RAWALPINDI MUNICIPAL CORPORATION
ISLAMIC REPUBLIC OF PAKISTAN

BASIC DESIGN STUDY REPORT
ON
PROJECT FOR IMPROVEMENT OF GARBAGE COLLECTION AND DISPOSAL IN RAWALPINDI CITY OF PUNJAB PROVINCE
IN
THE ISLAMIC REPUBLIC OF PAKISTAN

MARCH 1996

JAPAN INTERNATIONAL COOPERATION AGENCY
JAPAN TECHNO CO., LTD.

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PREFACE

In response to a request from the Government of the Islamic Republic of Pakistan, the Government of Japan Decided to conduct a basic design study on the Project for Improvement of Garbage Collection and Disposal in Rawalpindi City of Punjab Province and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Pakistan a study team from December 2 to December 29, 1995.

The team held discussions with the official concerned of the Government of Pakistan, 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 Pakistan in order to discuss a draft basic design, and as this result, the present report was finalized.

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

I wish to express my sincere appreciation to the officials concerned of the Government of the Islamic Republic of Pakistan for their close cooperation extended to the teams.

March, 1996

Kimio Fujita
President
Japan International Cooperation Agency

March, 1996

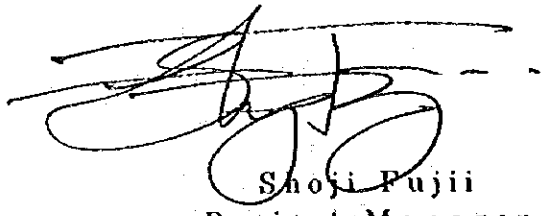
LETTER OF TRANSMITTAL

We are pleased to submit to you the basic design study report on the Project for Improvement of Garbage Collection and Disposal in Rawalpindi City of Punjab Province in the Islamic Republic of Pakistan.

This study was conducted by Japan Techno Co., Ltd., under a contract to JICA, during the period from November 27, 1995 to March 11, 1996. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of Pakistan 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.

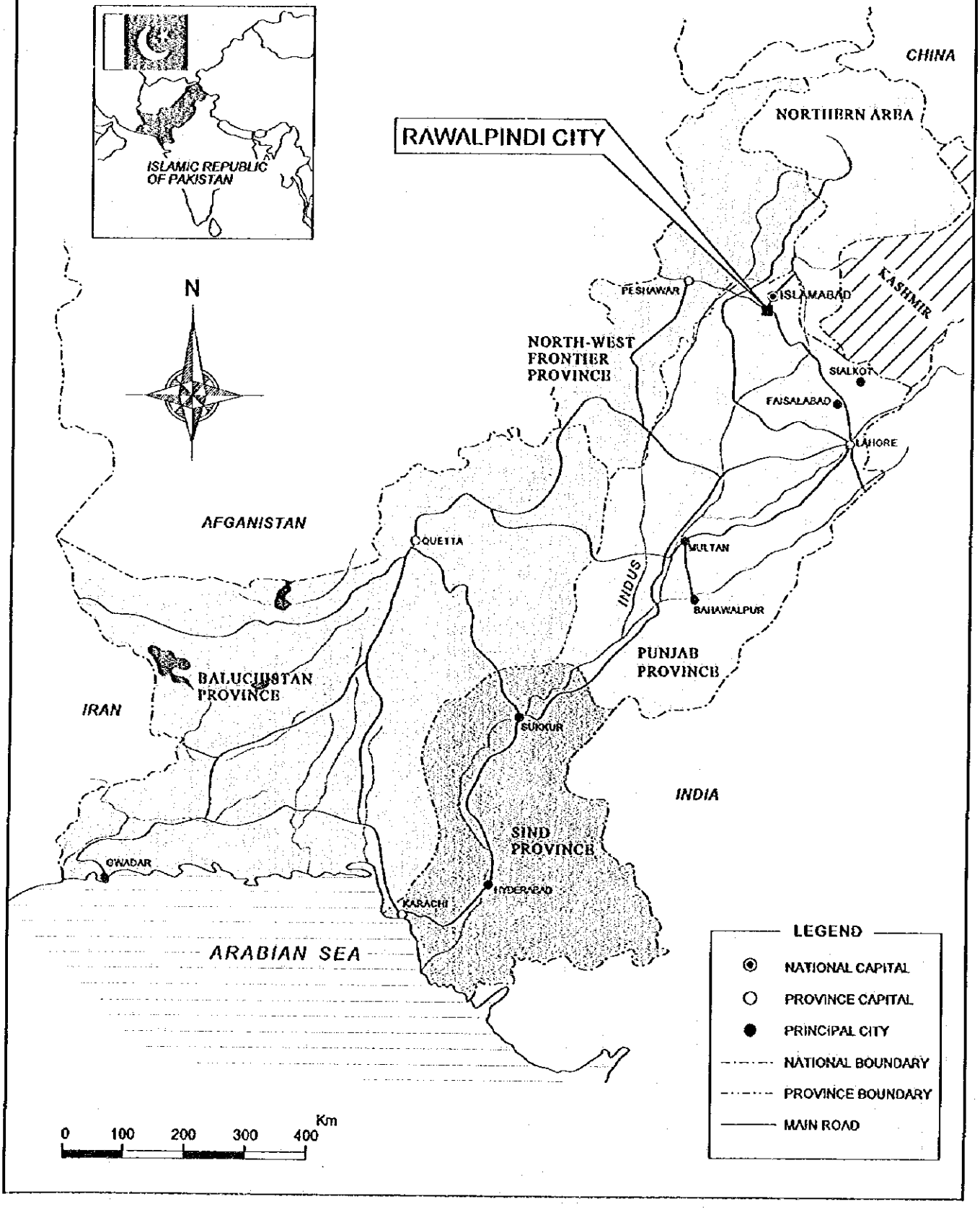
Very truly yours,

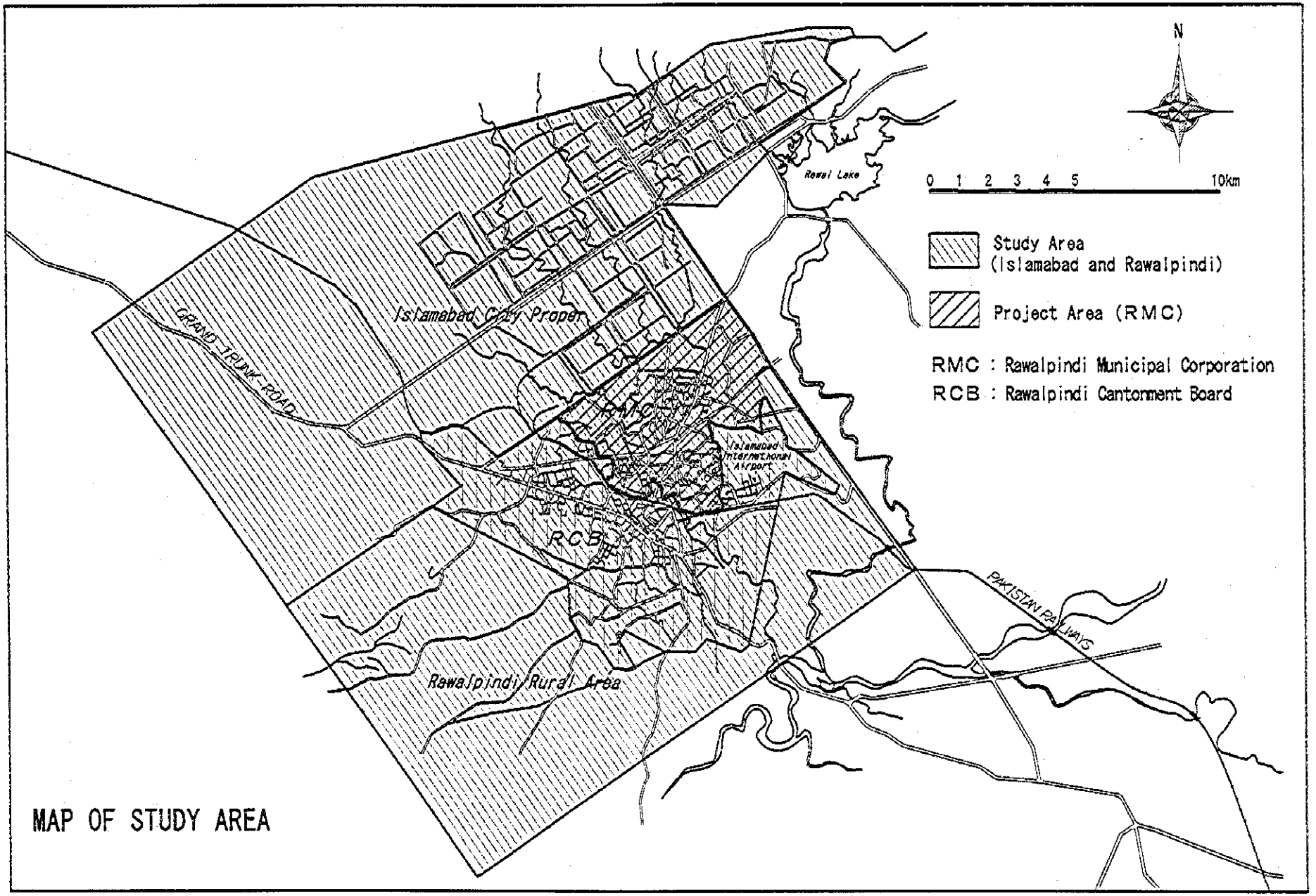


Shoji Fujii
Project Manager
Basic Design Study Team on
The Project for Improvement of
Garbage Collection and Disposal in
Rawalpindi City of Punjab Province in
The Islamic Republic of Pakistan
Japan Techno Co., Ltd.

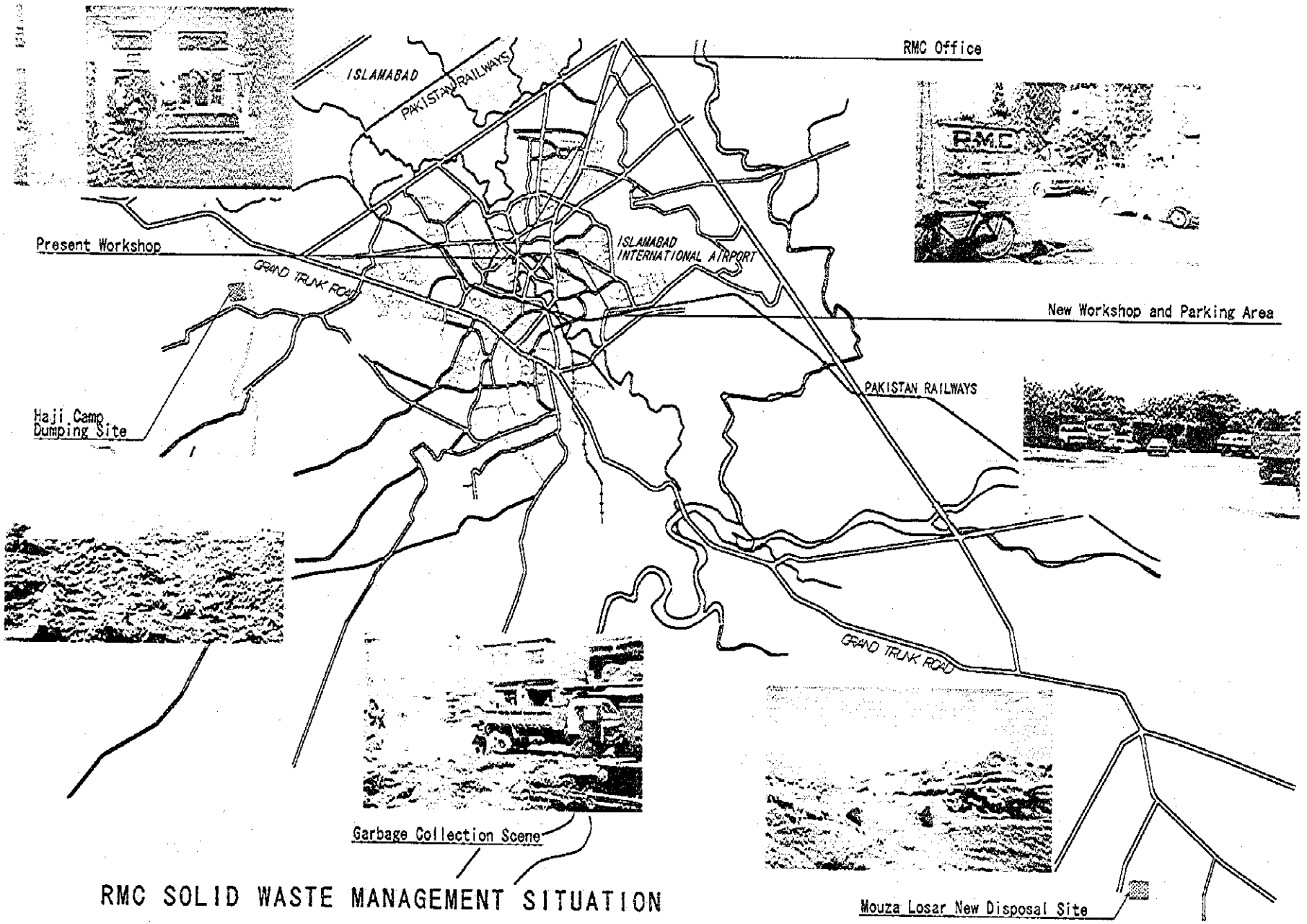
ISLAMIC REPUBLIC OF PAKISTAN

PROJECT FOR IMPROVEMENT OF GARBAGE COLLECTION AND DISPOSAL IN RAWALPINDI CITY OF PUNJAB PROVINCE





MAP OF STUDY AREA



RMC SOLID WASTE MANAGEMENT SITUATION

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ABBREVIATIONS

ADB	Asian Development Bank
BOT	Build, Operate and Transfer
CDA	Capital Development Authority
CMTI	Construction Machinery Training Institute
EAD	Economic Affairs Division
E/N	Exchange of Notes
FATA	Federally Administered Tribal Areas
GDP	Gross Domestic Product
JICA	Japan International Cooperation Agency
RCB	Rawalpindi Cantonment Authority
RDA	Rawalpindi Development Authority
RMC	Rawalpindi Municipal Corporation
Rs	Rupees
SAP	Social Action Programme

CHAPTER 1 BACKGROUND OF THE PROJECT

CHAPTER 1

BACKGROUND OF THE PROJECT

The Islamic Republic of Pakistan is located in southwest Asia bordered by Iran and Afghanistan to the west, India to the east and the Arabian Sea to the south. The total land area is about 796,000 km^2. The population is about 128 million persons (estimate for January, 1995, Economic Survey 1994-1995) growing at an annual rate of 2.9%. The provisional GDP for 1994-95 is 17.3 billion U.S. dollars (Economic Survey 1994-1995) with an improvement in growth from 3.8% during 1993-94 to 4.7% during 1994-95. The sectional share in GDP for 1994-95 reveals agriculture leading at 24.0%, next is manufacturing at 18.5%, wholesale and retail trade at 16.1%, followed by transport, storage and communication at 10.2%. Pakistan became an independent sovereign state in August, 1947 as a result of the division of the former British India. The country is administratively divided into four provinces of North-West Frontier, Punjab, Baluchistan and Sind, along with the Capital Federation of Islamabad, FATA and Asad Kashmir.

Presently, Pakistan is faced with a variety of environmental problems, but the problems concerning collection and disposal of about 47,000 tons/day of solid waste generated throughout the country are especially serious. The vital problems in solid waste management of Pakistan are (1) low collection efficiencies due to shortages and deterioration of collection equipment which give rise to degrading health conditions and unfavorable aesthetic views and, (2) water resources contamination, waste scatter, odors, generation of vectors, unaesthetics conditions and other environmental disruptions due to unmanaged disposal sites where open dumping operations are carried out routinely without such consideration as sanitary landfilling.

