(5) Results of Technical Propositions

The purpose of the Basic Design Study for the Rural Waste Treatment Improvement Project for Jordan is to target 10 of the 23 FDS in the entire nation, which were reviewed and determined by a Committee centered around the Department of Environment of the Ministry of Rural Affairs and Environment, as subjects of the Study and to formulate plans necessary for carrying out sanitary landfill and to promote the furnishing of landfill equipment based on such plans.

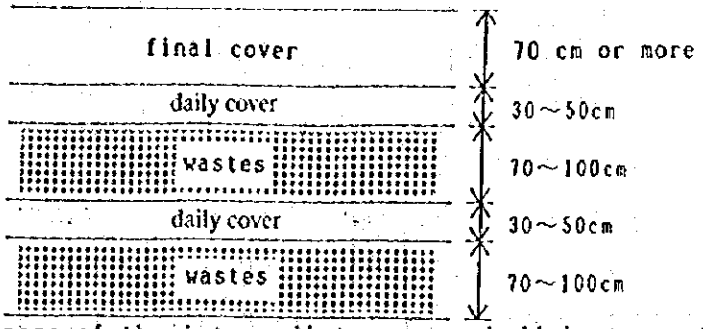
1) Sanitary landfill plan and planning of maintenance facilities

In this Basic Design Study, the topography, geology, quantity and classification of solid waste, existing facilities, landfill circumstances, impacts on the surrounding environment, etc. of FDS were considered based on field studies, existing soils, etc.
From such considerations, the optimal sanitary landfill method is proposed for each FDS as follows.

① Sanitary landfill using trenches
- Mafraq FDS
- Ma'an FDS
- Aqaba FDS

② Sanitary landfill by erection of embankments
- Al-Akalder FDS
- Humra FDS
- Tafila FDS
- Lojoon FDS
- Kufrinja FDS (existing)
- Kufrinja FDS (new)
- Madaba FDS
- North Shumeh FDS

It is also proposed that the thickness of the daily and final covers be as shown in Fig. 2-3-2-82.



(*) The thickness of the intermediate cover shall be approximately 50cm.

Fig. 2-3-2-82 Solid Waste Layer Thickness and Cover Thickness

In terms of maintenance facilities, it is proposed that the following facilities be installed at each FDS (Table 2-3-2-29).

① On-site road for passage of solid waste transporting vehicles

② Peripheral fence for preventing the entry of persons into the FDS, preventing illegal dumping, preventing scattering of solid waste, etc.

③ Monitoring well for monitoring the diffusion of pollutants flowing out from the FDS in the groundwater and the degree of impact on the living environment of people

④ Gas venting facility for rapidly venting the gas in the landfill solid waste layer to prevent impacts on the working and surrounding environments

⑤ Leachate collection pipe for rapidly discharging the rainwater and leachate that seep into the landfill layer and for promoting the activation of microorganisms and stabilization of the landfill site through expansion of the aerobic area

⑥ Leachate circulation pumping facility which circulates the leachate to the landfill section area by means of a pump to reduce the water quantity and improve the water quality

⑦ Night soil treatment water pumping facility for supplying nightsoil treatment water to a tree-planting plant, etc. to promote the greening of the FDS

Table 2-3-2-29 Necessary Facilities at each FDS

	Al-Akaider	Mafraq	Humra	Tafila	Ma'an	Lojoon	Aqaba	Kufri-nja	Madaba	North shuneh
On-site road		○※1	○		○	○	○	○	○	○
Access road				○						
Peripheral fence		○	○				○	○	○	○
Monitoring well	△※2	△	△	△	△	△	△	△	△	△
Gas venting facility								○		
Leachate collection pipe								○		
Leachate circulation pumping facility			○					○		

Remark

※1. Mark○: means facilities which should be constructed on the responsibility of Joldan before the construction machines procured from Japan awire except Gas venting facility.

※2. Mark△: means facilities which are preferably constructed by Joldan.

※3. Kufrinja column means the new FDS

It is expected that weigh bridge (truck scale) is to be equipped to record and to weigh wastes received in order to operate effective landfill.

2) Selection of landfill equipment

The landfill equipment shown in Table 2-3-2-30 were selected for carrying out sanitary landfill in consideration of the topography, geology, landfill method, types of solid waste, capacity of equipment, etc. of the FDS.

However it should be noted that this Table shows landfill equipment which are necessary for sanitary landfill and that the final determination of the landfill equipment to be procured is made in the Equipment Plan of Section 2-3-3 in consideration of the capacity, age, etc. of the landfill equipment that are currently owned by CSC.

Table 2-3-2-30 Landfill Equipment Selection Results

Landfill Method	Work		Equipment	Al-Akaider	Mafraq	Humra	Tafila	Ma'an	Lojoon	Aqaba	Kufrinja		Madaba	North Shuneh
											existing	new		
Sanitary landfill by trench excavation	Trench	Excavation	Excavator		1			1		1				
	Solid waste	Leveling Compaction	Bulldozer		(1)			(1)		(1)				
	Cover soil	Transfer	Bulldozer		(1)			(1)		(1)				
		Leveling Compaction	Bulldozer		1			1		1				
Sanitary landfill by embankment errection	Embankment	Excavation	Bulldozer	1					1				1	1
			D/S			1	1				1	1		
		Loading	D/S			1	1				1	1		
			W/L	1					1				1	1
		Transport	Dump Truck	1		1	1		1		1	1	1	1
		Leveling Compaction	Bulldozer	1		1	1		1		1	1	1	1
	Solid waste	Leveling Compaction	Bulldozer	(1)		(1)	(1)		(1)		(1)	(1)	(1)	(1)
	Cover soil	Excavation	Bulldozer	(1)					(1)				(1)	(1)
			D/S			(1)	(1)				(1)	(1)		
		Loading	D/S			(1)	(1)				(1)	(1)		
			W/L	(1)					(1)				(1)	(1)
		Transport	Dump Truck	(1)		(1)	(1)		(1)		(1)	(1)	(1)	(1)
		Leveling Compaction	Bulldozer	(1)		(1)	(1)		(1)		(1)	(1)	(1)	(1)
Other maintenance equipment		Chemical spraying vehicle		1	1	1	1	1	1	1	1	1	1	1
		Water tanker												

Note: 1: () indicates that the equipment is used in common for other work.
2: D/S = Dozershovel/ W/L = Wheel loader

2-3-3 Equipment Planning

The equipment plan is made as follows;
Firstly, some necessary equipment are selected corresponding to the design policy, secondly, some base work capacities (BWCs) are set for decision of these necessary equipment and thirdly, the number of the equipment are calculated from required work capacities.

(1) Necessary equipment

The necessary equipment are selected for planned equipment from among the equipment written in the Terms of Reference (TOR), from the existing equipment operated by the CSCs and from the equipment correspond to the design policy.
The necessary equipment are divided in 3 categories of the collection and transportation of the MSW, the landfill of the MSW and the maintenance of these equipment.
The necessary equipment for collection and transportation are comprised of compactors, dump trucks and container sets, for landfill are of bulldozers, wheel loaders, dozer shovels, excavators, dump trucks and tractor tanks and for maintenance are of vehicles and tools for maintenance.

(2) Base work capacity (BWC)

The BWC per day and per equipment is set as follows;
Weekly working days are 6 except for Friday and all yearly days are shown in Table 3-3-2-1. Daily working hours are set 6 for base work and 5.5 for bulldozer work.
The number of daily trip for collection and transportation are set 2 times with suppositions that a driving distance per trip is 35 km and it takes 3 to 3.5 hours per trip.
Though basically the BWC for landfill is to be set by the scale of a FDS, the average distance of bulldozer work is set in 50m in the project.
The results of selection of the necessary equipment and of set of the BWC are shown in Table 2-3-3-1.

Table 2-3-3-1 Necessary Equipment and Base Work Capacity

No.	Necessary Equipment	Specification	Purpose for use	Handling Availability		Working time	Work Capacity	Base Work Cap.	Remarks
1	Collection & Transportation			MSW	SOIL	[t/d]	[time/d]	[t/d]	
1-1	Compactor	16m³	for long distance	○	-	6.0	2	19.9	
1-2	Compactor	4m³	for narrow road	○	-	6.0	2	5.0	
1-3	Dump Truck	5.5t(10m³)	for wide road	○	△	6.0	2	9.6	
1-4	Dump Truck	5.0t(8m³)	for wide road	○	△	6.0	2	7.7	
1-5	Dump Truck	4.5t(6m³)	for narrow road	○	△	6.0	2.	5.7	
1-6	Dump Truck	3.5t(4m³)	for narrow road	○	△	6.0	2	3.8	
1-7	Container	1.1/0.2m³	for curb-side collection	○	-	-	-	-	
2	Landfill					[h/d]	[m³/h]	[m³/d]	
2-1	Bulldozer	280HP	Large size : EXC. + COMP.	○	○	5.5	93	512	Displacement
2-2	Bulldozer	220HP	Middle size: EXC. + COMP.	○	○	5.5	72	396	Distance 50m
2-3	Wheel Loader	220HP	Large size : EXC. + LOAD.	○	○	6.0	60	360	
2-4	Wheel Loader	180HP	Middle size: EXC. + LOAD.	○	○	6.0	52.8	317	
2-5	Dozer Shovel	200HP	: EXC. + COMP.	○	○	6.0	52.5	315	
2-6	Excavator	0.7m³	Small size : EXC. + LOAD.	○	○	6.0	25	151	Revolving angle = 90°
2-7	Dump Truck	12t(8m³)	Transportation of soil	○	○	6.0	-	-	
2-8	Tractor head with tank	50HP/ 1.5m³	Insecticide spray	-	-	6.0	-	-	
3	Maintenance								
3-1	Maintenance truck	80HP	Patrol and Repair	-	-	-	-	-	
3-2	Machines & Tools for Maintenance		Maintenance	-	-	-	-	-	

Remarks 1: ○ = Normal / △ = Possible / - = Impossible

2: EXC = Excavating / COMP = Compaction / LOAD = Loading

(3) Number of equipment

1) Equipment for collection and transportation

The number of equipment for collection and transportation are calculated as follows;
Firstly, the required quantity of MSW to be collected and transported (RQMSW) are from Table 2-3-1-1.
Secondly, the number of the equipment are calculated by the division with the base work capacities (BWC).
As a result, the equipment of 4 areas of Irbid, Salt, Aqaba and Madaba are still short, however the problems of these areas are possible to be solved by the extention of the working time. The equipment of remained 6 areas are a little bit surplus, however the exsisting equipment are remarkably old in these areas, so decisions were made to let their equipment be renewal. The process and the result of decisions are shown in Table 2-3-3-2.

Table 2-3-3-2 Number of Equipment for Collection and Transportation

Final Disposal Site	Required q'ty of MSW[RQMSW]	Equipment Specification	No.	Base Work Capacity [BWC]	Total Capacity	Difference
	t/d			t/d	t/d	t/d
Al-Akaider	91.5	Compactor 16m³	4	19.9	79.6	-11.9
Mafraq	7.5	Compactor 4m³	2	5.0	10.0	2.5
Salt	43.0	Compactor 16m³	1	19.9	23.7	-19.3
		Damp truck3.5t	1	3.8		
Tafila	0.8	Compactor 16m³	1	19.9	24.9	24.1
		Compactor 4m³	1	5.0		
Ma'an	7.4	Damp truck5.5t	2	9.6	19.2	11.8
Karaq	9.6	Compactor 16m³	1	19.9	19.9	10.3
Aqaba	13.8	Damp truck4.5t	1	5.7	9.5	- 4.3
		Damp truck3.5t	1	3.8		
Kufrinja	6.0	Damp truck5.0t	2	7.7	15.4	9.4
Madaba	52.7	Compactor 16m³	2	19.9	39.8	-12.9
N. Shuneh	2.4	Damp truck5.0t	1	7.7	7.7	5.3
Total	268.4	-	-	-	249.7	-18.7

REMARKS: RQMSW: Required quantity of MSW to be collected and transported
BWC : Basic Work Capacity

2) Equipment for landfill

Though the total number of exsisting equipment are 57 as shown in Table 2-2-1-5, the 14 equipment are heavily damaged and stopped to operate. The operation rate of those 57 equipment for landfill in 10 CSCs are low and the specification of those equipment are not adequate. The basic work to be done in landfill is to "dig and bury", but bulldozers are little. Therefore the project plans to improve these week points.

The number of equipment for landfill are calculated as follows;

Firstly the quantities of hauling MSW are calculated from the field study results, they are the RQMSWs for the landfill shown in the column [D] of Table 2-3-1-1 calculated in accodance with the design of sanitary landfill planned in this report.

Lastly the number of equipment are calculated by the division with the base work capacities (BWCs). The process and the result are shown in Table 2-3-3-3.

Table 2-3-3-3 Assignment and Capacity of Planned FDS Equipment

No	Final Disposal Site	Waste Quantity	Soil Quantity	Total Q'ty (q)	BWCs of equipment				Existing		Plan Q'ty (Q)	Balance	Relevance	Soil grade
					Bull-dozer	Loader	Shovel Dozer	Excavator	No	Quantity				
		m³/d	m³/d	m³/d	m³/d	m³/d	m³/d	m³/d	-	m³/d	m³/d	m³/d		
1	Al-Akaider	702	702	1,404	512	317		151	3	450	1,430	24	q<Q	Hard sandy soil
2	Mafraq	151	151	302	512			151	1	150	813	511	q<Q	Sandy clay
3	Salt	388	388	776	512		315		1	150	977	201	q<Q	Hard sandy rock
4	Tafila	62	62	124	396		315		0	0	711	587	q<Q	Sandy limestone
5	Ma'an	82	82	164				151	1	150	301	137	q<Q	Sand with gravel
6	Karaq	196	196	392	512	360			1	150	1,022	630	q<Q	Sand with gravel
7	Aqaba	132	132	264	396			151	0	0	547	283	q<Q	W.S.M.
8	Kufrinja	72	72	144	512		315		0	0	827	538	q<Q	Sandy limestone
9	Madaba	218	218	436	512	360			1	150	1,022	586	q<Q	Sandy clay
10	N. Shuneh	64	64	128	512	360			0	0	872	744	q<Q	Sandy soil
Number of main equipment		-	-	-	512×7 396×2 ×9	360×3 317×1 ×4	×3	×4	-	-	-	-	-	-

Note: q=Quantity dumped/ compacted or dug/ loaded/ covered in a day
Q=Capacity of planned equipment per day
q>Q: Equipment specifications short on capacity
q=Q: Equipment specifications with no spare margin
q<Q: Equipment specifications are relevant as they allow for a spare margin
WSM : Weathered sand material

3) Equipment for maintenance

In order to implement what is called the "preventive maintenance", the project plans to prepare the equipments for maintenance.
In this paragraph, the preventive maintenance means that maintenance actions are to be done preventively so that an equipment is suddenly not out of order and not to pay a loss.
The maintenance means the actions of the exchange of consumable parts and the adjustment and the repair means the actions of rehabilitation etc.
The total number of equipment for maintenance are 10 for 10 CSCs, they are installed in repair shops provided by CSCs.
The content of it is shown in the Table 2-3-3-4.

