</p> <p>Working bench with vise: For repair of hydraulic control valve, small components, etc.</p>	500	<p>Round trip: average 250km/trip</p> <p>Number of days required: average 4 days/trip (4 units/trip are repaired at the same job site)</p> <p>Operating repair units: 2</p>	$500 \text{ units} \div 4 \text{ units} \times 4 \text{ days} \div 2 \text{ units} = 250 \text{ days}$

Category	Contents of repair	Annual repair (unit)	Operating conditions	Annual operating days (Average)
	Crane: 1) Disassembling and assembling of hydraulic unit, bucket, etc. 2) Unit changing Hydraulic press: Inserting bush and pin. Battery charger: Battery charging.			
Heavy repair	1) Overhaul and rebuilding: Engine, Transmission, Brake, Clutch, Piston pump, Piston motor, etc. 2) Inspection and adjustment after assembling: Engine, Fuel injection pump, Hydraulic unit 3) Rebuilding: Engine parts, Brake, Clutch 4) Undercarriage: Replacement of pin, bush, shoe, etc. 5) Other repair:	700 (Content) Construction machine: 350 - Engine: 60% - Transmission: 30% - Hydraulic: 10% Vehicle: 350 - Engine: 80% - Brake, Clutch: 20%	Overhaul Number of days required: Engine: 7 days Transmission: 2-3 days Hydraulic unit: 1 day	

Note: The number of units of annual repair is the achievement in 1997.

1) Light repairs

Each governorate carries out light repairs with a pick-up truck of its own or rented from a private company. Therefore, this item shall be excluded from the object of cooperation of the present project.

2) Medium repairs

Construction machines requiring medium repairs are presently transported to the workshop. But these repairs can be done at the work sites of these machines after the introduction of two mobile workshops being planned under the project. These mobile units shall be based at the workshop and shall be despatched by the director of the workshop upon request from branch directors of the 12 governorates.

The mobile workshop shall be mounted with the equipment necessary for medium repairs: mechanical tools for construction machinery and vehicles, worktable with vise, welder with diesel generator, gas welder, hydraulic press, air compressor, battery charger, replacement parts, and a mechanic and his assistant driving the mobile workshop will carry out medium repairs at the work sites of construction machinery.

3) Heavy Repairs

Construction machines requiring heavy repairs are transported to the workshop. Repair work at each repair shop is planned as follows: the under-carriage repair shop, item ① and the hydraulic and transmission repair shop, item ③ below, which do not exist at the present workshop in Amman, shall be created newly at the Zarqa workshop. These equipment shall be included in the object of the equipment rehabilitation project, as they will contribute to improving the working rate of construction machinery through a reduction in repair time and prolongation of machine life.

- | | |
|-------------------------------|---|
| ① Under-carriage Repair Shop: | To prolong the life of under-carriage by preventive maintenance and replacement of parts. |
| ② Engine Repair Shop: | In-house rebuilding of parts and improvement of the reliability of engines after assembling |

- ③ **Hydraulic and Transmission Repair Shop:** In-house rebuilding of hydraulic cylinder and improved efficiency in the assembling and disassembling of torque converter
- ④ **Tyre Repair Shop:** Improved efficiency in tyre repair
- ⑤ **Chassis Repair Shop for the Construction Machinery:** Reduction of man-hour by the renewal of hooks and lifting equipment
- ⑥ **Electrical Components Repair Shop:** Rebuilding of electrical components
- ⑦ **Machine Shop:** Engine rebuilding and in-house machinery of chassis parts
- ⑧ **Cleaning and Painting Shop:** Cleaning of chassis and painting after repair
- ⑨ **Welding Shop:** Welding for chassis repair
- ⑩ **Vehicle Repair Shop:** Disassembling, assembling, inspection and adjustment of vehicles

4) Back-up equipment

- ① **Mobile Workshop:** The equipment shall be used for medium repairs (Refer to (2)-2) for detail)
- ② **Forklift:**

A forklift of 1.5 ton capacity has been selected for its maneuverability for the handling of spare parts in the small spaces of the parts warehouse.

A forklift of 3 ton capacity has been selected for use in the repair shop where the handling of heavy materials is required.

③ Diesel Generator:

The equipment has been selected as a stand-by power unit for power failure emergencies at the factory.

6) Contents of the Equipment

The names, main specifications, quantities and purposes of use of the repair equipment and their back-up units for each repair shops under project are shown in Table 2-8.

Table 2-8 Equipment Plan

1) Undercarriage repairing shop

No	Equipment	Main specification	Unit	Purpose of use
1	Roller & Idler press	Capacity: 100ton	1	For removing and installing bush in roller and idler.
2	Jib crane	Capacity: 500kg	1	For roller & Idler press: for lifting roller and idler.
3	Floating seal tester	Air pressure gauge: 0-10kg/cm ²	1	For inspecting oil leakage from floating seal of roller and idler.
4	Volume pump	Pressure: 50kgf/cm ²	1	For supplying oil to roller and idler
5	Track press	Capacity: 200ton Winch: 3ton	1	For removing and installing link pin in track link.
6	Lubricator & Tester kit for wet type track link	Pressure: 5kgf/cm ² With vacuum pump	1	For inspecting oil leakage from wet type link pin and supplying oil in case of insufficient lubricant.
7	Hydraulic shoe bolt wrench	Torque: 20-360kgm With conveyer, Accessories, etc.	1	For removing and installing bolts in track shoe.
8	Electric portable grinder	Grinding wheel: 125x19x12.7mm	1	For general works.
9	Master pin remover & installer set	For CAT, Komatsu, Fiat	1	For removing and installing master pin in track link.
10	Sprocket remover & installer set	For CAT, Komatsu, Fiat	1	For removing and installing sprocket in final drive shaft.

No	Equipment	Main specification	Unit	Purpose of use
11	AC arc welder	24kVA, 50-300A Welding rod: 2-6mm With accessories	1	For general works.

2) Engine service shop

No	Equipment	Main specification	Unit	Purpose of use
1	Mobile floor crane	Capacity: 1,000ton	1	For removing and installing component in construction machine.
2	Hydraulic shop press	Capacity: 60ton	1	For removing and installing bush, metal, bearing, etc.
3	Bench drill press	Capacity: 13mm	1	For general works.
4	Engine positioner	Capacity: 3,000kg	1	For disassembling, assembling and adjustment of engine.
5	Engine positioner	Capacity: 3,000kg	1	
6	Eccentric valve seat grinder	Valve seat dia: 38-160mm valve stem dia: 10-25mm	1	For the rebuilding of engine cylinder head.
7	Valve refacer	Grinding dia: Min.100mm	1	For the rebuilding of engine valve.
8	Valve spring tester	Capacity: 120kg	1	For inspection of valve spring
9	Piston heater	Temperature: max.300 degree Inside dimension: 450x450x400mm	1	For insertion of piston pin, etc.
10	Connecting rod aligner	Diameter: 30-75,80-120mm Length: 65-300mm	1	For inspection of connecting rod.
11	Cylinder head hydraulic test stand	Hydraulic pressure: 5-10kg/cm ²	1	For assembling of cylinder head.
12	Valve seat refacer	Valve seat dia: 20-60mm	2	For rebuilding of valve seat.
13	Parts cleaner	Vibration type Water temperature: 80 degree	1	For cleaning parts
14	Diesel compression gauge	70kg/cm ²	1	For checking engine
15	Cylinder liner puller	Cylinder dia: 70-150mm	1	For disassembling clinder liners.
16	Engine dynamometer	300PS, 4,000rpm	1	For checking the condition of the engine after rebuilding and for making correct diagnosis of troubles.

No	Equipment	Main specification	Unit	Purpose of use
17	Fuel injection pump test equipment	Bosch type Injection: 8 30-4,000rpm	1	For rebuilding and adjusting of fuel injection pump.
18	Injector nozzle reconditioning machine	1-phase 220V, 350W	1	For rebuilding of injector nozzle.

3) Hydraulic and power train service shop

No	Equipment	Main specification	Unit	Purpose of use
1	Hydraulic cylinder service stand	Torque: 4,000kgf-m Length: 2,500mm Diameter: 400mm	1	For disassembling and assembling of hydraulic cylinder
2	Hydraulic test gauge set	25,70,350kg/cm ²	2	For general inspection of hydraulic components
3	Hydraulic system checker	300kg/cm ² 25 ltr/min.	1	For inspection and adjustment of control valve and hydraulic cylinder after rebuilding.
4	Transmission positioner	Capacity: 3,000kg	1	For disassembling and assembling of transmission
5	Hydraulic hose clamping machine	Diameter: 3/8-2"	1	For clamping flanges of hydraulic hose.

4) Tyre service shop

No	Equipment	Main specification	Unit	Purpose of use
1	Hydraulic tyre removing tool	For OR tyre Rim size: 24-35" Ram capacity: 10ton	1	Tyre removing tool for construction machinery.
2	Thermopress	OR tyre:14.00-33.00	1	Tyre patch heater
3	Tyre service tool set		1	Tools for removing rim and tyre
4	Tube vulcanizer set	Size: 160x180mm	1	Heater for tube repair
5	Cold patch	Size: 30-70mm dia.	1	For repairing tubes
6	Air compressor	Motor output: 2-2.5kW	1	For pumping up tyres.
7	Tyre mounting & dismounting machine	Tyre size: 25-35"	1	For removing tyre from rim.
8	Tyre mounting & dismounting machine	Tyre size: 14-25"	1	
9	Portable wheel balancer	Rim size: 10-25"	1	Balancing machine for vehicles

5) Chassis repairing shop

No	Equipment	Main specification	Unit	Purpose of use
1	Mobile floor crane	Capacity: 3,000kg	1	For dismantling and mounting heavy component on construction machine.
2	Mobile floor crane	Capacity: 2,000kg	1	
3	Sling chain kit	28 kind of sling	2	
4	Wire rope for sling	Diameter: 9, 12mm	1	
5	Portable hydraulic jack	30ton, 50ton	each 2	
6	Parts cleaner	1- phase 220V, 35W 2- 20 ltr/min.	1	For washing parts.
7	Diaphragm pump	Capacity: 15 ltr/min.	1	For supplying oil.
8	Motor with hook for over head crane *	5ton & 7.5ton	1	Over head crane for chassis repair shop.
9	Universal joint service set		1 set	For the disassembling and assembling of heavy duty truck and bus.

6) Electric system service shop

No	Equipment	Main specification	Unit	Purpose of use
1	Starter generator test bench	Capacity: Starting motor: 25kW Generator: 2kW	1	For checking and adjusting the performance of electric components such as starting motor, generator, regulator, etc.
2	Circuit tester	Voltage: AC/DC 0-1000V Current: max. 500mA	1	
3	Armature tester	Voltage: AC/DC 0-±500V Current: 0-±500A	1	
4	Regulator tester	DC ammeter: ±60A DC voltmeter: 0-40V	1	
5	Insulation tester	DC voltage: 500V/1000MΩ	1	
6	Motor puller set		2 set	For pulling out armature in starting motor
7	Clamp tester	AC: approx. 1000A DC: more than 1000A	1	For use as a general purpose electric measuring instrument.
8	Silicon quick charger	DC output: 12-24V 140A Application: 24-200AH	2	For battery charging.

