

## 6.6 Economic and Financial Evaluation of the Alternatives Compost Plant

It was concluded that even the compost plant, planned in Section 5.3 as object of this Feasibility Study, can be made perfectly feasible by improving the charge collection scheme. When the current economic and financial situation of Egypt is taken into consideration however, it is desirable to examine the economic and financial evaluation of the alternative with further cuts in the construction and operation cost.

That being so, the economic and financial evaluation of the plant having mostly the same specifications as that one of the IBRD project is carried out here.

### 6.6.1 Conditions of the compost plant

- (1) Production of both coarse compost and fine compost.
- (2) Installation of one line of selective pulverizing classifier of the pretreatment system.
- (3) Distributing conveyor system, instead of the truck system, should be used for supplying raw materials to the fermentation yard.
- (4) The waste reception system should have 1-day storage capacity.
- (5) The plant capacity and operation time should be the same as that one of the plant examined in Clause 5.3.

. Waste treatment	300 t/d
. Operation time	16 h/d (net 14 h/d)
. No. of operation days	300 d/year

### 6.6.2 Alternative for New Abis Compost Plant

As an alternative to the plant described in Clause 5.3, this Clause proposes to reduce the construction cost by adopting the specifications approximately similar to those of the IBRD plant.

If different basic conditions are assumed for planning the two projects which are being advanced in parallel, it would be difficult to make accurate comparisons of the two as the apparent differences in construction cost and operating cost would not be in agreement with the actual differences.

This Clause, therefore, proposes to construct a plant in accordance with the specifications approximately similar to those of IBRD plant, and in order that comparisons with the plant proposed by IBRD can more easily be made.

1) Conditions for the Alternative Plant

Plant capacity, location, topographical and geological conditions, expected life of the plant, amount and composition of waste to be treated, and conditions for plant operation are the same as assumed in Clause 5.3.

2) Basic Study

The conditions assumed in Clause 5.3 were changed in the following respects.

(1) Reception system

The storage capacity was changed from 1.5 days to one day supply.

(2) Pretreatment system

The number of selective pulverizing classifier was changed from two lines to one line.

One manual sorting of baskets in waste:

At the existing Abis Compost Plant in order to prevent blockage of conveyor and homogenizing drum, baskets for carrying fruits are manually removed by workers in the waste storage yard.

In the system proposed in this clause, however, manual sorting and removal of baskets in the waste storage yard are unnecessary because there is no fear of blockage even if the baskets should enter the treating system, as the baskets input into the selective pulverizing classifier are classified as a part of residue.

(3) Fermentation

The system for feeding raw materials to the fermentation yard was changed from the truck haulage system to the distributing conveyor system.

Also, turning with turning machine will be done only during the fermentation period.

The static pile system will be adopted for the maturing yard instead of turning and transferring.

(4) Refining

In the long term, in order to raise the value of compost as fertilizer, it is imperative that quality of compost shall be improved by removing foreign objects as much as possible.

At present, a portion of the produce is sold as coarse compost without processing through refining.

For this reason, half the amount of compost will be sold as coarse compost and the other half will be refined.

(5) Material balance

Foreign objects/amount in the fine compost is set at about 2% under this study. Thus, recovery rate of the fine compost becomes about 12% and that of coarse compost becomes about 17%.

### 3) Facility Plan

#### (1) Plant capacity and operation plan

The plant capacity and operation plan shall be as underlisted:

- Waste treatment capacity: 300 t/d
- Operation hour : 16 hr/d (waste feeding: 14 hr/d)
- Operation days : 300 d/year
- Site area : 3.5 ha.

#### (2) Process flow

Following systems are adopted as major processes of the plant:

- Shovel loader system for waste receiving
- Selective pulverizing system for pretreatment
- Windrow system fermentation

Manual sorting process and refining process are also incorporated.

The process flow of the new plant is as shown in Fig. 6-6-1.

#### (3) Material balance

The plant is designed to treat 300 t/d of wastes with characteristics as expected in the year 2000, to produce daily 36.5 t/d of fine compost, 49.6 t/d of coarse compost and to salvage 21 t/d of reusable materials. In addition, rejects of 119.4 t/d is expected to be disposed of.

Daily 115.3 tons of water shall be supplied at the pretreatment and fermentation process for moisture content adjustment of raw materials. The detailed material balance is as shown in Fig. 6-6-2.

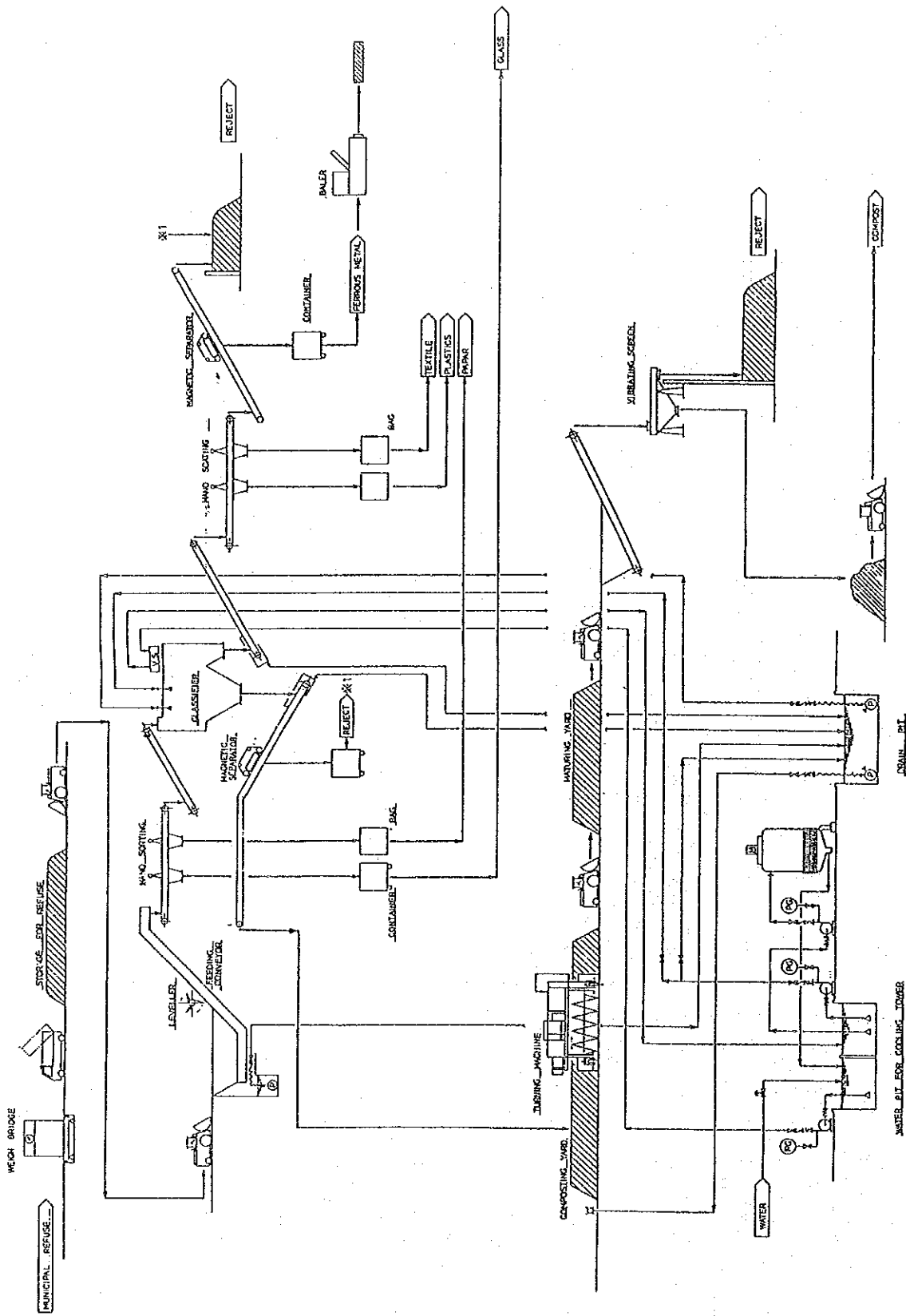


Fig. 6-6-1 PROCESS FLOW (Alternative)

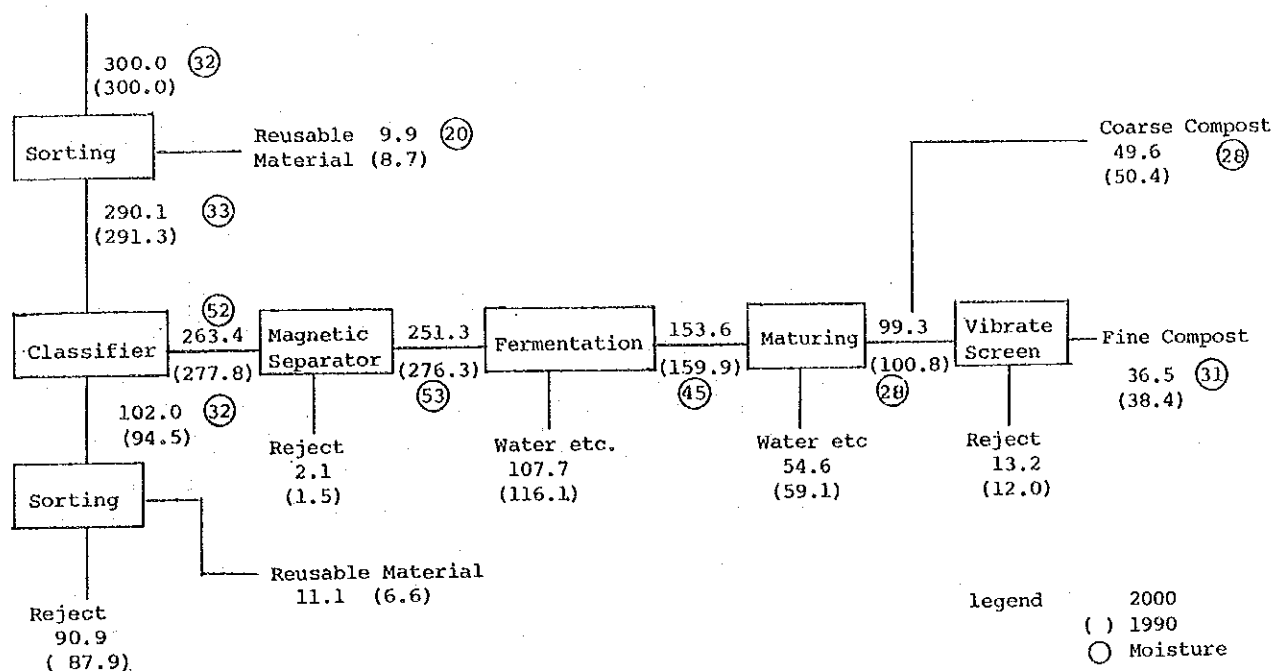


Fig. 6-6-2 MATERIAL BALANCE (Alternative)  
(t/d)

(4) Plant layout

The general plan of the plant is shown in Fig. 6-6-3.

(5) Machinery and Equipments

The alternative new Abis Compost Plant is provided with following facilities in which machines are listed in Table 6-6-2.

(6) Civil work and building plan

Following building shall be constructed in the site area:

- a. Administration Office Building: 12 m x 20 m = 240 m<sup>2</sup>
- b. Reception House : 38 x 20 = 760
- c. Sorting House : 18 x 15 = 270
- d. Generator House : 10 x 10 = 100
- e. Workshop and Restroom : 20 x 10 = 200

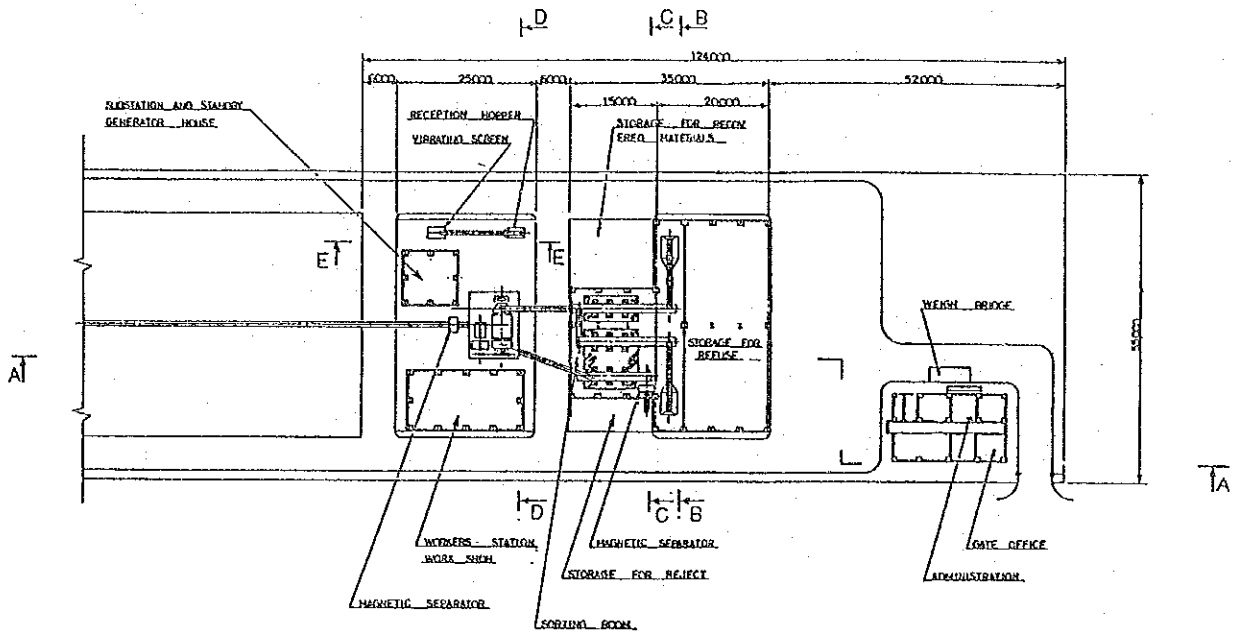


Fig. 6-6-3 LAYOUT PLAN (Alternative)

#### 4) Operation and Personnel Plan

The 101 personnel working in the new Alternative Abis Compost Plant shall consist of the administration personnel of 16 persons who are also in charge of the administration of the existing Abis Compost Plant and the personnel of 85 persons for the operation of the Alternative new Abis Plant.

Of the personnel of 85 persons for the new plant, 72 operative workers shall be divided into 2 shifts. Each shift shall contain 33 operative workers, and the first shift shall also include 6 drivers for rejects haulage other than the 33 operative workers.

Table 6-6-1 PLANT MACHINERY AND EQUIPMENTS (Alternative)

Item	Machine and Equipment		
Waste Reception	Truckscale	30 t	1 unit
	Storage area		Multi-load cell 600 m <sup>2</sup>
	Shovel loader	1.5 m <sup>3</sup>	2 units
	Feeding conveyor	w = 1.00 m	2 sets
Pretreatment	Conveyor (1)		1 set
	Pulverizer	ϕ = 3.0 m	1 set
	Conveyor (2)		1 set
	Conveyor (3)		1 set
	Conveyor (4)		1 set
	Magnetic separator		1 set
Picking	Picking conveyor (1)	w = 1.6 m	2 sets
	Picking conveyor (2)	w = 1.2 m	1 set
	Magnetic separator		1 set
	Baler for paper and textile		2 sets
	Baler for ferrous material		1 set
	Conveyor		1 set
	Storage for reusable material		1 lot
	Hand cart		24 units
Fermentation	Turning machine	w = 4.3 m	1 unit
	Fermentation yard		28,000 m <sup>2</sup>
Refining	Feeder conveyor		1 set
	Vibrating screen		1 set
	Shovel loader	1.5 m <sup>3</sup>	1 unit
	Storage for fine compost		1 lot
Electricity	Generator	625 KVA	1 set
Disposal	Shovel loader	1.5 m <sup>3</sup>	1 unit
	Dump truck	8 t	5 units
	Storage for rejects		1 lot



Table 6-6-2 PERSONNEL PLAN (Alternative)

(persons)			
	EXISTING COMPOST PLANT	NEW COMPOST PLANT (ALTERNATIVE)	TOTAL
<b>Administration</b>			
General Manager		1	1
Financial manager		1	1
Adm. director		1	1
Adm. clerk		3	3
Sales director		1	1
Sales assistant		3	3
Planning director		1	1
Planner		2	2
Worker		3	3
Sub-total		16	16
<b>Compost plant</b>			
Plant manager	1	1	2
Operation director	1	1	2
<b>Operation worker</b>			
Shift chief	2	2	4
Operator (Mechanic)	2	2	4
Operator (Electric)	2	2	4
Driver	10	16	26
Inspector	2	2	4
Worker (Baler)	4	6	10
(Sorting)	16	28	44
(Assistant)	6	10	16
(Clean)	4	4	8
(Guard)	4	4	8
Sub-total	54	74	128
Laboratory engineer	1	1	2
Laboratory worker	1	1	2
Maintenance director	1	1	2
Maint. engineer	3	3	6
Maint. worker	2	2	4
Adm. director	1	1	2
Clerk	2	2	4
Sub-total	11	11	22
<b>Total</b>	<b>65</b>	<b>16</b>	<b>85</b>
			<b>166</b>

5) Construction and Operation Cost

(1) Construction Cost

The construction cost of the Alternative compost plant amounts to 9,244,730 LE the details of which are shown in Table 6-6-3. The amount consists of foreign currency portion of 6,746,730 LE and local currency portion of 2,498,000 LE. The engineering fee is estimated at 5% of the construction cost and physical contingency is estimated at 10% of the construction cost.