Table 2-3-3-4 Equipment for Maintenance

No.	Equipment	No. per set	Total (sets)	Specification
(1)	Machines			
1	Welder set with generator	1	10	10 kVA generator with gasoline-engine
2	Gas welding and cutting outfit	1	10	
3	Handy Electric Grinder	1	10	
4	Handy Electric Drill	1	10	
5	Portable Hydrauric Jack	1	10	Manual 5t
6	Hydrauric Garage Jack	1	10	Manual
7	Air Compressor (Small-type)	1	10	only for pnenumatic tubu injection
8	Manual grease pump	1	10	for high-pressure
9	Grease gun	1	10	
10	Oil measure	1	10	
11	Plastic handy can	1	10	
12	Tire bead breaker	1	10	Handy-Air-type
13	Battery charger	1	10	12V
14	Chain block	1	10	2t
(2)	Tools			
1	Mechanic tool set	1	10	
2	Wire rope for trailing	1	10	
3	Wire rope cutter	1	10	
4	Tire service tool set	1	10	
5	Tool box: Wooden Large	1	10	
	: Steel Medium	2	10	

4) Number of Equipment

The number of equipment by the CSC etc. is shown in Table 2-3-3-5.

Table 2-3-3-5 Basic Design Details for the Equipment

FDS	Al Akaidar	Mafraq	Kufrinja	Humra	Lojoon	Ma'an	Aqaba	North Shunch	Madaba	Tafila	TOTAL
AREA	Irbid	Mafraq	Ajlun	Salt	Karak	Ma'an	Aqaba	North Ghor	Madaba	Tafila	unit (set)
For collection/transportation											
Compactor (16m3)	4			1	1				2	1	9
Compactor (4m3)		2								1	3
Dump truck (10m3/5.5t)						2					2
Dump truck (8m3/5t)			2					1			3
Dump truck (6m3/4.5t)							1				1
Dump truck (4m3/3.5t)				1			1				2
Container (set)	1	1	1	1	1	1	1	1	1	1	(10)
For landfill											
Bulldozer (280 Hp)	1	1	1	1	1			1	1		7
Bulldozer (220 Hp)							1			1	2
Wheel loader (220 Hp)					1			1	1		3
Wheel loader (180 Hp)	1										1
Dozer shovel (200 Hp)			1	1						1	3
Excavator (0.7m3)	1	1				1	1				4
Dump truck (8m3/12t)	1		1	1	1			1	1	1	7
Tractor head with tank	1	1		1	1		1	1	1		7
For maintenance											
Maintenance truck			1			1	1				3
Machines and tools (set)	1	1	1	1	1	1	1	1	1	1	(10)
Total	11	7	8	8	7	6	8	7	8	7	(20)+57

CHAPTER 3 IMPLEMENTATION PLAN

Chapter 3 Implementation Plan

3-1 Implementation Plan

3-1-1 Implementation Concept

The Project will be implemented on the basis of a grant aid scheme and put into practice through a process involving the following formalities which are due to commence upon the signing of the E/N. The process will be comprised of the following steps.

(1) Process of implementation

1) Exchange of Notes (E/N)

(A) Signing of the E/N

2) Consultant contract and detailed design

(A) Confirmation of scope of work
(B) Signing and attestation of consultant contract with Japanese consultant firm
(C) Banking Arrangement (B/A) and Authorization to pay (A/P)
The government of the recipient country shall conclude a Banking Arrangement (B/A) for the receipt of the grant aid funds with an officially approved Japanese foreign exchange bank.
(D) Setting and confirmation of detailed design specification and tender conditions

3) Tendering and evaluation

(A) Tendering plan
(B) Tender documents and approval by the government of the recipient country
(C) Preparation for tendering
(D) Tendering
(E) Elaboration of tender result

(F) Negotiation and award of contract (Acceptance of JICA)

(G) Procurement contract with Japanese firms

The recipient country shall exchange contracts for the procurement of the Project equipment with the Japanese firms as the result of the tender procedure in Japan.

(H) Verification of contract by the Japanese government

(I) Issuance of authorization to pay

The recipient country shall issue a statement of A/P and the Japanese Supplier shall accept said statement A/P.

4) Supervisory services

(A) Supervision of the manufacturing and delivery schedules

(B) Final inspection and performance tests

(C) Supervison of the packing work

(D) Confirmation of quantities and supervision of shipping

(E) Invoice for payments and payments

After loading the equipment on board maritime vessel, the Japanese Suppliers shall present his invoices for payment to the bank with which the recipient country has signed the B/A and receive payments.

5) Delivery of equipment to the site

(A) Customs clearance

(B) Inland transportation

(C) Assembling, performance tests, adjustments, and instruction on operation

(D) Delivery inspection and acceptance

6) Completion of activities

(2) Implementing policy

With regard to the above procedures, particular attention should be given to step 3) (I); ie. "the issuance of authorization to pay (A/P)". The timing of the issuance of said A/P will have a significant impact on the period required for the procurement of the equipment.

It is not until the receipt of said A/P that the Supplier will make arrangements for the commencement of manufacture of the equipment. The belated receipt of said A/P by the Supplier would therefore result in a delay in the commencement of production of the equipment and consequently in a delay in the procurement of the equipment and its delivery.
The recipient country should therefore be given full explanations to solicit its understanding of the importance of the early issuance of said A/P so that the Project must be excuted within a single fiscal year.
The Jordan side shall undertake the customs clearance formalities and land transportation of the equipment under the inspection of the Authorities within the MHRAB. In this context, it will also be essential to ensure the early implementation of the formalities concerned. Upon arrival of the equipment in Jordan, it will be necessary for the Japanese side to arrange for the dispatch of consultant engineers.
The schedule shall be adhered to strictly and the transfer shall be carried out without fail in consideration of the above.

3-1-2 Implementation Conditions

As the project is an equipment project and is not a construction project, there are no particular matters to be noted in terms of implementation.

3-1-3 Scope of Works

The scope of works of the present project are given below.

(1) Japanese side

The manufacture of the equipment, its procurement, its shipping to the port of Aqaba and its assembly and trial operation at Agaba.

(2) Jordanian side

1) Customs clearance.
2) Inland transportation of equipment from the port of Aqaba to the final disposal sites of the CSC's or the local workshops.

3) Construction of facilities at final disposal site, such as onsite roads, fence, environmental facilities etc. and of workshops for maintainance of the procured equipment.

Rough estimation of Jordan side expences will be shown in the Appendix 5.

3-1-4 Consultant Supervision

(1) Conditions

After the contract with the Supplier has been signed, the equipment to be supplied will be handed over to the Jordanian side through a process comprising the manufacture of the equipment, inspection, packaging, loading on board maritime vessel, maritime transportation, stevedoring, customs clearance, assembling, adjustment, trial operation and delivery inspection. To ensure the transfer of all of the equipment to the Jordanian side within the contractual period, it will be essential to manage all stages of this process to assure strict adherence to the schedule. The following restrictions and special conditions must be noted.

1) Number of days required for the formalities and approval procedures (tax exemption formalities, customs clearance procedures etc.)
2) Restrictions associated with the site conditions such as port facilities and roads, and the general practices and customs in life style and religion.

(2) Matters to be noted in terms of consultant supervision

1) Procedures in Japan

(A) Confirmation of progress

The progress of work shall be checked to confirm adherence to the terms of the contract and the Jordan side will be informed accordingly. A detailed schedule will be established covering from the manufacture of all units of equipment to their transfer to the Jordanian side and a progress report will be demanded from the Supplier on a monthly basis in order to prevent the occurrence of problems.

(B) Advice for customs clearance

The stevedoring and customs clearance procedures in the Jordanian port shall be carried out on account of the Jordanian side and the Jordanian side is advised to ensure that the customs clearance procedures associated with the duty exemption measures will not take a long time and the Supplier is encouraged to ensure the early issue of the shipping documents.

(C) Inspection

In the case of equipment that are manufactured in Japan, checks and inspections shall be performed by the consultant at the factory upon completion of the equipment to confirm that the equipment have been manufactured in accordance with the specifications and the production drawings. At the same time, the performance of the equipment shall be checked. The packaging shall also be checked for compliance with the packaging specifications.

2) Procedures in Jordan

(A) Advising and supervision of customs clearance procedures

In order to ensure the smooth execution of the customs clearance procedures in Jordan, the Supplier shall forward to the Jordanian side the shipping documents immediately after the equipment have been loaded on board a maritime vessel so that the Jordanian side can begin its preparations prior to the arrival of the freight vessel in the Jordanian port. To ascertain the progress of the customs clearance procedures and ensure the smooth completion thereof, prior notification will be served on the Jordanian authorities in charge. Particular attention will be required since the duty exemption procedures may take a long time.

(B) Delivery inspection and supervision

Final delivery inspection tests shall be conducted on the delivered equipment, all accessories, spare parts, and jigs or tools to ascertain damage or breakage and check that the quantities supplied are correct. These inspection tests shall be properly conducted under the supervision of the consultant for official acceptance by the Jordanian side.

All the mobile vehicles and the heavy duty machines for which there will be no traffic problems, etc., shall be subjected to the delivery inspection tests near Aqaba port immediately after customs clearance.

(C) Supervision of land transportation of equipment

It is recommended that the safest means of transport should be used for the transportation of for both the mobile vehicles and the equipment to be assembled after land transport. Since the quantity of equipment is large and the transported lots may become splitted or concentrated depending on the equipment type, the persons concerned shall be made adequately aware of making preparations and local adjustments for smooth execution of delivery inspections and delivery near Aqaba port. If the traffic conditions of the southern area allow, the heavy equipment to be carried on a low-bed trailer shall undergo assembly and trial operation at a factory premise, etc. near Aqaba port and transferred to the Jordanian side immediately after the delivery inspection tests. It will therefore be necessary to supervise the progress of work, including that to be caried out at the manufacturer's agent's.

(D) Acceptance

After the equipment has been subjected to the trial operation the Jordanian side will be given the notice of acceptance. After the Jordanian side has given its approval, the certificate of completion shall be issued with the witness of consultant.

(E) Supervision of trial operation and operating instruction

After the delivery of the equipment, trial operation shall be carried out to check equipment performance. The manufacturers of the equipment will be required to provide instructions on operation and maintenance procedures.

3-1-5 Procurement Plan

(1) Procurement policy

Procurement of equipment shall be subject to a tender procedure which may also include third-country products.

Consequently, the equipment to be procured will not be limited to Japanese products alone and products from third-party countries can also be selected. The procurement of equipment shall not be determined solely according to whether the price of the equipment is low. Procurement decisions should also be based on the issue of future maintenance and management, that is, the relative ease for the Jordanian side to procure parts in Jordan and whether a repair and after-sales care system is sufficiently in place. The procurement calls for prudence and caution, and a low price must not be the only consideration as quality and delivery time will have to be taken into serious account. In the case of procurement from third-party countries, it will be essential to safeguard against all eventualities through a Japanese company in order to obviate the hazards of a delivery management that would less consistent than that provided in the case of procurement within Japan. In the selection of the equipment, the following basic considerations should be taken into account:

1) The equipment should be from manufacturers offering definite quality and delivery period.

2) The equipment should be from manufacturers who have local agents in Jordan and can offer a proper service system.

3) There should be no doubt as to the availability of a comprehensive parts procurement system and the effective utilization of the equipment.

(2) Procurement plan

The tender will take place in Japan. However, with respect to the procurement sources, the possibility of ordering products from third-party countries should not be excluded, so far as they satisfy the necessary criteria in terms of quality, delivery time and all other conditions. Products made in Europe and nations neighboring Jordan may be considered upon thorough investigation and provided that quality and delivery period requirements are met in terms of repairs, after-sales service, etc.
Table 3-1-5-1 gives an overview of the manufacturers and their dealers.

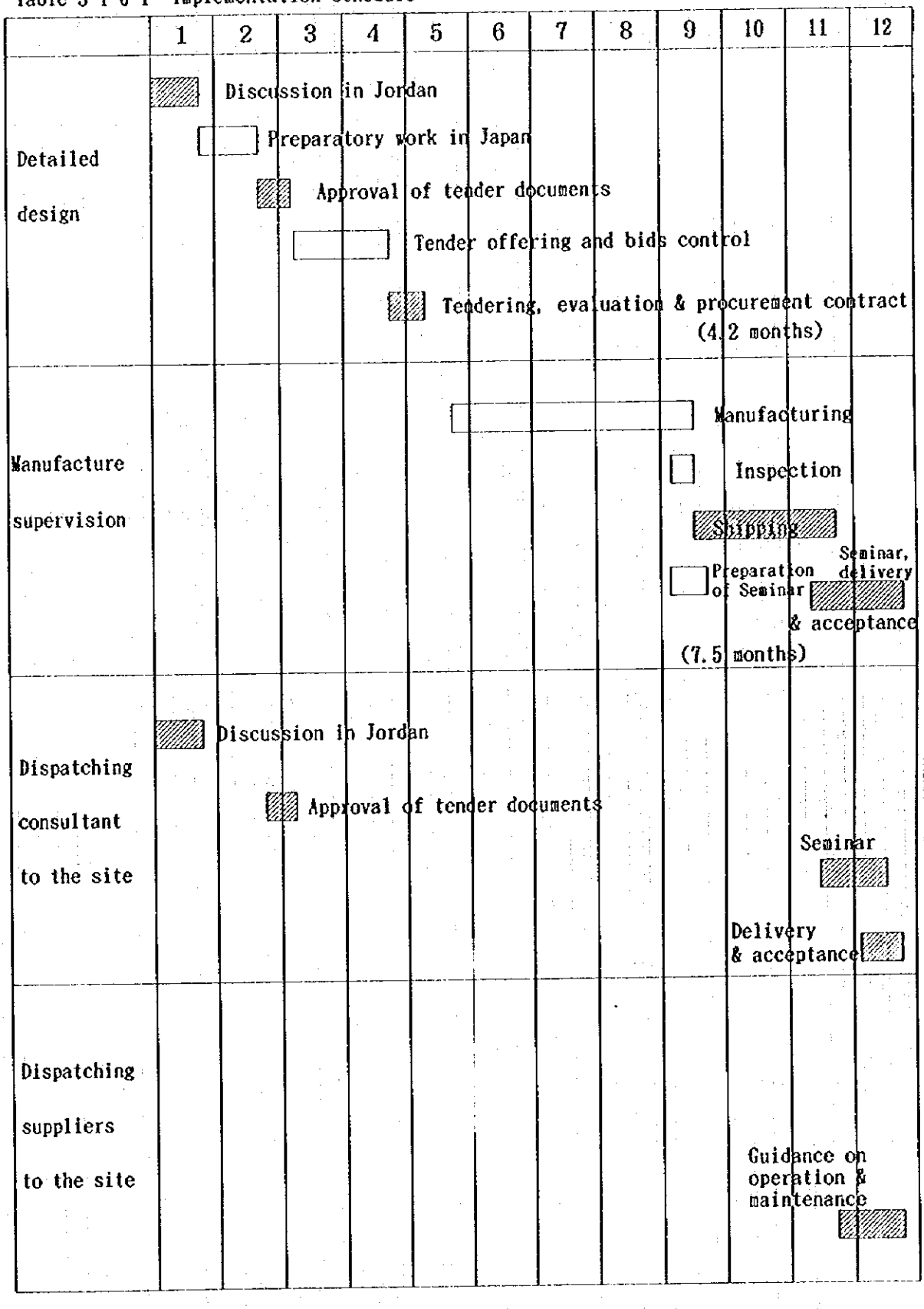
Table 3-1-5-1 Agents of Main Equipment Manufacturers in AMMAN and their Servicing Yards

