

No. 12

MINISTRY OF PUBLIC WORKS  
THE PALESTINIAN INTERIM SELF-GOVERNMENT AUTHORITY

**BASIC DESIGN STUDY REPORT  
ON  
THE PROJECT FOR IMPROVEMENT AND MAINTENANCE  
OF  
MAIN ROAD  
IN  
GAZA STRIP**

SEPTEMBER 1996

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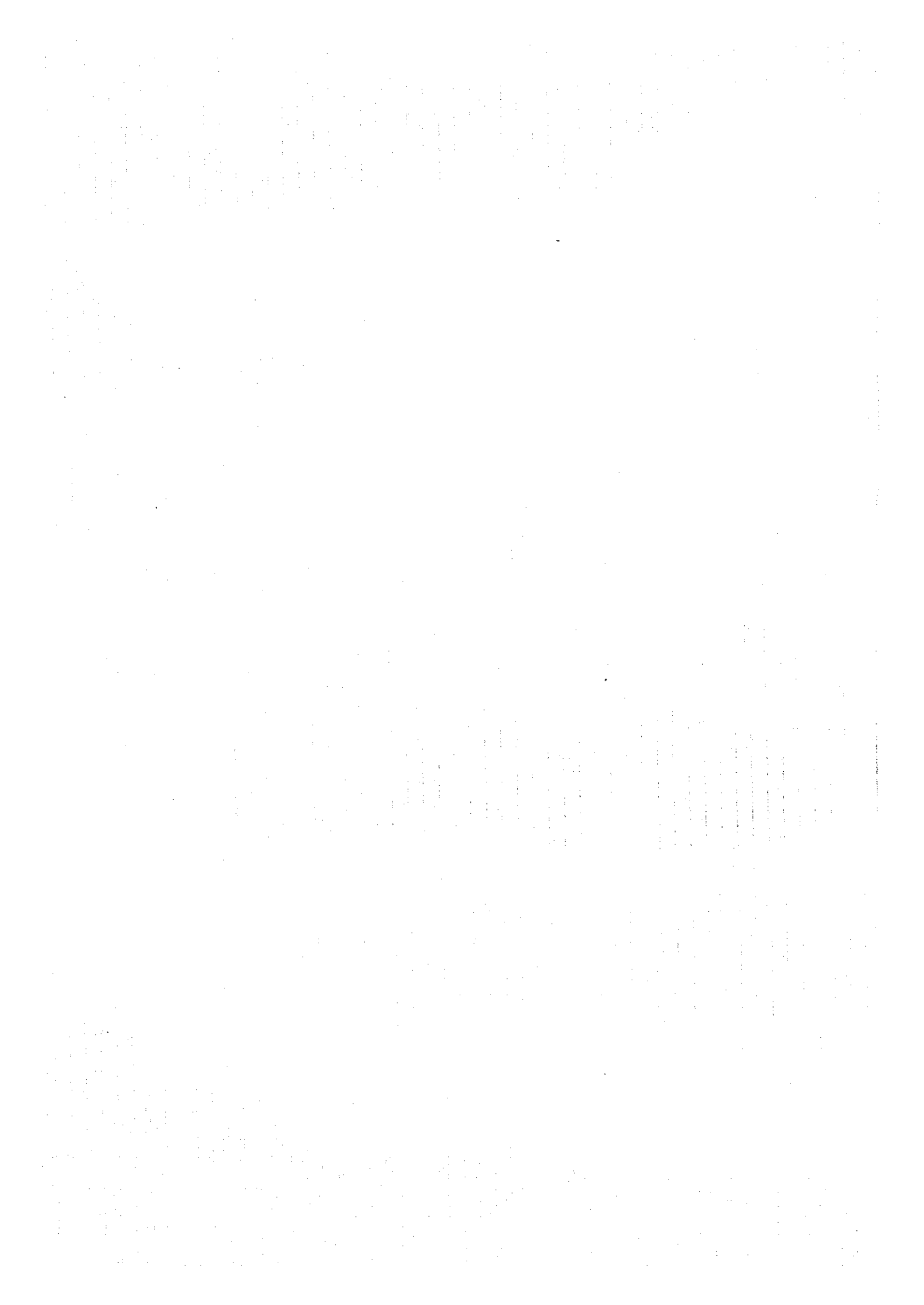
JAPAN INTERNATIONAL COOPERATION AGENCY  
CONSTRUCTION PROJECT CONSULTANTS, INC.

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BASIC DESIGN STUDY REPORT ON THE PROJECT FOR IMPROVEMENT AND MAINTENANCE OF MAIN ROAD IN GAZA STRIP

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## PREFACE

In response to a request from the Palestinian Interim Self Government Authority the Government of Japan decided to conduct a basic design study on The Project for Improvement and Maintenance of Main Road in GAZA STRIP and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Palestine a study team from June 16 to July 3, 1996.

The team held discussions with the officials concerned of the Palestinian Interim Self Government Authority, and conducted a field study at the study area. After the team returned to Japan, further studies were made, and as this result, the present report was finalized.

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

I wish to express my sincere appreciation to the officials concerned of the Palestinian Interim Self-Government Authority for their close cooperation extended to the teams.

September 1996



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Kimio Fujita

President

Japan International Cooperation Agency

September 1996

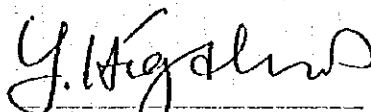
Letter of Transmittal

We are pleased to submit to you the basic design study report on The Project for Improvement and Maintenance of Main Road in GAZA STRIP.

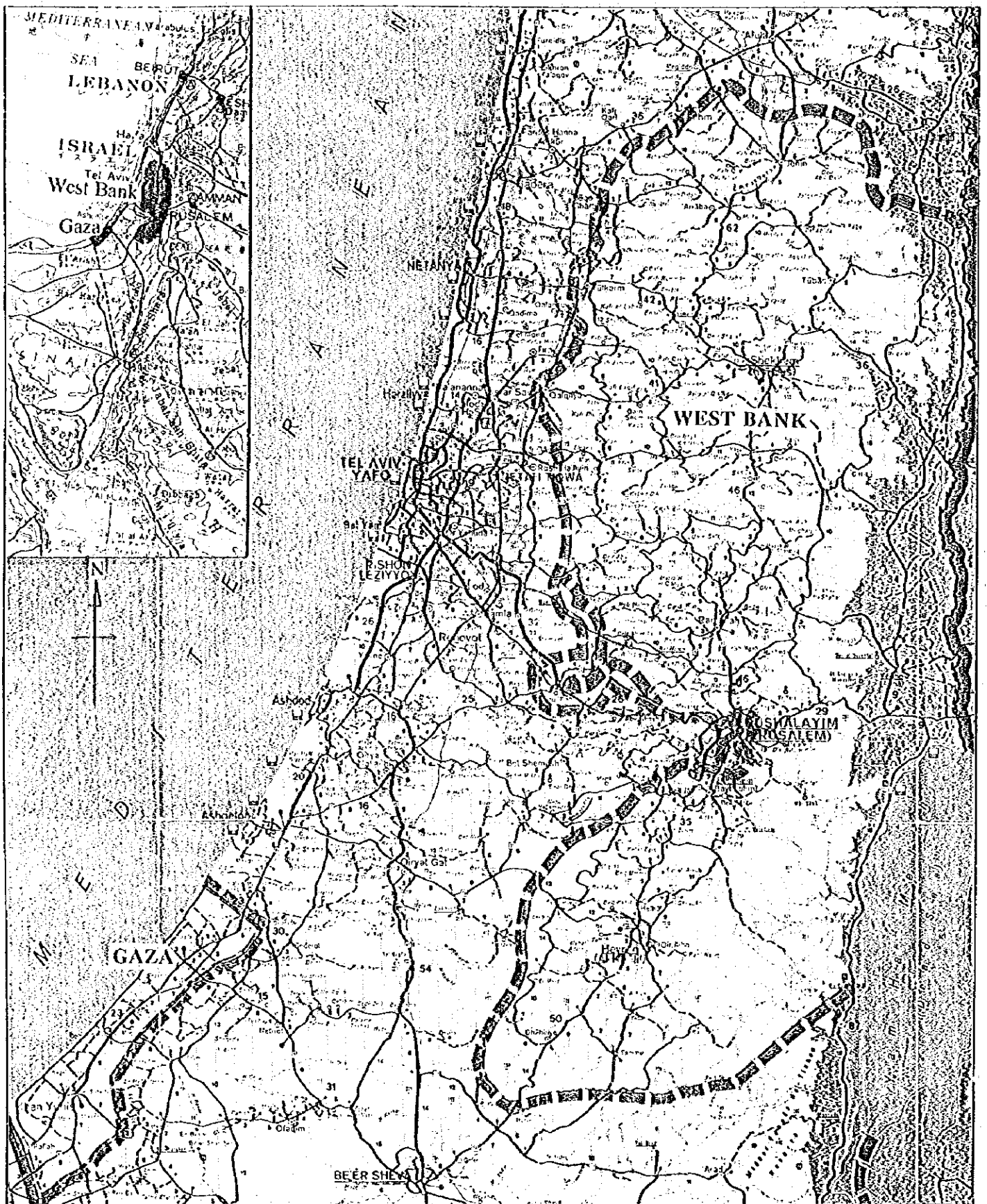
This study was conducted by Construction Project Consultants, Inc., under a contract to JICA, during the period from June 16 to July 3, 1996. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of Palestine and formulated 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,



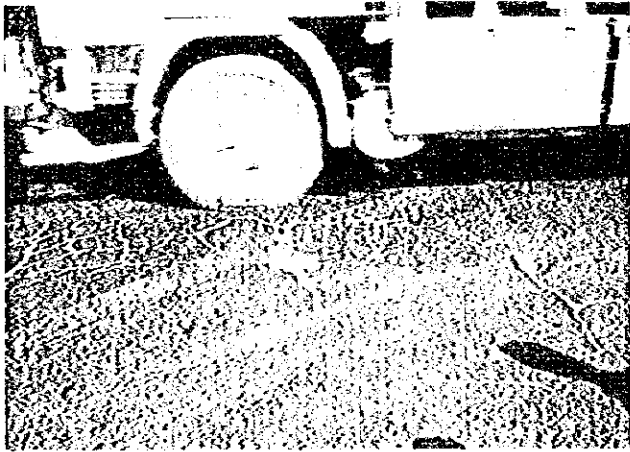
Yoichi Higaki  
Project manager,  
Basic design study team on  
The Project for Improvement and  
Maintenance of Main Road in GAZA STRIP  
Construction Project Consultants, Inc.