The construction cost of the Alternative compost plant based on the same conditions of IBRD is 6,657,930 LE.

(2) Machinery and Equipment Procurement Cost

The procurement cost for machinery and equipment, including loader, dump trucks, etc., to be dispatched to the plant amounts to 716,100 LE as indicated in Table 6-6-3. The procurement cost of spare parts for 2 years is included in this amount.

The procurement cost based on the same conditions as IBRD is also 444,170 LE.

(3) Operation Cost

Total 101 persons will be newly employed at the new Abis Compost Plant. The operation cost of the plant mainly consisting of personnel wages for such personnel is expected to amount to 1,127,162 LE/year as shown in Table 6-6-4.

Renewal purchase of vehicles shall be made every five years for smooth operation of the plant without any interruptions.

The operation cost based on the same conditions as IBRD is 676,750 LE/year.

Table 6-6-3 CONSTRUCTION COST OF ALTERNATIVE COMPOST PLANT

			(LE)
Item	Foreign Currency Portion	Local Currency Portion	Total
<b>1. Construction cost</b>			
Civil work and buildings	643,300	1,501,000	2,144,300
Machinery	5,047,000	662,000	5,709,000
Spare parts	151,000	0	151,000
Sub-total	5,841,300	2,163,000	8,004,300
Eng. service	292,000	108,000	400,000
Physical contin.	613,430	227,000	840,430
Total	6,746,730	2,498,000	9,244,730
<b>2. Machinery and equipments procurement</b>			
Machinery and equipments	620,000	-	620,000
Spare parts	62,000	-	62,000
Sub Total	682,000	-	682,000
Eng. Services	27,280	6,820	34,100
Total	709,280	6,820	716,100
Grand Total (1. + 2.)	7,456,010	2,504,820	9,960,830

Table 6-6-4 OPERATION AND MAINTENANCE COST (Alternative)

(LE/year)

Depreciation		
Civil and Buildings	86,487	
Machinery	472,707	
Vehicles	117,738	
Sub-total	676,932	
Maintenance		
Machinery	114,180	
Vehicles	49,600	
Sub-total	163,780	
Fuel, oils and Lubricants		
for Vehicles	44,660	
Sub-total	44,660	
Water and Power		
Water	5,400	
Power	65,070	
Sub-total	70,470	
Personnel Cost	171,320	
Grand Total	1,127,162 LE/year	12.5 LE/t
Total excluding depreciation	450,230 LE/year	5.0 LE/t

6) Comparison among Plants

Plants to be compared: Plant proposed in Clause 5.3

- Plant 1 (Basic proposal)

Plant proposed in this Clause

- Plant 2 (Alternative proposal)

Plant proposed by IBRD

- Plant 3

(1) Conditions assumed for each plant

Since the basic conditions assumed for each plant differ due to the difference in study method and the year in which each study was made, the planning conditions for each plant were compared and shown in S.R. 5.3.

The planning conditions for Plant 3 were quoted from "The Final Report on Feasibility Study for Waste Collection and Resource Recovery in Five Governorates" submitted in January 1985.

(2) Specification and costs

Major item of the specifications and costs of each plant are compared below. For more details, please refer to the comparison tables in S.R. 5.3.

a. Capacity - While the capacity of Plant 1 and also of Plant 2 is specified in terms of daily treatment amount of 300 tons, the capacity of Plant 3 is specified in terms of hourly treatment amount of 19 tons.

b. Site area - The differences in site area are large as follows:

Plant 1	5 ha
Plant 2	3.5 ha
Plant 3	2.5 ha



For Plant 2 and 3, when the same exchange rate (US\$1 = LE 0.82) is applied to the foreign currency portion, the costs are as follows:

Plant 2: LE 7,102,100 (US\$ 1 = LE 0.82)

Plant 3: LE 6,451,000 (US\$ 1 = LE 0.82)

The construction cost of Plant 2 becomes almost comparable to that of the Plant proposed by IBRD.

f. Operation cost:

The operation cost stated in each applicable report is as follows:

Plant 1: 1,474,287 LE/year (583,472 LE/year excluding depreciation)

Plant 2: 1,127,162 LE/year (450,230 LE/year excluding depreciation)

Plant 3: 616,950 LE/year (191,950 LE/year excluding depreciation)

For Plant 2 and 3, when the same unit prices and other conditions assumed in the IBRD report are adopted, the costs are as follows:

	(LE/Y)	(LE/Y, excluding depreciation)
Plant 2:	676,750	215,202
Plant 3:	616,950	191,950

### 6.6.3 Economic Evaluation of Alternative

In connection with the economic benefits, it is necessary to apply larger quantities of coarse compost in agriculture compared with fine compost in order to attain the same composting effect. Therefore, the same benefit as that attained when producing exclusively fine compost is taken into account in this study.

On the other hand, the quantities of reusable materials and rejects are changed, and increased benefits are expected in this connection.

Besides, as for the costs, the construction cost and operation cost are expected to be reduced, but the costs related to the transportation of products is expected to increase.

The results obtained by taking into consideration the said facts are summarized in Table 6-6-5.

As can be seen, benefits amounting to 32,387,000 LE is expected during the 15-year life cycle, and on the other hand the NPV (benefit - cost) will amount to 12,759,000 LE.

The project has a high EIRR of 11.9%, and therefore it can be regarded as high priority one from the standpoint of national economy.



Table 6-6-5 ECONOMIC EVALUATION (Alternative)

( 1000 LE )

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total	
Benefit																			
Increase of Crop Productivity	0	0	1395	1395	1395	1395	1395	1395	1395	1395	1395	1395	1395	1395	1395	1395	1395	1395	20925
Saving of Chemical Fertilize	0	0	273	273	273	273	273	273	273	273	273	273	273	273	273	273	273	273	4095
Saving of Irrigation Water	0	0	102	105	6	6	6	6	6	6	6	6	6	6	6	6	6	6	285
Reusable Materials	0	0	167	171	175	179	183	188	192	196	200	204	208	208	208	208	208	208	2895
Saving of Transportation Cost	0	0	166	166	166	166	166	166	166	166	166	166	166	166	166	166	166	166	2490
Saving of Disposal Cost	0	0	133	130	124	122	118	115	113	111	107	104	104	104	104	104	104	104	1697
Subtotal	0	0	2236	2240	2139	2141	2141	2143	2145	2147	2147	2148	2152	2152	2152	2152	2152	2152	32387
Cost																			
Construction Cost	4622	4623	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9245
Heavy Equipment Cost	0	0	716	0	0	0	0	716	0	0	0	0	716	0	0	0	0	0	2148
Vehicles for Products	0	0	140	0	0	0	0	140	0	0	0	0	140	0	0	0	0	0	420
O/M Cost	0	0	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	6750
O/M Cost for Products	0	0	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	1065
Subtotal	4622	4623	1377	521	521	521	521	1377	521	521	521	521	1377	521	521	521	521	521	19628

RATE = 0.0 % B/C = 1.650  
 RATE = 4.0 % B/C = 1.391  
 RATE = 8.0 % B/C = 1.175  
 RATE = 12.0 % B/C = 0.998  
 RATE = 11.5 % B/C = 1.018  
 RATE = 11.6 % B/C = 1.014  
 RATE = 11.7 % B/C = 1.010  
 RATE = 11.8 % B/C = 1.006  
 RATE = 11.9 % B/C = 1.002

#### 6.6.4 Financial Evaluation of Alternative

The balance of incomes and expenditures before depreciation is improved, because the income attributable to compost and usable goods is increased, and furthermore the costs are cut down.

It must be borne in mind however, that the income will be insufficient to cope with the depreciation cost and the interests, unless considerable amounts of subsidies are taken into consideration.

As for the money flow exclusively restricted to the Middle District, the internal reservations will amount to 3,199,000 LE, which is twice as much as that one of the case examined in Clause 5.3.

Moreover, internal reservations amounting to 9,030,000 LE can be expected also in the implementation plan, and therefore this project is regarded as perfectly feasible as long as satisfactory charge collection and financial resources of Budget Chapter 3 are secured.

#### 6.6.5 Conclusion

As can be seen, the construction of compost plant with mostly the same specifications as the plant of the IBRD project can be regarded as a project worthy of promotion, as long as composting is implemented in the same way as in the alternative examined in this Clause.

Table 6-6-6 BALANCE OF ALTERNATIVE NEW ABIS COMPOST PLANT

(1000 LE/year)	
Items	Remark
Revenue	
Basic Wages	92 101 persons
Selling income	
Compost	236 ( fine compost 10 LE/ton
Reusable materials	208 coarse compost 8 LE/ton
Total(A)	536
Expenditure	
Personnel expenditure	171
Utilities cost	
Electricity	65
Water	5
Fuel	45
Maintenance	164
Total(B)	450
Balance (A-B)	86
Depreciation(D)	677
Cost including depreciation(E)	1127
Deficit (E-A)	584
Interest(F)	288 4% for foreign portion redemption for 20 years after 5 years
Total cost including Interest(G-E+F)	1415
Deficit(G-A)	879

Table 6-6-7 MONEY FLOW OF THE ALTERNATIVE PROJECT

Year	(1000 LE)																Total
	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	
Revenue																	
Resident	125	238	351	464	577	690	720	750	779	809	839	870	900	931	961	992	10396
Company	175	297	419	542	664	786	847	908	970	1031	1092	1163	1234	1305	1377	1448	14259
Cleansing Fund	209	210	210	211	211	212	213	213	214	214	215	215	216	216	217	217	3413
Budget Chapter 3	714	713	2423	710	6691	6169	668	1125	730	1466	1179	620	943	416	1441	1020	27028
Wage from Central Gov.	666	690	714	726	750	866	907	898	889	880	876	895	913	932	950	969	13521
Composts	0	0	0	0	0	0	231	232	232	233	233	234	234	235	235	236	2335
Recycle of Materials	0	0	0	0	0	84	171	173	179	183	188	192	196	200	204	208	1900
Subtotal (A)	1889	2148	4117	2653	8893	8807	3757	4301	3993	4816	4622	4189	4636	4236	5385	5090	73532
Expense																	
Personnel	1015	1072	1129	1167	1224	1449	1526	1518	1509	1501	1504	1539	1574	1609	1644	1679	22659
Maintenance	225	236	246	286	296	542	630	636	642	648	675	684	694	703	712	722	8577
Fuel	59	61	63	88	90	158	185	187	191	193	197	201	205	210	214	218	2520
Others	10	10	10	14	14	49	83	83	82	82	81	81	81	81	81	81	923
Interests	0	8	0	82	82	312	479	475	518	506	570	574	552	573	542	601	5873
Subtotal (B)	1309	1387	1448	1637	1706	2510	2903	2899	2942	2930	3027	3079	3106	3176	3193	3301	40552
Balance (A-B)	580	761	2669	1016	7187	6297	854	1402	1051	1886	1595	1110	1530	1060	2192	1789	32980
Investment																	
Local (C)	735	109	2536	832	2497	2681	158	638	1097	528	2037	446	1101	475	869	1707	18446
Long Term Loan (Local)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Long Term Loan (Foreign)	0	0	2045	0	5745	4183	0	1182	100	2181	716	100	1182	0	2281	716	20431
Foreign Grant	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subtotal	735	109	4581	832	8242	6864	158	1820	1197	2709	2753	546	2283	475	3150	2423	38877
Repayment (D)	0	0	0	0	0	0	102	102	390	599	599	658	663	772	808	813	5504
Short Term Loan	155	-652	-133	-184	-4690	-3616	-594	-662	436	-759	1040	-6	234	187	-315	731	-9030
[(B+C+D)-A]																	

## CHAPTER 7. IMPLEMENTATION PLAN



## CHAPTER 7. IMPLEMENTATION PLAN

### 7.1 Implementation Schedule

#### 1) Implementation Policy

As mentioned in Chapter 6, the projects under review were all judged feasible. Consequently, the Implementation Plan is drawn up by combining the following three projects:

- (1) Improvement of Waste Collection and the Construction of Transfer Station in the Middle District
- (2) Sanitary Landfilling at MBSDS
- (3) The New Abis Compost Plant Construction

With the target year of 2000, Collection Improvement Project in the Middle District will run for a longer period of time compared with the life of equipment required for the improvement. Therefore, the enforcement of the project shall be divided into two stages. The first stage of the project shall cover the 5-year period from present to 1990, during which the collection and haulage system in the northern half of the Middle District will be improved and transfer station facilities shall be constructed. 1990 is also the year when the disposal in MBSDS will be terminated and the New Abis Compost Plant will start its operation, as described below. Following the first stage of the project, the second stage will commence in 1990 to improve the collection and haulage system in the southern half of the Middle District with the target year 2000.

Currently at MBSDS wastes are being disposed of by open dumping. However, it is an urgent task to switch the disposal method to the sanitary landfilling for environmental conservation in adjacent areas, and to introduce measures for a more effective use of this site to prolong the life expectancy as much as possible. For these requirements, it is necessary to implement this project at the earliest date possible.

The new Abis Compost Plant Construction Project shall be completed by 1990, the year when the landfill at MBSDS will be terminated, because one of the purposes of the project is to save the waste haulage cost due to the remote location for the landfill site, as well as to provide the aforementioned transfer station.

2) Preparatory period

About two years is estimated as a preparatory period from the end of this feasibility study to the commencement of construction work. During this period, the following items of work should be performed.

- (1) Budget compilation for a local currency portion of the project cost and its approval.
- (2) Preparation for the finance in foreign currency and formulation of a repayment plan.
- (3) Acquisition of the land.
- (4) Detailed design, and preparation of the specifications for construction work and equipment purchase.
- (5) Selection of contractor (tender, evaluation and contract awarding)

3) Implementation schedule

The implementation of this project shall be divided into two portions, one is to purchase equipments and materials and others required for the execution of the construction work. The time period required by the following category of work is as listed below:

- (1) Purchase of equipments and materials:  
6 months after the contract
- (2) Operation of the transfer station:  
1 year after the commencement of the construction work

(3) Operation of the sanitary landfilling at MBSDS:

6 months after the commencement of the construction work

(4) Operation of New Abis Compost Plant:

1.5 years after the commencement of the construction work

Among the items listed above, the construction project at MBSDS can afford no delays in its implementation schedule due to its urgency.

The implementation schedule which summarizes these schedules is shown in Fig. 7-1-1.

Fig. 7-1-1 IMPLEMENTATION SCHEDULE

Year	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
Preparation	-----	-----								
Collection Improvement										
First stage			-----	-----	-----	-----	-----	-----	-----	-----
Second stage							-----	-----	-----	-----
Transfer Sta.				-----	-----	-----	-----	-----	-----	-----
Transfer Vehicle					-----	-----	-----	-----	-----	-----
MBSDS										
Construction		-----	-----	-----	-----					
Landfill Equipment		-----	-----	-----	-----					
New Abis C.P.										
Construction				-----	-----	-----	-----	-----	-----	-----
Plant Equipment					-----	-----	-----	-----	-----	-----

----- Construction and procurement, ----- Operation

## 7.2. Executive Agency

Although cleansing service in Alexandria has been managed by both the Governorate and the District, the service will be transferred to a unified management by the Cleansing Authority, which will be newly established.

Thus, the Cleansing Authority is expected to become a promoter of the project on its implementation. Since this project will become the first major project for the Cleansing Authority, a project division should be established in the authority to manage this project.



### 7.3 Financial Plan

This clause deals with a financial resource prospect and a loan repayment plan of the project in question.

#### 1) Basic line for financial resources

The assumptions regarding financial resources of the project are mentioned in the following, on the premise of future switching to the Authority scheme.

- a. The basic wages should be paid every year by the Central Government, in correspondence to the number of the existing personnel, but the incentives and the like should be paid with self-supporting financial resources, by improving the charge collection. (Please refer to Table 7-3-1.)
- b. Charges, amounting to 1 LE/month for high-income households and 0.5 LE/month for low-income households, should be collected from citizens, and the charge collection rate should be improved to be 70% or more. And, charges corresponding to the waste treatment and disposal cost shall be collected from commercial and business establishments as well.
- c. Selling profits of compost and reusable materials should be regarded as income.
- d. As for the purchase of collection vehicles, the relevant cost should be covered with the budget of Chapter 3 allotted to the Middle District in correspondence to the amount of waste, and the charge collection. As for the burden of other districts regarding the construction of the final disposal sites, the compost plant, etc., to be used in common with other Districts as well (including the equipment purchase cost), they should be provided by the Central Government or the Alexandria Governorate, in the form of the additional subsidy from the budget of Chapter 3.

e. The foreign currency portion of the construction and procurement cost of the plants and facilities should be regarded on the basis of a 4% annual interest rate loans with 5-year grace period and 20-year repayment.

As for the short-term loans, they should be available at 5% annual interest rate, in the same way as in the case of other state-owned enterprises.

Table 7-3-1 MANPOWER REQUIRED FOR THE PROJECT

	(person)			
	1985	1990	1995	2000
1) Collection and Street sweeping				
Supervisory and managerial	13	18	20	23
Technical and special	67	131	147	166
Driver	33	76	77	94
Worker	117	252	283	349
Sweeper	571	430	304	304
2) Transfer station				
Administrative	-	5	5	5
Driver	-	22	24	24
Worker	-	11	15	15
Sweeper and Other	-	5	5	5
3) Final disposal				
Administrative	10	11	11	11
Driver	8	11	11	11
Worker	26	6	6	6
4) Compost				
Administrative	-	31	31	31
Driver	-	16	16	16
Worker	-	58	58	58

2) Handling of the expenditures

All construction cost and expenditure for the three projects are taken into account as lump sums, and O/M cost should be handled in the same way, as shown in Table 7-3-2.

