

CHAPTER 4 INSTITUTION AND ORGANIZATION PLAN



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4.1 Share of Responsibility for Solid Waste Management

The solid waste collection, haulage, transfer and disposal works in the Project Plan will be carried out in keeping with the share of responsibility outlined in the Conceptual Master Plan for the overall project. In concrete terms, they will be as follows.

- a. Public market wastes, park wastes and canal wastes will be collected and hauled by P.D. Pasar Jaya, DPU and Dinas Pertamanan respectively, while Dinas Kebersihan will be responsible for management of wastes from transfer haulage to final disposal of these waste.
- b. In principle, collection of domestic waste excluding primary collection done by RW, haulage and disposal of it shall be the duties of Dinas Kebersihan.
- c. Large commercial dischargers will be allowed to haul in wastes directly to the transfer stations (either by themselves or through private collectors) with a payment of tipping fee. They shall be instructed, however, to leave collection of wastes to Dinas Kebersihan as much as possible.

4.2 Operational Guidline of Solid Waste Management

The Conceptual Master Plan aims to operate solid waste management autonomously by converting Dinas Kebersihan into a public enterprise arround 1995, and to induce the system of collecting fees together with electric bill.

Until 1995 which is the target year of the Project Plan, however, it would be advisable to reorganize and strengthen the organizational system within the basic framework of the existing organization and to extent the

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new fee collection system step by step, based on the following reasons.

- a. A fundamental reorganization, such as converting Dinas Kebersihan into a public enterprise, will call for a drastic structural change involving all Wilayahs. However, reorganization is difficult to accomplish all in short terms. The development of any new system or improvement of the collection service until 1995 must first be tried in Jakarta Pusat and then gradually expanded to other Wilayahs.
- b. The shift to the system of collecting fees together with electric charges will take a time even if carried out only in Jakarta Pusat as it will demand coordination with PLN (the Public Electric Company), the establishment of a stable collection service system, arrangement of managing data on fee collection, the elimination of improper fee collection practice and other preparation.
- c. It will take until 1992 at the earliest to develop transfer stations and final disposal sites and to improve the collection system in Jakarta Pusat, all of which must be developed in parallel with the enhancement of the organization.

4.3 Organization and Management Plan

1) Tasks to strengthen the organization

The Conceptual Master Plan proposes an organizational structure shown in Part II, Fig. 4-8-1 (the department responsible for collection and treatment of night soil and septic tank sludge is currently belonged to Dinas Kebersihan and will continue to be so) for the waste management organization which is to be responsible the waste management of the entire city as a public enterprise. However, to attain this goal, the tasks up to 1995, which is the period covered by the Project Plan, are to strengthen the organization in the following way.

- a. In order to convert the organization into a public enterprise to cover the entire city in and after 1995, it is necessary to strengthen the functions of the existing Dinas Kebersihan as a central office as well as the functions of each Suku Dinas Kebersihan as its branch office. It is also necessary that a system that will allow fees to be collected on a full-scale fee collection from around 1993 in Jakarta Pusat, which will precede all other Wilayahs, must be established.
- b. To achieve the above, the position of the Suku Dinas Kebersihan within the organizational framework of Dinas Kebersihan must be raised, and competent personnel (managerial staff, proficient in planning, collection activity control, general affairs, accounting and administrative control) must be assigned to provide a stable collection service, to integrate data on actual status of waste discharge, to facilitate fee collection and to strengthen managerial control.
- c. In order to accomplish the foregoing tasks, an incentive fund must be established so that workers are rewarded according to the degree of contribution on the stable collection or on fee collection, and any of the improper

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incentive should be prohibited. In addition, penalties (wage cuts, and demotions, etc.) for those workers demanding tips from individual dischargers and other types of misconduct must be established.

- d. A new section to be responsible for inspection of collection, integration and management of information on dischargers, confirmation of fee payment, surveillance of and provision of guidance to licensed private waste collectors must be established for the Suku Dinas Kebersihan in Pusat.

2) Organizational structure and manpower plan

The following are the organizations involved in the project.

- a. Suku Dinas Kebersihan of Jakarta Pusat which will be responsible for waste collection, regulating waste discharge methods and fee collection.
- b. The Treatment and Disposal Department which should be establish for operation and management of transfer station and Bekasi Disposal Site.
- c. Dinas Kebersihan which should be reinforced for the development of the Project and for back up the aforesaid two organizations.

The scope of activities covered by the Project is improvement of street sweeping and waste collection and development of transfer station, disposal site and sub-workshop. The organizational structure of above department is as shown in Fig. 4-3-1.

The 1995 manpower plans for Suku Dinas Kebersihan of Jakarta Pusat and the Treatment and Disposal Department are as shown in Table 4-3-1.

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When the manpower size given in the Table 4-3-1 is compared to the current manpower size of Suku Dinas Kebersihan the size of the collection staff is drastically reduced whereas the size of the administrative and technical staff for planning, fee collection and other jobs are increased.

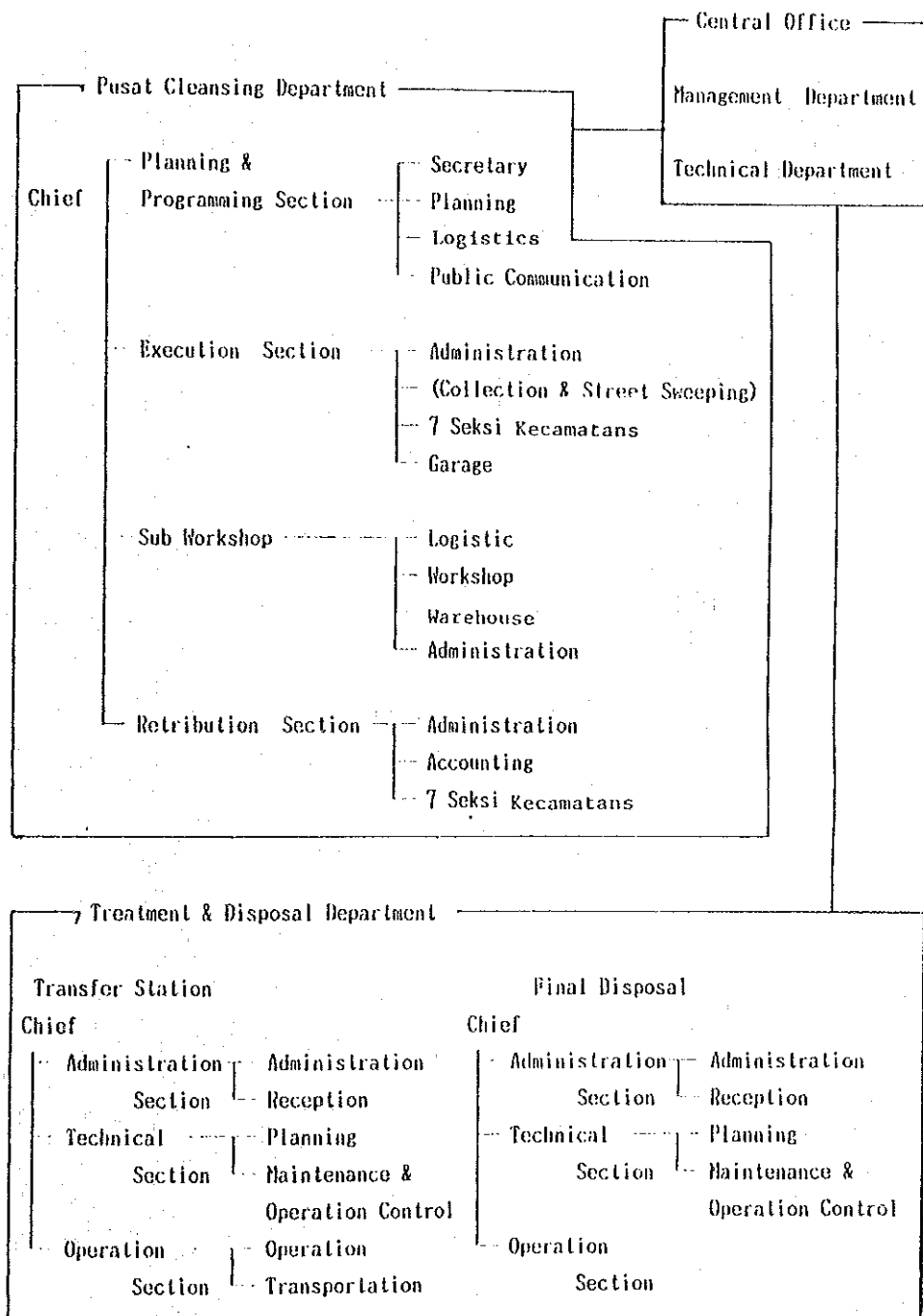


Fig. 4-3-1 Organizational Structure of the Project Plan

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Table 4-3-1 Manpower Size of Organization directly involved in the Project Plan (for 1995)

		Chiefs/ Stuff	Inspectors/ Technician	Drivers	Collectors	Sweepers	Other	Total
A. Pusat Cleansing Dept								
Chief		1	0	0	0	0	0	1
Planning Section	Sub chiefs	1	0	0	0	0	0	1
	Secretaries	3	2	0	0	0	1	6
	Planning	4	2	0	0	0	1	7
	Logistics	4	2	0	0	0	1	7
	Public Communication	4	2	0	0	0	1	7
Execution Section	Sub chiefs	1	0	0	0	0	0	1
	Collection	10	8	0	0	0	4	22
	Sweeping	6	4	0	0	0	4	14
	Special Collection	8	7	50	138	0	4	207
Retribution	Sub Chiefs	1	0	0	0	0	0	1
	Administration	2	0	0	0	0	0	2
	Accounting	0	9	0	0	0	0	9
7 Seksi Kecamatan	Sub Chief	7	0	0	0	0	0	7
	Administration	28	0	0	0	0	0	28
	Collection	0	44	158	422	0	14	638
	Sweeping	0	25	0	0	361	0	386
	Retribution	7	21	0	0	0	0	28
Sub Workshop	Sub Chiefs	1	0	0	0	0	0	1
	Logistics	3	0	0	0	0	0	3
	Workshop	5	56	0	0	0	0	61
	Warehouse	5	0	0	0	0	0	5
	Administration	5	0	0	0	0	0	5
Total		106	182	208	560	361	30	1,447
B. Suntar Transfer Station								
Chiefs		1	0	0	0	0	0	1
Administration Section		3	3	0	0	0	0	6
Technical Section		2	5	0	0	0	0	7
Operation Section		1	7	42	0	0	6	56
Total		7	15	42	0	0	6	7
C. Bekasi Final Disposal Site								
Chiefs		1	0	0	0	0	0	1
Administration Section		2	4	11	0	0	0	17
Technical Section		2	3	2	0	0	0	7
Operation Section		1	0	21	0	0	0	22
Total		6	7	34	0	0	0	47
Grand Total		119	204	284	560	361	36	1,567

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2) Direction in which organization must be strengthened

The following measures must be taken to strengthen the organizational setup as above.

(1) Proper assignment of workers

Insofar as the Suku Dinas Kebersan of Jakarta Pusat is concerned, the workers for waste collection is already considerably swollen and is likely to generate a fairly large surplus manpower when the waste collection system is rationalised in the future. At other Suku Dinas Kebersihan, a large increase in manpower is anticipated to be required due to the expansion of collection areas and an increase in collection frequency, necessitating the manpower to be reshuffled among the different Suku Dinas Kebersihan for efficient personnel allocation.

The Age of workers is currently extremely biased towards the higher age group due to the suspension of new worker recruitment for nearly ten years. It is, therefore, necessary to consider raising the percentage ratio of younger workers when the personnel is reshuffled among the Suku Dinas Kebersihan.

(2) Securing of administrative and technical personnel

Top priority in the organization for a stable and rational solid waste management system should be given to the reinforcement of the administrative and technical personnel of the Administration Department and the Technical Department of the Central Office and the technical and managerial staff of the transfer station and final disposal site.

It is not possible under the DKI Jakarta's existing organization system to offer special incentives to the staff of the Dinas Kebersihan. When capable manpower cannot be secured by offering better salaries, the following measure is considered necessary.

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The existing job rankings within the Dinas Kebersihan are quite low despite the important position that it assumes in the city's administration in terms of budget size and other aspects and these must be upgraded. In concrete terms, it will be necessary to renumerate the staff according to individual ability by upgrading the ranking of the job classification for instance, by raising the chief of each department to the rank of IV-a, the chief of each section of the Central Office and chiefs of Suku Dinas Kebersihan, transfer station and final disposal site to III-d, and the chief of each section of Suku Dinas Kebersihan to III-c.

(3) Application of incentives

In the establishment of the fee collection system, it will be necessary to ban the practice of individual dischargers giving improper incentives to the drivers and crew members of collection vehicles. It is considered necessary for the waste management organization to make incentive payments for proper collection and other laudable conduct.

The appropriation of such a fund for incentive payment is recognized only partially under the city's financial system. However, considering the fact that in solid waste management, the service is provided directly by the manpower involved, special consideration is called for.

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(4) Amplification of the information system

The management of related information is a fundamental subject in waste collection control and fee collection.

In particular, the development of a management system for controlling data on waste collection (actual operating performance of vehicles, actual waste amount collected and transported by area and by large dischargers), ranking by the amount of fees chargeable and information on actual fees collected are necessary.

4.4 Development of Fee Collection System

The development of a fee collection system is indispensable for the successful completion of the Project. During the project period i.e. from 1992 through 1995, fees will only be collected from large dischargers and households receiving the door-to-door service. The fee collection system to be introduced after 1993 should be prepared in line with the improvement of the collection system and the operation of the transfer station, as well as the final disposal site. The introduction of a new fee collection system of a surcharge on the electricity bill has been discussing between the DKI and the PLN. It is expected to transfer to this new system smoothly.

4.5 Measures to be Taken in the Institutional Aspect

The following measures must be taken to establish an autonomous operating system which shall be based on the revenue from fee collection.

1) Revision of the municipal ordinance on fees

In order to shift to the system of collecting fees together with electric rates, the municipal ordinance on fees must be drastically revised in the following way.

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- a. Shift from direct fee collection or fee collection through RW to collection by means of bank transfer together with electric rates.
 - b. Revision of the tariff to be enable autonomous operation of the solid waste management system.
 - c. Inducement and application system of authorizing business establishments for transporting the waste and for disposing of the waste. (Arrangement whereby the business establishments which discharge large amounts of waste will be charged a collection fee if their waste is collected by the Dinas Kebersihan. In the case of them wishing to transport the waste directly themselves or consign the work to some private operator, they shall so notify the Dinas Kebersihan and obtain its approval on a partial reduction of fees.)
- 2) Strict application of the system of licensing private operators and disposal sites

The exclusion of "informal routes" is essential in establishing a fee collection system. This requires stricter application of the system which authorizes private operators, including the establishment of private disposal sites for business establishments which discharge large amounts of waste.

Particularly as far as disposal sites are concerned, it is necessary to stipulate structural standards and to apply strict conditions for granting permission for their establishment, as in the case of authorizing disposal sites for industrial waste, as there is a danger that lowcost and devious routes will be formed which will seriously hamper the Dinas Kebersihan's operation and proper waste management.

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3) Reinforcement of penalties on illegal dumping of waste

The clarification of the technical standards for waste treatment and the strengthening of the system to expose improper treatment and illegal dumping, as well as reinforcement of the penalty codes is indispensable to prevent the establishment of devious routes.