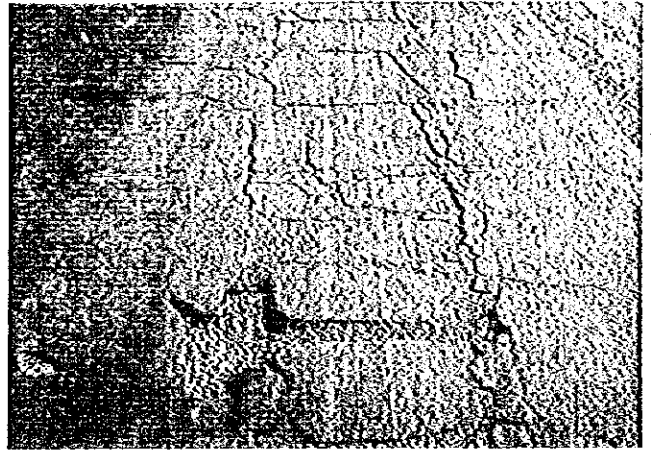
LOCATION OF MAP



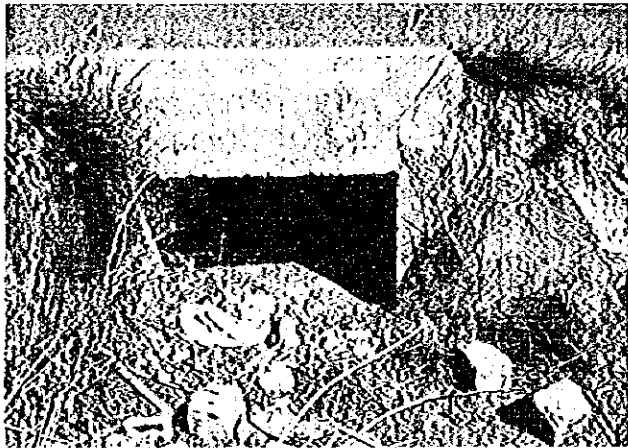
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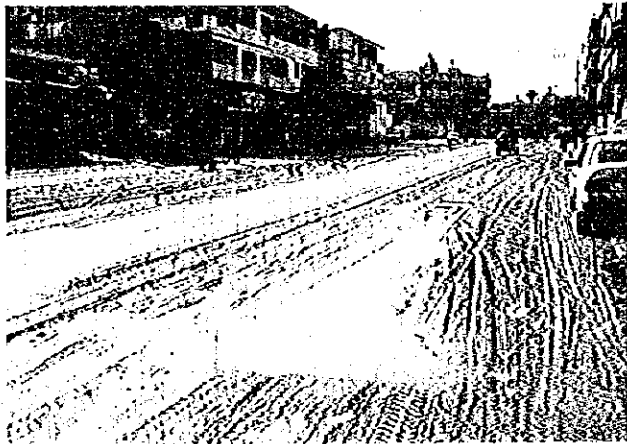
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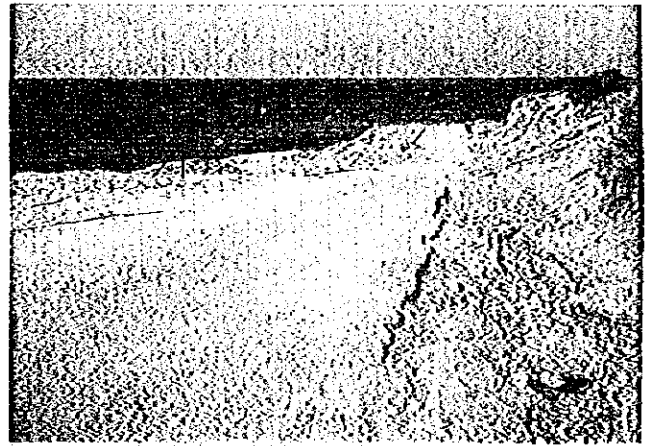
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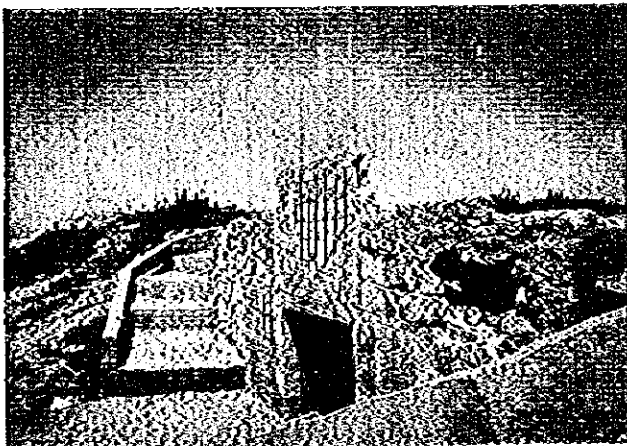
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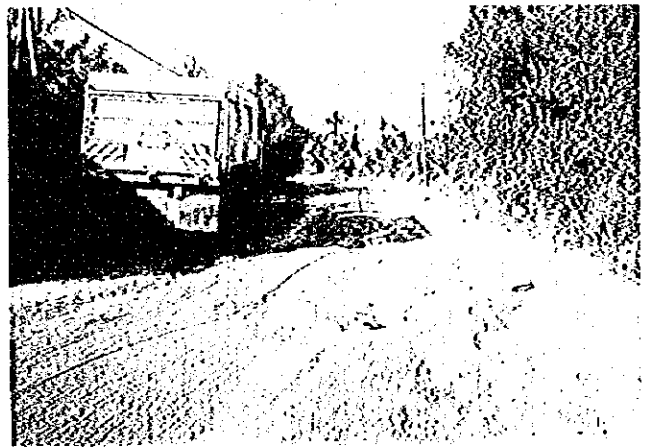
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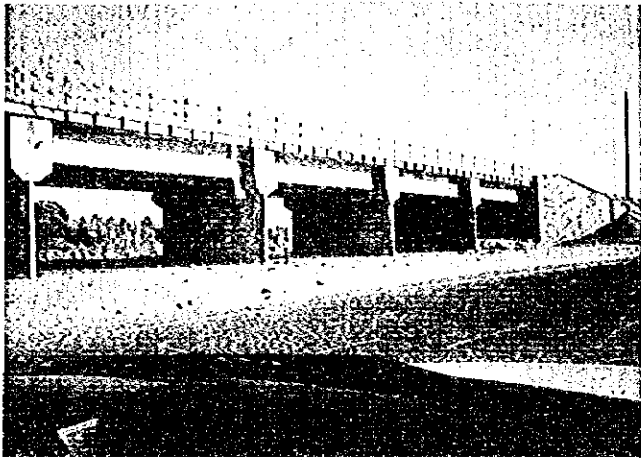
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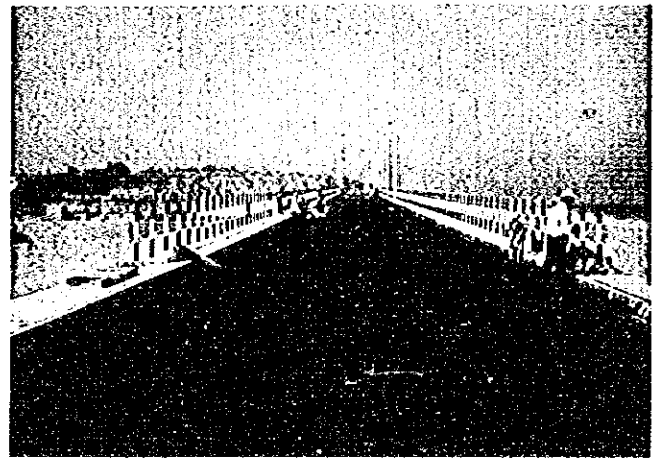
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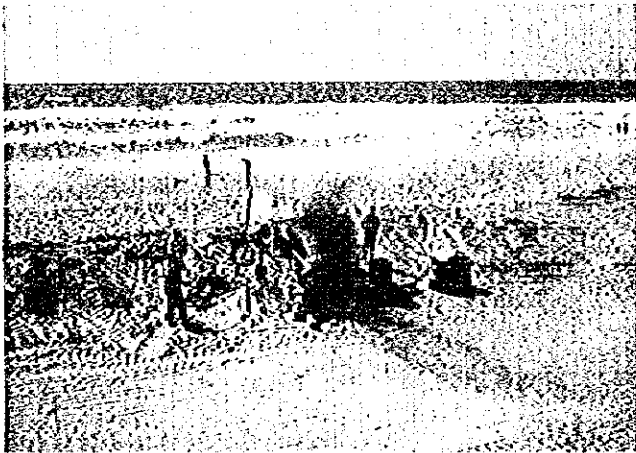
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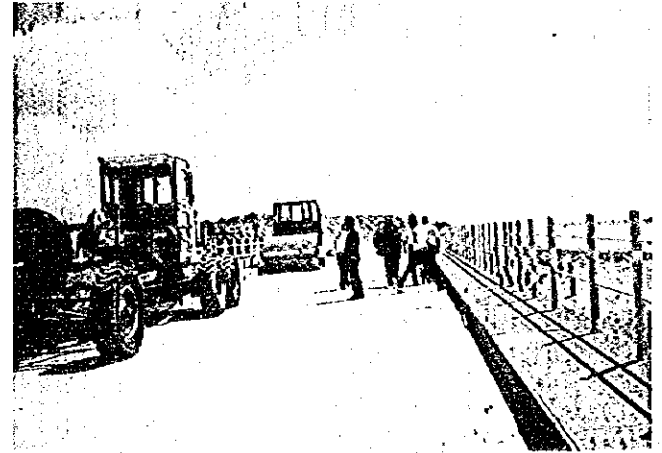
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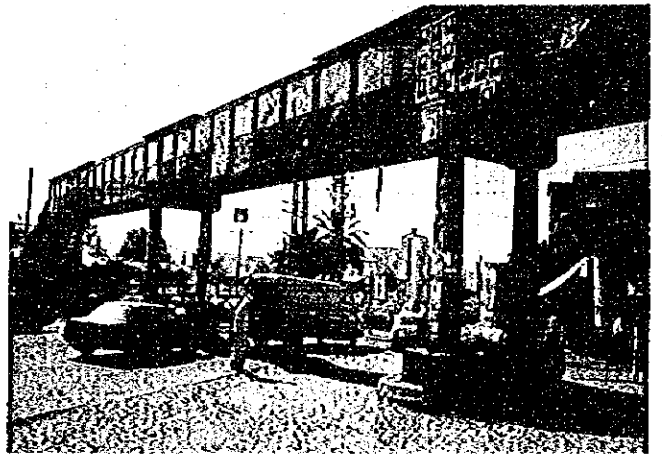
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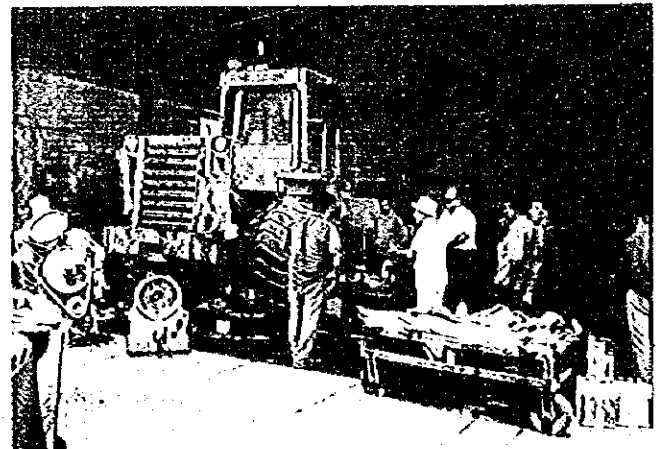
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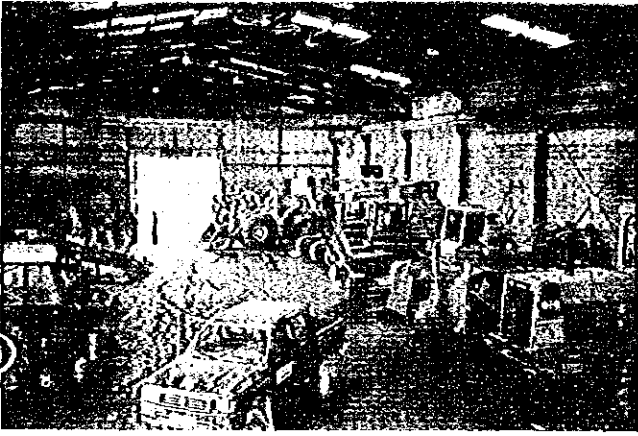
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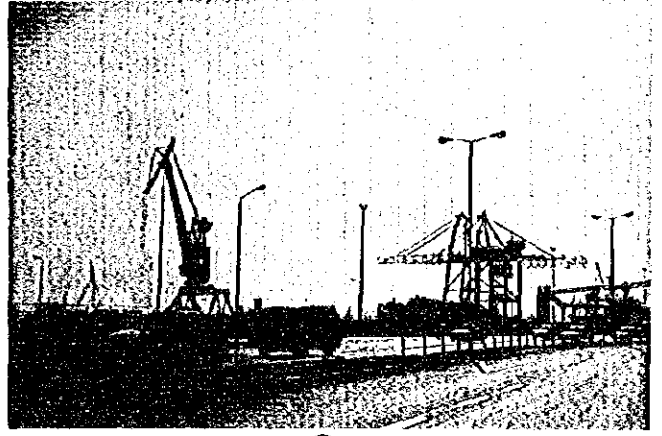
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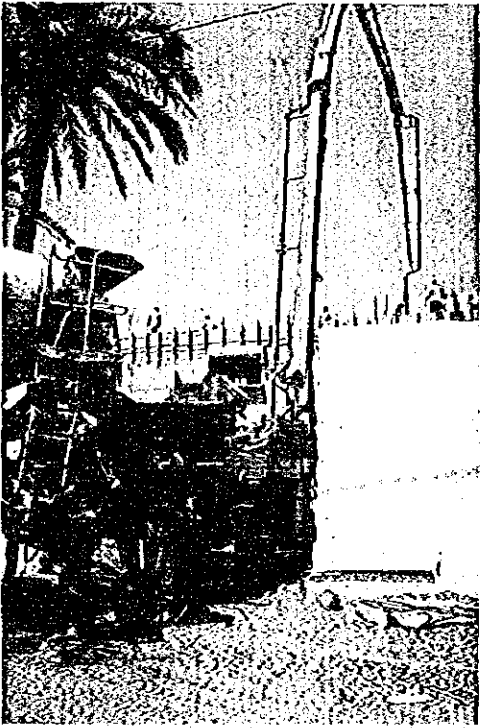
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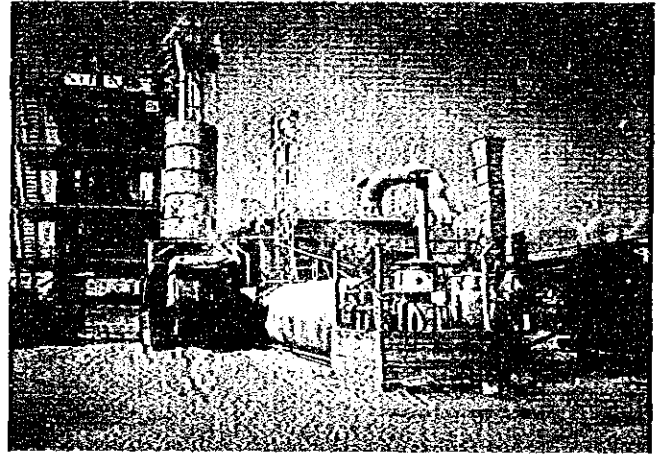
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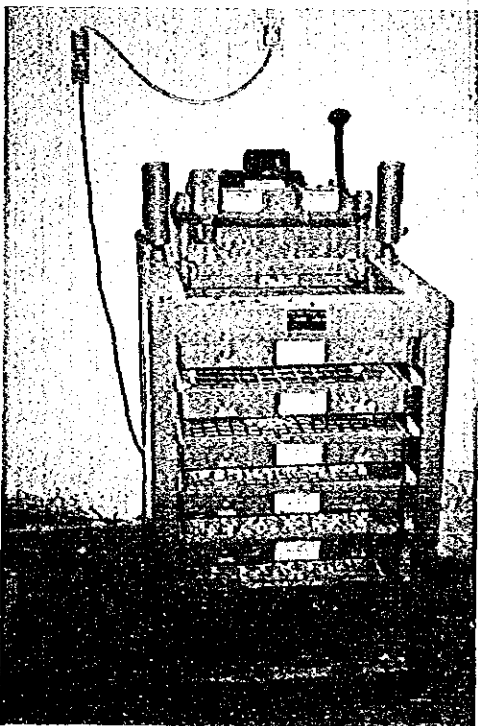
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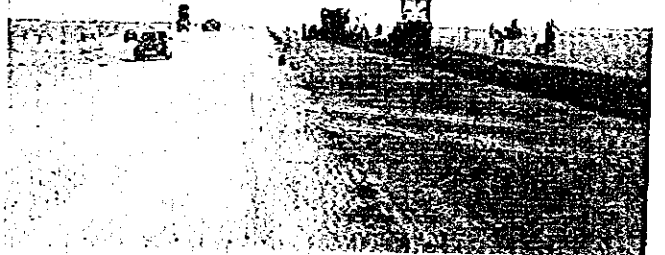
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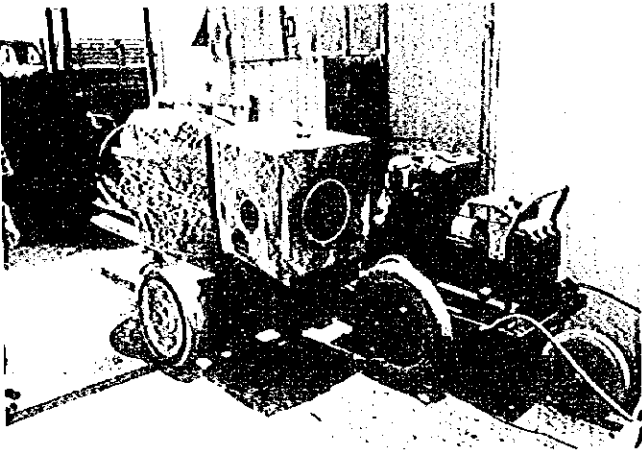
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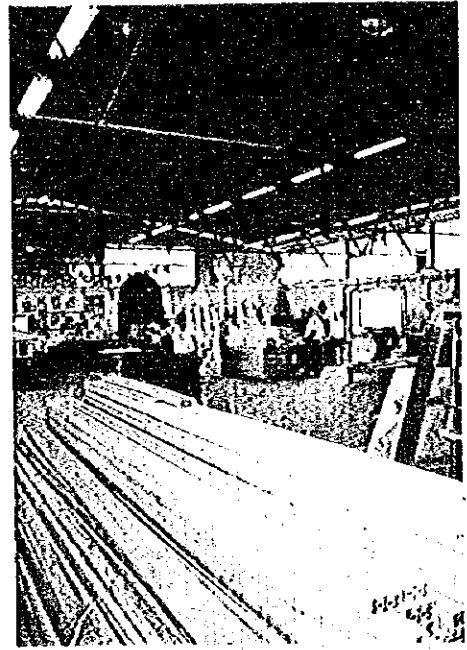
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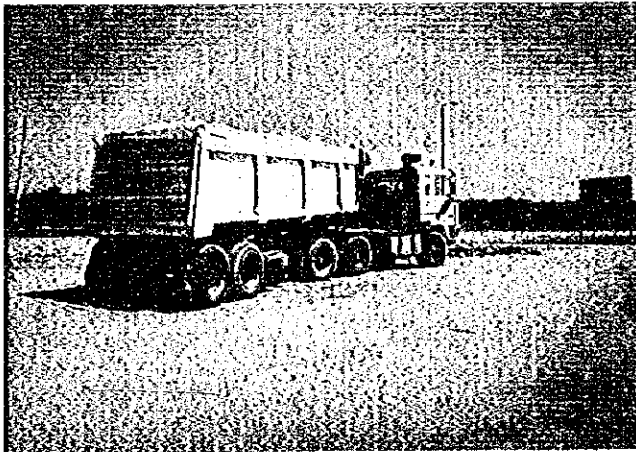
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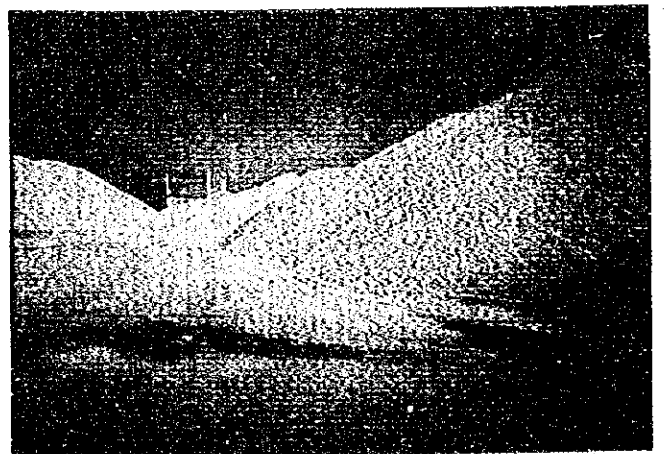
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## Present Conditions of Inter-Urban Roads in Gaza Strip