Name of Agent	Tel.	Contact Person	Agent - Equipment handled for Repairs
JORDAN TRACTOR	661141	Husam Abu Hanna	CAT Products, on-line parts ordering
MERCEDES BENZ	732410	Ibrahim M.Musallam	Vehicles, on-line parts ordering
VOLVO	655635	Shawki Abu Haidar	Loader, vehicles, 40,000 parts in stock
THE COMM. & IND. CO.	651397 651398/9	Shehadeh S. Twal	UD, Ford, Suzuki, Poclain,
UNIVERSAL EQUIPMENT	824232	Omar A. Shaban	FIAT products, on-line ordering of parts
THE NEAR EAST EQUIPMENT	812816/7	Fahmi Gheith	Komatsu products, on-line parts ordering
TOYOTA	638103/4	George E. Haddad	Toyota vehicles
Mitsubishi Motors	654071	Issac M. Kamal	Mitsubishi vehicles

3-1-6 Implementation Schedule

It will take approximately eight months to complete the entire process after signing the contract with the Supplier. Seminars on the effective utilization of the procured equipment shall be held for the personnel concerned within one month after the shipment of equipment. Table 3-1-6-1 shows the implementation schedule for the operations under this Project.

Table 3-1-6-1 Implementation Schedule



3-1-7 Obligations of Recipient Country

(1) Arrangement of facilities

The facilities below shall be furnished as auxiliary facilities in order to guarantee that the equipment obtained under grant aid cooperation scheme are used effectively for the execution of this Project and maintained appropriately.

1) Onsite road
2) Peripheral fence
3) Gas collection system
4) Leachate collection line
5) Leachate circulation and pumping facility
6) Parking areas workshops, etc. for vehicles and heavy equipment and workshops

(2) Other undertakings

1) Early signing of the procurement contract with the supplier.

2) Exemption from import duty, tax and all other levies imposed on equipment and parts transported into Jordan in connection with the implementation of this Project.

3) Measures required to expedite the unloading on arrival of the equipment in the destination port, customs clearance procedures and land transportation.

4) Payment of the following charges to the Japanese foreign exchange bank for the bank services and procedures.

(A)Charges due for the notification of the authorization for acceptance of payment

(B) Charges due on payment

5) Cooperation in the grant of entry and residence

Permits in Jordan on behalf of the Japanese subjects whose presence is deemed necessary in connection with the implementation of this Project.

Exemption from import duty, tax and any other levies imposed in Jordan on products and services with respect to such Japanese subjects.

6) Grant of exemptions and waivers on all items deemed necessary in connection with the implementation of this Project in addition to those items already covered by the grant aid cooperation scheme.

3-2 Operation and Maintenance Plan

3-2-1 Current State of Equipment Operation and Maintenance

(1) CSC's duties for equipment operation and maintenance

The CSC is comprised of 3 different functioning groups, those are for the final disposal site operation, the collection and transportation of the MSW, the regional roads repairing and maintenance as well as equipment maintenance.

Due to the nature of CSCs organization, all equipment owned by the CSC are to be used in common, so that 3 functioning groups are able to mobilize the equipment in accordance with the occacion took place.

The CSC, in fact, is lacking of a plan for equipment maintenance and renewal of the equipment in each function.

With this reoson, it can be noted that the CSC is hardly to select appropriate equipment and maintenance systems forecasting on a long term scheme.

The representative samples observed are shown in Table 3-2-1-1.

Table 3-2-1-1 Current State of Equipment Management

Description	CSCs etc.
a.Lack of plans for equipment servicing and renewal	Aqaba, Ajlun
b.Not appropriate equipment are selected	Mafraq, Salt, Ma'an, Aqaba
c.Absence of proper preventive maintenance	All CSCs

(2) Current situation of equipment servicing

The current situation of equipment servicing is shown in Table 3-2-1-2.

Only three areas, Madaba, Salt, and Aqaba, have own equipment workshop. The other seven CSCs have decided to build own workshop with the subsidies prepared by the central government.

Table 3-2-1-2 Current Status of Equipment Workshop

CSC	Irbid	Mafraq	Kufrinja	N. Shuneh	Salt	Madaba	Karaq	Tafila	Ma'an	Aqaba
Equipment in use	15	7	8	7	9	11	19	11	10	8
Servicing personnel	1	1	0	0	0	0	0	0	1	5
Workshop	No	No	No	No	Yes	Yes	No	No	No	Yes
FDS site administration building	Yes	No	No	Yes *1	Yes	Yes	Yes	Yes	Yes	No

* 1: The building is required to reconstruct.

3-2-2 Operation and management plans recommended

By the time of transfer of the equipment specified by the Project, the DOE of the MMRAE will become the Environmental Protection Corporation. This opportunity should be used to make plans on equipment operation and management under this background. Considerable plans are described below.

(1) Centralized management

1) Centralized management and organization

Equipment operation and management can be carried out efficiently if it is carried out in a centralized manner. That is, by carrying out the allocation, preventive maintenance, renewal, etc. of all equipment in a centralized manner, redundancies in personnel and equipment can be avoided and unexpected failures, stoppage, etc. can be coped with more readily.

The organizations for collection, transport, and final disposal of waste in Jordan are numerous including the DOE, the DORC, the CSCs and municipalities, even when they are limited to those that are relevant to the Project. Among these, the CSCs enjoy a high degree of independence. Such diversity of organizations is one factor that is making the centralized management of equipment difficult at the present time.

In view of the facts as stated above, the DOE would be enforced in its functions to establish a centralized management system in terms of top position organizing other agencies concerned.

Additionally it is desirable that not only equipment operation and management but activities including environmental monitoring also be brought under the centralized management with the new organization.
Thus in and after the Project, plans would be formulated so that the equipment of the project will serve as elements that provide overall support when the centralized management of equipment is realized in the future.

2) CSCs

Under the control of the DOE with the new organization, the CSCs will serve to provide overall support in the future. These agencies can perform the abovementioned service activities including FDS management and also own the equipment for these purposes.
The CSCs is in fact conducting the similar systems in terms of small scale centralized system as previously mentioned, so that the CSCs will easily be involved in the new organization.

(2) Equipment operation and maintenance plan

1) Graded servicing system for equipment

In consideration of that the projected equipment are dispersed among the ten CSCs etc. with about ten collection vehicles and a few heavey duty equipment for landfilling, an equipment operation and maintenance plan to establish a graded servicing system should be formulated to satisfy such scales and circumstances. In other words, the scope of equipment operation and maintenance of each CSC will be self-defined in cooperation with the DOE. Prior consideration of the scope of accomodation will be effective for the appropriate allocation of the equipment in terms of servicing activities for failure, repair, and preventive maintenance of the equipment as well. Failures may range from light failures such as flat tires to serious failures such as deformation of a vehicle body. Inadequacies will arise if the entire range of repairs for such failures are to be performed at outpost work shop at far-away locations such as the final disposal site.
In the Project, the servicing work for such repairs and preventive maintenance are graded into the five stages shown in Table 3-2-2-1 and plans shall be made accordingly.

Table 3-2-2-1 Five-Stage Grading of Equipment Servicing

Stage	Scope of Servicing Tasks	Scope of Responsibility	Person in Charge
Stage 1	Cleaning of equipment, replenishing of cooling water, grease/oil and fuels,hydraulic oil, and tire air, inspection of electrical parts, etc.	Checking before, during and after operation	Operator
Stage 2	Replacement of cooling water, lubricant, fuel, hydraulic oil, and tires. Repairing of flat tires Cleaning and replacement of filters, electrical parts and other small wearing parts	Daily and periodic	Operator, Servicing staff of CSC and/or manufacturer's agent
Stage 3	Adjustment of faulty parts of devices and electrical equipment including cooling water, lubricant, fuel, hydraulic parts, etc. Cleaning and replacement of medium wearing parts Replacement, recovery, and reinforcement of assembled parts Reinforcement, medium disassembly, adjustment, and assembly of faulty parts	Periodic cheking	Servicing staff of manufacturer's agent
Stage 4	Reinforcement, replacement, major disassembly cleaning, adjustment, assembly, and parts overhaul or large wearing parts Rehabilitation	Periodic cheking periodic maintenance, periodic renewal	Private servicing firm, manufacturer's agent's factory
Stage 5	General equipment overhaul, rehabilitation	Periodic maintenance, periodic renewal	Private servicing firm, manufacturer's agent's factory

The services of stage 1 and stage 2, more or less include daily inspections, inspection and replacement of lubricants, greasing and reinforcement welding of operating equipment, replacement of small parts, adjustment of mechanical systems, periodic inspection and maintenance under the presence of the agents of the equipment manufacturers, etc. The services up to stage 2 shall be performed at the work shop.

The services of stage 3 and above will basically be performed at private sector servicing firms and the workshop, etc. of the agents of the equipment manufacturers.
The objectives of the services of stage 2 are to "uphold an equipment availability of 85%" and to "conduct preventive maintenance for avoiding unexpected failures, repairs, and servicing," and these are important elements for supporting the function of the final disposal site.

2) Selection of wearing parts and inventory Control

Wearing parts shall be selected on the basis of the stage 5 servicing plan and their quantities shall be defined in accordance with the scheduled operating time per year, etc. Wearing parts shall be stored in the servicing facility, replaced in accordance with the preventive maintenance and periodic inspection schedule and provided with systematic inventory control. For inventory control, a feature list (inventory control note) shall be provided for each part to ensure accurate management of the numbers of parts that are being used and the numbers in stock. Parts purchasing schedule shall be established based on these management procedures.

(A) Selection of wearing parts:

The parts required for periodic maintenance servicing through stages 2-5 shall be selected.

(B) Quantity and cost of wearing parts:

In experience as reference, the table attached below provides the factors to be used for calculation of estimated cost for wearing parts in the following example of Bulldozer 280HP;
Bulldozer cost x 0.0302 (for the case of operation after 1,000 hrs) = Expected cost for preparing of wearing parts of the Bulldozer.

Table 3-2-2-2 Factors to be used for determining of cost of wearing parts

FDS Equipment	1,000 (hr)	2,000 (hr)	Waste collection & transportation	1,000 (hr)	2,000 (hr)
Bulldozer 280HP	0.0302	0.0700	Dump truck 6 ton	0.3510	0.0776
Bulldozer 220HP	0.0343	0.0749	Dump truck 8 ton	0.0378	0.1394
Wheel loader	0.0394	0.0872	Dump truck 10 ton	0.0331	0.1207
Dozer shovel	0.0347	0.0763	Dump truck 20 ton	0.0326	0.1165
Excavator	0.0265	0.0570			

(3) Size of equipment servicing facilities

1) Scale of servicing facility

Seven of the ten CSCs etc. covered by the Project have no workshops. The MMRAE is making plans for the equipment of the servicing facilities for these seven CSCs etc.

The Study Team has planned and estimated the scales of the servicing workshops based on the concept of graded servicing and has proposed a servicing workshop with a floor area of approximately 100m^2.

2) Equipment for the servicing workshops

Ten CSCs etc. except for Aqaba are inadequately equipped with servicing tools and machines and are not in a position to carry out preventive maintenance tasks. Although these CSCs etc. subcontract regular servicing and periodic maintenance tasks out to private-sector firms, the preventive maintenance tasks that need to be conducted on a daily basis are within the scope of responsibility of the equipment operators and it is essential that they should be provided with the necessary tools and equipment for carrying out these tasks. Daily inspection and lubrication are particularly essential for the undercarriage, actuating devices, etc. of the equipment.

To achieve a full 13 years' service life for the equipment, it will be essential to train the mechanical operators (drivers, service technicians) in maintenance and inspection and inculcate a proper sense of responsibility for these operations.

For this purpose, it will be an urgent priority to provide the necessary tools and equipment for the maintenance, inspection and upkeep of the equipment fleets of the CSCs etc.

3) Agents of main equipment manufacturers and their servicing yards

Table 3-1-5-1 shows the servicing yards of agents of the main equipment manufacturers in Jordan.

The agents below have the facilities and servicing potentiality to carry out major maintenance tasks. Some of these are large in scale and have over 30,000 items of wearing parts in the warehouses. All servicing yards are kept neat and clean, and are fully capable of providing a comprehensive and effective servicing system.

The agents of heavy equipment manufacturers provide after-sales services within a 200km radius of the metropolitan area by means of travelling repair vehicles.

The agents of construction equipment manufacturers (CAT, FIAT, KOMATSU, VOLVO, etc.), in particular, are equipped with facilities for initial and advanced training and have a full range of teaching and training aids in the form of videos and technical literature at their disposal. They are thus in a position to offer a very favorable service which is markedly superior to their service capabilities in Central and South America and other areas of the world. There is and will therefore be no problem in terms of the after-sales services for the equipment scheduled under the project.

(4) Collection of equipment information and rationalization of management

In terms of general information of the CSCs, information on fuel, oil/grease, and personnel are being controlled currently. However, such informations are not being integrated and/or analyzed statistically. Furthermore, unified principles for accounting have not been introduced as yet.

The CSCs etc., which are responsible for part of the management of the urban service sector, need to rationalize the collection and management of equipment information and introduce unified accounting principles. The plan for collection of equipment information and rationalization of management is shown below.

1) Keeping of daily, weekly, monthly and annual Journals

It is essential that daily, weekly, monthly, and annual journals, etc. be kept as basic items of information collection and for budget planning, equipment renewal, etc. The daily journals should include the items below, document formats should be standardized, and implementation should be ensured through education and training.

(A) Daily operation journals for collection and transportation equipment and FDS equipment

(B) Daily journals on the deliveries to the FDS by the waste transportation vehicles

2) Keeping of equipment manuals, equipment catalogues, and Parts catalogues

The CSCs etc. should have at least minimum knowledges required for a manager of the equipment and should keep and store equipment manuals, equipment catalogues, and parts catalogues as sources of information.