4) Improvement of the organization of Suku Dinas Kebersihans

The fact that Suku Dinas Kebersihans are currently under the supervision of both the Wilayahs and the Dinas Kebersihan is preventing them from having an adequate number of competent personnel.

Restructuring of the organizational and institutional aspects is considered necessary in order to place Suku Dinas Kebersihans, whose organizational structure is required, under the supervision of the Dinas Kebersihan.

CHAPTER 5 PROJECT EVALUATION



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5.1 Project Cost

5.1.1 Investment cost

The investment cost was estimated by adding the cost of each items based on their 1987 prices. The foreign portion, import duties and value added tax were taken into consideration in addition to CIF prices. The exchange rate used was Rp.10.- = fl.-.

With regard to the distinction between the local and foreign portions, while product imports are duly classified as the foreign portion, the values of imported parts and their respective costs in those machines and equipment manufactured in Indonesia are excluded from the local portion.

In estimating the economic cost, part of the cost of unskilled labor was deducted in addition to the aforesaid import duties and value added tax.

The land price was not considered in the financial evaluation since the land purchase would have been completed prior to commencing construction.

1) Collection equipment, etc.

The investment cost for collection equipment, etc. consists of the purchasing costs of collection vehicles, containers and handcarts which are necessary in 1995, the purchasing cost of the micro-computers necessary for managerial control and the development cost of the depots. The division into the foreign portion and local portion and the economic cost for each item are as follows.

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Table 5-1-1 Investment Cost for Collection Equipment, Etc. (10^6 Rp.)

	Financial Cost			Economic Cost
	Foreign	Local	Total	
Vehicle				
Compactor L	4,851	2,079	6,930	5,712
S	843	361	1,204	992
Arm Roll	1,260	540	1,800	1,484
Container				
L (10 m^3)		175	175	167
S (1 m^3)		815	815	776
Micro-Computer	48		48	37
Hand-cart		162	162	154
Sub-Total	7,131	4,187	11,318	9,494
Depo				
Improvement		342	342	326
New Construction		286	286	272
Land Acquisition				310
Sub Total		628	628	908
Total	7,131	4,815	11,946	10,382

2) Street sweeping equipment, etc.

The investment cost for street sweeping equipment, etc. consists of the costs of mechanical sweepers and handcarts. The division into the foreign portion and local portion and the economic cost for each item are as follows.

Table 5-1-2 Investment Cost for Street Sweeping Equipment, Etc. (10^6 Rp.)

	Financial Cost			Economic Cost
	Foreign	Local	Total	
Mechanical Sweeper	480	0	480	369
Hand-cart	0	114	114	109
Total	480	114	594	478

3) Transfer station

The investment cost for the transfer station consists of the construction cost of the transfer stations and the purchasing cost of vehicles and equipment for secondary transport. The division into the foreign portion and local portion and the economic cost of each item are as follows.

Table 5-1-3 Investment Cost for Transfer Station (10^6 Rp.)

	Financial Cost			Economic Cost
	Foreign	Local	Total	
Construction				
Civil work & Building	953	3,812	4,765	4,364
Land Acquisition				1,200
Machinery	11,901	2,975	14,876	11,988
Electric apparatus	2,100		2,100	1,615
Sub-Total	14,954	6,787	21,741	19,167
Equipment	8,320		8,320	6,400
Total	23,274	6,787	30,061	25,567

4) Final disposal site

The investment cost for the final disposal site consists of the construction cost of the final disposal site and the purchasing cost of heavy equipment. The division into foreign portion and local portion and the economic cost for each item are as follows.

Table 5-1-4 Investment Cost for Final Disposal Site (10^6 Rp.)

	Financial Cost			Economic Cost
	Foreign	Local	Total	
Construction				
Civil work & Building	2,864	7,466	10,330	9,384
Land Acquisition				3,000
Machinery	4,864	1,216	6,080	4,900
Sub-Total	7,728	8,682	16,410	17,284
Equipment	2,984	24	3,008	2,318
Total	10,712	8,706	19,418	19,602

5) Workshops

The investment cost for the workshops consists of the construction cost of the sub-workshops and cost of apparatus and tools. This includes some of apparatus and tools of the main workshop related to the development of sub-workshop. The division into the foreign portion and local portion and the economic cost for each item are as follows.

Table 5-1-5 Investment Cost for Workshops (10^6 Rp.)

	Financial Cost			Economic Cost
	Foreign	Local	Total	
Construction				
Civil work & Building	246	982	1,228	1,124
Land Acquisition				186
Machinery	282	70	352	284
Electric apparatus	200		200	154
Sub-Total	728	1,052	1,780	1,562
Equipment				
Sub Workshop	587		587	452
Main Workshop	92		92	71
Sub-Total	679		679	523
Total	1,407	1,052	2,459	2,085

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6) Total investment cost

Table 5-1-6 summarizes the foregoing. The engineering fee was assumed to be 7% of the investment amount. 10% of the development cost, excluding vehicles, tools, etc., was included as physical contingency. 3% of the foreign portion and 8% of the local portion were included as price contingency. A construction period of two years (1990-1991) was assumed for the development of the transfer station, final disposal site, workshop and depots, while vehicles, tools, etc. were assumed to be procured in 1991.

Table 5-1-6 Investment Cost (10^6 Rp.)

	Financial Cost			Economic Cost
	Foreign	Local	Total	
Collection Improvement	7,131	4,815	11,946	10,382
Street Sweeping	480	114	594	478
Transfer Station	23,274	6,787	30,061	25,567
Final Disposal	10,712	8,706	19,418	19,602
Workshop	1,407	1,052	2,459	2,085
Sub-Total	43,004	21,474	64,478	58,114
Engineering Fee	3,010	1,503	4,513	
Physical Contingency	2,341	1,715	4,056	
Price Contingency	939	1,056	1,995	
Total	49,294	25,748	75,042	58,114

Of these, the transfer station, workshops and depots can be basically utilized until 2005. The final disposal site will, however, be filled up in 6.8 years based on the assumption that waste from Bekasi is accepted. In the financial evaluation, therefore, it was assumed that the disposal site will be extended into the adjacent area sometime during the 1997-1998 period in view of its use up to 2005. Since part of civil work and buildings, as well as the equipment, is usable until 2005 even in this event, the development cost for the said portion was deducted from the appropriations.

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As the life expectancy of vehicles and heavy equipment is set at seven years, replacement investment will be required every seven years. Of these, collection vehicles require additional or supplementary investment commensurate to the increase in the amount of waste to be collected. Likewise, additional and/or replacement investment must be appropriated every four years for containers, etc. and every five years for the micro-computer.

Considering all the foregoing, the investment plan shown in Table 5-1-7 results.

Unit:Rp.million

Table 5-1-7 Investment Plan (F/S)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Total
Collection																	
Vehicle		10118							13009								10118
(Renual)																	13009
Container etc.		1200															1200
(Renual)						1152	48			1481		48		1481			4210
Depo		628															628
Transfer Station																	
Construction	10871	10870															21741
Vehicle		8320							8320								8320
(Renual)																	
Final Disposal																	
Construction	8205	8205						5024	5024								16410
(Renual)																	10048
Heavy Equipment		3008							3523								3008
(Renual)																	3523
Street Sweeping																	
Mechanical Sweeper		480							480								480
(Renual)																	480
Hand-cart etc.		114															114
(Renual)						114				114				114			342
Work Shop																	
Construction	890	890															1780
Equipment etc.		679															679
Total	19965	44512	0	0	0	1266	48	5024	30356	1595	0	48	0	1595	0	0	104410

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5.1.2 Annual Expenses

Annual expenses consist of the depreciation allowance and operation and repair costs. The operation and repair costs consist of the maintenance cost, fuel and others, and personnel expenses.

The depreciation allowance was found by dividing the construction and procurement cost by the durable years after allowing for the residual book value. The maintenance cost was calculated by multiplying the construction and procurement cost with the certain percentage determined for each item. Fuel and others were calculated by estimating the unit price on the basis of the unit consumption rate and multiplying it with the amount collected and disposed of. Personnel expenses were determined in consideration of the manpower composition, as shown in Table 4-3-1 of Part III.

In estimating the economic prices, a certain percentage of the financial cost was deducted to allow for import duties and value added tax on spare parts, etc. as well as for the manpower cost of unskilled labor.

1) Collection

Annual expenses incurred by collection were calculated on the basis of the waste amount to be collected in 1995 excluding, however, fuel and others. Annual expenses for 1999 and thereafter were calculated on the basis of the waste amount to be collected in 2005.

Table 5-1-8 Annual Expenses for Collection (10^6 Rp.)

	Financial Cost		Economic Price	
	1992-1998	1999-2005	1992-1998	1999-2005
Depreciation				
Vehicle	1,318.9	1,695.7		
Container	226.4	291.1		
Hand-Cart	40.5	52.1		
Micro Computer	8.6	8.6		
Depo	24.6	24.6		
Sub-Total	1,619.0	2,072.1		
Maintenance Cost	293.1*	376.8*	266.5*	342.5*
Fuel & Others	320.0	415.1	278.3	361.0
Personnel Expenses	916.8	1,178.7	761.0	977.6
Total	3,148.9	4,042.7	1,305.8	1,681.1

* In regard to the maintenance cost, only half of the amount generally considered necessary was appropriated considering the duplication with the annual expenses of the workshops.

2) Street sweeping

Annual expenses incurred by street sweeping are assumed to remain unchanged until 2005.

Table 5-1-9 Annual Expenses for Street Sweeping (10^6 Rp.)

	Financial Cost		Economic Price	
	1992-1998	1999-2005	1992-1998	1999-2005
Depreciation	103.1	103.1		
Maintenance Cost	20.6	20.6	18.7	18.7
Fuel & Others	47.3	47.3	41.1	41.1
Personnel Expenses	375.8	375.8	310.8	310.8
Total	546.8	546.8	370.6	370.6

* In regard to the maintenance cost, only half of the amount generally considered necessary was appropriated considering the duplication with the annual expenses of the workshops.

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3) Transfer stations

Annual expenses incurred by transfer stations are also assumed to remain unchanged until 2005.

Table 5-1-10 Annual Expenses for Transfer Stations (10^6 Rp.)

	Financial Cost		Economic Price	
	1992-1998	1999-2005	1992-1998	1999-2005
Depreciation				
Civil work & Building	190.6	190.6		
Machinery	1,091.3	1,091.3		
Equipment (Vehicle)	1,069.7	1,069.7		
Sub-Total	2,351.6	2,351.6		
Maintenance Cost	838.8	838.8	762.5	762.5
Fuel & Others	766.0	766.0	666.1	666.1
Personnel Expenses	113.3	113.3	112.1	112.1
Total	4,069.7	4,069.7	1,540.7	1,540.7

4) Final disposal site

Annual expenses incurred (until 1998) by the final disposal sites, excluding fuel etc., were calculated on the basis of the waste amount to be disposed of in 1998. Annual expenses for 1999 and thereafter were calculated on the basis of the waste amount to be disposed of in 2005.

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Table 5-1-11 Annual Expenses for Final Disposal Sites (10^6 Rp)

	Financial Cost		Economic Price	
	1992-1998	1999-2005	1992-1998	1999-2005
Depreciation				
Civil work & Building	1,356.4	1,559.2		
Machinery	390.9	390.9		
Equipment (Vehicle)	386.7	453.0		
Sub-Total	2,134.0	2,403.1		
Maintenance Cost	331.7	367.6	301.5	334.2
Fuel & Others	595.5	750.8	517.8	652.9
Personnel Expenses	77.3	85.9	74.6	82.8
Total	3,138.5	3,607.4	893.9	1,069.9

5) Workshops

Annual expenses incurred by workshops are assumed to remain unchanged until 2005.

Table 5-1-12 Annual Expenses for Workshops (10^6 Rp.)

	Financial Cost		Economic Price	
	1992-1998	1999-2005	1992-1998	1999-2005
Depreciation				
Civil work & Building	49.1	49.1		
Machinery	73.2	73.2		
Sub-Total	122.3	122.3		
Maintenance Cost	28.9	28.9	26.3	26.3
Fuel & Others	271.0	271.0	235.7	235.7
Personnel Expenses	103.0	103.0	96.8	96.8
Total	525.2	525.2	358.8	358.8

6) Others

In addition to the foregoing, expenses incurred by fee collection must also be borne in the implementation of solid waste management activities.

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Here, only the manpower cost for the administration of fee collection was appropriated. And it was assumed that actual fee collection would be commissioned.

7) Total annual cost

Summarizing the above, are the 1995 annual expenses as follows.

Table 5-1-13 Annual Expenses for 1995 (10⁶ Rp.)
(Financial Cost)

	Depreciation	Maintenances Cost	Fuels & Others	Personnel Expenses
Collection	1,619.0	293.1	320.0	916.8
Street Sweeping	103.1	20.6	47.3	397.0
Transfer Station	2,351.6	838.8	766.0	113.3
Final Disposal	2,134.0	331.7	595.5	77.3
Workshop	122.3	28.9	271.0	103.0
Fee Collection etc.				67.2
Total	6,330.0	1,513.1	1,999.8	1,674.6

The yearly annual expenses are as shown in Table 5-1-14.

Unit:Rp.million

Table 5-1-14 Cost Trends (F/S)

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Total
Collection	1619	1619	1619	1619	1619	1619	1619	1619	2072	2072	2072	2072	2072	2072	25837
Depreciation	293	293	293	293	293	293	293	377	377	377	377	377	377	377	4690
Maintenance	304	309	315	320	330	339	349	358	368	377	387	396	406	415	4973
Fuel & Others	917	917	917	917	917	917	917	1179	1179	1179	1179	1179	1179	1179	14672
Personnel Cost	2352	2352	2352	2352	2352	2352	2352	2352	2352	2352	2352	2352	2352	2352	32928
Transfer Station	839	839	839	839	839	839	839	839	839	839	839	839	839	839	11746
Depreciation	766	766	766	766	766	766	766	766	766	766	766	766	766	766	10724
Maintenance	113	113	113	113	113	113	113	113	113	113	113	113	113	113	1582
Fuel & Others	2134	2134	2134	2134	2134	2134	2134	2403	2403	2403	2403	2403	2403	2403	31759
Personnel Cost	332	332	332	332	332	332	332	368	368	368	368	368	368	368	4900
Final Disposal	566	576	586	595	611	627	642	658	673	689	704	720	735	751	9133
Depreciation	77	77	77	77	77	77	77	86	86	86	86	86	86	86	1141
Maintenance	103	103	103	103	103	103	103	103	103	103	103	103	103	103	1442
Fuel & Others	21	21	21	21	21	21	21	21	21	21	21	21	21	21	294
Personnel Cost	47	47	47	47	47	47	47	47	47	47	47	47	47	47	658
Street Sweeping	397	397	397	397	397	397	397	397	397	397	397	397	397	397	5558
Work Shop	122	122	122	122	122	122	122	122	122	122	122	122	122	122	1708
Depreciation	29	29	29	29	29	29	29	29	29	29	29	29	29	29	406
Maintenance	271	271	271	271	271	271	271	271	271	271	271	271	271	271	3794
Fuel & Others	103	103	103	103	103	103	103	103	103	103	103	103	103	103	1442
Personnel Cost	67	67	67	67	67	67	67	67	67	67	67	67	67	67	938
Fee Collection	11472	11487	11503	11517	11543	11568	11593	12731	12756	12781	12806	12831	12856	12881	170325
Personnel Cost	6330	6330	6330	6330	6330	6330	6330	7052	7052	7052	7052	7052	7052	7052	93674
Depreciation	1514	1514	1514	1514	1514	1514	1514	1634	1634	1634	1634	1634	1634	1634	22036
Maintenance	1954	1969	1985	1999	2025	2050	2075	2100	2125	2150	2175	2200	2225	2250	29282
Fuel & Others	1674	1674	1674	1674	1674	1674	1674	1945	1945	1945	1945	1945	1945	1945	25333
Personnel Cost	5142	5157	5173	5187	5213	5238	5263	5679	5704	5729	5754	5779	5804	5829	76651
O.M. Cost															

5.2 Project Evaluation

5.2.1 Framework for Evaluation

1) Framework for evaluation

The project evaluation was based on the following principles in view of the characteristics of solid waste management.