### 3) Money Flow and Problems

The money flow shall be as shown in Table 7-3-3 and Fig. 7-3-1, and as can be seen, short-term loan will be required in 2000, but inversely, in cumulative terms, internal reserve of the project in question is expected to result in 3,572,000 LE. The project will be able to reimburse 10,000,000 LE and approximately 43% of the foreign loan, added to the previously reimbursed portion.

The said fact can be interpreted as leading to the consolidation of independent financial resources, but on the other hand, the project suffers a risk of failing in financial difficulties if the charge collection would be insufficient or if it would be impossible to secure financial resources to cope with the investment costs for the compost (including the transfer station) and MBSDS project to be borne by other districts, as can be seen from the results of the sensitivity analysis. Such being the case, further efforts of the authorities concerned are required for a successful implementation of this project.

Million  
LE

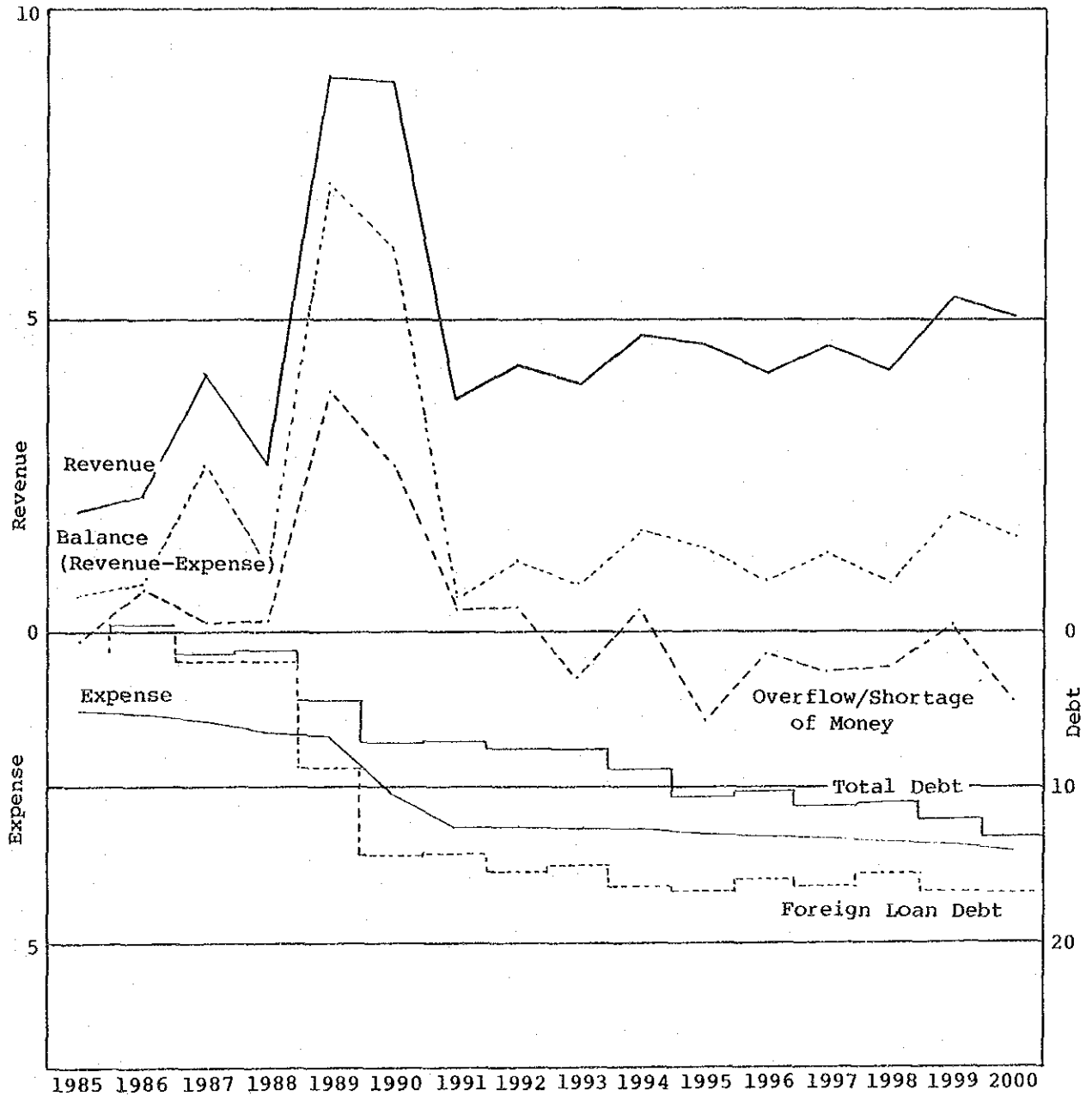


Fig. 7-3-1 CASH FLOW AND DEFICIT OF THE PROJECT

Table 7-3-2 ESTIMATED CONSTRUCTION & OPERATION COST FOR THE PROJECT

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Total
(1000 LE)																	
<b>Construction &amp; Purchase</b>																	
Collection & Sweeping	735	109	506	832	454	1,190	158	638	862	528	2,037	211	1,101	475	634	1,707	12,177
Transfer station					3,166					2,181					2,181		7,528
Compost					6,544	7,495					941					941	15,931
Final Disposal		4,075				335	1,182	335				335	1,182		335		7,779
Total	735	109	4,581	832	10,174	9,020	158	1,820	1,197	2,709	2,978	546	2,283	475	3,150	2,648	43,415
<b>Operation &amp; management</b>																	
Personnel Expenses	(1,015)	(1,072)	(1,129)	(1,167)	(1,224)	(1,452)	(1,533)	(1,525)	(1,516)	(1,508)	(1,511)	(1,546)	(1,581)	(1,616)	(1,651)	(1,686)	(22,732)
Collection & Sweeping	940	997	1,054	1,112	1,169	1,226	1,218	1,210	1,201	1,193	1,185	1,220	1,255	1,290	1,325	1,360	18,955
Transfer station					82	82	82	82	82	82	93	93	93	93	93	93	968
Compost					89	178	178	178	178	178	178	178	178	178	178	178	1,869
Final Disposal	75	75	75	55	55	55	55	55	55	55	55	55	55	55	55	55	940
Maintenance	(225)	(236)	(246)	(286)	(296)	(565)	(675)	(681)	(687)	(693)	(720)	(729)	(739)	(748)	(757)	(767)	(9,050)
Collection & Sweeping	172	183	193	203	213	224	230	236	242	248	254	263	273	282	291	301	3,808
Transfer station					153	153	153	153	153	153	174	174	174	174	174	174	1,809
Compost					105	209	209	209	209	209	209	209	209	209	209	209	2,195
Final Disposal	53	53	53	83	83	83	83	83	83	83	83	83	83	83	83	83	1,238
Fuels	(59)	(61)	(63)	(86)	(90)	(191)	(250)	(252)	(256)	(258)	(262)	(266)	(270)	(275)	(279)	(282)	(3,203)
Collection & sweeping	34	36	38	41	43	50	52	53	55	56	58	59	60	62	63	64	824
Transfer Station					39	39	41	42	44	45	47	50	53	56	59	62	538
Compost					55	110	110	110	110	110	110	110	110	110	110	110	1,155
Final Disposal	25	25	25	47	47	47	47	47	47	47	47	47	47	47	47	47	686
Others	(10)	(10)	(10)	(14)	(14)	(37)	(99)	(99)	(98)	(98)	(97)	(97)	(97)	(97)	(97)	(97)	(1,091)
Collection & sweeping	10	10	10	11	11	11	10	10	9	9	8	8	8	8	8	8	149
Transfer station																	
Compost					43	86	86	86	86	86	86	86	86	86	86	86	903
Final Disposal					3	3	3	3	3	3	3	3	3	3	3	3	39
Sub total																	
Collection & sweeping	1,156	1,226	1,295	1,367	1,436	1,511	1,510	1,509	1,507	1,506	1,505	1,550	1,596	1,642	1,687	1,733	23,736
Transfer station					274	276	277	279	279	280	314	317	320	323	326	329	3,315
Compost					292	583	583	583	583	583	583	583	583	583	583	583	6,122
Final Disposal	153	153	153	188	188	188	188	188	188	188	188	188	188	188	188	188	2,903
Total	1,309	1,379	1,448	1,555	1,624	2,265	2,557	2,557	2,557	2,557	2,580	2,638	2,687	2,736	2,784	2,833	36,076
Grand Total	2,044	1,488	6,029	2,387	11,798	11,285	2,715	4,377	3,754	5,266	5,568	3,184	4,970	3,211	5,934	5,481	79,491

Table 7-3-3 MONEY FLOW OF THE PROJECT

Year	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Total
Revenue	125	238	351	464	577	690	720	750	779	809	839	870	900	931	961	992	10,996
Company	175	297	419	542	664	786	847	908	970	1,031	1,092	1,163	1,234	1,306	1,377	1,448	14,259
Cleaning Fund	209	210	210	211	211	212	213	213	214	214	215	215	216	216	217	217	3,413
Budget Chapter 3 *1	714	713	2,423	710	6,691	6,169	668	1,125	730	1,466	1,179	620	943	416	1,441	1,020	27,028
Wages from Central Gov.	666	690	714	726	750	868	911	902	893	884	889	899	917	936	954	973	13,563
Compost	0	0	0	0	0	0	203	203	203	203	203	203	203	203	203	203	2,030
Recycle of Materials	0	0	0	0	0	70	144	149	153	158	162	166	171	175	180	184	1,712
Sub Total (A)	1,889	2,148	4,117	2,653	9,893	8,795	3,705	4,250	3,942	4,765	4,570	4,136	4,584	4,184	5,333	5,037	73,001
Expense																	
Personnel	1,015	1,072	1,129	1,167	1,224	1,452	1,533	1,525	1,516	1,508	1,546	1,581	1,616	1,651	1,686	1,707	22,732
Maintenance	225	236	246	286	296	565	675	681	687	693	720	729	739	748	757	767	13,563
Fuel	59	61	63	88	90	191	250	252	256	258	262	266	270	275	279	283	3,203
Others	10	10	10	14	14	57	99	98	98	98	97	97	97	97	97	97	1,091
Interests	0	8	0	82	82	356	576	572	615	602	660	669	642	658	622	675	6,819
Sub total (B)	1,309	1,387	1,448	1,637	1,706	2,621	3,133	3,129	3,172	3,159	3,250	3,307	3,329	3,394	3,406	3,508	42,895
Balance(A-B)	580	761	2,669	1,016	7,187	6,174	573	1,121	770	1,606	1,320	829	1,255	789	1,927	1,529	31,106
Investment *2																	
Local (C)	735	109	2,536	832	3,327	3,504	158	638	1,097	528	2,037	446	1,101	475	869	1,707	20,099
Long Term Loan(Local)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Long Term Loan(Foreign)	0	0	2,045	0	6,847	5,516	0	1,182	100	2,181	941	100	1,182	0	2,281	941	23,316
Foreign Grant	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subtotal	735	109	4,581	832	10,174	9,020	158	1,820	1,197	2,709	2,978	546	2,283	475	3,150	2,648	43,415
Repayment (D)	0	0	0	0	0	0	102	102	445	720	720	780	785	894	941	946	6,435
Short Term Loan	155	-652	-133	-184	-3,860	-2670	-313	-381	-772	-358	1437	397	631	580	-117	1,124	-3,572
(A-B-C-D)																	

Note: \*1 Budget Chapter 3 means investment budget for the s.w.m. in Alexandria Governorate.

\*2 Investment includes replacement cost for equipment.



CHAPTER 8. ORGANIZATION AND FINANCE  
OF CLEANSING AUTHORITY





## CHAPTER 8. ORGANIZATION AND FINANCE OF THE CLEANSING AUTHORITY

As mentioned in section 2.5, the cleansing service of Alexandria, consisting mainly of the s.w.m., will be operated by the Cleansing Authority which is expected to be established on the basis of the Law No. 61/1963.

The organizational and financial plan required for implementation of the service in conformity with the Master plan, and on the premise of its operation by the aforementioned Authority, is described in the following.

### 8.1 Organization

#### 8.1.1 Operational Scheme of the Authority

The Authority will be established on the basis of the Law No.61/1963, and the law stipulates the composition of the Board of Directors, the framework of the financial resources, etc., and as a matter of fact the other existing Authorities are organized under the same laws with the said stipulations.

Table 8-1-1 summarizes the characteristics of the main operational schemes of the Water Authority and Sewerage Authority, which are the representing organizations in Alexandria, and other authorities established in Cairo and Giza.

As can be seen, the main operational policy of the Authority is established by the Board of Directors chaired by the chairman of the Authority, and in general the various Authorities have financial resources with a similar composition.

The Cleansing Authority of Alexandria is expected to have the same operational scheme as those of Cairo and Giza, and the work will be allotted is expected to include the street sweeping, disinfection and control of stray cats and dogs, which are provided by the Cleansing Fund currently.

Table 8-1-1 MAIN ITEMS OF AUTHORITY UNDER OPERATION (1)

General Authority for Cairo Cleanliness and Beautification	General Cleanliness and Beautification Organization at Guiza Governorate	Alex. General Organization for Sanitary Drainage	Alex. Water General Authority
Place of establishment	Cairo	Alexandria	Alexandria
Decrees concerning establishment	Decree 284/1983	Decision 363/1979	Decree 1639/1968
Laws concerned at establishment	law No. 61/1963 (the law of the General Authorities) law No. 37/1967 (the law of General Cleansing) law No. 47/1967 (the law of the state civil servants scale) law No. 43/1979 (the law of the local governments)	law No. 61/1963 law No. 47/1979 law No. 93/1962 (the law of liquid waste) decision of the President No. 1637/1968 about sewerage system authority and No. 335/1979	law No. 308/1955 (Concerning the administrative) law No. 121/1960 (concerning law issue of local management system and laws straightened to it) law No. 68/1963 law No. 45/1963 (Concerning official employer) law No. 129/1963 (Concerning General foundation of accounts) law No. 44/1955 (Concerning management of supervision for accounts of general authorities foundation companies establishments and
Organization within which the authority has been established	Cairo Governorate	Guiza Governorate	Decision 4415/1965 of President Concerning of housing ministry Decision 4418/1965 Concerning General Egyptian foundation for utilities work Decision 3309/Concerning issue of Employer System at General Sector Ministry of Housing and Utilities (now only technical rotation)

Table 8-1-1 MAIN LINES OF AUTHORITY UNDER OPERATION (2)

	General Authority for Cairo Cleanliness and Beautification	General Cleanliness and Beautification Organization at Guiza Governorate	Alex. General Organization for Sanitary Drainage	Alex. Water General Authority
Constitution of Board of directors	<ul style="list-style-type: none"> <li>Chief of the Board of Directors</li> <li>Governorate Secretary General</li> <li>Director of the Health Affair Dept. in the Governorate</li> <li>A member from the Competent Legal Opinion Dept. of the State Council at Loans of the Grade Assist Counsellor</li> <li>The Authority General Manager</li> <li>Two high official, to be assigned by the Governor</li> <li>Heads of cities and quarters where the Authority shall exercise its activities.</li> <li>Three individuals of expertise in the field of the Authority activity appointed by the Governor for a period of two years renewable.</li> </ul>	<ul style="list-style-type: none"> <li>Chief of the Board of Directors</li> <li>General Manager of the Technical Affairs.</li> <li>General Manager of the Financial and Administration Affairs.</li> <li>Under-Secretary of Housing Ministry in Alex.</li> <li>Under-Secretary of Health Ministry in Alex. Governorate</li> <li>Legislative Counsellor of Alex. Governorate.</li> <li>Representative of the Chief of the Administrative Council for Alex. Water Supply Authority &amp; Technical Affairs.</li> <li>Two individuals of expertise in sewages, sanitary or drainage affairs appointed by the Governor for a period of two years renewable.</li> </ul>	<ul style="list-style-type: none"> <li>Chief of Board Director and Submanager of Chief of Directors employed according to the decision of President.</li> <li>Government Consultant</li> <li>Manager of Utilities and Housing of Alex. Gov.</li> <li>Manager of Utilities and Housing at El Be</li> <li>Manager of Utilities and Housing at</li> <li>Manager of Financial &amp; Administrative Affairs</li> <li>Agent for Ministry of sanitation selected by the minister</li> <li>2 from Technical manager at agency issues decision from Minister of Housing and utilities Minister for 2 years able to renew.</li> <li>2 members from those has experience in field of potable water appointed by Housing &amp; Utility minister for 2 years able to remain.</li> </ul>	
Financial resources of the Authority	<ul style="list-style-type: none"> <li>Appropriations in the State Budget</li> <li>Proceed of the Cleansing Funds under law 38/1967</li> <li>Allocations made from the local service, account in the Governorate</li> <li>Revenues received in the return for work and services performed by the Authority</li> <li>Loan concluded by the Authority</li> <li>Subsidies accepted by the Local of Directors</li> </ul>	<ul style="list-style-type: none"> <li>The Funds in the State Budget</li> <li>Revenues received in the return for its activities</li> <li>Loan permitted by decrees of the law</li> <li>Subsidies accepted by the Board of Directors</li> </ul>	<ul style="list-style-type: none"> <li>The income which results from administration and utilization utilities</li> <li>The funds which decided for it.</li> <li>Contracts of loans.</li> <li>Money gifts that accepted by Board of Directors.</li> </ul>	
Budget system	Independent budget according to rules of law of the General Budget of the State.	Independent budget according to rules of law of the General Budget of the State.	Independent budget according to rules of law of General Budget of the State.	
Position of workers	Under the state civil servants scale insofar as no special stipulation shall be made by the Board of Director.	Under the decrees of the regulation of civil employees of the State.	Under the decrees of the regulation of civil employees of the State.	