1. Main Road No. 4  
Heavy axle load vehicle passing on damaged pavement.
2. Main Road No. 4  
Cracked and pot hole existing on the road.
3. Main Road No. 4  
Covered by soils and stones at outlet of box-culverts.
4. Main Road No. 4  
Existing conditions of pavements and drainage facilities.
5. Main Road No. 250  
Existing conditions of damaged pavements and lack of drainage facilities.
6. Main Road No. 230 (Coastal Road)  
Existing conditions of damaged pavements due to erosion and water run-off.
7. Main Road No. 230 (Coastal Road)  
Existing conditions of box-culvert.
8. Regional Road  
Access road between Main Road No. 230 and Gaza Strip. Existing conditions of damaged pavement (as a earth road).
9. Main Road No. 230 (Coastal Road)  
Wadi-Gaza Bridge, contracted by Ministry of Public Works. Construction equipments were procured from private company.
10. Main Road No. 230 (Coastal Road)  
Pavement conditions on the Wadi-Gaza Bridge.
11. Main Road No. 230 (Coastal Road)  
Heating of coal tar for pavement repair.
12. Main Road No. 230 (Coastal Road)  
Pavements construction on the Wadi-Gaza Bridge. Constructed by Ministry of Public Works using the pavement equipment which were procured from private company.

13. Roads in Gaza Municipal  
Road improvement by Gaza Municipality.
14. Roads in Gaza Municipal  
Pedestrian bridge, constructed by MPN procuring the construction equipment from private company
15. Private Machine Shop
16. Private Work Shop
17. Private Work Shop in Jordan
18. Hifa Port in Israel which will be planned to un-load of construction equipments.
19. Gaza Municipal  
Placing concrete using concrete agitator and pumping tracks.
20. Sub-urban of Gaza Municipal  
Asphalt plant owned by private company.
21. Automatic aggregate classification instruments at Soil and Material Laboratory (private company joints between Egypt and Palestine)
22. Gaza Airport  
Pavement construction of runway.  
Client : Ministry of Public Works  
Contractor : Private company from Egypt  
Consultants : Morocco
23. Stock of Cements (Imported from Egypt, Type II)  
At Private company in Gaza Municipal.
24. Portable concrete mixer (0.2 m<sup>3</sup>) owned by Ministry of Public Works (MPW owned only this equipment at present).
25. Wood Assemble Factory owned by MPW.
26. Motor-pool of garbage equipment in Gaza Municipal.
27. Dump track (30 t) use to transport the boulders from Israel.

28. Gaza Municipal  
Redy-mixed concrete agitator track (5~7 m<sup>3</sup>)
29. Sub-urban of Gaza Municipal  
Private pre-cost concrete factory for man-hole.
30. Stock yard of aggregate for pre-cost concrete for man-hole.

## **Present Conditions of Inter-Urban Roads in West Bank**

1. **Regional Road**  
Existing conditions of damaged and pot-holes on the pavement.
2. **Regional Road**  
Partial repair at pot-hole by CA.
3. **Regional Road**  
Existing condition of pipe culverts.
4. **Regional Road**  
Damaged pavement due to un-qualified base course material at shoulder.
5. **Local Road**  
  
Existing conditions of road layout plan and longitudinal alignment which should be improved.
6. **Main Road**  
Existing conditions of road layout plan and damage of cutting and embankment slope.
7. **Regional Road**  
Damaged pavement due to road crossing ditch salutation.
8. **Regional Road**  
Damaged pavement due to lack of drainage facilities.
9. **Regional Road**  
Damaged of embankment slope due to water run-off.
10. **Regional Road**  
Damaged of pavement surface and base-course due to lack of drainage and un-qualified material.
11. **Regional Road**  
Existing condition of ditch salutation at out-let of pipe culvert.
12. **Regional Road**  
Damage of pavement surface due to spalling out of material. Starting pot-holes and deforming of pavement.

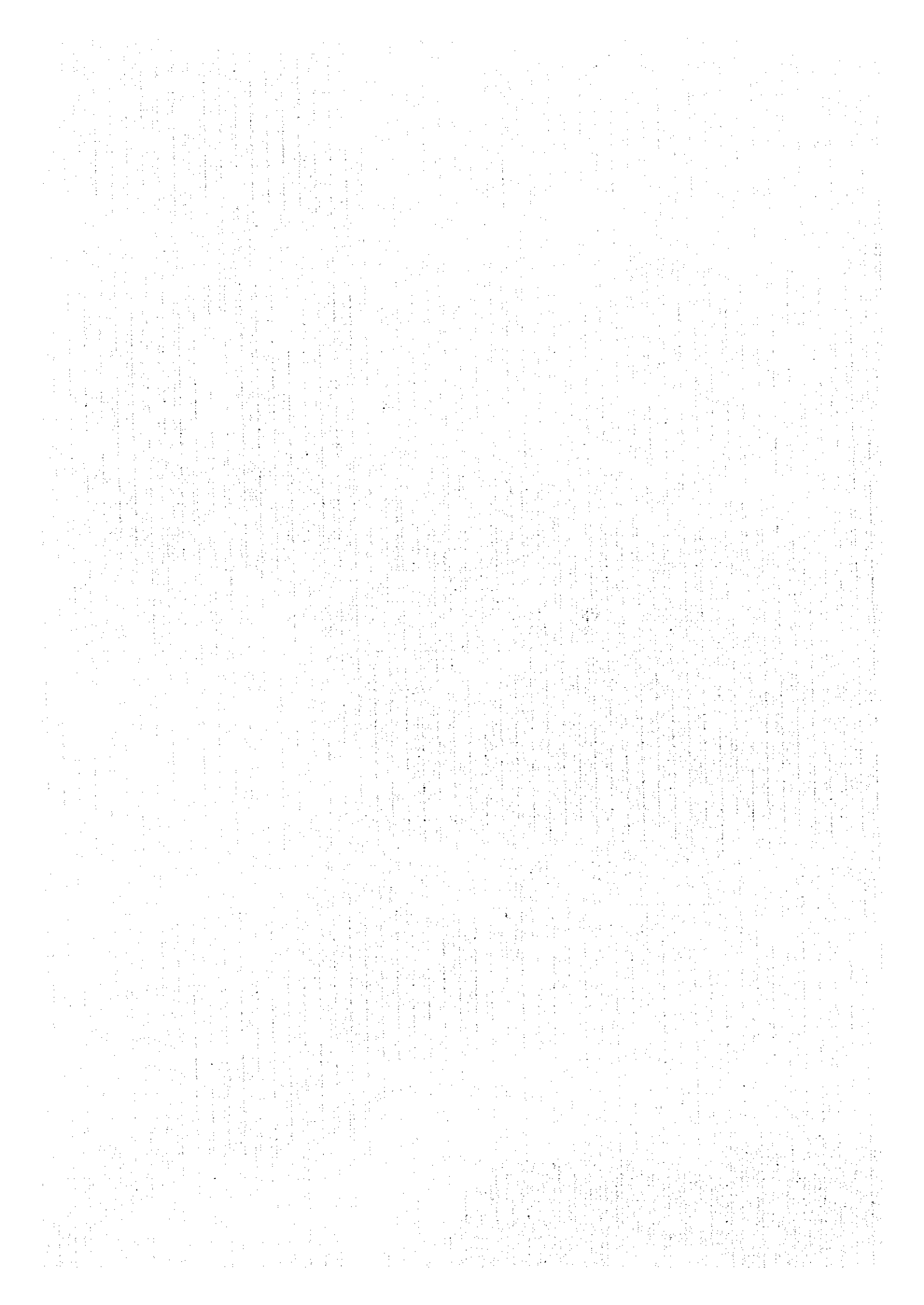


13. Regional Road  
Damage of both side of carriageways due to submerge on the road by flood in 1992.
14. Regional Road  
Washed-out of pavement and shoulder along the stream due to flood in 1992.
15. Regional Road  
Washed-out of carriage ways due to shortage of drain capacity of pive culverts by flood in 1992.
16. Regional Road  
Drainage facilities condition of ditch salutation after the flood in 1992.
17. Regional road in heavy snow.
- 18.-19. Dump track (5 t), Handi Compactor (200 kg), Material transportation deck owned by Ramara Regional Office
20. Asphalt plant owned by private general contractor in West Bank.
21. Dump track (30 t) owned by private general contractor in West Bank.

## Abbreviations

AP	:	Authorization to Pay
BA	:	Banking Arrangement
CA	:	Civil Administration
CG	:	Consultative Group
EAPC	:	The Executive Authority of Palestinian Council
EC	:	European Communities
EIP	:	Emergency Investment Program
E/N	:	Exchange of Notes
ERP	:	Emergency Rehabilitation Program
IEC	:	Israeli Electric Corporation
JDECO	:	Jerusalem District Electric Company
MPIC	:	Ministry of Planning & International Cooperation
MPW	:	Ministry of Public Work
OHP	:	Over Head Projector
PC	:	Palestinian Council
PCU	:	Palestinian Contractors
PDP	:	Palestinian Development Program
PECDAR	:	Palestinian Economic Council for Development and Reconstruction
PLO	:	Palestine Liberation Organization
SQ	:	Israeli Shekel
UNDP	:	United Nations Development Programme
UNRWA	:	United Nations Relief and Works Agency
USAID	:	United State Agency for International Development

## SUMMARY



## SUMMARY

In Palestine, the roads are regarded vital as the only means of transportation and communication, which play an important part, but in spite of this fact the condition of the roads is getting worse since most of the roads have been left being exposed to severe deterioration without appropriate routine maintenance and periodical rehabilitation for the past 3 decades.

The total length of the road network in Palestine is 2,200 km including 294 km in the Gaza Strip and the roads are classified under the category of the main road, the regional road and the local road. The road section in good condition occupies only 27% in the Gaza Strip and its remaining 73% is in inferior condition or rather in deteriorated condition.

In May, 1994, the Palestinian Interim Agreement was concluded between the Israeli Government and PLO. This agreement enhanced possibility of the bilateral cooperation based on the arrangements such as the withdrawal of Israeli military forces from the Gaza Strip and the Jericho area deployment of Palestinian police forces, establishment of the Interim Self-Government and transfer of authority, etc.

So under the circumstances, in accordance with the start of execution of the interim self-governing in the Gaza Strip and Jericho area, the construction equipment for the road maintenance and rehabilitation was removed by the Israeli Government. The Ministry of Public Works is presently implementing the maintenance and rehabilitation for the inter-urban roads, which are under the jurisdiction of the Ministry of Public Works, with the equipment leased from the private sector despite the Ministry employs a plenty of engineers.

Under these circumstances, the Ministry of Public Works regarded the most top priority plan for the road maintenance and rehabilitation (the year of 1996) and medium-term plan for the road maintenance and rehabilitation (the years of 1997-1998) as Emergency Road Maintenance and Rehabilitation Program. Based on the above program, the Ministry of Public Works made a request to the Government of Japan for a general grant aid with regard to the following roads:

1) Main Roads (Route No. 4/No. 250)	51 km
2) Regional Roads (Access to Route No. 4/No. 250)	29 km
3) Local Roads	81 km
Total	161 km

After studying and confirming the contents of the request for the grant aid, the Government of

Japan made a decision on implementation of the basic design study in respect of this program for the purpose of defining the most proper procurement of the necessary construction equipment. According to this decision, JICA dispatched the basic design study team to Palestine during the period from June 16, 1996 to July 3, 1996. The study team carried out the survey of the road condition and factories of the private sector as well as collection of reference materials and discussions with the parties concerned of the Palestinian National Authority. At the result of the study the construction of the workshop and the training center out of the items listed up in the Palestinian request was eliminated from the program due to problems existing in the phase of operation and investment efficiency. Moreover, the size of equipment requested was minimized to small type, especially the truck-crane changed from 130 ton capacity to 25 ton capacity and also the mobile pile driver and some other equipment were eliminated because this time the program was limited to focus on the road maintenance and rehabilitation in the Gaza Strip.

Furthermore, in view of the fact that the Ministry of Public Works owns no construction equipment, a minimum of some equipment needed for this program, mainly the 5 items mentioned below, shall be added for the following reasons:

- 1) Tire-roller  
Needed for finish of asphalt rehabilitation.
- 2) Truck w/3t crane  
Used for transportation of small - sized equipment.
- 3) Truck/trailer  
Needed for transportation of bulldozer, excavator, asphalt-finisher, etc. to the site.
- 4) Air compressor  
Needed for fixing and detaching bolts/nuts for the breakers and for repairing machines.
- 5) Equipment and materials for prefabricated house  
Needed to prevent spare parts, tools, measuring tools and soil-test equipment from being exposed outside.

In conclusion, on the basis of this program the following construction equipment shall mainly be supplied by the Government of Japan:

### Machines and Equipment for Road Maintenance and Rehabilitation

No.	Equipment	Specifications	Quantity	Remarks
1.	Bulldozer	160-180HP	1	
2.	Hyd. Excavator	125-135HP	1	
3.	Wheel Loader	160-170HP	2	
4.	Motor Grader	150-160HP	2	
5.	Dump Truck	8-10 t	9	
6.	Water Tank Truck	8,000 Lit	1	
7.	Fuel Tank Truck	8,000 Lit	1	
8.	Hyd. Truck-Crane	25 t	1	
9.	Mobile Workshop	8 t	1	
10.	Service Car	1 t	1	
11.	Vibration Roller	10 t	2	Static load
12.	Hand Guide Roller	600 kg	3	
13.	Tire Roller	8 t	1	w/ballast 20 t
14.	Asphalt Finisher	2.3 (standard) ~4.0 m (maximum)	1	
15.	Asphalt Distributor	6,000 Lit	1	
16.	Plate Compactor	70 kg	3	
17.	Rammer	60 kg	1	
18.	Cargo Truck	8 t	1	w/3 t crane
19.	Truck/Trailer	30 t	1	
20.	Air Compressor	7 m <sup>3</sup> /min	1	
21.	Breaker	6 kg/cm <sup>2</sup>	2	
22.	Concrete Mixer	0.5 m <sup>3</sup>	3	
23.	Asphalt Kettle	6 m <sup>3</sup>	3	
24.	Tool and Measuring Tool		1 set	
25.	Test Equipment for Soil, Material, Asphalt, etc.		1 set	
26.	Spare Parts	15% of maximum of the price of the construction machines and 5% maximum of the price of the other equipment		
27.	Equipment and Materials for Prefabricated House 300 m <sup>2</sup>		1 set	
28.	Training Equipment		1 set	

At the result of study on the needed term of implementation, the Government of Japan and the Palestinian Authority confirmed to mutually cooperate and to set forth the schedule as follows:

D/D	December, 1996
Tender for Procurement of Equipment	March, 1997
Shipment of Equipment including Installation	December, 1997
Delivery of Equipment	January, 1998

Based on the contents of the above scheme set forth by the Government of Japan, the cost needed for implementation of the project is estimated 517 million yen (505 million yen borne by Japan and 12 million yen borne by Palestine).