Rawalpindi city is located within Rawalpindi District of Punjab Province. The area is administratively divided into the Rawalpindi Municipal Corporation (RMC) administered area, the Rawalpindi Cantonment Board (RCB) area, and the Rawalpindi rural area. The city adjoins the national capital of Islamabad which is administered by the Capital Development Authority (CDA). RMC was established in 1867, while construction for Islamabad commenced in 1962 and transfer of the capital from Karachi completed in 1968. RMC is bordered by Islamabad to the north-east and

north-west, and by the RCB area to the south-east and south-west. The area of RMC is about 27 km² which is about 15% of the total area of Rawalpindi city (about 182 km²). The RMC area is situated between 33°36' and 33°40' north latitude, and between 73°02' and 73°07' west longitude.

The population of RMC is about 780,000 (1995 RMC estimate) with an annual growth rate of 3.6%. Domestic animals number about 39,000, having a growth rate of 3% per annum. The area is vastly covered by the old city, delaying municipal infrastructure improvement services, which is especially affected by the shortage of garbage collection services giving rise to social problems.

The solid waste generation rate of RMC is presently about 700 tons/day, which breaks down to 510 tons/day from households, 80 tons/day from animals and 110 tons/day from commercial establishments. Of the total 36 collection trucks currently owned by RMC, 22 trucks (61%) are actually in operation. Seven of the operating trucks have been used over 10 years since procurement, and only 12 trucks or 33% of the total are within their durable life span. The collection rate of the 22 trucks in operation is presently about 280 tons/day (40% collection), and the remaining 420 tons/day is unlawfully dumped into rivers and open spaces. Moreover, at the final disposal site located about 10 km away from the city center, transported garbage is dumped without any measures for sanitary landfilling, such as leveling, compacting or covering the garbage with soil, due to the unavailability of disposal equipment whatsoever.

RMC's waste problems stem from the shortage of equipment, and therefore in 1990, a request was made for a Japanese grant aid for procurement of equipment necessary to increase the collection efficiency and introduce sanitary landfilling. The requested equipment are listed below.

Usage	Item	Requested Quantity
Collection	Dump Truck	11
	Detachable Container Truck	60
	Container	240
	Sewer Cleaning Truck	2
Disposal	Dump Truck	4
	Wheel Loader	5
	Bulldozer	5
	Excavator	2
	Water Bowzer	10
Maintenance	Recovery Truck	1
	Spare Parts	1 lot
	Workshop Tools	1 lot

CHAPTER 2 CONTENTS OF THE PROJECT

CHAPTER 2

CONTENTS OF THE PROJECT

2.1 Objectives of the Project

In the Prime Minister's Package (1995/96) for Rawalpindi, based on the Greater Rawalpindi Master Plan of 1970, the procurement of garbage handling vehicles was listed as one of the important plans for city improvement and beautification. Also, the Eighth Five Year Plan (1993/94-1997/98) gives environmental protection as one of the national policies having high priority. In this context, the Rawalpindi Municipal Corporation (RMC) requested the "Project for Improvement of Garbage Collection and Disposal in Rawalpindi City of Punjab Province" to Japan for grant aid. This project has the objectives of improvement of sanitary conditions, beautification of the living environment and upgrading of operation and maintenance capabilities.

2.2 Basic Concept of the Project

The basic concepts of the project will be the following.

1. This project covers domestic and commercial solid wastes only. Hospital (infectious) and industrial wastes are out of scope for this project. Also, the requested sewer cleaning vehicle will not be included in the plan.

2. This project focuses on the 780,000 population (1995 estimate) of Rawalpindi Municipal Corporation (RMC). Of the total solid waste generation rate of 700 ton/day, collection and disposal equipment to handle 450 ton/day will be planned. Using the new container trucks along with the 12 highly operational dump trucks of RMC acquired in 1995, the present collection ratio of 40% can be improved to 64%. The basic elements for the project are summarized below:

   - Population: 780,000 persons (1995)
   - Generation rate: 700 t/day (1,750 m^3/day)
     - Households: 510t/day
     - Domestic Animals: 80t/day

Commercial Establishment:	110t/day
- Bulk density:	0.4 t/m^3
- Rate of collection/disposal:	450t/day
- Collection efficiency	64%

3. The present collection method is manual loading of garbage placed along road sides and from open concrete storage areas. This project will change the collection method to a container type collection. The new method will alleviate waste left over after collection, upgrade garbage loading efficiency and improve sanitary conditions of workers. Moreover, placing containers at the storage stations will serve as incentives to the residents , who are the waste generators, for throwing garbage into the designated place.

4. The presently used disposal site at Haji Camp is recommended to be closed after procurement of equipment from this project, because the fill capacity is almost full and the environmental impact is negative. However, RMC has procured a 75 acres plot at Mouza Losar located about 25 km southeast of RMC to be used as a new disposal site. This land was acquired through the Prime Minister's package.

5. RMC has made a plan for sanitary landfilling of about 10 acres of this land as a short term emergency strategy with consideration on environmental impact. This plan was examined by the study team and is judged to be, in principle, acceptable for this purpose. Therefore, this new landfill site will be used as the final disposal site for this project.

6. The workshop presently owned by RMC is lacking in tools and repair equipment, and the present workshop staff is repairing and maintaining the collection trucks with minimum equipment. To improve the maintenance capacity of RMC, workshop tools will be procured.

7. The equipment plan will take into full consideration of the operation and maintenance cost to be borne by RMC.

8. Consequently, the basic aims of this project will be the following.

   - A new collection system using containers will be introduced to partially replace

the presently used manual collection system.

- A new disposal method using sanitary landfilling will commence to improve the present open dump method.
- Required equipment will be procured to handle the new systems of collection and disposal.
- Equipment and materials to improve the operation and maintenance capacity will be procured.

2.3 Basic Design

2.3.1 Design Concept

1) Policy on Social Conditions

At the locations where garbage is informally dumped inside the city, removal of the piled up garbage along with covering the area with clean soil is immediately needed. Furthermore, since the street sweepers cannot possibly clear away all of the open spaces used as dumping sites within their routine work schedule, the introduction of a container collection system and a campaign on awareness directed to the citizens can be an effective measure to gradually eliminate these informal dumping sites.

2) Policy on Collection and Transportation

From the view points of (a) solving the problem of left-over waste after collection, (b) increasing the efficiency of waste collection, and (c) improving the sanitary condition of workers, the present concrete and open road side storage areas should be abolished eventually and the new container system should be introduced. Since the collection will change to a container system, new dump trucks for collection need not be procured, but by using the present RMC fleet of dump trucks, the present collection can be improved. The container allocation plan and collection plan using container trucks and dump trucks will be made by RMC.

3) Policy on Disposal

The new landfill site at Mouza Losar will be used as the final disposal site for this project. During the basic design field survey, the study team submitted to RMC suggestions for preparation of this disposal site with consideration of measures to prevent environmental degradation. In response, RMC has prepared a landfill plan for the new disposal site based upon these suggestions.

Since the presently used dump site is nearly full capacity and is imparting negative influence on the environment, the transfer of disposal operations to the new landfill site is urgently needed. For the preparation of the new landfill site, the equipment to be procured by this project should be fully utilized.

(1) Use Plan

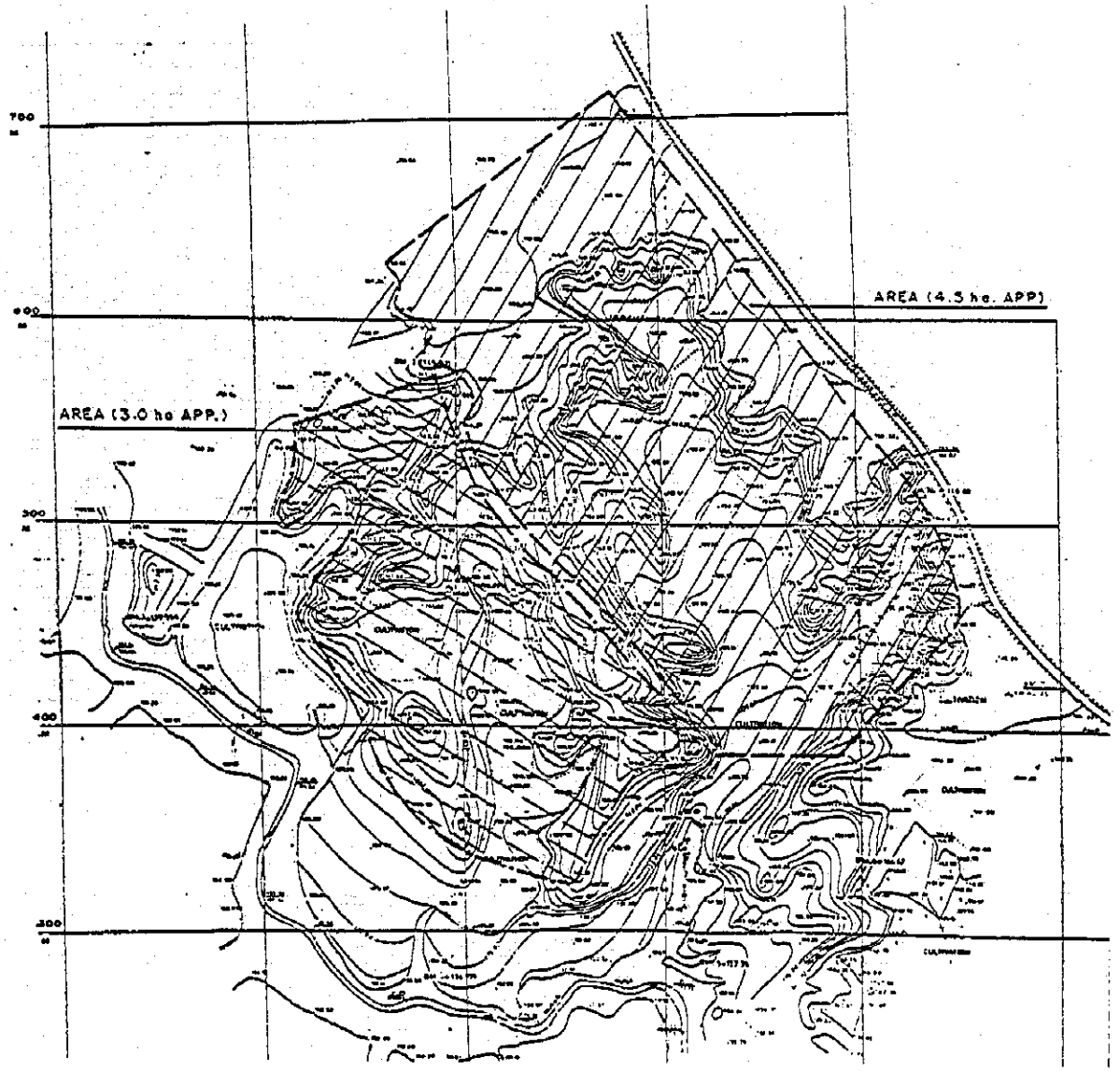
Out of the total area of 75 acres acquired by RMC, a short term plan on a 10 acres (4.5 ha) portion was prepared by RMC to handle collected garbage for the next 2 to 3 years. Following this Phase I plan, RMC is considering the further development of a 7 acres (3 ha) landfill area as Phase II adjacent to the Phase I area. The facilities such as internal roads and oxidation ponds are designed so as to be capable of catering to both of the phases. With the experience obtained in Phase I, planning of future phases which eventually will cover the total 75 acres should be carried out in succession. Fig. 2-1 shows the areas selected for landfilling.

(2) Sanitary Landfill

A daily cover, cell method of sanitary landfill is planned with necessary measures for leachate control and gas removal. Fencing is planned to control scattering waste. Consideration is also given to after use of the landfill when it is completed.

(3) Environmental Protection Plan

The following measures against probable environmental impacts are designed for the new landfill site. These designs are acceptable for environmental control.



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AREA FOR PROPOSED SANITARY LANDFIL SITE : PHASE-I

AREA FOR PROPOSED SANITARY LANDFIL SITE : PHASE-II

CONTOURS

PAVED ROAD (EXISTING)

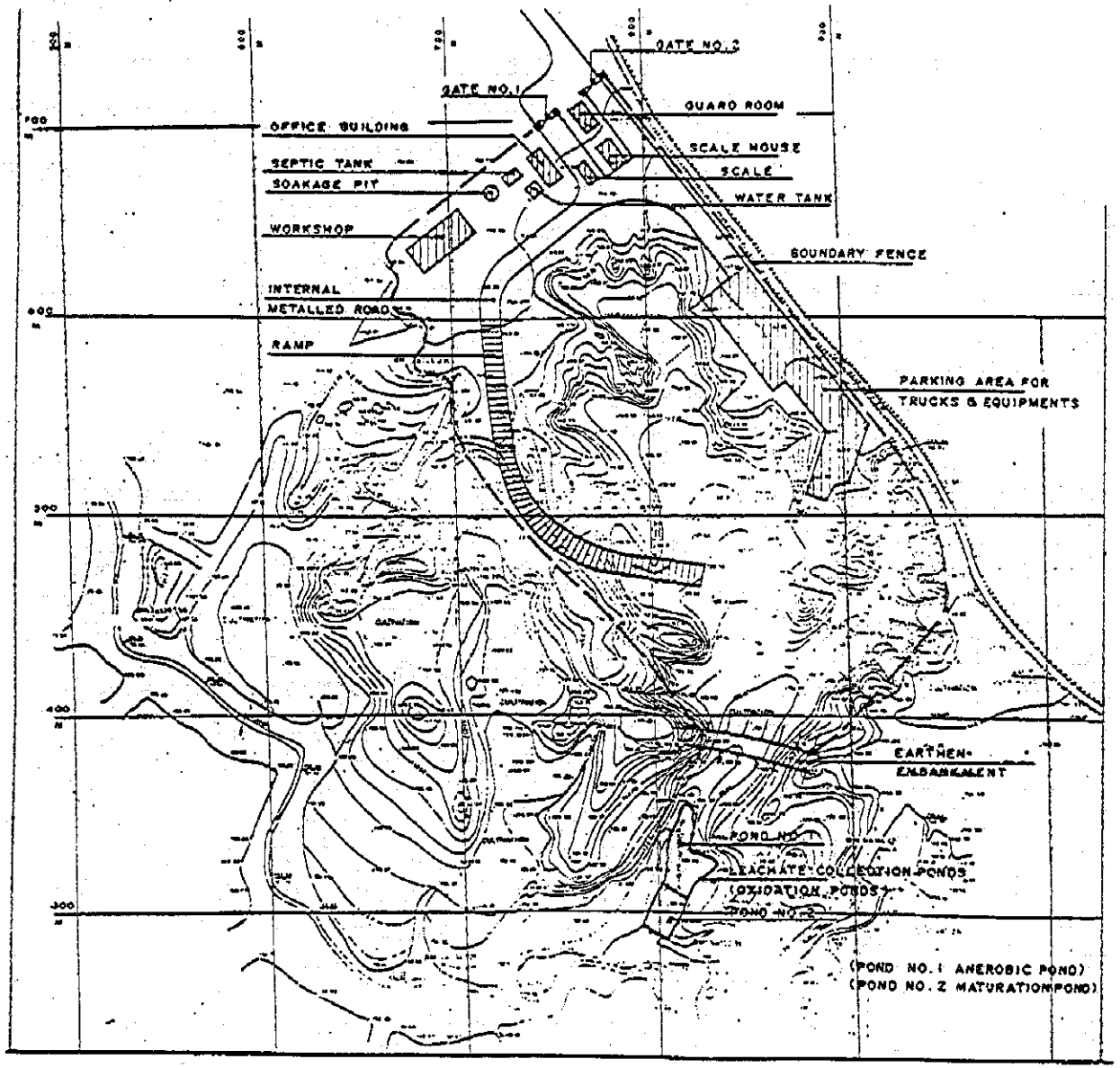
FIG. 2-1
Proposed Area for
Sanitary Landfil Site

Measure	Design	Comment
Waste Outflow Control	An earth embankment using clay found around the site is planned. The detailed dimensions will be decided after detailed studies.	The proposed location and preliminary design is acceptable.
Storm Water and Leachate Management	Storm water drainage is planned along internal roads and ramps. A leachate collection network using perforated pipes will deliver leachate to oxidation ponds for treatment. The treated effluent will be over-flowed.	Further detailed designing is needed to improve the storm water drainage system.
Groundwater Contamination Prevention	A 15 cm clay liner is designed as a countermeasure against potential groundwater contamination. A monitoring borehole is to be constructed to monitor pollution levels.	The clay layer is an acceptable prevention against contamination. The location of the monitoring well needs to be selected during detailed studies.
Gas Control	Gas vents using PVC pipe will be spaced from 20 to 60 m. Gas movement will be controlled by clay lining.	Considerations for gas collection and removal is very extensive.