Table 8-1-1 MAIN ITMES OF AUTHORITY UNDER OPERATION (3)

Activities of the Authority	General Authority for Cairo Cleanliness and Beautification	General Cleanliness and Beautification Organization at Guiza Governorate	Alex. General Organization for Sanitary Drainage	Alex. Water General Authority
<p>Obligations of Board of directors</p>	<ul style="list-style-type: none"> <li>Applying and executing provision of law No. 38/1967 and the regulations for the execution of same.</li> <li>Collection and haulage of waste of all forms from their various sources.</li> <li>Construction and operation of facilities for the transmit of waste.</li> <li>Carrying out simple and urgent repairs to streets and roads.</li> <li>Taking urgent steps and measures for the removal of waste arising from digging operations in streets and roads.</li> <li>Co-ordination with the other utilities machinery whose activities shall be connected with the Authority purpose.</li> <li>Giving come to public gardens, plant trees in squares, streets and roads.</li> <li>ging and familiarising citizens with to keep the city clean and beautified.</li> <li>Providing trained labour.</li> <li>Procuring vehicles and equipments for the attainment of of the Authority</li> <li>Laying down the Authority general and the operations to be carried out.</li> <li>Setting the plans and the projects for the development of the Authority.</li> <li>Issue internal regulations and organizational decisions related to financial, technical, administrative and personal affairs.</li> <li>Approval of the annual budget draft and the closing account.</li> <li>Conclusion of contracts related to supplies and works concerning the general cleanliness utility and supervising execution of contracts.</li> <li>Conclusion of loans within the framework of the plan, the budget and the approved agreements.</li> <li>Acceptance of subsidies offer to the Authority.</li> <li>Study of periodical reports about the work and financial situation.</li> <li>Design of training programs for the workers aimed at rising their efficiency.</li> <li>Study of the subjects referred by the Governor or the Chairman of the Band of Directors.</li> </ul>	<ul style="list-style-type: none"> <li>Operation and repair of the sewerage system in Alex. and supporting this system.</li> <li>Preparing plans of projects of the sewerage net work.</li> <li>Make studies and researches about sewerage system.</li> <li>Design and put the standard, technical conditions and characters.</li> <li>Preparing the contracts of the project.</li> <li>Offering the projects in adjudications.</li> <li>Suggesting the Authority's general policy and the plans, projects which the Authority will execute.</li> <li>Decision of the general condition of executing the the projects.</li> <li>Issuing the internal regulations and decisions, arrange the financial and administrative affairs of the Authority.</li> <li>Design of training programs to rise the efficiency.</li> <li>Admitting the project of the annual budget of the Authority.</li> <li>Study the periodical reports about the work and financial situation.</li> <li>Ask for funds, according to the low.</li> <li>Study the subject, the governor or chief of board decide.</li> </ul>	<ul style="list-style-type: none"> <li>Under the decrees of the regulation of civil employees of the State.</li> <li>Operation and repair the water system in Alex. and supporting this system.</li> <li>Preparing the plans of the projects of the water net work.</li> <li>Make studies and researchers about water system.</li> <li>Design and put the standard and technical conditions and characters.</li> <li>Preparing the contracts of the project.</li> <li>Offering the projects in adjudications.</li> <li>Suggesting the general policy of Authority for utilities controlled by Authority.</li> <li>Suggesting of developmental plan, project and executing its program.</li> <li>Putting internal reports and internal decision concerned with financial &amp; administrative affairs for the Authority and its workers.</li> <li>Agreement yearly budget project and total accounts</li> <li>Contracts of loans.</li> <li>Forming financial reserve.</li> <li>Suggesting the price of water.</li> <li>Seeing periodical decision that introduced about follow up work at the Authority and its financial position.</li> </ul>	

### 8.1.2 Organization Framework of the Cleansing Authority

The organizational framework of the Alexandria Cleansing Authority is developed in consideration for the framework of the present cleansing organization, whose problems as discussed in Section 2.5, and those of the existing authorities such as the Alexandria Water General Authority. The framework is further refined through discussions with the counterparts, and it is presented in Fig. 8-1-1. In the following, important points in constructing the organizational framework of the Authority are discussed.

#### 1) Framework

The overall feature of the Authority and several organizationally important points are summarized as follows.

##### (1) Integration of all districts' cleansing activities

The new authority should be established as an independent organization which shall integrate cleansing activities of all the districts, and serve all citizens of Alexandria because the Authority shall be required to have high abilities in financial and administrative affairs, and should provide cleansing service in all districts with equal level and equal charge.

The chiefs of the districts will be able to reflect their opinions on the management of Authority only through being members of the Board of Directors.

##### (2) Projects and works of the Authority

All projects and works listed below is practicable from the standpoint of the present final feasibility. In the beginning most projects are related to the basic s.w.m. system.

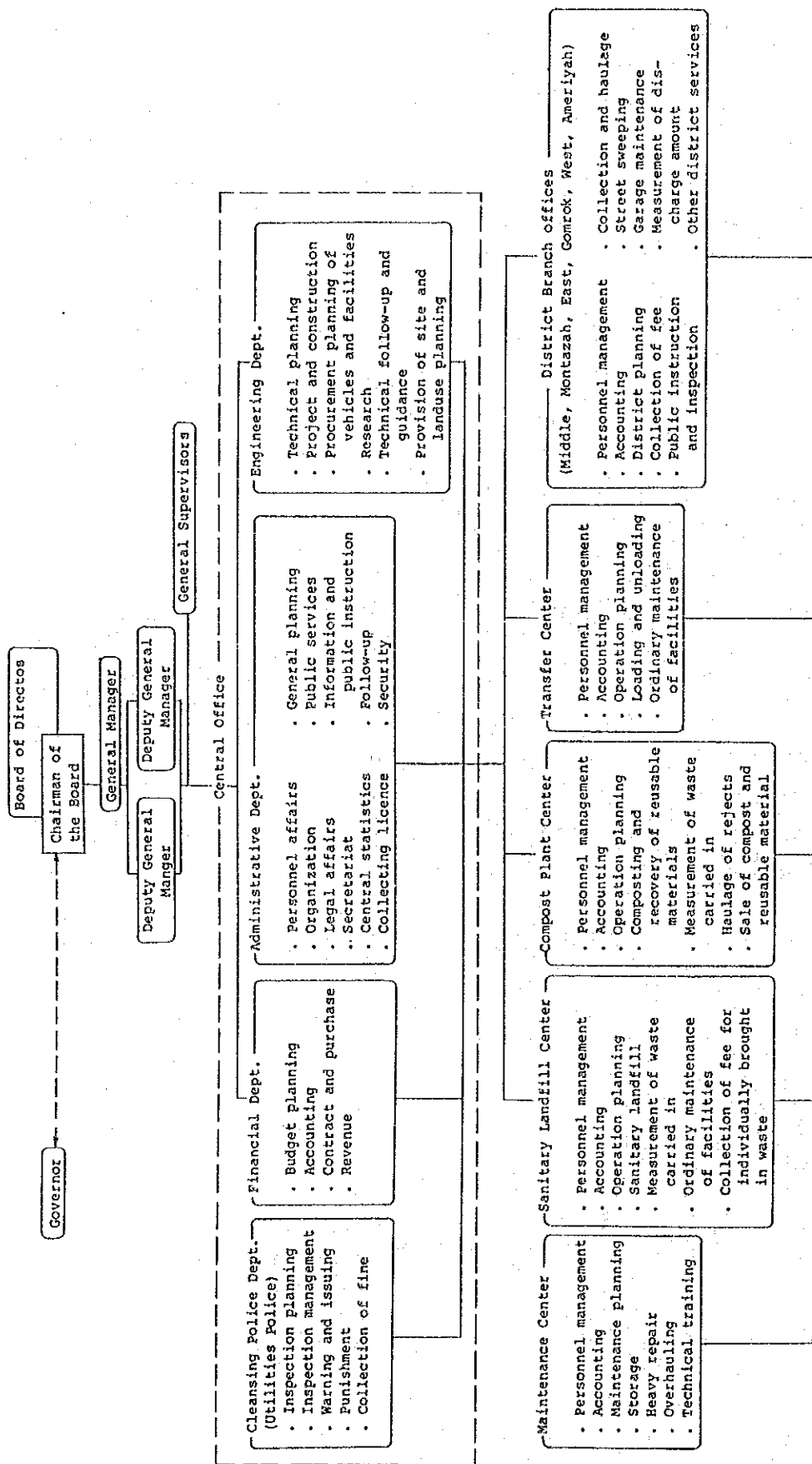


Fig. 8-1-1 THE FRAMEWORK OF THE ORGANIZATION SYSTEM OF THE AUTHORITY

- |  |  |
|--|--|
| <p>Projects from the beginning</p> <ul style="list-style-type: none"> <li>. Public WC</li> <li>. Insecticide spraying</li> <li>. Control of stray cats and dogs</li> </ul> | <ul style="list-style-type: none"> <li>. Collection and haulage</li> <li>. Street sweeping</li> <li>. Disposal of solid waste</li> <li>. Disposal of waste hauled by the individuals</li> <li>. Compost as plant operation</li> <li>. Plastic bags sale</li> </ul> |
| <p>Projects in the future</p>  | <ul style="list-style-type: none"> <li>. Street beautification by planting and others</li> <li>. Repairs of vehicles</li> <li>. Expand of composting capacity</li> <li>. Recycling of the materials and their sale</li> </ul>                                      |

(3) The framework of the organization system

As shown in Fig. 8-1-1, the Authority is composed of the Board of Directors which makes overall management decisions, the Central Office which involves four departments (i.e. Financial, Administrative, Engineering and Cleansing Police Departments), the sanitary landfill site, compost plant and maintenance centers, and the District Branch Offices which are responsible for actual cleansing works in the field. The specific work of each organizational unit are given in Fig. 8-1-1.

(4) Board of Directors and its chairman

The Board of Directors is the supreme decision making body of this Authority and should be organized with such members as follows:

- General Manager
- Governorate Secretary General
- Chiefs of six districts
- General Manager of Financial & Administrative Affairs
- Chief of Directorate of Ministry of Housing and Utilities
- Chief of Directorate of Ministry of Health
- Chief of Alex. Water General Authority



- Two high officials to be chosen by the Governor
- Legislative counsellor of Alex. Governorate
- Two individuals of expertise in cleansing & sanitary affairs to be chosen by the Governor

As in the case of Alexandria Water General, the General Manager of the Authority who will have the responsibility for the execution of s.w.m. shall be also assigned as the Chairman of the Board who will have the responsibility for highest ranking decision on the organization.

(5) Deputy General Managers and Supervisors

Two Deputy General Managers are necessary to support General Manager. One of them is responsible for financial and administrative affairs. The other is responsible for technical matters.

Supervisors organizationally stand directly under Deputy General Manager and are responsible for supervising and evaluating the operation and management of each district branch office and the three centers. This is the typical way of organizational systems in Egypt.

(6) Maintenance Center

In Maintenance Center only heavy repair and overhaul work that the Garage of District Office cannot perform are carried out. The vehicles, bulldozers and other machines which belong to the Authority taken care of at this Maintenance Center. The question of whether this Center is positioned as a part of the present Central Workshop or created as a new establishment should be carefully examined by the Governorate of Alexandria.

(7) District Branch Offices

District Branch Office in the organization of the Authority corresponds to each of the six districts in Alexandria. However, from the standpoint of organizational efficiency, two or so districts can be combined to become a District Branch Office.

(8) Cleansing Police Dept.

Collection of cleansing fee and attaining citizens' cooperation in waste discharge garbages are the two important items in the management of cleansing service. In order to strengthen these items it is appropriate to involve Cleansing Police Dept. in this Authority organization.

2) Important items in constructing the Authority organization

(1) Organization

The organizational chart shown in the Fig. 8-1-1 is planned with a view point that it can be fully applicable in 5 - 10 years. During this 5 - 10 years, the Authority should employ competent specialists and staff, and establish District Branches and increase employees' wages step by step.

(2) Maximum number of employees required

The number of employees of this Authority shall be around 4,000. This number should not be increased. If the Authority wants to start new activities, the Authority should do this by using manpower that may be saved through rationalization of street sweeping service.

(3) Decisions by the Board of Directors

Major decisions on the Alexandria cleansing services are currently made by the Executive Council, the Secretary General, the Board of Directors of the Cleansing Fund and the Central Workshop. After establishment of the Authority, these decisions are to be made by the Board of Directors of the Authority through consultation with the Governor.

(4) Transfer of the existing organization to the Authority

The existing organization for cleansing service will be transferred to the Authority in the following scheme.

a. General Follow-up Dept.

The present General Follow-up Dept.'s duties shall be separated and allocated respectively to the General Supervisor, the Follow-up Section of the Administrative Dept., the Compost Center and the Sanitary Landfill Center. Personnel in General Follow-up Dept. with good performance shall be employed in the Management Sections of the Engineering Dept. and District Branches.

b. Cleaning Section of each district

The present Cleansing Section of each district is transferred to the District Branch Offices of the Authority. Personnel in technical and management sections shall be changed according to the policies and evaluations of the Authority.

c. ADS

The collection service and plastic bag sales of ADS will be transferred to the Authority.

d. Compost Plant Center and Sanitary Landfill Center

Personnel of the Compost Plant Center are those of the present Abis Compost Plant and Follow-up Compost Section personnel. As for the Sanitary Landfill Center many new employees, especially for the Technical and Management Sections, will be required.

e. Central Office

Personnel in the Central Office except for Cleaning Police Dept. will be transferred from various administrative organizations or newly employed. However, the abilities of the presently employed personnel in these fields are not sufficient. Therefore, personnel with field expertise and technical knowledge shall be employed in Engineering Dept., furthermore consultants in foreign countries might be asked to train technical personnel as well. For the personnels in Financial and Administrative Dept., training or temporary employment in the Water General Authority or the Sewerage Authority should be applied.

f. Relation with the Central Workshop and Utilities Police

The relationship between the Authority and both the Central Workshop and Utilities Police should be further studied.

(5) In order to strengthen the management capability of the Authority, establishment of an efficient and smooth organization is necessary. The major points of consideration are listed below.

- a. Deputy General Manager have to have knowledge and experience in sanitary engineering and administration. Departments in the Central Office should have specialists with planning ability and be composed of at most four to five divisions in order to avoid the function spreading over the entire office.
- b. It is suggested that the Chiefs of the three Centers and the six District Branch Offices be given responsible positions.
- c. The personnel training and development should be considered to be an important part. Through public instructions and inspections by Inspector Cleansing Police, the public cooperation in waste discharge manner should be improved, and the cost reduction should be achieved.

- d. A fair and efficient system for promotions and incentives to maintain the activeness of the organization.
- e. Punishment and strict penalty should be imposed on the illegal deeds in collection of fee and inspection. This will help obtain the trust of people. Especially during inspection, the process of instructions, caution and punishment should be applied.
- f. Expansions of plants, vehicles and machinery should be accompanied by the improvement in capability of organizations and workers.
- g. Maintenance should be expanded as much as possible to make the most of collection vehicles and landfilling bulldozers and to reduce the expenditure for them.
- h. A special collection system and Cleansing Police should be utilized for completion of charges collecting.

(6) Increase of employees' wage level

The employees wage level shown in the attached table may not be high enough to recruit all necessary workers and staff. If the Authority needs to increase the wage level, it should achieve this by rationalizing its activities and by increasing management efficiency, and not resort to the increase of the charges to be collected from citizens. If the increase of the charges were allowed, this should be used for investments in future projects.

(7) Necessity for the study of other authorities

The Alexandria General Water Authority seems to have very efficient systems in management, administration and finance. Therefore, it would be very useful and helpful for the new Cleansing Authority to study their systems. To study the corresponding systems of the Sewerage Authority may also be useful in order to understand problems that may arise during the early stage of the establishment of the Authority.

(8) Preparation of regulations

The Authority should establish regulations concerning the followings:

- Waste discharge manners and conditions
- Charge for waste collection and disposal fee
- Service level

The above-mentioned regulations should be informed to all citizens.

### 8.1.3 Manning Scheme of the Authority

#### 1) Manning scheme at the target year

The manning scheme of the Authority in 2000, which is the target year of the project, is shown in Table 8-1-2. This manning scheme is drawn up on the basis of the following consideration.