No	Equipment	Main specification	Unit	Purpose of use
9	Water purifier	Flow rate: 10 ltr/h	1	For supplying distilled water for batteries.

7) Machine shop

No	Equipment	Main specification	Unit	Purpose of use
1	Crankshaft grinding machine	Distance between centers: approx. 2,300mm Grinding diameter: max. 200mm Width of grinding wheel: 19-60mm	1	For rebuilding the bearing part of a crankshaft.
2	Cylinder boring machine	Boring diameter: approx. 30-320mm boring depth: max. 700mm	1	For rebuilding the inside of the cylinder in a cylinder block.
3	Cylinder honing machine	Honing diameter: approx. 30-300mm	1	
4	Surface grinding machine	Grinding capacity: approx. 1,600x400mm	1	
5	Con-rod boring machine & grinding machine	Boring range: approx. 30-150mm Con-rod length: approx. 100-500mm	1	For rebuilding the bearing part of a con-rod.
6	Electric balancing machine	Capacity: approx. 3-300kg	1	For balancing engine flywheel, crankshaft, etc.
7	Lathe	Distance between centers: 2,000mm Swing over bed: 500mm	1	For components rebuilding and general purpose parts machining.
8	Lathe	Distance between centers: 1,000mm Swing over bed: 250-350mm	1	
9	Electric bench grinder	Wheel size: 250x25x19mm	2	
10	Milling machine	Universal type Travel: approx. 850x400x400mm	1	
11	Upright drilling machine	Upright drilling machine		
12	Jib crane	Capacity: 1ton Jib length: 3m	3	For loading and unloading of work-pieces for machine-tools.

No	Equipment	Main specification	Unit	Purpose of use
13	Shaping machine	Stroke: max. 700mm	1	For the components rebuilding and general purpose parts machining.
14	Hacksaw machine	Cutting diameter: 200-250mm	1	
15	Universal press	Capacity: 100ton	1	For redressing of parts such as crankshaft, spindle, shaft, axle, etc.
16	Cylinder block counter bore boring tool set	For Cummins, CAT, Komatsu, Hino, Nissan, Mitsubishi	1 set	For rebuilding the inner surface of cylinder block.

8) Cleaning and Painting shop

No	Equipment	Main specification	Unit	Purpose of use
1	Hot water high pressure Washer	Capacity: 800 ltr/h Temperature: 30-100 degree Fuel: Kerosene	1	For cleaning of construction machines and vehicles.
2	Steam cleaner	Steam pressure: 7-10kg/cm ²	1	
3	Air compressor	Single stage Air cooled 230 ltr/min.	1	For general purpose painting.

9) Welding shop

No	Equipment	Main specification	Unit	Purpose of use
1	AC arc welder	Input: 24kVA Secondary current range: 50-300A Welding rod: 2-6mm	1 set	For general purpose welding.
2	Gas welder set	Oxygen pressure regulator: 7-250 kgf/cm ² acetylene pressure regulator: 1.8-25kgf/cm ²	1 set	For cutting and welding with oxygen and acetylene.
3	Hydraulic shop press	Capacity: 100ton	1	For parts requiring inserting and pulling-out by force.
4	Hand lever shear	Blade length:250mm Capacity: Sheet metal 6.5mm	1	For general purpose steel sheet cutting.
5	Jet multiple chisel	Stroke: 17mm	1	For removing slug from the electric welded part.
6	Pipe bender	Pipe diameter:32mm	1	For general purpose pipe bending.

10) Automobile service shop

No	Equipment	Main specification	Unit	Purpose of use
1	Compression gauge for gasoline engine	Max. 25kgf/cm ²	1	For checking compression pressure in gasoline engine.
2	Spark plug cleaner and tester	Air pressure: 9kgf/cm ²	1	For testing and adjusting gap and insulation of spark plug after cleaning.
3	Wheel alignment tester	Wheel diameter: 10-20"	1	For measuring and adjusting wheel alignment of vehicle.
4	Wheel balancing machine	Wheel diameter: 10-20" wheel width: 3.5-10" wheel weight: 65kg Digital display	1	For balancing tyres of vehicle.
5	Two post car lift	3ton	1	For checking, repairing and adjusting of vehicle.
6	Hydraulic garage jack	20ton	2	
7	Auto lift	6ton 4ton	2 1	

11) Tools

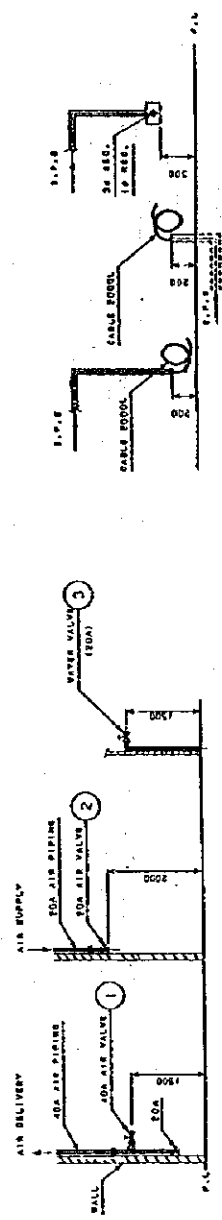
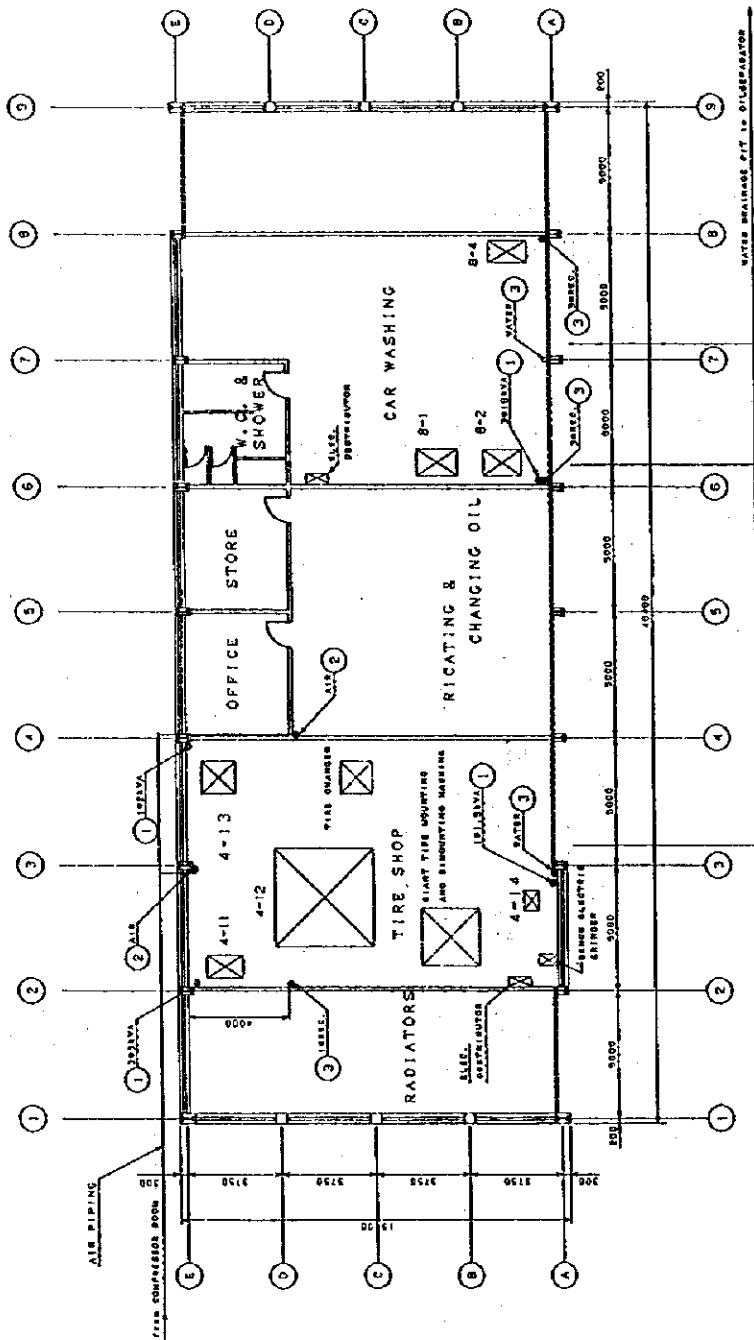
No	Equipment	Main specification	Unit	Purpose of use
1	Tools	Tools for mechanics for construction machine including measuring tools, preventive maintenance tools, etc.	1 set	For using as general purpose tool in workshop for repairing, adjusting, measuring, etc.

12) Maintenance back-up equipment

No	Equipment	Main specification	Unit	Purpose of use
1	Mobile workshop	4x4 Hydraulic crane: 3ton	1	For repairing and adjusting construction machines and vehicles at job site.
2	Mobile workshop	4x4 Power gate loading type	1	
3	Fork lift	Diesel, 1.5ton	1	For using in warehouse.
4	Fork lift	Diesel, 3ton	1	For using in workshop.
5	Diesel generator	125kVA	1	For using in an emergency of electric failure.

7) **Equipment Layout Drawings**

The drawings on Fig. 2-2 ~ 2-7 show the layout of the requested equipment in each repair shop.