- a. The project will be evaluated from three aspects, i.e. economic, financial and environmental.
- b. The economic evaluation will be based on the cost minimization method which guarantees that "the system will attain the target service level with the minimum cost". In addition, the cost of the collection service shall be compared to the citizens' willingness to pay. Here, the benefits of the collection service perceived by the citizens will be taken into account. In regard to transfer stations, their quantitative economic benefits will be estimated.
- c. In the financial evaluation, it will be confirmed that the project is financially possible within the limit of DKI Jakarta's available financial resources for solid waste management.
- d. In regard to the environmental aspect, the anticipated environmental problems will be qualitatively analyzed and countermeasures will be studied and evaluated.
- e. In addition to the above, the following will also be studied.
 - Conformity of various measures with the social system
 - Operating system, organization and possibility of deployment in local communities.

2) Basis for economic evaluation

Although economic evaluation is considered indispensable in judging the feasibility of a project, it is difficult to immediately measure the benefits of solid waste management. Judging from our experience in Japan, it is unreasonable to expect these benefits to exceed the cost.

In view of the above, economic evaluation was conducted according to the following steps.

- a. The effects of improvement in waste collection service and implementation of sanitary landfill will be qualitatively examined and evaluated.
- b. In regard to a services offering direct benefits to the citizens, such as door-to-door collection, the additional cost for the service will be comparatively examined.
- c. The effects of the transfer stations will be evaluated not only qualitatively but quantitatively. However, only the costs and benefits of the transfer stations which are quantifiable will be calculated. In particular, their effect of reducing the collection cost will be counted as a benefit.
- d. The project will be considered feasible from the viewpoint of economic evaluation if the benefits exceed the costs.

3) Basis for financial evaluation

Financial evaluation may be broadly divided into the following two fields.

- Financial evaluation of the project concerned
- Analysis of the project's impact on solid waste management in DKI Jakarta as a result of its implementation

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Pusat will be the subject of the former evaluation and its financial position for a period of about 15 years will be analyzed on the basis of the expenses that will be incurred for solid waste management and the estimated revenues accruing from it. The financial analysis will include sensitivity studies on the impact of the construction cost, difference between the planned amount of waste and the actual amount of waste conditions on sources of funds and inflation, etc.

The assumed rate of the waste collection fee shall be within 1% of the household income in view of the results of the questionnaire survey on citizens' consciousness of the cost and discussions held with the Indonesian side.

The budget appropriation of RP. 2.2 billion directly allocated to Suku Dinas Kebersihan Jakarta Pusat by DKI shall now be considered the upper limit.

In the financial evaluation, the following cases will be examined. Case b) is taken as the base case.

- a. The waste amount handled at the transfer station will be the waste amount collected in Pusat. And commensurate to the amount for landfilling at the final disposal site. All expenses incurred in managing this amount of waste will be considered.
- b. The waste amount handled at the transfer station will match the capacity of the transfer station. Tipping fees from places other than Pusat will be considered. All expenses incurred at the transfer station and final disposal site will be considered.

5.2.2 Economic Evaluation

1) Economic evaluation of the waste collection service improvement project

It is apparent that the purpose of solid waste management in a city is to quickly collect and remove waste generated from urban activities in order to maintain/improve public sanitation and environment.

In general, improvement of the collection service will have the following effects.

Regular collection	Will contain the propagation of flies, mosquitoes, rats, etc.	Will prevent spreading of damage by blight and harmful insects
	Will prevent piling and littering of waste	Will prevent traffic flow from being impeded.
	Will prevent generation of offensive odor	Will form a comfortable environment
Improvement of Working environment	Will reduce sickness and injuries	Will favorably impress tourists
		Will improve collection efficiency

Such efforts will secure Jakarta a comfortable living environment and stimulate its economic activities.

Since these effects are indirect, it will however, be difficult to estimate their benefits.

As the collection improvement project will reduce the collection cost, the project can justifiably be said to contribute to the national economy.

A service like door-to-door collection, where the benefits directly reach the citizens may seem to act against the purpose of economic evaluation, i.e. the minimization of the cost of the total system. Since it has the effect of enhancing the benefits accruing to the citizens, however, it can be considered to contribute to the minimization of cost provided the amount citizens' are willing to pay for such a service is larger than the amount of the additional cost incurred for such a service. The difference in costs between the door-to-door service and the depot type collection is considered to be about Rp.120/households per month. High income households in Jakarta however, have expressed a willingness to pay Rp.3,000 or more per month. The higher burden for high income households is considered a cross-subsidy by which it would be possible to extend the collection service to low income households which have difficulty in bearing even the minimum cost and, therefore, further advances the effects on public sanitation and environment.

In regard to the cost reduction effect, a saving of more than 15% will result. While the collection cost under the existing system is estimated to be Rp.10,570/ton or more, the collection cost under the improved system is estimated to be Rp.8,690/ton, including the construction/improvement cost of the workshops. This cost saving effect is asserted on the construction of the transfer station.

For reference, the cost saving effect in the case of the collection system being changed to the improved system without the construction of the transfer station will be Rp.1910/ton. When the cost of the workshop construction is taken into account, however, the saving in cost would only amount to Rp.990/ton (for 2005).

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2) Economic effect of disposal by sanitary landfill

Solid waste from not only Pusat but also from Utara and Bekasi will be disposed of by the sanitary landfill method at the Bekasi disposal site. The provision of a landfill disposal site at Bekasi can be expected to have following 4 effects.

- a. Shift from open dumping to controlled landfill disposal
- b. New availability of a solid waste disposal site
- c. Locationing of a disposal site outside Jakarta
- d. Establishment of an appropriate disposal technique

The concrete contents of these effects in Pusat, which is the main subject of collection area, are described below.

- a. Almost all of the solid waste generated in Pusat, i.e. 1,040 t/d, is currently disposed of by the open dumping method with 360 t/d being outside the official solid waste disposal system. As a result, there is a number of open dumping sites scattered in Pusat, a district of progressive urbanisation, worsening the environmental conditions in the area. With the construction of the Bekasi disposal site, the entire volume of solid waste generated in Pusat can be disposed of at this new site. Accordingly, the small open dumping sites in Pusat can be eradicated, making a positive contribution to environmental conservation. The negative impact of the disposal site on Bekasi's environment can be minimized by using covering soil and by treating the waste water.
- b. As all the solid waste generated in Pusat will be dealt with at the Bekasi disposal site, regulations which include a total ban on illegal open dumping can be introduced in Pusat, therefore contributing to environmental improvement in Pusat.

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- c. Although the locationing of the new disposal site outside Jakarta will increase the waste disposal cost, it will alleviate the adverse environmental impact of the present open dumping method on areas of progressive urbanisation. The number of those affected by the bad environment will decline, the adverse environmental impact will be mitigated by the adoption of the sanitary landfill method and the proper control of solid waste disposal will be achieved.
- d. As the collection of covering soil is possible near the Bekasi disposal site, an appropriate disposal technique for sanitary landfill can be easily established, forming the basis for the final solid waste disposal system in Jakarta which can be feasibly transferred to other cities.
- e. As it is planned that the Bekasi disposal site will deal with 45% of the solid waste generated in Utara in 1995, the above-described effects can also be expected to Utara in proportion to the disposal ratio of the solid waste generated there.

3) Economic evaluation of the transfer station

The construction of the transfer station will have the direct effect of reducing the haulage cost and contributing to the national economy by allowing the surplus funds to be diverted for other developmental investment.

At the same time, it will improve the collection system by guaranteeing the regularity of the collection service.

It will also prevent the scattering littering of waste which tends to accompany waste haulage and help maintain/improve public sanitation and the environment.

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Here, attention will be paid to the first point and of the various effects that will result from the implementation of the project, only those which can be measured will be examined and evaluated.

(1) Setting the conditions for evaluation

The construction of the transfer station will shorten the haulage distance of collection vehicles and increase the number of trips per vehicle. This will result in reducing not only the required number of collection vehicles, drivers and collection crew but the number of supervisory and managerial staff. In other words, it will reduce the investment cost, as well as operation and maintenance costs incurred in waste collection.

Another truth of this evaluation is that the effect of collection service improvement will only be achieved by the construction of the transfer station as previously stated. Accordingly, it is assumed here that the collection service will be improved and the difference in collection costs between the existing system and the proposed system considered as benefit.

The investment in the transfer station and the operating expenses are considered as costs.

(2) Calculation of benefits and costs

The collection cost of the proposed collection system without the transfer station (direct haulage to final disposal site) is assumed to be Rp.18,243.

Against this, the cost of the existing collection system without the transfer station (direct haulage to final disposal site) will be Rp.20,157. (refer to Table 5-2-1).

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Table 5-2-1 Comparison of Costs with and without Transfer Station by Collection System

(Unit : Rp.million)

	Proposed System with T/S	Collection improvement without T/S	Extension of present system without T/S
Collection System			
Investment amount			
Depo	616	616	0
Vehicle	10,118	24,906	21,539
Container	990	963	194
Handcart	162	162	1,259
Micro-computer	48	48	
Total	11,934	26,595	22,992
Annual expenses in 1995			
Depreciation	1,619	3,494	3,128
O. & M. cost			
Maintenance cost	586	1,423	1,231
Fuel & others	320	787	1,237
Personnel cost	917	1,754	2,644
Sub Total	1,823	3,964	5,112
Total	3,442	7,458	8,240
Cost per ton (Rp./ton)	8,420	18,243	20,157
Transfer Station			
Investment amount			
Construction			
Civil work & Building	4,765		
Machinery	14,876		
Electric apparatus	2,100		
Sub Total	21,741		
Equipment	8,320		
Total	30,061		
Annual expenses in 1995			
Depreciation	2,352		
O. & M. cost			
Maintenance cost	839		
Fuel & others	766		
Personnel cost	113		
Sub Total	1,718		
Total	4,070		
Cost per ton (Rp./ton)	9,956		
Cost per ton (Rp./ton) with T/S	18,376		

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Here, the benefits are given as the differences in the investment cost and the operation/maintenance cost arising from the existence or non-existence of the transfer station after the introduction of the improved collection system. In comparison, the costs are given as the investment cost and the operation/maintenance cost necessitated by the construction of the transfer station.

The resulting benefits and costs are as shown in Table 5-2-2.

Since the transfer station will be constructed and operated to meet the waste amount of Pusat in 2005, the annual expenses are estimated in proportion with the handling amount. The expenses that will be incurred in the case where waste is not hauled in from anywhere other than Pusat are also shown for reference purposes.

Table 5-2-2 Benefits and Costs of Transfer Station

(Unit: Rp. million)

Year	Market prices			Economic prices		
	Benefit	Cost		Benefit	Cost	
		Wastes also hailed in from elsewhere	Pusat alone		Wastes also hailed in from elsewhere	Pusat alone
1990	0	10,871	10,871	0	9,584	9,584
1991	14,761	19,190	19,190	12,163	15,983	15,983
1992	2,141	1,230	1,718	1,932	1,104	1,541
1993	2,141	1,254	1,718	1,932	1,125	1,541
1994	2,141	1,277	1,718	1,932	1,146	1,541
1995	2,114	1,301	1,718	1,906	1,167	1,541
1996	2,141	1,343	1,718	1,932	1,204	1,541
1997	2,141	1,384	1,718	1,932	1,242	1,541
1998	21,154	9,746	10,038	17,603	7,676	7,941
1999	2,719	1,468	1,718	2,452	1,317	1,541
2000	2,754	1,509	1,718	2,485	1,354	1,541
2001	2,754	1,551	1,718	2,485	1,391	1,541
2002	2,754	1,593	1,718	2,485	1,429	1,541
2003	2,719	1,635	1,718	2,452	1,466	1,541
2004	2,754	1,676	1,718	2,485	1,504	1,541
2005	2,754	1,718	1,718	2,485	1,541	1,541
Total	67,941	58,746	62,381	58,661	50,233	53,541

(3) Evaluation results and comments

As a result of the above, EIRR of the project is 6.3% in both market price and economic price when waste hauled in from areas other than Pusat is taken into consideration. Hence the project may be evaluated to have a relatively high rate of return for a BHN (Basic Human Needs) type project.

For information, if the construction cost of the transfer station is reduced by 10%, EIRR will rise to 8.6%. In contrast, if it increases by 10%, EIRR drops to 4.2%, meaning that the project may justifiably be promoted as far as the economic evaluation results are concerned.

In the case where waste generated in Pusat only is managed, EIRR is a mere 3.8%, indicating that it is necessary to utilize the transfer station effectively by actively collecting waste from other Wilayahs in the initial period of operation.

In comparison, the proposed system, reduces the manpower employed in waste collection, which is not necessarily in conformity with the task of the national economy of creating employment opportunities.

If the personnel cost reduction effect is disregarded in the evaluation, the benefit accruing until 2005 will only be Rp.48 billion even at a zero discount rate and result in a negative EIRR.

However, since it is apparent that the economy of Jakarta will become increasingly service-oriented, securing of a labor force for solid waste management will accordingly become difficult.

In addition to that stated above, the reduction in the required parking space as a result of the reduction in the required number of collection vehicles may also be cited as one of the effects of having the transfer station. However, since evaluation of the effect of reduction in scattered spaces is influenced by locational and other various conditions, such effect appears to be outside the scope of to present quantitative evaluation.

5.2.3 Financial Evaluation

Here, the prospect of establishing an independent source of revenue in the year 2005 with the improved fee collection system is examined and appraised.

The following 3 criteria are introduced to judge the prospect of establishing an independent source of revenue.

- a. Revenue and expenditure balance will show a surplus around the year 2000.
- b. Annual repayment of the foreign, as well as local, currency portions of the loan is secured.
- c. While the financial burden on the DKI is reduced, the total debt in 2005 should also be reduced as far as possible, at least to less than half of the initial total debt.

1) Basic Concept of Revenue Source

In principle, the collected fees will provide a source of revenue for the Project. Work which has a public character, such as street sweeping, will be catered for in the DKI budget.

In principle, the solid waste collection fee will be added to the electricity bill. As there are some uncertainties in regard collection, the following 3 cases are assumed in the financial analysis.

- a. The surcharge on the electricity bill will commence in 1992.
The collection ratio is expected to improve from the initial 30% to 90% in 1999.
- b. The surcharge on the electricity will commence in 1992 when the new solid waste disposal system commences operation. The collection ratio will be set at 90% of the potential total fees.
- c. The commencement year of the surcharge on the electricity bill will be altered to 1993 or 1995. The collection ratio will be set at 90% of the potential total fees.