- a. Responsible persons of a high-positioned job group should be nominated for the positions of chiefs of the various departments of the Central Office and the three Centers, respectively.
- b. The specialist job group of the Central Office will be allocated to the service fields shown in Fig. 8-1-1. As for office clerks, one person will be allotted to each person of the high-positioned job group. As for the Financial Dept. however, two clerical specialists will be allotted because such an accounting work as summing up of charge income, etc. is concentrated in this Department.
- c. The number of drivers of the Central Office is planned by assuming one driver for every member of the high-positioned job group. As for other workers, consisting of office sweepers, tea-serving girls, etc., they shall be allotted at a rate of one for every 20 persons.
- d. As for the personnel of the Centers and the field workers in charge of street sweeping and waste collection, the manning scheme examined in Chapter 5 is assumed to be applied. As for the manning scheme of the Maintenance Center, the position is not clearly defined yet within the Authority (it is not known if this Center will be incorporated in the Authority, and its relationship with the existing Central Workshop is not clear) then the minimum manning requirement is calculated separately.
- e. In connection with other works related to city beautification and sanitation affairs besides waste collection and street sweeping included in the list of duties of the Authority, such as keeping of public lavatories (at present, 130 persons are allotted for this job in the Middle District alone), control of stray cats and dogs,

prevention of epidemics, etc., one person for every 5,000 inhabitants will be allotted in Middle and Gomrok District, and one person for every 7,500 inhabitants in the other four Districts. One person in every 20 of the said personnel will be regarded as a work master and as a member of specialists.

- f. In Alexandria, there are approximately 64,500 shops (28,000 in the Middle District) registered as of 1981. The total number of the establishments existing in the city, summing ordinary business establishments and public establishments and the said shops, amount to approximately 70,000 including 30,000 in Middle District. It is presumed that the said number of establishments in Alexandria will increase to approximately 100,000 in 2000. On the other hand, the number of households is expected to reach 820,000 in 2000.

If a door-to-door charge collection system should be introduced, each charge collector working with a frequency of four times collection per year would take charge of 1600 establishments or 3200 households, by assuming that 20 establishments or 40 households shall be visited every day by each charge collector. Accordingly, the number of charge collectors to cover the totality of the households and establishments receiving to collection service as of 2000 will be 63 persons for establishments and 256 persons for ordinary households. The manning scheme will be drawn up by assuming 350 persons, taking into consideration of possible non-attendances.

This manning scheme is drawn up by assuming one charge collector for every 10,000 inhabitants in the Middle and Gomrok Districts, one charge collector for every 14,000 inhabitants in the Ameriyah District, and one charge collector for every 12,000 inhabitants in the other three districts. The said charge collectors are assumed to belong to the specialist job group, because they will take charge of such jobs as warning to charge defaulters, issuance of charge bills, summing up of the collected charges, etc.



- g. As for the personnel of the specialist job group of the District Branch Offices (excluding garages), six office-work specialists and four technical-work specialists shall be allotted in the West District, and the number of persons calculated in correspondence to the waste amount shall be allotted to the other districts. As for the clerks, two persons shall be allotted to each person in charge of the high-positioned job the specialist job of the clerical work, and one shall be allotted to each member of the speacialist job group of the technical work, by taking into consideration the massive work related to the accounting of charges and the personnel management.

As for the drivers of ordinary vehicles and vehicles related to beautification work, five persons shall be allotted to the West District and the number of persons calculated in correspondence to the waste amount shall be allotted to the other districts.

As for the office sweepers and tea-serving girl and other assistant personnel, they shall be allotted at a rate of one person in every 30 office clerks and personnel other than the other job group.

Table 8-1-2 NUMBER OF THE WORKERS IN EACH SECTION OF THE AUTHORITY

(person)

Classification of workers	High-positioned job group		Specialist job group		Technical job group			Supervisory job group			Other job group				Total
	Administrative	Engineering	Law finance Admini- strative	Engi- neering	Assis- tant engineer	Driver		Fee collector, Inspector, Police	Work master	Office clerk	Sweeper	Waste Collec- tion worker	WC keeper, etc.		
						Collec- tion vehicle	Bull- dozer, etc.								
Central Office															
General Deputy Supervisor	2	1	2	1	-	-	2	-	-	6	-	-	1	15	
Administrative Dept.	1	0	7	4	-	-	2	-	-	12	-	-	1	27	
Financial Dept.	1	0	4	2	-	-	2	-	-	11	-	-	1	21	
Cleansing Police Dept.	1	0	3	1	-	-	1	60	-	5	-	-	2	73	
Engineering Dept.	0	1	2	6	6	-	2	-	-	9	-	-	1	27	
Subtotal	5	2	18	14	6	-	9	60	-	43	-	-	6	163	
Transfer Center	0	1	1	1	2	-	24	-	2	3	-	10	5	49	
Sanitary Landfill Center	0	1	3	3	5	-	35	11	3	3	-	12	6	82	
Compost Plant Center	0	1	3	3	14	26	4	6	7	-	-	90	16	170	
District Branch Office															
Middle	1	-	14	9	11	109	9	93	62	37	304	312	160	1,097	
Montazah	1	-	9	6	12	103	10	77	41	24	246	357	114	1,000	
East	1	-	12	8	13	97	10	79	49	32	288	357	114	1,027	
Gomrok	1	-	7	5	5	42	4	40	28	19	136	146	69	502	
West	1	-	6	4	6	45	5	53	27	16	183	159	77	582	
Ameriyah	1	-	7	6	12	102	10	63	38	24	432	335	108	1,140	
Subtotal	6	-	57	38	57	474	48	405	245	152	1,589	1,635	642	5,348	
Grand Total	11	5	82	59	04	474	142	480	256	208	1,589	1,747	675	5,812	

Based on the Table 8-1-2, the organization of the Authority in 2000 is outlined as follows:

- a. The total number of personnel is to be approximately 5,800, including some 160 employed at the Central Office, 300 at the three Centers and 5,350 at District Branch Offices. Nearly 90% of the total shall be engaged in waste collection and street sweeping, with the rest being in charge of keeping public lavatory and serving as charge collectors at the District Branch Offices.
- b. Another principal feature of the personnel structure lies in the fact that, in terms of basic wage ranking, almost 3/4 will be belong to the "other job group" of 5th and 6th classes.

Table 8-1-3 shows the breakdown by job category of personnel in the Alexandria Water General Authority, a body which is said to be among the best organization of Egypt's various Authorities.

Table 8-1-3 NUMBER OF PERSONNEL IN EACH JOB CATEGORY  
(ALEXANDRIA WATER GENERAL AUTHORITY)

Job group	High-positioned job	Specialist job	Technical job	(person)	
				Supervisory job other job	Total
Number of workers	17	360	303	3,400	4,080
Percentage (%)	0.4	8.8	7.4	83.4	100.0

- c. It is estimated that approximately 3,500 persons in the Authority are presently engaged in the work related to the project. The number of personnel required in the year 2000 therefore represents an increase by 75%.

The following reasons will be given for this increase:

- With the exception of the Follow-up Dept., Finance, Personnel, Planning and Cleansing Police Departments have been integrated into the Central Office.

increase by approx. 200 persons

- Increase in personnel to cope with higher level of operation and expanded facilities at the three Centers

approx. 150 persons

- Increase in personnel in conjunction with improved organization in the charge collection system

approx. 350 persons

- Intensified operations in Finance, Personnel and Technical Departments of District Branch Offices

approx. 300 persons

- Addition of District Garage personnel

approx. 250 persons

Increased number of personnel engaged in waste collection and street sweeping in Ameriyah District as a result of population increase from present 113,000 to 775,000

approx. 500 persons

- Increased number of personnel engaged in waste collection and street sweeping in other districts

approx. 900 persons

Meanwhile, the Alexandria Water General Authority maintains 1,800 employees, including some 400 persons in the "high-positioned job" and "special job" groups (including the Management Dept.) and 1,400 clerical workers engaged in office work, charge collection, etc. This total accounts for 40-50% of all personnel, so the aforementioned increase in personnel to cope with fortification of the Management Dept. is not particularly large.

## 2) Organization improvement plan

The major items of consideration related to organizational improvement have already been mentioned in Section 8.1.2. Here, the discussion will focus on personnel planning aimed at 2000.

The personnel plan is proposed according to the following policies.

(1) Personnel at Central Office

Although the required number of personnel at the Central Office should be determined in proportion to the amount of work which this office shall undertake. At present, however, it is difficult to determine such work amount due to its administrative and planning nature. Therefore for the purpose of this study number of personnel required for Central Office is estimated as follows.

With this respect, 50% of the organizational structure of the Central Office will be instituted by 1990, 100% by 1995. The number of personnel is proportional to the amount of planned waste.

Number of personnel in 1990 = 0.5 x Number personnel in 2000 x amount  
of waste in 1990/amount of waste in 2000

Number of personnel in 1995 = 1.0 x Number of personnel in 1000 x  
amount of waste in 1995/amount of waste  
in 2000

(2) Number of personnel engaged in waste collection and street sweeping at the Centers and District Branch Offices

The number of personnel to be involved in waste collection and street sweeping at the Centers and the District Branch Offices will accord with the personnel plan for each Planning Dept.

(3) Personnel at District Branch Offices, etc.

The organization in the Middle District is targeted for completion by 1990, while in the other districts the target will be 50% completion by 1990 and fully completion by 1995.

The number of personnel is proportionate to the planned waste amount.

Table 8-1-4 shows the number of personnel during each year as calculated in compliance with the above policies.

Tab. 8-1-4 NUMBER OF PERSONNEL BY EACH YEAR

(person)

	Administration jobs		Technical jobs		Special jobs	Other jobs		Total
	High tion	Specialist	Driver	Others		Clerk assistant	Sweeper others	
1990								
Central Office	3	11	3	2	20	15	2	56
Transfer Center	1	2	22	2	2	11	3	43
Compost Plant Center	1	6	26	14	10	97	16	170
Sanitary Landfill Center	1	6	31	5	12	14	6	75
District Middle D.	1	18	76	9	122	252	556	1,034
Branch Office Others	5	23	181	15	161	596	1,482	2,463
Subtotal	6	41	257	24	283	848	2,038	3,497
Total	12	66	339	47	327	985	2,065	3,841
1995								
Central Office	6	27	8	5	50	36	5	137
Transfer Center	1	2	24	2	2	12	4	47
Compost Plant Center	1	6	26	14	10	97	16	170
Sanitary Landfill Center	1	6	35	5	12	15	6	80
District Middle D.	1	20	77	10	137	283	446	974
Branch Office Others	5	59	279	38	405	948	1,507	3,241
Subtotal	6	79	356	48	542	1,231	1,953	4,215
Total	15	120	449	74	616	1,391	1,984	4,649
2000								
Central Office	7	32	9	6	60	43	6	163
Transfer Center	1	2	24	2	2	13	5	49
Compost Plant Center	1	6	26	14	10	97	16	170
Sanitary Landfill Center	1	6	35	5	14	15	6	82
District Middle D.	1	23	94	11	155	349	464	1,097
Branch Office Others	5	72	428	46	495	1,438	1,767	4,251
Subtotal	6	95	522	57	650	1,787	2,231	5,348
Total	16	141	616	84	736	1,955	2,264	5,812

While it is expected that the activities of the Authority will partially commence in 1987, the period through 1989 is to be a transition phase in which organizational and fiscal aspects will accord with the regular operations to date of the Governorate and ADS. The personnel plan, therefore, is to begin in 1990.

To understand the numerical trends in personnel for each year, Table 8-1-5 shows personnel numbers for four different categories; Administrative jobs, Technical jobs, Supervisory jobs and Other jobs.

Table 8-1-5 PERSONNEL TRENDS BY JOB CATEGORY

(person)

Year	Administrative job group	Technical job group	Supervisory job group	Other job group	Total
1990	78	386	327	3,050	3,841
1995	135	523	616	3,375	4,649
2000	157	700	736	4,219	5,812

## 8.2 Financial Plan

The existing s.w.m. system in Alexandria has been operating on the basis of the following financial resources, as mentioned in Section 2.

- Basic wages provided by the Central Government to the Governorate of Alexandria.
- Cleansing Fund consisting mainly of the collection of 2% of house rents from the houseowners.
- Investment provided by the Central Government, including foreign aids.
- Revenues from selling compost and reusable materials.

Besides the aforementioned financial resources, funds for reimbursement of loans from foreign countries are provided by the Central Government. However, most of foreign aid programs for s.w.m. projects are grants, and therefore, there is practically no demand for reimbursement funds. The financial resources for implementation of the cleansing service carried out by the ADS are the collection of charges from the residents and shops and sales of plastic bags.

The Cleansing Fund is practically the only independent financial resource of the cleansing service by the Governorate of Alexandria, and there is a chronic shortage of funds for increase in workers' incentives maintenance of vehicles and other equipment, etc. This has resulted in a serious obstacle to satisfactory operations of the cleansing service.

Furthermore, it is indispensable to improve the current financial system which relies heavily on grants provided by foreign countries as a financial resource for the vehicles, facilities and equipments used for cleansing services.



Strengthening of independent financial resources is seriously required so as to solve these problems within the scope of the financial plan of the Authority.

In this study the expenses needed for the Authority to implement the s.w.m. system are calculated, and the methodology for securing the financial resources to meet the expenses is proposed.

#### 8.2.1 Expenses for Cleansing Authority

The expenses and the financial plan of the projects were examined in Chapter 7. This chapter deals with the expenses between 1990 and 2000 for examining the financial scale of the Authority planned to be established by around 1990. In this regard, the investment cost for the facilities and the annual ordinary expenditure other than the proposed projects are based on the costs estimated for Alternative-2 (Sanitary Landfill in Green Belt) of the Master Plan. (Please refer to the Section 5.2 and Table 5-2-2 of S.R.)

Namely, collection and street sweeping cover the costs of five Districts, excluding Middle District by assuming that the number of the compactors reaches the same number of the open dump trucks in 2000. As a result, 21,076,000 LE is required for purchasing the vehicles during 1990 to 2000 excluding the cost for the transfer station.

For the existing Abis Compost Plant, replacement cost, excluding the cost of civil structures, was taken in the calculation in 1999 based on the consideration that the life of the plant is determined to be 15 years. As for the final disposal site, two of the disposal sites are planned to be constructed, east and west on the Green Belt. It is assumed that the disposal sites will be constructed in 1988 and the replacement cost and a part of expansion project cost of the disposal site is taken into consideration.

In line with the construction and improvement projects mentioned above, the personnel and other expenditures from 1990 to 2000 will increase by 1.7 times for collection service due to the increase in waste amount. Disposal cost will increase by 1.2 times while the cost for composting will remain almost the same. Consequently, the cost of collection service will gradually increase and the total s.w.m. cost excluding the depreciation cost for vehicles will reach 9 LE/t in 2000.

On the occasion of calculating the money flow of the Authority, in addition to the above costs the following are listed below.

- Investment costs, revenue and expenditure of the proposed projects.
- Personnel expenditure estimated from the organizational plan of the Authority.
- Interest of the foreign loan.
- Other costs such as office expense calculated as 10% of the basic salary.

The result of the cost estimation for construction and operation for the Authority is shown in Table 8-2-1.

However, interest of the short-term loan is not considered in the money flow calculation because the handling of the deficit for the fiscal year is still unknown since the budgetary system of the Authority is concretely established from now on.

Table 8-2-1 ESTIMATED CONSTRUCTION AND OPERATION COST FOR THE AUTHORITY

(1000 LE)

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Total
<b>Construction &amp; Purchase</b>												
Project	9,020	158	1,820	1,197	2,709	2,978	546	2,283	475	3,150	2,648	26,984
Other Area	2,116	2,116	2,028	4,131	2,612	4,314	2,372	2,372	4,605	6,313	3,045	36,224
Subtotal	11,136	2,274	3,848	5,328	5,312	7,292	2,918	5,080	9,663	5,693	9,663	63,208
<b>Operation &amp; Management Personnel Expenditure</b>												
Project	1,452	1,533	1,525	1,516	1,508	1,511	1,546	1,581	1,616	1,651	1,686	17,125
Other area	2,217	2,339	2,461	2,584	2,717	2,839	3,027	3,214	3,402	3,592	3,780	32,172
Others	1,509	1,563	1,704	1,847	1,977	2,108	2,215	2,323	2,430	2,535	2,642	22,853
Subtotal	5,178	5,435	5,690	5,947	6,202	6,458	6,788	7,118	7,448	7,778	8,108	2,150
<b>Maintenance</b>												
Project	565	675	681	687	693	720	729	739	748	757	767	7,761
Other area	859	891	930	961	1,008	1,090	1,104	1,153	1,141	1,183	1,190	11,510
Subtotal	1,424	1,566	1,611	1,648	1,701	1,810	1,833	1,892	1,889	1,940	1,957	19,271
<b>Fuel</b>												
Project	191	250	252	256	258	262	266	270	275	279	283	2,842
Other area	269	280	292	303	330	341	359	378	396	421	439	3,808
Subtotal	460	530	544	559	588	603	625	648	671	700	722	6,650
<b>Others</b>												
Project	57	99	98	98	98	97	97	97	97	97	97	1,033
Other area	54	54	54	56	56	56	56	56	56	56	56	608
Other	259	272	285	297	310	323	339	356	372	389	405	3,607
Subtotal	370	425	438	449	464	476	492	509	525	542	558	5,248
Interest for foreign loan	505	726	722	759	822	898	921	887	881	932	1,136	9,199
Total	7,937	8,682	9,005	9,362	9,777	10,245	10,659	11,054	11,424	11,892	12,481	112,518
Grand Total	19,073	10,950	12,853	14,690	15,098	17,537	13,577	15,709	16,504	21,555	18,174	175,726

## 8.2.2 Framework of financial resources

The financial resources of the Authority consist of the following items:

- Basic wage provided by the Central Government
- Cleansing Fund
- Revenues resulting from the implementation of the cleansing services (collection of charges, sales of composts and plastic bags, etc.)
- Loans and subsidies (including aids provided by foreign countries)

Each item is examined in more detail in the following.