(4) Management Facilities

The facilities for proper management of the disposal site are access road, internal roads, gate, fencing, guard room, weighing facility, office building, workshop, parking area, fire control and others. The main facilities are described below and the layout of the facilities is indicated in Fig. 2-2.

Facility	Description	Comment
Access Road	An 8 m width road to handle two-way traffic of collection vehicles	A cross-section drawing is prepared, but the location and length of the widening is not described.
Fence	Barbed wire fencing on reinforced concrete foundation	Fencing only along the road was suggested, but the plan covers the total area for improved control.
Office Building	Includes water supply and sanitation facilities	Necessary facilities are appropriately planned.



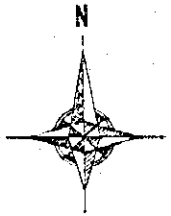


FIG. 2-2
Layout Plan of Facilities
at Sanitary Landfil Site

(6) Budget

Appropriate planning to procure necessary budget for the following is an important aspect of the total plan. The budget for initial capital of the landfill is anticipated from the Prime Minister's package this year.

- Initial cost for construction of the disposal site
- Running cost for daily operation and maintenance of the landfill
- Investment for later phases and future developments

4) Policy on Management, Operation and Maintenance

Since the presently owned workshop of RMC has a shortage of tools and equipment, the procurement of workshop tools is included in this project to improve the maintenance capacity. The tools are divided into the following categories.

- Engine service tools
- Chassis service tools
- Body service tools
- Mechanic tools
- Electric tools
- Measuring tools

The collection equipment will be stored at the parking lot next to the new workshop now under construction. The disposal equipment will be stored in the parking area to be constructed next to the new disposal site.

As a financial source to reduce the burden on the cost for operation and maintenance of the equipment to be procured, RMC is planning to introduce a sanitation tax in the 1996/97 fiscal year.

5) Policy on Equipment Design

The planning of the equipment and materials to be procured in this project will be based on the following design policies.

- The design will consider models suitable for use under local conditions.
- The design will consider after-care services.
- The specifications will be determined with emphasis on essential requirements, easy operation and simple maintenance.
- The construction machinery will be designed with emphasis on proven reliability.
- Since locally manufactured spare parts for Japanese vehicles have limitations on applicable models and also have problems with quality, the minimum required quantity of spare parts for each equipment will be included. The parts will be given priority to those for the engine and the hydraulic system, and will be selected with consideration for fast-moving consumables, non-compatible specialized parts and locally low available parts.

6) Policy on Procurement of Equipment

(1) Containers

Waste containers are produced in Karachi, Lahore and other locations in Pakistan. Therefore, in consideration of ocean freight costs for overseas procurement, local procurement of containers is preferred.

(2) Vehicles

Vehicle chassis are being assembled locally, but each manufacturer deals with only limited models. The bodies, however, are mostly imported. As for European vehicles, since they have low popularity in Pakistan, procuring spare parts for them locally is very difficult. As a consequence, procurement of vehicles from Japan will reduce unfairness in tendering, but after further study, if conditions allow, procurement from other sources may be considered.

(3) Construction Machineries

Local dealers of construction machineries handle only imported models. Furthermore, since European models are not so popular in Pakistan resulting in insufficient after-care services, local procurement needs to be considered carefully.

7) Policy on Procurement Schedule

The schedule for procurement is prepared with consideration of inland transportation up to Rawalpindi. However, to prevent any delays in delivering, full cooperation by the Pakistan side is needed to make arrangements for smooth processing of inland transportation.

2.3.2 Basic Plan

1) Total Plan

The request for this project is the procurement of equipment and materials for collection, transportation, and disposal of garbage to improve the environmental, sanitary and aesthetical conditions of Rawalpindi. The requested equipment and materials can be classified as follows:

Collection Equipment: for collection and transportation of garbage

- Dump truck
- Detachable container truck
- Container
- Sewer cleaning truck

Disposal Equipment: for landfill operation and cover material handling

- Dump truck wheel loader
- Bulldozer
- Excavator
- Water Bowzer

Maintenance Equipment and Materials: for repair and maintenance of equipment

- Recovery truck
- Spare parts
- Workshop tools

2) Equipment Plan

(1) List of Items

The requested quantities of equipment and materials as well as the quantities planned for this project are listed below.

Item	Requested Quantity	Planned Quantity
For Collection		
Dump truck	11	0
Detachable container truck	60	30
Container	240	160
Sewer cleaning truck	2	0
For Disposal		
Dump truck	4	4
Wheel loader	5	3
Bulldozer	5	2
Excavator	2	2
Water Bowzer	10	2
For Maintenance		
Recovery truck	1	1
Spare parts	1 lot	1 lot
Workshop tools	1 lot	1 lot

(2) Feasibility of Quantities

a. Collection Equipment

For collection and transportation of garbage, 30 detachable container trucks having 3 ton payload each at an operational rate of 90% will be assumed. Also, considering the fact that the present collection trucks are making an average of 3 trips per day, and if the container system is introduced, the collection time can be reduced, then the new collection system should be capable of making 3.5 trips daily. Furthermore, RMC is considering collection on alternate days as well.

Since a new system using container collection will be adopted, new dump trucks as requested for collection will not be required. However, the 12 dump trucks (3.5 ton payload) presently owned by RMC will be used for collection, in addition to the new container trucks. For this project, since dump trucks will be

important for transporting cover material for sanitary landfilling, new dump trucks solely for this purpose will be procured.

Moreover, the requested sewer cleaning trucks cannot be included in the present project since the sewage treatment plant for Rawalpindi is presently not functioning and a sewage sludge disposal site is not secured. Furthermore, the project for sewage treatment of Rawalpindi is under study by ADB, and when the sewerage project is implemented and completed, the sewerage management will be transferred to the Rawalpindi Development Authority (RDA).

On the assumption that the collected waste will be transported to the new disposal site at Mouza Losar, the following conditions will be used to base the feasibilities.

- Generation rate: 700 ton/day
- Container truck payload: 3 ton/truck
- Container truck operational rate: 90%
- Number of trips for container truck: 3.5 trips/day
- Container collection frequency: daily + alternate days
- Container operational rate: 95%
- Existing truck collection rate: 126 ton/day
  (12 trucks×3.5 t/truck×3 trips/day)

Detachable Container Truck

Based on the above conditions, the collection rate will be as follows:

- Total number of container trucks: 30
- Number of container trucks in operation: 27
- Daily collection rate by container trucks: 284 ton/day
- Alternate day collection rate: 81 ton/2 days (41 ton/day)
- Container truck collection rate: 325 ton/day {(27 trucks × 3.5 trips/day × 3 t/truck) + (27 trucks × 1 trip/2 days ×3 t/truck)}
- Existing truck collection rate: 126 ton/day
- Collection ratio: 64% {(325 + 126)÷700}

Container

For 30 collection trucks and the above conditions, the required number of containers will be as follows:

- Required number for daily collection: 95 containers
- Required number for alternate day collection: 27 containers
- Normally loaded number: 30 containers
- Number of spares during repairs: 8 containers
- Total required number: 160 containers

b. Disposal Equipment

The base conditions to calculate the quantities of equipment required for landfilling and cover material handling at the newly proposed disposal site are listed below:

- Disposal rate: 450 ton/day (1,125 m^3/day)
- Bulk density of waste: 0.4 t/ m^3
- Disposal method: Daily cell type sanitary landfill
- Dimensions of daily cell: 20 m width × 22.5 m length × 2 m thickness
- Volume of cover material: 107 m^3
- Bulk density of cover material: 1.6 t/ m^3
- Cover material transport distance: From river bed located 15 km away from disposal site

Dump Truck

The dump trucks to be procured in this project will be used only for transporting sand and silt to be used as cover material for sanitary landfilling. Based on the above requirements, for a 8,000 kg payload truck, the unit operation rate will be 3.6 m^3/hr, and the total daily time requirement will be 29.7 hours.

- with 2 trucks, 14.9 hr/truck
- with 3 trucks, 9.9 hr/truck
- with 4 trucks, 7.4 hr/truck

Therefore, 4 dump trucks are necessary.

Wheel Loader

With a bucket capacity of 3 m^3, the unit operation rate will be 54.3 m^3/hr for garbage and 46.6 m^3/hr for cover material. This would result in requiring about 23.0 hours for a day's operation.

- with 2 loaders, 11.5 hr/loader
- with 3 loaders, 7.7 hr/loader

Therefore, 3 wheel loaders are required.

Bulldozer

With a handling capacity of about 14,000 kg, a unit operation would take 140m^3/hr for garbage and 121 m^3/hr for cover material, which would require 8.9 hours operation daily.

- with 2 bulldozers, 4.5 hr/dozer

Therefore, 2 bulldozers are needed.

Excavator

With a bucket capacity of 0.8 m^3 and a unit operation rate of 127 m^3/hr, one excavator would require 5.3 hours for a daily operation of filling dump trucks with sand and soil to be used as cover material. Another excavator is needed at the landfill site to handle trenching operations. Therefore, 2 excavators are necessary.

Water Bowzer

For a 6,000 liters capacity water bowzer, the assumptions of a spraying width of 4 m and a 12 min. pumping capacity will be used. For a working area of 50m x 100m and 2 km of road sprinkling, the required sprinkling rate during the summer will be 130 m3/day. This means that the daily time requirement would be as follows.

- with 1 bowzer, 14.1 hr/truck
- with 2 bowzers, 7.1 hr/truck

Therefore, 2 water bowzers are required.

c. Maintenance Equipment and Materials

Recovery Truck

Whenever a vehicle has a breakdown, an accident, or any other trouble, the recovery truck can move the vehicle in need of repair from the site to the workshop.

Spare Parts

Spare parts dealers are mainly located in Karachi, and in Rawalpindi, agents do not exist, but many small shops just disorderly stock parts for various manufacturers. Some spare parts of Japanese vehicles are manufactured in Pakistan, but only limited models are assembled for each manufacturer, and customers tend to place confidence on imported parts more than locally made ones. Consequently, spare parts for the equipment to be procured are essential. The spare parts for engine and hydraulic system are given importance, but the parts will be selected according to the following considerations.

- Parts that are more prone to wear and breakage during the course of operation
- Parts peculiar to each equipment and are not compatible
- Parts difficult to procure locally or, even if they are available, the local parts are of poor quality

Workshop Tools

At the existing workshop of RMC, tools and repair equipment are in shortage, and in addition, procurement of equipment for the new workshop is still under consideration. Presently, the workshop staff is just barely able to handle repair and maintenance work with the minimal equipment, but the work is somehow accomplished. Therefore, to improve the maintenance capacity of RMC, tools are needed. The tools are broken down into the following categories:

- Engine service tools: tools required for inspection and repair of engine parts and electronic components
- Chassis service tools: tools required for lubrication, tire/wheel service,

etc.

- Body service tools: tools required for body repair and finishing
- Mechanic tools: general hand tools such as wrench, pliers, etc.
- Electric tools: tools such as electric drill, bench grinder, etc.
- Measuring tools: tools required for precise measurements, which include calipers, measuring tape, etc.

(3) Specifications and Use Objectives

The main specifications, quantities and usage of each equipment and materials are shown in Table 2-1.

Table 2-1 Specifications of Equipment and Materials

Item	Main Specifications	Q'ty	Usage
For Collection			
1. Detachable Container Truck	Type: Multi-loader type for container below Engine: Water-cooled diesel, 160 PS(min.) Drive: 4x2, right-hand, PTO Payload: 3,000 kg (min.)	30	For collection of garbage in container, and transportation to disposal site
2. Container	Type: Multi-loader type, with lid Capacity: 7 m^3	160	For storage of garbage
For Disposal			
3. Dump Truck	Type: For sand and soil transport Engine: Water-cooled diesel, 175 PS (min.) Drive: 4x2, right-hand, PTO Payload: 8,000 kg (min.) Capacity: 5.3 m^3 (min.)	4	For transport of cover material from sand extracting area to disposal site
4. Wheel Loader	Type: Waste disposal arrangements Operating weight: 17,500 kg (min.) Flywheel power: 200 HP (min.) Bucket capacity: 3.0 m^3 (approx.)	3	For handling waster and cover material at disposal site
5. Bulldozer	Type: Waste disposal arrangements Operating weight: 14,000 kg (min.) Flywheel power: 175 HP (min.) Blade: With refuse screen	2	For leveling and compacting waster and cover material at disposal site
6. Excavator	Operating weight: 19,000 kg (min.) Flywheel power: 128 HP (min.) Bucket capacity: 0.8 m^3 (approx.)	2	For loading cover material (sand) onto dump truck at sand extracting area, and for trenching operation at disposal site
7. Water Bowzer	Engine: Water-cooled diesel, 160 PS (min.) Drive: 4x2, right-hand, PTO Tank capacity: 6,000 liters Attachment: Spray bar	2	For sprinkling water onto to waster and cover material at disposal site
For Maintenance			
8. Recovery Truck	Engine: Water-cooled diesel, 160 PS (min.) Drive: 4x2, right-hand, PTO Towing capacity : 3,000 kg (min.)	1	For transporting disabled vehicle from the accident site to the workshop
9. Spare Parts	8% of equipment cost of Items 1,3,4,5,6,7,8 above	1 lot	As exchange parts for repairing and maintaining equipment
10.Workshop Tools	Chassis service tools Engine service tools Body service tools Mechanic tools Electric tools Measuring tools	1 lot	For repair and periodic inspection of equipment