With regard to the special fees for the door-to-door services (including that for large amount dischargers) and the tipping fees imposed on those taking solid waste directly to either the transfer station or the final disposal site, the surcharge on the electricity bill will, in principle, be introduced based on individual contract.

In the financial analysis, the fee in each case will be collected at a ratio of 100% from the beginning of the new operation in proportion to the amount of solid waste generated. (In the case of 3 above, the fees will be collected directly until the commencement of the surcharge system.)

It is assumed that the DKI will provide a budget similar to the amount it currently spends on solid waste disposal management in Pusat. This appropriation will gradually be decreased to the level of street sweeping cost.

1992 - 1995 : Rp.2.2 billion

1996 - 2000 : Rp.1.1 billion

2001 - : Rp.0.6 billion (for street sweeping)

The case including the tipping fee at the Bekasi disposal site will also be examined.

2) Formation of Investment Funds

The initial investment funds will be basically provided by foreign and local loans. Since the anticipated foreign and local portions are Rp.49 billion and Rp.26 billion respectively, as described in the Project Cost, Indonesia may find it difficult to raise the required funds.

In the case of the conventional budget of the Dinas Kebersihan, the vehicle purchase cost will be independently secured as part of the development budget. The investment required for equipment renewal in Pusat will be included in this budgetary item.

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With regard to the local portion of collection and street sweeping equipment, 2 cases are considered for comparison purposes. The first case is that the local portion will be secured as part of the DKI's development budget while the second case is that it will be repaid in the future as part of the total loan.

The following are assumed to be the basic loan condition.

	Repayment Conditions	Market Interest Rate	Real Interest Rate
Foreign Loan	Repayment over 25 Years with a 7 year grace period	8%	4%
Local Loan			
RDI	Repayment over 20 Years with a 5 year grace period	9%	5%
BPD	Short-term loan (repayment the following	18%	12%

The real interest rate is assumed here because the revenue and expenditure in the financial analysis/evaluation exclude the price rise factor while the market interest rate is determined in relation to the expected inflation. Those cases where these assumed conditions change will be examined and compared in the later section dealing with the alternatives. As far as funds for additional equipment or equipment renewal are concerned, it is assumed that the local loan will meet the entire loan requirements. This severe condition for the present analysis purpose is introduced because of the harsh competition with other sectors for foreign loans and the necessary improvements of solid waste management in Wilayahs other than Pusat in the near future.

3) Revenue Composition and Transition

The expected revenue is the same as that shown in the Tariff Table given in the Master Plan.

Taking into consideration the possible population and real income increases in Pusat in the future, the anticipated revenue for each case is shown in Table 5-2-3.

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Table 5-2-3 Conditions for Fee Collection

	1992	1995	2000	2005
Assumed				
No. of Household	303,100	310,000	323,130	336,260
High income	60,868	74,900	115,075	155,250
(Door-to-door Service)	(24,569)	(25,128)	(26,191)	(27,257)
Middle income	156,495	167,700	154,753	141,770
Low income	85,736	67,400	53,320	39,240
No. of Companies	7,500	7,936	8,610	9,284
Solid waste (ton/day)				
from Large Dischargers	288	315	382	450
direct to T/S from Pusat	186	200	245	290
direct to T/S : other than Pusat	491	420	210	0
direct to F/D	238	340	610	880
Potential (Rp. million)				
Basic Fees				
Household Collection				
High income (95%)	1,387	1,709	3,935	5,311
Middle income (80%)	1,052	1,127	1,560	1,428
Low income (50%)	154	121	106	78
Company Collection (90%)	486	514	837	902
Special Fees				
Households (Door-to-door Service by Dinas Kebersihan)	590	603	943	981
Large Dischargers	2,088	2,300	4,183	4,896
Tipping Fees				
direct to T/S from Pusat	679	730	1,341	1,588
direct to T/S : other than Pusat	1,792	1,533	1,150	0
direct to F/D	434	621	1,670	2,409
Total	8,662	9,258	15,725	17,595

4) Composition of Expenditure

The figure for expenditure is basically determined by adding the interest amount based on the loan conditions and the fee collection expenses to the annual expenses (operation/ maintenance cost and depreciation cost) shown in the Project cost. 5% commission is assumed for the collected amount of fees as the fee collection expense.

5) Establishment of Alternatives and Examination of Calculation Results

Alternatives are introduced for those preconditions which are regarded as particularly important in the examination of a financial plan and are compared. Comparisons between major cases are given in Figs. 5-2-1 - 5. The engineering fee and contingency is omitted from the calculation.

Table 5-2-4 Study Cases for Financial Evaluation

Condition

Projects contents	A:Existing System	B:Proposed System	C:Improved System			
Revenue						
Basic Fees	1:100% of potential	2:90% of potential	3:Gradual improvement			
Start Time of Surcharge on Electricity Fee	1:1992	2:1993	3:1995			
Tipping Fees	1:100%	2:No Fee from other Wilayah	3:No fee from Bekasi 4:Discountsd fee from Bekasi			
Loan conditions						
Repayment period						
Local loan	1:20 years	2:18 years	3:16 years	4: 14years	5:12 years	6:10 years
Grace period	5 years	4 years	3 years	2 years	1 years	1 years
Interst						
Local loan	1: 0%	2: 5%	3: 9%	4:11%	5:18%	

Other factors						
Implementation						
Programs	1:Proposed Program	2:Divide the first stage				
Personnel Cost	1:Constant relatively	2:Rapid increase		3:20% highre than asumes		
Fee Collection cost	1:Proposed commission rate		2:20% higher than assumes			

☐ Those in squares are finally adopted.

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Based on the above examination, it is clearly important that the conditions to commence fee collection by means of a surcharge on the electricity bill will be met as soon as possible. Together with the preparation of the present Project, therefore, it is desirable that among other things the institutional arrangements be completed and an information processing system be established. While the commencement of the surcharge system in 1993, if not in 1992, will only bring about a small increase of the total debt in 2005, its commencement in 1995 will have a similar result to the case where the collection ratio gradually increases.

The revenue and expenditure balance in 2005 will still show a deficit if tipping fees in proportion to the amount of solid waste accepted from Bekasi are not collected.

With regard to the source of investment funds for the implementation programme, it is very important that the DKI secure a development budget for the purchase of collection equipment and for other purposes in the initial stages of the Project.

In terms of the loan conditions, a longer repayment period will increase the interest burden while a shorter repayment period will increase the DSR.

The case where the repayment periods of the foreign loan and local loan are decided to be 25 years (including a 7 year grace period) and 12 years (including a 1 year grace period) appears to have the most balanced loan conditions. However, due to various administrative constraints, the repayment period of 20 years with a 5 year grace period is adopted for the local loan in the implementation plan to be described later.

In regard to the interest rate, the total debt will not decrease if the interest rate reaches 10% or more.

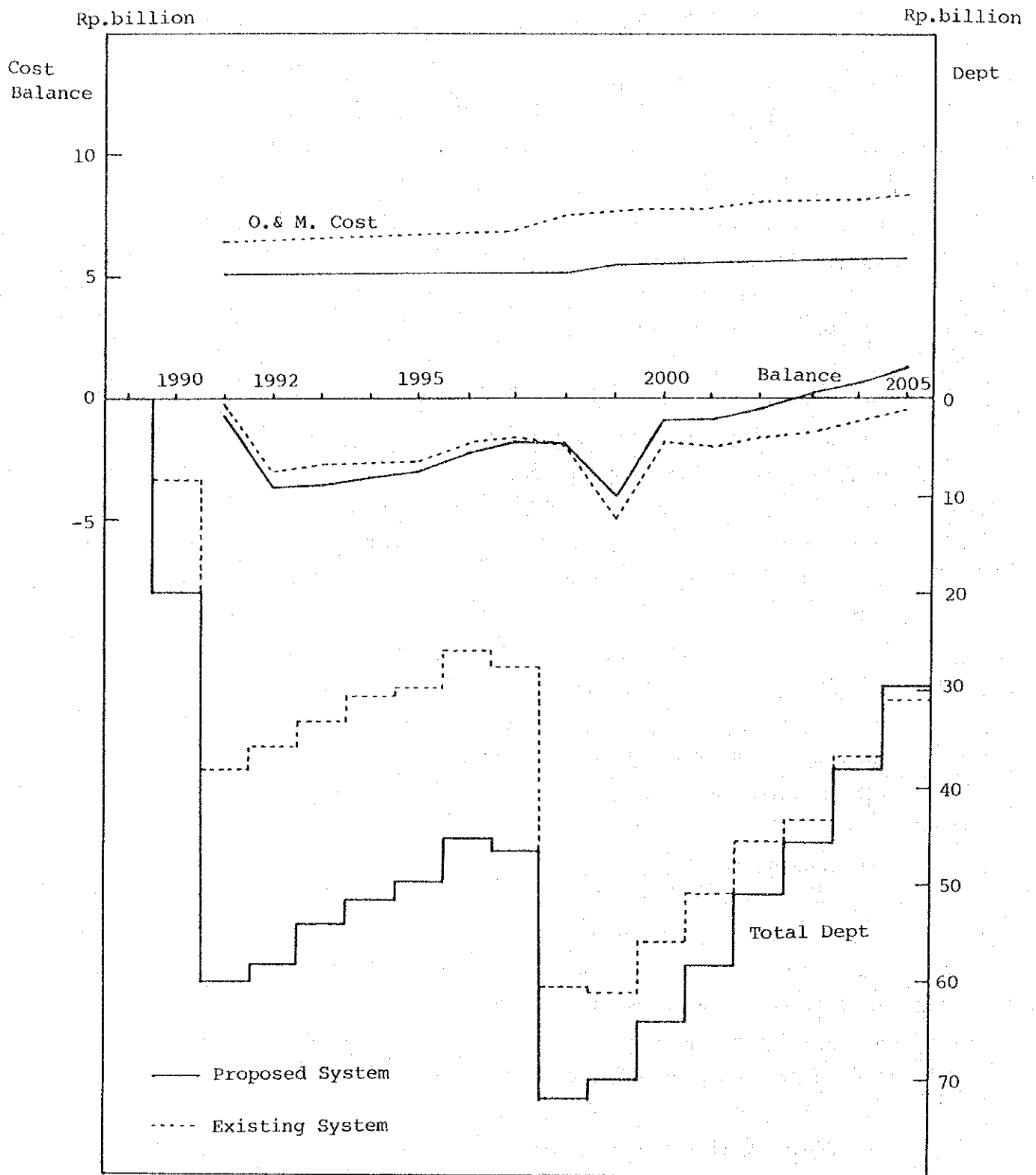


Fig5-2-1 Comparison between Existing System & Proposed One

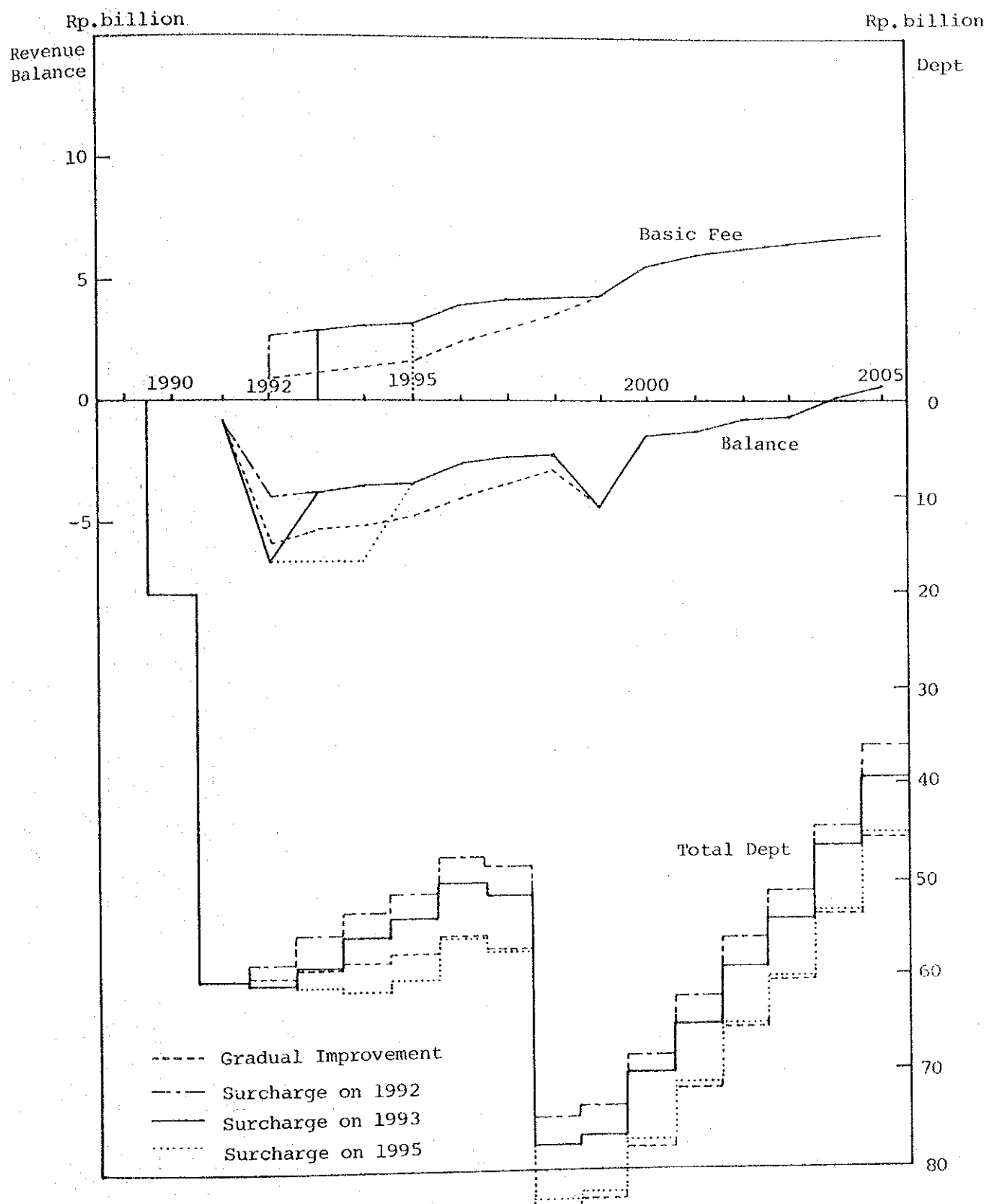


Fig. 5-2-2 Alternatives of Revenue (Basic Fee)