DETAIL VALVE AIR/WATER

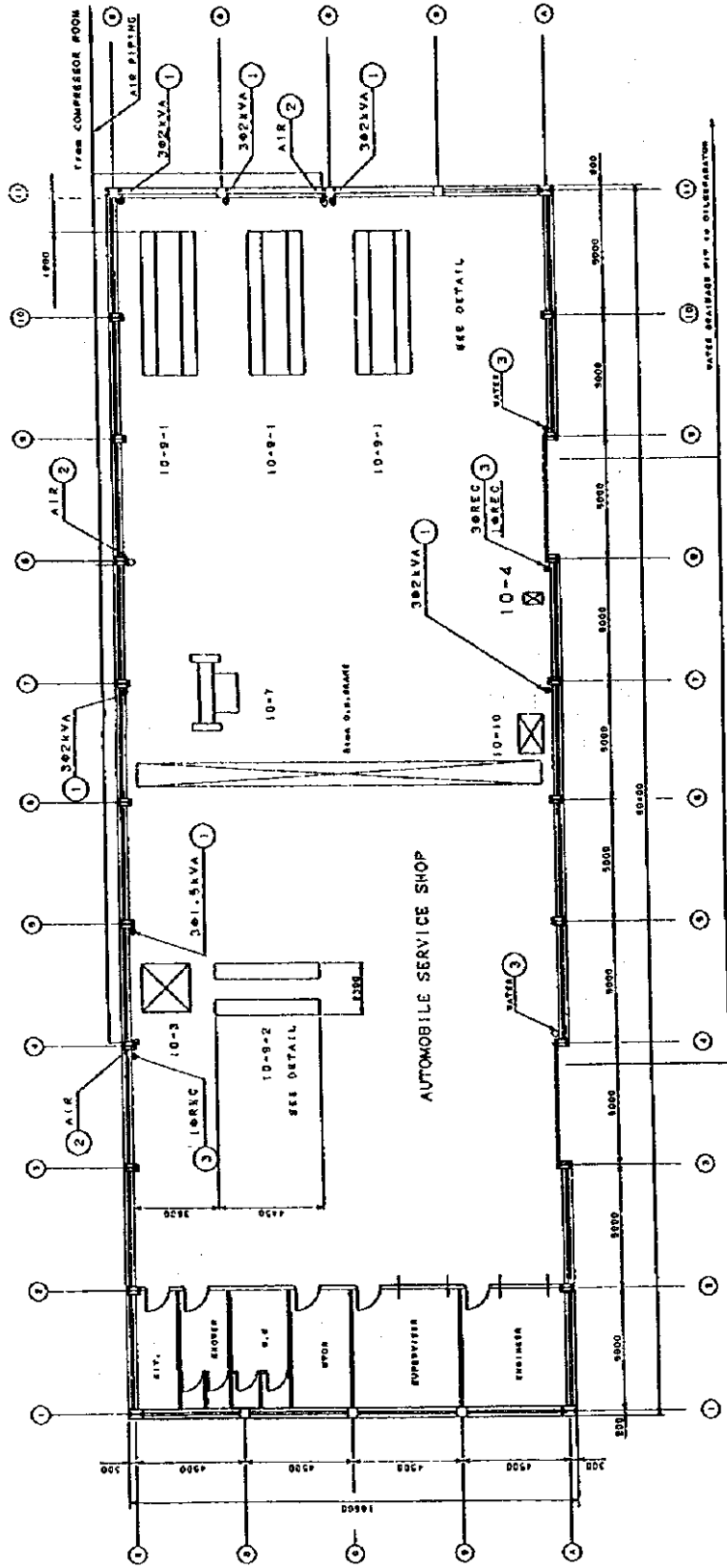
TYPICAL SYMBOLS OF WIRING

- ☐ EXISTING MACHINE
- ⊕ S.P. ELECTRIC POWER SUPPLY
- ⊕ 3Ø R.E.C. 3PHASE RECEPTACLE
- ⊕ 1Ø R.E.C. 1PHASE RECEPTACLE

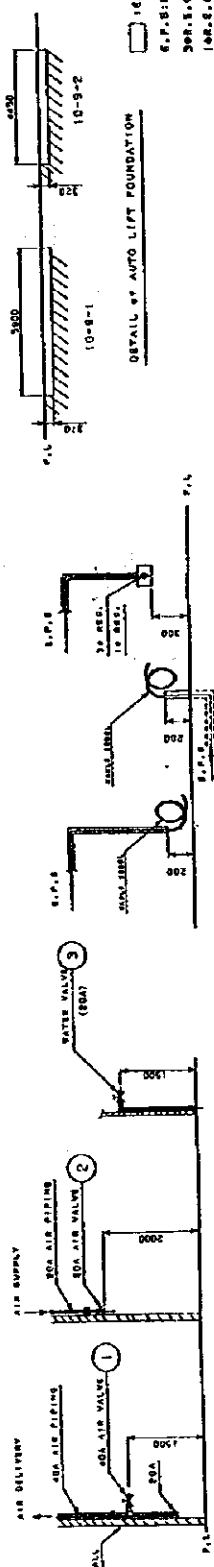
THE HASHEMITE KINGDOM OF JORDAN
 MINISTRY OF PUBLIC WORKS & HOUSING
 TRANSPORT & WORKSHOP DEPARTMENTS

NO. 3

981222-3



AUTOMOBILE SERVICE SHOP



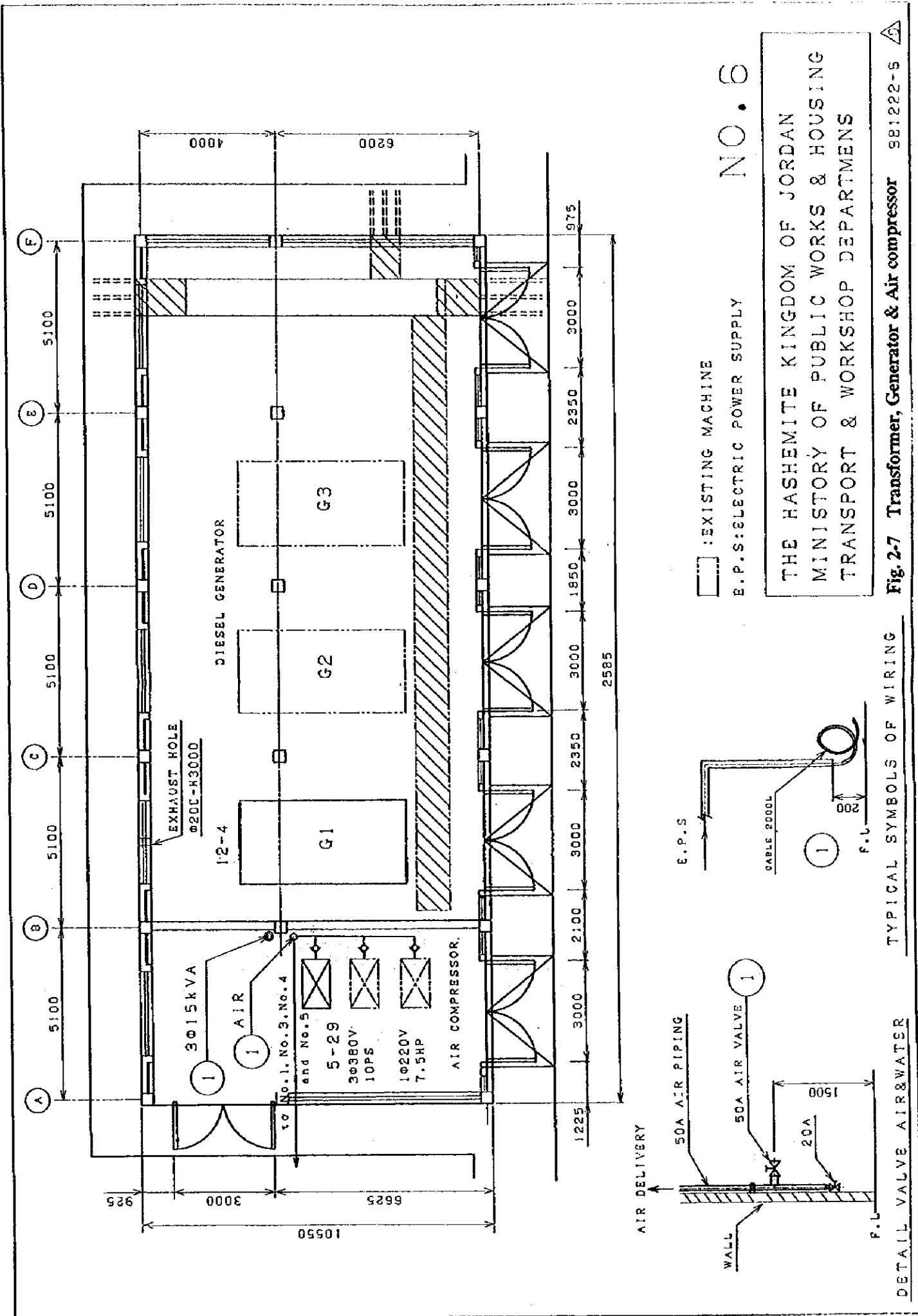
- 1 EXISTING MACHINE
- 2 6.P.S. ELECTRIC POWER SUPPLY
- 3 3ØR.S. 3-Ø PHASE RECEPTACLE
- 4 1ØR.S. 1-Ø PHASE RECEPTACLE

NO. 5

THE HASHEMITE KINGDOM OF JORDAN
 MINISTRY OF PUBLIC WORKS & HOUSING
 TRANSPORT & WORKSHOP DEPARTMENTS

961222-5

Fig. 2-6 Gasoline engine and Vehicle Service Hangar



CHAPTER 3

IMPLEMENTATION PLAN

Chapter 3. Implementation Plan

3.1 Implementation Plan

3.1.1 Implementation Concept

(1) Project Implementing Agency

In the case of implementation of the project under Japan's Grant Aid, the organizations concerned will function following the mechanism illustrated in Fig. 3.1.

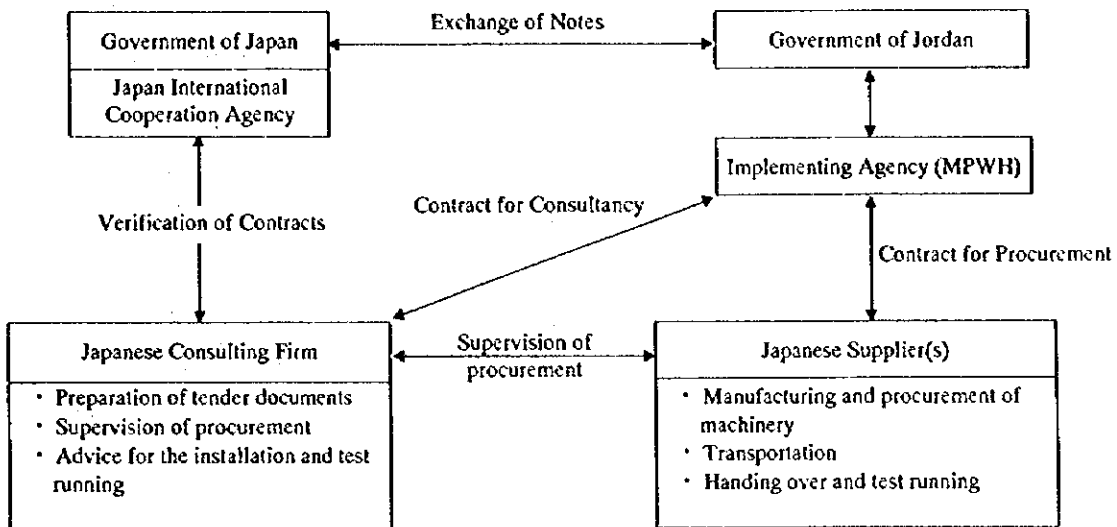


Fig. 3.1 Mechanism of Project Implementation

The project implementing agency in Jordan is the Ministry of Public Works and Housing (MPWH).

In accordance with Japan's Grant Aid System, a Japanese consulting firm will undertake the detailed design and supervision of the Project, and Japanese trading firm(s) will undertake the supply of equipment under the project.

(2) Consultant

In accordance with Japan's Grant Aid System, a Japanese consulting firm will be employed for engineering services for the Project.

After the signing of Exchange of Notes (E/N) between the Government of Japan and the Government of Jordan, MPWH will conclude speedily a contract with a Japanese consulting firm for the procurement of consultancy services.