3) Management of equipment repair enterprises

The CSC's should place all heavy-duty servicing and maintenance work from grade 3 upwards as shown in Table 3-2-2-1 with the servicing yards of the agents of the equipment manufacturers and/or with private servicing firms. It will therefore be necessary to hold careful and adequate discussions on the implementation of inspections and servicing carried out by the agents. For this reason, it will be essential for the CSCs etc. to keep in very close touch with the agents and private-sector service yards and provide subcontracting control.

(5) Training of equipment operators

(A) Middle management

This Report provides a landfill plan for each FDS. These plans are entirely pointless unless they are implemented.

The success of sanitary disposal of waste, that is, of sanitary landfill, critically depends on the abilities, expertise and action of the FDS chiefs and the environmental inspection staff of the DOE. Thus the landfill plan must be carried out thoroughly under instructions of the management. Although Jordan is relatively well-endowed with sites for FDSs effective, artificial measures, such as sanitary landfill, must be taken to prevent the dispersal of waste and other pollutions. It will therefore be necessary to convey and establish the operation and management know-how for FDS based on the landfill plans by allowing for the prevailing environmental conditions and by implementing training at the ten CSCs etc. for the middle management staff. The following overview gives the contents of the training to be provided for middle management staff.

Table 3-2-2-3 Training & Instruction for FDS Operation & Management

Training	Description
a. Landfill methods	It is best to carry out training in trench work techniques at Ma'an and training in open-cut techniques at Aqaba and Madaba.
b. Waste delivery volume management	
c. Measures to prevent environmental pollutions and waste dispersal	
d. Waste disposal costs and operation management	
e. Equipment operation management	

2) Operating personnel

In connection with the introduction of the equipment scheduled under the project, initial operational instruction and basic training in essential mechanical know-how, preventive maintenance, inspection and servicing needs to be given, and scope of responsibility of the operators in terms of servicing and precautions in equipment operation must be defined and made thoroughly understood. It will also be necessary to prepare training manuals and to have middle management and/or the equipment manufacturers' agent conduct training programs on a regular basis in order to ensure that these activities will become firmly established as a system.

The following breakdown outlines the training for operating personnel.

Table 3-2-2-4 Contents of Training for Operating Personnel

No.	Contents of Training
a.	Basic mechanical know-how
b.	Training on inspection and maintenance
c.	Initial operator instruction
d.	Training on Record Keeping in Operating Journals
e.	Landfill methods and operating efficiency
f.	Training on safety

3) Servicing personnel

In connection with the introduction of the equipment scheduled under the project and the erection of servicing facilities, basic training in essential mechanical know-how, maintenance, and inspection shall be provided first. Training on the methods for the establishment of preventive maintenance and regular servicing schedules and in the skills required for understanding parts manuals shall be provided and the scope of responsibility in terms of servicing shall be defined clearly.

It will also be necessary to prepare training manuals and have medium management and/or the equipment manufacturers' agent conduct training programs on a regular basis in order to ensure that these activities will become firmly established as a system. The following breakdown outlines the training aimed at servicing personnel.

Table 3-2-2-5 Contents of Training for Servicing Personnel

	Contents of Training
a.	Basic mechanical know-how
b.	Initial instruction on inspection and maintenance
c.	Training on Record Keeping in Operating Journals
d.	Training on the development of schedules for maintenance, inspection and regular maintenance
e.	Training on safety

4) Office administration personnel

In connection with the introduction of the planned equipment, it will be essential to standardize documentation formats and prepare manuals for organizing, analyzing, and reporting basic informations. Training should be provided on basic knowledge in data management, including journals, statistical tables, calculation of operation costs, and preparation of the annual budget.

5) Teaching aids for training programs

All teaching aids used for or in the training programs conducted in accordance with the Project should be prepared in Arabic and distributed to the CSC staff concerned with equipment.

6) Establishment of a safety management system

In the interest of prevention of site accidents due to vehicles and heavy equipment, it will be essential that safety consciousness be heightened through training, that serviced equipment be presented, and that the operating plans are in accordance with the topographical conditions of the site. Although the landfill site designs of this Project are prepared upon taking these factors into account, it will be incumbent upon the CSCs etc. to ensure adequate safety measures with respect to the access roads etc. to the FDSs.

The Salt and Kufrinja final disposal sites, in particular, have the highest degree of danger as a result of there being many steep inclines and sharp bends on the access route to the sites. These sites therefore necessitate the installation of road signs on the access route as well as the erection of guard rails or guard walls as urgent accident prevention measures.

In the mountainous zones there are five CSCs etc. in the northern part and two CSCs etc. in the central part with ice and snow conditions in winter. For these CSCs etc. it will be of paramount importance to establish appropriate safety measures.

3-2-3 Existing Equipment Running and Management Costs

The actual operation and management costs of the existing equipment are shown in the accounts as the total of fuel, oil/grease and servicing costs, and Table 3-2-3-1 below compares the equipment maintenance and management costs with the availability of the equipment for 1995.
At the Salt, Tafila, and Aqaba CSCs, the maintenance costs for the equipment are high despite a low availability because of the high incidence of equipment breakdown resulting in considerable repair expenditures.

Table 3-2-3-1 Actual Equipment Operating and Management Costs Incurred by the CSCs and the Equipment Availability

CSC Budget	Irbid	Mafraq	Kufrinja	N. Shuneh	Salt	Madaba	Karaq	Tafila	Ma'an	Aqaba
1995 Data (1,000JD)	82.00	50.00	15.98	7.73	52.79	20.61	54.00	53.00	11.30	31.00
Equipment Availability(%)	73 [7]	86 [2]	75 [5]	86 [2]	44 [10]	91 [1]	74 [6]	64 [8]	80 [4]	50 [9]

Note:1: Equipment availability data have been extracted from the Current Statistical Tables for Equipment in the Possession of the CSCs etc.

2: The figure in [ ] indicates the ranking of the ten CSCs etc.

3-2-4 Planned Equipment Running and Management Costs

(1) Essential framework parameters

1) Numbers of working days in a year

Religious practice in Jordan dictates that every Friday is a holiday. This means that the five-day week is not part of life in Jordan. If all Fridays and holidays in a year are thus deducted from the total number of days a year, and if we further subtract the days on which the vehicles are out of service because of heavy rains and other bad weather conditions and the need for equipment servicing and repair, we are left with a total of 297 effective working days assumed.

Table 3-2-4-1 Days Worked in a Year

Month	1	2	3	4	5	6	7	8	9	10	11	12	Total
No. of days	31	28	31	30	31	30	31	31	30	31	30	31	365
No. of days-off	4	4	5	4	4	5	4	4	5	4	4	5	52
No. of public holidays	1				1							1	3
No. of working days	26	24	26	26	26	25	27	27	25	27	26	25	310
Vehicles grounded due to weather (estimated)	1	1									1	1	4
Vehicles grounded due to regular maintenance (estimated)			1			1			1			1	4
Days of repair (estimated)						5							5
Total no. of non-working days	1	1	1	0	0	6	0	0	1	0	1	2	13
No. of effective working days	25	23	25	26	26	19	27	27	24	27	25	23	297

2) Collection and transportation time and trip frequency

The results from the statistical survey of the present status of waste collection and transportation in the areas under the jurisdiction of the CSCs etc. have been used to set the conditions for calculating the operating time of the collection equipment and the number of transportation trips as shown in Table 3-2-4-2.

Table 3-2-4-2 Calculation Parameters

Working hours		7 hours per day
Collection/Transportation Efficiency	: in plains	0.9
	: in hilly terrain	0.8
	: in mountainous areas	0.7
Maximum Transportation Distance	: L1	50km
Minimum Transportation Distance	: L2	20km
Average Collection Distance	: L3	4km
Travel Speed of Empty Vehicle	: V1	60km/h
Travel Speed of Laden Vehicle	: V2	30km/h
Travel Speed during Collection	: V3	3km/h

The relationship between the haulage distance and the collection and transportation time and number of trips are shown in Table 3-2-4-3.

Table 3-2-4-3 Collection and Transportation Hours and Trip Frequency

Distance(km):L			50	49	48	47	46	45	44	43	42	41	40
Collect time(Hr):H			4.38	4.32	4.26	4.19	4.13	4.07	4.01	3.94	3.88	3.82	3.75
Collect cycle:N			1.60	1.62	1.64	1.67	1.69	1.72	1.75	1.78	1.80	1.83	1.87
L	39	38	37	36	35	34	33	32	31	30	29	28	27	26
H	3.69	3.63	3.56	3.50	3.44	3.38	3.31	3.25	3.19	3.12	3.06	3.00	2.93	2.87
N	1.90	1.93	1.96	2.00	2.04	2.07	2.11	2.15	2.20	2.24	2.29	2.34	2.39	2.44
L	25	24	23	22	21	20	19	18	17	16	15	14	13	12
H	2.81	2.75	2.68	2.62	2.56	2.49	2.43	2.37	2.30	2.24	2.18	2.12	2.05	1.99
N	2.49	2.55	2.61	2.67	2.74	2.81	2.88	2.96	3.04	3.12	3.21	3.31	3.41	3.52

(2) Operation and maintenance costs for the planned equipment

The additional budgets for the operation and maintenance costs for the planned equipment of each CSC are to be calculated by taking into consideration the number of units to be deployed at each site.
Tables 3-2-4-4 and 3-2-4-5 respectively show the running cost of equipment per unit time and the total operating costs of the equipment.

Table 3-2-4-4 Running Cost of Equipment per hour (JD/Unit)

Equipment	Cost/Hr	Cost/year (Running 1 - 6Hr/Day)					
	JD/h	1h/d	2h/d	3h/d	4h/d	5h/d	6h/d
Collection and Transport							
Compactor 16m3	7.14	2,121	4,241	6,362	8,482	10,603	12,723
Compactor 4m3	5.35	1,589	3,178	4,767	6,356	7,945	9,534
Dump truck 10m3/5.5t	7.14	2,121	4,241	6,362	8,482	10,603	12,723
Dump truck 8m3/5t	7.14	2,121	4,241	6,362	8,482	10,603	12,723
Dump truck 6m3/4.5t	5.35	1,589	3,178	4,767	6,356	7,945	9,534
Dump truck 4m3/3.5t	4.11	1,221	2,441	3,662	4,883	6,103	7,324
Container set	-	-	-	-	-	-	-
Landfill							
Bulldozer 280 HP	27.31	8,120	16,240	24,360	32,480	40,600	48,720
Bulldozer 220 Hp	18.85	5,598	11,197	16,795	22,394	27,992	33,591
Wheel loader 220 HP	12.20	3,623	7,247	10,870	14,494	18,117	21,740
Wheel loader 180 Hp	16.05	4,767	9,534	14,301	19,067	23,834	28,601
Doser Shovel 190 HP	12.16	3,612	7,223	10,835	14,446	18,058	21,669
Excavator 110 HP(0.7m3)	5.80	1,723	3,445	5,168	6,890	8,613	10,336
Dump truck 8m3/12t	7.14	2,121	4,241	6,362	8,482	10,603	12,723
Tractor with tank 1.5m3	3.25	965	1,931	2,896	3,861	4,826	5,792
Maintenance							
Maintenance car	3.48	1,034	2,067	3,101	4,134	5,168	6,201
Mechanical Tool set	0.30	89	178	267	356	445	534

Table 3-2-4-5 Calculation of Operating Costs for the Projected Equipment

FDS	Al Akaidar		Mafraq		Kufrinja		Husra		Karak		Ma'an		Aqaba		North Shuneh		Madaba		Tafila	
AREA	Irbid		Mafraq		Ajlun		Salt		Karak		Ma'an Central		Aqaba		North Ghor		Madaba		Tafila	
	q'ty	cost	q'ty	cost	q'ty	cost	q'ty	cost	q'ty	cost	q'ty	cost	q'ty	cost	q'ty	cost	q'ty	cost	q'ty	cost
Collection and Transportation																				
Working time [h/d]	-	6	-	6	-	6	-	5	-	6	-	5	-	6	-	4	-	6	-	6
Compactor (16m3)	4	50.892					1	10.603	1	12.723							2	25.446	1	12.723
Compactor (4m3)			2	19.068															1	
Dump truck (10m3/5.5t)											2									
Dump truck (8m3/5t)					2	25.446									1					
Dump truck (6m3/4.5t)													1							
Dump truck (4m3/3.5t)							1	6.103					1							
Container set	1		1		1		1		1		1		1		1		1		1	
Landfill																				
Working time [h/d]	-	2	-	2	-	2	-	2	-	2	-	2	-	2	-	2	-	2	-	2
Bulldozer (280 Hp)	1	16.240	1	16.240	1	16.240	1	16.240	1	16.240					1	16.240	1	16.240		
Bulldozer (220 Hp)													1	11.197					1	11.197
Wheel loader (220 Hp)									1	7.247					1	7.247	1	7.247		
Wheel loader (180 Hp)	1	9.534																		
Dozer shovel					1	7.223	1	7.223											1	7.223
Excavator (0.7m3)	1	1.723	1	6.890							1	8.613	1	8.613						
Dump truck (8m3/12t)	1	4.241			1	4.241	1	4.241	1	4.241					1	4.241	1	4.241	1	4.241
Tractor head(50Hp/1.5m3)	1	965	1	965			1	965	1	965			1	2.896	1	965	1	965		
Maintenance																				
Maintenance car					1	3.101					1	6.201	1	6.201						
Mechanical tool set	1	534	1	534	1	534	1	445	1	534	1	445	1	534	1	356	1	534	1	534
Total	11	84.129	7	43.697	8	56.785	8	45.820	7	41.950	7	36.465	8	46.299	7	37.531	8	54.673	7	45.452

The actual operation and maintenance costs in 1995, consisting of the personnel cost, fuel cost, consumables cost, servicing cost, etc., and the additional budget requirements after the planned equipment have come into operation are shown for each CSC in Table 3-2-4-6.

Table 3-2-4-6 Budget Calculation Covering the Operating Costs for the Projected Equipment

CSC				Irbid	Mafraq	Kufrinja	N. Shuneh
1995 Data (JD/year) (A)				198,476	155,385	53,230	60,971
Amount of Budget Increase (B)				84,129	43,697	56,785	37,531
Rate of Budget Increase (%) (C)				42.4	28.1	106.7	61.6
CSC	Salt	Madaba	Karaq	Tafila	Ma'an	Aqaba	Total
(A)	125,000	72,891	155,761	134,496	30,300	1,053,000	2,039,510
(B)	45,820	54,673	41,950	45,461	36,465	46,299	492,810
(C)	36.7	75.0	26.9	33.8	120.3	4.4	24.2

*1 : Increase in equipment operation and management costs accompanying the operation of the equipment procured through this Project.