The implementation of this Project is considered to contribute significantly to accomplishment of the Program for Emergency Road Maintenance and Rehabilitation in the Gaza Strip. Also, the maintenance and rehabilitation of the road network will surely bring about significant benefits to the inhabitants of the Gaza Strip in socio-economic spheres and play a meaningful role in being executed under a Japan's Grant Aid.

A most important tasks in implementation of this project will be to procure the construction equipment within a deadline, to deliver them to the site within a deadline and to secure Palestinian staff. Especially, the most important task will be how to deliver the equipment unloaded at the Israeli port to a designated place in the Gaza Strip without any problem. If this is cleared up, this construction equipment will play a significant role in implementation of the road maintenance and rehabilitation in the Gaza Strip.



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Preface

Letter of Transmittal

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## **CHAPTER 1. Background of Request**



## **Chapter 1 Background of Request**

### **1.1 Middle East Peace Process**

The agreement on Declaration of Principles on Interim Self-Government Arrangements made in Washington in September, 1993 between the Government of the State of Israel and PLO aimed at establishment of a framework for conception of the Interim Self-Government Arrangements in the Middle East peace process after the Madrid Peace Conference held in October, 1991.

This agreement means the real commencement of peace negotiations and confirms that the both sides accepted in principle the conception of:

- 1) Carrying out withdrawal of Israeli military forces from the Gaza Strip and Jericho area and establishment of Interim Self-Government Authority for Palestinian people in the Gaza Strip and Jericho area ahead of other areas.
- 2) Expanding Palestinian Authority territory to other occupied areas taking its transition and outcome into consideration.
- 3) Starting the negotiations on the permanent status of the occupied areas two years after the Interim Self-Government has been established.

Furthermore, this agreement specifies the provision of immediate implementation of direct and free election to choose the members of the Council in order to stimulate the start of self-governing based on democratic principle for Palestinian people residing in the West Bank and the Gaza Strip.

The Middle East peace process is being implemented in an international supporting system set forth by the consultative group consisting of the World Bank, the U.N. organizations and other assistance organizations of donor countries immediately after Declaration of Principles was agreed. Japan declared its intention to fund 0.2 billion dollars for two years following EC's decision made in September, 1993 of a budgetary support for 0.6 billion dollars for five years. In November, 1993 Japan dispatched a fact-finding mission to Palestine to study Palestinian needs, movement of other donor countries toward assistance and its spheres for possible cooperation. Furthermore, Japan attended the CG meeting held under the auspices of the World Bank in December, 1993 to have a conference with the World Bank and other donors, ahead of which Japan had expressed in November, 1993 to offer 5 million dollars to the World Bank Trust Fund for technical assistance for Palestine and had published in December, 1993 to give

a grant of 24.7 million dollars through an international organization for emergency assistance and 20 million dollars to Japan-Palestine Fund in UNDP.

Since March, 1994 the Government of Japan had dispatched the planning and research staff to the Embassy of Japan in Israel for the purpose of studies on Palestinian needs for assistance in the Gaza Strip and the West Bank including discussions with international organizations and other donors. In consequence, it was confirmed that Palestine is in a growing need of assistance in building the infrastructure in the spheres of education, medical institution and road construction, etc.

## **1.2 Interim Agreement on the Gaza Strip and the Jericho Area**

The Interim Agreement on the Gaza Strip and the Jericho Area (so called Oslo I Agreement) was signed between and by the Government of Israel and PLO in Cairo in May, 1994 subsequent to conclusion of the Cairo Agreement in February, 1994. This Interim Agreement implies the following arrangements:

- 1) Scheduled withdrawal of Israeli military forces including police forces from the Gaza Strip and Jericho area and deployment of Palestinian police forces to maintain public security and order.
- 2) Transfer of authority in the Gaza Strip and the Jericho area from the Israeli military government and its Civil Administration to the Palestinian Authority.
- 3) Constitution of Palestinian Interim - Government.
- 4) Definition of jurisdiction in various fields implied in the authority.
- 5) The definitions and spheres of powers and responsibilities of Palestinian Interim Government in respect to legislation, administration of justice, formation of policy, jurisdiction, employment of public officials, establishment of ministries/agencies/ departments/bureau as well as complaint/defense and contract.
- 6) Definition and spheres of legislative powers of Palestinian Interim Government.
- 7) Arrangements in respect to security and public order.
- 8) Duty of establishment of Palestinian police forces and the Palestinian Directorate of Police.

- 9) Arrangements in respect of the international passage between the Gaza Strip and Egypt, also Jericho Area and Jordan.
- 10) Arrangements in respect of the passage between the Gaza Strip and Jericho Area.

This agreement enhanced possibility of bilateral negotiations with Palestinian Interim Government with regard to implementation of Japan's ODA.

### **1.3 Interim Agreement on the West Bank and the Gaza Strip**

The Israeli Government and PLO reached at Taba in September, 1995 the Interim Agreement on the West Bank and the Gaza Strip (so called Oslo II Agreement). This agreement stipulates that the territorial jurisdiction of Interim self-governing shall be expanded to the whole West Bank area including the Jericho area and that this interim agreement shall supersede the Interim Agreement on the Gaza Strip and the Jericho Area previously concluded.

Compared this agreement with the previous agreement, one of the strong points is to transfer the authority from the Israeli Military Government and its Civil Administration to the Palestinian Council consisting of the members chosen by election, but before the election was completed, the implementation of authority was to be acted by the Palestinian Authority established in accordance with the provision of the previous agreement.

### **1.4 Execution of Election for the Palestinian Council**

In February, 1996 the election of the Council was conducted and the Palestinian Council (consisting of 88 members) was inaugurated as a legislative body of both the West Bank and the Gaza Strip.

Furthermore, the Executive Authority of the PC (EAPC) was also inaugurated as an organ corresponding to the Cabinet acting to execute the administrative power and the chairman of the PLO was appointed as the Raees of EAPC. In the provision of constitution of the Palestinian Council in the Interim Agreement on the West Bank and Gaza Strip (so called Oslo II Agreement), it is specified that the Palestinian Interim Self-Government Authority (Palestinian Authority) consists of the Palestinian Council and the Raees of EAPC and that the both shall simultaneously be chosen by direct election.

## 1.5 Request to Japan for Assistance

So under the circumstances, the PLO made a request to the Government of Japan for a cooperation of assistance for improvement of public services such as main road maintenance, collection of garbage, fire fighting, insurance and medical treatment.

According to analysis of the detailed contents of the request as to maintenance for the main roads (trunk road and regional road), the roads are regarded vital as the only means of transportation in Palestine but they are conspicuously deteriorated without appropriate routine maintenance and periodical rehabilitation for approximately 3 decades. However, the trunk roads out of the main roads are almost in good condition in respect of pavement and drainage facilities since the trunk roads lead to the Israeli settlements for which the Israeli Civil Administration exceptionally conducted maintenance and rehabilitation works.

As to the regional roads, most of them are located in the area where Palestinians reside and it is not too much to say that they are extremely deteriorated without maintenance and rehabilitation by the Israeli Civil Administration which were not involved in the framework of program. However, exceptionally some of specific sections leading to the Israeli settlements are generally in good condition with conduct of periodical rehabilitation.

According to the report of the World Bank, 40% of roads except for the farm roads are in deteriorated condition under the critical limit and if the implementation of the emergency maintenance and rehabilitation for such roads are further delayed, the reconstruction shall be required. Meanwhile, the number of vehicle holdings in Palestine is increasing at the rate of 10% per annum in 15 years from 1975 to 1990. Especially for these 3 years (1992 - 1995) the number of the registered vehicles is increasing at the rate of 200% to 300%. Therefore, the narrow regional roads, which are 3 to 5 meters in width cannot function enough to meet such an increase in traffic volume and are required for expansion of road width and realignment of the curved section. Moreover, the drainage facilities along the roads must be improved due to entirely unsatisfactory condition. Such being a case, Palestine is presently confronting with the vital necessity of maintenance and rehabilitation for the deteriorated roads and improvement to meet such boosting traffic volume and demands.



## **1.6 Improvement and Rehabilitation Program for Main Roads in Gaza Strip**

Under these circumstances, since January, 1995 the Ministry of Public Works has been allocated a budget for execution of public works in the Gaza Strip after conclusion of the Interim Agreement made in May, 1994 and started implementation of the emergency maintenance and rehabilitation mainly for the trunk roads, bridges and drainage facilities.

In the era under control of the Israeli Civil Administration, most of the current organizations of the Ministry of Public Works handled only management and administration with the abundant budget as its subordinate body for construction, maintenance, rehabilitation and improvement of pavement for the access roads to the Israeli settlements, but all of such works were actually implemented by subcontractors. In accordance with the withdrawal of Israeli Civil Administration, the construction equipment of the Administration's property was naturally removed, which had been used for the construction of the access roads to Israeli settlements. The Ministry of Public Works really did not own such construction equipment and it therefore is implementing maintenance and rehabilitation for the main roads by force account with the equipment leased from private companies despite it employs enough engineers.

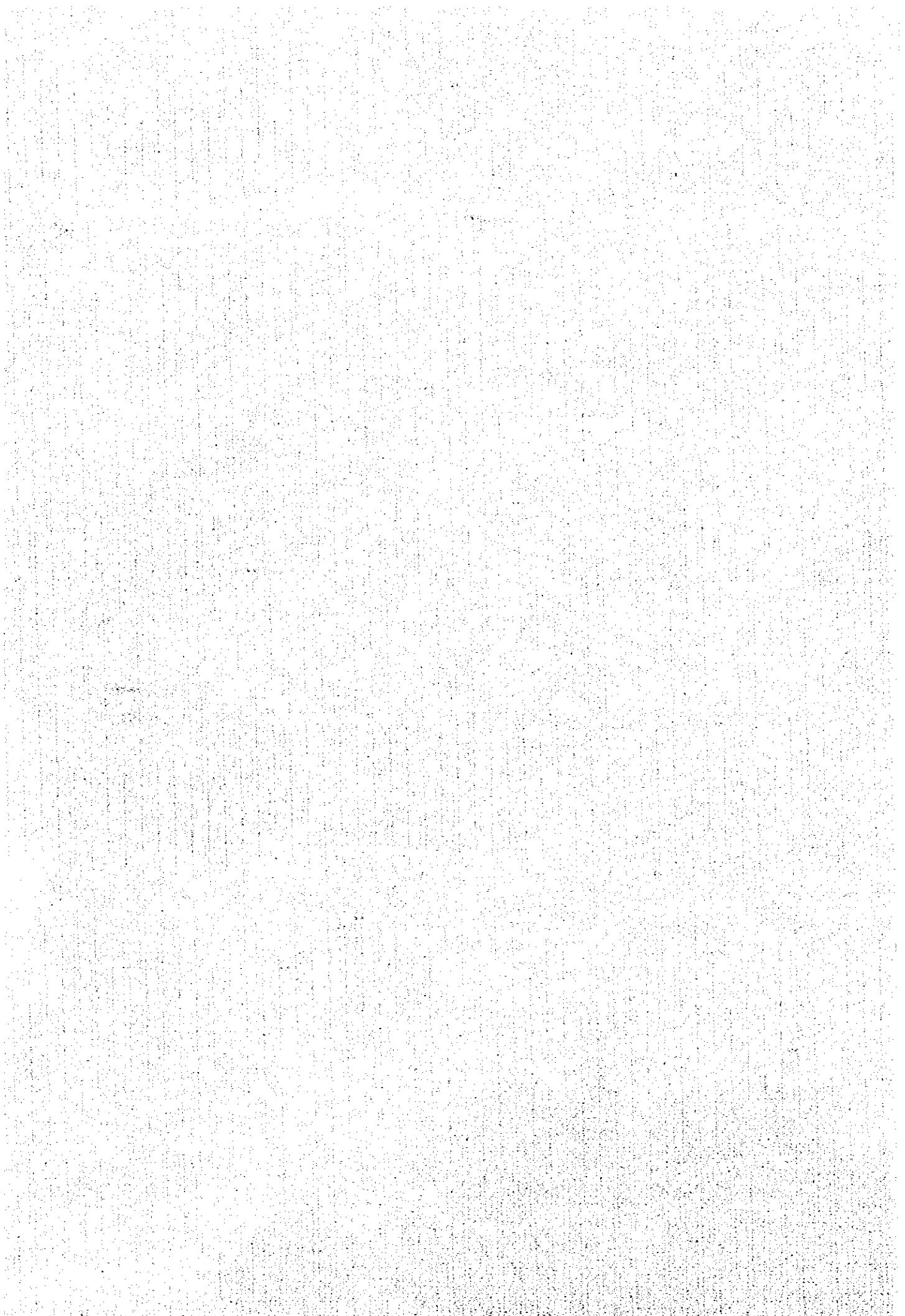
As to the West Bank, the Ministry of Public Works was focusing on its effort until June, 1996 to establish organizations of each regional headquarters in the West Bank area because the authority on public works was very recently transferred from the Public Works Department of Israeli Civil Administration to the Ministry of Public Works subsequent to the election for the Palestinian Council executed in January, 1996. Consequently the Ministry implemented only tentatively the emergency rehabilitation for the broken part of local roads with the budget allocated up to June, 1996. The implementation of the regular maintenance and rehabilitation shall start from July, 1996 upon allocation of the budget for the project and the programmed works shall start in full scale from January, 1997. The West Bank is approximately one year behind the Gaza Strip in starting implementation of works and is facing the same problems as the Gaza Strip confronting with lack of enough budget and equipment for implementation of works.

That is the reason why the Ministry of Public Works suffers from a burden both in the West Bank and the Gaza Strip that a high rent for construction equipment causes short of the budget for construction of roads and procurement of materials and that this causes the Ministry to implement only at limited capacity the road works. For this reason the Ministry of Public Works intends to promote the pending roads projects in the following

scheme: 1) to procure the minimum sets of road construction equipment to be owned by the Ministry. 2) to start implementation of the vital maintenance and rehabilitation for the main roads. 3) to increase effectively the volume of construction by decrease in the rent for equipment. For the purpose of execution of this scheme the Palestinian Interim Government made a request to the Government of Japan for a grant aid for procurement of construction equipment as well as construction of a workshop and a training center.

Based on the above-mentioned request, the Government of Japan dispatched in December, 1995 a mission for project formation in order to investigate the current situation and issues in functioning of the public services. Judging from the extent of maturity and capability at the Ministry side in pursuance to the field of road maintenance, it was finally determined this time that the procurement for construction equipment in a small scale should initiate to execute the scheme in the limit to the Gaza Strip.