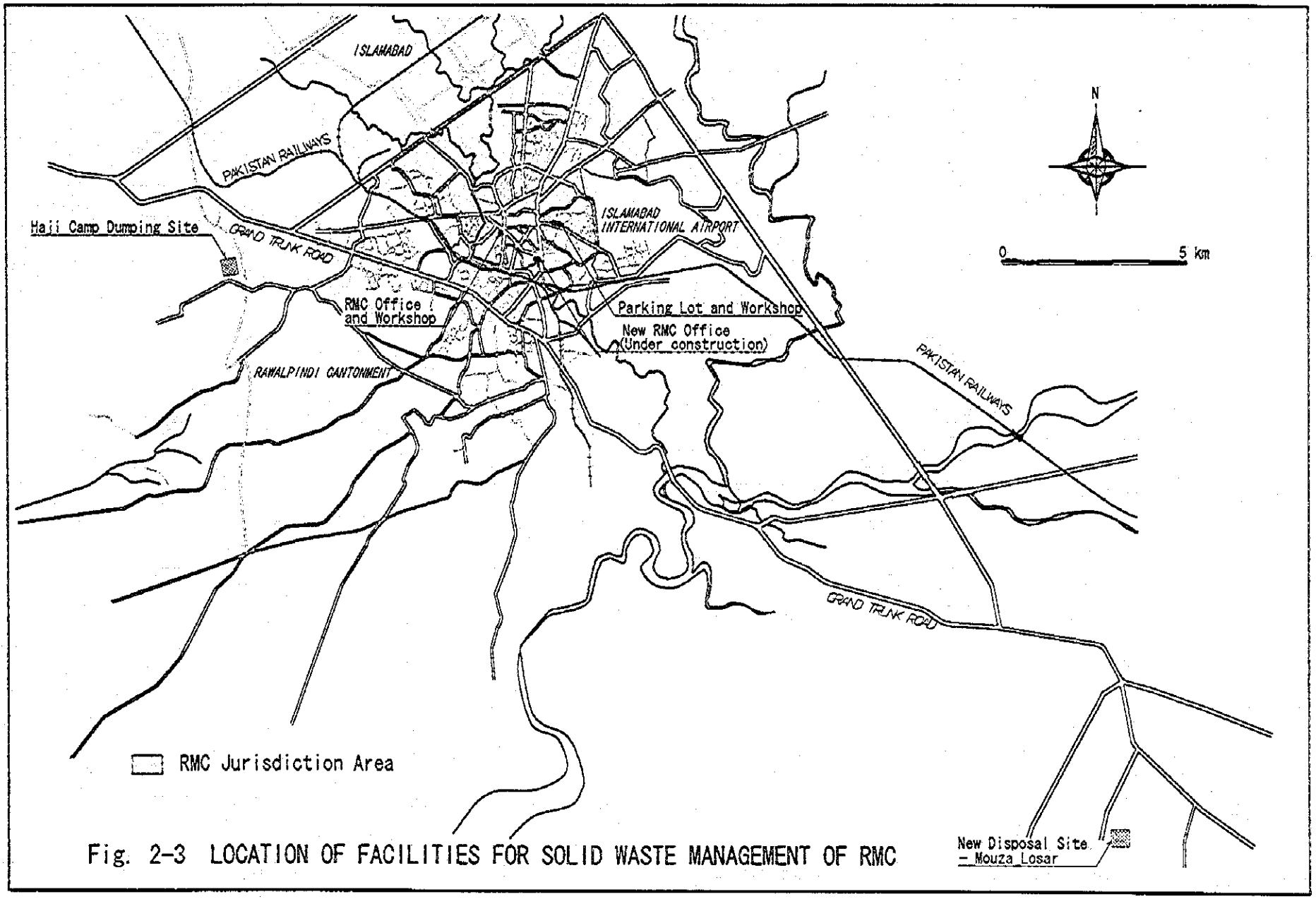


Fig. 2-3 LOCATION OF FACILITIES FOR SOLID WASTE MANAGEMENT OF RMC

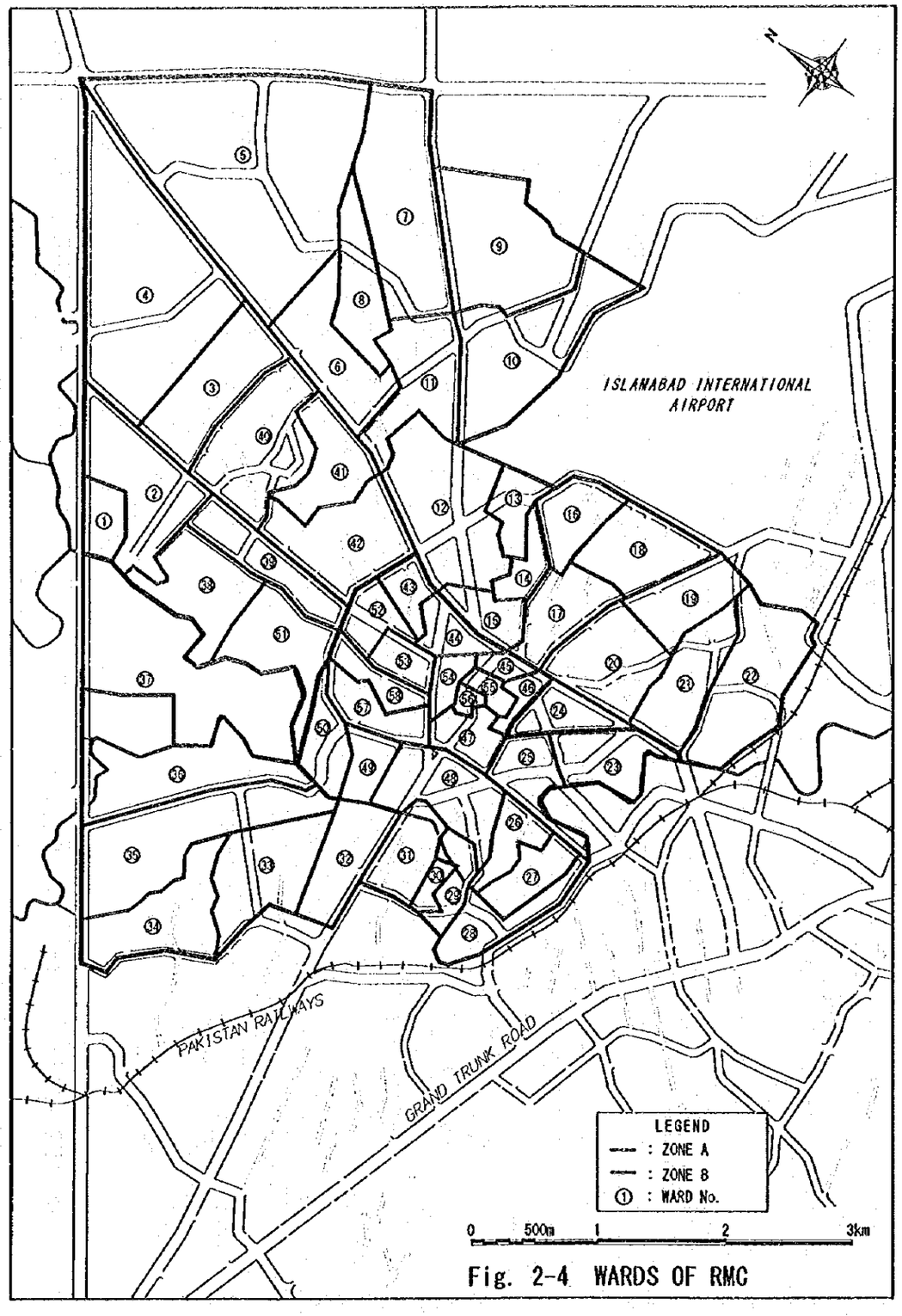


Fig. 2-4 WARDS OF RMC

(1995)

WARD No.	WARD NAME	POPULATION	AREA (km²)	No. OF HOUSES
①	New Kalarian	10,454	0.145	1,478
②	F' Block	14,116	0.487	2,075
③	New Mal Pur	7,388	0.655	1,187
④	Pandora	30,460	1.490	4,467
⑤	Dhoke Kala Khan	26,836	1.336	4,230
⑥	Dhoke Kashmirian	20,115	1.089	3,018
⑦	Dhoke Ali Akbar	16,588	1.116	2,296
⑧	Sadiqabad	12,216	0.294	1,989
⑨	Muslim Town	22,059	0.857	3,361
⑩	Muslim Town	31,954	0.582	4,329
⑪	Sadiqabad	11,194	0.501	1,759
⑫	Amarpura	14,130	0.597	1,973
⑬	Glass Factory Road	15,290	0.292	2,267
⑭	New Amarpura	11,825	0.269	1,606
⑮	Zafar-ul-Haq Road	8,543	0.192	1,189
⑯	Dhoke Hukamdad	13,330	0.240	1,778
⑰	Millat Colony	11,369	0.301	1,476
⑱	Dhoke Khaba	18,499	0.472	3,054
⑲	Dhoke Farman Ali	19,286	0.642	2,688
⑳	Dhoke Elahi Buksh	11,599	0.390	1,962
㉑	Arja Mohallah	8,268	0.353	1,168
㉒	Chaman Zar Colony	9,646	0.538	1,423
㉓	D.A.V College Road	10,530	1.513	1,105
㉔	Chachi Mohallah	7,355	0.156	1,037
㉕	Nia Mohallah Usman Pura	10,924	0.260	1,402
㉖	Mohan Pura	9,230	0.235	1,150
㉗	Argan Nagar	12,618	0.247	1,582
㉘	Ratta Amtal	8,381	0.360	1,095
㉙	Dhoke Ratta	9,662	0.173	1,371
㉚	Dhoke Ratta	7,688	0.180	1,089
㉛	Dhoke Ratta	10,571	0.264	1,482
㉜	Umarabad/Hazara Colony	13,346	0.319	1,091
㉝	Dhoke Mangtal	18,693	0.447	2,707
㉞	Dhoke Hassu	20,778	0.447	2,636
㉟	Pit Wedhai	30,256	1.024	4,198
㊱	Bangash Colony	21,853	0.943	3,076
㊲	Khayaban-e-Sir Syed	30,995	1.076	4,325
㊳	Mohallah Raja Sultan	18,622	0.739	2,911
㊴	Said pur scheme-I	8,372	0.514	1,238
㊵	D' Block Satellite Town	11,347	0.767	1,631
㊶	B' Block Satellite Town	8,274	0.408	1,160
㊷	B' Block Asgher Mall Scheme	13,600	0.691	1,944
㊸	Kartar pura	9,130	0.146	1,181
㊹	Kohati Bazar	8,349	0.213	1,127
㊺	Mohallah Ch. Waris Khan	7,476	0.100	1,309
㊻	Mohallah Kutab Din	10,630	0.131	1,360
㊼	Bazar Talwaran Purana Qilla	6,929	0.210	822
㊽	Mohallah Workshop	10,699	0.420	1,188
㊾	Akal Garh	14,713	0.291	1,613
㊿	Dhoke Dalal/Safdarabad	10,423	0.266	1,342
(51)	Mohallah Eid Guh	7,046	0.481	1,076
(52)	Kariar pura/Angal pura	10,580	0.195	1,448
(53)	Mohallah Banni	8,626	0.146	1,213
(54)	Said puri Gate	13,133	0.173	2,488
(55)	Bhabar Khana	8,509	0.100	1,636
(56)	Sarala Bazar	5,392	0.055	429
(57)	Kirishan Pura	11,635	0.247	1,624
(58)	Mohallah Imam Bara	8,457	0.240	1,162
TOTAL		779,987	27.015	110,831

CHAPTER 3 IMPLEMENTATION PLAN

CHAPTER 3

IMPLEMENTATION PLAN

3.1 Implementation Plan

If the project is executed under the Japanese grant aid system, the implementation plan will be as follows.

3.1.1 Implementation Concept

The executing agency for implementation of the project is Rawalpindi Municipal Corporation (RMC), and it will be responsible for procedures from detailed design to equipment delivery, as well as the operation and maintenance of the procured equipment and materials. (Refer to Fig. 3-1 for the Organization of RMC.) After the Exchange of Notes (E/N) made between both governments, RMC will enter into a consultancy agreement with a Japanese consultant firm regarding the detailed design and the procurement supervision. Then, RMC will carry out a tender for the procurement of the equipment under this project with the assistance of the consultant firm. As a result of evaluation on the tendering, RMC will enter into a supply contract with a contractor. In accordance with the guideline of the Japanese grant aid system, the principal contractor shall be a Japanese firm.

The organization for implementation of this project is depicted in Fig. 3-2.

Of the equipment to be procured in this project, RMC does not have experience in using construction machinery and vehicles, other than dump trucks. Therefore, a short-term training is necessary to give operating instructions.

Moreover, a final disposal engineer will be sent to confirm the progress of the planning for the new landfill site of RMC.

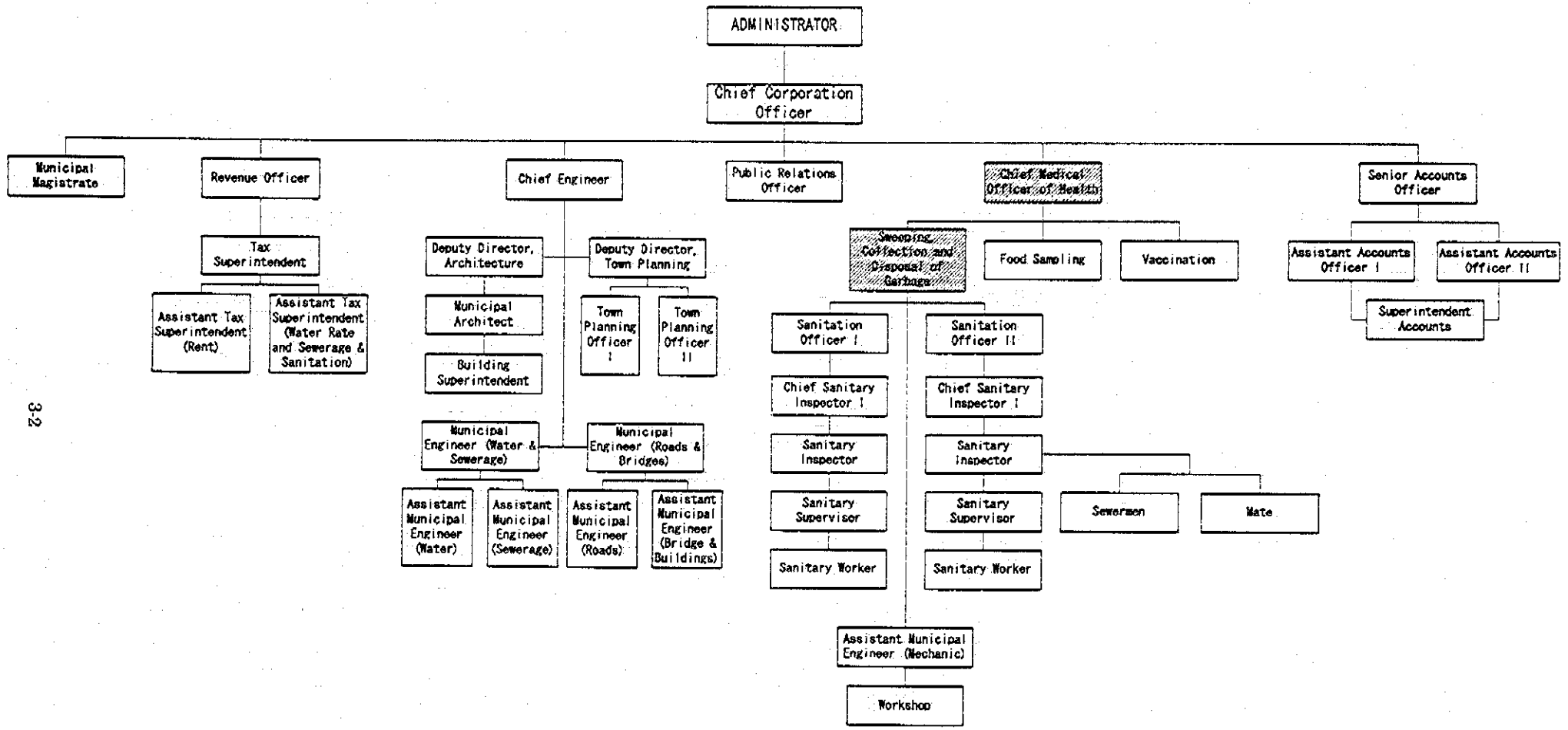


Fig. 3-1 Organization Chart of Rawalpindi Municipal Corporation(RMC)