### 1) Basic wage provided by the Central Government

The amount of basic wages provided by the Central Government is 20 percent greater than the amount that is simply calculated by multiplying the standard basic wage of each rank of workers with the number of worker by the rank. Standard basic wage of each rank is shown in Table 8-2-2.

The Law No. 26/1983 entitles the Prime Minister to determine the wage standard of Sewerage Authority workers (later adopted to the Water Authority workers) independently of other public employees. The current wage standard adopted in the two Authorities is approximately as twice as other public employees'.

Occupational risk allowance	Max. 60% of basic wage
Overtime work allowance	Max. 50% of basic wage
Incentive	Max. 50% of basic wage

The Law No. 26/1983 might possibly be applied to the Cleansing Authority so that in the long run the wage levels can reach those of the Sewerage Authority and Water Authority. However, in this study the wage level is set at the current level which is of the order of 1.2 times the amount calculated by simple multiplication of basic wage of each worker and the number of workers.

Table 8-2-2 BASIC WAGE LEVEL FOR EACH CLASS OF EMPLOYEES

(LE/year)	
Class	Basic Wage
High rank general manager	2,000
1st class	1,600
2nd class	1,400
3rd class	1,100
4th class	800
5th class	700
6th class	600

The budget for wages of the employees in the Governorate of Alexandria and the wage provided by the Government Budget as Chapter 1 are shown in Table 8-2-3.

Table 8-2-3 BUDGET FOR WAGES AND REVENUE THROUGH CHAPTER 1 (1984/85)

(LE)			
	Type of Job	Number of Workers	Budget
The amount determined by the basic wage standard	Higher administration	10	20
	Specialist job	148	173
	Technical job	312	292
	Industrial and trade job	926	943
	Administrative development job	630	767
	Clerical job	2,712	2,322
	Assistant services job	1,136	843
	Other categorie	672	586
	Total (A)	6,546	5,945
Wage revenue provided by the National Budget (B)			7,064

B/A = 1.19

The rank evaluation of the cleansing workers in Alexandria is fairly low compared with that of the Water Authority.

The number of the Water Authority workers by each class is shown in Table 8-2-4 as a reference.

Table 8-2-4 WATER AUTHORITY WORKERS OF ALEXANDRIA BY EACH CLASS  
(person)

Class	No. of Workers	Proportion (%)
Over general Manager	17	0.4
1st class	83	2.0
2nd class	426	10.5
3rd class	1,191	29.3
4th class	1,201	29.5
5th class	520	12.8
6th class	629	15.5
Total	4,067	100.0

In this study the current rank evaluation is assumed to remain generally unchanged, and the classes of cleansing workers are set as in Table 8-2-5.

Table 8-2-5 CLASS BY TYPE OF JOB IN THE AUTHORITY

Jobs Group	Class
High position jobs group	1st 2nd
Specialist jobs group	3rd
Technical jobs group	4th
Special jobs group	4th
Clerk and Assistant	5th
Others (Sweeper, others)	6ty

In view of the aforesaid consideration, the basic wage to be allotted by the Central Government will be the amount listed in Table 8-2-6.

Table 8-2-6 BASIC WAGE TO BE PROVIDED BY THE CENTRAL GOVERNMENT

Year	1984 record	1990	1995	2000
Basic Wage (1000 LE/year)	(2,500*)	3,107	3,875	4,865

It can be pointed out that the basic wage per worker of this Authority will mount to 830 LE/man-year in 2000, but the wage recorded in the Water Authority of Alexandria in 1984/85 mounts to approximately 1,500 LE/man-year, and the differential between them is conspicuous.

## 2) Cleansing Fund

In connection with the Cleansing Fund, there are favourable factors such the improvement of the collection rate, increase of the number of households through decomposition of large families into small nuclear families, rise of the rents, strengthening of the penalty collection scheme, etc., that are expected to contribute to increasing the sum collected from each resident. However, there are unfavourable factors, such as increase of new low-rent housing demand due to the future population growth, and uncertainty about the use of the large-sized vehicle tax as a financial resource of the Cleansing Fund in future, that could contribute to reducing the revenue.

Thus, this study assumes that financial resource of the Cleansing Fund will increase merely in proportion to the population growth, as shown in Table 8-2-7.

Table 8-2-7 FINANCIAL RESOURCES OF THE CLEANSING FUND

	Recorded in 1984	1990	1995	2000
Population (1000 person)	2,884	3,191	3,645	4,099
Financial resource of the Fund (1000 LE/year)	1,365	1,510	1,725	1,940

## 3) Subsidies and loans

The investment financial resources of the s.w.m. system in Alexandria are provided by the Central Government, including aids from foreign countries.



These financial resources consist of three items.

- Grants provided by foreign countries.
- Loans from foreign countries should be in accordance with articles 15 and 129 of Law 43/1979. So far, the Central Government has borne the reimbursement of these loans, and in reality foreign loans are the same as grant-in-aid for the Governorate of Alexandria.
- Funds provided by the Central Government as an investment financial resource to the Governorate of Alexandria.

After the establishment of the Authority, these subsidies and loans will be received by the Authority, and measures should be taken so as to establish an independent financial base for the Authority. Of the three financial resources mentioned above, grants from foreign countries should be reduced to zero by 2000, and loans should be accepted but subsidies of the Central Government for reimbursing them should not be accepted.

The following courses of actions are set for the financial plan.

- Grants and loans from foreign countries with reimbursement borne by the Central Government, which amount to approximately 60% of the investment financial resources at the present time, are expected to remain unchanged until 1990, but after 1990 they shall be gradually reduced down to zero in 2000.
- Funds provided by the Central Government by way of an investment financial resource will be received also in the future, proportionally to the population.
- Loans with reimbursement borne by the Authority itself should be introduced by taking into account the reimbursing capability.

The prospect of the annual financial resources in conformity with these conditions is shown in Table 8-2-8.

Table 8-2-8 FINANCIAL RESOURCES CONSISTING OF SUBSIDIES AND LOANS

(1000 LE/year)				
Item	1984/85 (Actual sum)	1990	1995	2000
Grants and subsidized loans	1,330	1,330	670	0
Investment funds provided by the Central Government	1,000	1,110	1,260	1,420
Loan	0	The Authority will be entitled to receive loans at its discretion, within certain limits		

4) Collection of charges for waste collection

The collection of charges for waste collection will be one of the key sources of operational revenue of the Authority. Once established, the Authority will be able to collect the charges officially. However, it will face two questions.

- How to organize the charge collection system?
- To what extent is the charge level practicable as to the cost to the beneficiaries?

(1) Charge collection system

There are five possible cases for the charge collection system.

Case 1: House-to-house collection, with establishment of the charge by household or family size.

Case 2: Use of prescribed discharge containers, and collection of charges depending on the number and capacity of containers.

Case 3: Use of standardized bags (plastic or paper), and imposition of an additional charge to the bag selling price.

Case 4: Individual contracts according to the waste amount discharged, mainly with massive waste generators, and collection of fixed monthly charges.

Case 5: Collection of haulage charge, in accordance with the waste amount hauled directly into compost plants, transfer stations or final disposal sites.

Of these cases, Cases 4 and 5 are the systems applicable to massive waste generators, and Case 2 can be regarded as the system applicable to small- and middle-scale commercial and business establishments because all the waste collection systems will eventually use bags as discharge containers.

Therefore, the charge collection systems applicable to ordinary households, that account for the absolute majority of waste sources, are Cases 1 and 3. The advantages and disadvantages of these two cases are summarized in Table 8-2-9.

Table 8-2-9 COMPARISON OF CASES OF CHARGE COLLECTION SYSTEMS APPLICABLE TO ORDINARY HOUSEHOLDS

	House-to-house Collection System	Collection of additional Charge
Current Situation in Alexandria	In the residential areas occupied by low-income households, which are not covered by the waste collection service of the district, ADS is carrying out the service and collecting approximately 35 to 50 PT/household-month. The charges for the electricity and water services are metered and collected from each house but the effective collection rate of the water service is barely 60%.	The ADS is adding 0.5 to 1.0 PT/bag to the selling price of the bags, and the relevant revenue is used for funding the activities of the ADS.

	House-to-house Collection System	Collection of additional Charge
Advantages and Disadvantages	<ul style="list-style-type: none"> <li>o The collection rate will be improved if the collection system is implemented in full scale.</li> <li>. The charge becomes indiscriminate, irrespective of the waste amount, because it is difficult to measure the waste generation rate. As a consequence, it is difficult to control the waste generation amount.</li> <li>. This case requires full-time charge collection personnel, and will result in additional collection expenses. (The additional expense, however, is of the order of 500,000 LE/year.)</li> </ul>	<ul style="list-style-type: none"> <li>o This system contributes to controlling the waste discharge rate, because it functions virtually as a gradually-increasing charge system since the charge is added to the bag-selling price. (The waste amount to be discharged will be added by the portion corresponding to the bags, but the waste suppressing effect is much larger.)</li> <li>. The charge collection rate will be lowered if the percentage of use of bags is small.</li> <li>. It is necessary to control the scale of similar products.</li> <li>. If the burden of the waste discharger is 5PT/bag, it amounts to the huge sum of 11,300,000 LE/year.</li> <li>. It is necessary to organize the network for selling the standard bags, and furthermore guidance for using them should be accompanied. (Selling system by using inspectors, work-masters, etc.).</li> </ul>

Of these advantages and disadvantages, the most important one is the burden upon the waste dischargers caused by adding the charge to the standard bag selling price. If ordinary households and establishments excluded from the house-to-house collection service should obey the bag-discharge system as a result of the relevant guidance and campaign, the bag-purchasing burden would amount to 11,300,000 LE/year. (In reality however, the sum added to the bag-selling price is 5PT/bag.)

On the other hand, the house-to-house collection system brings about expenses consisting of the wages for the charge collection personnel which mounts to 500,000 LE/year. In this case the sum to be borne by the discharger is barely 5% of that in Case 3.

It is presumed to be difficult to secure the citizenry cooperation with the bag-discharge system, which incurs the large economic burden mentioned above. Since this results in instability of the financial resource for the system, it is concluded that the house-to-house collection system is the most appropriate charge collection system.

In view of the aforesaid consideration, it is concluded that the most appropriate scheme for the Authority is basically the house-to-house collection system for ordinary households, combined with the individual contract system for establishments with massive waste generation (including markets) and collection of charge through the use of specific waste containers.

(2) Charge level

The following facts were taken into consideration as references for determining the charge levels.

- The beneficiary burden limit of 6 LE/year for one household is proposed as a reference level by the Alexandria authorities. This level, including 2% of house rent, is regarded as a practicable charge level at which fee collecties can be made from the citizens.
  
- The ADS of the Middle District is collecting the following charges (monthly sums). However, this system is implemented on the premise of waste discharging in front of the building.

- a. Household
  - Low-income area : 35PT/household
  - Middle-income area and high : 50PT/household
  
- b. Shop
  - Minimum : 1 LE
  - Maximum : 15 LE (juice shop)
  
- c. Other places
  - Tea & coffee house : 3 LE
  - Bakery : 5 LE
  - Hotel : 7 LE
  - Factory : 15 to 40 LE
  - Hospital : Over 30 LE
  - School : 3 LE/shift
  - Gasoline station : 60 LE (mud is discharged)
  - Private workshop : 10 LE

- Results of the fact-finding survey indicate that a low-income household pays 0.25 to 0.50 LE/month, while a middle- or high-income household pays 0.5 to 1.0 LE/month. As for the price to be paid for the house-to-house waste collection, a low-income households is willing to pay 0.5 to 1 LE/month, and a middle- or high-income household 1 to 2 LE/month.

These values are on the premise of the house-to-house collection.

- The charge collection systems for other utilities in Alexandria are shown in Table 8-2-10.

Table 8-2-10 CHARGE COLLECTION SYSTEMS FOR UTILITIES IN ALEXANDRIA

Type of Utility	Charge Collection System								
Water supply service	<p>The charge is authorized by the local Council, when the Authority makes the relevant request.</p> <p>The charge is metered and collected every month on house-to-house basis. Approximately 20% of the users pay directly at the counter of the Branch Offices of the Authority.</p> <p>The charges are as follows:</p> <ul style="list-style-type: none"> <li>- Ordinary households               <table data-bbox="730 752 1209 875" style="margin-left: 20px;"> <tr> <td>First 30 m<sup>3</sup>/month</td> <td>3 PT/m<sup>3</sup></td> </tr> <tr> <td>Over 30 m<sup>3</sup>/month</td> <td>5 PT/m<sup>3</sup></td> </tr> <tr> <td>- Ships</td> <td>2 LE/m<sup>3</sup></td> </tr> <tr> <td>- Other establishments</td> <td>15 PT/m<sup>3</sup></td> </tr> </table> </li> </ul> <p>The estimated quantity of payable city water supplied in 1983/84 mounted to 222,800,000 m<sup>3</sup>/year (including 9,300,000 m<sup>3</sup> supplied to Matruh City and excluding 143,100,000 m<sup>3</sup>/year of non-payable water), with an annual revenue amounting to approximately 15,000,000 LE. An ordinary household paid approximately 1 LE/month.</p>	First 30 m <sup>3</sup> /month	3 PT/m <sup>3</sup>	Over 30 m <sup>3</sup> /month	5 PT/m <sup>3</sup>	- Ships	2 LE/m <sup>3</sup>	- Other establishments	15 PT/m <sup>3</sup>
First 30 m <sup>3</sup> /month	3 PT/m <sup>3</sup>								
Over 30 m <sup>3</sup> /month	5 PT/m <sup>3</sup>								
- Ships	2 LE/m <sup>3</sup>								
- Other establishments	15 PT/m <sup>3</sup>								
Sewage service	<p>No charge is being collected at the present time. Most of the expenses are being covered by subsidies provided by the State Budget (including aids from foreign countries).</p> <p>The collection of sewage service charge is being examined. The sum being proposed is of the order of 10% of the water charge, but this is sufficient to cover barely a fraction of the required expenses.</p>								
Electricity service	<p>Electricity charge is metered and collected every month on house-to-house basis (contract unit).</p> <ul style="list-style-type: none"> <li>- Charge system               <ul style="list-style-type: none"> <li>. Ordinary household                   <table data-bbox="692 1704 1246 1821" style="margin-left: 20px;"> <tr> <td>Under 80 KWH</td> <td>1.60 PT/KWH</td> </tr> <tr> <td>80 to 100 KWH</td> <td>1.87 PT/KWH</td> </tr> <tr> <td>100 to 250 KWH</td> <td>2.26 PT/KWH</td> </tr> <tr> <td>Over 250 KWH</td> <td>3.11 PT/KWH</td> </tr> </table> </li> </ul> </li> </ul>	Under 80 KWH	1.60 PT/KWH	80 to 100 KWH	1.87 PT/KWH	100 to 250 KWH	2.26 PT/KWH	Over 250 KWH	3.11 PT/KWH
Under 80 KWH	1.60 PT/KWH								
80 to 100 KWH	1.87 PT/KWH								
100 to 250 KWH	2.26 PT/KWH								
Over 250 KWH	3.11 PT/KWH								

Type of Utility	Charge Collection System
	. Other users (10 Ampere or more)
	Under 75 KWH 2.00 PT/KWH
	75 to 100 KWH 2.93 PT/KWH
	100 to 250 KWH 3.16 PT/KWH
	Over 250 KWH 4.82 PT/KWH
An ordinary household is paying charges of the order of 5 LE/month.	
Telephone service	The minimum annual telephone charge is 24 LE (including 1,500 local call charges). Local calls surpassing 1,500 and long distance calls are charged according to the call-meter reading and destination of long distance calls.

The levels of waste collection charge determined by taking into consideration these facts as listed in the following.

a. Charge collected from ordinary households

Average charge	: 0.75 LE/month-household
(Low-income households	: 0.5 LE/month-household,
Middle- & high-income	
households	: 1.0 LE/month household)

Explanation:

The waste collection charge is set at the level of 0.5 LE/month for a low-income household and 1.0 LE/month for a middle- or high-income household, by taking into consideration the official rent classification of each household.

The aforementioned annual charge of 0.75 LE/month (9 LE/year-household) household will result in an average revenue of approximately 6 LE/year household in 2000, assuming that the charge collection rate will reach to 70%.



b. Charge collected from commercial and business establishments

Small- and middle-scale commercial and business establishments: 1.8 PT/kg (5.4 LE/month with waste discharge of 300 kg/month)

Explanation:

The waste collection charge imposed on small- and middle-scale commercial and business establishments is set at 1.8 PT/kg, based on the beneficiary-should-pay-principal.

c. Large-scale establishments and establishments served by door-to-door collection: 2.3 PT/kg.

Explanation:

The charge imposed on establishments with massive waste generation and establishments are collected directly at the establishment or at the office in each cleansing zone.

(The cleansing cost is approximately 18 LE/ton. Door-to-door collection will be provided for establishments with massive waste generation and establishments located in the city center).

(3) Charge collection rate

Charge collection rates as shown in Table 8-2-11, are based on the facts that the current water charge collection rate is approximately 70%, that there is possibility of realizing higher collection rates because the waste service charge is a fixed-sum type, and that the organizational and institutional aspects of the system are expected to be improved.