The said firm will provide engineering services for the procurement of equipment including detailed design, preparation of tender documents, assistance for tender(s) and contract(s), and supervision of procurement, in accordance with the contract until the completion of delivery of the equipment under the Project.

(3) Supplier(s)

MPWH will conclude contract(s) for the supply of the equipment under the project with the Japanese trading firm(s) who has(have) been awarded the tender(s) after having passed successfully the examination as to the specified quality at the open tender with conditional admission.

The said firm(s) has(have) the obligation to deliver the equipment requested by MPWH and carry out its initial operation diligently within the delay stipulated in the contract.

3.1.2 Conditions for implementation

The equipment to be procured in Japan and the third countries shall be unloaded at Aqaba port and shall clear customs there. After customs clearance, the equipment shall be transported by the supplier(s) to MPWH's new workshop at Zarqa.

The equipment transported shall be installed in the workshop by the supplier(s) and shall be delivered to MPWH after the supplier(s) has(have) carried out the initial running of the equipment installed and has(have) provided instructions for the maintenance of equipment.

After the transport of the equipment to Zarqa workshop, the supplier undertakes the storage and installation of that equipment as its responsibility until the completion of delivery.

3.1.3 Scope of Work

The procurement cost of equipment including the transport upto MPWIH's Zarqa workshop is to be borne by Japan side. All procedures necessary for the exemption of import duties and other taxes are to be taken by Jordan side.

3.1.4 Consultant's Supervision

(1) Principles of Procurement Supervision

In case of implementation of the project under the grant aid scheme of the Japanese government, the consultant shall carry out the preparation of tender document and the supervision of procurement with thorough understanding of the following.

- Background of the implementation programme
- Contents of the basic design report
- System of Japan's grant aid
- Contents of the Exchange of Notes between the two governments

Based on the above understanding, the contents, division of responsibilities, and special notes for the detailed design and supervision of procurement are explained below.

(2) Scope of Consulting Services

After the signing of Exchanges of Notes (E/N), the consultant concludes contract for consulting services with the implementing agency within the scope of services specified in the Exchange of Notes (E/N).

The scope of services are summarised below,

1. Detailed Design

- Consultancy agreement (in Jordan) and verification (in Japan)
- Prompting the procedures for issuance of the Authorization to Pay (A/P) (Jordan)
- Preparation and discussion of tender documents (Japan, Jordan)
- Obtaining approval for tender documents from Jordan side (Jordan)
- Announcement of tender and distribution of tender documents (Japan)

- Execution of tender(s), evaluation of tenders, preparation of evaluation report, approval for the report (Jordan/Japan)
- Witness of the contract(s) for equipment supply (Jordan/Japan), and verification of the contract(s) (Japan)
- Confirmation of the obligations of Jordan side (Jordan/Japan)

2. Supervision of the Procurement of Equipment

- Confirmation of the manufacturing order
- Follow-up of the procurement
- Ex-factory inspection
- Attendance to the delivery inspection
- Progress report
- Witness of final hand-over
- Preparation of completion note and final report

3. Initial Operation of the Equipment

It is necessary that instructions for initial running and for preventive and routine maintenances are provided by the supplier's (suppliers') engineer(s) under the supervision of the consultant.

(3) Special Notes

The equipment and its specifications confirmed at the basic design should be confirmed, and the content of the design should be reviewed after the signing of Exchange of Notes, in order to ensure that the specifications are in accordance with the objectives of Japan's Grant Aid for equipment procurement project and to prepare the tender documents accordingly.

3.1.5 Procurement Plan

Procurement of equipment from Japan and the third countries shall be done according to the following plan. Jordan shall be excluded from the eligible supplier countries as it is not manufacturing the equipment under project.

(1) Items to be procured from Japan

As regards the general repair equipment for construction machinery, the Ministry of Water and Irrigation is already using the equipment supplied from Japan. It is therefore considered that MPWH has a good technical and organizational capacity for the maintenance and management and that the Japanese manufacturers and suppliers have also a good capacity of supplying spare parts.

(2) Items which can be procured from the third countries

Equipment of European and American origin, which is satisfactory in quality and obtainable at a good price, and also that which is not obtainable in Japan, can be procured from third countries.

Based on the above, the following equipment shall be admitted for procurement from Japan and the third countries.

Procurement from the third countries

- 1) Fuel Injection Pump Test Equipment (Engine repair)
- 2) Crank Shaft Grinder (machinery)
- 3) Cylinder Boring Machine (machinery)
- 4) Cylinder Honing Machine (machinery)
- 5) Surface Grinding Machine (machinery)
- 6) Con-rod Boring Machine (machinery)
- 7) Crank Shaft Balancing Machine (machinery)

Procurement from Japan or third countries

- 1) Hydraulic Track Press (Under carriage repair)
- 2) Roller Idler Press (Under carriage repair)
- 3) Hydraulic Cylinder Service Stand (Hydraulic and power train repair)
- 4) Tyre (Tyre repair)
- 5) Wheel Balancer (Tyre repair)
- 6) Hot water high pressure washer (Cleaning and painting)
- 7) Steam cleaner (Cleaning and painting)
- 8) Wheel alignment tester (Chassis repair)
- 9) Gasoline engine analyzer (Chassis repair)

3.1.6 Implementation Schedule

The project shall be implemented according to the schedule shown in Fig. 3-2.

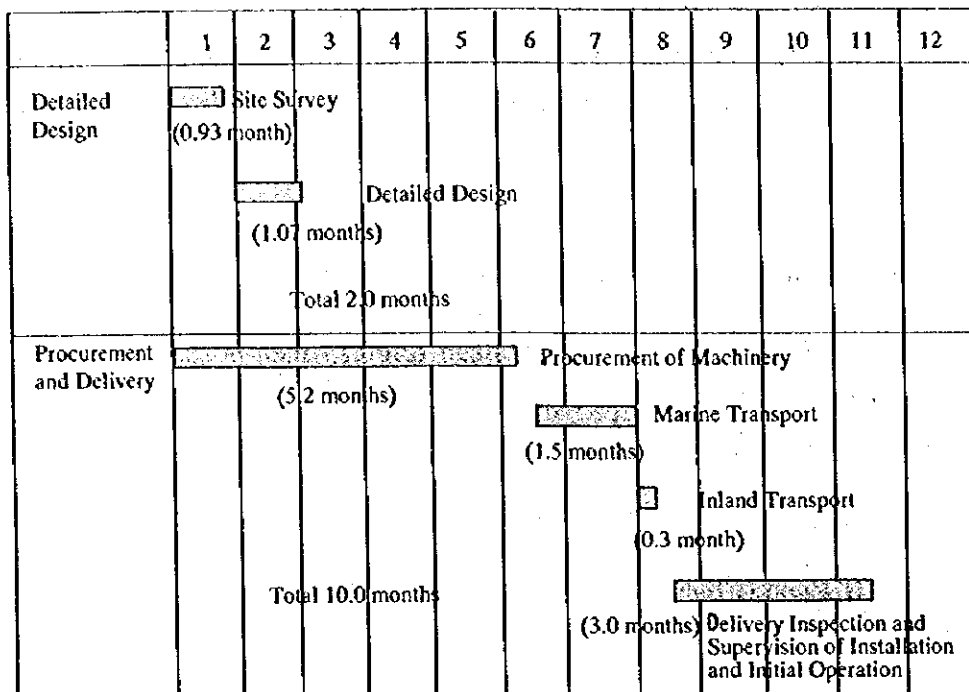


Fig. 3-2 Implementation Schedule

3.1.7 Obligations of Recipient Country

In case the Project is implemented under Japan's Grant Aid Scheme, the following obligations are to be fulfilled by Jordan side.

- (1) Preparation of construction ground for the new workshop
- (2) Construction of the new workshop (from design to construction of the workshop building)
- (3) The responsibilities for the installation of utilities (Electricity, water, telephone etc.) shall be divided between Jordan and Japan sides as follows.

1) Electricity

Cabling upto taps on wall:	Jordan
Cabling from wall plugs to equipment:	Japan

2) Water

Piping upto water taps:	Jordan
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- Piping from water taps to equipment: Japan
- 3) Compressed air
- Piping upto intake elbows: Jordan
- Connecting the quick chuck and equipment by hose: Japan
- 4) Overhead crane
- Fabrication and setting of crane girder
in H-beam and setting of rails: Jordan
- Setting of the hoist on the crane girder
and mounting of the crane: Japan
- 5) Forced exhaust duct for engine test room
- Tower and openings on the wall;
fabrication and installation of underground
cooling tank, pipings and foundation
rails for installation: Jordan
- Fabrication and fixing of exhaust duct: Japan
- 6) Jib crane
- Fabrication and installation: Japan
- 7) The drawings required for the above item
- 1)~6) shall be prepared by Japan and Jordan side respectively in time with the
work progress schedule.

3.2 Project Cost Estimation

3.2.1 Project Cost Estimation

The project costs related to the construction of buildings and the preparation of utilities are to be borne by Jordan side.

3.3 Operation and Maintenance Costs

4) Operation and Maintenance Cost

The cost of operation and maintenance of the repair workshop for construction machinery after implementation of the project is estimated as per Table 3-1. The expenditure for the procurement of spare parts and consumables is estimated at 14.2 Million Yen (equivalent to 86,000 JD), and the expenses for subcontracting repair works at about 10,000 JD owing to increased in-house repair works.

Table 3-1 Estimate of Annual Operation and Maintenance Budget for the New Maintenance Workshop

Unit: JD

Expense Items	1999 - 2000
— Personnel expenses	810,000
— General expenses	11,200
— Workshop operation cost	114,700
• Electricity	(10,300)
• Water	(3,200)
• Fuel and oil	(2,500)
• Telephone	(1,500)
• Spare parts and consumables	(86,000)
• Materials	(11,200)
— Sub-contract repair cost	10,000
Total	945,900

Table 3-2 Estimate of Annual Expenditure for Maintenance Parts and Consumables

Unit: Yen 1,000

	Repair Shop	Amount
1	Under-carriage Repair Shop	573
2	Engine Repair Shop	1,972
3	Hydraulic and Transmission Repair Shop	183
4	Tyre Repair Shop	585
5	Construction Machinery Chassis Repair Shop	746
6	Electrical Components Repair Shop	189
7	Machining Shop	5,998
8	Washing and Painting Shop	123
9	Welding Repair Shop	133
10	Vehicle repair Shop	998
11	Tools (general tools, measuring instruments)	266
12	Back-up Equipment	2,605
	Total	14,171

The spare parts and consumables have been estimated separately for repair equipment and tools, according to the frequency of use of each equipment, within the limit of 2.5 to 15% of equipment value.