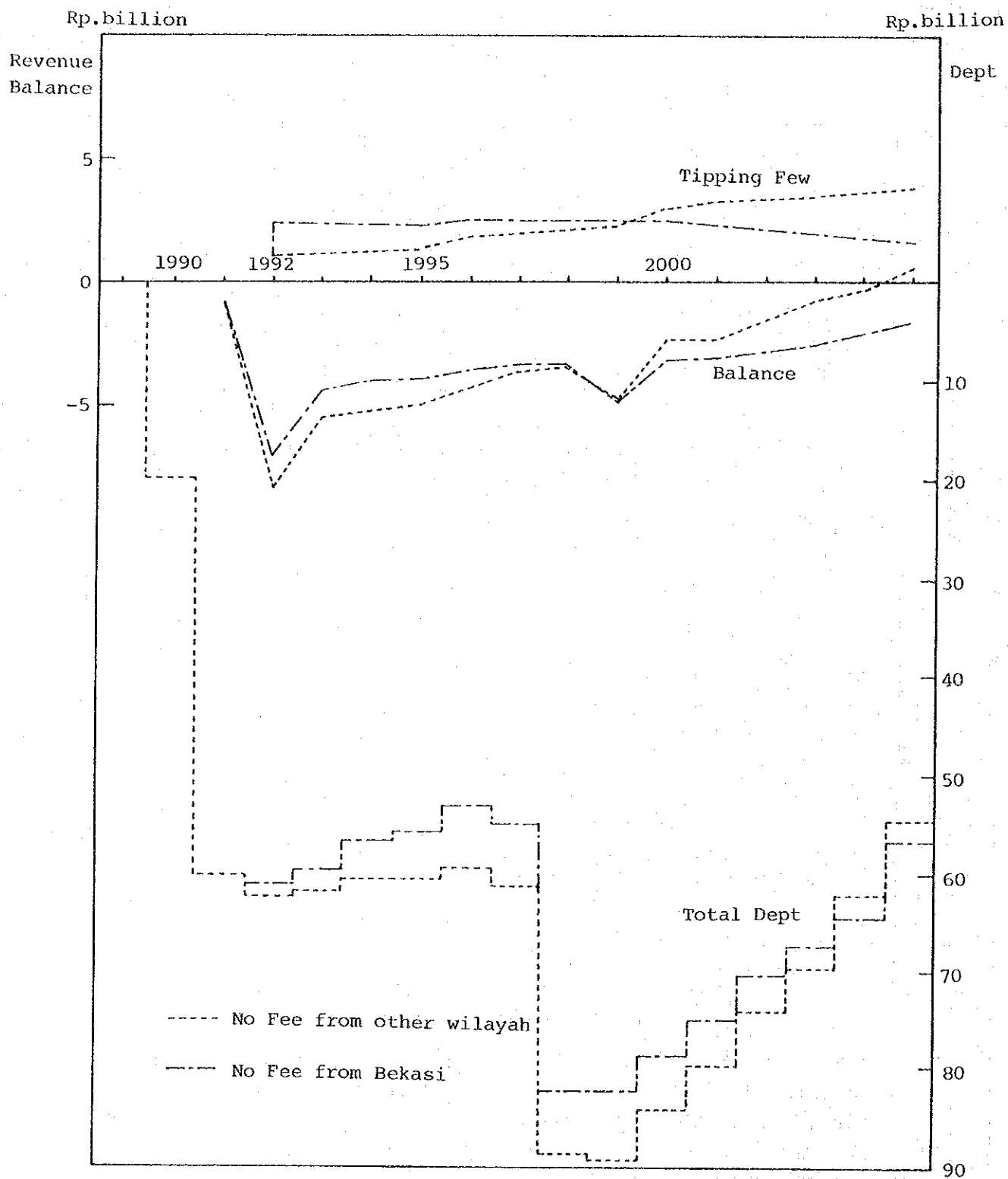


Fig 5-2-3 Alternatives of Revenue (Tipping Fee)

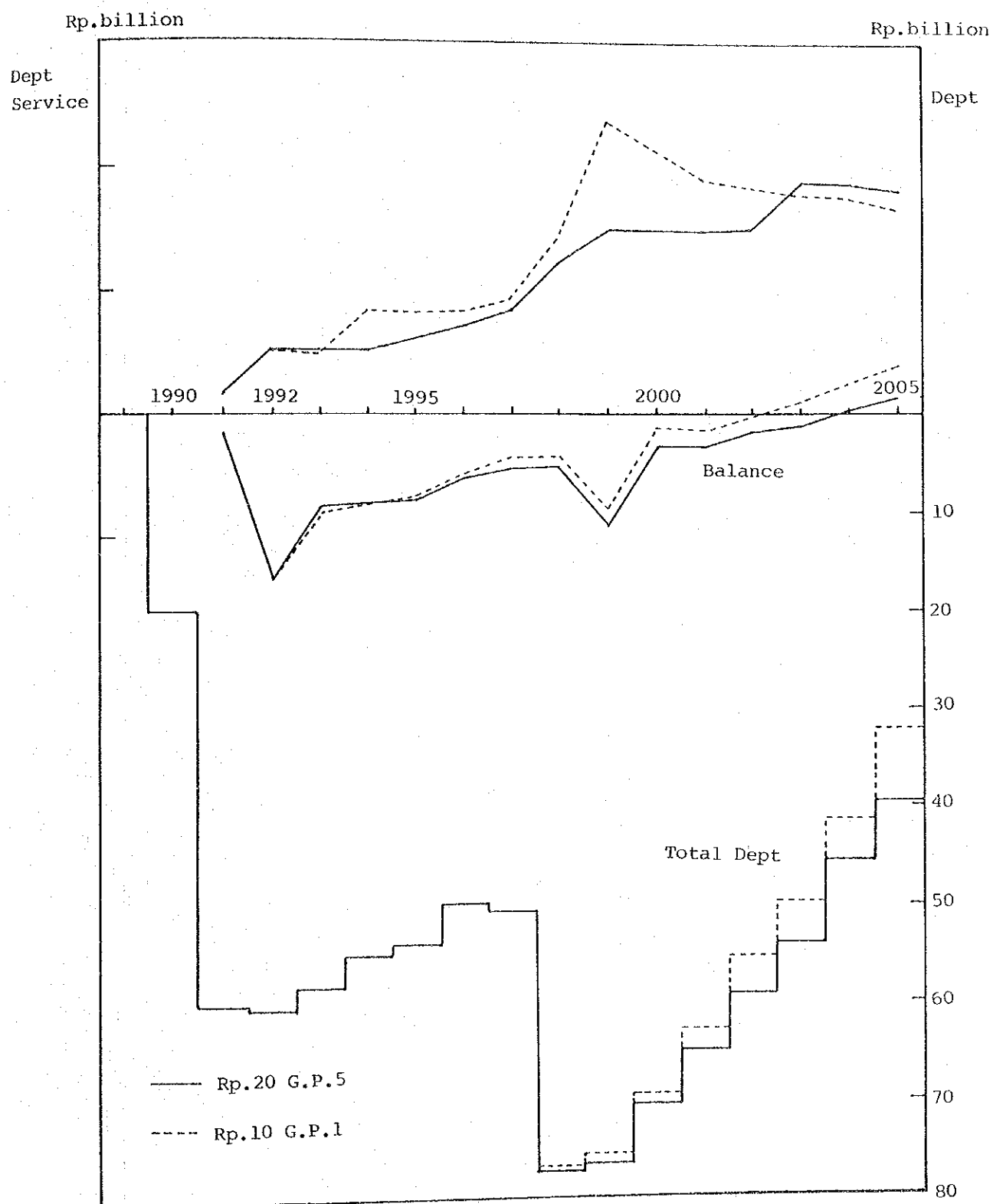


Fig 5-2-4 Alternatives of Loan Conditions (Repayment Period)

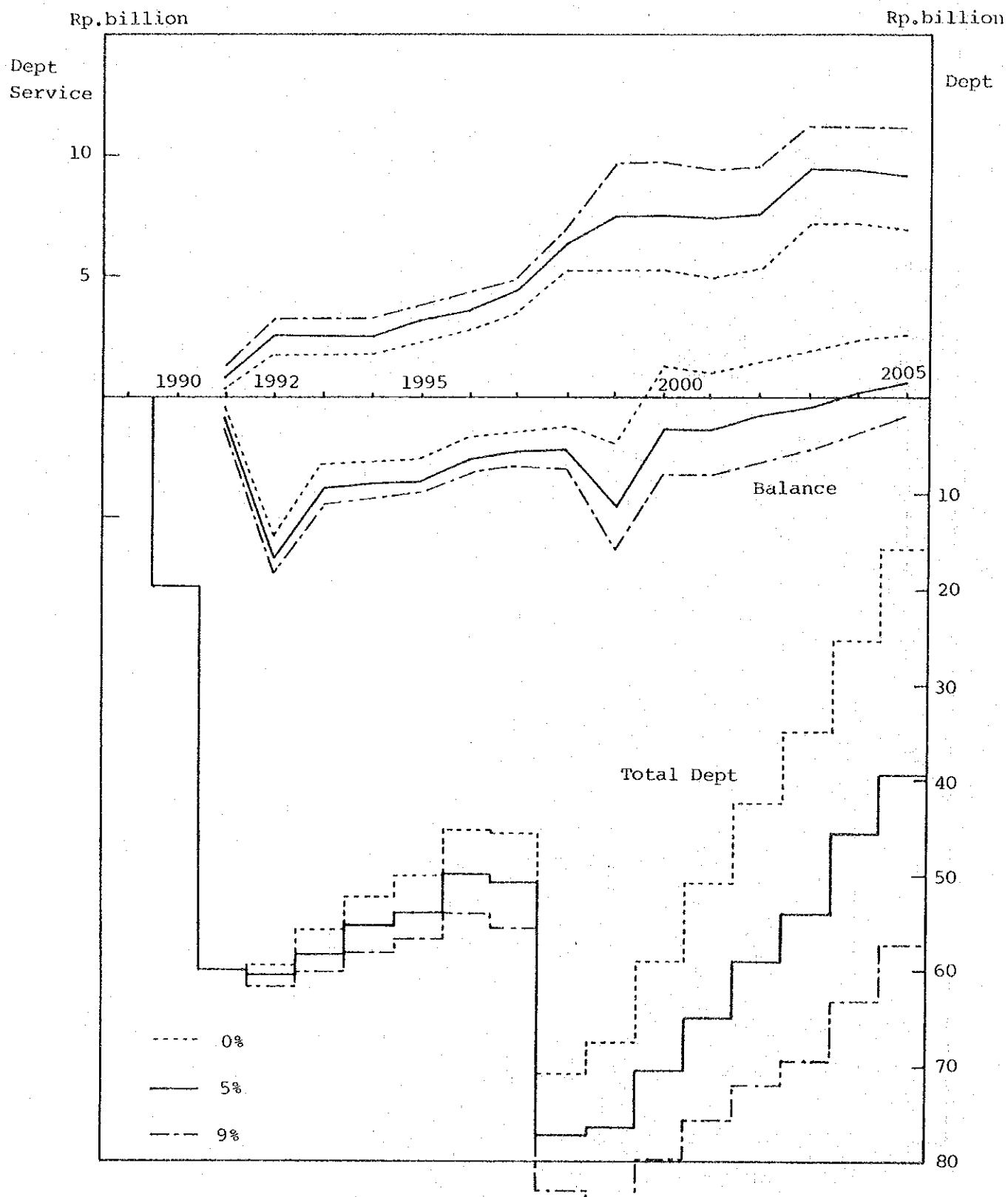


Fig 5-2-5 Alternatives of Loan Conditions (Interest)

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6) Conclusion

(1) Financial Evaluation of the Project

Based on the previous examination, it is believed that it will be possible to clearly determine the direction to establish an independent source of revenue once the surcharge on electricity bill is introduced by around 1993. This direction is outlined in Table 5-2-5 and Fig. 5-2-6. The DSR by year is given in Table 5-2-6.

Table 5-2-5 Cashflow of the Project
(Unit: Rp.billion)

	Loan		DKI	Fee Collection	Repayment & Interest (Dinas Keb.)
	Foreign	Local			
1990	11.7	8.3		-	-
1991	31.3	8.3	4.9	-	0.9
1992	-	-	2.2	5.6	2.5
1993	-	-	2.2	8.5	2.5
1994	-	-	2.2	8.7	2.5
1995	-	1.3	2.2	8.9	3.1
1996	-	0.0	1.1	11.0	3.7
1997	-	5.0	1.1	11.2	4.3
1998	-	30.4	1.1	11.5	6.2
1999	-	1.6	1.1	11.8	7.6
2000	-	-	1.1	15.1	7.6
2001	-	0.0	0.6	15.4	7.4
2002	-	-	0.6	15.8	7.6
2003	-	1.6	0.6	16.1	9.5
2004	-	-	0.6	16.5	9.4
2005	-	-	0.6	16.8	9.1

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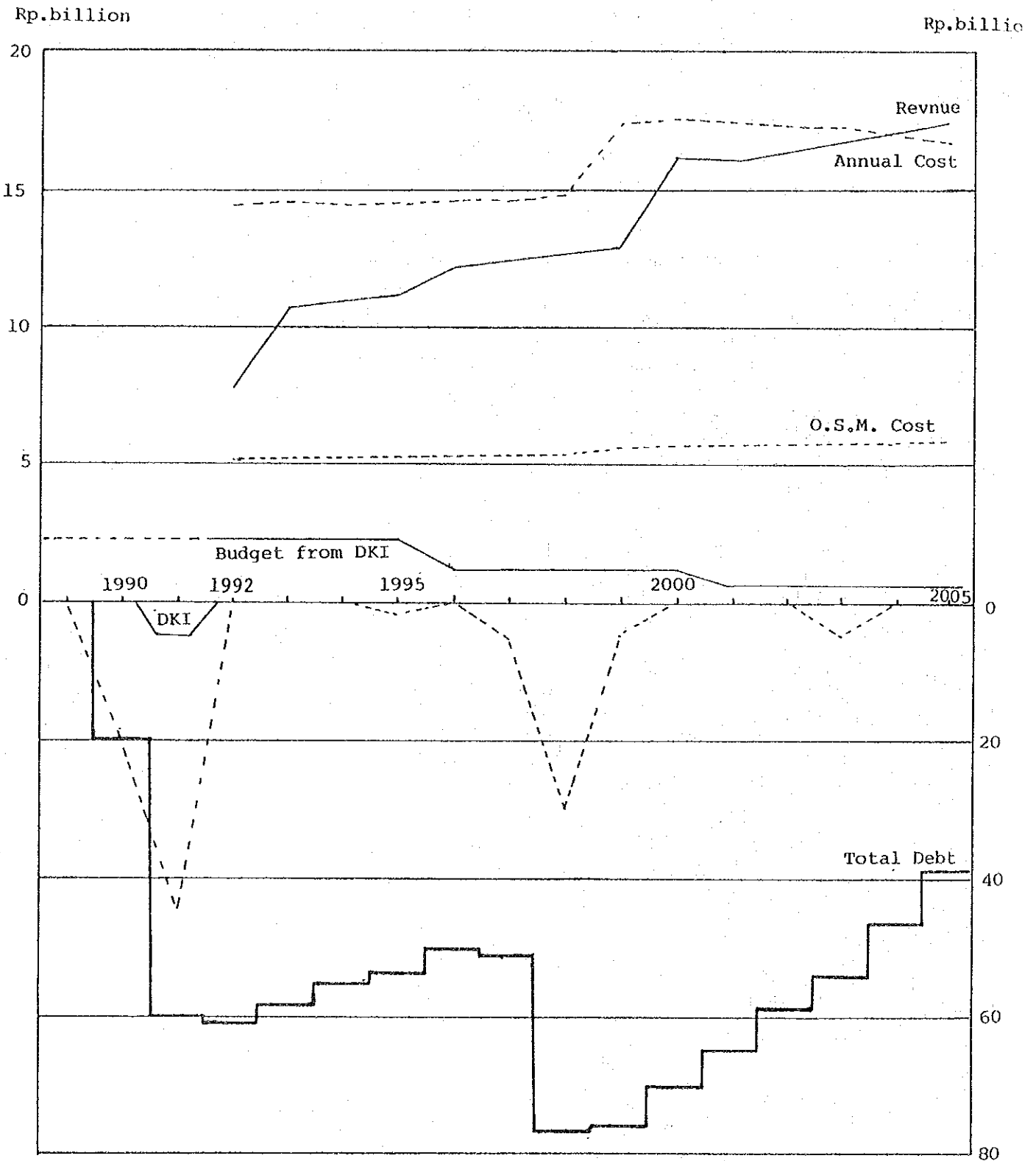


Fig. 5-2-6 Cash flow of the Project

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Table 5-2-6 Project and Debt Service Ratio

(Unit: Rp. million)

	Debt Service			Development Budget	DSR(%)
	Payment	Interest	Total		
1991	-	881	881	234,050	0.4
1992	-	2,547	2,547	245,750	1.0
1993	-	2,547	2,547	258,040	1.0
1994	-	2,547	2,547	274,940	0.9
1995	551	2,547	3,098	284,490	1.1
1996	1,103	2,583	3,686	298,710	1.2
1997	1,753	2,530	4,284	313,650	1.4
1998	3,492	2,700	6,193	329,330	1.9
1999	3,492	4,068	7,560	345,790	2.2
2000	3,577	3,997	7,573	363,080	2.1
2001	3,580	3,842	7,421	381,240	1.9
2002	3,915	3,689	7,604	400,300	1.9
2003	5,938	3,517	9,455	420,320	2.3
2004	6,045	3,324	9,369	441,330	2.1
2005	6,045	3,045	9,090	463,400	2.0

DSR for DKI Jakarta is supposed to be less than 15%. The estimated DSR however, amounts to 2.3% in 2003, implying a sixth of the permissible DSR for the development budget to be accounted for by the Project. The Project will, therefore, have an extremely important position in the development efforts of the DKI.