## **CHAPTER 2. Contents of the Project**



## Chapter 2 Contents of the Project

### 2.1 Objectives of the Project

As one of the top priority provisions in infrastructure improvement, the PDP implies implementation of maintenance and rehabilitation for the roads in Palestine, most of which are getting worse due to being left exposed to severe deterioration without appropriate routine maintenance and rehabilitation for the past 3 decades. The objectives of the project aim to contribute to improvement of living standard for Palestinian people as well as to socio-economical development of the Gaza Strip through social services including education, medical treatment, etc. rendered to the residents in the areas. In order to materialize the objectives, the Ministry of Public Works decided to procure the minimum units of the construction equipment needed for maintenance and rehabilitation of 161 km of the selected roads (inter-urban roads) in the Gaza Strip listed up as the most top priority project.

1) Main Roads (Route No. 4/No. 250)	92 km
2) Regional Roads (Access to Route No. 4/No. 250)	29 km
3) Local Roads	40 km
Total	161 km

### 2.2 Basic Concept of the Project

Palestine requested first the Government of Japan to provide the construction equipment for maintenance and rehabilitation of the inter-urban roads in the Gaza Strip and the West Bank. However, the execution of the study was this time narrowed down only to the Gaza Strip and after the Government of Japan and the Ministry of Public Works therefore had discussions on the contents of the equipment requested, the study team conducted the survey of the function and level of equipment repair in addition to studying further the contents of the equipment from the view-points of function, use, frequency in use and economical efficiency of equipment as well as workers' technological capability. At the result of the study, the final revised contents of the equipment are as follows:

Table 2-1 Required Equipment and Study Result

No.	Required Equipment			Study Result	
	Equipment	Specification	Q'ty	Specification	Q'ty
1	Motor Grader	210HP	3	150~160HP	2
2	Bulldozer	230HP	5	160~180HP	1
3	Excavator	0.7 m <sup>3</sup> 128HP	3	125~135HP	1
4	Wheel Loader	200HP	7	160~170HP	2
5	Vibratory Roller	10 t	6	10 t	2
6	Hand Guided Roller		5	600 kg	3
7	Dump Truck	9 t 235HP	5	8~10 t	10
8	Dump Truck	16 t 280HP	5		0
9	Asphalt Finisher		2	Std2.3mMax4m	1
10	Water Tanker	10,000Lit	3	8,000Lit	1
11	Fuel Tanker	10,000Lit	1		0
12	Mobile Workshop		1		0
13	Workshop		1 set		0
14	Truck Crane	100 t	1	25 t	1
15	Truck Crane	130 t	1		0
16	Piles Driving Mobile Unit	160PS	1		0
17	Mobile Soil Testing Laboratory		1		0
18	Soil & Asphalt Testing Equipment		1		1
19	Service Car			1 t	2
20	Tyre Roller			8 t (20 ton with Ballast)	1
21	Asphalt Distributor			6,000Lit	1
22	Plate Compactor			70 kg	3
23	Rammer			60 kg	1
24	Cargo Truck	with 3 ton crane		8 t	1
25	Tractor Trailer			30 t	1
26	Air Compressor			7 m <sup>3</sup> /min	1
27	Pick Hammer			6 kg/cm <sup>2</sup>	2
28	Concrete Mixer			0.5 m <sup>3</sup>	3
29	Asphalt Kettle			6 m <sup>3</sup>	1
30	Tools & Measures				each one set
31	Spare Parts			Heavy equip. max10% and other equip. max 5%	1 set
32	Prefabricated House Material			300 m <sup>2</sup>	1 set
33	Training Equipment				1 set

Taking into account topography and the nature of soil in the Gaza Strip as well as scope of road rehabilitation works, the composition of equipment was mainly focused on construction machines and vehicles for road rehabilitation. However, the large-sized truck crane and mobile pile driver, etc. were eliminated from the list of equipment because those equipment clashes with the scope of road maintenance and rehabilitation works in the Gaza Strip. Meanwhile, in view of the lack of factory for repairing construction machines, the minimum units of equipment needed such as the service truck used effectively for maintenance or repair of equipment at the field, tyre roller needed for finishing road pavement, etc. were added.

Furthermore, as the additional equipment, some equipment and materials for a prefabricated house were listed up on condition that the Ministry of Public Works would erect a prefabricated house at the south-east area of the Gaza Strip where the Ministry of Public Works is scheduled to store the construction machines and vehicles so as to prevent the equipment from being exposed to wind and rain, sand and direct rays of the sun since there was no warehouse to store the existing equipment like tools, spare parts and soil test equipment being exposed outside.

In the meantime, although a producer or supplier will guarantee the equipment for one year after delivery, the maintenance of the equipment thereafter will be taken care by private sector like a repairshop or the producer's agent in case equipment is broken or is physically in trouble. In the Gaza Strip, only two specific producers of construction equipment are presently trying to set up their agents subject to approval of Palestinian Authority, but in case a trouble with equipment manufactured by other than the above-mentioned two producers happens, the repair shall be applied to other agents located in the neighbouring countries like Israel, Jordan or Egypt.

## **2.3 Basic Design**

At the result of the study on the sphere of equipment requested as per Table 2-1, the selection of the equipment for this project was made on the basis of the following policies.

### **2.3.1 Design Concept**

The design policy was formulated as mentioned below taking into account such issues as natural and social condition of the programmed location, status of procurement and the features of this project.

1) Policy on Natural Condition

From the viewpoint of the natural condition, the construction machines and vehicles shall be equipped as per the following specifications as the countermeasure to avoid damage caused by sand:

- (1) Sand proof radiator
- (2) Steel fan
- (3) High speed fan pulley
- (4) Dust & Water proof starter
- (5) Double element type air cleaner
- (6) Sealed type alternator

2) Policy on Social Condition

Palestine had been merged by Israel from the end of 3rd Mid-East War (67 year War) to September, 1993 when the Declaration of Principles on Interim Self-Government Arrangements was agreed in Washington. Palestinian people keep their Arabic manners and customs, culture and food habits, among whom there are not a few Westernized people coming back from Western countries to be engaged in the founding of a state. Therefore, European or U.S. specifications of construction equipment may be applicable and the instruction plates and manual, etc. shall be made out in English version.

3) Policy on Construction Sector

The Ministry of Public Works subcontracted road construction and maintenance works to private sector or implemented those works by force account with leased equipment after the Interim Self-Government Authority was inaugurated. On this project, however, the Ministry of Public Works will carry out by itself road maintenance works with the construction equipment provided by the Government of Japan since it is easy to newly employ operators of equipment by recruiting qualified staff from a lot of unemployment.

4) Policy on the Execcuting Agency's Capability of Equipment Maintenance and Administration

The Ministry of Public Works dispatched its technician and mechanic to foreign countries for overseas training since the year of 1994 and those trainees



implemented maintenance of the construction equipment leased from the private sector.

Consequently, it is considered that even after this project is completed, the maintenance and administration of the construction equipment can satisfactorily be carried out for the reasons that Palestine takes it up to accomplish expansion and improvement of socio-economical infrastructure as one of the most top priority targets for the state development program and that the maintenance and rehabilitation of inter-urban roads are strictly regarded vital as the greatest important implementation and that the budget is rapidly being increased. Furthermore, as regards technological level of maintenance and administration, the existing 37 members of engineer stay technically on high level in specialties though some of new engineers are required to be hired. Those engineers are considered enough to be capable of mastering skills even in new equipment subject to standard specifications in accordance with producer's technical guidance.

#### 5) Policy on the Sphere and Grade of Equipment and Facilities

##### (1) Sphere of Equipment

This project aims at procurement of construction equipment to be used for the road rehabilitation in the emergency road maintenance program (extension of road 161 km) in the Gaza Strip made out on the basis of both the most top priority road maintenance program and medium-term road maintenance program. The composition of equipment was prepared in consideration of the outcome of the study conducted at the site of Palestine, contents of which was somewhat changed from the original requirements. The two truck cranes w/100 t and w/130 t and the mobile pile driver were eliminated due to unnecessary, while a truck/trailer needed for transportation of heavy machines and the air compressor, rammer and asphalt distributor, etc. used for pavement were supplemented. Also, the tools, measuring tools, training equipment and equipment/materials for a prefabricated house (approx. 300 m<sup>2</sup>) of the administration office were added.

##### (2) Grade

Taking into account after-sales service, the equipment was selected to be of the same standard grade as that of equipment being presently used worldwide.

6) Policy on Implementation Term

This shall be a single fiscal year taking into account procurement for equipment of the standard grade.

2.3.2 Basic Design

1) Overall Plan

In this project of main road maintenance and improvement, the equipment as shown on Table 2-2 is scheduled to be provided and the part of an industrial park area in the outskirts of the Gaza city is prepared as the base storing the equipment in the Gaza Strip. The expected location of the base is flat land without any building as shown on Figure 2-1, which can be used as it is. Furthermore, a prefabricated house shall be erected at this location to be used for administration, training, store of tools as well as soil test laboratory.

Meanwhile, the Ministry of Public Works will build the prefabricated house with the equipment and materials provided by the Government of Japan. The construction work schedule is as follows:

- (1) Number of workers : 6 persons
- (2) Period of construction : 10 days
- (3) Facilities required : Water/Electric supply and toilet

The Ministry of Public Works is studying on the budget needed for the construction works. A repair-shop is also expected to be built at this location in the future.

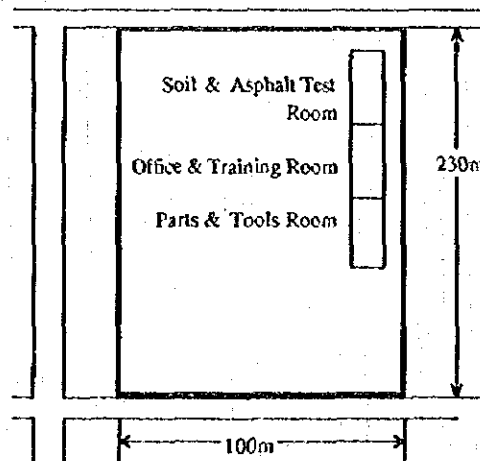


Fig. 2-1 Parking Area

2) Plan on Equipment

Since Palestinian authority does not own any equipment in the Gaza Strip, the equipment as shown on Table 2-2 shall be provided for the purpose of emergency rehabilitation of the road 161 km.

Table 2-2 Main Equipment

No.	Equipment	Purpose of Use	Specification	Q'ty
1	Bulldozer	Road rehabilitation	160-180HP	1
2	Excavator	Ditch repairing & cleaning	125-135HP	1
3	Wheel Loader	Shoulder repairing	160-170HP	2
4	Motor Grader	Road rehabilitation	150-160HP	2
5	Dump Tuck	Carrying materials	10 ton	10
6	Water Tanker	Water supply to worksite	8,000 ltr	1
7	Truck Crane	Disassemble the machine component	25 ton	1
8	Service Car	Machine maintenance	1 ton	2
9	Vibratory Roller	Road foundation	10 ton	2
10	Hand Guided Roller	Patching Work and others	600 kg	3
11	Tyre Roller	Pavement work	8 ton	1
12	Asphalt Finisher	Overlay work	Std2.5m, Max4.5m	1
13	Asphalt Distributor	Overlay work	6,000 ltr	1
14	Plate Compactor	Patching work	70 kg	3
15	Rammer	Patching work	60 kg	1
16	Cargo Tuck (w/3 ton crane)	Carrying materials	8 ton	1
17	Tractor Trailer	Carrying construction equipment	30 ton	1
18	Air Compressor	Road maintenance	7 m <sup>3</sup> /min	1
19	Pick Hammer	Road maintenance	6 kg/cm <sup>2</sup>	2
20	Concrete Mixer	Producing culvert	0.5 m <sup>3</sup>	3
21	Asphalt Kettle	Asphalt pavement	6 m <sup>3</sup>	1
22	Tools & Measures	Machine repair and maintenance		1 set
23	Soil & Asphalt Testing Equipment	Testing		1 set
24	Spare Parts	For construction equipment	10% of Total Price	1 set
	"	For other equipment	5% of Total Price	1 set
25	Prefabricated House Material (Not include Foundation & Building Work, Water-Air-Electric Work etc.)	Tools, Parts, Testing Equip., Training Room	300 m <sup>2</sup>	1 set
26	Training Materials	Training		1 set

There is no peculiar equipment listed up in this project. The Ministry of Public Works and its engineers are familiar with all sorts of equipment to be procured in the project and they have experiences of having handled similar equipment in domestic and abroad. The spare parts and consumables shall be provided at the rate of 10% of the price for construction machines as shown on Table 2-2, No. 1-4 and 5% of the price for the other equipment as shown on Table 2-2, No. 5-21 respectively.

Meanwhile, all of the equipment shall be procured from other area than the Gaza Strip where any equipment listed up in this project is not produced. Japan or other countries that produce not only the equipment required but also own their factories in Germany, U.K., France, Belgium and Sweden are considered as the sources of procurement.

Table 2-3 shows some sort of equipment which will be expected to be suppliable from foreign countries including Japan:

Table 2-3 Const. Equipment Suppliable from European Manufacturer

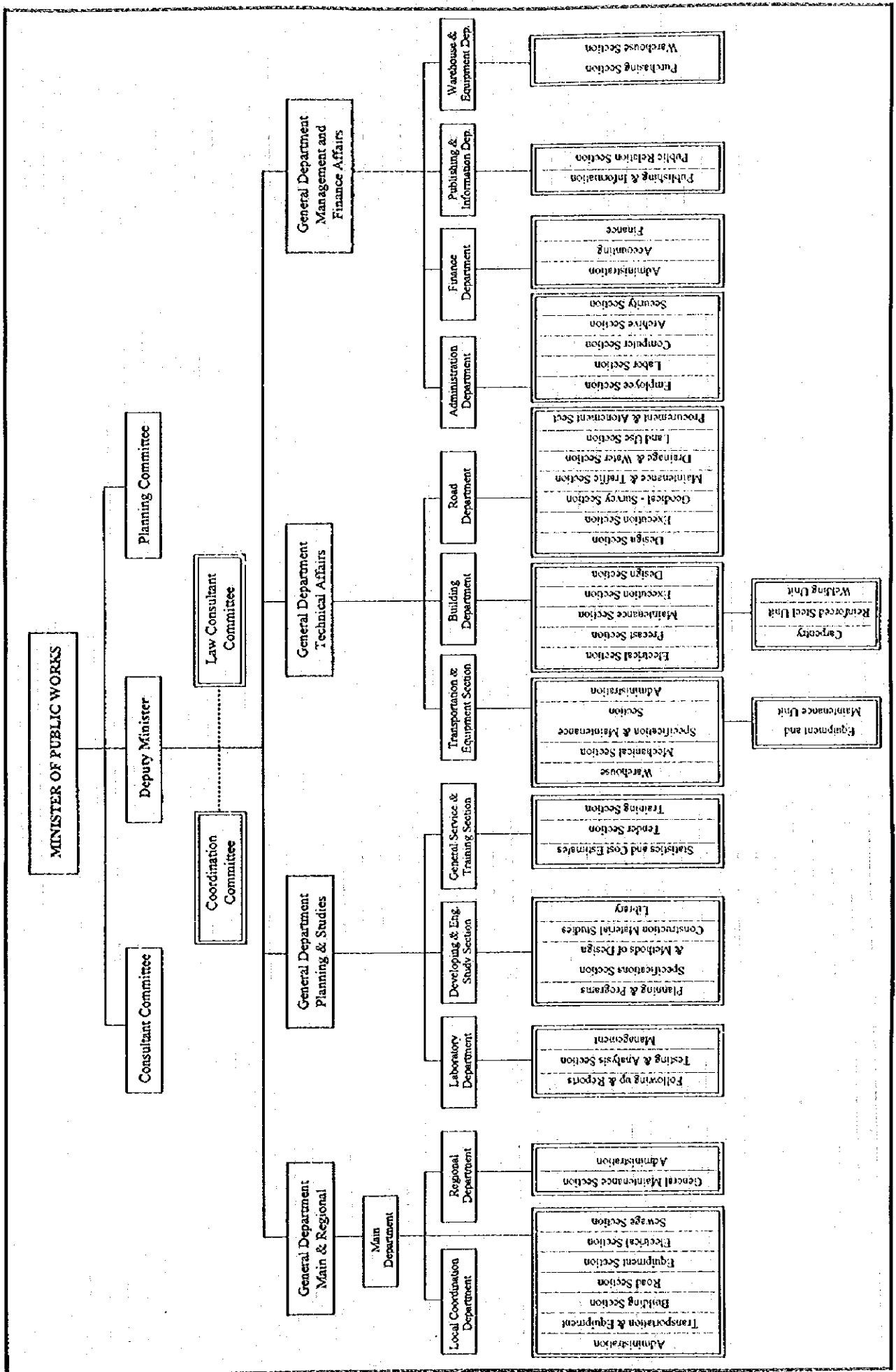
No.	Equipment	Q'ty
1	Excavator	1
2	Wheel Loader	2
3	Motor Grader	2
4	Dump Truck	10
5	Water Tanker	1
6	Cargo Truck with 3 ton Crane	1
7	Tyre Roller	1
8	Truck Trailer	1