	Percentage of equipment price - for 1 year's operation	
	Repair equipment (%)	Tools (%)
1) General equipment	3	2.5
2) Equipment of frequent use	5	5~8
3) Equipment comprising consumables	7.5	15

With the implementation of the project, the improved maintenance capacity of the workshop shall prolong the life of construction machinery. The average life of machines, which is 7 years on average at present, is expected to be extended to about 10 years. As a result, the annual expenditure for renewal of construction machinery and vehicles, which is currently about JD 1.5 million, is expected to be reduced by about 30 percent (equivalent to 450,000 JD). Therefore, the operation budget for the whole Technical Division comprising the procurement and maintenance of construction machinery is estimated to become as follows after the implementation of the project (1999/2000) (Table 3-3).

**Table3-3 Estimate of Annual Budget for the Technical Division
- for the departments concerned with the construction machinery**

Unit: JD

	1997	1998	1999/2000
Maintenance and Operation of Construction Machinery Maintenance Workshops	853,367	741,850	945,900
Replacement Parts for Construction Machinery (1)	497,000	489,000	600,000
Purchase of Construction Machinery (2)	1,300,000	1,500,000	1,050,000
Total	2,650,367	2,730,850	2,595,900

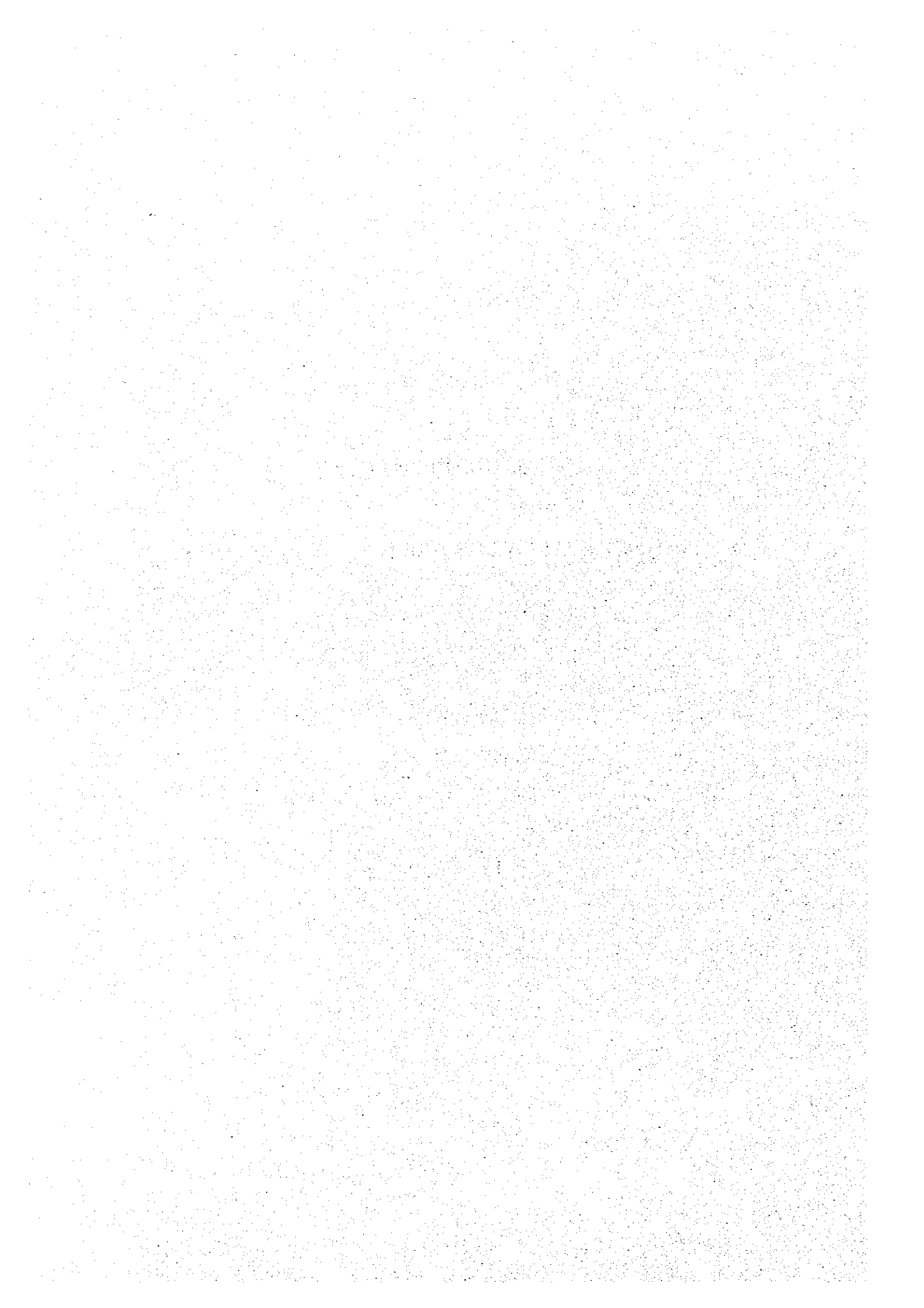
Notes: (1) Estimates are based on the past records.

(2) Purchase cost of construction machinery takes into account the reduction in machinery renewal costs, which will be realized by the improvement in repair capacity.

As explained above, the increase in the operation cost of the maintenance workshop can be covered by the reduction in machinery renewal cost and can, therefore, be well absorbed by the budget of the Technical Service Division. And, moreover, there is the possibility of reducing the budget required by the division.

CHAPTER 4

PROJECT EVALUATION AND RECOMMENDATION



Chapter 4. Project Evaluation and Recommendation

4-1 Project Effect

(1) Justification and its verification of the project

The MPWH undertakes the routine maintenance of the national road network and the construction of local roads (Agricultural road) using its own road construction machinery. Because of the deterioration and aging of the workshop equipment the repairing capacity of the maintenance workshop for construction machinery has been reduced substantially. In consequence, the operating efficiency of construction machinery has been lowered, resulting in the reduced capacity of road construction and maintenance. Furthermore, incomplete repair works have been shortening the life of construction machinery compelling the MPWH to prematurely replace the machinery.

Under these circumstances, the contents of the project, the implementation of which shall produce the following effects, is considered appropriate.

1) Economic Effects

The maintenance capacity of the workshop shall be improved, resulting in qualitative improvement of repairs, reduction of repair time and expansion of repair range.

These improvements will bring about the following economic effects.

1.1 Improvement of road construction capacity

The construction of rural roads (agricultural roads) being undertaken by MPWH on force account shall support the productive activities of the rural population, who are mostly engaged in agriculture. This shall contribute to raising their revenue level and also to improving their accesses to social services such as education and health, thus elevating their overall living standards. This impact is valuable in alleviating regional disparities as well, which is one of government's priorities in development policy.

1.2 Improvement of Road Maintenance Capacity

Improvement of routine maintenance of road undertaken by MPWH on force account shall bring about the following economic effects.

- ① Maintaining roads in good condition shall reduce transportation cost (reduction of vehicle operating costs.)
- ② Adequate and regular road maintenance shall prevent the premature deterioration of roads, allowing the compression of expenditure for costly road rehabilitation works.

2) Financial Effects

2.1 Reduction of expenditure for the purchasing of construction machinery

With the implementation of the project for rehabilitation of maintenance workshop, it shall become possible to carry out repair works which are not possible currently or to carry out timely, with MPWH resources, those repair works which are presently subcontracted to private workshops. Consequently the machine life which has been reduced to about 7 years now is expected to be extended to about 10 years.

As a result, the annual expenditure for the renewal of construction machinery, for which the budget was JD150 million in 1998, is expected to be reduced by about 30%, and shall, therefore be compressed to about JD100 million.

2.2 Reduction of expenditure for the subcontracting of repairs

The current expenditure of 75,000 - 80,000 JD per year can be reduced to about 10,000 JD after the new maintenance workshop has come into full operation.

4-2 Recommendation

(1) Management of the Workshop

Generally, success of a workshop project depends largely on the capability of the workshop manager. Unlike a production factory the performance of which is judged by the quantity and quality of products, it is quite difficult to measure the performance of maintenance workshop. It is necessary to establish and apply a severe system for checking the effects of maintenance such as prolongation of life of the machine receiving maintenance service, improvement in operating rate, effects compared with maintenance cost etc. For achieving the objectives of improvement in these factors of performance, a most challenging management is required.

The project implementing organization on Jordan side is considered to have basically the required capability, but if the equipment under project is to be operated fully enabling the new workshop to operate to its full potential, the enhancement of the manager's capability in practical planning and his leadership in execution is indispensable.

It is, therefore, advised that the most capable staff be assigned to its operation, resorting to all possible measures: training of the manager, if necessary, getting advices or cooperation for a certain period from the outside, assigning a newly selected management staff etc.

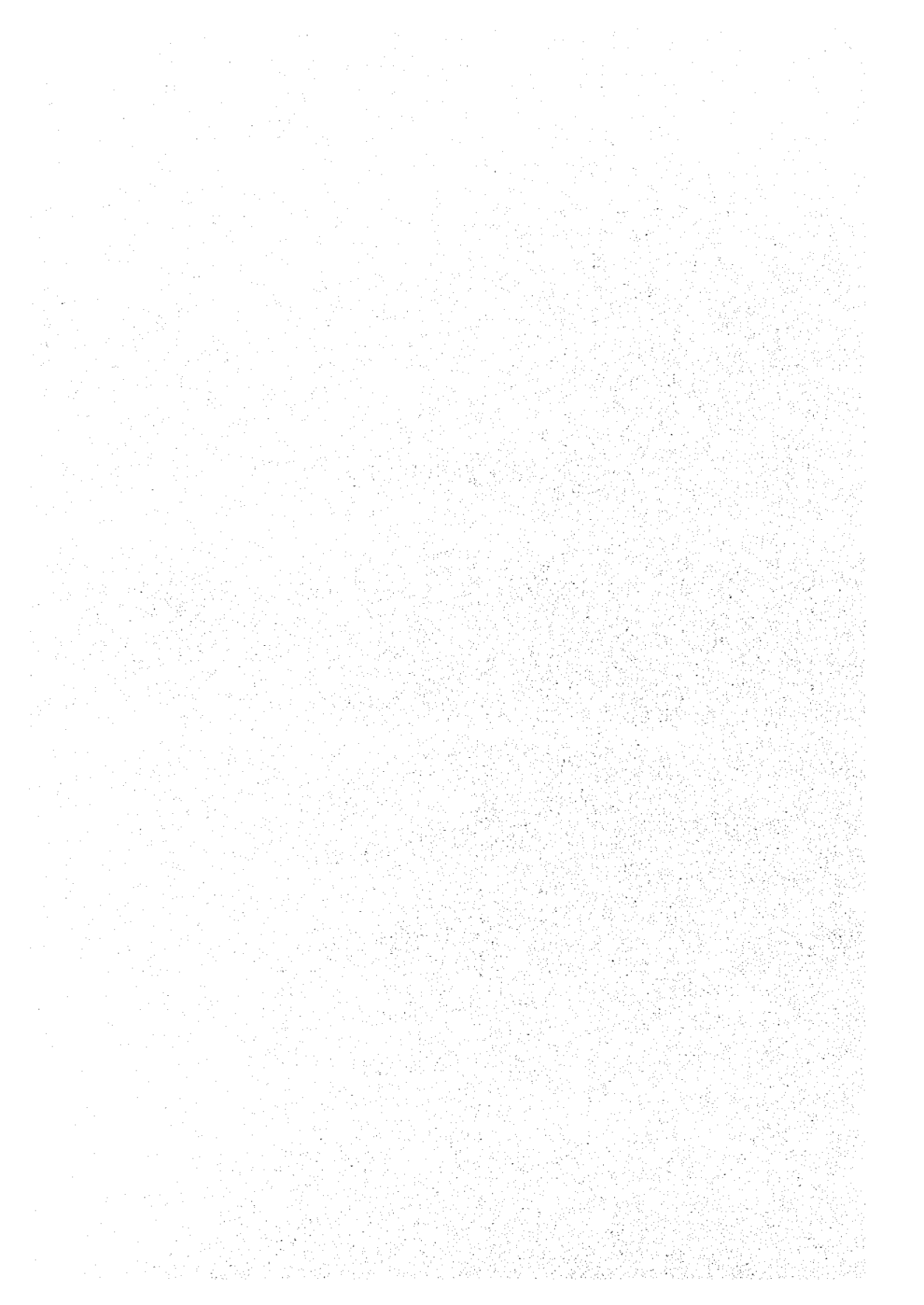
(2) Strengthening of the regional capacity of maintenance of construction machinery