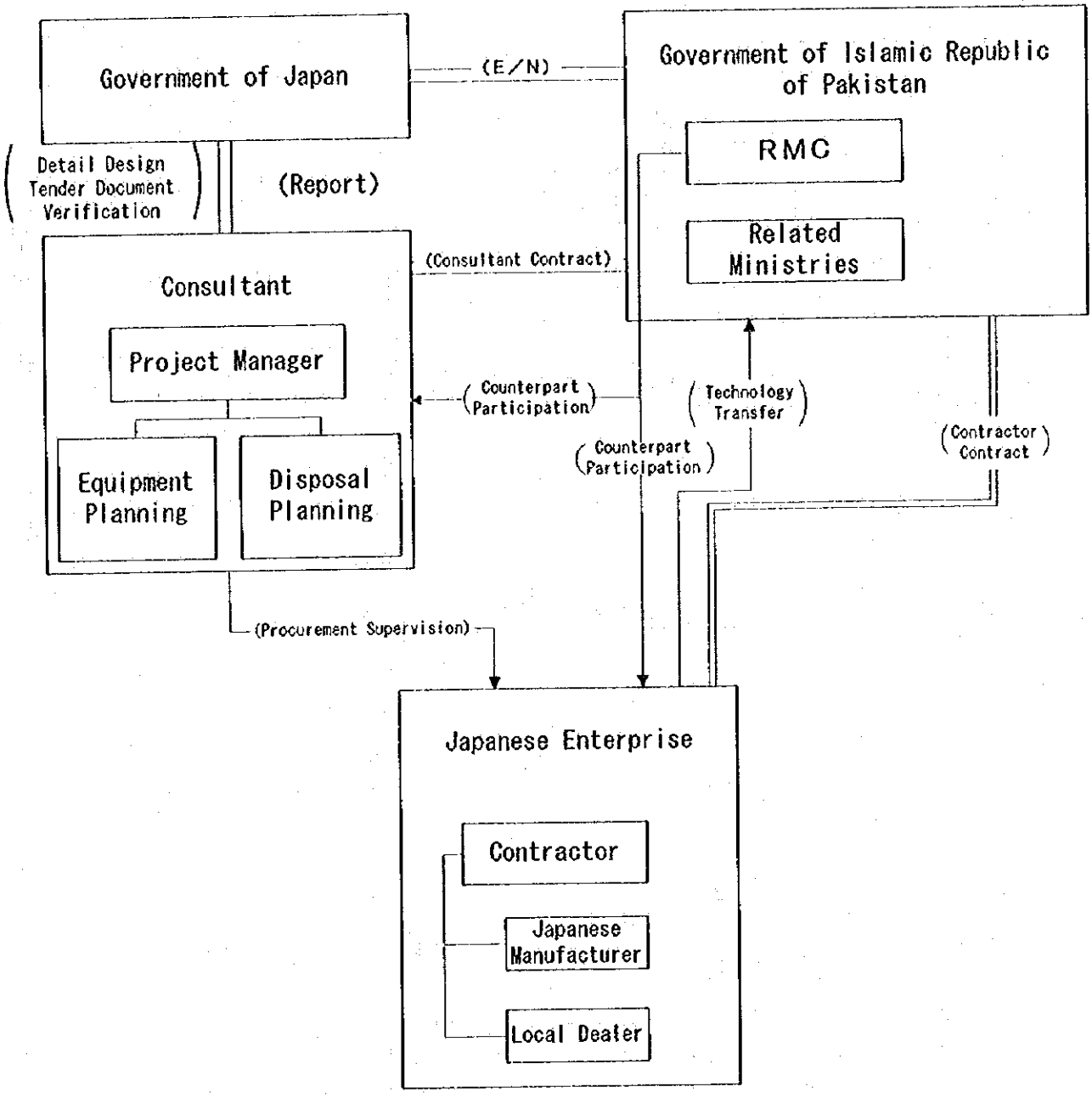


Fig. 3-2 Organization for Project Implementation

3.1.2 Implementation Conditions

1) Inland Transportation

For equipment to be procured from Japan, the port of delivery will be Karachi. Then, the equipment must be transported inland from Karachi to the project site of Rawalpindi. The following inland transportation methods can be considered.

- Road transportation
- Rail transportation

In consideration of time limitations and security reasons due to time-tables and transshipments for rail transportation, the equipment can be more reliably transported by road than by rail. Therefore, road transportation will be the transport method considered for this project.

2) Allocation of Containers

Considering the traffic conditions and widths of roads in Rawalpindi, some areas may present problems when placing the containers and during collection operations. RMC will make an allocation plan and collection schedule giving sufficient consideration to container placement, collection routing and other significant factors.

3.1.3 Scope of Works

1) Responsibilities of the Japanese side

a. The consultant services necessary for implementation of this project
b. The procurement of equipment and materials for collection/transportation, disposal and operation/ maintenance
c. The ocean transportation of equipment and materials from the port in Japan to Karachi port
d. The inland transportation of equipment and materials from Karachi to Rawalpindi
e. The dispatch of an engineer for testing and giving instructions on operation of the equipment

2) Responsibilities of the Pakistani Side

a. The provision of parking and storage space necessary for the equipment and materials to be procured by the project
b. Bearing commissions to the foreign exchange bank in Japan for the banking services based upon the banking arrangement
c. Smooth enforcement of administrative measures necessary for the implementation of the project such as obtaining exemption or paying taxes and taking necessary measures for custom clearance of the equipment, and furnishing data and information
d. Arranging tax exemption related to the Japanese personnel dispatched from Japan for the implementation of the project and protecting them by all possible means during their stay in Pakistan
e. Preparation of an appropriate management, operation, and maintenance organization with personnel and budget required for proper functioning of the equipment to be procured

3.1.4 Consultant Supervision

The consultant will enter into the consultancy agreement with RMC for the services described below after the E/N is exchanged between the Governments.

1. The detailed design for the procurement of the equipment and the preparation of the tender documents for the project.

2. The tendering assistance and the evaluation on the tendering.

3. The support and advice during the tendering process from the opening the tender to the contracting.

4. The scheduling supervision on the procurement, transport, equipment testing, and operation guidance performed by the engineer dispatched from Japan.

5. Confirmation of the final disposal site implementation.

6. Inspection of the equipment.

7. Reporting.

3.1.5 Procurement Plan

If quality and procurement of a certain quantity is not a hindrance, then procurement of equipment from the Pakistani market can be considered. Furthermore, in consideration of maintenance and after-sales services, products other than Japanese-manufactured ones are considerable.

Therefore, in choosing the locality of the equipment to be procured, the following points should be taken into consideration.

- Performance
- Quality
- Procurement possibility for quantity
- After-sales services/maintenance
- Availability of spare parts

The present situation of local and third country procurement is explained below.

1) Trucks

Dealers of Japanese model trucks for five manufacturers are available in Karachi. Chassis of four of them can be assembled in Karachi, but the models are limited and each manufacturer handles classes different from each other.

Vehicles of one Japanese manufacturer and a German brand are not assembled locally, but only imported. As for trucks of the German manufacturer, their main buyer is the Pakistani army.

A British manufacturer formerly had an assembly plant in Pakistan, but their line is now closed. Also, their local dealer has now switched to selling Japanese brand vehicles.

2) Construction Machinery

Manufacturers of Japanese, American and Italian brands have dealers in Karachi. However, the popularity of European brands is very low in Pakistan.

3) Containers

Waste containers manufactured in Karachi and Lahore are presently being used in Pakistan.

In consideration of the above situation, third country procurement has little possibility. As for containers, the proven experience in Pakistan as well as possible high ocean freight costs for foreign procurement make local procurement more favorable.

3.1.6 Implementation Schedule

The project starts when the E/N is exchanged between the Government of Japan and the Government of Pakistan for the grant aid of the project, and is necessary to be completed in the Japanese fiscal year.

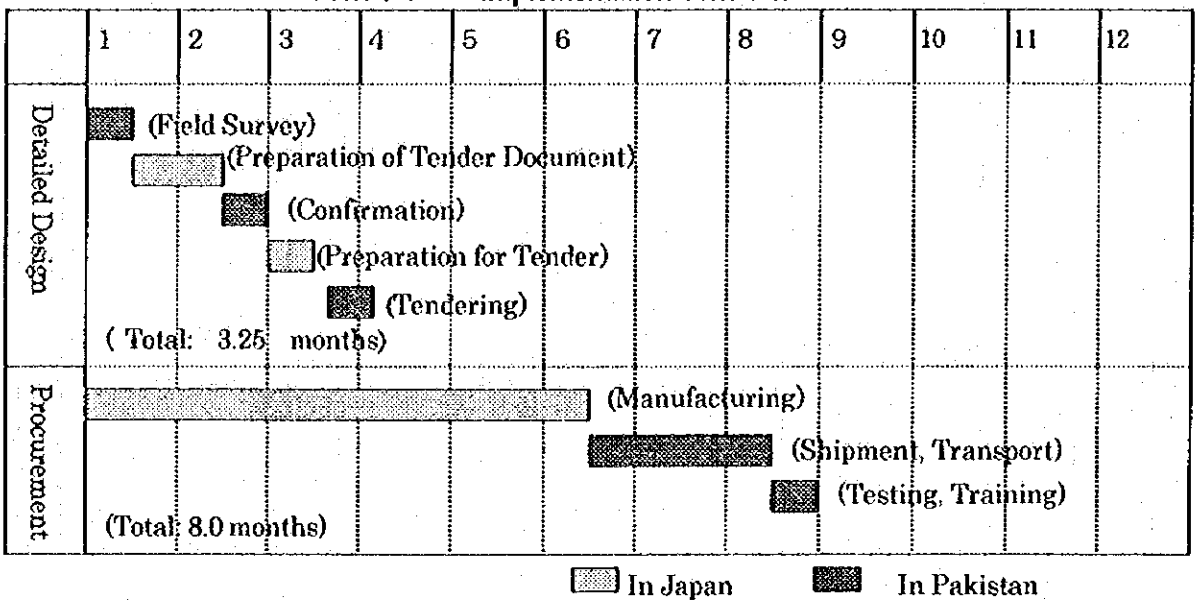
As the executing agency, RMC is to enter into a consultant agreement with a Japanese consultant firm for the project. The consultant firm will conduct the detailed design and prepare the tender documents after the verification of the consultant agreement by the Japanese Government, and carry out the tendering on behalf of RMC in Japan after the approval of the tender documents by both Governments. The consultant firm will conduct procedures from the tendering to the contracting for procurement, supporting or on behalf of RMC. During this period, the firm will carry out the whole services of the tendering; the evaluation of the tendering; the negotiation between RMC and the successful tender; and the signing of the procurement contract.

The procurement contract will become effective after the verification by the Government of Japan. It may take about 3 months until the signing of the procurement contract after the E/N is exchanged.

The contractor will start procurement of the equipment after the verification of the procurement contract. The contractor may need about 5.5 months for delivery, 2 months for ocean transport, customs clearance and inland transport, and 0.5 month for testing and training on operation of the equipment.

The implementation schedule is shown in Table 3-1.

Table 3-1 Implementation Schedule



3.1.7 Obligations of Recipient Country

The scope of responsibilities of the Pakistani side was indicated in Section 3.1.3 and in the Minutes of Discussions. In addition, the Pakistani side will prepare the new landfill site of Mouza Losar with consideration for environmental impacts, since the present Haji Camp dumping site is almost full capacity and is environmentally unsound. The cost estimate to prepare the new site is presented in Appendix 2.

3.2 Operation and Maintenance Plan

3.2.1 Organization

An appropriate number of personnel should by added to help strengthen RMC organization. Although qualified personnel can be recruited through public advertisement, it should be noted that the trainees of the Construction Machinery Training Institute (CMTI) are also considered as a source of manpower to meet the project requirement. The required staff include drivers and operators of equipment to be procured under the project and mechanics to be engaged at the workshop as well. The details are given below.

Table 3-2 Required Number of Drivers/Operators

Equipment	Drivers/Operators	Helper	Total
Container Truck	32	31	63
Dump Truck	5	5	10
Wheel Loader	4	3	7
Bulldozer	2	2	4
Excavator	3	2	5
Water Bowzer	2	2	4
Recovery Truck	1	2	3
Total	49	47	96

N.B. : the above figures include relief personnel

Table 3-3 Required Number of Workshop Staff

Classification	Skilled Laborer	Helper	Total
Mechanic (Vehicle)	2	2	4
Mechanic (Heavy Equip.)	2	2	4
Electrician	1	1	2
Welder	1	1	2
Blacksmith	1	1	2
Total	7	7	14

The total manpower required for the project operation is estimated at 101 persons as indicated above. Personnel expenses of only these staff members may be included in the operation and maintenance costs to analyze project feasibility, as the project revenue is not expected to cover the expenses of all staff who are currently engaged in garbage collection and disposal works. Salary of RMC staff is based on pay scales revised in 1994 (see Table 3-4). In addition, RMC bears fringe benefits which account for about 42% of the salary.

Table 3-4 Pay Scales of RMC Personnel

Classification	Scale	Salary (Rs)
Garbage Collection		
Sanitation Officer I	18	8745
Sanitation Officer II	16	5490
Chief Sanitary Inspector	15	4845
Sanitary Supervisor	12	3780
Sanitary Worker	8	2860
Truck Worker	4	2230
Truck Driver	8	2860
Loader	5	2390
Workshop		
A. Municipal Engineer	17	7360
Clerk	6	2535
Sub-Engineer	7	2695
Mechanic (Diesel)	12	3780
Mechanic (Petrol)	9	3060
Electrician	12	3780
Welder	9	3060
Fitter	5	2390
Black Smith	6	2535
Helper	5	2390

Note: Salary is based on RMC pay scales revised in 1994

3.2.2 Operation and Maintenance Costs

The annual cost required for the operation and maintenance shall be estimated in the following way in order to judge whether the project is financially feasible or not.

1) Operation Cost

Cost is estimated on the basis of such precondition that the number of daily operation hours would be 7 for all equipment expect recovery vehicle. Costs of fuel, oil and labor are the key components in this connection. Fuel consumption is calculated if horse power and fuel consumption rate (lit/PS-hr) are properly specified for each equipment. Oil and lubrication cost is estimated at 20% of fuel charge. Table 3-5 shows a summary of daily-based unit cost for fuel and oil consumption, and monthly-based unit costs for both fuel and labor are summarized in Tables 3-6 and 3-7, respectively.