*2 : Currently, the CSCs etc. are not recorded the costs upon breaking them down into personnel cost, fuel cost, consumables cost, and servicing cost, etc.

(3) Placement of personnel

Each CSC must consider the reinforcement and personnel from a clear perspective of such issues as reinforcement of operation and maintenance of waste collection and landfill equipment, furnishing of systems, securing of own funds, etc. In doing so, the CSCs must note the following three points.

1) Reinforcement of personnel for waste collection and transportation and for landfill at the FDS.

2) Reinforcement of staff and fee collectors for the fee collection and other accounting departments.

3) Improvement of services for all activities and reinforcement of planning staff for budget allocation, etc.

(4) Financial plan for the project

The objective of the project is make maximum use of the equipment to be supplied to thereby cover the inadequacies of existing equipment and substantiate the minimum necessary capacity. If some leeway arises as a result of operations, the operation of obsolete, high energy consumption type equipment can be interrupted to perform overhauls. In substantiating the minimum necessary capacity, the availability of all equipment shall be increased gradually through the supplying of equipment. That is, in the first fiscal year of 1997, an availability of 70 % should be aimed at and this should be increased by 10 % each year so that the availability will be 100 % by the year 2000. The total revenues and expenditures for all ten CSCs etc. shall be examined upon adding the operation and maintenance cost required for this new plan for waste collection, and disposal to the actual operation costs of 1995. It shall be assumed that the total revenues, including government subsidies, contributions from municipalities, and operational income of the CSCs etc., will increase at a rate of 5 % a year for 3 years commencing in 1997. The balance shall be examined upon predicting the financial sources to be as shown in Table 3-2-4-7 based on the above.

Table 3-2-4-7 Expenditures for the Operation and Maintenance Cost of the Planned Equipment in 10 CSCs etc. (x1,000JD)

Fiscal Year	1995	1996	1997	1998	1999	2000
Total expenditure	2,040	2,040	2,384	2,433	2,482	2,532
Subsidy	1,057	1,057	1,110	1,165	1,224	1,224
Contribution	942	942	989	1,039	1,090	1,090
Other income	215	215	226	237	249	249
Total Revenue	2,214	2,214	2,325	2,441	2,563	2,563
Balance	174	174	-59	8	81	31

Provided that there is an increase in the operational income of the CSCs etc., through improvements in the collection rates of waste collection fees as well as increases in contributions and government subsidies, the cleansing activities should become well-substantiated.

It is therefore judged that the execution of the project will not present a problem in terms of revenues and expenditures.

(5) Effective equipment utilization

The operation and maintenance costs of the scheduled equipment due be deployed at the CSCs etc. will probably account for a large part of the CSCs budget. In this sense, the site chiefs (middle management) need to plan the site work by constantly taking into account the importance of assuring effective equipment utilization. For this reason, it will be essential to promote centralized control of the site equipment through improving the present organization of the CSCs and to establish the equipment utilization schedules needed for urban service operation by giving full consideration to the need for efficient equipment utilization.

3-2-5 Service Life of Equipment

The service life shown in Table 3-2-5-1 must be taken into account for the planned equipment of this Project and the existing equipment. The service life of general construction equipment in Japan is generally seven years or so. Given the nature of the work and operating hours at the CSC's, it is estimated that the service life will be about thirteen years. Equipment depreciation should therefore be considered on the basis of a service life of thirteen years and reserve funds should be saved for the purpose of major equipment repair and renewal. The principles of equipment depreciation should therefore be introduced and methods and measures should be established for securing financial resources.

Table 3-2-5-1 Service Life of the Equipment in the Possession of the CSCs

Equipment Usage, Location	No. of Hours of Operation per year	Service life (hours)	Service life (years)
General construction sites	2000 - 3000	17,500	7 - 8
CSC operating site	594 - 1700	17,500	13 - 15

Note: Operating hours per year for CSC vehicle : 1700 hours
Operating hours per year for heavy duty equipment: 594 hours

3-2-6 Equipment Renewal Plans

In view of the nature of the service operations of the CSCs etc. and the equipment specifications, the periods for renewal have been estimated on the basis of the predetermined service life data for the main equipment. From around the year 2002, the need for equipment rehabilitation will start to occur and from and after 2010 it will be necessary to replace all equipment.

Table 3-2-6-1 Equipment Renewal Schedule

Equipment	Service Life (Years)	Year for Major Repair	Year for Renewal
Compactor 16m3	13	2003	2010
Compactor 4m3	13	2003	2010
Dump truck 10m3	13	2003	2010
Dump truck 8m3	13	2003	2010
Dump truck 6m3	15	2004	2012
Dump truck 4m3	15	2004	2012
Bulldozer 280HP	13	2003	2010
Bulldozer 220HP	13	2003	2010
Wheel loader 220HP	13	2003	2010
Wheel loader 180HP	13	2003	2010
Doser Shovel 190HP	13	2003	2010
Hydraulic excavator 110HP	10	2002	2007
Dump truck 8m3	10	2002	2007
Tractor with tank 50HP	13	2003	2010

CHAPTER 4 PROJECT EVALUATION AND RECOMMENDATION

Chapter 4 Project Evaluation and Recommendation

4-1 Project Effect

4-1-1 Effects of the Execution of the Project

The following effects can be anticipated from the execution of the project.

(1) Sanitation and beautification of urban areas

Presently in the areas targeted by the project, the MSW collection is not carried out at all in remote towns and villages and in urban areas in mountainous areas due to a lack of waste collection equipment. Even in the other urban areas, collection is carried out only to a minimal extent and even in cases where collection is carried out, the MSW is left uncollected due to failure of hauling vehicle, etc. and is causing the degradation of sanitary conditions and of the appearance of the areas.
If the collection rate is improved from 75% to 100% by the execution of the project in the target year of 2000, the sanitation and beautification of the areas can be improved further.

(2) Environmental improvement of final disposal sites

The execution of the present project, aimed at the target year 2000, not only will lead to improvements in the sanitary conditions of workers and the appearance of the final disposal site, but will also alleviate the environmental problems of fires, offensive odors, etc. of the MSW and will facilitate the management of final disposal sites including new constructions. The benefitting population will not be limited to the approximately 1.46 million residents in the areas targeted and there will also be great contributions to the improvement of the urban environment and sanitation. Furthermore, the project will have a wide-ranging effect in that it will serve as a model case for the MSW disposal improvement plans for the other twelve areas in the Kingdom of Jordan, which are about to be carried out as national projects.

4-1-2 Verification of Validity

Within the MSW collection areas of the CSCs etc., which manage the 10 final disposal sites targeted by the project, areas in which MSW is uncollected exist over a wide range corresponding to 25 % of the population due to a lack of MSW collection and hauling equipment. This is causing damage to the sanitation condition and appearance of these areas. By allocating the collection/hauling equipment and materials of the plan to the 10 CSCs etc., etc., which are the operating agencies, the uncollected areas can be eliminated by the target year of 2000 to bring about great improvements in the sanitation conditions and urban appearance in all of the areas. Since the project will not only result in the satisfaction of the basic requirements of residents be fulfilled but will also provide significant secondary effects, such as the promotion of tourism, etc., the present project is sufficiently valid as a grant aid project.

Furthermore, the formulation of plans necessary for the implementation of sanitary landfill and the furnishing of equipment based on such plans will significantly alleviate sanitation problems due to pests, etc., air pollution due to open burning, and environmental problems, such as residents' complaints against offensive odors, etc., at the 10 final disposal sites. These provide further grounds for the validity of the project as a grant aid project.

4-2 Recommendation

4-2-1 Technical Propositions

(1) Propositions on cleansing services in general

1) Management for effective utilization of the equipment

(A) Administrative control

The operation and maintenance costs of the planned equipment and materials may exceed the current budgets of the CSCs etc. Managers must therefore constantly consider the effective use of equipment in planning the operations.

(A) Administrative control

The operation and maintenance costs of the planned equipment and materials may exceed the current budgets of the CSCs etc. Managers must therefore constantly consider the effective use of equipment in planning the operations. Rationalization and effective use must be promoted through centralized control of the equipment and materials, and changes in the organization of the CSCs etc. should also be considered. To be more specific, administrative control must be provided through the collection of data using daily operation reports, etc., the filing of quantities of fuel and oil consumed, repair costs, etc., and the preparation of the annual working budget.

(B) Allocation and control of equipment

Changes may arise in the landfill method at a final disposal site in accompaniment with the progress of landfill. In accompaniment with such changes, equipment and materials may have to be exchanged among the CSCs etc. after the procurement of new equipment and materials. In particular, at Mafraq, the trench method (trench digging) using an hydraulic excavator has been deemed to be rational in terms of the conditions of the final disposal site and plans by the study team have been made accordingly. However, the corresponding CSC is desiring the open cut method using a bulldozer as they are experienced with this method. The switch from the trench method to the open cut method may become effective in the future when the bedrock line becomes shallow.

For the new final disposal site at Karak, the open cut method, in which excavation and banking are carried out with a bulldozer, is being planned. However, it may also be effective to switch to the trench method using a hydraulic excavator depending on the depth of the bedrock line.
It will thus be effective for the CSCs etc. to exchange equipment and materials with each other in accompaniment with future changes in the methods. A department for making adjustments among the CSCs etc. will be needed to cope with problems related to the control of such allocation of equipment and materials, and it is anticipated that the Department of Environment will serve this purpose.

2) Rational setting of landfill fees

Although a rational calculation of the fees for cleansing activities, in particular, fees for landfill operations, has not been carried out yet, it will be necessary to rationalize the collection of landfill fees. Furthermore, in order to secure new finances by the landfill fees, each CSC should conduct the measurements of quantities hauled to the final disposal site, which were conducted by the Study Team, prepare daily reports on data on hauling by vehicles by the municipality, private sector, etc. which use the final disposal site, and tabulate the results to introduce meter rates to be charged to each municipality, private sector, etc.

(2) Technical propositions concerning landfill

1) Sanitary landfill plan

In the present Study, ① sanitary landfill utilizing trenches or ② sanitary landfill by erection of earth embankments was proposed as the optimal sanitary landfill method for each final disposal site based on data on the topography, geology, MSW quantity/quality, existing facilities, landfill conditions, impacts on the surrounding environment, etc. obtained through field surveys and existing materials. The thickness, etc. of the daily cover and final cover were also proposed as shown in Fig. 2-3-2-82.

2) Operation and maintenance facilities

It has been proposed that the following facilities be installed where necessary as operation and maintenance facilities.

(A) Onsite road for passage of the MSW hauling vehicles

(B) Peripheral fence for prevention of unwanted entry of persons into the final disposal site, illegal dumping, scattering of MSW, etc.

(C) Monitoring wells for monitoring the diffusion in groundwater of pollutants flowing out from the final disposal site and impact on the living environment of residents

(D) Gas collection system for immediate discharge of the gases in the landfill MSW layer and prevention of impacts on the working environment and the surrounding enviroment

(E) Leachate collection line for promoting the activation of microorganisms and stabilization of the landfill

(F) Leachate circulation and pumping facility for promoting the reduction of water quantity and improvement of the water quality

(G) Nightsoil water pumping facility for supplying nightsoil water the tree-planting plants, etc. for promotion of the greening of the final disposal site

4-2-2 Themes

The system in the Kingdom of Jordan for the operation and management of the project does not have any problems in terms of personnel, enthusiasm, and ability. However, the following themes must be accomplished in order to execute the project more smoothly and effectively.

(1) Fortification of finances

1) Furnish a waste disposal fee system and establish a stable source of funds.

2) Review subsidy system for waste disposal activities.

(2) Establishment of organizations

1) Fortify the operation and maintenance organization for equipment owned by the CSCs etc..

2) Establish an organization with authority in the central government for carrying out rational centralized control of the CSCs etc. and for making adjustments among the CSCs etc..

(3) Technical improvements

(4) Furnishing of related facilities

1) Furnish the final disposal sites with access roads, control offices, heavy duty equipment parking space, etc.

2) Install weighing equipment to carry out quantitative control of the MSW hauled.

(5) Education on environmental conservation and sanitation awareness

4-2-3 Examination of the Themes

(1) Fortification of finance

In accompaniment with the furnishing of the equipment and materials of this project, the MSW disposal cost at each CSC will increase as shown in Table 4-2-2-1. As shown in Table 3-3-2-3, the cost will increase by 120% at the maximum in the case of a CSC in which the availabilities of the existing equipment are low or a CSC which lacks equipment. Though a stable source of income will thus be needed to secure the budget for the project, each CSC will have to make self-help efforts in addition to obtaining subsidies from the central government.

1) Thorough collection of waste disposal fees

That waste disposal fees are not being collected sufficiently has been pointed out as a problem in the section on the budget. This problem must be resolved as part of the self-help efforts of the CSCs etc. and thorough fee collection must be carried out to provide a stable source of income.

This can be promoted further by carrying out MSW collection thoroughly and providing education on environmental conservation and sanitation awareness.

2) Analysis of the costs

In order to achieve the above, the costs for MSW collection, hauling, landfill, etc. should be analyzed and a fee system and a cost subsidizing system should set up for the allotment of the respective costs. That is, appropriate allotments should be set up for the households, the private stores, the municipalities and other regional autonomies, and the central government.

Table 4-2-2-1 shows the allotment per household calculated for the case where only households are to bear the costs for the Ma'an CSC, for which the rate of increase in the budget will be the highest (the figures below are all estimated amounts). The amount borne by each household, assumed to be comprised of an average of 6 persons, is estimated to increase by 3.48 JD (approx. 501 yen; see Note) per year for the collection and hauling cost and by 2.34 JD (approx. 337 yen) per year for the landfill costs or by a total of 5.82 JD (approx. 838 yen) per year. In terms of the amount per capita for the total population, the above will amount to a total increase of approximately 0.97 JD (approx. 140 yen) per year. Since the subsidies from the central government is not included in the above amounts, the amount borne will be less than the calculation results if subsidies are subtracted. Nevertheless, a raise in fees from the current total annual fee per household of 12 JD (approx. 1,728 yen) will still be necessary.

Note : The figures in ( ) were calculated with: 1 US$ = 0.7 JD = 101 yen;
1 JD = 144 yen.

Table 4-2-2-1 Increases in the MSW Disposal Costs

Cost Item	Amount (JD/year)	Amount (yen/year)
MSW collection and hauling cost per person	0.58	83
MSW landfill cost per person	0.39	56
Annual fee borne per person	0.97	140
Annual fee borne per household (6 person)	5.82	838

3) Collection of landfill fees and the introduction of meter rates

Since the amount borne by each household will increase at the most by approximately 50 % as described above, new sources of finances should be considered to avoid this situation.
Presently, the CSCs etc. have not carried out rational calculations of the fees for final disposal site operation and are not collecting landfill fees by the meter-rate system.