If a 10 year repayment period for the local loan is adopted, the DSR will increase to 3.0% in 2000. This high level of the DSR appears difficult for the Dinas Kebersihan, only a department of the DKI, to attain in view of striking a balance with other departments. However, this figure is still feasible if the transition to a public enterprise progresses. The Project's total debt in 1991 is expected to reach Rp. 60 billion and further investment will be required for additional collection equipment, equipment renewal and for extension of the final disposal site.

The Project, however, also suggests the possibility of establishing its own source of revenue by which the total debt can be reduced to Rp. 39 billion in 2005 with annual operation showing a surplus from 2004 onwards.

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In view of the sizes and DSR of solid waste disposal projects in the past, the Project appears feasible on financial grounds. However, the task of raising the Rp. 26 billion of local portion and the expected total debt of Rp. 39 billion in 2005 certainly impose a heavy burden on the Indonesian Government or the DKI. These figures should be reduced as much as possible by reducing the investment size, including a reduction in the construction cost, by means of the rational procurement of materials and equipment.

(2) Impact of Project Implementation on Solid Waste Management in Jakarta

The annual budgetary amount to be directly borne by the DKI vis-a-vis the Project is expected to be as follows.

Table 5-2-7 Budget of DKI for the Project

(Unit: Rp billion)

	Development Budget	Current Budget	Total
1989	1.5	(2.2)	1.5
90	-	(2.2)	-
91	4.9	(2.2)	4.9
2		2.2	2.2
3		2.2	2.2
4		2.2	2.2
5		2.2	2.2
6		1.1	1.1
7		1.1	1.1
8		1.1	1.1
9		1.1	1.1
2000		1.1	1.1
1		0.6	0.6
2		0.6	0.6
3		0.6	0.6
4		0.6	0.6
2005		0.6	0.6
Total	6.4	17.3	23.7

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If the expenditure for solid waste management in the budget is expected to continue at a similar level to the present, the Project will not constitute a significant burden which will hinder investment in other areas, except in 1991 when a large portion of the development budget used for the purchase of collection vehicles and for other purposes will be allocated to Jakarta Pusat. The amount usually allocated to Jakarta Pusat will, however, be available for the development efforts of other Wilayah in the same year. In this context, the Project will be significant in terms of effective government spending.

(3) Conclusion

It is concluded that the Project is feasible from the viewpoint of financial aspect as the foregoing examination results suggest.

5.2.4 Environmental and Social Impacts

1) Environmental Impact

- (1) The environmental impact of solid waste collection differs from that of solid waste disposal.
- (2) The increased number of collection vehicles and container are environmental impact factors deriving from improvement of a solid waste collection system. Although there is a problem of bad odor at near any containers, resulting in protests from the residents living nearby, it is still preferable to widespread bad odor resulting from inadequate collection. This inconvenience which is currently felt by most residents can be mitigated by the introduction of regular collections. The improvement of the collection system will be very effective in preventing a worsening of public sanitation caused by solid waste being left unattended for a long time and, therefore, will contribute to the improvement of the environment.

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As large containers are placed in the depot surrounded by a wall, their adverse effects on residents are considered small and limited.

- (3) To some extent, solid waste disposal affects the environment around the related facility due to the very existence of the facility and the concentration of a large amount of solid waste.
- (4) The introduction of the Bekasi landfill disposal site will reduce the number of open dumping sites which are scattered in Jakarta Pusat and, therefore, will prevent the aggravation of the environment of those people living near the latter. Although the size of the disposal site will be much larger than the existing open dumping sites, its impact on the environment will be minimized on the whole by the application of covering soil and the collection and treatment of leachate.
- (5) The Bekasi disposal site is expected to have the following impact on the environment.
 - a. It is unlikely that significant damage to the environment will be caused by the site because the number of vehicles arriving at the site will be limited to some 200 due to the introduction of large semi-trailers and the construction of a special access road. The residents of the area will rather benefit from the convenience afforded by the improved roads nearby.

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- b. The spread of bad odor and/or waste and the propagation of harmful insects can be reduced by the use of covering soil. In addition, a system to carry out odor prevention and/or disinfection work will be provided where deemed necessary.
 - c. The leachate will be collected and discharged after treatment. The treated water quality in terms of the BOD will be 120 ppm and it is discharged to the river with the flow volume of some 17,000 m³/day. The treated water will, therefore be diluted 20 times and it is estimated that the resulting BOD will be less than 10 ppm. However, as the river water is used for agriculture, a minor effect on crops may occur due to the nitrogen content.
 - d. The contamination of groundwater by the leachate will be prevented as much as possible by the introduction of an earth liner beneath the disposal site and by the discharging system of leachate.
 - e. As the Project itself will be implemented under some financial constraints, the efforts to minimise the impact on the environment will not escape financial limitations. Nevertheless, all the relevant facilities have been designed so that their functions minimise the adverse impact on the environment and will be reinforced by additional facilities or other means whenever the present constraints are lifted in the future.
- (6) The construction of the transfer station at Sunter will play a important role in solid waste management together with the Bekasi disposal site and will contribute to environmental improvement by preventing illegal dumping in Jakarta Pusat and by other means.

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(7) The transfer station is expected to have the following impact on the surrounding environment.

- a. As the total number of incoming and outgoing collection vehicles will only be some 12% of the current traffic volume, traffic near the station will not be seriously affected.
- b. The area which will be possibly affected by bad odour or dust will be small due to the closed storage.
- c. As the waste water will be discharged only after treatment and as the discharge volume will not be large, it is unlikely that Sunter Lake will be affected.

(8) Based on the above-described evaluation results, it is believed that the Project will contribute to the improvement of solid waste management in Jakarta Pusat and also to the improvement of the living environment through the application of a better solid waste collection system. It is unlikely that the environment around either the transfer station or the final disposal site will be seriously affected by the Project.

2) Social Impact

The following items are of importance in terms of the social impact of the Project.

- a. Effect on scavengers and handcart workers
- b. Effect on fee collection of RT/RW
- c. Work conditions

(1) Effect on Scavengers and Handcart Workers

Although scavengers and handcart workers currently play an important role in Jakarta's solid waste management, their number shows a declining trend in the long-term perspective.

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The improvement of the collection system envisaged in the Project will lead to a decrease of the number of these people. However, consideration has been given to securing their employment by actively adopting the depot-container system which will utilise handcarts.

As far as scavengers are concerned, their scope of activity will be narrowed due to the construction of the transfer station and the implementation of sanitary landfill under the Project. However, since a long period of time will be required for the completion of all transfer stations and the full-scale introduction of a landfill disposal system to cover all Jakarta, the Project will not drastically reduce their places of work over a short period.

(2) Effect of Fee Collection on RT/RW

RT/RW currently collect a solid waste collection fee from each household and employ guardmen and handcart workers to secure the safety and living environment of their communities. Although fee collection by means of a surcharge on the electricity bill and the improved collection system will affect the scope of RT/RW activities, a large area will still remain for their mutual self-help efforts with the maintenance of security at the core. The Project will not, therefore, seriously affect the organization of RT/RW.

(3) Work Conditions

In order for regular collections and for the transfer station and the sanitary landfill operation to smoothly function, an orderly labour situation will be required to maximise the facility utilisation. As one of the new work conditions will be 8 hours of work on weekdays, the present system where basically only half a day is worked on Fridays would be changed. A supplementary workforce is, however, accounted for in the Project to deal with this requirement. With the

preparation of a management plan which takes this supplementary workforce into consideration, work conditions suited to the local requirements can be established.

5.2.5 Comprehensive Evaluation

The foregoing evaluation results are summarised as follows.

- a. The financial effect by the improved collection system is estimated to be 990 Rp. per ton of solid waste, in addition to the improvement of public sanitation and the environment in Jakarta Pusat. While the introduction of the Bekasi final disposal site will increase the financial burden, it will make restrictions on the small disposal sites scattered in Jakarta Pusat possible, contributing to the improvement of the environment. The site will also assist in the establishment of an appropriate final disposal technique for Jakarta's solid waste management and the transfer of the relevant technology to other cities will be possible. The construction of the transfer station is considered to be a highly profitable project with an EIRR of 6.3% compared to other BHN-type projects. This profitability is mainly the result of a reduction in the transport cost. The station will also contribute to an environmental improvement in Jakarta Pusat by establishing regular collections, etc.
- b. The results of the financial evaluation suggest that the total debt in 2005 will be reduced to 39 Rp. billion and an operation surplus will be generated in 2003 onwards with additional investment for equipment renewal and the expansion of the final disposal site being implemented throughout the period upto 2005. Therefore, the Project is considered to be also feasible on financial grounds.

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- c. With regard to the social and environmental aspects, the areas around the transfer station and the final disposal site will be affected. However, the Project envisages the introduction of environmental measures to mitigate the possible adverse impact. The Project's contribution to environmental improvement in Jakarta Pusat should be duly evaluated. Although the scope of activity of scavengers and handcart workers will be narrowed with the implementation of the Project, the anticipated changes will not be large or fast enough to cause serious friction.

In conclusion, the Project is considered to be feasible on economic, financial, environmental and social grounds.

CHAPTER 6 IMPLEMENTATION PLAN



CHAPTER 6 IMPLEMENTATION PLAN

6.1 Work Programme

1) Basic Policy

As all the components of the Project are considered to be feasible, as described in Chapter 5, the implementation programme has now been prepared. The basic policy for the preparation of the implementation programme is as follows.

- a. Design Target Year : 1995
- b. Commencement of Operation : 1992
- c. Subject Area : Pusat, Jakarta
- d. Main Facilities : Sunter Transfer Station
and Equipment : Bekasi Final Disposal Site
: Sub-Workshop (Sunter)
: Depots
: Collection Vehicles

2) Preparation Method

The preparation period between the completion of the feasibility study and the commencement of the construction work will be 2 years, during which the following must be completed.

- Budgetary authorisation of the local portion of the project cost.
- Fund raising of the foreign portion of the project cost and preparation of the repayment programme.
- Acquisition of the necessary sites (depots, transfer station, sub-workshop and final disposal site).
- Selection of contractor(s) (tender, evaluation and contract).

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3) Work Schedule

The necessary work related to the Project is largely divided into the procurement of materials and equipment and the construction of the facilities. The period required for each work is as follows.

- Procurement of materials and equipment: 6 months
- Transfer Station : 18 months
- Final Disposal Site : 18 months
- Sub-Workshop : 12 months

The improvement of the collection system will only be possible when the transfer station becomes operational. Approximately 1 year will be required after the transfer station starts operation for the new system to take root.

4) Execution Body for the Project

Solid waste management in Jakarta is currently under the direct control of the municipal government and, therefore, the municipal government will be the main body responsible for the Project. The Ministry of Public Works will be responsible for raising foreign funds relating to the Project.

Table 6-1-1 Work Implementation Schedule

	1987	1988	1989	1990	1991	1992	1993	1994	1995
Feasibility Study	■								
1) Fund Raising	■	■							
2) Detailed Design			■						
3) Contract				■					
4) Construction and Purchase									
1) Collection Vehicles					■				
2) Street Sweeping					■				
3) Transfer Station					■				
4) Final Disposal Site					■				
5) Sub Workshop					■				
5) Operation									
1) Collection Vehicle									
2) Street Sweeping									
3) Transfer Station									
4) Final Disposal Site									
5) Sub Workshop									

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6.2 Financial Plan

The financial plan associated with the project implementation is described below based on the financial evaluation results. Although the engineering service and contingency are excluded in the financial analysis, they are included in this financial plan.

1) Financing

The sources of finance are the DKI development budget and foreign and local loans with the following composition.

Table 6-2-1 Sources of Investment Funds (1987 Price)

(Unit: Rp billion)

	1989	1990	1991	Total*
DKI Development Budget	1.5	-	4.9	6.4
Foreign Loan	3.0	12.9	33.4	49.3
Local Loan	-	9.1	10.2	19.3
Total*	4.5	22.0	48.5	75.0

The following loan conditions should be sought assuming the transition to a public enterprise is effected around 1995.

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Table 6-2-2 Loan Condition

		Market Interest Rate	Real Interest Rate
Foreign Loan	Repayment over 25 years with a 7 year period of grace	8%	4%
Local Loan			
RDI	Repayment over 20 years with a 5 year grace period	9%	5%
BFD	Short-term loan (Repayment in the following year)	18%	12%

The sources of finance for the operation cost of the solid waste management will be the ordinary budget of the DKI and collected fees.

The surcharge on the electricity bill will commence in 1993 in view of the necessary preparation period for establishing the relevant system. The regular tipping fee on waste brought in from Bekasi will be charged in 1992 onwards. The resulting revenue composition is as shown in Table 6-2-3.

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Table 6-2-3 Composition of Revenue (1987 price)

(Unit: Rp billion)

	1992	1993	1994	1995	Total
DKI Current Budget	2.2	2.2	2.2	2.2	8.8
Fee Collection					
Basic Fee	-	2.9	3.0	3.1	9.0
Special Fee	2.7	2.8	2.8	2.9	11.2
Tipping Fee	2.9	2.9	2.9	2.9	11.6
Sub-Total	5.6	8.6	8.7	8.9	31.8
Total	7.8	10.8	10.9	11.1	40.6

2) Expenditure

The investment amount and the annual expenses are as shown in the Project Cost.