Table 3-5 Unit Cost of Fuel and Oil Consumption (Unit/Day)

Equipment	Fuel/Oil	Unit	Q'ty	Unit Cost(Rs)	Amount (Rs)	Remarks
Detachable Container Truck (120 PS)	Diesel (Running)	lit	33	6.2	205	0.040 x 120 x 6.8
	Diesel (Loading/ Unloading)	lit	3	6.2	19	0.138 x 120 x 0.2
					45	
	Oil	Ls	1			Fuel x 20%
Sub-Total					269	
Dump Truck (175 PS)	Diesel	lit	49	6.2	304	0.040 x 175 x 7.0
	Oil	Ls	1		61	Fuel x 20%
Sub-Total					365	
Wheel Loader (203 PS)	Diesel	lit	163	6.2	1,011	0.115 x 203 x 7.0
	Oil	Ls	1		202	Fuel x 20%
Sub-Total					1,213	
Bulldozer (177 PS)	Diesel	lit	171	6.2	1,060	0.138 x 177 x 7.0
	Oil	Ls	1		207	Fuel x 20%
Sub-Total					1,242	
Excavator (130 PS)	Diesel	lit	126	6.2	781	0.138 x 130 x 7.0
	Oil	Ls	1		156	Fuel x 20%
Sub-Total					937	
Water Bowzer (160 PS)	Diesel	lit	34	6.2	211	0.030 x 160 x 7.0
	Oil	Ls	1		42	Fuel x 20%
Sub-Total					253	
Recovery Vehicle (165 PS)	Diesel	lit	46	6.2	285	0.040 x 165 x 7.0
	Oil	Ls	1		57	Fuel x 20%
Sub-Total					342	

Table 3-6 Fuel Consumption Cost (Unit/Month)

Equipment	Number of Days	Daily Cost (Rs)	Monthly Cost (Rs)
Container truck	30	269	8,070
Dump Truck	30	372	11,160
Wheel Loader	30	1,183	35,490
Bulldozer	30	1,242	37,260
Excavator	30	907	27,210
Water Bowzer	30	253	7,590
Recovery Truck	30	52	1,560

Table 3-7 Labor Cost for Equipment Operation (Unit/Month)

Equipment	Required	Manpower	Unit Cost(Rs)	Amount(Rs)
Container Truck	Driver:	1	2,860	2,860
	Helper:	1	2,390	2,390
Sub-Total				5,250
Dump Truck	Driver:	1	2,860	2,860
	Helper:	1	2,390	2,390
Sub-Total				5,250
Wheel Loader	Operator:	1	3,780	3,780
	Helper:	1	2,390	2,390
Sub-Total				6,170
Bulldozer	Operator:	1	3,780	3,780
	Helper:	1	2,390	2,390
Sub-Total				6,170
Excavator	Operator:	1	3,780	3,780
	Helper:	1	2,390	2,390
Sub-Total				6,170
Water Bowzer	Operator:	1	2,860	2,860
	Helper:	1	2,390	2,390
Sub-Total				5,250
Recovery Truck	Driver:	1	2,860	2,860
	Helper:	2	2,390	4,780
Sub-Total				7,640

Thus, annual operation and maintenance costs are estimated at Rs. 9.8 million, of which Rs. 6.6 million will be required for the fuel and oil consumption accounting for 68% (see Table 3-8).

Table 3-8 Annual Equipment Operation Cost

Equipment	No. of Month	Labor Cost		Fuel Cost		Total	Remarks
		Unit Cost	Amount	Unit Cost	Amount		
Container Truck	360	5,250	1,890,000	8,070	2,905,200	4,892,520	30 units x 12 Months
	24	2,860	68,640				2 Relief Drivers x 12 M.
	12	2,390	28,680				1 Relief Helper x 12 M.
Dump Truck	48	5,250	252,000	10,950	525,600	840,680	4 units x 12 Months
	12	5,250	63,000				1 Relief Driver x 12 M
							1 Relief Helper x 12 M
Wheel Loader	36	6,170	222,120	36,393	1,310,040	1,577,520	3 units x 12 Months
	12	3,780	4,5360				1 Relief Operator x 12 M
Bulldozer	24	6,170	148,080	38,160	915,840	1,063,920	2 units x 12 Months
Excavator	24	6,170	148,080	28,110	674,640	868,080	2 units x 12 Months
	12	3,780	45,360				1 Relief Operator x 12 M
Water Bowzer	24	5,250	126,000	7,590	182,160	308,160	2 units x 12 Months
Recovery Truck	12	7,640	91,680	10,260	123,120	214,800	1 unit x 12 Months
Total			3,129,000		6,636,600	9,765,600	

2) Maintenance Cost

Maintenance cost includes salary of mechanical staff to be placed in workshop and repair expenses of the proposed equipment. The annual salary will amount to about Rs. 495,000 to cover the required manpower. The details are shown below:

Classification	No. of Staff	Annual Salary (Rs)	Total Amount (Rs)
Mechanic	4	45,360	181,440
Electrician	1	45,360	45,360
Welder	1	36,720	36,720
Blacksmith	1	30,420	30,420
Helper	7	28,680	200,760
Total	14		494,700

It is desirable that all equipment be replaced every 5 or 6 years in accordance with their durable life period. The repair cost shall be such an amount as figured out at the rate of the basic price of the equipment, and the annual repair cost is estimated at one (1) percent of the equipment price on the assumption that the workshop is constructed during project and some essential spare parts are provided under Japan's Grant Aid.

Thus, the total maintenance cost will be about Rs. 2 million per year covering all expenses necessary for mechanical inspection and repair works.

3.2.3 Balance of Project Account

Financial analysis is quite significant to judge whether the project is viable or not. In this sense, it is important to discuss the possibility of the newly proposed sanitation tax for the next fiscal year to cover the additional operation and maintenance cost resulting from procurement of equipment through this project. However, the present Rs. 10 million budget for operation and maintenance of current operations is assumed to be available. The sanitation tax will be levied by the Accounts Office of RMC and the residents can pay directly to RMC or through a designated bank account of RMC. Whether the tax is to be paid collectively with other taxes such as the annual sewerage tax or separately on a monthly basis is now under consideration.

The tax revenue which is the only income source for the project is scheduled to be Rs. 10 or Rs. 15 per month from each household, so that the revenue will vary significantly

depending on the tax collection rate. Assuming the total number of households is 110,000 in the area, the annual revenues are limited to Rs. 13.2 million and Rs. 19.8 million, respectively (see Fig. 3-3).

The operation and maintenance cost will amount to Rs. 11.8 million if fringe benefits for the required manpower are taken into consideration. Consequently, the project will pay off for the case of Rs. 10 , if the tax is collected from 90% of the total households. Meanwhile, it will also reach a break-even point to make both ends meet if Rs. 15 of monthly tax is collected from 60% of the households.

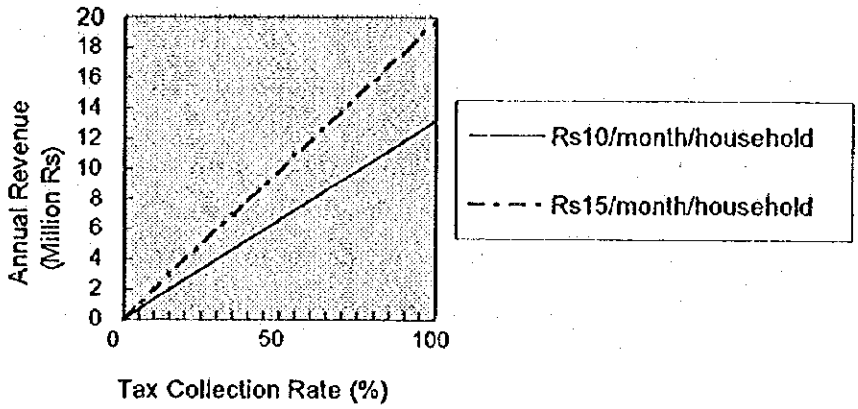


Fig. 3-3 Relationship between Sanitation Tax Collection Rate and Revenue

CHAPTER 4 PROJECT EVALUATION AND RECOMMENDATIONS

CHAPTER 4

PROJECT EVALUATION AND RECOMMENDATIONS

4.1 Project Effects

This project aims to improve the difficulties facing RMC in collection, transportation and disposal of solid waste due to shortage and deterioration of the presently owned equipment. As a result of implementation of this project, effects such as improvement of health conditions, improved appearance of city streets and residential areas, and upgrade in capacity of operation and maintenance can be expected. The importance and urgency of this project is placed in the Eighth Five Year Plan (1993/94 - 1997/98) as one of the policies to conserve the environment and promote environmental sanitation, which will contribute to development of urban society and improvement of economic living conditions. The effects of this project are detailed in Table 4-1.

Furthermore, the following points confirm the feasibility of this project under the Japanese grant aid system.

a. In the Eighth Five Year Plan, protection of the environment is given as one of the national policies of high priority. Therefore, the implementation of this project will contribute to promoting this policy.

b. The present collection efficiency is low because the collection method is being carried out manually. The procurement of new collection vehicles using containers will allow the collection rate to increase from the present 40% to 64% which will improve the environmental and sanitary conditions. With new collection equipment, the collection service area can be increased and this can serve as incentive to the citizens, who are the waste generators, to throw out their garbage at the right place.

Table 4-1 Effects and Degree of Improvement due to Project Implementation

Present Situation and Problems	Measures to be Taken in the Project	Effects and Degree of Improvement of Project
1. The collection/transportation equipment of RMC is in shortage and deteriorated so that collection is insufficient (presently 40% collection) and causing environmental and sanitary problems. Also, the present collection method is manual and mechanization is delayed.	• The collection method will be changed to a container system with allocation of containers at the collection points.	• With the procurement of detachable container trucks and containers, the collection ratio can be raised from 40% to 64%. The environmental sanitation condition will be improved and the new container collection system can upgrade the collection efficiency.
2. The present disposal method is open dumping which gives bad impact on the environment as well as create problems in sanitation and aesthetics to the surrounding residents. Also, without any disposal equipment, measures cannot be carried out for an environmentally considered landfilling.	• Disposal handling equipment will be procured so that sanitary land-filling can be executed.	• Upon consideration on the environmental effects of the disposal site, due to daily covering of waste, the environment can be preserved and problems to the surrounding residents can be minimized. Proper disposal techniques can be carried out with the new equipment.
3. At the presently used workshop of RMC, tools and equipment as well as spare parts are lacking, and procurement of equipment and materials for the new workshop now under construction is still in the planning stage. Therefore, the operation and maintenance situation is having difficulties.	• A recovery truck, spare parts and workshop tools will be procured.	• With the recovery truck, disabled vehicles can be transferred to the workshop more rapidly so that repairs can be carried out without delay. The procured spare parts and tools can help to supplement the repair capabilities and reduce maintenance costs, which will have an effect of improving the maintenance efficiency.

c. The present disposal method of open dumping can cause problems in degrading the environment as well as influence on the surrounding inhabitants. The disposal equipment to be procured will make it possible to carry out sanitary landfilling. Therefore, proper daily covering of waste can be effected to reduce waste scatter, odor, vectors and other nuisances, which can greatly upgrade the environmental condition. Moreover, since sanitary landfilling at the newly proposed disposal site will serve as a model case for Pakistan, proper disposal operations in the future can be anticipated.

d. At the present workshop of RMC, tools and equipment for repair and maintenance are in shortage and maintenance work cannot be handled sufficiently. With the maintenance equipment and materials to be procured, improvement in the maintenance organization can be expected. Furthermore, the repairs contracted out can be now be done by RMC to upgrade the efficiency of the maintenance system.

4.2 Recommendations

4.2.1 Collection and Transportation

1) Treatment of Informal Dumping Sites

The informal dumping sites scattered in and around the city should be cleared and covered with soil as soon as possible.

2) Awareness Campaign on New Collection System

To improve the effect of introducing the container collection system, awareness programs to citizens on placing their garbage in the containers is needed.

3) Treatment of Uncollected Waste

With this project, the collection efficiency will increase to 64%, but to raise it to 100%, the remaining 36% should be treated appropriately by the citizens themselves through promotion from RMC using such media as awareness campaigns.

4) Consideration of Transfer Stations

Presently, RMC does not have a transfer station. However, for future planning of increased waste generation rates and since the newly planned disposal site is about 25 km away from the city, transfer stations, where collected waste is transferred onto larger vehicles to be transported to the disposal site, need to be considered.

5) Handling of Hospital and Industrial Wastes

Hospital and industrial wastes are not considered for this project. However, these wastes are presently mixed with the household and commercial wastes which can present dangerous situations during collection and disposal.

Therefore, as a countermeasure, hospital waste should be treated by the generators through such measures as incineration or private contracting, or a separate collection by RMC can be effected with disposal by incineration, remote landfilling or other appropriate means. When separate collection is to be carried out, the collection method must give sufficient consideration to safety of the collection workers. However, since the three main hospitals and more than 100 clinics generate only about 0.2% of the total waste generation rate of RMC, this waste can be handled along with household waste only for the present time, if precautions are made.

Furthermore, the approximately 50 industrial establishments in RMC area are mostly small-scale factories and therefore, these can be treated as commercial waste, and the larger factories should be contracted out.

4.2.2 Final Disposal

1) Life Extension and Closure of Present Disposal Site

Since the presently used dumping site at Haji Camp is almost full capacity and creating environmental problems, early commencement of the new disposal site at Mouza Losar is seriously needed. In this connection, the procured equipment should be effectively utilized and necessary budget allocation in

preparation for the new landfill is required. However, during the period of preparation for the new site, the present dumping site can be extended for about one year with proper environmental consideration measures. For this purpose, sanitary landfilling with mounding is recommended. At the same time, the problem of mutual use between RMC and RCB of the dumping site needs to be settled and solved as soon as possible.

2) Environment Problems of the New Disposal Site

The topography of the new disposal site at Mouza Losar reveals a silt table land being eroded by rain. Landfilling can prevent further erosion. Leachate will not increase the contamination level of the stream since the stream is already contaminated to high levels due to domestic wastewater from the two villages upstream as well as nightsoil from cattle, sheep and goats grazing along the stream. Therefore, if direct discharge of concentrated leachate during the dry season is controlled, further contamination is inconceivable. However, other impacts as given below cannot be avoided.

- Decrease in bird species due to increase in crows and other predator birds
- Damage to crops due to increase in rodents and rats resulting from increase in feed (garbage)
- Injuries due to increase in stray dogs
- Unaesthetic views due to scattering of plastics and other waste
- Negative influence on surrounding villages due to increase in traffic

However, these problems can be solved through strengthening of the disposal management capacity, mutual discussions with the surrounding villagers and other considerations taken by RMC.

3) Use of New Disposal Site

RMC is in the process of designing the development plan for the new disposal site at Mouza Losar. The implementation of this plan should be carried out as soon as possible

4.2.3 Management, Operation and Maintenance

1) Introduction of Sanitation Tax

RMC is planning to impose a sanitation tax to offset financial burden on operation and maintenance of solid waste management. However, before the sanitation tax goes into effect, a preparatory period is needed in which the citizens are informed of the necessity and aims of the new tax so that they are convinced of its importance.

2) Management Organization

In the present organization, the chief medical officer of health is in charge of solid waste management as well as medical related affairs, and he cannot concentrate only on solid waste matters. However, RMC has plans to create a separate department solely for solid waste management. If this is realized, the management of garbage collection and disposal can become more efficient.

3) Securing Manpower

To properly operate and maintain the disposal equipment to be procured, recruiting and/or training of operators and maintenance staff through CMTI, newspaper advertisement or other media is recommended.

4.2.4 Intermediate Processing and Resource Recovery

Presently in Pakistan, no processing of waste is carried out. All collected waste is disposed by an open dump method. Although sanitary landfilling is essential as a disposal method, some kind of processing or resource recovery should be considered to reduce the burden on disposal.

Many methods of processing have been developed, but when planning such methods, sufficient consideration needs to be made on waste generation rate, composition, characteristics, marketability (if by-products are expected), cost of facilities, running costs and other factors.

1) Incineration

Of the available processing methods, incineration has the greatest effect on waste volume reduction. Furthermore, incineration reduces organics to inorganic gas and ash to make the waste stable and harmless. Moreover, waste heat can be recovered as steam, electricity, fuel or other energy resources. This process is suitable for municipalities that cannot find sufficient landfill areas. However, initial installation investment and operating costs are very high, and maintenance requires high technology. Also, high costs for air pollution control are needed.

According to the field survey, the lower heating values for RMC waste were found to be as follows.