(2) Technical improvements

"Technical improvements", and "education on environmental conservation and sanitation awareness", which were raised as themes in the section 4-2-2, concern matters which should be acquired by the Department of Environment, the CSCs etc., and the management of the municipalities who are involved in cleansing activities in cooperation with the above. Progress can be met in this aspect by taking transferring the technologies of our nation up as part of the project. The Study Team is therefore planning to hold an explanatory meeting, in which these issues will be included, as part of the detailed design and construction management steps.

APPENDICES

Appendix 1.

Member List of the Survey Team

1) Members of the Basic Design Study Team

Mitsuru SUEHORI : Leader
Director of First Basic Design Study Division,
Grant Aid Study and Design Department,
Japan International Cooperation Agency (JICA)

Tokio INABA : Technical Advisor
Manager, Facilities Construction Section,
Equipment Division,
Sanitation Bureau, Kyoto City Municipal Office

Shokichi SAKATA : Project Coordinator
First Basic Design Study Division,
Grant Aid Study and Design Department,
Japan International Cooperation Agency (JICA)

Kenjiro NAKAMURA : Project Manager
Environmental Technologic Consultant CO., LTD. (ETC)

Yuji TANAKA : Waste Collection and Transportation Planner
Environmental Technologic Consultant CO., LTD. (ETC)

Fuminori TSURUNAGA : Land Filling Planner
Pacific Consultants International (PCI)

Takashi ISAKARI : Equipment Planner
Construction Project Consultants, INC. (CPC)

Yoshishige Inagawa : Cost Estimation and procurement planner
Environmental Technologic Consultant Co., LTD. (ETC)

2) Members of Draft Report Mission Team

Tetsuo YABE : Leader
First Basic Design Study Division,
Grant Aid Study and Design Department,
Japan International Cooperation Agency (JICA)

Tokio INABA : Technical Adviser (Irrigation Planner)
Director
Planning Division, Facility Department, Waste Disposal Bureau,
Kyoto Prefectual Government

Kenjiro NAKAMURA : Chief Consultant
Environmental Technologic Consultant CO., LTD. (ETC)

Fuminori TSURUNAGA : Land Filling Planner
Pacific Consultants International (PCI)

Appendix 2.

Survey Schedule

1. Basic Design Study Schedule

MONTH	DATE		MAJOR VISITING				SUEHORI	INABA	SAKATA	NAKAMURA	TANAKA	TSURUNAGA	ISAKARI	NAGAWA
11	21	TUE	A:ARRV. AMMAN				-	-	A	-	-	-	-	-
	22	WED	A:LEFT JAPAN				-	-	AMMAN	A	A	A	A	-
	23	THU	A:ARRV. AMMAN		B:JICA/DOE/MOP		-	-	B	A/B	A/B	A/B	A/B	-
	24	FRI	HOLIDAY	A:ARRV. AMMAN			A	A	IM	IM	IM	IM	IM	-
	25	SAT	A:MINISTER OF MMRAE				A	A	A	A	A	A	A	-
	26	SUN	A:EOJ/MOGA/RUSEIFA		B:MAFRAK	C:KUFRINJA	A/B	A/B	A/C	A/C	A/C	A/B	A/B	-
	27	MON	A:IRBID	B:NORTH SHUNEH			A	A	B	A	B	A	B	-
	28	TUE	A:MOGA	B:SALT	C:MADABA	E:DORC	A/C	A/C	A/B	A/C	A/B	A/B	A/B	-
	29	WED	A:KARAK	B:TAFILA/MA'AN			A	B	A	A	B	B	A	-
	30	THU	A:DOE	B:AQABA			A	B	A	A	B	B	A	-
12	1	FRI	HOLIDAY				IM	IM	IM	IM	IM	IM	IM	-
	2	SAT	A:MMRAE(SIGNATURE of M/D)/		B:LEFT AMMAN		A/B	A/B	A/B	A/D	A/D	A/D	A/D	-
	3	SUN	A:DOE	B:ROMA			B	B	B	A	A	A	A	-
	4	MON	A:SALT	B:ARRV. JAPAN		C:MOP/MOT	B	B	B	C	A	A	A	-
	5	TUE	A:MAFRAQ	B:RJGC/UNDP			-	-	-	B	A	A	A	-
	6	WED	A:KUFRINJA				-	-	-	A	D	A	A	-
	7	THU	A:IRBID	B:DOE			-	-	-	B	D	A	A	-
	8	FRI	HOLIDAY	B:RUSEIFA			-	-	-	B/IM	IM	IM	IM	-
	9	SAT	A:NORTH SHUNEH		B:MOGA/DOE	C:MADABA	-	-	-	B	C	A	A	-
	10	SUN	A:DOE	B:MAFRAQ	C:WA)	B:	-	-	-	A/B/C	A/B	A/B	A/B	-
	11	MON	A:MADABA	B:MOGA	C:MA'AN		-	-	-	B	C	A	A	-
	12	TUE	A:KARAK	B:MOGA			-	-	-	B	A	A	A	-
	13	WED	A:TAFILA/	B:JORDAN UNIVERSITY		C:WA	-	-	-	C	B	A	A	ARRV.
	14	THU	A:SALT	B:DOE	C:JICA/EOJ		-	-	-	B/C	B/D	A	A	B/C
	15	FRI	HOLIDAY				-	-	-	IM	IM	IM	IM	IM
	16	SAT	A:MA'AN	B:EOJ/MOGA		C:	-	-	-	B	C	A	A	B
	17	SUN	A:AQABA	B:	C:UNRWA		-	-	-	B/C	B/D	A	A	ED
	18	MON	A:DOE(KUFRINJA)		B:UNGEF		-	-	-	A/B	D	D/A	ED	ED
	19	TUE	HOLIDAY	A:DISC. with C/C			-	-	-	A	A	A	A	A
	20	WED	A:DOE				-	-	-	A	D	D	ED	ED
	21	THU	A:C/P LUNCH PARTY		B:DOE		-	-	-	B/A	D/A	D/A	ED/A	ED/A
	22	FRI	HOLIDAY				-	-	-	D	D	D	D	D
	23	SAT	A:DOE				-	-	-	A/D	A/D	D	D	ED
	24	SUN	A:DOE	B:AQABA			-	-	-	A/D	ED/D	D	D	ED/B
	25	MON	A:DOE	B:AQABA	C:MADABA		-	-	-	A/ED	A/ED	A/D	A/C	B
	26	TUE	A:DOE	B:KUFRINJA	C:JORDAN UNIVERSITY		-	-	-	A/D	A/C	B	B	A/D
	27	WED	A:DOE	B:JICA(10:00)/EOJ(15:30)			-	-	-	A/B	D	D	D	A
	28	THU	A:DOE				-	-	-	A/IM	A/IM	A/IM	A/IM	A/IM
	29	FRI	HOLIDAY	A:LEFT AMMAN			-	-	-	A	A	A	A	A
	30	SAT		A:LONDON			-	-	-	A	A	A	A	A
	31	SUN		A:ARRV. JAPAN			-	-	-	A	A	A	A	A

REMARKS

1: MMRAE = MINISTRY OF MUNICIPAL & RURAL AFFAIRS & THE ENVIRONMENT
2: DOE = DEPARTMENT OF ENVIRONMENT
3: DORC = DEPARTMENT OF RURAL COUNCIL
4: MOP = MINISTRY OF PLANNING
5: MOT = MINISTRY OF TRANSPORTATION
6: MOGA = MUNICIPALITY OF GREATER AMMAN
7: RJGC = ROYAL JORDANIAN GEOGRAPHIC CENTER
8: WA = WATER AUTHORITY
9: UNRWA = UN REFUGEE
10: UNGEF = UN GLOBAL ENVIRONMENTAL FACILITY
11: EOJ = EMBASSY OF JAPAN
12: JICA = JAPAN INTERNATIONAL COOPERATION AGENCY

ARRV. = ARRIVAL
C/P = COUNTERPART
D = DATA ANALYSIS
DISC. = DISCUSSION with
ED = EQUIPMENT DEALER
IM = INTERNAL MEETING

2. Draft Report Mission Schedule

Feb.	1st (Thu.)	Leaving Japan
	2nd (Fri.)	Arrival in Amman
	3rd (Sat.)	Courtesy call on Jordanian officials concerned and discussion about shedule
	4th (Sun.)	Explanation and discussion on Draft Final Report at MMRAE
	5th (Mon.)	Explanation and discussion on Draft Final Report at MMRAE
	6th (Tue.)	Discussion on Minutes of Discussions
	7th (Wed.)	Signing of Minutes of Discussions
	8th (Thu.)	Report to JICA / Embassy of Japan
	9th (Fri.)	Holiday
	10th (Sat.)	Explanation of Draft Final Report and Technical study in Mafraq FDS
	11th (Sun.)	Explanation of Draft Final Report and Technical study in Humra FDS
	12th (Mon.)	Explanation of Draft Final Report and Technical study in Kufrinja FDS
	13th (Tue.)	Leaving Amman

Appendix 3

List of Party Concerned in the Recipient Country

	Position	Name	Address	Tel/Fax
1. Ministry of Municipal and Rural Affairs and the Environment (MMRAE)				
1.	Minister of MMRAE	Mr. Nadar Duhairat		
2.	Deputy Minister Engineer	Mr.R. Rashdan S. Rasllan		
3. Department of Environment				
1	Director	Dr. Saleh Al-Sharea	P.O.Box 35206 Amman	T.673149 F.672135
2	Head Coordinator	Mr. Hail Al-Zabin		
3	Environmental Engineer	Mr. Khalid Alfayez	P.O.Box 1799 Amman	T.672131 F.672135
4	Environmental Engineer	Mr. Izzat Abu-Humra	P.O.Box 1799 Amman	T.672131 F.672135
5	Environmental Engineer	Mr. Jabur Daradkah	P.O.Box 1799 Amman	T.672131 F.672135
6	Environmental Engineer	Ms. Sana Al-Labadi		
7	Environmental Engineer	Mr. Adbel-Karim Al-Ziyoudi		
8	Environmental Lawyer	Dr. Saleh Sharari		
4. Department of Rural Councils				
1	Director	Mr. Faris Al-Junaidi		T. 619290 F. 640404
5. CSC of Irbid				
1	Director	Mr. Jamil Momani		
2	Engineer	Mr. Ra'ed Abu-Hassan		
3	Engineer	Mr. Husni Masadeh		
6. CSC of Mafraq				
1	Civil Engineer	Mr. Musa Radaideh		
2	Environmentalist	Mr. Rasen M. Abdallah		
3	Civil Engineer	Mr. Sameeh Hussein		
7. CSC of Salt				
1	Director, Civil Engineer	Mr. Adel Heassat		
2	Civil Engineer	Mr. Ahmad M. Ali Hiary		
8. CSC of Tafila				
1	Chairman, Architecture	Mr. Sager M. Sqour		
9. CSC of Ma'an				
1	Director, Civil Engineer	Mr. Sail Abbu-Alhawa		
10. CSC of Karak				
1	Director, Engineer	Mr. Farhan Fares Haddad		
2	Director of Culture Dept.	Mr. Ahmad Tarawneh		
3	Engineer	Mr. Murad Metry - Bakain		
4	Assistant Engineer	Mr. Fawaz Shawamri		

	Position	Name	Address	Tel/Fax
11. CSC of North Ghor				
1	Director	Mr. Imad Mohad Hasan Abu Abbas		
2	Engineer	Mr. Ahmad Mohamad Said Prijasin		
3	Engineer	Mr. Mamoon Alawneh		
12. CSC of Ajlun				
1	Director	Mr. Khaled Innab		
2	Civil Engineer	Mr. Mustafa Alaneza		
13. CSC of Madaba				
1	Governor of Madaba	Mr. Abdulgader Habahbeh		
2	Director	Mr. Madalla Al-Tarawneh		
II. Ministry of Planning (MOP)				
1	Assistant Secretary General - International Cooperation	Mr. Salem O. Ghawi	P.O.Box 555 Amman	T. 644466 F. 642247
2	Head Officer - Bilateral Division	Dr. Nael Al-Hajaj	P.O.Box 555 Amman	T. 644466 F. 642247
3	Department of Statistics - Environmental Section	Mr. Munther Al-Badnniyeh		T. 846171
III. Ministry of Transportation (MOT)				
1	Meteorological Dept. - Climate Division	Mr. Mohammad Samawi		
2	Deputy Director - General Meteorological Dept.	Mr. Haitham N. Sha'er		
IV. Jordan University				
1	Assistant Proffessor			
2	Engineer	Mr. Moh'd Akkad		
V. Ministry of Water and Irrigation				
1	Water Authority Engineer	Mr. Sa'ad Abderrahman Alkaid		T. 680100
2	Head of wasterwater Service Operation Sectopn Engineer	Mr. A. A. Mater		T. 680100
VI. Royal Jordanian Geographic Center (RJGC)				
		Mr. Mousa Al-Mahaisen		T. 845188
VII. Municipality of Greater Amman (MOGA)				
1	Under Secretary Assistant for Health and Environmental Aff.	Dr. Hussein Zaki Said	P.O.Box 132 Amman	T. 646450 F. 649420
2	Cleaning Dept. Manager	Mr. Said El-Hisham		
3	Engineer	Mr. William Haddad		

	Position	Name	Address	Tel/Fax
VIII. Dealer of Equipment				
1. Mercedes Benz				
1		Mr. Musallam	P.O.Box 419 Postal Cord 11118, Amman	T. 962-6-732410 F. 732548
2. Volvo Mithkal Shawkat & Sami Asfour				
1		Mr. Haidar	P.O.Box 26 Amman	T. 655635-651989 F. 962-6-649636
3. Fiat				
1	Managing Director	Mr. O.A. Shaban	Shaban Bldg. 7th Circle P.O.Box 675	T. 824232 F. 825230
2	General Manager	Mr. M.B. Nahar		
4. Komatsu, The Far East Equipment Co., Ltd.				
1	Chairman	Mr. W.Z. Ibrabim	P.O.Box 141309	T. 812816 F. 821653
2	Sales Manager	Mr. F. Ghelth		
5. CAT (Jordan Tractor)				
1	General Manager	Mr. F.D. Khatib	P.O.Box 313	T. 661141 F. 678149
2	Mechanical Eng.	Mr. H.A. Hanna		
6. Toyota, Ismail Bilbeisi & Co., Ltd.				
1	General Manager	Mr. George E. Haddad	P.O.Box 213 Amman	T. 638103 F. 658542
7. Mitsubishi Motors, TRANSJORDAN Trading Co., Ltd.				
1	Service Manager	Mr. I.L. Kamal	P.O.Box 129	T. 654071 F. 649585
8. Nasser Manufacturing Trading Co.				
1	Manager	Mr. Hassan A. Nasser	P.O.Box 15146	T. 636517 (Off.) 659170 (Fac.) F. 962-6-659170
IX. Embassy of Japan (EOJ)				
1	Ambassador	Mr. Kimura		
2	Second Secretary	Mr. Tomoaki Abe		
X. Japan International Cooperation Agency (JICA)				
1	President Representative	Mr. Yasuyuki Mori		
2	Deputy Director	Mr. Kiichiro Kuno		
3		Mr. Hani Al-Kurdi		
XI. UNDP				
1.	Program Officer	Dr. Montaser J. Oklah		
XII. Global Environment Facility				
1	Small-Grant Programme National Coordinator	Mr. Munier Adgham		
XIII. UNRWA				
1	Chief, Field Health Programe	Dr. AlSalem Abu- Amad		
2	Field Sanitary Engineer	Mr. Hasan Salem		T. 607194

Appendix 4.