## 2.4 Executing System of the Project

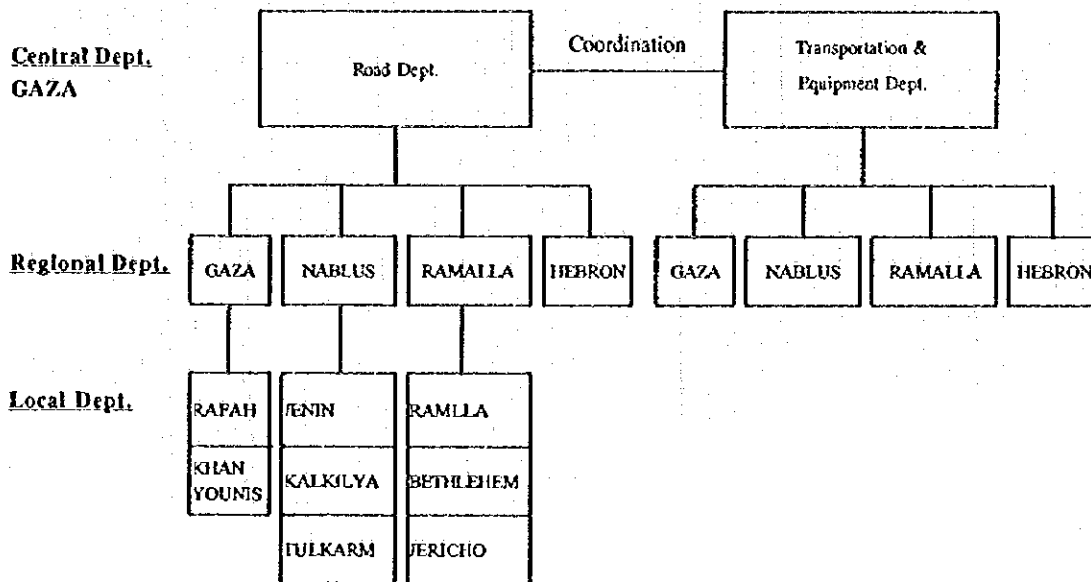
### 2.4.1 Organization

The Ministry of Public Work plays the main role in charge of this project and its organization chart is as follows:

Figure 2-2 The Organization of the Ministry of Public Works



The maintenance work for Palestinian inter-urban roads is being executed by 4 regional departments subordinated to the Ministry of Public Works. Each regional department has a road division for road maintenance and administration and a transport and equipment division for maintenance and control of equipment. The organization chart is as per the Figure 2-3.



**Figure 2-3. Organization Chart for Road Maintenance and Management in MPW**

The fixed number of the staff of the Ministry of Public Works is at present 1,236 persons in total, among whom the staff related to road maintenance comprise 644 persons of the road division and 176 persons of the transport and equipment division.

#### 2.4.2 Budget

Table 2-4 shows a comparison between the budget of the fiscal year 1995 and 1996 in order to verify the validity of this project to be performed in the fiscal year 1996 budget plan of the Ministry of Public Works.

Table 2-4 Annual Budget

Unit: Million US\$

Year	Budget				The ratio of the road maintenance budget against the national budget
	National	MPW	Road Const.	Road Maintc.	
1995	480	60	—	23	4.8%
1996	600	70	20	30	5.0%

It is found out from the above Table 2-4 that though the percentage of the fiscal year 1996 budget for road maintenance against the national budget exceeds that of the fiscal year 1995, the both percentages are almost same and that the sum of the fiscal year 1996 budget is a realistic and reasonable figure.

The total sum of the fiscal year 1996 budget demanded by the Ministry of Public Works is 70 million dollars (the national budget 0.6 billion dollars) consisting of 30 million dollars (43%) for road maintenance works, 20 million dollars (28.5%) for road rehabilitation works (including new construction works) and 20 million dollars (28.5%) for the administration fee including the salary of the staff. Out of 70 million dollars of the budget the Gaza Strip shall be allocated 28 million dollars (40%).

The maintenance of the equipment newly provided will cost 0.705 million dollars per year, which is 25% of 28 million dollars budget for the Gaza Strip. This amount of cost can be considered to be allocated from the budget. Meanwhile, the procurement of equipment will save approximately 7.55 million dollars per year of rent for equipment leased in the past, which will be possible to be allocated for personnel expenses such as the salary for operators newly employed.

#### 2.4.3 Staff and Technological Level

The road division of the Ministry of Public Works is engaged in implementation of the project by using the equipment provided for road maintenance works, while the transport and equipment division is in charge of transportation and maintenance of equipment. The operation system of both the above-mentioned divisions is as follows:

##### 1) Road Department

The number of personnel of the road department is 644 persons in total comprising 124 persons of the central division, 388 persons of the regional division (97 persons × 4 regions) and 132 persons of local division (12 persons × 11 districts) as shown on Table 2-5.

Regarding the West Bank, the administration of roads was just transferred from Israeli Civil Administration in January, 1996 and the establishment of organizations of regional and local divisions subordinated to the Ministry of Public Works is presently under process. The personnel deployment of the road division in the Gaza Strip is as follows:

**Table 2-5-1 Staff of the Road Department**

Central Department (Gaza)		Unit: Person
		124
Managing Director	Senior Eng.	1
Design Head Section	Senior Eng.	1
Execution Head Section	Senior Eng.	1
Maintenance and Traffic Head Section	Senior Eng.	1
Sewage and Water Head Section	Senior Eng.	1
Land Use Head Section		1
Procurement and Atonement Head Section		1
Geodical Head Section	Senior Eng.	1
Traffic Engineers Civil Engineers, Road and Traffic Engineers		9
Foremen		5
Surveyors		6
quantity Surveyors		2
Draftsmen		5
Computer Draftsmen		3
Technicians		36
Unskilled Labor		32
Secretary		2
Drivers		8
Employee for Land Use and Procurement		8



Table 2-5-2 Staff of the Road Department

Unit: Person

Main Department		97	Regional Department		12
Head Section	Senior Engineer	1	Managing Director	Senior Engineer	1
Road and Traffic Engineers		4	Road Engineer		1
Civil Engineer		2	Drainage and Sewage System		1
Foremen		3	Foremen		1
Draftsmen		2	Driver		2
Computer Draftsmen		2	Secretary		1
Surveyors		3	Surveyors		2
Quantity Surveyors		2	Quantity Surveyors		2
Technicians		10	Draftsmen		1
Electrical Technicians		3			
Unskilled Labour		60			
Secretary		1			
Drivers		4			

In the meantime, the operators of construction machines in the Gaza regional divisions are planned to be prepared as follows:

Table 2-6 Operators of Construction Equipment  
(Present personnel and future plan in Gaza Strip)

Unit: Person

Equipment	Operators in Gaza	
	Present	Future Plan
Bulldozer	4	5
Motor Grader	2	3
Excavator	2	3
Wheel Loader	6	5
Road Roller	6	5
Asphalt Finisher	2	3
Dump Truck	6	15
Water Tanker	2	3
Fuel Tanker	2	3
Mobile Workshop	1	2
Truck Crane	1	3
Soil Testing Equipment	1	2
Pile Hammer	1	2
Other Equipment for Paramount Work	-	6
Total	36	60

2) Transport of Equipment Department

The number of personnel of the transport and equipment department is 176 persons in total comprising 40 persons of the central division and 136 persons of the regional division (34 persons × 4 regions). The personnel deployment of the transport and equipment division in the Gaza Strip is as follows:

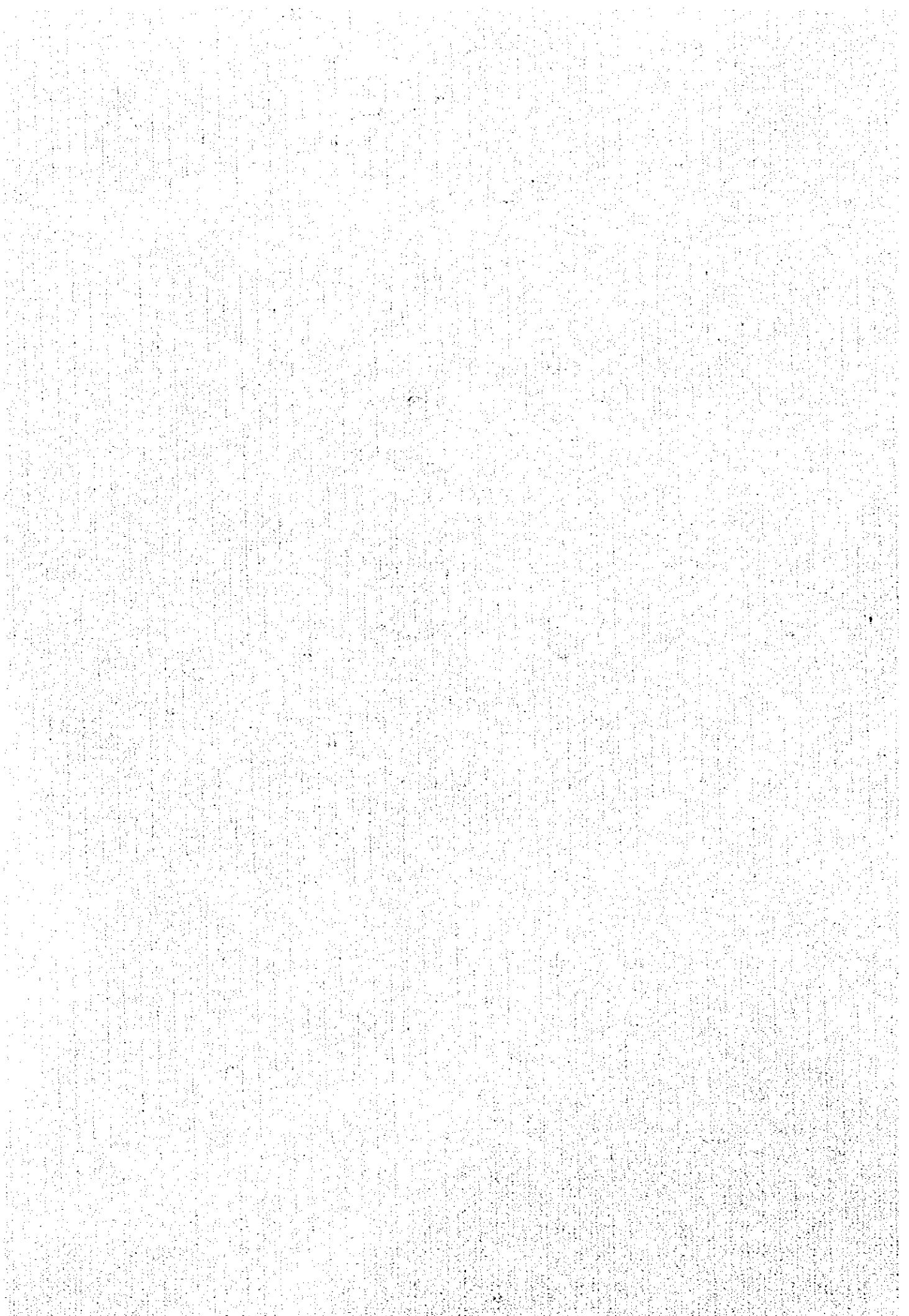
Table 2-7 Staff of the Transportation and Equipment Department

Central Department (Gaza)		40	Main Department		34
Director	Senior Engineer	1	Head Sect. Manager	Senior Mech. Eng.	1
Head Section for Inspection and Maintenance	Senior Mech Eng.	1	Mechanical Engineer		2
Head Section for Mechanical Section	Senior Mech. Eng.	1	Foremen		2
Head Section for Warehouse	Senior Mech. Eng.	1	Technicians		8
Mechanical Engineers		4	Labors		6
Electrical Engineers		1	Drivers		13
Technicians		14	Computer		1
Foreman		2	Secretary		1
Computer Operators		2			
Secretary		1			
Drivers		12			

3) Technological Level

For the purpose of implementation of the project the Ministry of Public Works has dispatched one engineer and 4 mechanics to Egypt for overseas training and is scheduled to dispatch some more engineers in 1996. However, the operation and routine maintenance of equipment may satisfactorily be carried out since the producer's instructor will render the service how to manage operation and maintenance of equipment after delivery of equipment.

## **CHAPTER 3. Implementation Plan**



## Chapter 3 Implementation Plan

### 3.1 Equipment Plan

#### 3.1.1 Implementation Concept

##### 1) Main Executing System

The flow chart of implementation of the project under the Japanese Grant Aid is as shown on Figure 3-1.

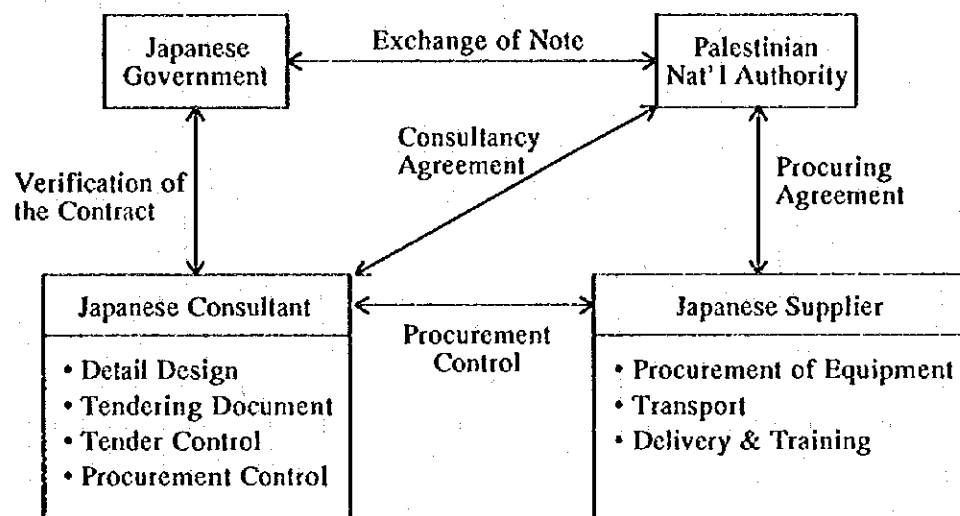


Fig. 3-1. Flow of the Execution of Grant Aid

Palestinian executing agency for the project is the Ministry of Public Works (MPW). Meanwhile, the design works and supervision for procurement of equipment will be conducted by a Japanese consultant and the equipment will be provided by a Japanese trading firm/firms as a supplier/suppliers who will respectively conclude a contract with the counterpart.