The implementation of the project shall improve substantially the maintenance capacity of the central workshop for construction machinery and will consequently have the effect to ease the workshop's operation financially. Therefore, the MPWH should now apply this financial facility to the strengthening of maintenance capacity of its regional branches. At present MPWH's regional branches have practically no repair equipment: of the 12 governorates, only Aqaba, Zarqa and Irbid have a few equipment; and Karak, Jarash and Ajlun have none; 6 other governorates have only workshop buildings and the few equipment they have are too old to operate properly.

Timely execution of the periodical maintenance and of the light repairs shall minimize requests for heavy repairs, which shall reduce the overall expenditure for repair, extend the machine life and alleviate the work load of the central workshop.

The maintenance works being carried out by the regional branches do not require heavy equipment, therefore the purchase cost of necessary equipment is considered to be in a range absorbable by the reduction in overall expenditure resulting from the rehabilitation of the central workshop.

APPENDICES



Appendices

- Appendix 1. Member List of the Survey Team**
- Appendix 2. Survey Schedule**
- Appendix 3. List of Party Concerned in Jordan**
- Appendix 4. Minutes of Discussion**

Appendix 1 Members List of the Study Team

Mr. Y. Yabe	Team Leader	Chief representative in Jordan, Japan International Cooperation Agency
Mr. H. Matsuki	Coordinator	Second Project Study Div., Grant Aid Project Study Dept., JICA
Mr. A. Shima	Chief Engineer	Construction Project Consultants, Inc.
Mr. H. Sasaki	Machinery Planner	Construction Project Consultants, Inc.
Mr. A. Ando	Cost Estimate/Procurement	Construction Project Consultants, Inc.

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

6th Floor, Shinjuku Maynds Tower Building
1-1, Yoyogi, 2-chome, Shibuya-ku, Tokyo 151, Japan
Fax: (03) 5352-5381
Phone: (03) 5352-5321

Construction Project Consultants, Inc. (CPC)

YSK Bldg.
3-23-1 Takadanobaba, Shinjuku-ku, Tokyo 169-0075, Japan
Fax: (03) 5273-4861
Phone: (03) 5273-3201

Appendix 2 Survey Schedule

	Date	Schedule			Stay
		Mr. Y. Yabe* (Team Leader)	Mr. H. Matsuki (Planning and Management)	Mr. Shima (Chief Engineer) Mr. H. Sasaki (Machinery Planner) Mr. A. Ando (Cost Estimate/ Procurement)	
1	Aug/16 (Sun)		Tokyo 11:00→Bangkok 15:30 (TG641)		Bangkok
2	17 (Mon)		Bangkok 14:30→Amman 19:00 (RJ181)		Amman
3	18 (Tue)	Courtesy Call to Embassy of Japan, JICA Jordan Office Courtesy Call to Ministry of Planning and Ministry of Public Works and Housing			Amman
4	19 (Wed)	Discussion with Ministry of Public Works and Housing (Explanation of Inception Report and Discussion on the schedule)			Amman
5	20 (Thu)	Site Survey (Amman, Zarqua)			Amman
6	21 (Fri)	Internal Meeting			Amman
7	22 (Sat)	Survey on the general condition of road construction			Amman
8	23 (Sun)	Discussion on the Minutes with MPWH			Amman
9	24 (Mon)	Discussion on the Minutes with MPWH			Amman
10	25 (Tue)	Discussion on the Minutes with MPWH			Amman
11	26 (Wed)	Signing of Minutes of Meeting Report to Embassy of Japan, JICA Jordan Office	Same as* Amman 21:15→	Same as*	Consultants (8/26 - 9/7) Amman
12	27 (Thu)		→ Bangkok 11:45 (RJ180)	Survey	Province
13	28 (Fri)		Bangkok 19:59 → Tokyo 19:00 (TG640)	Internal Meeting	Province
14	29 (Sat)			Survey	Province
15	30 (Sun)			Survey	Province
16	31 (Mon)			Survey	Province
17	Sep/1 (Tue)			Survey	Province
18	2 (Wed)			Survey	Amman
19	3 (Thu)			Survey	Amman
20	4 (Fri)			Internal Meeting	Amman
21	5 (Sat)			Survey	Amman
22	6 (Sun)			Survey	Amman
23	7 (Mon)			Discussion with MPWH	Amman
24	8 (Tue)			Discussion with MPWH Amman → Milano 12:10(RJ117)18:50	Chief Engineer, Machinery Planner (9/8 - 14) Amman Milano
25	9 (Wed)			Final Meeting with MPWH Survey of Manufacturers	Amman Verona
26	10 (Thu)			Report to Embassy of Japan, JICA Jordan Office Survey of Manufacturers Milano → Copenhagen 19:10(SK688)21:20	Amman Copenhagen
27	11 (Fri)			Compiling of data and information Survey of Manufacturers Copenhagen → Arhus 9:55(SK229)10:35	Amman Arhus
28	12 (Sat)			Amman 17:30→Dubai 21:25 (EK904) 22:45 Arhus → Copenhagen 15:20(QJ176)16:00	Plane Copenhagen
29	13 (Sun)			→ Bangkok 8:10, 22:15 → (TG518) Copenhagen → Amsterdam 10:40(KL1126)12:05 Amsterdam 14:30(KL861)	Plane

Appendix 3 List of Party Concerned in Jordan

(1) Ministry of Public Works and Housing

Mr. Nasser Allwzi	Minister
Mr. Basheer Al Jagbeer	Secretary General
Mr. Abdel - Shakur Barakat	Technical Assistant to Undersecretary
Mr. Yahya Kiski	Assistant to Secretary General for Building Affairs
Mr. Mouhammed Radwar	Architect
Mr. Mazen Nsur	Public Relation
Mr. Najeh Hamamreh	Director of Equipment and Transport
Mr. E. Hashem Anaswah	Director of Workshop
Mr. Isam Majali	Workshop Engineer
Mr. Mouhammed Shafaamri	Workshop Engineer
Mr. M. Maayaha	Director of Road Construction
Mr. Mouhammed Ramthawi	Department of Road Construction
Mr. Walid Ishrug - Laban	Director of Road Maintenance
Mr. Fayez Hamdan	Department of Road Maintenance
Mr. Najeb Hasser	Department of Road Maintenance
Mr. Sami Halase	Director of Road Studies
Mr. Asim Hijjawi	Director of Financial Affairs
Mr. Majed Alshari	Department of Financial Affairs
Mr. Alwi Yacoub	Department of Financial Affairs
Mr. Yousef Harb	Zarqa Branch Manager
Mr. Nayet Nawayes'h	Karak Branch Manager
Mr. Radwan Al Madani	Tafila Branch Manager
Mr. Ali Al-Kurdy	Aqaba Branch Manager
Mr. Abdel Munem Abu Hlaleh	Ma'an Branch Manager
Mr. George Kaldani	Balqa Branch Manager
Mr. Ahmad El Majja	Irbid Branch Assist. Manager
Mr. Mahdi Nusir	Jerash Branch Assist. Manager
Mr. Walid Aku-Obeillah	Ajlun Branch Electrical Engineer

(2) Ministry of Planning

Mr. Nael Hajjaj	Deputy Director Department of Bilateral Cooperation
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(3) Aqaba Port Corporation

Mr. Mohamed El-Dalafieh	Director General
--------------------------------	-------------------------

Appendix 4 Minutes of Discussion

MINUTES OF DISCUSSIONS
BASIC DESIGN STUDY ON THE PROJECT FOR
REHABILITATION OF CENTRAL WORKSHOP OF ROAD CONSTRUCTION
AND MAINTENANCE MACHINERY
IN THE HASHEMITE KINGDOM OF JORDAN

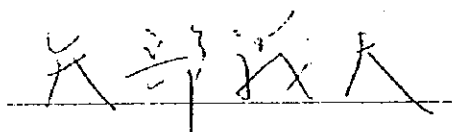
In response to the request from the Government of the Hashemite Kingdom of Jordan, the Government of Japan decided to conduct the Study on the Project for Rehabilitation of Central Workshop of Road Construction and Maintenance Machinery (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Jordan a study team, which is headed by Mr. YABE Yoshio, Resident Representative, JICA Jordan Office, and is scheduled to stay in the country from August 18 to September 12, 1998.

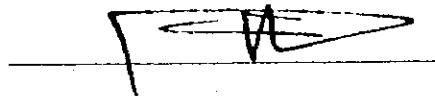
The team held discussions with the officials concerned of the Government of Jordan, and conducted a field survey at the study areas.

In the course of discussions and field surveys, both parties confirmed the main items as described on the attached sheets. The Team will proceed to further works and prepare the Study Report.

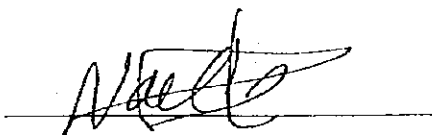
Amman, August 26, 1998



Mr. YABE, Yoshio
Leader
Basic Design Study Team
JICA



Eng. Bashir Jaghbeer
Secretary General
Ministry of Public Works
and Housing



Dr. Nael Al Hajaj
Deputy Director
Bilateral Cooperative Department,
Ministry of Planning

ATTACHMENT

1 . Objective of the Project

The objective of the Project is to improve the road construction capacity of the Ministry of Public Works & Housing, through the reinforcement of its workshop equipment.

2 . Project Site

The Project Site is shown in ANNEX-1.