Household waste	:	930 kcal/kg
Commercial waste	:	2,590 kcal/kg
Total Average	:	1,200 kcal/kg

Therefore, the present mixed garbage of RMC is not suitable for incineration, but if commercial waste alone is collected, the waste has a heating value capable of continuous incineration without supplemental fuels. However, in consideration of future changes in the waste composition due to rise in living standards, paper and plastics will most likely increase which will raise the heating value, and also that future availability of disposal sites will be minimized, incineration can become an appropriate alternative as a processing method.

2) Composting

If a compost product is processed from the organic portion of waste, it can be used as a stabilized material for land reclamation and landfill covering, or it can be used as a soil conditioner or as a fertilizer (if nutrients such as nightsoil or sewage sludge are added). The former use is obviously a year-round pursuit, but the latter is highly seasonal and requires sufficient storage area.

RMC is making studies on composting with the help of a local consultant. As a result, a compost plant is now in the planning with possibilities for contracting

on a BOT basis, or if not, the use of the Prime Minister's package is also under consideration.

However, to realize this plan, the existence of a viable market is the key to the successful operation of a composting system. For landfilling and landfill cover, benefits are plenty, but not much profit can be expected. If selling as a soil conditioner is planned, and if a certain amount of income is anticipated, many factors must be considered, such as institutional arrangements, distribution, storage, promotion, visual attractiveness as a product, and production of a high-grade, low-cost product.

3) Materials Recovery (Recycling)

At the garbage collection stations and dumping sites of RMC, scavengers are making their living through the sell of valuables such as paper, plastics, glass and tins found in the garbage. The number of scavengers is estimated at 1,000 persons and each specializes in a certain material for picking. the picked materials are sold to middlemen who buy them at Rs. 1.5 - 3/kg for paper, Rs. 3 - 5/kg for plastic bags, and Rs. 4 - 6/kg for tins.

The primary middlemen handle multiple kinds of materials from the scavengers, but these are sold to secondary middlemen who specialize in certain materials. When the transactions from primary to secondary middlemen are made, the prices rise Rs. 1 to 2/kg from the prices paid to the scavengers. then, paper and plastics are recycled at factories, glass bottles go to beverage factories and other materials are likewise recycled. Fig. 4-1 shows the recycling flow for Rawalpindi.

The recycled amount in RMC area is about 25 tons/day which is equivalent to about 4 % of the total waste generated. Systematizing this materials recovery flow as listed below is recommended to improve social, economic and aesthetic conditions of RMC.

- Install a recovery plant which includes a hand sorting materials recovery line using belt conveyors.
- For hand sorting personnel, employ the scavengers, who are experienced in this

kind of work. Utilize the middlemen as supervisors for the work.

- Establish a distribution/selling network may be required.

With the implementation of the above, the following advantages can be expected.

- Can contribute to reduction of waste.
- Employment chances can be increased (however, since many of the scavengers are refugees, the employment regulations may need to be given special arrangements)
- In some cases, income can be expected on a long-term basis,
- Since scavenging activities will decrease inside the city, the view of the living environment will become more acceptable.
- Can contribute to conservation of resources.

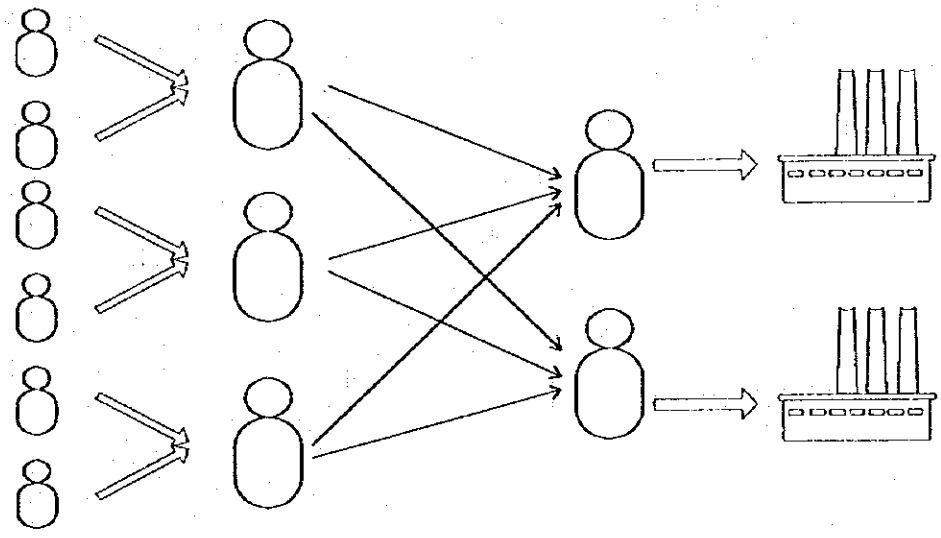


Fig. 4-1 Waste Recycling Flow

4) Land Reclamation

Since residuals are always generated in any solid waste management system no matter what processing is used, landfills are inevitable. Therefore, planning on the after-use of completed landfills is significant for a comprehensive system planning. The completed landfills, however, possess problems as listed below due to biological, physical and chemical changes undergone gradually inside the landfills, and proper precautions need to be taken.

a. The most common problem is that of land subsidence by a variety of causes such as decomposition and consolidation of materials into voids.
b. Biological decomposition also generates gases, mostly methane and carbon dioxide with traces of hydrogen sulfide, which can give of odors.
c. Leachate has potential to pollute surface and groundwater resources.

For the newly planned disposal site, RMC is taking considerations for b. and c. above, but for the presently used site, no measures are considered. The after-use of RMC disposal sites can include agricultural land (fruit orchards, wheat fields, etc.), park, athletic field (such as cricket field) and garden.

APPENDICES

APPENDIX 1 MEMBER LIST OF SURVEY TEAM

Position	Name	Affiliation
Basic Design Survey		
Team Leader	Mr. Yoshiaki Nishikawa	Deputy Director First Basic Design Study Division Grant Aid Study and Design Dept., JICA
Technical Adviser	Mr. Keiichiro Hoashi	Waste Management Division, Water Supply and Environmental Sanitation Dept. Ministry of Health and Welfare
Coordinator	Mr. Tomohiro Ishimori	First Basic Design Study Division Grant Aid Study and Design Dept., JICA
Consultant Leader	Mr. Shoji Fujii	Japan Techno Co., Ltd.
Collection and Transportation Planner	Mr. Masakazu Maeda	Japan Techno Co., Ltd.
Disposal Planner/ Environmental Analyst	Mr. Toyosaku Kato	Japan Techno Co., Ltd.
Management, Operation & Maintenance Planner	Mr. Kazuyoshi Kageyama	Japan Techno Co., Ltd.
Explanation of Draft Basic Design		
Team Leader	Mr. Yoshiaki Nishikawa	Deputy Director First Basic Design Study Division Grant Aid Study and Design Dept., JICA
Consultant Leader	Mr. Shoji Fujii	Japan Techno Co., Ltd.
Collection and Transportation Planner	Mr. Masakazu Maeda	Japan Techno Co., Ltd.
Disposal Planner/ Environmental Analyst	Mr. Toyosaku Kato	Japan Techno Co., Ltd.

APPENDIX 2 SURVEY SCHEDULE

－Basic Design Survey

No.	Date	Day	Itinerary
1	12/2	Sat	Depart Tokyo
2	12/3	Sun	Arrive in Islamabad、Courtesy call to JICA and EAD
3	12/4	Mon	Courtesy call to RMC, Presentation and explanation of Inception Report
4	12/5	Tue	Meeting with RMC, Site survey
5	12/6	Wed	Meeting with RMC, Site survey
6	12/7	Thu	Meeting with RMC, Team leader arrives in Islamabad
7	12/8	Fri	Meeting with RMC, Site survey
8	12/9	Sat	Discussion on Minutes
9	12/10	Sun	Discussion on Minutes, Site survey
10	12/11	Mon	Signing of Minutes, Report to Embassy of Japan and JICA, Technical adviser and Coordinator depart Islamabad
11	12/12	Tue	Site survey, Team leader joins another project
12	12/13	Wed	Site survey
13	12/14	Thu	Site survey, Meeting with RMC
14	12/15	Fri	Site survey, Data organization and analysis
15	12/16	Sat	Site survey, Data organization and analysis
16	12/17	Sun	Meeting with RMC, Site survey, Data collection
17	12/18	Mon	Site survey
18	12/19	Tue	Site survey, Data organization and analysis
19	12/20	Wed	Site survey, Data organization and analysis
20	12/21	Thu	Site survey, Data organization and analysis
21	12/22	Fri	Data organization
22	12/23	Sat	Data organization
23	12/24	Sun	Meeting with RMC, Data analysis
24	12/25	Mon	Data analysis
25	12/26	Tue	Meeting with RMC and related organizations
26	12/27	Wed	Report to JICA, Meeting with RMC
27	12/28	Thu	Meeting with RMC, Depart Islamabad
28	12/29	Fri	Arrive in Tokyo (consultant team)

－Explanation of Draft Basic Design

No.	Date	Day	Itinerary
1	2/25	Sun	Depart Tokyo
2	2/26	Mon	Arrive in Islamabad、Courtesy call to JICA
3	2/27	Tue	Meeting with JICA, Courtesy call to and meeting with RMC
4	2/28	Wed	Meeting with RMC, Explanation of draft basic design
5	2/29	Thu	Meeting with RMC, Site survey, Team leader arrives in Islamabad
6	3/1	Fri	Team meeting, Site survey
7	3/2	Sat	Meeting with RMC, Explanation of draft B/D, Discussion on Minutes
8	3/3	Sun	Signing of Minutes
9	3/4	Mon	Report to Embassy of Japan and JICA, Courtesy call and report to EAD
10	3/5	Tue	Meeting with RMC, Depart Islamabad
11	3/6	Wed	Transit
12	3/7	Thu	Arrive in Tokyo

APPENDIX 3 LIST OF PARTY CONCERNED IN THE RECIPIENT COUNTRY

Embassy of Japan

Minister	Mr. Hiroshi Fukada
First Secretary	Mr. Mitsuyoshi Nakada

JICA Pakistan Office

Resident Representative	Mr. Akira Murata
Deputy Resident Representative	Mr. Noriaki Nishimiya
Deputy Resident Representative	Mr. Kazushige Aragaki
Assistant Resident Representative	Mr. Hiroshi Shiono
Assistant Resident Representative	Mr. Ryoji Yaginuma
Chief Programme Officer	Mr. Mahmood A. Jilani

Economic Affairs Division (EAD), Ministry of Finance and Economic Affairs

Deputy Secretary	Mr. Shahid Humayun
Section Officer (Japan-1)	Mr. Nabeel Ahmad Goheer

Local Government and Rural Development Department, Provincial Government of Punjab

Secretary	Mr. Kashif Murtaza
Additional Secretary	Mr. Azhar H. Shamim

Rawalpindi District

Deputy Commissioner	Mr. Javid Awan

Rawalpindi Municipal Corporation (RMC)

Administrator	Mr. Tauqir Ahmad
Former Administrator	Mr. Iftikhar Hussain Babar
Chief Corporation Officer	Mr. Muhammed Iqbal Saddozai
Chief Medical Officer	Dr. Abdul Salam Chaudhry
Chief Engineer	Mr. Tariq Iqbal Khan
Sanitation Officer (Zone A)	Dr. Mazhar Azim
Senior Accounts Officer	Mr. Munir Malik
Municipal Engineer	Mr. Malik Muhammd Akram
Assistant Municipal Engineer	Mr. Shahid Hussain Khan
Assistant Municipal Engineer	Mr. Kashif Butt
Deputy Director, Architecture	Mr. Iqtedar Yaqoob
Deputy Director, Town Planning	Mr. Fida Hussain Ashori
Chief Sanitary Inspector (Zone A)	Mr. Ata-ur-Rahmam Qureshi
Chief Sanitary Inspector (Zone B)	Mr. Malik Mulazim Hussain
Sanitary Inspector	Mr. Inamul Huq
Sanitary Inspector	Mr. Khalid Naeem
Sewerage Inspector	Mr. Ijaz Gill

Rawalpindi Development Authority (RDA)

Director of Traffic, Engineering and Planning Director of Town Planning	Mr. Makeen Shahbaz
Chief Engineer Project Manager, WASA (Water and Sanitation Agency)	Mr. Bashir Ahmad Tarar

Capital Development Authority (CDA)

Director Sanitation	Mr. Abdul Ghafoor
Deputy Director Sanitation	Mr. Gul Hussain Khan
Assistant Director Sanitation	Mr. Ishaq Khan
Assistant Director (Technical)	Mr. Hafiz M. Ehsan-ulhaq
Director Machinery Pool Organization (MPO)	Mr. Muhammad Ashfad Ahmad
Deputy Director MPO	Mr. Mehboob-ur-Rehman

Small Dams Division, Irrigation and Power Department

Executive Engineer	Mr. Ubaidullah Rundhawa
Civil Engineer	Mr. Abid Alla-ud-Din

University of Engineering and Technology

Assistant Professor	Dr. M. A. Kamal
Assistant Professor, Civil Engineering	Mr. Imtiaz Husain Yahya

Construction Machinery Training Institute (CMTI)

Director	Mr. Masud Hussain
Civil Engineer	Mr. Zahid Rashid

Environment Systems & Engineering (Pvt.) Ltd.

Senior Consultant	Mr. Nizar Ali Noormohammed
Consultant SWM Project	Mr. Shaikh Muzafar Ali

APPENDIX 4 MINUTES OF DISCUSSIONS

4-1 MINUTES OF DISCUSSIONS ON BASIC DESIGN SURVEY

MINUTES OF DISCUSSIONS
BASIC DESIGN STUDY
ON THE PROJECT FOR
IMPROVEMENT OF GARBAGE COLLECTION AND DISPOSAL
IN RAWALPINDI CITY OF PUNJAB PROVINCE
IN ISLAMIC REPUBLIC OF PAKISTAN

In response to a request from the Government of Islamic Republic of Pakistan, the Government of Japan decided to conduct a Basic Design Study on the Project for Improvement of Garbage Collection and Disposal in Rawalpindi City of Punjab Province (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Pakistan a study team, which is headed by Mr. Yoshiaki NISHIKAWA, Deputy Director, 1st Basic Design study Division, Grant Aid Study and Design Department, JICA, and is scheduled to stay in the country from December 3 to 28, 1995.

The team held discussions with the officials concerned of the Government of Islamic Republic of Pakistan and conducted a field survey at the study area.

In the course of discussions and field survey, both parties have confirmed the main items described on the attached sheets. The team will proceed to further works and prepare the Basic Design Study report.

December 11, 1995

Mr. Yoshiaki Nishikawa
Leader
Basic Design Study Team
JICA

Mr. Syed Iftikhar Hussain Babar
Administrator
Rawalpindi Municipal Corporation

Mr. Kashif Murtaza
Secretary
Local government and rural development Department
Government of Punjab, Pakistan

Mr. Shahid Humayun
Deputy Secretary
Economic Affairs Division
Ministry of Finance and Economic Affairs
Government of Islamic Republic of Pakistan

ATTACHMENT

1. Objective

The objective of the Project is to procure the equipment for efficient collection and disposal of garbage, to improve the means and facilities in maintaining environmental and sanitary conditions.

2. Project Site

Rawalpindi Municipal Corporation

3. Responsible and Executing Agency

Responsible Agency: 1) Local government and rural development department, Government of Punjab
2) Rawalpindi Municipal Corporation

Executing Agency : Rawalpindi Municipal Corporation

4. Items Requested by the Government of Pakistan

After discussions with the Basic Design Study Team, the following items were finally requested by the Pakistan side. (ANNEX- I)
However, the final components of the Project , both quantity and specifications, will be decided after further studies.

5. Japan's Grant Aid System

(1) The Government of Pakistan has understood the system of Japan's Grant Aid explained by the team, as described in Annex- II

(2) The Government of Pakistan will take necessary measures, described in Annex- III 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 Consultant will proceed to further studies in Pakistan until December 28, 1995.