##### 2) Consultant

The procurement of a consultant is certainly inevitable to the project under a grant aid. After the exchange of note is made between both the governments, an agreement on the consultancy service will be concluded between the Ministry of Public Works and a Japanese consultant. Thereafter the consultant will render such engineering services for procurement of equipment as detailed design, preparation for tender documents, tender guidance and supervision. The consultant,

therefore, will play an important role by taking a responsibility for completion of final delivery of the equipment.

### 3) Supplier

The tender for procurement of equipment will be carried out on the basis of general competitive bid on condition that the qualified applicants are general trading firms organized and registered under the laws of Japan. The Ministry of Public Works will make a contract for supply of equipment with the supplier awarded the tender at the result of evaluation in both phases of technical capability and cost.

The supplier will be liable to deliver the equipment within the deadline of delivery and to render the service for operation guidance.

#### 3.1.2 Implementation Conditions

The equipment shipped from Japan or other countries shall be unloaded at a Israeli port. The completion of delivery will be recognized when the supplier finishes to render the service on operation and maintenance guidance for the equipment forwarded from the port to the site of the Gaza Strip. The mode of transportation of the equipment will be on the road and a most important task will be how to clear the customs and transport the equipment to the site of the Gaza Strip without any trouble. For this purpose, it is a most important to prepare in advance the documents showing clearly that the equipment has been shipped under the Japanese Grant Aid. Also, a liability must be made clear in order to avoid any trouble regarding accidents of breakage, steal, etc. during the period of transportation.

#### 3.1.3 Scope of Works

The equipment shall be delivered at the place designated by the Ministry of Public Works in the area of the industrial park at the Gaza city. Though the supplier is responsible for delivery of the equipment at the designated place, the Ministry of Public Works will bear all the expenses accrued after the delivery, the details of which are specified in Article 3.1.7.

### 3.1.4 Consultant Supervision

#### 1) Basic Plan on Supervision

The supervision must be implemented bearing in mind the followings:

- to grasp the background of the project
- to grasp the contents of the basic design report
- to grasp the system of the grant aid
- to grasp the contents of E/N agreed between the bilateral countries

Based on the above, the outline of the contents of supervision is described as follows:

#### (1) Contents of Supervision

After E/N is made, the consultant will conclude an agreement with the Ministry of Public Works on consulting services in accordance with the terms and condition of E/N. The scope of works is outlined as follows:

##### i. Detailed Design Works

- detailed design and preparation for tender documents
- to obtain Palestinian approval on the tender documents
- to confirm Palestinian responsibility

##### ii. Procurement of Equipment

- execution of tender, evaluation, report and attendance at contract
- inspection of equipment prior to shipment
- attendance in delivery of the equipment
- report and completion procedure

##### iii. Equipment Operation and Maintenance Guidance

- initial operation guidance by the producer's mechanical engineer in attendance of consultant's engineer
- guidance for equipment maintenance

#### (2) Implementation Conditions

- to check and confirm whether or not any condition on procurement specified in the basic design is changed.

- to draw up specifications of equipment based on the condition defined under the grant aid and to obtain Palestinian approval

### 3.1.5 Procurement Plan

The equipment existing in the Gaza Strip includes a few of Japanese-made construction machines and vehicle, but most of the equipment comprise European-made machines and vehicle. The study on procurement of equipment, therefore, was made in concentration of European countries besides Japan as a supply source.

Table 3-1 European Manufacturers of Construction Equipment

Country		Belgium	France	Germany	Italy	Sweden	English
Machine	Horse Power (PS)						
Bulldozer	190-260			H/M, LBH			
	160-190		CAT	H/M, LBH	F/H		
	130-160			H/M, LBH	F/H		A/B
	105-130			H/M, LBH	F/H		A/B
	85-105			H/M, LBH	F/H		A/B
Tractor Shovel	130-190			H/M, LBH	F/H		A/B
	105-130			H/M, LBH	F/H		A/B, JCB
	75-105			H/M, LBH			A/B, JCB
Wheel Loader	120-150	CAT	DEERE, VME	H/M, O&K, LBH, FR	F/H	VOLVO	A/B, JCB
	100-120		DEERE, VME	H/M, O&K, LBH, FR	F/H	VOLVO	A/B, JCB
	80-100		DEERE, VME	H/M, O&K, LBH, FR	F/H		JCB
	60-80			H/M, O&K, LBH, FR	F/H		JCB
	-60			H/M, O&K, LBH, FR			JCB
Excavator (Granular Type)	150-200	CAT	PCIN, FR	H/M, O&K, LBH, AT	F/H		HY-MAC, JCB
	130-150		PCIN, FR	H/M, O&K, LBH, AT	F/H		HY-MAC, JCB
	100-130		PCIN, FR	H/M, O&K, LBH, AT	F/H		HY-MAC, JCB
	80-100		PCIN, FR	H/M, O&K, LBH, AT	F/H		HY-MAC, JCB, CAT
Excavator (Wheel Type)	120-150		PCIN	H/M, O&K, AT	H/D		HY-MAC, JCB
	80-120		PCIN	H/M, O&K, AT	F/H		HY-MAC, JCB
	-80		PCIN	H/M, O&K, AT	H/D		HY-MAC, JCB
Motor Grader	200-250			O&K			A/B
	170-200			O&K			A/B
	145-170			O&K			A/B
	135-145			O&K			A/B
	115-135			O&K			A/B
	75-115			O&K			A/B
Truck	15-20T		RENAULT		ASILA	VOLVO	A/B
	10-15T					VOLVO	
	7-8T						
	5-6T						
Explanatory Notes		CATERPILLAR	FOCIAN FURUKAWA RENAULT VME CATERPILLAR	ILANOMAG O&K UBIERR ATLAS FURUKAWA	HYDROMAC FIAT/HITACHI		Aveling Barford JCB HY-MAC



Table 3-2 Result of Study on European Manufacturers

No.	Item	Hanomag (Germany)	O&K (Germany)	Liebherr (Germany)	CAT (France) (Belgium)	Volvo (Sweden)	JCB (England)
1	Have a delivery record in GAZA Strip?	No	No	No	Yes	Yes	Yes
2	Have a interest the machine delivery to GAZA?	Yes	Yes	Yes	Yes	Yes	Yes
3	Distributor in GAZA	NBEC	No	Boss Co.	Palesinian Tractor	No	No
4	Distributor's Scale	Under establishing	—	Not confirm	Under establishing	—	—
5	Distributor's Member	2	—	Not confirm	3	—	—
6	Quality Control & Productive Reliability	Reliable	Reliable	Reliable	Reliable	Reliable from actual result	Reliable from actual result
7	Service Activity & Parts Supplying System to GAZA	Preparing at Dist.	From Egyptian Dist.	Preparing at Dist.	Preparing at Dist.	From Israel Dist.	From Cyprus Office or neighbor Dist.

At the result of the basic design study, the following countries including Sweden have been selected in addition to Japan as the procurement sources of construction equipment.

Belgium  
Germany  
France  
Sweden  
U.K.

All of the equipment shipped from the above countries shall be unloaded at Israeli port and transported on the road to the Gaza Strip. The equipment provided by Japanese supplier shall be delivered at the place designated by the Ministry of Public Works in the Gaza Strip.

### 3.1.6 Implementation Schedule

The implementation schedule of the project is as per the Figure 3-2.

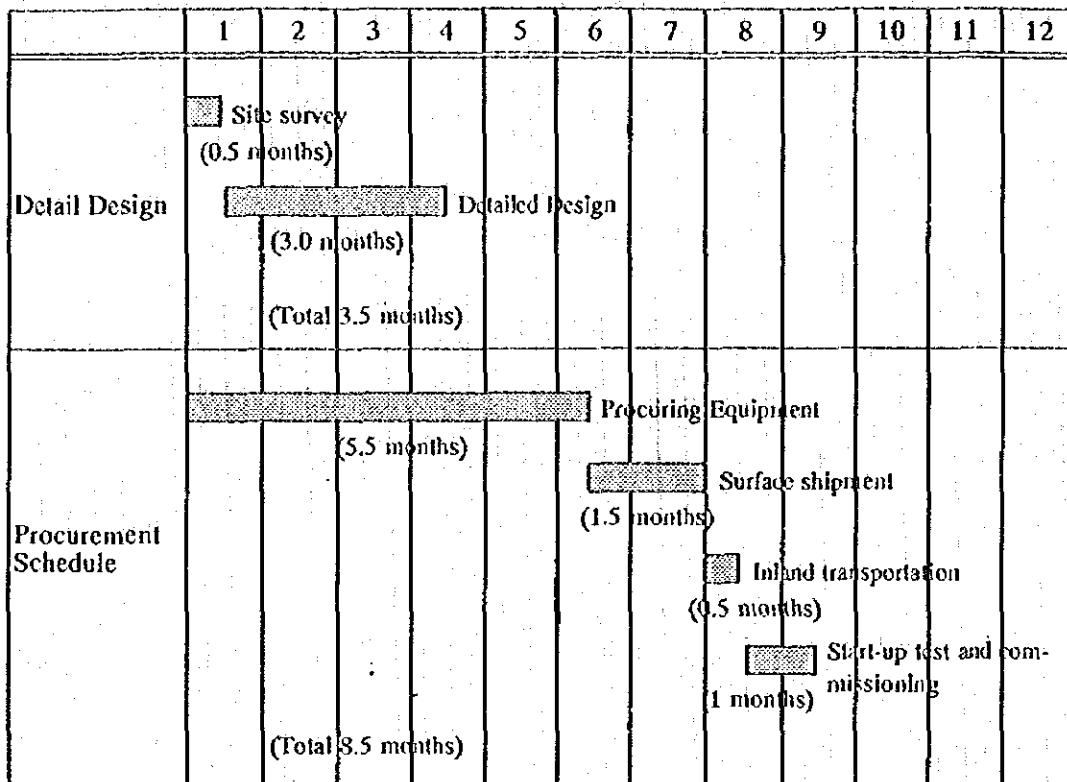


Fig. 3-2 Implementation Schedule

### 3.1.7 Obligation of Recipient Country

Palestinian obligations are as follows:

- 1) Land acquirement for storage of equipment
- 2) Construction work for 3 prefabricated buildings
- 3) Installation of the following facilities:
  - (1) Electric supply facilities
  - (2) Water supply facilities
  - (3) Drainage facilities
- 4) Preparation for documents needed for customs clearance at Israeli port.
- 5) Payment to Japanese foreign exchange bank for the following bank charges based on a bank agreement:
  - (1) Issuing charges of authorization to pay
  - (2) Bank commission

- 6) Exemption from customs duties and Palestinian taxes for Japanese firm and personnel engaged in services of the project.
- 7) To assist Japanese personnel related to the project to enable them to enter and stay at Palestine for implementation services.
- 8) Appropriate use and maintenance of the equipment procured under the project.
- 9) Payments for other expenses than the payments made under the grant aid.

### 3.2 Project Cost Estimation

#### 3.2.1 Project Cost Estimation

The total cost required for implementation of the project under the Japanese grant aid is approximately 0.505 billion yen, which shall be shared by the Government of Japan and Palestinian Authority as per the following estimation:

##### 1) Cost borne by the Government of Japan

Description	Total Cost in Billion Yen
1) Equipment	0.478
2) Supervision	0.027
Total	0.505

##### 2) Cost borne by the Palestinian Authority

Construction cost of prefabricated building    ¥130,000 (equivalent to US\$1,200)

##### 3) Basis of Estimation

- (1) Estimation : August, 1996
- (2) Exchange rate : ¥107.-/US\$
- (3) Implementation Period : as per implementation schedule
- (4) Others : The project shall be implemented in accordance with the definitions of the Japanese grant aid.

### 3.2.2 Maintenance and Administration Plan

- 1) The appropriate maintenance and control of the equipment after delivery are expected to be carried out in view of Palestinian technological level.

- (1) Routine maintenance

This shall be conducted in accordance with a routine maintenance sheet instructed by the producer and the use of fuel, cooling water, grease as well as operation hours must be recorded each time of replenishment on the routine maintenance sheet in order to report to a mechanical engineer.

- (2) Periodical maintenance

Based on the routine maintenance sheet, the timing for implementation of a periodical maintenance shall be reported to a mechanical engineer, who will apply to the chief engineer for implementation of a periodical maintenance.

- (3) Repair work procedure

- Repair work application:

The mechanical engineer will check the use of water, fuel and grease, but in case an unusual increase in consumption is found, the mechanical engineer will apply to the maintenance section for inspection and repair against the trouble.

- Repair work report:

After investigating a cause of the trouble, the chief of the maintenance section of equipment will record the contents of trouble, order of repair, parts required for replacement and time of repair on the repair sheet and instruct the technician in charge to conduct the repair in submission of the repair sheet. In case replacement for parts is required, an application for provision of spare parts shall be issued to the technician in charge of the warehouse section, showing item number, name of spare parts and quantity. The technician in charge will record the results of checking the machines in trouble on the repair sheet and list up the number and names of mechanic to instruct each mechanic on the contents of repair. The technician in charge will submit to the chief of the maintenance section the repair sheet reflecting the results of repair which are reported by the mechanic.

#### (4) Control of Spare Parts

The control of spare parts will be executed on the basis of a spare parts list showing the item numbers, names of spare parts, quantity of stock, quantity of consumption and storing place. However, it will be necessary in future for technician of warehouse section to learn computerized control technology. The spare parts required are as follows:

- Parts periodically replaced : Element, Filters, Corrosion resistor
- Ware Parts : Blade cutting edge, End-bit, Ripper-tip, Sprocket, Segment, Bolt, Nut, Brake lining, etc.
- Seal Kits : Seal ring, Gasket, Grease Oil seal, Dust seal, etc.
- Others : V-bolt, Lamp, Valve, Hose, Fuel nozzle, Fuse, Switch, Meter, etc.

The stock of the spare parts for engine like cylinder and piston ring is not always necessary, but a means of procurement must be prepared taking into account an emergency case. However, the necessity of replacement for such consumer durable parts will rarely arise since the equipment shall be used only for road maintenance.

#### 2) Estimation of Maintenance and Administration Expense

The followings are the estimation of the additional expense needed for increase in the number of operators and equipment with regard to main items of maintenance and administration cost borne by the Ministry of Public Works.