Minutes of Discussion

MINUTES OF DISCUSSIONS ON BASIC DESIGN STUDY ON THE PROJECT FOR IMPROVEMENT OF SOLID WASTE MANAGEMENT IN MAJOR LOCAL AREAS IN THE HASHEMITE KINGDOM OF JORDAN

In response to the request from the Government of the Hashemite Kingdom of Jordan, the Government of Japan decided to conduct a Basic Design Study on the Project for Improvement of Solid Waste Management in Major Local areas in the Hashemite Kingdom of Jordan (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Jordan a Basic Design Study Team (hereinafter referred to as "the Team"), which was headed by Mr. Mitsuru Suemori, Director, First Basic Design Study Division, Grant Aid Study and Design Department, JICA, from 21 November to 29 December , 1995.

The Team held discussions with the officials concerned of the Hashemite Kingdom of Jordan and conducted a field survey at the study area.

In the course of the discussions and field survey, both parties have confirmed the main items described on the attached sheets.

Amman, 2 December, 1995

Mr. Mitsuru Suemori
Leader
Basic Design Study Team
JICA

Mr.Nader Al Duhairat
Minister
Ministry of Municipal and Rural Affairs and the Environment

Mr. Salem O. Ghawi
Assistant Secretary General
International cooperation
Ministry of Planning

ATTACHMENT

1. Objective

The objective of the Project is to improve the situation of sanitation in major local areas in Jordan through procurement of equipment necessary for solid and liquid waste management.

2. Project Site

The project areas are ten(10) local areas described in ANNEX I and III.

3. Executing Organization

The Ministry of Municipal and Rural Affairs and the Environment in ANNEX II is responsible for the administration and execution of the Project.

4. Items requested by Jordan

After discussions with the Team, the equipment described in Annex III were finally requested by the Government of Jordan.

However, the final components of the Project will be decided after further studies.

5. Japan's Grant Aid System

(1) The Government of Jordan has understood the system of Japan's Grant Aid program in ANNEX IV explained by the Team.

(2) The Government of Jordan will take necessary measures described in ANNEX V for the smooth implementation of the Project, on condition that Japan's Grant Aid is extended to the Project.

6. Schedule of the Study

(1) The consultants of the Team will proceed to further study in Jordan until 29 December 1995.

(2) JICA will prepare the draft basic design report in English and dispatch a mission to Jordan in order to explain the contents of the report in and around February, 1996.

(3) In case the contents of the report are accepted in principle by the Government of Jordan, JICA will complete the final report on the Project and send it to the Government of Jordan by the end of April, 1996.

7. Other Relevant Issues

(1)The Government of Jordan should inform the Government of Japan if the responsibilities of executing agency for the Project delegates its responsibilities to other organization.

(2) Candidate sites to be covered under the Japan's grant aid will be 10 sites out of existing 23 disposal sites. Existing 23 disposal sites were determined with consultation among 4 ministries of Municipal and Rural Affairs and the Environment, Water, Health and Agriculture, by taking into consideration of environmental aspect.

Candidate sites were selected with criteria such as size of environmental problem, geographic allocation and necessity for improvement of disposal site. They were also selected and prioritized in accordance with the present study for improvement solid waste management of local areas.

(3) It is confirmed that collection and transportation for solid waste are managed by each of municipalities, rural communities and cooperative service councils under the supervision of Ministry of Municipal and Rural Affairs and the Environment. Management for solid waste in disposal sites under the Project is responsible for cooperative service councils under the supervision of Ministry of Municipal and Rural Affairs and the Environment.

(4) New disposal site for Kufrinja is now proceeding to get a final approval within three months. The Jordanian side informed Japanese side of its progress by the end of January, 1996.

(5) Jordanian side strongly requested to the Team that workshops necessary for preventive maintenance of equipment will be included in the Project. In case of workshops to be covered under Japan's Grant aid, Jordanian side agreed to construct the facilities of workshops, garages and/or shelters for equipment at

least 8 sites by Jordanian side.

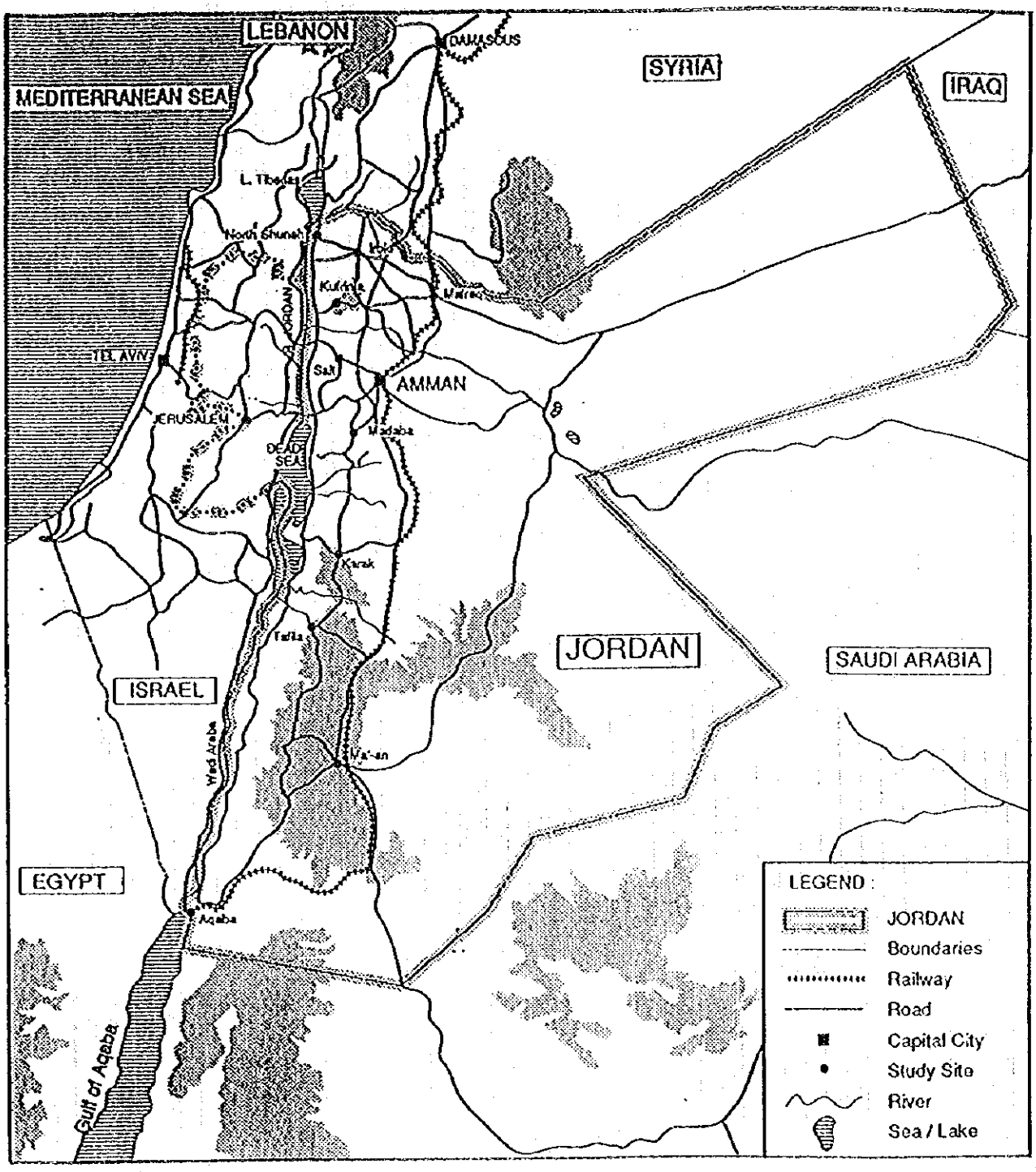
(6) Both sides agreed to cover only domestic solid and liquid waste under the Project, excluding medical, industrial and other hazardous waste.

(7)Jordanian side also requested to the Team that transfer of technic necessary for operation and maintenance of equipment will be done through holding relevant seminars and preparing manuals, in the course of the implementation of the Project.

(8) Jordanian side promised that relevant information and data necessary for formulation of the Project will be provided to the Team by the end of December,1995.

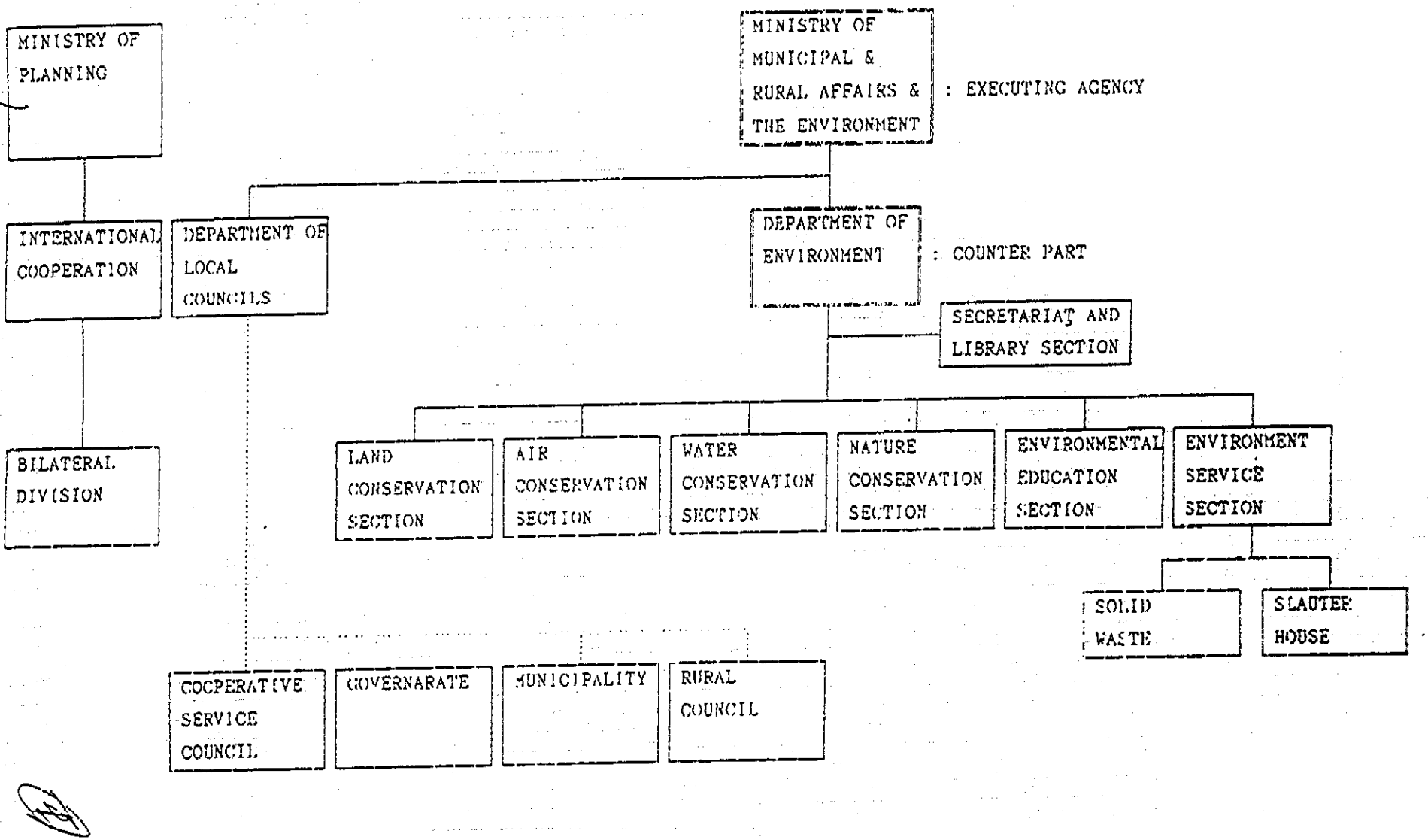
(9) For the success of the Project, Jordanian side will allocate necessary number of staff, budget and others for proper operation and maintenance for equipment to be procured under the Project.

Annex I : Location Map of the Project



ANNEXII

ORGANIZATION CHART



ANNEX III

EQUIPMENT REQUESTED BY JORDANIAN SIDE

	Priority	A	A	A	B	B	A	B	B	A	B	Priority			TOTAL
	Disposal Site	Al-Akaider	Mafraq	Humra (Salt)	Tafila	Ma'an	Lojoon (Karak)	Aqaba	Kufrinja	Madaba	North Shuneh	A	B	C	A+B+C
No.	Item														
1	Collection/Transportation														
1-1.	Garbage Truck (16 m3)	B-3		A-1,C-1	B-1, C-1		A-1	A-1		B-3		3	7	2	12
1-2.	Garbage Truck (4 m3)		B-2	C-1	B-1							0	3	1	4
1-3.	Dump Truck (10 m3)			A-2		B-2	B-1					2	3	0	5
1-4.	Dump Truck (8 m3)	B-2							B-1		A-1	1	3	0	4
1-5.	Dump Truck (6 m3)		B-2					B-1	B-1			0	4	0	4
1-6.	Dump Truck (4 m3)			A-1				B-1				1	1	0	2
1-7.	Vacuum Tanker (12 m3)				B-1					B-2		0	3	0	3
1-8.	Container Set	B-1	B-1	B-1	B-1	B-1	B-1	B-1	B-1	B-1	B-1	0	10	0	10
2	Landfill														
2-1.	Bulldozer (280 HP)	A-1	A-1	C-1		C-1	A-1					3	0	2	5
2-2.	Bulldozer (220 HP)				B-1			B-1			B-1	0	3	0	3
2-3.	Wheel Loader (220 HP)		A-1		C-1		B-1			A-1		2	1	1	4
2-4.	Wheel Loader (180 HP)	A-1	C-1				C-1					1	0	2	3
2-5.	Dozer Shovel	A-1		A-1					B-1			2	1	0	3
2-6.	Landfill Compactor	B-1			B-1	B-1				B-1		0	4	0	4
2-7.	Excavator	A-1			C-2	B-1						1	1	2	4
2-8.	Dump Truck (8 m3)	A-1		A-1								2	0	0	2
2-9.	Tractor Head w/Tank (1.5 m3)	A-1	A-1	A-1			A-1	B-1	B-1	A-1	B-1	5	3	0	8
2-10.	Water Tanker (small)				B-1							0	1	0	1
2-11.	Cargo Truck		A-1									1	0	0	1
3	Maintenance														
3-1.	Pick-up Truck		B-1	B-1							B-1	0	3	0	3
3-2.	Mechanic Tool Set	A-1	A-1	A-1	A-1	A-1	A-1	A-1	A-1	A-1	A-1	10	0	0	10

MINUTES OF DISCUSSIONS
BASIC DESIGN STUDY ON THE PROJECT FOR IMPROVEMENT OF SOLID WASTE MANAGEMENT IN MAJOR LOCAL AREAS IN THE HASHEMITE KINGDOM OF JORDAN (CONSULTATION ON DRAFT REPORT)

In November 1995, the Japan International Cooperation Agency (hereinafter referred to as 'JICA') dispatched a Basic Design Study team on the Project for Improvement of solid waste management in major local areas in the Hashemite Kingdom of Jordan (hereinafter referred to as 'the Project') to the Hashemite Kingdom of Jordan, and through discussions, field survey, and technical examination of the results in Japan, has prepared the draft report of the study.