Table 8-2-11 COLLECTION RATE OF WASTE COLLECTION SERVICE CHARGE

(%)

District	Type of Discharger	1990	1995	2000
Middle District	Ordinary households	50	60	70
	Establishments with door-to-door collection	60	70	80*
	Other establishments	50	60	70
Other District	Ordinary households	30	50	60
	Establishments with door-to-door collection	50	60	70
	Other establishments	30	50	60

\* The maximum collection rate is regarded as 90%, by taking into consideration of factors such as the difference between the waste amount assumed at the contract and the actual waste amount, and the occurrence of accounts that are not received.

(4) Amount of commercial waste

It is expected that establishments with massive waste generation and establishments with door-to-door collection, such as those located in the City Center, account for 60% of the total amount of commercial waste generated in the Middle District and approximately 40% on the average in other districts.

The generation rates of commercial waste calculated on the assumption of these percentages, are shown in Table 8-2-12. The summer vacationers' waste is regarded as a part of the city beautification service, and is excluded from the consideration for charge system.

Table 8-2-12 GENERATION RATES OF COMMERCIAL WASTE

(1000 t/year)

District	Type of Discharger	1990	1995	2000
Middle District	Establishment of concern	40	47	54
	Other establishments	25	31	36
Other Districts	Establishments of concern	48	61	75
	Other establishments	73	93	112
All Districts	Establishments of concern	88	108	129
	Other establishments	99	124	148
	Total	187	232	277

The annual waste collection revenues calculated on the premises (1) to (4) above are shown in Table 8-2-13.

Table 8-2-13. REVENUE FROM WASTE COLLECTION CHARGES

		(1000 LE/year)		
District	Type of Discharger	1990	1995	2000
Middle District	Ordinary households	690	839	992
	Establishments (door-to-door collection)	552	757	994
	Other establishments	234	338	454
	Sub-total	1,476	1,931	1,440
Other District	Ordinary households	1,746	2,581	3,577
	Establishments (door-to-door collection)	752	842	1,208
	Other establishments	394	838	1,210
	Sub-total	2,692	4,261	5,995
All Districts	Ordinary households	2,436	3,420	4,569
	Establishments (door-to-door collection)	1,104	1,599	2,202
	Other establishments	628	1,173	1,664
	Total	4,768	6,192	8,435

## 5) Service revenue (excluding waste collection charge revenue)

The service revenue of the Authority (excluding the waste collection charge) consists of the following.

- Compost and reusable materials selling profit
- Selling profit of standard bags for discharge

(1) Compost and reusable materials selling profit

The profit obtained from the sales of compost and reusable materials consists of the following.

- Compost : 9 LE per ton sold
- Reusable materials : 1.87 LE per ton of waste amount treated

Table 8-2-14 COMPOST AND REUSABLE MATERIAL SELLING PROFIT

	(1000 LE/year)		
	1990	1995	2000
Compost selling profit	320	320	320
Reusable material selling profit	214	236	258
Total	534	556	578

(2) Selling profit of standard bag for discharge

a. Selling profit per bag

A selling profit of 1 PT/bag shall be set by considering that the profit earned in the sales of similar bags by the ADS barely produces 4 to 5% of workers' incentives.

b. Average waste amount discharged per bag

The average waste amount discharged by each bag is assumed to be 3 kg/bag, because it has a maximum capacity of 4 kg/bag.

c. Diffusion rate of standard bags and market share of the Authority

The diffusion rate of standard bags is of the order of 20% in terms of the amount of discharged waste. It is expected that the diffusion rate of these standard bags will rise to approximately 40% or more in 2000 through the instruction to use bags for discharge and the convenience of the use of bags itself.

The market share of the Authority regarding these standard bags is assumed to be as shown in Table 8-2-15.

Table 8-2-15 MARKET SHARE OF THE AUTHORITY AND PORTION OF WASTE DISCHARGED IN THE BAGS SOLD BY THE AUTHORITY

	District	1990	1995	2000
Diffusion rate		25	30	40
Market share of the Authority	Middle	30	40	50
	Other Districts	20	30	40
Portion of waste discharged in bags sold by the Authority	Middle	7.5	12	20
	Other Districts	5	9	16

The profits resulting from the sale of standard bags, calculated with these assumptions are shown in Table 8-2-16.

Table 8-2-16 STANDARD BAG SELLING PROFITS

	District	1990	1995	2000
Amount of waste discharged in bags sold by the Authority (1000 t/year)	Middle	158	179	201
	Other Districts	387	498	609
Quantity of standard bags sold (1000 t/year)	Middle	3,950	7,160	13,400
	Others District	6,450	11,610	32,480
Selling profits (1000 LE/year)	Middle	40	72	134
	Others Districts	65	116	325
	Total	105	188	459

6) Overall financial resources

The overall financial resources, summarizing the results given above, are shown in Table 8-2-17.

Table 8-2-17 OVERALL FINANCIAL RESOURCES

(1000 LE/year)

		Year 1990	1995	2000
Basic wage financial resources provided by the Central Government		3,107	3,875	4,865
Investment financial resources provided by the Central Government	Foreign grants and loans with repayment subsidies	1,330	670	0
	Subsidies from the Central Government	1,110	1,260	1,420
	Sub-total	2,440	1,930	1,420
Cleansing Fund		1,510	1,725	1,940
Service revenue	Compost & reusable material selling profit	534	556	578
	Standard bag selling profit	105	188	459
	Waste collection charge revenue from ordinary households	2,436	3,420	4,569
	Waste collection charge revenue from establishments	1,732	2,772	3,866
	Sub-total	4,807	6,936	9,472
Total		11,864	14,466	17,697

The financial scale of the s.w.m. system will amount to 17,700,000 LE by 2000, with the service revenue (9,500,000 LE) accounting for 54%.

The financial scales per capita and per ton of waste are shown in Table 8-2-18.



Table 8-2-18 FINANCIAL SCALES PER CAPITA AND PER TON OF WASTE

	(LE)		
	1990	1995	2000
Financial scale per capita	3.7	4.0	4.3
Financial scale per ton of waste *	21.8	21.3	21.8

\* Note: Excluding summer vacationers' waste

### 8.2.3 Financial Plan

The financial plan is examined with the purpose of devising how to raise the funds to cope with the service expenses calculated in Section 8.2.1 within the framework of the service revenue examined in Section 8.2.2.

The plan is examined on the following premises

- a. In connection with the financial balance of the Authority until 1989, it is assumed that the running expenses will be kept balanced. As for the investment financial resources, it is assumed that subsidies by the Central Government will be available only for covering the local currency portion of the construction costs of the new Abis Compost Plant (300 t/d), transfer station and MBDS landfill site. As for the foreign portion, it is assumed that a 4% interest loan with 5-year grace period and 20-year repayment will be available.
- b. Foreign aids and loans with repayment subsidies by the Central Government could be considered as financial resources for purchasing vehicles and heavy equipments. But it is assumed instead that they are comprised within the foreign aids and subsidized loans listed in the framework of the financial resources. In other words, no financial resources are considered except for those listed at the beginning.
- c. The various components of the annual financial resource are assumed to change linearly between the reference years given in section 8.2.2.

- d. If a surplus in financial resources results, they shall be regarded as reserve funds and transferred to subsequent years. On the other hand, if deficit results, loans shall be arranged from private banks to cover it. No interest is taken into consideration in this connection.

The financial balance of the Authority is shown in Fig. 8-2-1. Foreign grants are provided for commodities such as vehicles, and the amount listed under investment expense is the balance. The corresponding sum is subtracted from the local purchase funds. The actual expenditure of the Authority consists of the running expense (B) including payment of interests, the local investment expense (C), and the loan repayment expense (D) as shown in Fig. 8-2-1.

Million

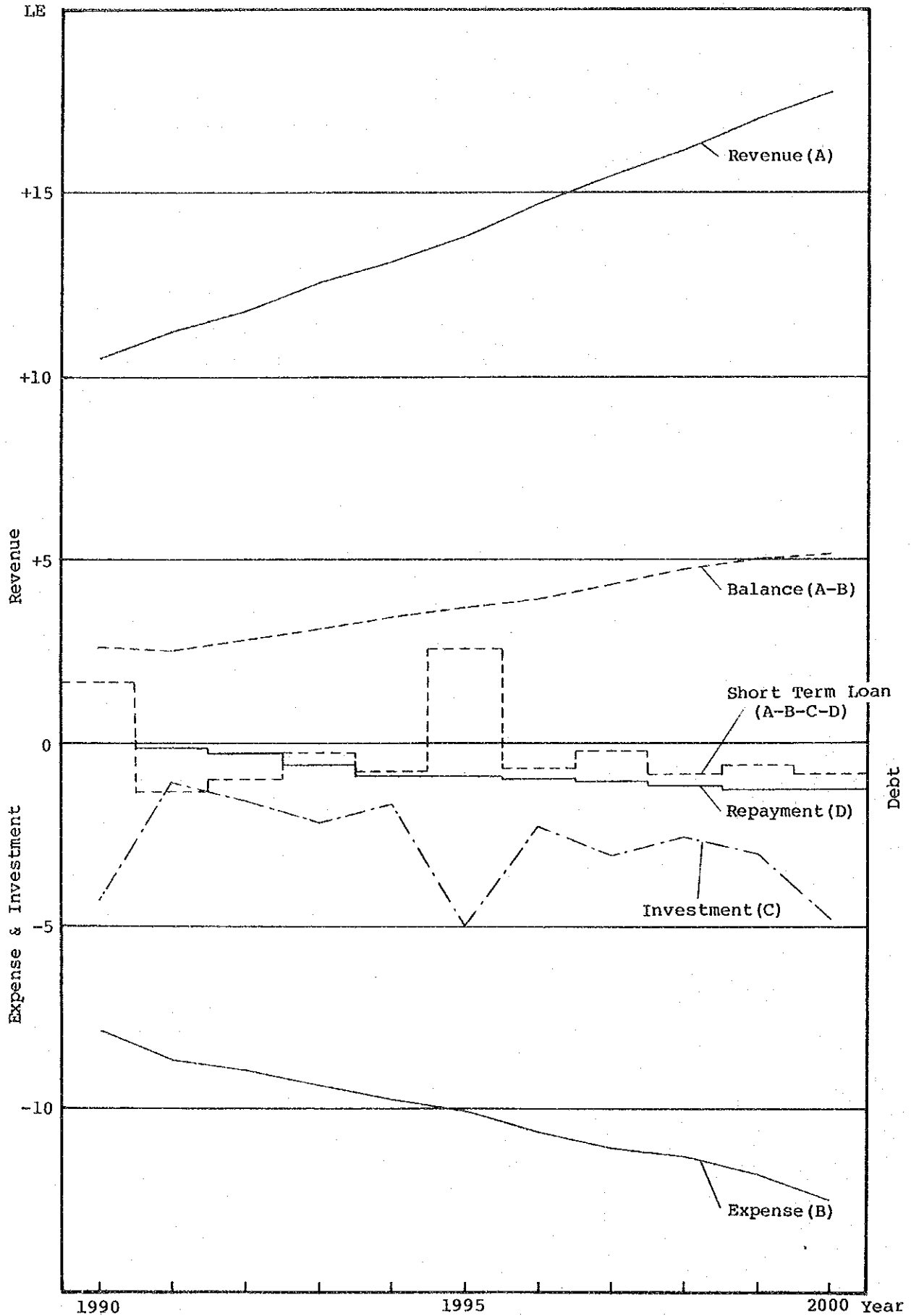


Fig. 8-2-1 MONEY FLOW OF THE CLEANSING AUTHORITY

The following points related to the money flow of the Authority can be made from the balance shown in Fig. 8-2-1.

1) Revenue

As for the components of the revenue, those excluding the foreign grants and loans with repayment subsidies by the Central Government will amount to 11,900,000 LE in 1990, 14,500,000 LE in 1995 and 17,700,000 LE in 2000.

2) Running expenses

The balance examined by considering only the running expenses including the payment of the loan interests is shown in Table 8-2-19, and a considerable margin is indicated.

Table 8-2-19 BALANCE CONSIDERING ONLY THE RUNNING EXPENSES

	(million LE)		
	1990	1995	2000
Revenue	11.9	14.5	17.7
Running cost	7.9	10.2	12.5
Balance	4.0	4.3	5.2

3) Investment expenses

The investment expenses consisting of the costs for purchasing vehicles and heavy equipment, construction of the sanitary landfill after 1990, and others are expected to amount to 63,200,000 LE for 11 years from 1990 to 2000, with an average of 5,700,000 LE every year.

Of the total investment expenses, the remnants of the foreign grants existing at the beginning amounts to 7,300,000 LE (11.6%) and long-term loans 24,100,000 LE (38.1%). The remaining part, which amounts to more than 50% of the total, consists of direct expenditures from the financial resources of the services.

The actual sums that are spent every year consist of the direct expenditure and the repayment of the loans. The total expenditure in the 11-year period amounts to 40,500,000 LE, which corresponds to an annual average expenditure of 3,700,000 LE.

#### 4) Overall balance of the project

As for the overall balance of the project, a considerable cumulative surplus is expected at the beginning, but it will worsen in the latter years due to the gradual increase of the repayment burden and the lower work efficiency in other districts than Middle District (increasing costs and smaller charge collection revenue). Ultimately the balance is expected to result in a small deficit of 700,000 LE in 2000.

Under these circumstances, an increase of 10 to 20% in the waste collection charge will be unavoidable after 2001, because an additional repayment burden of loans since renovating the compost plant will be required after that year, in addition, to the small budget deficit expected to occur in 2000.

If the framework of the basic wage subsidy provided by the Central Government is expanded up to the same level as the Sewage Authority and the Water Authority, it will be possible to improve the wage levels of workers for the Cleansing Authority from 1.2 times the basic wage assumed in this project to 2.0 times of that sum, and furthermore it would be possible to operate the cleansing service without increasing the charges and without the risk of summing up deficits.

## CHAPTER 9. RECOMMENDATION



## CHAPTER 9. RECOMMENDATIONS

In this report, the Master Plan, which defines the long-term developing measure of the s.w.m. improvement in Alexandria, the priority improvement projects to be implemented, and the organizational and financial plan of the Cleansing Authority which will be the executive agency in charge of the future s.w.m. are presented. It must be borne in mind, however, that there are various issues to be examined with care prior to the practical implementation of the said plans and projects. This chapter describes the issues associated with the implementation of the various plans and projects mentioned so far, in the form of recommendations.

Recommendation 1 Consolidation of an integrated operation scheme and independent financial base through the establishment of the Cleansing Authority

The most fundamental subject related to the improvement of the s.w.m. in Alexandria is the consolidation of an integrated operation scheme and an independent financial base. In this connection the establishment of a cleansing authority is highly desirable. Fortunately, preparations are being made for establishing a cleansing authority in Alexandria (henceforth called the Authority), and that being so it is very important to strengthen the organizational and financial systems of the Authority in conformity with the lines mentioned in this report.

Recommendation 2 Smooth transfer to the Authority

As thing now stand, the Governorate and the District authorities are in charge of most of the s.w.m. in Alexandria, and number of Zabbaleen are few. Under these circumstances, the transfer to the Authority is expected to be smooth compared with the case in Cairo and other cities.



However that the ADS is expanding the cleansing service and it supports a large part of the finance of the service in question. Therefore, it is indispensable to transfer the personnel in the Cleansing Section of ADS to the Authority. It is also important to define the responsibilities of the Authority and the Central Workshop in the Directorate of the Ministry of Housing and Utilities for equipments purchase and their maintenance.

Recommendation 3 Enforcement of the cleansing ordinance  
(waste collection regulations)

The s.w.m. in Alexandria is regulated by the Law No. 38/1967. Although its prohibition on the collection of charge adversely affects the self-financing of the cleansing service, this can be solved through provision of the law establishing the Authority. Therefore, it may safely be said that no improvement in particular is required from the statutory standpoint.

While, a rule on waste collection has to be clearly written and to attain publicity so that improvements in collection and street sweeping systems can be achieved, and an understanding and cooperation of the citizenry about the collection of charge can be obtained. This collection rule have to include at least the type of container to be used for discharge, discharge location, discharge time, collection time and frequency, collection of the charge, and responsibilities of the citizenry and the Authority.

Recommendation 4 Strengthening of the technical capability of the  
personnel and the financial, administrative and planning  
functions

The examination of organizational aspects of the s.w.m. system in Alexandria indicated that the technical capability of personnel and the financial, administrative and planning functions of current system were very weak.

For the consolidation of an integrated operation and an independent financial base, not only an organizational and institutional improvement, but also the strengthening of the said capability and functions are indispensable.

The development of the technical capability of the personnel can be achieved by such measures as technical exchange with domestic and foreign cleansing organizations, and technical training and discipline of the workers.

As for the reinforcement of the financial, administrative and planning functions, the elimination of the excessive dependency on technical assistance from foreign countries and the exchange with domestic organizations having a great deal of experience, such as the Alexandria Water General Authority, should be considered.

Recommendation 5 Recruitment of qualified personnel and improvement of the wage level

The recruitment of qualified technical personnel is indispensable for realizing the said reinforcement of the organizational functions, and the improvement of the labor conditions up to a satisfactory level is required in this connection.

Improvement in the working conditions of the field workers, such as shortening of the working hours, can be realized as a result of the transfer to the Authority. However, the wage level set in this plan remain the same as the current state.

In order to recruit qualified personnel and to secure a decent standard of living for the workers, it is desirable that the improvement of the wage level is given high a priority when any surplus occurs in the budget.

Recommendation 6 Rationalization of the operation and expansion of the financial resources

The scale of the financial resources of the Authority in 2000 is projected to be approximately 18,000,000 LE and there is not so much margin in financing the cleansing service. Under these conditions, expenditure reductions through rationalization of the operation and expansion of financial resources are necessary for improving the wage level of personnel and upgrading the technical level of the system.