(2) Based upon the Minutes of Discussions and technical examination of the study results, JICA will prepare the Draft Basic Design in English and dispatch a mission to Pakistan in order to explain its contents around February, 1996.

(3) In case that the contents of the Draft Basic Design are accepted in principle by the Government of Pakistan, JICA will complete the final report and sent it to the Government of Pakistan by the end of March, 1996.

1. 7

7. Other Relevant Issues

1. The team pointed out that there are some possibilities of environmental problems at the new disposal (landfill) site since the RMC has not finished studying and designing the disposal (landfill) site from topographical, geological, and environmental points of view. The consultants will suggest what necessary measures the Pakistani side needs to take prevent from resulting in the possible problems before 28 December, 1995. The Pakistani side shall make a concrete plan for such preventive measures based on the suggestion and submit it to the team through JICA office in Pakistan by the end of January, 1996.
   Main points to be considered by the RMC urgently are the following:
   1) need for installation of drainage facilities at the disposal site
   2) consideration of discharging leachate from the disposal site to surrounding areas
   3) possibility of contamination of the groundwater
   4) execution of sanitary landfilling

2. The Pakistani side informed the team that they have an idea of using sand at the landfill site to cover the garbage and reducing chances of contamination. They also have an intention of installing a compost plant at the landfill site.

3. Both sides agreed that industrial waste and infectious waste are out of scope.

4. The team pointed out that the existing disposal site at Haji Camp needs to be closed after proper treatment for reclamation.

5. The Pakistani side agreed that the informal dumping sites in the city must be closed as soon as possible for the improvement of the sanitary condition.

6. It is agreed that in case Japan's Grant Aid is executed, the RMC must make a allocation plan of containers and collection schedule and announce to the citizens about the new system of garbage collection.

7. The team was explained that the RMC will execute the collection of a sanitation tax and will take necessary measures to utilize it solely for the solid waste management in the RMC.

8. The Pakistani side asked the team to consider the possibility that the inland transportation cost might be covered in the Grant.

9. The Pakistani side expressed the needs of acceptance of trainees from RMC by JICA in the solid waste management category.

ANNEX I .Items requested by the Pakistani side

ITEM	Quantity & Priority			TOTAL
	A	B	C	
For Collection				
Dump truck	0	0	12	12
Detachable container truck	30	10	20	60
Sewerage cleaning truck	0	0	2	2
Container	160	30	50	240
Recovery vehicles	1	0	0	1
For Dumping				
Dump truck	2	1	0	3
Wheel loader	2	1	2	5
Bulldozer	2	0	3	5
Excavator	2	0	0	2
Water bowzer	1	1	8	10
Spare parts	1lot	—	—	1lot
Tools for workshop	—	1lot	—	1lot

Remarks:

A:Essential for this project;
subject to the fulfillment of the condition mentioned in 7-1 of this ATTACHMENT regarding the submission of the concrete plan

B:Need more consideration

C:Not appropriate to be included in this project

ANNEX II

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 a recipient country)
Study	(Basic Design Study conducted by JICA)
Appraisal & Approval	(Appraisal by the Government of Japan and Approval by Cabinet)
Determination of Implementation	(The Notes 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 appraise 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 result are then submitted to the Cabinet for approval.

Fourthly, the Project, once approved by the Cabinet, 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.

y.n

2. Basic Design Study

1) Contents of the Study

The aim of the Basic Design Study, conducted by JICA on a requested project is to provide basic document necessary for the appraisal of the project by the Japanese Government. The contents of the Study are as follows:

a) Confirmation of the background, objectives, and benefits of the requested 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 the 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 Japan's Grant Aid Scheme.

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 jurisdiction of the organization in the recipient country actually implementing the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations in the recipient country through the Minutes of Discussions.

2) Selection of Consultants

For the smooth implementation of the study, JICA uses (a) registered consultant firm(s). JICA selects (a) firms(s) based on proposals submitted by interested firms. The firm(s) selected carry (ies) out the Basic Design Study and write(s) a report, based upon terms of reference set by JICA.

The consulting 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 and also to avoid any undue delay in implementation should the selection process be repeated.

3. Japan's Grant Aid Scheme

1) What is Grant Aid ?

The Grant Aid Program provides a recipient country with non-reimbursable funds needed to procure the facilities, equipments and services (engineering services and transportation of the products, etc.) for economic and social development the country under the principals 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, etc., are confirmed.

3) "The period of the Grant" means the one fiscal year in which the Cabinet approves the project for. Within the fiscal year, all procedure such as exchanging of 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, in principle, Japanese products and services including transport or those of the recipient country are to be purchased.

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

However the prime contractors, namely, consulting, contracting 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 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 execution for unloading, customs clearance at the port of disembarkation and internal transportation of the products purchased under the Grant.
(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.
(6) To accord Japanese nationals whose services may be required in connection with the supply of the products and services under the Verified Contracts, such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work.

7) "Proper Use"

The recipient country is required to maintain and use the facilities constructed and equipment purchased under the Grant Aid properly and effectively and to assign the necessary staff for operation and maintenance of them 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 shall 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 an authorized foreign exchange 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 III. Necessary measures to be taken by the Government of Pakistan in case Japan's Grant Aid is executed.

1. To provide the land for a temporary site office, warehouse and stock yard during implementation of the project

2. To provide necessary facilities for the Project such as electricity and other incidental facilities.

3. To bear the following commissions to the Japanese foreign exchange bank for the banking services based upon the Banking Arrangement.
   (1)Advising commission of Authorization to Pay
   (2)Payment Commission

4. To exempt taxes and to take necessary measures for customs clearance of the materials and equipment brought for the project at the port of disembarkation.

5. To accord Japanese Nationals whose services may be required in connection with the supply of products and the services under the verified contract such facilities as may be necessary for their entry into Pakistan and stay therein for the performance of their work.

6. To maintain and use the equipment procured under the Grant properly and effectively.

7. To bear all expenses other than those to be borne by the Grant, necessary for the transportation of the equipment.

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.

4-2 MINUTES OF DISCUSSIONS ON THE EXPLANATION OF THE DRAFT BASIC DESIGN

MINUTES OF DISCUSSIONS
ON
THE BASIC DESIGN STUDY
ON THE PROJECT FOR
IMPROVEMENT OF GARBAGE COLLECTION AND DISPOSAL
IN RAWALPINDI CITY OF PUNJAB PROVINCE
IN ISLAMIC REPUBLIC OF PAKISTAN
(EXPLANATION OF THE DRAFT BASIC DESIGN)

In December 1995, the Japan International Cooperation Agency (JICA) dispatched the Basic Design Study Team on the Project for Improvement of Garbage Collection and Disposal in Rawalpindi City of Punjab Province (hereinafter referred to as "the Study" and "the Project" respectively) to the Government of the Islamic Republic of Pakistan, and through discussions, field surveys and the results of technical examinations in Japan, has prepared the Draft Basic Design of the Study.

In order to explain and to consult the Pakistani side on the components of the Draft Basic Design, JICA has sent to Pakistan a study team (hereinafter referred to as "the Team"), which is headed by Mr. Yoshiaki Nishikawa, Deputy Director, 1st Basic Design Study Division, Grant Aid Study and Design Department, Japan International Cooperation Agency (JICA), and is scheduled to study in the country from February 26 to March 6, 1996.

In the course of discussions, both parties have confirmed the main items described in the attached sheets.

March 3rd, 1996

Mr. Yoshiaki Nishikawa
Leader
Draft Report Explanation Team
JICA

Mr. Sheikh Tauqir Ahmad
Administrator
Rawalpindi Municipal Corporation

Mr. Kashif Murtaza
Secretary
Local Government and Rural
Development Department
Government of Punjab, Pakistan

Mr. Shahid Humayun
Deputy Secretary
Economic Affairs Division
Ministry of Finance and Economic Affairs
Government of Islamic Republic of Pakistan

ATTACHMENT

1 Components of Draft Basic Design

The Pakistani side has agreed and accepted in principle the components of the Draft Basic Design proposed by the Team.

2 Japan's Grant Aid Program

2.1 The Government of the Islamic Republic of Pakistan has understood the system of Japan's Grant Aid explained by the Team. (ANNEX I.)

2.2 The Government of the Islamic Republic of Pakistan will take necessary measures described in the ANNEX II for the smooth implementation of the Project on condition that the Grant Aid assistance by the Government of Japan is extended to the Project.

3 Schedule of the Study

JICA will complete the final report in accordance with the confirmed items, and send it to the Government of the Islamic Republic of Pakistan by April, 1996.

4 Other Issues Relevant to the Project in case Japan's Grant Aid is Executed

4.1 The Pakistani side designated the Rawalpindi Municipal Corporation (RMC) as the designated authority of the Pakistan Government for the purpose of executing the project after the Exchange of Notes (E/N), including Banking Arrangement and payment of the commissions mentioned in ANNEX II, 3.

4.2 The Japanese side was informed that RMC will develop the final disposal site at Mouza Losar according to their plan submitted to JICA on 31 January, 1996. The Japanese side was explained that the budget for this purpose will be allocated from the Prime Minister's Package which will be decided by the middle of March, 1996. The Japanese side was also informed that RMC will submit documents showing evidence of acquisition of land at Mouza Losar to be used as the final disposal site, especially the land for Phase I development, by the end of May, 1996 to the JICA Pakistan office.

4.3 The Pakistani side is requested to execute the preventive measures for environmental protection at the disposal site including sanitary landfill utilizing the equipment to be procured within the Grant.

4.4 The Pakistani side is requested to make comments on the allocation plan for containers explained by the Team and, if necessary, will submit the revised plan together with the comments to the Team before the 5th of March, 1996.

4.5 The Pakistani side is also requested to make a concrete plan for execution of the sanitation tax, especially its collecting method, and will submit the plan before 15 March, 1996 to the JICA Pakistan office.

4.6 The Pakistani side will make every effort to carry out the custom clearance and inland transportation of the equipment efficiently and smoothly. The cost of the inland transportation will be covered under the Grant, but tax exemption is the responsibility of the Pakistani Government.

4.7 The specifications of equipment will be finalized in consultation with RMC during the detailed design stage.

4.8 The Pakistani side expressed the need for acceptance of trainees from RMC by JICA in the solid waste category.

ANNEX I.

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 a recipient country)
Study:	(Basic Design Study conducted by JICA)
Appraisal & Approval:	(Appraisal by the Government of Japan and Approval by Cabinet)
Determination of Implementation:	(The Notes 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 appraise 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 result are then submitted to the Cabinet for approval.

Fourthly, the Project, once approved by the Cabinet, 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, conducted by JICA on a requested project is to provide basic document necessary for the appraisal of the project by the Japanese Government. The contents of the Study are as follows:

a) Confirmation of items agreed on by both parties concerning the basic concept of the project.
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 the 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 Japan's Grant Aid Scheme.

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 jurisdiction of the organization in the recipient country actually implementing the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations in the recipient country through the Minutes of Discussions.

2) Selection of Consultants

For the smooth implementation of the study, JICA uses (a) registered consultant firm(s). JICA selects (a) firms(s) based on proposals submitted by interested firms. The firm(s) selected carry (ies) out the Basic Design Study and write(s) a report, based upon terms of reference set by JICA.

The consulting 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 and also to avoid any undue delay in implementation should the selection process be repeated.

3. Japan's Grant Aid Scheme

1) What is Grant Aid ?

The Grant Aid Program provides a recipient country with non-reimbursable funds needed to procure the facilities, equipments, services (engineering services and transportation of the products, etc.) for economic and social development the country under the principals 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, etc., are confirmed.

3) "The period of the Grant" means the one fiscal year in which the Cabinet approves the project for. Within the fiscal year, all procedure such as exchanging of 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 factor 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 Government.

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

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

However the prime contractors, namely, consulting, contracting 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 recipient country

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

(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 execution for unloading, customs clearance at the port of disembarkation and internal transportation of products purchased under the Grant.
(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.
(6) To accord Japanese nationals whose services may be required in connection with the supply of the products and services under the Verified Contracts, such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their works.

7) "Proper Use"

The recipient country is required to maintain and use the facilities constructed and equipment purchased under the Grant Aid properly and effectively and to assign the necessary staff for operation and maintenance of them 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 shall not be re-exported from 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 an authorized foreign exchange 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 II.

Necessary Measures to be taken

by the Government of Pakistan in case Japan's Grant Aid is Executed

1. To provide warehouse for stocking of parts, parking area and workshop during implementation of the project

2. To provide necessary facilities for the Project such as electricity and other incidental facilities.

3. To bear the following commissions to the Japanese foreign exchange bank for the banking services based upon the Banking Arrangement.
   (4) Advising commission of Authorization to Pay
   (5) Payment Commission

4. To exempt taxes and to take necessary measures for customs clearance of the equipment and materials brought for the project at the port of disembarkation.

5. To accord Japanese Nationals whose services may be required in connection with the supply of products and the services under the verified contract such facilities as may be necessary for their entry into Pakistan and stay therein for the performance of their work.

6. To maintain and use the equipment and materials procured under the Grant properly and effectively.

7. To bear all expenses other than those to be borne by the Grant, necessary for the transportation of the equipment and materials.

8. To ensure the necessary budget and personnel for the proper and effective implementation of the Project, including operation and maintenance of the equipment and materials procured under the Grant.

APPENDIX 5 COST TO BE BORNE BY THE RECIPIENT COUNTRY

The cost to be borne by the Pakistani side will be the cost required to prepare the new disposal (landfill) site with consideration of environmental effects. The cost estimate of landfill site preparation for phase I is estimated at Rs. 28 million. The breakdown is as follows.

Description	Amount (Rs)
Approach road	3,000,000
Internal Road and Parking Area	1,224,000
Earthen Embankment	3,800,000
Storm Water Drainage	420,000
Gas Vent	1,250,000
Leachate Collection and Treatment	4,650,000
Clay Liner	3,360,000
Administration Block, Warehouse and Ancillary Facilities	7,595,000
Sub-Total	25,299,000
Contingencies (10%)	2,530,000
Grand Total	27,829,000

APPENDIX 6 REFERENCES

Title	Year	Publisher
1. Eighth Five Year Plan (1993-98)	1994	Planning Commission
2. Economic Survey, 1994-95	1995	Finance Division
3. 1981 District Census Report of Rawalpindi	1984	Population Census Organization Statistics Division
4. Master Plan for Greater Rawalpindi	1970	Communication and Works Department
5. PC-1 for Urban Water Supply and Sanitation Project Phase-1 for Rawalpindi City	1994	Water and Sanitation Agency, RDA
6. Pakistan Environmental Protection Act, 1995	1995	Environment and Urban Affairs Division
7. Pakistan Environmental Issues	1992	Pakistan Office, JICA
8. Geology of Mandra-Riwat Area, Rawalpindi District, Punjab	1984	Geological Survey of Pakistan, Quetta
9. Geologic Map of the Islamabad/Rawalpindi Urban Area, Pakistan	1985	U.S. Geological Survey, Geological Survey of Pakistan
10. Environmental Geology of the Islamabad-Rawalpindi Area, Pakistan	-	Geological Survey of Pakistan
11. Punjab, Map, Scale 1:50,000	1988	Survey of Pakistan
12. Islamabad and Rawalpindi Districts, Map, Scale 1:125,000	1987	Survey of Pakistan
13. Islamabad and Surroundings, Map, Scale 1:50,000	1985	Survey of Pakistan
14. Rawalpindi, Map, Scale 1:500,000	1985	Survey of Pakistan
15. Islamabad and Rawalpindi Guide Map, Scale 1:30,000	1992	Survey of Pakistan