3) Money Flow and Problems

The results of the calculation based on the above conditions are given in Table 6-2-4 using 1987 prices. As the Table clearly shows, the revenue and expenditure balance will go into the black in 2005 with a total debt of RP. 53 billion where the remaining debt from the original investment is RP. 38.2 billion, consisting of RP. 26.3 billion and RP. 11.9 billion for the foreign loan and local loan respectively. Since the internal reserve in 2005 is expected to reach RP. 10.6 billion, part of the transfer station renewal cost can be paid for.

The highest DSR will be 2.4%, as shown in Table 6-2-5.

Table 6-2-4 Money Flow of the Project (1987 Constant Price)

1¥=10Rp.

Unit: Rp. million

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Total
Revenue																		
Base fee	0	0	0	0	2,888	3,007	3,124	3,921	4,104	4,289	4,471	5,794	6,025	6,256	6,485	6,717	6,947	64,029
Special fee	0	0	0	2,678	2,753	2,828	2,903	3,607	3,730	3,854	3,977	5,126	5,277	5,426	5,577	5,726	5,877	59,339
Tipping fee	0	0	0	2,905	2,897	2,892	2,884	3,434	3,408	3,381	3,356	4,161	4,128	4,096	4,062	4,030	3,997	49,631
Budget from DKI	0	0	0	2,200	2,200	2,200	2,200	1,100	1,100	1,100	1,100	1,100	600	600	600	600	600	17,300
Subtotal (A)	0	0	0	7,783	10,733	10,927	11,111	12,062	12,342	12,624	12,904	16,181	16,030	16,378	16,724	17,073	17,421	190,299
Expense																		
Depreciation (B)	0	0	0	6,330	6,330	6,330	6,330	6,330	6,330	6,330	7,052	7,052	7,052	7,052	7,052	7,052	7,052	93,674
Personnel	0	0	0	1,673	1,673	1,673	1,673	1,673	1,673	1,673	1,945	1,945	1,945	1,945	1,945	1,945	1,945	25,326
Maintenance	0	0	0	1,514	1,514	1,514	1,514	1,514	1,514	1,514	1,634	1,634	1,634	1,634	1,634	1,634	1,634	22,036
Fuel & Others	0	0	0	1,954	1,969	1,985	1,999	2,025	2,050	2,075	2,100	2,125	2,150	2,175	2,200	2,225	2,250	29,282
Interest	0	120	1,111	3,159	3,303	2,969	2,938	2,971	2,902	3,054	4,397	4,303	4,125	3,949	3,754	3,537	3,236	49,828
Fee Collect	0	0	0	279	427	436	446	548	562	576	590	754	771	789	806	824	841	8,650
Subtotal (B)	0	120	1,111	14,910	15,216	14,908	14,899	15,061	15,031	15,222	17,718	17,814	17,677	17,544	17,391	17,217	16,958	228,796
Balance (A-B)	0	-120	-1,111	-7,127	-4,478	-3,981	-3,788	-2,999	-2,689	-2,597	-4,814	-1,632	-1,648	-1,166	-667	-144	463	-38,497
Resource of Investment																		
Budget from DKI	1,503	0	4,929	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6,432
Long Term Loan																		
Local (C2)	0	9,087	10,229	0	0	0	1,266	48	5,024	30,356	1,595	0	48	0	1,595	0	0	59,248
Foreign (C3)	3,010	12,875	33,409	0	0	0	0	0	0	0	0	0	0	0	0	0	0	49,294
Subtotal (C)	4,513	21,962	43,567	0	0	0	1,266	48	5,024	30,356	1,595	0	48	0	1,595	0	0	114,974
Repayment (D)	0	0	0	0	0	0	606	1,455	2,171	4,027	4,027	4,111	4,114	4,449	6,473	6,579	6,579	44,591
Remain of Loan	3,010	24,972	68,610	68,610	68,610	68,610	69,270	67,864	70,717	97,046	94,614	90,503	86,437	81,988	77,110	70,530	63,951	
Money Demand (E)	4,513	22,082	49,678	8,580	8,886	8,578	10,441	10,234	15,896	43,275	16,288	14,873	14,788	14,942	18,407	16,744	16,485	
Short Term Loan																		
(F)	0	120	1,111	797	-1,852	-2,349	-1,936	-1,877	-1,470	294	1,789	-1,309	-1,290	-1,436	88	-329	-936	-10,586
Total of Debt	3,010	25,092	69,841	70,638	68,785	66,436	65,160	61,877	63,260	89,883	89,240	83,821	78,464	72,579	67,788	60,880	53,365	
Reserve Fund																		
(G1)																		
(G2)																		

Table 6-2-5 Debt Service Ratio of the Project

Unit: Rp. million					
	Debt Service			Development	DSR(%)
	Repayment	Interest	Total	Budget	
1991	-	969	969	234,050	0.4
1992	-	2,817	2,817	245,750	1.1
1993	-	2,817	2,817	258,040	1.1
1994	-	2,817	2,817	274,940	1.0
1995	606	2,817	3,423	284,490	1.2
1996	1,455	2,850	4,305	298,710	1.4
1997	2,170	2,781	4,952	313,650	1.6
1998	4,026	2,933	6,959	329,330	2.1
1999	4,026	4,277	8,303	345,790	2.4
2000	4,111	4,183	8,293	363,080	2.3
2001	4,114	4,005	8,118	381,240	2.1
2002	4,449	3,829	8,277	400,300	2.1
2003	6,473	3,634	10,106	420,320	2.4
2004	6,579	3,417	9,996	441,330	2.3
2005	6,579	3,116	9,694	463,400	2.1

In addition, the collection fee should be increased by at least 50% from the level suggested in the Master Plan if inflation is considered. The expected fee increases in 1996 and 2000 should also take inflation into account.

The ordinary budget appropriation of the DKI should be accordingly increased to reflect the inflation rate. Table 6-2-6 shows the money flow incorporating contingencies and inflation, etc. for reference purposes.

Table 6-2-6 Money Flow of the Project (Current Price)

Inflation rate = 6%

UNIT : Rp. million

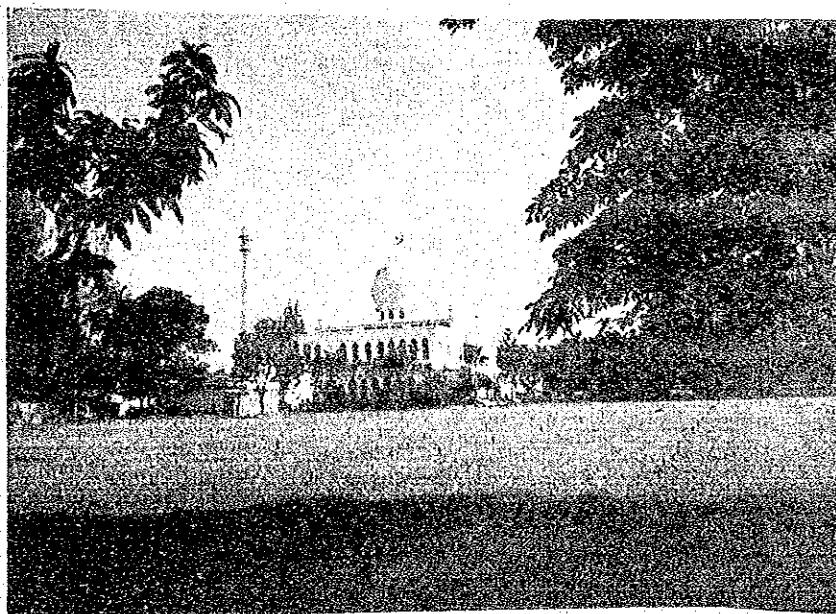
IX=10Rp.

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Total
Revenue																		
Base fee	0	0	0	0	4621	4811	4998	7921	8290	8664	9032	14776	15363	15354	16538	17129	17716	145813
Special fee	0	0	0	4285	4405	4525	4645	7286	7534	7786	8034	13072	13458	13837	14222	14602	14987	132678
Tipping fee	0	0	0	4648	4835	4927	4614	8242	8179	8115	8054	16645	16512	16384	16248	16120	15989	149012
Budget from DKI	0	0	0	2944	3121	3308	3506	1858	1969	2088	2213	2346	1357	1438	1525	1616	1713	31002
Subtotal (A)	0	0	0	11877	16782	17271	17763	25307	25972	26653	27333	48839	46690	47613	48533	49467	50405	458505
Expense																		
Depreciat- ion (B1)	0	0	0	8260	8260	8260	8260	8448	8454	8454	14688	14986	14986	14991	14991	15202	15202	163442
Personel	0	0	0	2238	2272	2315	2655	2825	2995	3175	3913	4148	4397	4660	4940	5235	5551	51630
Maintenance	0	0	0	2026	2148	2276	2413	2558	2711	2874	3046	3485	3694	3916	4151	4400	4654	44362
Fuel	0	0	0	2614	2407	2385	3186	3420	3672	3938	4225	4479	4861	5213	5588	5992	6422	59002
& Others	0	270	2521	7077	7531	7236	6955	6872	6558	7158	11957	11860	11461	11072	10619	10185	9367	128700
Fee Collect	0	0	0	447	583	598	713	1172	1200	1228	1256	2225	2267	2309	2350	2393	2435	21375
Subtotal (B)	0	270	2521	23662	23402	23970	24192	25296	25591	26827	39085	41182	41666	42161	42640	43408	43641	468511
Balance(A-B)	0	-270	-2521	-10785	-6619	-6699	-6429	11	382	-174	-11752	5657	5024	5452	5894	6059	5764	-10006
Resource of																		
Investment																		
Budget from	1689	0	5870	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7559
DKI (C1)																		
Long Term																		
Loan																		
Local (C2)	0	10823	10229	0	0	0	2018	81	8998	57616	3209	0	109	0	4051	0	0	97134
Foreign	3384	15334	39790	0	0	0	0	0	0	0	0	0	0	0	0	0	0	58508
(C3)																		
Subtotal	5073	26157	55889	0	0	0	2018	81	8998	57616	3209	0	109	0	4051	0	0	163201
(C)																		
Repayment	0	0	0	0	0	0	722	1591	2443	4553	4653	4788	4793	5393	9234	9448	9448	57169
(D)																		
Remain of	3384	29541	79560	79560	79560	79560	80857	79346	85901	138863	137419	132631	127946	122553	117370	107921	98473	
Loan																		
Money Demand	5073	26427	58410	14402	15142	15710	18672	18520	28578	80643	32259	30984	31582	32563	40934	37654	37887	
(E)																		
Short Term	0	270	2521	2525	-1641	-1561	-1109	-6868	-6392	-3626	1717	-15855	-15217	-15050	-11650	-11813	-12518	-96267
Loan (F)																		
Total of	3384	29811	82351	84875	83235	81674	81861	73483	73645	122981	123254	102612	82710	62267	45433	24172	2206	
Debt (G1)																		
Reserve																		
Fund (G2)																		

Comment
E=(B-B1)+C+D
F=E-C-A

Foreign Loan Interest = 8. % Repayment Period = 25 Grace Period = 7
Local Loan Interest = 9 % Repayment Period = 20 Grace Period = 5

CHAPTER 7 RECOMMENDATION



CHAPTER 7 RECOMMENDATION

7.1 Recommendation for Implementation of the Project

1) Establishment of the Project Team

Establishment of the Project Team consisting of Cipta Karya and DKI Jakarta is indispensable in order for the Project plan to proceed smoothly.

The Project Team has to be allowed to conduct and order in line with the project proceeding, and its staff should be proficient in managerial and technical aspects because they will be responsible for the administration in relation to the future sanitation and environment in Indonesia.

a. Preparation of regulations for solid waste management

- To introduce a licensing system for private collection and disposal operators.
- To regulate the responsibility of solid waste disposal by its character in accordance with the Conceptual Master Plan.
- To revise the regulations and laws in relation to waste discharge and the fee system and put them into full scale effect implementation.

Those regulations are to be executed first in Jakarta Pusat and then extended to other Wilayahs step by step.

b. Arrangement of fee collection system

- To arrange the regulation and data for door-to-door service and large amount dischargers in order to introduce new fee collection system.

PART III

- To reinforce the present fee collection system, while the new system of collecting fees is being implemented.

c. Reinforcement of management, planning capability

It is recommended to prepare a management system capable of processing and analyzing the basic data necessary for solid waste management by reinforcing the existing management and planning capacity of the Dinas Kebersihan and Suku Dinas Kebersihan of Jakarta Pusat.

The following data and information are necessary for management and planning

- Amount of solid waste of entire treatment and disposal, and its composition
- Amount of solid waste by area and by large amount discharger
- Population and number of households by RW which receive solid waste collection service
- Number and location of large amount dischargers
- Operation record of vehicles
- Amount of fees collected for solid waste services
- Total length of street sweeping

d. Arrangement of equipments before the commencement of the Project

In Jakarta Pusat, even before starting the Project, some new equipments will be required, e.g. increasing and renewing the collection vehicles.

The arrangement of this new equipments should be done in accordance with the project's requirements.

e. Public campaign for project execution

It is recommended to campaign policy in order to obtain the understanding and corporation of citizens and business

PART III

establishments in implementing the Project.

2) Securing of the Project sites

It is recommended that the following sites for the project be secured in the earlier period of the project schedule.

- Sunter transfer station site: in order to prepare this site, sanitary landfill should be completed at the Sunter site as soon as possible.
- Sites for Depots and Sub-workshop
- Entire site for Bekasi final disposal site including access road

3) Securing funds

It is necessary to prepare the necessary funds for the implementation of the project.

- Introduction of foreign fund.
By raising the priority of this Project among other projects in Indonesia, start preparing the introduction of foreign aid loans for this Project.
- Securing domestic funds
Considering the optimum combination between various domestic loans available to this Project and the development budget of DKI Jakarta, prepare the domestic funds for the Project.

4) Arrangement of staff and workers

It is necessary to arrange sufficient staff and workers for the new transfer station, disposal site and sub-workshop. Also it is required to arrange the planning and supervising staff in the Suku Dinas Kebersihan. In particular, technical staff and upper and middle management staff are essential. It is recommended to make efforts to educate the necessary staff through training and

other proper means.

As technology advances in future, it is recommended to introduce technical aids from abroad.

7.2 Other Recommendations

1) Preparation for reinforcing the fee collection system

In order to collect the waste management fees through the fee collection system of P.L.N., it is necessary to prepare for managing a great amount of data and information. Accordingly, it is recommended to prepare another project dealing with these matters.

2) Securing sites in the other Wilayahs

Considering the future development of Phase I-B, II and III, necessary lands (e.g. sanitary landfill sites) should be secured beforehand.

3) Reinforcement of the organization

Through reallocation of staff experienced with the Project in Jakarta Pusat to other Wilayahs, where similar projects are to be executed, effective reinforcement of the organization in Suku Dinas Kebersihan is recommended.

4) Reinforcement of cleansing service management in the other Wilayahs

While this Project in Jakarta Pusat is going on, the cleansing service requirement in other Wilayahs will increase as they physically develop. In order to cope with this situation, cleansing service management in the other four Wilayahs should be reinforced.