##### (1) Personnel Expense

Present wage level is as follows:

Mechanical Engineer	US\$1,000/month
Foreman	" 600/month
Skilled Labour	" 400/month
Mechanic	" 400/month
Operator	" 500/month

The estimation of the personnel expenses for 23 additional operators as shown on Table 2-7 of Article 2.4.3 is as follows:

Table 3.3. Estimation of Personnel Expenses

Personnel	Additional Number	Monthly Wages (Average)	Expected Additional Expenses
Operator	23	US\$500/M	US\$11,500/M
Additional expenses per month	---	---	US\$11,500/M
Additional expenses per year	---	---	US\$138,000/year

(2) Fuel and Lubricating Oil

The expected consumption of fuel/lubricating oil and expenses are as shown on Table 3-4 and the estimation is made on the basis of the following conditions:

Price of diesel oil	US\$0.38/l (August 1996)
Price of gasoline	US\$0.93/l
Price of lubricating oil	US\$3.97/l
Average of operation hours per day	6.25 hours
Operation days per year	271 days
Average of operation hours per year	1,693.75 hours
Rate of fuel consumption	0.030-0.228/l/PS.h
Percentage of lubricating oil expenses against fuel expenses	0.2%

Table 3-4 Estimation of Fuel Cost

Equipment	PS	Q'ty	Fuel Consumption		Annual Cost US\$
			l/PS-h	l/h	
Bulldozer	180	1	0.138	24.84	15,988
Excavator	130	1	0.138	17.94	11,547
Wheel Loader	170	2	0.138	46.92	30,199
Motor Grader	155	2	0.081	25.12	16,168
Dump Truck	370	10	0.133	492.10	316,728
Truck	225	1	0.030	6.75	4,344
Water Tanker	280	1	0.030	8.40	5,406
Truck Crane	295	1	0.037	10.92	7,028
Service Car*	185	2	0.037	13.70	21,580
Vibratory Roller	130	2	0.114	29.64	19,077
Tyre Roller	90	1	0.075	6.75	4,344
Asphalt Finisher	28	1	0.114	3.19	2,053
Asphalt Distributor	19	1	0.069	1.31	843
Rammer	3.3	1	0.228	0.75	483
Tractor Trailer	290	1	0.056	16.24	10,453
Annual Fuel Cost :					466,241
Annual Fuel & Lubrication Oil Cost					475,713

\* mark: Gasoline vehicle

### (3) Repair Expense of Equipment

The repair expense per year of the equipment is US\$256,424, which is estimated, based on the following conditions:

- Vehicles 5% of vehicle price  
(dump truck, service car, truck, etc.)
- Construction Machines 10% of construction machine  
(Bulldozer, wheel loader, motor grader, excavator, etc.)
- Light Machines 5% of light machine  
(Plate compactor, rammer, concrete mixer, etc.)

The spare parts will be procured under this project to meet requirements for 2-3 years.

### (4) Utility Expenses

The annual utility expenses incurred for the office, training room, tool room, soil test laboratory and electric power supply to soil test machine are estimated at US\$1,000 (US\$0.07/kW/H).

(5) Total Operation Cost

The total operation cost per year is estimated as shown on Table 3-5.

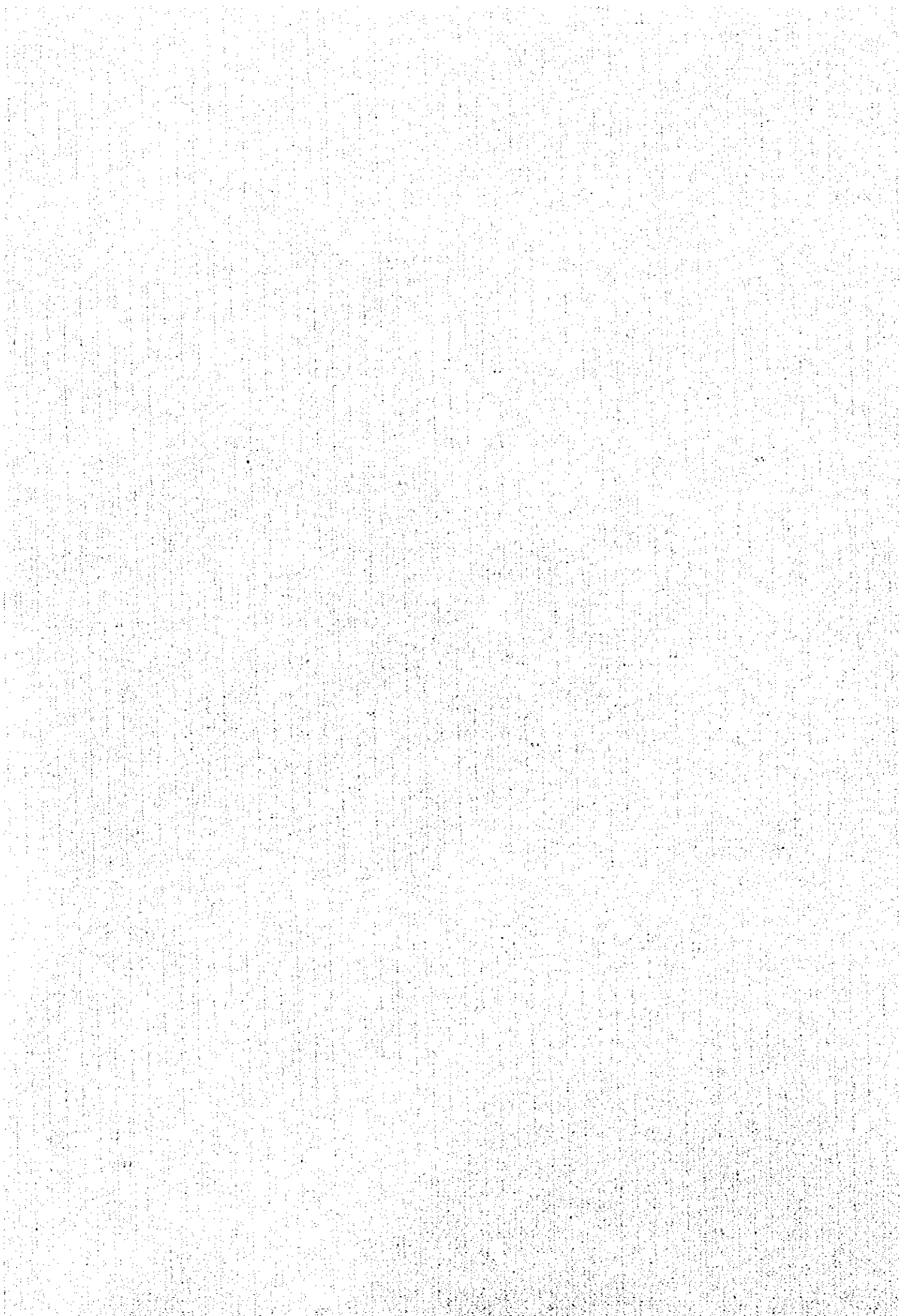
Table 3-5 Annual Operating Cost

Unit: US\$

Personnel Expenses		138,000
Fuel, oil and utility expenses	Fuel	466,241
	Lubrication Oil	9,472
	Electric	1,000
	Sub-Total	476,713
Maintenance Cost	Vehicles	121,711
	Construction Equipment	92,147
	Small Machines	42,566
	Sub-Total	256,424
Total		871,137



## **CHAPTER 4. Project Evaluation and Recommendation**



## **Chapter 4 Project Evaluation and Recommendation**

### **4.1 Project Effect**

This project aims to procure the equipment needed for maintenance and improvement for 161 km inter-urban road in the Gaza Strip selected under the top priority road maintenance program, which covers 55% of 294 km of the paved road network in the Gaza Strip.

This project will contribute to save approximately 7.5 million US dollars per year equivalent to 0.8 billion yen paid for the rental for equipment leased from the private sector, with which the road maintenance is presently being implemented. Furthermore, this saved money can be used for additional road maintenance and the implementation of the project will be accelerated.

Moreover, the increase in volume of road maintenance works will serve in decreasing the rate of unemployment since the Ministry of Public Works needs to employ additional 150 workers.

The acceleration of implementation of road maintenance will cause to activate the movement of Palestinian inhabitants and goods in the Gaza Strip, which will enhance economic activities, stability of the prices and upgrading of living standard for 0.8 million residents in the Gaza Strip.

The soil test equipment and concrete test equipment provided under the project will enable to conduct road quality control, which is expected to upgrade the road quality and to bring about economical benefit.

The project effect is described as follows:

**Table 4-1 Project Effect and Recommendation**

Present Situation and Problems	Countermeasure	Effect
(1) The main road in target of the project are left being exposed to severe deterioration without appropriate routine maintenance for the past 3 decades. The Ministry of Public Works does not own the equipment needed for road maintenance.	The most appropriate equipment is procured for the purpose of implementation of road maintenance for 160 km road extension selected in the top priority road maintenance program.	The project will contribute to save approximately 7.5 million US dollars per year paid for the rental for equipment leased from the private sector. The saved money can be used for additional road maintenance and accelerate improvement of road maintenance.
(2) The Working population of the Gaza Strip is approximately 0.132 million persons, out of which the workers employed are approximately 0.106 million persons. The rate of unemployment is 20%. Palestine needs to create projects for promotion of employment.	The employment of approximately 150 persons including 100 laborers is expected to be required in the project for procurement of equipment.	An opportunity of employment arises and upgrading of living standard of the inhabitants can be realized.
(3) A few of means of communication among inhabitants and accessibility to public service authorities.	Implementation of main and regional road maintenance to activate the movement of Palestinian inhabitants and goods	Realization of accessibility to public service authorities and benefit for 0.8 million Palestinian residents in the Gaza Strip.
(4) Problem with quality control since soil test and concrete test are subcontracted to the private sector.	Procurement of test equipment	Quality control can be accomplished.

The project effect described as above shows clearly the necessity of implementation for the project under the Japanese grant aid. The project is expected to be realized as soon as possible because the Ministry of Public Work is ready to prepare the budget and personnel needed for operation and administration of the project.

#### **4.2 Technical Cooperation and Collaboration with Other Donors**

##### **1) Technical Cooperation**

The Ministry of Public Works does not need the technical cooperation in operation and control of the equipment provided under the project since it has the basic technical knowledge and experiences in using similar equipment leased from the private sector. However, Palestinian engineers are required to learn much higher technology of equipment maintenance and control in order to create a greater project effect and therefore some of them are expected to be dispatched to Japan for technical training.

## 2) Collaboration with Other Donors

In transportation sector project, other donors will generally provide Palestine with a budgetary support for road construction. However, this project aims at procurement of the equipment used for road maintenance in which other donors will not take part. Consequently, the project will contribute to the improvement of the road network in the Gaza Strip and imply a significant role in various spheres.

## 4.3 Recommendation

As described so far, it is considered that the project will play a significant role to create a great effect. There still exist, however, some recommendations as mentioned below in implementing the project.

### 1) Implementation Period

Since the equipment is procured from foreign countries as well as Japan under the project to be implemented in a single fiscal year, the shipment and delivery of the equipment must carefully be taken care. It is very important for Palestine to carry out and complete, as scheduled, such works as foundation works and erection of the prefabricated building with equipment and materials shipped from Japan because some equipment like test equipment must be installed in the building. Therefore, the best detailed plan is required to be drawn up.

### 2) Training for Engineer and Mechanic

In order to make the most of the equipment, the training is one of the most important tasks and the Ministry of Public Works has dispatched one trainee of engineer and four trainees of mechanics to Egypt for training. Anyway, the training must further be continued in the future for the purpose of upgrading technological capability of Palestinian engineers and mechanics including operators.

### 3) Upgrading of Capability for Equipment Maintenance and Control

It is the most important to utilize effectively the equipment and carefully take care of equipment maintenance and control in order to have the equipment last as long as possible. Therefore, upgrading of capability for maintenance and control is one of the most vital issues. The Gaza Strip is a desert area where a sandstorm will attack sometimes in the winter. So, the equipment stored outside must be taken care not to be damaged.

4) Dispatch of Technical Expert

The Ministry of Public Works has begun to seek a short-term dispatch of Japanese experts engaged in training Palestinian for maintenance and control of the equipment procured. The Government of Japan may be required to meet Palestinian request from the viewpoint that a short-term dispatch of Japanese experts will lead to the success in the project.

5) Delivery of Equipment

The equipment will be unloaded at Ashdod port or Hifa port in Israel and be forwarded to the destination in land transportation. It is a key point to carry out the land transportation through the border without any trouble that the Ministry of Public works will keep close contact with the authorities concerned of the related foreign countries in Palestine in this matter.

## Appendix

## **Appendices**

- 1. Member List of the Survey Team**
- 2. Survey Schedule**
- 3. List of Party Concerned in the Recipient Country**
- 4. Minutes of Discussion**
- 5. Cost Estimation Borne by the Recipient Country**
- 6. Other Relevant Data (if applicable)**
- 7. References**



## **Appendix**

### **1. Members List of Survey Team**

<b>Takahiro SASAKI</b>	<b>Team Leader</b> <b>Deputy Director</b> <b>2nd Project Study Div., JICA</b>
<b>Tetsuhiro UENO</b>	<b>Coordinator</b> <b>Grand Aid Project Study &amp; Design Dept., JICA</b>
<b>Yoichi HIGAKI</b>	<b>Chief Engineer</b> <b>Constructions Projects Consultants, Inc.</b>
<b>Akira SHIMA</b>	<b>Equipment Planning/Cost Estimates</b> <b>Construction Project Consultants, Inc.</b>

2. Survey Schedule

No.	Date		Activities
1	Jun. 17	Mon.	Courtesy call to Ministry of Public Works (MPW)
2	18	Tue.	Site Survey
3	19	Wed.	Discussion with MPW
4	20	Thu.	Ditto
5	21	Fri.	Internal Meeting
6	22	Sat.	Discussion o Minutes of Meeting
7	23	Sun.	Discussion and Signing on Minutes of Meeting Government members Depart (KL508) (Mr. Sasaki and Mr. Ueno)
8	24	Mon.	Site survey
9	25	Tue.	Ditto
10	26	Wed.	" Mr. Shima depart to Jordan
11	27	Thu.	"
12	28	Fri.	"
13	29	Sat.	"
14	30	Sun.	"
15	Jun. 1	Mon.	"
16	2	Tue.	"
17	3	Wed.	Depart (KL506)

### 3. List of Party Concerned in the Recipient Country

#### 1) GAZA Strip

Waleed A. Siam	MPIC	Deputy Director General
Ali Alyazji	"	Civil Engineer
Osama Masli	"	Traffic Engineer
Deef Ala Akhras	MPW	Deputy Minister
Selim Saleh	"	General Director
Fuad Manna	"	Director, System & Tech. Assistance Dept.
Abdel Kadel Bissa	"	Manger, Engineering Dept.
Hisham Mater	"	Civil Engineer, Road Dept.
Kassimi El Zaanjen	"	Manager, Transportation & Equipment Dept.
Afif Essaid	"	Manager, Road Dept.
Ahamad Ali	"	Civil Engineer, Road Dept.

#### 2) West Bank

##### (1) RAMALAH District

Maher Fathi Zuhd	MTC	RAMALAH, General Manager
Ismal Shaheen	"	Manager, Transportation & Equipment Dept.
Mohammed Aenoah	"	" , Road Dept.
Sudky Daral Abed	"	" , Finance Dept.
Hatem Dawoud	"	" , Warehouse & Equipment Dept.
Abdul Rahman Ayyad	"	" , Administration Dept.

##### (2) NABLUS, TULKARM District

Ibrahim Mosleh	MTC	NABLUS, General Manager
Mauawiah Al Rishch	"	Manager, Road Dept.

##### (3) HEBRON, JERUSALEM District

Majdi Abu-Gharbieh	MTC	HEBRON, General Manger
Fuad Ali Amleh	"	" , Deputy General Manager
Rashed Saeed	"	Manager, Road Dept.

**(4) JERICHO District**

Musa Jadallah	MTC	JERICHO, General Manager
Yeah Akras	"	" , Deputy General Manager

**(5) JENIN District (On schedule)**

Mofid Al Ahwad	MTC	JENIN, General Manager (On schedule)
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