3 . Responsible Ministry and Executing agency

Responsible Ministry : Ministry of Public Works and Housing

Executing Ministry : Ministry of Public Works and Housing

(Organization Chart of MPWH is shown in ANNEX-2)

4 . Items Requested by the Government of Jordan

After discussions with the Team, the items listed in ANNEX-3 were finally requested by the Government of Jordan.

However, the final components of the Project will be decided by the Basic Design Study Team after further studies in Japan on the basis of the Project under the Japan's Grant Aid.

5 . Japan's Grant Aid System

(1) The Government of Jordan has understood the system of the Japan's Grant Aid explained by the Team as described in ANNEX-4.

(2) The Government of Jordan will take the necessary measures described in ANNEX-5 for smooth implementation of the Project on condition that the Grant Aid Assistance by the Government of Japan is extended to the Project.

6 . Schedule of the Study

(1) The consultants will proceed to further studies in Jordan until September 12, 1998.

(2) Based on the Minutes of Discussions and technical examination of the study results, JICA will complete the final report and send it to the Government of Jordan by March, 1999.

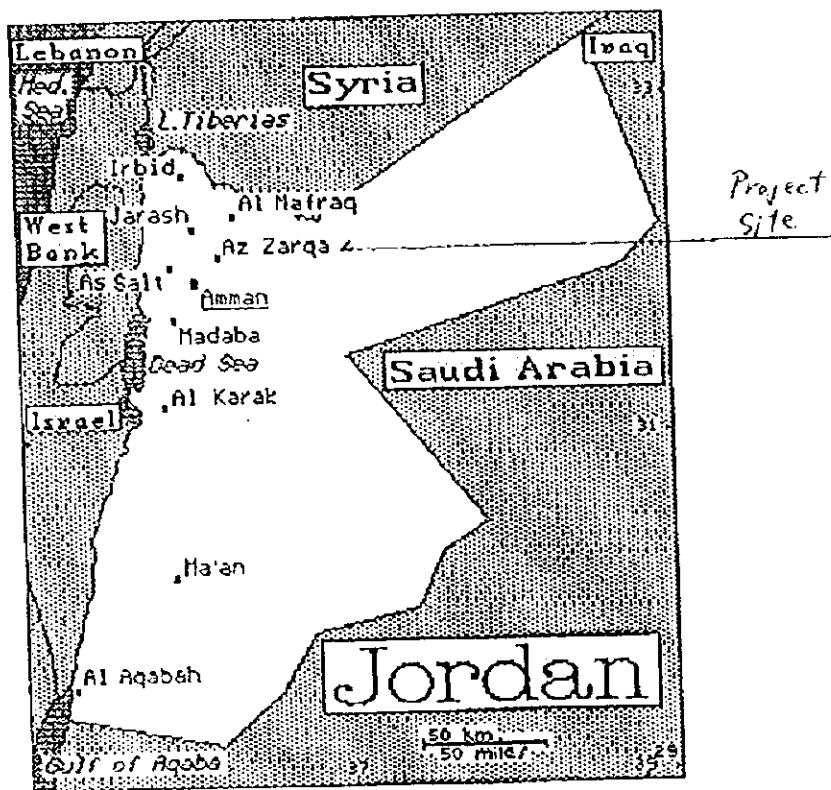
7 . Other Relevant Issues

(1) MPWH plans to revise the detailed design of the new workshop in Zarqa and it will send the revised plan to Japanese side by October, 1998. The revised point of the detailed design is as follows;

a) The height of overhead crane at the Diesel workshop (the Construction machinery workshop) will be 6.5m from the floor level.

(2) MPWH ensured to complete the construction of the new workshop buildings in Zarqa by August, 1999.

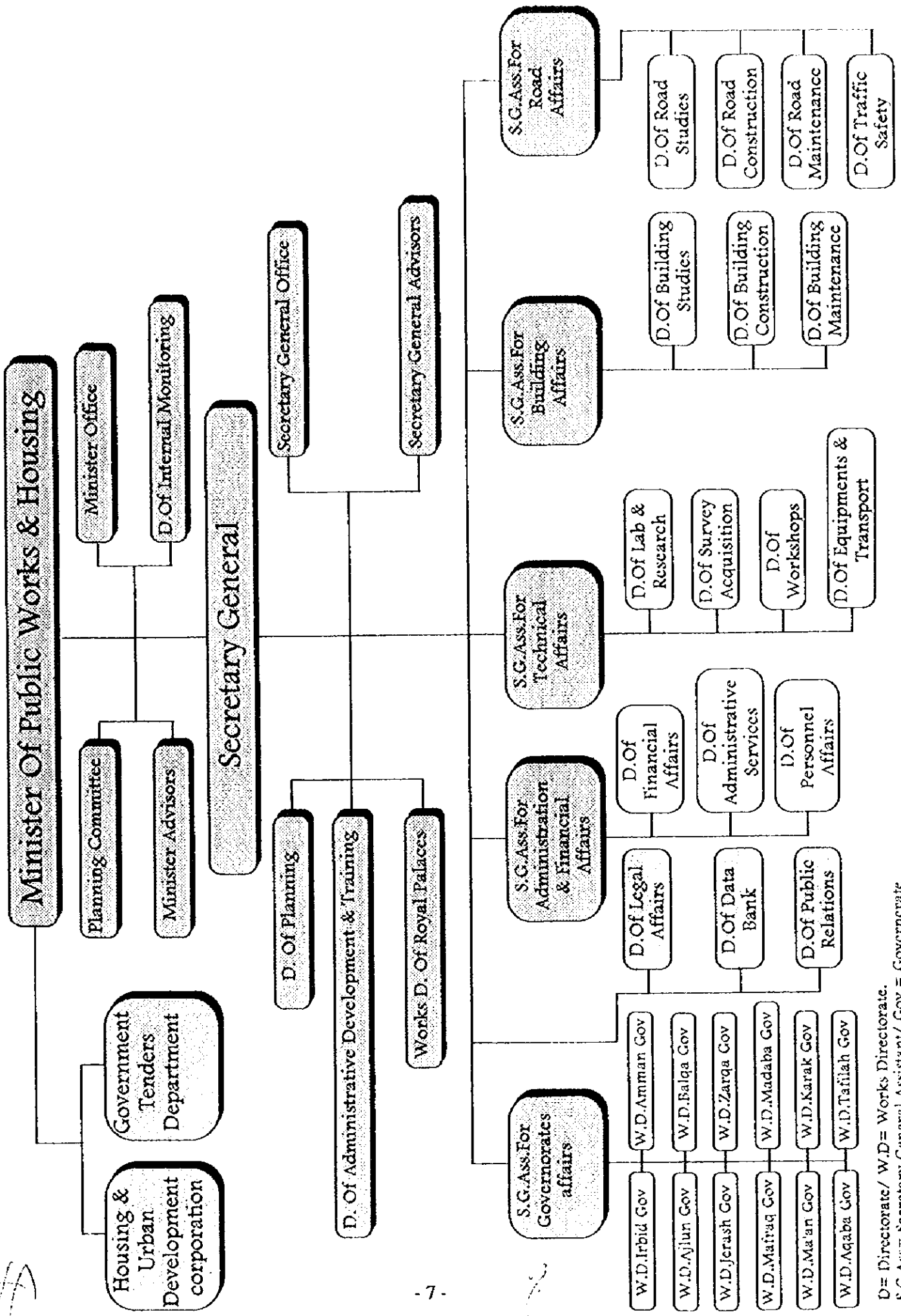
ANNEX 1



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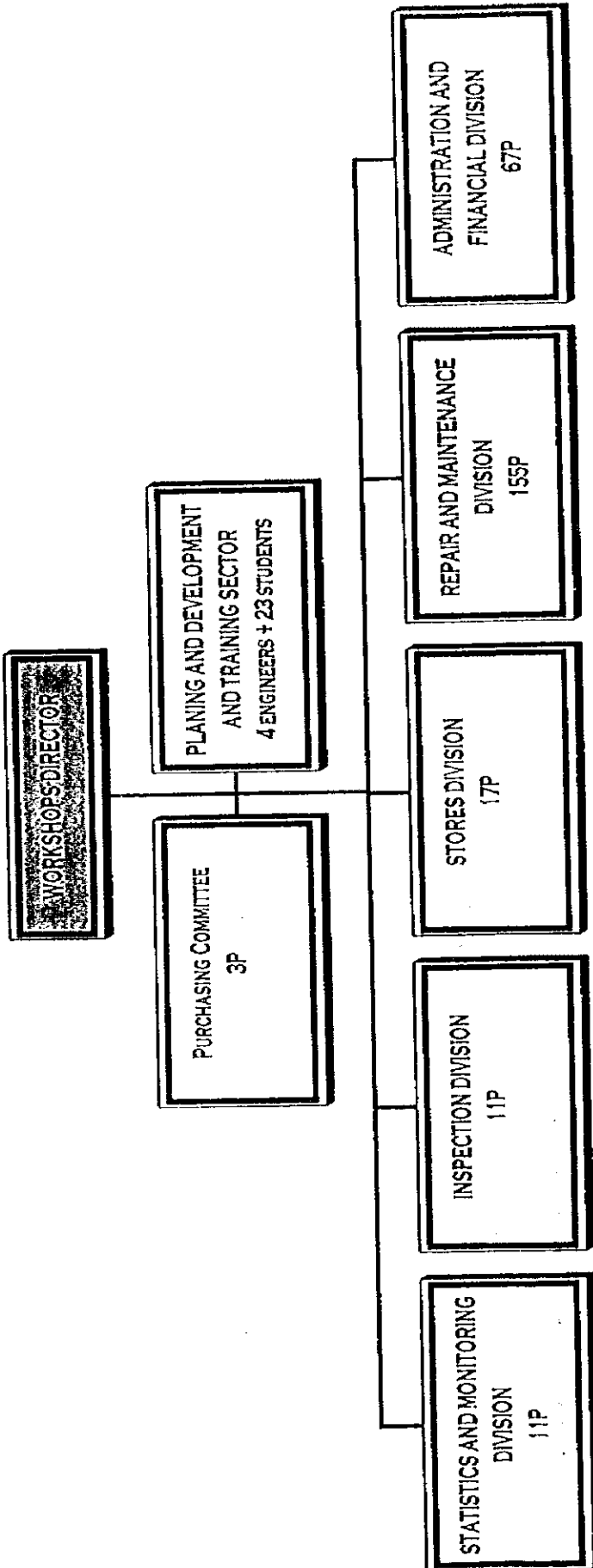
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D= Directorate/ W.D= Works Directorate.
 S.G.Ass= Secretary General Assistant/ Gov.= Governorate

ORGANIZATION CHART OF WORKSHOPS DEPARTMENT

ANNEX 2-2

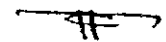


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ANNEX- 3 : Items Requested by the Government of Jordan

1) Undercarriage Repairing Equipment	1 set
2) Engine Service Equipment	1 set
3) Hydraulic & Power Train Service Equipment	1 set
4) Tire Service Equipment	1 set
5) Chassis Repairing Equipment	1 set
6) Electric System Service Equipment	1 set
7) Machine Shop Equipment	1 set
8) Cleaning & Painting Equipment	1 set
9) Welding Equipment	1 set
10) Automobile Service Equipment	1 set
11) Tools	1 set
12) Parts Warehouse Equipment	1 set
13) Vehicles	1 set
14) Spare Parts for Work Equipment	1 set



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ANNEX-4 : JAPAN'S GRANT AID SCHEME

1. Grant Aid Procedures

1) Japan's Grant Aid Program is executed through the following procedures.