In order to explain and to consult the Jordanian side on the components of the draft report, JICA sent to Jordan a study team (hereinafter referrered to as 'the Team'), which is headed by Mr. Tetsuo Yabe, First Basic Design Study Division, Grant Aid Study & Design Department, JICA, and is scheduled to stay in the country from February 2 to 13, 1996.

As a result of discussions, both parties confirmed the main items described on the attached sheets.

Amman, February 7, 1996

Mr. Tetsuo Yabe
Leader
Draft Report Explanation Team
JICA

Mr. Abdul Razzaq Tubeishat
Minister
Ministry of Municipal and Rural Affairs and the Environment

Mr. Salem O. Ghawi
Assistant Secretary General
for International Cooperation
Ministry of Planning

ATTACHMENT

1. Components of draft report

The Government of Jordan has agreed and accepted in principle the components of the draft report proposed by the Team.

2. Japan's Grant Aid System

(1) The Government of Jordan has understood the system of Japanese Grant Aid explainend by the Team, as described in ANNEX-I.

(2) The Government of Jordan will take the necessary measures, described in 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. Further Schedule

The Team will make the Final Report in accordance with the confirmed items, and send it to the Government of Jordan by the end of April, 1996.

4. Other Revelant Issues

(1) The Government of Jordan stressed the significance of the Project for all major local areas, and strongly requested the Team to consider the ten(10) major local areas to be covered under the Japan's Grant Aid as shown in the Minutes of Discussions signed on December 2nd, 1995.

A. T.

(2) The Government of Jordan assured to prepare adequate recurrent budget, staff and others necessary for operation and maintenance of equipment to be procured under the Project.

(3) Both sides agreed that technology transfer necessary for operation and maintenance of equipment should be done through holding relevant seminar and preparing manuals during the implementation of the Project. Jordanian side stated that technology transfer is necessary in the fields of ① collection/transportation planning, ② sanitary landfill planning, ③ operation and maintenance of equipment, and ④ others, and the Jordanian side agreed to bear the cost of Jordanian instructors and participants in the seminar.

(4) The Government of Jordan shall construct with its own expense the facilities of workshops, garages and/or shelters for equipment prior to arrival of equipment to Jordan, and shall report to JICA Jordan Office about the progress in securing the necessary budget by the end of March, 1996.

(5) The Government of Jordan is requested to execute the sanitary landfill as shown in ANNEX-III in consideration of environmental conservation by efficiently and effectively utilizing equipment to be procured within the Grant.

(6) In case that the executing agency related to the Project delegates its responsibilities to other organization, then the implementation of the Project shall be succeeded to the appropriate agency.

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

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

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

2. Basic Design Study

1) Contents of the Study

The aim of the Basic Design Study (hereafter referred to as "the Study"), conducted by JICA on a requested project (hereafter referred to as "the Project") is to provide a basic document necessary for the appraisal of the Project by the 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 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 the jurisdiction of the organization in the recipient country actually implementing the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country through the Minutes of Discussions.

2) Selection of Consultants

For smooth implementation of the Study, JICA uses (a) registered consultant firm(s). JICA select (a) firms(s) based on proposals submitted by interested firms. The firm(s) selected carry(ies) out a 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 to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for economic and social development of the country under principles in accordance with the relevant laws and regulations of Japan. Grant Aid is not supplied through the donation of materials as such.

2) Exchange of Notes (E/N)

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

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

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

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

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

5) Necessity of "Verification"

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

6) Undertakings required of the Government of the Recipient Country

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

(1) To secure land necessary for the sites of the Project and to clear, level and reclaim the land prior to commencement of the construction.

(2) To provide facilities for the distribution of electricity, water supply and drainage and other incidental facilities in and around the sites.

(3) To secure buildings prior to the procurement in case the installation of the equipment.

(4) To ensure all the expenses and prompt execution for unloading, customs clearance at the port of disembarkation and internal transportation of the products purchased under the Grant Aid.

(5) To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which will be imposed in the recipient country with

respect to the supply of the products and services under the Verified Contracts.

(6) To accord Japaneses 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 staff necessary for this operation and maintenance as well as to bear all the expenses other than those covered by the Grant Aid.

(8) "Re-export"
The products purchased under the Grant Aid should not be re-exported from the recipient country.

(9) Banking Arrangements (B/A)

a) The Government of the recipient country or its designated authority should open an account in the name of the Government of the recipient country in 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 the recipient country in case Japan's Grant Aid is extended to the Project

(1) To provide data and information necessary for the Project.

(2) To secure land for the sites of the Project.

(3) To clear the sites prior to commencement of the construction.

(4) To provide facilities for distribution of electricity, water supply, drainage and other incidental facilities outside the site.

(5) To bear commissions to the Japanese foreign exchange bank to execute the banking services based upon the Banking Arrangement.

(6) To ensure prompt unloading and customs clearance at port(s) of disembarkation in the recipient country and facilitate internal transportation therein of the products purchased under the Grant.

(7) To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the Verified Contract(s).

(8) To accord Japanese nationals whose services may be required in connection with the supply of the products and the services under the Verified Contract(s), such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work.

(9) To assign the necessary staff and secure the necessary budget for operation and maintenance of the equipment purchased under the Grant.

(10) To maintain and use properly and effectively the equipment and materials purchased under the Grant.

(11) To ensure that the equipment purchased under the Grant are used and maintained properly and exclusively for the Project.

(12) To bear all the expenses other than those to be borne by the Grant necessary for the project implementation.

ANNEX-III

Necessary Facilities in final disposal site

Facility / Dumping site	Al-Akaider	Mafraq	Kufrinja	Humra	Karak	Ma'an	Aqaba
Onsite road		○	○	○	○	○	○
Peripheral fence		○	○	○			○
Monitoring well	△	△	△	△	△	△	△
Gas venting facility			○				
Leachate collection pipe			○				
Leachate circulation pumping facility			○	○			

Notes:

1. Facility ○ means that the Government of Jordan shall construct with its own expense before the arrival of equipment in each final disposal site except Gas venting facility.
2. Facility △ means that the Government of Jordan is recommended to construct with its own expense as soon as possible.
3. Kufrinja means new Kufrinja final disposal site.

Appendix 5.

Cost Estimation Borne by the Recipient Country

In accordance with the study report, the costs borne by the Jordan side are as follows;

1. Construction cost:

In order to accomplish the sanitary landfill and the better maintenance in each FDS, it is requested for the recipient country to bear the construction costs of the internal roads, the fence repairments and the work shop shown below.

(JD)

1	Internal road	10,000 x 8 FDS = 80,000
2	Fence repair	25,000 x 6 FDS = 150,000
3	Work shop	10,000 x 7 FDS = 70,000
-	Total	300,000

2. Equipment transportation cost:

In the project, the inland transportation cost of the equipment shall be borne by the Jordan side as shown below.

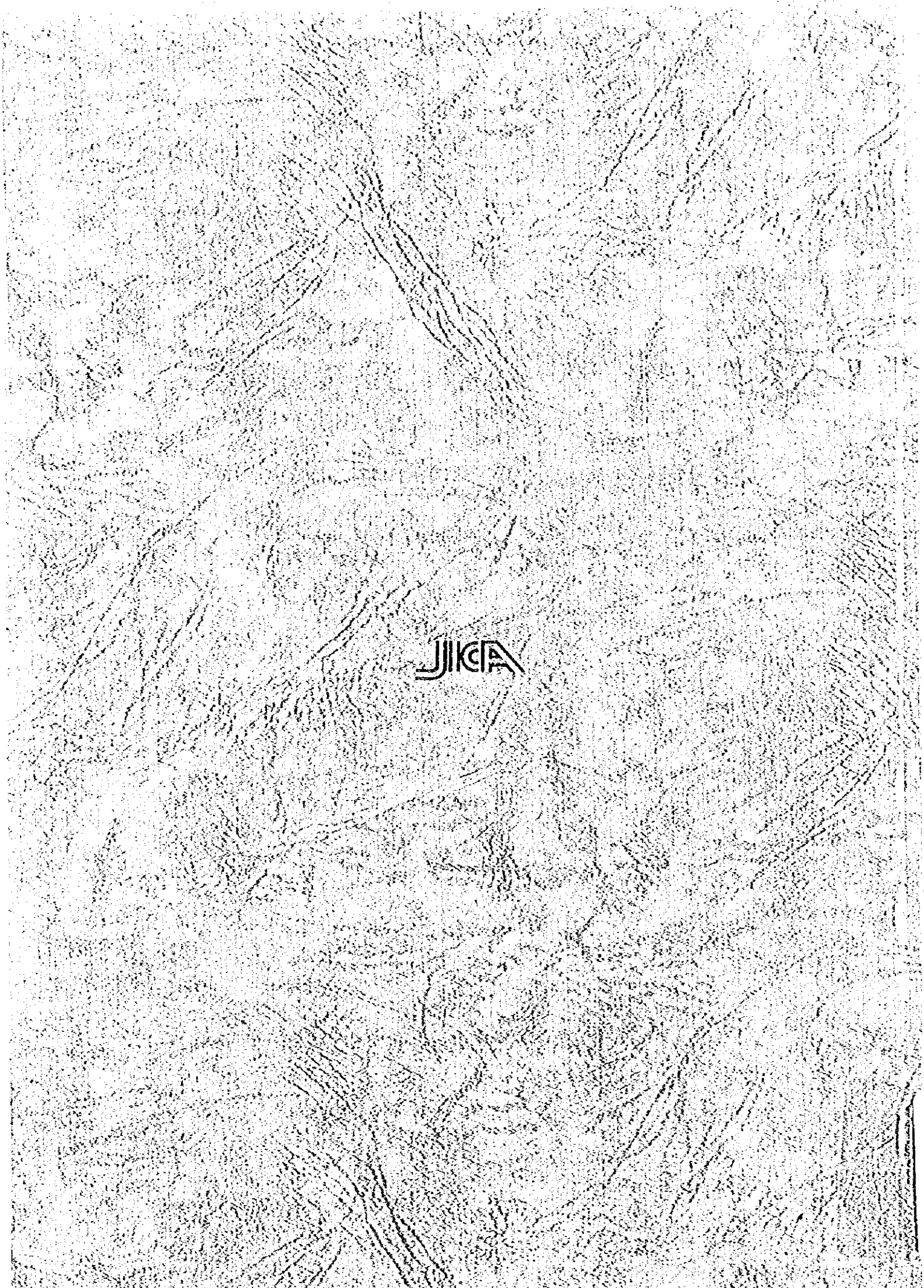
(JD)

1	Loading 20 heavy duty machines on trailer	3,500
2	Inland transportation by trailer	9,200
3	Inland transportation without trailer	12,300
-	Total	25,000

Appendix 6.

Information of Ten Areas

District		Northern District				Central District		Southern District			
No	Area	IRBID	MAFRAQ	KUFRINJA	NORTH GHOR	SALT	MADABA	KARAK	TAFILA	MA'AN CENTR	AQABA
1	Name of CSCs etc.	Irbid CSC	Mafraq CSC	Ajlun CSC	N. Ghor CSC	Humra CSC	Madaba CSC	Karak CSC	Tafila CSC	Ma'an Centr	Aqaba Munic
2	Final disposal site	Al-Akaider	Mafraq	Kufrinja	N. Shuneh	Humra	Madaba	Lojoon	Tafila	Ma'an	Aqaba
3	Landfill site: Topography/(ha)	Hill/60.6	Plane/18.0	Valley/7.0	Valley/18.0	Valley/17.0	Hill/102.0	Hill	Hill	Plane	Plane
4	Number of staff: Total	42	37	10	17	38	21	42	37	44	35
	Director of the CSC	1	1	1	1	1	1	1	1	1	1
	Site engineer	1	1	1	1	1	1	1	1	1	1
	Environment & other engineer	4	3	1	1	3	4	-	-	-	-
	Clerical manager	9	5	3	3	7	6	6	8	17	10
	Operater	10	13	3	6	8	8	18	8	15	11
	Maintenance	1	1	-	-	1	-	-	-	-	-
	Full-time labor	15	12	-	3	17	-	14	20	8	11
	Guard man	2	1	1	2	2	1	2	1	2	1
5	CSC administrative area (km^2)	-	266	218	440	77.000	52.000	3.217	1.900	3.000	10
6	Amount of autonomies	87	82	22	19	33	85	40	36	22	3
	Cities :3000 persons or more	40	27	14	9	12	15	18	8	7	1
	Towns :3000 persons or less	40	35	8	6	17	40	20	9	11	2
	Villages: 500 persons or less	7	20	ND	4	4	30	2	19	4	-
7	Hospitals	12	3	1	15	2	2	5	ND	ND	ND
	Medical waste	Incinerated	Incinerated	Mixed	Mixed	Mixed	Mixed	Mixed	Mixed	Mixed	Mixed
8	Major industries	Agriculture	Agriculture	Agriculture	Agriculture	Agricalture	Agricalture	Agriculture	Agricalture	Agricalture	Commecial
		Commercial	Commercial			Chemical	Commercial	Tourism			Tourism
						Cement					
	Industrial waste	Batteries	Bags,	Non	Non	Tile chips	Bags	Non	Non	Non	
		etc.	Plastics				Plastics				
9	Destination of night soil	-	Irbid	Irbid	Irbid	-	-	Plant	FDS	FDS	Plant
	Handled by		Private	Pprivate	Private	Pprivate	Private	-	Pprivate	Private	-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