In this connection, rationalization of the collection and street sweeping works through the promotion of citizenry cooperation, improvement of the productivity of the final product in composting through the haulage of selected waste rich in organic material suited for composting, and other technical rationalizations are important. It is also important to expand the financial resource for wages through the application of the Law No. 26/1983 to the Cleansing Authority and to increase the revenue from the collection of charge through an effective implementation of the charge collection work.

Recommendation 7 Stepwise improvement of the collection and street sweeping services

Waste collection and street sweeping are the nucleus activities of cleansing services, and account for the largest portion of both operational expenditures and organizational activity.

Thus, the improvement of these services become the most important subjects regarding the technical aspects of the s.w.m. in Alexandria. The waste collection and street sweeping systems are related to each other as the improvement of the collection system reduces street waste. Both can be improved only with the understanding and cooperation of the citizenry and the improvements in the technical capability of the workers and the organizational system for the two services.

In order to realize the said improvements and upgradings in the long run, a stepwise planning is required. The Master Plan proposes to make improvements in Middle District at first, followed by the expansion of the systems throughout Alexandria. For the improvement process in each district, the following steps should be applied.

- First Step

The collection service (e.g. providing reliable and regular collection) should be improved by utilizing the existing facilities and equipment efficiently so that regular discharge of waste by the citizenry can be attained. Also, common understanding about the scheduled collection service between the collection service sector and the citizenry should be formed. In this step, the collection method is not necessarily that with plastic bags.

- Second step

The collection with plastic bags should then be applied to the area where the first step has already been implemented and the transfer to the plastic bag collection system is relatively easily done. For the new districts being planned, the plastic bag collection system is introduced from the beginning.

Recommendation 8 Introducing of new compost facilities

The introduction of a new compost plant incurs a substantial cost increase when compared with the sanitary landfill scheme.

In addition to the existing Abis Compost Plant, total compost capacity of both plants will reach to 460 t/d.

The construction of the new compost plant with a capacity of 300 t/d is planned in this report. However, the compost plant construction above this capacity should be implemented only after confirming the existence of favourable conditions such as the subsidies related to the utilization of compost by the agricultural sector, and thereby relieving any pressure on the finance for the s.w.m. in Alexandria. In other words, the construction of compost plants whose total capacity is over 460 t/d should be considered only on the premise that there is no risk of pressure on the financing of the s.w.m. system and that the marketability of compost in the Governorate of Alexandria is guaranteed. While, the compost demand in 2005 of the whole agricultural lands within the area is predicted to meet with the supply amount by adding another 200 t/d plant, or 660 t/d plant in total, in consideration of the amount of all organic manures available within the area.

Recommendation 9 Measures for securing landfill sites at an early time and in a systematic way

This report proposes the implementation of sanitary landfilling in the MBSDS for the time being. However, the MBSDS is not necessarily an appropriate site for landfilling. It was selected because it was the only site that could be secured within a short time.

Strictly speaking, landfill sites should be secured at places where no adverse environmental impact is expected, and the haulage distance is short.

In Alexandria, the difficulty in securing appropriate landfill site is not due to the physical shortage of land space, but due to the land use regulation for a green and farming land development plan which restricts other land uses.

In this connection, the Cleansing Authority should provide other concerned authorities with the following information to obtain their cooperation.

- It is very important for the finance of the s.w.m. system to secure landfill site near the city areas.

- The use of the landfill site for greening and farming is possible by the implementation of sanitary landfill.

Recommendation 10    Securing of financial resources for  
the implementation of the priority project

The projects selected through the Feasibility Study require urgent implementation to improve present situation of the s.w.m. in Alexandria. Securing of the financial resources holds sway over the future implementation of the projects. Accordingly, 23,300,000 LE (including foreign portion of 16,300,000 LE) should be secured initially intending to perform the projects targetted in 1990 for the implementation of the first step of the integrated s.w.m. improvement project.

With regard to the financial resources, local portion should be obtained from the allocation of the Governorate Budget and from the subsidy of the Central Government and the foreign portion should be secured by a loan with an interest rate of about 4% or as less as possible from the relevant organizations of the international aid programs. Immediate determination is required on securing of the future financial resources.

Recommendation 11    Promotion of the project

Positive project promotion, such as an appropriate scheduling, will become an important, as well as the securing of financial resources, in achieving successful result of the project. Accordingly, a service for the forthcoming step-by-step tasks such as detailed engineering designs, contracts, procurements of machinery, equipments and construction materials, and constructions should be completed by or in 1990 as a first stage for materialization of the project. Quick launching on the project implementation brings in the early solution of the s.w.m. problems in the city, and moreover makes it possible to improve public sanitation and the standard of living environment.



ATTACHMENT






SCOPE OF WORKS  
FOR  
THE FEASIBILITY STUDY  
ON  
THE PLAN FOR REFUSE COLLECTION, TREATMENT AND DISPOSAL  
IN  
THE CITY OF ALEXANDRIA  
OF  
THE ARAB REPUBLIC OF EGYPT


AGREED UPON BETWEEN  
THE GOVERNORATE OF ALEXANDRIA  
AND  
JAPAN INTERNATIONAL COOPERATION AGENCY

March 29, 1984

Alexandria, The Arab Republic of Egypt



Mr. Saad Rafael  
General Manager of Follow-up Dept.,  
The Governorate of Alexandria



Dr. Sachiho Naito, Leader  
The Japanese Preliminary Survey  
Team, Japan International  
Cooperation Agency

## I. INTRODUCTION

In response to the request of the Government of the Arab Republic of Egypt for the technical cooperation in conducting the feasibility study on refuse collection, treatment and disposal system in the City of Alexandria, the Government of Japan has agreed to provide the service of a team of Japanese experts to undertake the feasibility study (hereinafter referred to as Study) within the general framework of technical cooperation between Japan and Egypt which is set forth in the Agreement on Technical Cooperation between the Government of Japan and the Government of the Arab Republic of Egypt entered into force on the 31st of January, 1984.

The Japan International Cooperation Agency (hereinafter referred to as JICA), the official agency responsible for implementation of the technical cooperation programs of the Government of Japan, will undertake the Study in close cooperation with the concerned authorities of the Egyptian Government, and in particular with the Governorate of Alexandria.

The present document sets forth the scope of work for the Study.

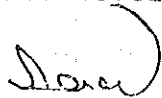
## II. OBJECTIVES

The general objective of the Study is to perform a comprehensive solid waste management for Alexandria. The Study will specify the appropriate technical, economic, administrative, and social programs needed to solve the present environmental problems in a manner compatible with conditions in Alexandria.

The Study will be composed of two sub-objectives, such as overall system objective and specific program objective.

### 1. Overall System Objective

The overall system objective is to eliminate the public health hazards created by existing solid waste practices in all problem districts, taking into account the recycling system under the practices of present communities, and to create a solid waste management organization at the Governorate level.



## 2. Specific Program Objective

The specific program objective is to identify, define and evaluate all feasible options for managing solid wastes in a specific project district. This will include solid waste management facilities, human resources and community program to achieve a balance between resource recovery and the protection of public health, in addition to the recommendation for specific action programs and institutional structures.

### III. OUTLINE OF THE STUDY

#### 1. Study Area

The area to be covered by this Study is limited to the city area of Alexandria.

#### 2. Content of the Study

In order to fulfill the objectives of the Study, following items are to be studied in the field programs (field surveys and data/information collection) in Alexandria in addition to the analysis works in Japan.

The Study is made to provide an intense and systematic exposure to the solid waste problems in Alexandria. This will lead to the establishment of a basic data/information and to an understanding of what problems need to be addressed in technical, economic and social terms. For each major source of solid wastes such as residential and commercial wastes excluding industrial wastes in Alexandria, the purpose is to formulate alternative programs of solid waste management and to analyze each alternative in economic, social and institutional terms for the purpose of improving present status.

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In addition, the purpose is to recommend a specific program of implementation of solid waste management for a specific project district of Alexandria. While a specific project district may provide only a solution of single problem area, it will be presented as a part of overall system objective, acting in concern with other specific program objective.

The tasks to be accomplished are as follows in consequence of report preparation and submission.

#### Phase-I

- (1) Investigations (by means of field program) regard to the present solid waste management system of Alexandria to identify the problems in the present operation.
  - a. to establish the quantity and characteristics of solid waste.
  - b. to diagnose the present discharge and storage procedure of solid wastes.
  - c. to diagnose the existing solid wastes collection method and haulage system.
  - d. to diagnose the existing solid wastes treatment and disposal system, including field investigation of existing landfill sites.
  - e. to diagnose the present resource recovery system and to identify markets for recovered materials.
  - f. to characterize the social and economic situation of communities involved in solid wastes handling.
  - g. to identify the present institutional, administrative and management system (organization, manpower, budget) involved in solid waste management.
  - h. to diagnose the existing land use and city and rural development plans.

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Phase-II

(2) Identification and evaluation of solid waste management to eliminate public health hazards in a way that takes into account the economic values associated with waste recycling in consequence of report preparation and submission.


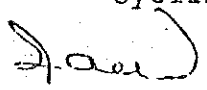
- a. Improvement of conditions at the source of solid wastes in views of discharge and storage procedure, social customs and behavior and need for education.
- b. Collection and haulage requirements in views of containers, vehicles, supporting facilities and human resources:.
- c. Deposition, processing and final disposal taking into account the alternative studies of incinerator, composting, landfill, recycling and energy recovery and human resources, considering environmental impact.
- d. Institutional options in views of public ownership and operation, contracts to private organization and unions, informal enterprise without contracts, coordination with public health sector, role of the workers, and laws and customs.

Phase-III

(3) Design of a feasible implementation program for the specific project district, to present specific program of actions relating to overall system based upon the analysis of options in the previous Phase, in consequence of report preparation and submission.

- a. Planning programs:

Determination of future prediction of population through 2000 and characteristics of the specific project district to be served, quantity and characteristics of solid wastes to be discharged and stored in addition to the recommendation of suitable sites for treatment, disposal and recycling system.



b. Engineering programs:

Determination of collection, haulage, treatment and disposal system in views of technical innovation, establishment of solid waste treatment facilities, and establishment of recycling program,

c. Social program:

Programs of social action such as public education, manpower development and training, community development and waste management training.

d. Public administration program:

Recommendation for a specific organization or combination of organizations within the Governorate or municipal sector, including enforcement of regulation and labor relations.

e. Overall evaluation of cost effectiveness and benefit.

#### IV. Schedule of the Study

The Study will be conducted in accordance with the tentative study schedule as shown in the appendix.

#### V. Reports

JICA will prepare and submit the following reports in English to the Governorate of Alexnabria in the course of the Study.

(1) Inception Report

Twenty (20) copies at the beginning of the Study

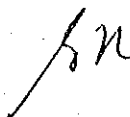
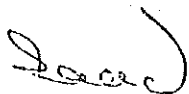
(2) Progress Report (1)

Twenty (20) copies at the end of the field survey(1)

(3) Interim Report

Twenty (20) copies within four (4) months after completion of the field survey(1)

(The Governorate is expected to submit their comments within one month after receipt of the Interim Report to JICA through the Japanese Embassy.)



(4) Draft Final Report

Twenty (20) copies within three months after completion of the field survey (2)

(The Governorate is expected to submit their comments within one month after receipt of the Draft Final Report to JICA through the Japanese Embassy.)

(5) Final Report

Fifty (50) copies within two months after receipt of the comment on the Draft Final Report

VI. Undertakings of the Government of Egypt

The Government of the Arab Republic of Egypt shall accord privileges, immunities and other benefits to the Japanese study team, and through the authorities concerned, take necessary measures to facilitate the smooth implementation of the Study.

1. The Government of Egypt shall make necessary arrangements with the cooperation of other relevant organizations for the followings:

- (1) to secure the safety of the Japanese study team,
- (2) to permit the members of the Japanese study team to enter, leave and sojourn in Egypt for the duration of their assignment,
- (3) to exempt the members of the Japanese study team from taxes, duties and other charges on equipment, machinery and other materials brought into Egypt by the team for the implementation of the Study,
- (4) to exempt the members of the Japanese study team from income tax and other charges of any kind imposed on or in connection with any emolument or allowance paid to the members of the Japanese study team for their services in connection with the implementation of the Study,

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- (5) to provide necessary facilities to the Japanese study team for remittance as well as utilization of the funds introduced into Egypt from Japan in connection with the implementation of the Study,
  - (6) to provide medical services as needed, its expenses will be chargeable on the members of the Japanese study team,
  - (7) to secure permission to take all data and documents including photographs, related to the Study out of Egypt to Japan by the study team,
2. The Governorate of Alexandria shall, at its own expense, provide the Japanese study team with the followings, in cooperation with other relevant organizations:
    - (1) available data and informations related to the Study,
    - (2) counterpart personnel,
    - (3) suitable office space in the City of Alexandria,
    - (4) 2 vehicles with drivers,
    - (5) credentials or identification cards.
  3. The Governorate of Alexandria shall take the responsibility of selection of the sites for construction of treatment facility and landfill, right in time as required in accordance with the Study schedule.
  4. The Government of Egypt shall bear claims, if any arise against the members of the Japanese study team resulting from, occurring in the course of, or otherwise connected with the discharge of their duties in the implementation of the Study, except when such claims arise from gross negligence or willfull misconduct on the part of the members of the Japanese study team.

25/1/2014  
Saad

VII. Undertakings of JICA

For the implementation of the Study, JICA shall, in accordance with the relevant laws and regulations in force in Japan, take the following measures:

- (1) to dispatch, at its own expense, study teams to the Arab Republic of Egypt,
- (2) to perform technology transfer to the Egyptian counterpart personnel in the course of the Study.

VIII. Consultation

JICA and the Governorate of Alexandria will consult with each other in respect of any matter that is not agreed upon in this document and may arise from or in connection with the Study.

- IX. The Minutes of Meeting is herewith attached to this "Scope of Works" and is an integral part of the scope of works, Said. *for*

*Said for*

ATTACHMENT 2

NAMES OF PARTICIPANTS CONCERNED

JICA ADVISORY COMMITTEE

Chairman Dr. Sachiho Naito	Professor of Kantogakuin University
Hiroki Hashizume	Ministry of Health and Welfare
Hideo Mori	Osaka City
Hirotooshi Nagano	Yokohama City
Kunitoshi Sakurai	JICA
Mitsuo Kinjoh	JICA Coordinator

JICA STUDY TEAM

Eng. Kango Mito	Team Leader
Eng. Kotaro Takatsuno	Waste Collection, Haulage Planner
Hisashi Ogawa	Waste Collection, Haulage Planner
Masato Ono	Collection, Haulage Planner
Hiroshi Abe	Intermediate Treatment, Disposal Planner
Tohru Naito	Collection Experiment Specialist
Kazunori Suzuki	Collection Experiment Specialist
Masao Takenaga	Maintenance Engineer
Susumu Shimura	Facility Designer
Keiji Nagayoshi	Waste Composition Analysis, Environmental Assessment Engineer
Shinya Kawada	Environmental Engineer
Akimichi Hatta	Organization, Institution Planner
Shunsuke Aoyama	Organization, Institution Planner
Kozo Baba	Economicist
Toshiro Hamada	City Planner
Masaharu Takasugi	Agro-Economist
Hiroki Nakamura	Agro-Economist
Kiichiro Sakaguchi	Socio-Economist

## EGYPTIAN COUNTERPARTS

Gen. Saad Rafael	General Manager of General Follow-up Department of Alexandria Governorate
Eng. Mohamed Abdallah	Chief of Site Follow-up Section, Follow-up Dept.
Eng. Hussein Hassan Roushdy	Deputy Director of Alexandria Housing Dictorate
Dr. Olfat Elsebaie	Professor of Environmental Chemistry of Higher Institute of Public Health, Alexandria University
Dr. Hassan Mitwally	Professor of Environmental Health, Higher Institute of Public Health, Alexandria University
Mr. El Sayed El Badrashiny	General Manager of Production and Economic Affairs Section, Alexandria Governorate
Mr. Mohammed Mohammed Aly	Economist in Production and Economic Affairs Section, Alexandria Governorate
Dr. Ahmed Hussein	Assistant Lecturer of Environmental Health Department, Higher Institute of Public Health, Alexandria University
Eng. Elweya Mohanna	Manager of Abis Compost Plant
Mr. Ahmed Hamed	Chief of Follow-up Cleansing Section of General Follow-up Department, Alexandria Governorate
Mr. Kamel Ahmed Fahmey	Assistant Chief of Site Follow-up Section of General Follow-up Department, Alexandria Governorate
Mr. Khairy Abd el Gawwad	Inspector of Follow-up Cleansing Section of General Follow-up Department, Alexandria Governorate
Mr. Mohammed Kassem	Inspector of Follow-up Cleansing Section of General Follow-up Department, Alexandria Governorate
Eng. Aly Mohammed Moursey	Inspector of Follow-up Cleansing Section of General Follow-up Department, Alexandria Governorate
Eng. El Sayed Hegazey	Inspector of Follow-up Cleansing Section of General Follow-up Department, Alexandria Governorate
Mr. Abd el Hamid el Dawwey	Asst. Chief, Cleansing Sect. Middle District
Mr. Salah el Sayed	Asst. Chief, Cleansing Sect. Middle District
Dr. Mounir S. Neamatalla	President, Environmental Quality International, Governorate Consultant