- Application (Request made by the recipient country)
- Study (Basic Design Study conducted by JICA)
- Appraisal & Approval (Appraisal by the Government of Japan and Approval by the Cabinet)
- Determination of Implementation (The Note exchanged between the Governments of Japan and the recipient country)

2) Firstly, the application or request for a Grant Aid project submitted by a recipient country is examined by the Government of Japan (the Ministry of Foreign Affairs) to determine whether or not it is eligible for Grant Aid. If the request is deemed appropriate, the Government of Japan assigns JICA (Japan International Cooperation Agency) to conduct a study on the request.

Secondly, JICA conducts the study (Basic Design Study) using (a) Japanese consulting firm(s).

Thirdly, the Government of Japan appraises the project to see whether or not it is suitable for Japan's Grant Aid Program, based on the Basic Design Study report prepared by JICA, and the results are then submitted to the Cabinet for approval.

Fourthly, the project, once approved by the Cabinet, becomes official with the Exchange of Notes signed by the Governments of Japan and the recipient country.

Finally, for the implementation of the project, JICA assists the recipient country in such matters as preparing tenders, contracts and so on.

2. Basic Design Study

1) Contents of the study

The aim of the Basic Design Study (hereafter referred to as "the Study") conducted by JICA on a requested project (hereafter referred to as "the Project") is to provide a basic document necessary for the appraisal of the Project by the Government of Japan. The contents of the Study are as follows :

- a) Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of agencies concerned of the recipient country necessary for the Project's implementation.
- b) Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, social and economic point of view.
- c) Confirmation of items agreed on by both parties concerning the basic concept of the Project.
- d) Preparation of a basic design of the Project.
- e) Estimation of costs of the Project.

The contents of the original request are not necessarily approved in their initial form as the contents of the Grant Aid project. The Basic Design of the Project is confirmed considering the guidelines of the Japan's Grant Aid Scheme.

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The Government of Japan requests the Government of the recipient country to take whatever measures are necessary to ensure its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the organization in the recipient country actually implementing the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country through the Minutes of Discussions.

2) Selection of Consultants

For smooth implementation of the Study, JICA uses (a) registered consultant firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms. The selected firm(s) carry(ies) out a Basic Design Study and write(s) a report, based upon terms of reference set by JICA. The consultant firm(s) used for the Study is(are) recommended by JICA to the recipient country to also work on the Project's implementation after the Exchange of Notes, in order to maintain technical consistency.

3. Japan's Grant Aid Scheme

1) What is Grant Aid?

The Grant Aid Program provides a recipient country with non-reimbursable funds to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for economic and social development of the country under principles in accordance with the relevant laws and regulations of Japan. Grant Aid is not supplied through the donation of materials as such.

2) Exchange of Notes (E/N)

Japan's Grant Aid is extended in accordance with the Notes exchanged by the two Governments concerned, in which the objectives of the Project, period of execution, conditions and amount of the Grant Aid, etc., are confirmed.

3) "The period of the Grant Aid" means the one fiscal year which the Cabinet approves the Project for. Within the fiscal year, all procedures such as exchanging of the Notes, concluding contracts with (a) consultant firm(s) and (a) contractor(s) and final payment to them must be completed. However, in case of delays in delivery, installation or construction due to unforeseen factors such as weather, the period of the Grant Aid can be further extended for a maximum of one fiscal year at most by mutual agreement between the two Governments.

4) Under the Grant Aid, in principle, Japanese products and services including transport or those of the recipient country are to be purchased.

When the two Governments deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country.

However, the prime contractors, namely, consulting, constructing and procurement firms, are limited to "Japanese nationals." (The term "Japanese nationals" means persons of Japanese nationality or Japanese corporations controlled by persons of Japanese nationality.)

5) Necessity of "Verification"

The Government of recipient country or its designated authority will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be verified by the Government of Japan. This "Verification" is deemed necessary to secure accountability to Japanese taxpayers.

6) Undertakings required of the Government of the Recipient Country

In the implementation of the Grant Aid Project, the recipient country is required to undertake such necessary measures as the following:

- (1) To secure land necessary for the sites of the Project and to clear, level and reclaim the land prior to commencement of the construction.
- (2) To provide facilities for the distribution of electricity, water supply and drainage and other incidental facilities in and around the sites.
- (3) To secure buildings prior to the procurement in case the installation of the equipment.
- (4) To ensure all the expenses and prompt excursion for unloading, customs clearance at the port of disembarkation and internal transportation of the products purchased under the Grant Aid.
- (5) To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which will be imposed in the recipient country with respect to the supply of the products and services under the Verified Contracts.

7) "Proper Use"

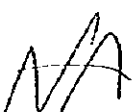
The recipient country is required to maintain and use the facilities constructed and the equipment purchased under the Grant Aid properly and effectively and to assign staff necessary for this operation and maintenance as well as to bear all the expenses other than those covered by the Grant Aid.

8) "Re-export"

The products purchased under the Grant Aid should not be re-exported from the recipient country.

9) Banking Arrangements (B/A)

- a) The Government of the recipient country or its designated authority should open an account in the name of the Government of the recipient country in a bank in Japan (hereinafter referred to as "the Bank"). The Government of Japan will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the Verified Contracts.
- b) The payments will be made when payment requests are presented by the Bank to the Government of Japan under an authorization to pay issued by the Government of the recipient country or its designated authority.

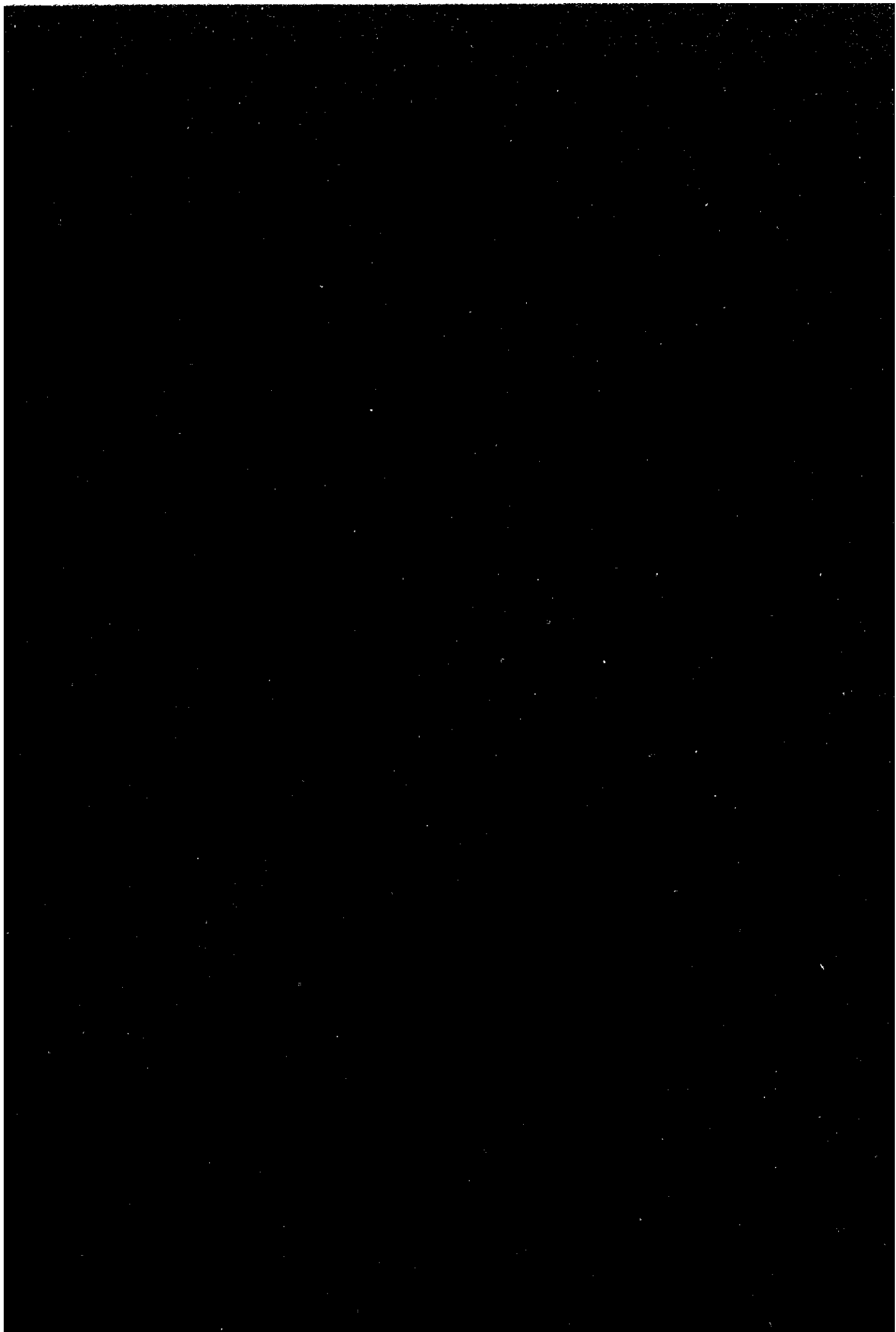


ANNEX-5 : UNDERTAKINGS REQUIRED OF THE GOVERNMENT OF JORDAN

In addition to the undertakings mentioned in the section 4.) of ANNEX-3, following necessary measures shall be taken by the Government of Jordan on condition that the Grant Aid by the Government of Japan is extended to the Project.

- 1 To provide data and information necessary for the Project.
- 2 To provide facilities for the distribution of electricity, water supply and drainage and other incidental facilities in and around the sites.
- 3 to provide necessary permissions, licenses and other authorization for implementing the Project, if necessary.
- 4 To secure buildings prior to the procurement.
- 5 To ensure all the expenses and prompt excursion for unloading, customs clearance at the port of disembarkation in Jordan and internal transportation of the products purchased under the Grant Aid.
- 6 To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which will be imposed in the recipient country with respect to the supply of the products and services under the Verified Contracts.
- 7 To maintain and use facilities procured under the Grant Aid properly and effectively for the Project.
- 8 To ensure the necessary budget and personnel for the proper and effective implementation of the Project, including operation and maintenance of the equipment procured under the Grant Aid.
- 9 To bear commissions to the Japanese bank for its banking services based upon the Banking Arrangement, namely the advising commission of the "Authorization to Pay" and other payment commissions.
- 10 To bear all the expenses other than those covered by the Grant Aid, necessary for the Project





JICA