ATTACHMENT 1

SCOPE OF WORK
FOR
THE STUDY
ON
THE SOLID WASTE MANAGEMENT SYSTEM IMPROVEMENT PROJECT
IN
JAKARTA CITY
OF
THE REPUBLIC OF INDONESIA

SCOPE OF WORK
FOR
THE STUDY
ON
THE SOLID WASTE MANAGEMENT SYSTEM IMPROVEMENT PROJECT
IN
JAKARTA CITY
OF
THE REPUBLIC OF INDONESIA

AGREED UPON BETWEEN
MINISTRY OF PUBLIC WORKS
AND
JAPAN INTERNATIONAL COOPERATION AGENCY

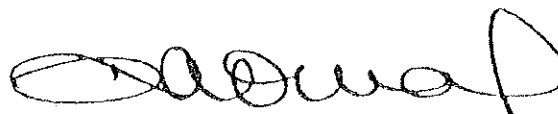
IN JAKARTA, 26 SEPTEMBER 1985

For Japan International
Cooperation Agency (JICA)

For Directorate General of
Human Settlements, Ministry
of Public Works



Dr. KUNITOSHI SAKURAI
TEAM LEADER
JICA PRELIMINARY SURVEY
TEAM



Ir. RADINAL MOOCHTAR
ACTING DIRECTOR GENERAL OF
DIRECTORATE GENERAL OF HUMAN
SETTLEMENTS

B. 42/85

SCOPE OF WORK
FOR
THE STUDY
ON
THE SOLID WASTE MANAGEMENT SYSTEM IMPROVEMENT PROJECT
IN
JAKARTA CITY
OF
THE REPUBLIC OF INDONESIA

I. INTRODUCTION

In response to the request of the Government of the Republic of Indonesia (hereinafter referred to as "Indonesia"), the Government of Japan has decided to conduct a study on Solid Waste Management System Improvement Project in Jakarta City in the Republic of Indonesia (hereinafter referred to as "the Study" in accordance with the laws and regulations in force in Japan.

Accordingly, the Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of the technical cooperation programmes of the Government of Japan, will undertake the Study in close cooperation with the authorities concerned of Indonesia, in particular with Ministry of Public Works, Directorate General of Human Settlement (hereinafter referred to as "CIPTA KARYA").

The present document sets forth the Scope of Work with regard to the above mentioned Study.

II. OBJECTIVE OF THE STUDY

The general objective of the Study is to contribute to the improvement of the Solid Waste Management System of Jakarta city, the capital of Indonesia.

The specific objectives of the Study are to design and visualize the future rational Solid Waste Management System in Jakarta city, from the view point of technical, economic and social feasibility, formulating a conceptual master plan, and carrying out a feasibility study for the first priority project selected from the results of the master plan Study.

III. SCOPE OF THE STUDY

1. Study Area

Jakarta city area.

2. Contents of the Study

The Study will be composed of 4 phases, each of which will be conducted with field surveys in Indonesia and analysis works in both Indonesia and Japan.

(1) Phase I Study: Analysis of present status

1) Collection of existing data and documents

a. city development plan

- b. waste composition (physical and chemical)
- c. waste generation
- d. collection, transportation and disposal method
- e. resource recovery
- f. charge system and financial condition
- g. administration and socio-economic condition
- h. legislation (national and local)
- i. existing plan
- j. others.

2) Reconnaissance of Study Area.

3) Analysis of present status, identification of service deficiencies and review of existing plans.

4) Preevaluation of basic criteria for the design of the future solid waste management system

a. confirmation of the planning framework

- future population

- socio-economic trends based on city planning

b. preliminary analysis of future treatment and disposal methods.

5) Preparation of the Pilot Study for new collection system and of Basic field survey of Solid Waste generation and composition.

a. site selection

- b. study schedule
- c. methodology
- d. working allotment.

(2) Phase II Study: Pilot Study for collection system and
Basic Field Survey of solid waste generation
and composition

- 1) Implementation and evaluation of the Pilot Study
(dry and wet season)
- 2) Implementation and evaluation of the Basic Field Survey
of solid waste, generation and composition (dry and wet
season)
- 3) Identification of final disposal sites.

(3) Phase III Study: Master Plan Study

- 1) Determination of basic criteria for the design of the
future solid waste management system
 - a. target year
 - b. planning area
 - c. waste generation and composition
 - d. service demand and supply capacity
 - e. analysis of future treatment and disposal methods.
- 2) Conceptual plan of the future solid waste management
system - Determination of system components

- a. primary collection
 - b. street sweeping
 - c. primary transfer
 - d. secondary collection and transfer
 - e. transportation
 - f. final disposal
 - g. maintenance of equipment
- 3) Financial, institutional and social consideration.
 - 4) Implementation schedule.
 - 5) Identification of first priority project.

(4) Phase IV Study: Feasibility Study on the First Priority project

- 1) Identification of planning criteria
 - a. target year
 - b. planning area
 - c. service demand
 - d. system components.
- 2) Examination of the least cost combination of system components.
- 3) Preliminary design of facilities
 - a. transfer stations
 - b. disposal sites (including additional facilities).

- 4) Consideration of material and equipment.
- 5) Cost estimation.
- 6) Analysis of institution, organization and human resource development program including public education.
- 7) Project evaluation
 - a. economic evaluation
 - b. financial evaluation
 - c. social and environmental evaluation.
- 8) Project implementation
 - a. implementation schedule
 - b. disbursement schedule.

IV. STUDY SCHEDULE

The whole Study will be conducted in accordance with the attached tentative schedule.

V. REPORTS

JICA will prepare and submit the following reports in English to CIPTA KARYA in the course of the Study.

1. Inception Report, 35 copies, at the beginning of the field survey of Phase I Study.
2. Progress Report (I), 35 copies, at the end of the field survey of Phase I Study.

3. Interim Report (I), 35 copies, within four (4) months after completion of the field survey of Phase I Study. CIPTA KARYA will provide JICA with their comments within one (1) month after receipt of the Interim Report (I).
4. Progress Report (II), 35 copies, at the end of the field survey in the dry season of Phase II Study.
5. Interim Report (II), 35 copies, within three (3) months after completion of the field survey in the dry season of Phase II Study. CIPTA KARYA will provide JICA with their comments within one (1) month after receipt of the Interim Report (II).
6. Progress Report (III), 35 copies, at the end of the field survey of Phase IV Study.
7. Draft Final Report, 35 copies, within four (4) months after completion of the field survey of Phase IV Study. CIPTA KARYA will provide JICA with their comments within one (1) month after receipt of the Draft Final Report.
8. Final Report, 50 copies, within two (2) months after receipt of comments on the Draft Final Report.

VI. UNDERTAKING OF THE GOVERNMENT OF INDONESIA

The Government of Indonesia shall accord privileges, immunities and other benefits to the JICA Study team, through

the authorities concerned, and take necessary measures to facilitate the smooth implementation of the Study.

1. To facilitate smooth conduct of the Study, CIPTA KARYA shall make necessary arrangements with the cooperation of other relevant organizations for the following:-

- (1) to secure the safety of the JICA Study team;
- (2) to permit the members of the JICA Study team to enter, leave and sojourn in Indonesia for the duration of their assignment therein, and exempt them from alien registration requirements and consular fees;
- (3) to exempt the members of the JICA Study team, from taxes, duties and any other charges on equipment, machinery and other materials brought into Indonesia for the conduct of the Study;
- (4) to exempt the members of the JICA Study team from income tax and charges of any kind imposed on or in connection with any emoluments or allowances paid to the members of the JICA Study team for their services in connection with the implementation of the Study;
- (5) to provide the necessary facilities to the Japanese Study team for the remittances as well as utilization of funds introduced into Indonesia from Japan in connection with the implementation of the Study;

- (6) to secure permission for entry into private properties or restricted area for the conduct of the Study;
 - (7) to secure permission for the JICA Study team to take all data and documents (including photographs) related to the Study out of Indonesia to Japan; and
 - (8) to provide medical services as needed, of which expenses will be chargeable to the members of the JICA Study team.
2. The Government of Indonesia shall bear claims, if any arise, against the members of the JICA Study team resulting from occurrences 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 willful misconduct on the part of the members of the JICA Study team.
3. CIPTA KARYA shall act as the counterpart agency to the JICA Study team and also as the coordinating body in relation to the other governmental and non-governmental organizations concerned for the smooth implementation of the Study.
4. CIPTA KARYA shall, at its own expense, and in cooperation with other agencies concerned, if necessary, provide the JICA Study team with the following:

- (1) available data and information related to the Study;
- (2) counterpart personnel;
- (3) non-technical support personnel;
- (4) suitable office space with necessary equipment in Jakarta; and
- (5) credentials of identification cards.

VI. UNDERTAKING OF JICA

For the implementation of the Study, JICA shall take the following measures:

1. to dispatch, at its own expense, Japanese Study Team to Indonesia; and
2. to pursue technology transfer to the Indonesian counterpart personnel in the course of the Study.

VII. OTHERS

JICA and CIPTA KARYA will consult with each other in respect of any matter that may arise from or in connection with the Study.

TENTATIVE SCHEDULE

APPENDIX

Work No. Items	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Preparation of Study																							
Phase I Study																							
Phase II Study																							
Phase III Study																							
Phase IV Study																							
Presentation of Final Report																							

Field Survey or Exp. of Reports : Reports

House Work

ATTACHMENT 2

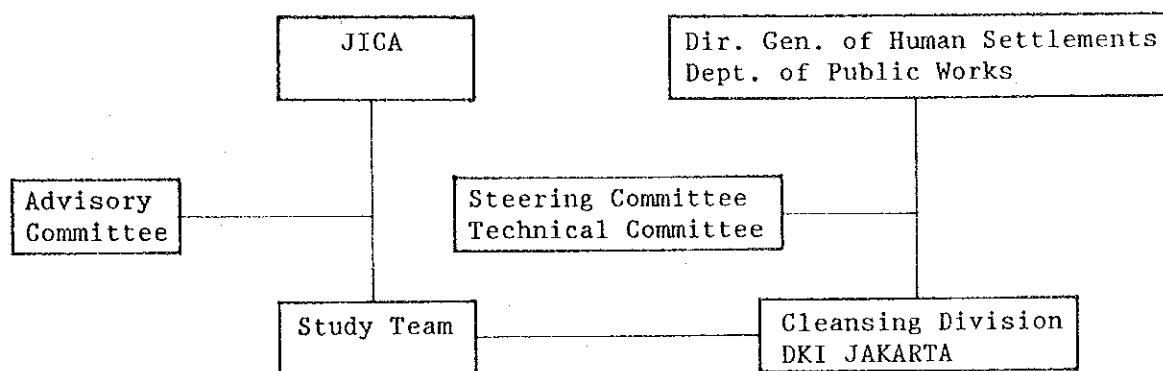
STUDY ORGANIZATION

Study Organization

The Study for this project should be carried out by the Japan International Cooperation Agency (JICA) through an Advisory Committee and a Study Team organized by JICA.

A Steering Committee and a Technical Committee for this project should be organized on the Indonesian side.

Organization Chart



1) Members of Advisory Committee

Dr. Sachiho Naito (Chairman)	: Professor, Kanto Gakuin University
Dr. Kunitoshi Sakurai (member)	: Environmental Health Development Specialist, Institute for International Cooperation (JICA)
Mr. Masaaki Kinoshita (member)	: Waste Management Div., Water Supply and Environmental Sanitation Dept., Environmental Health Bureau, Ministry of Health and Welfare
Mr. Fujio Shinmura (member)	: Solid Waste Resources Development Div., Bureau of Environment, Yokohama City
Mr. Junji Ishizuka (Study Coordinator)	: Social Development Cooperation Dept., JICA

2) Members of Study Team

Mr. Koomi Noda	: Project Manager
Mr. Masato Ono	: Collection & Haulage Plan
Mr. Shunsuke Aoyama	: Treatment Plan (General Plan)
Mr. Kango Mito	: Disposal Plan (Vice Project Manager)
Mr. Koki Fujii	: City Planning
Mr. Hiroshi Abe	: Facility Planning/Solid Waste Analysis
Mr. Toshiro Hamada	: Institutional Analysis
Mr. Hisashi Ogawa	: Environment & Health Assessment (Socio-Educational Plan)
Mr. Kozo Baba	: Economic & Financial Analysis
Mr. Tsuneji Sasaki	: Collection Experiment
Mr. Naoyuki Minami	: Collection Experiment
Mr. Toru Naito	: Basic Field Survey
Mr. Hideyasu Shibayama	: Maintenance Survey

3) Steering Committee

Ir. Soenarjono Danoedjo	: Direktur Jenderal Cipta Karya
Ir. Mardjono Notodihardjo	: Kepala Biro Perencanaan, Dep. P.U.
Ir. Hendropranoto Suselo	: Direktur Bina Program Dit. Jen. Cipta Karya
Ir. Martsanto D.S.	: Direktur Penyehatan Lingkungan Pemukiman, Dit. Jen. Cipta Karya
Drs. Soekrisno	: Kepala Biro Kerjasama Luar Negeri, Dep. Pekerjaan Umum
Drs. Sead A Basaib M.Sc.	: Karo Kesejahteraan Sosial dan Perumahan Rakyat, BAPPENAS
Drs. Bully Surjaatmadja	: Direktur Dana Luar Negeri, Dit. Jen. MLN. Dep. Keuangan

Dr. J. B. Kristiadi : Direktur Pembinaan Kekayaan Negara, Dep. Keuangan

Ir. Sugiarto Padmopcanoto: Direktur Pembinaan Pengembangan Perkotaan, Dep. Dalam Negeri

Dr. Untung : Direktur Research, Operasi dan Maintenance BPPT

Dr. A. Suriaatmadja : Pembantu Asisten Menteri KLH

Ir. Soenarjo : Direktur Bina Program, Dit. Jen. Industri Kimia Dasar Departemen Perindustrian

Ir. G. Pandjaitan : BKLH

Ir. Herbowo : Ketua Bappeda DKI Jakarta Raya

Ir. Soedjarwoko : Kawanwil. PU DKI Jakarta Raya

H. A. Djaelani : Kepala Dinas Kebersihan DKI Jakarta Raya

4) Technical Committee

Ir. Hendropranoto Suselo : Direktur Bina Program Dit. Jen. Cipta Karya

Ir. Martsanto D.S. : Direktur Penyehatan Lingkungan Pemukiman, Dit. Jen. Cipta Karya

Ir. Rochjat Dulia Sudjatma: Ka. Sub Dit. P.E.P. Dit. Bina Program Cipta Karya

Drs. Karsono : Dit. Pembinaan Kekayaan Negara Departemen Keuangan

Ir. F. W. Adam : Staf Biro Kesejahteraan Sosial dan Perumahan, BAPPENAS

H. A. Djaelani : Kepala Dinas Kebersihan DKI Jakarta Raya

Ir. Budiman Arief : Ka. Sub Dit. Persampahan, Dit. Penyehatan Lingkungan Pemukiman

Ir. Benyamin Karyabdi : Ka. Sub Dit. Air Limbah, Dit. Penyehatan Lingkungan Pemukiman

Ir. Ali Rozi : Kepala Sub Dinas Perencanaan dan Bina Program Dinas Kebersihan DKI Jakarta Raya

Ir. Budi Hardjo : Kepala Prasarana Fisik BAPPEDA DKI Jakarta Raya

Ir. Budi Rahardjo : BKLH
 Ir. Sri Bebasari : Badan Pengkajian dan Penerapan Teknologi
 Ir. Masnelyati : Kantor Menteri Negara Kependudukan dan Lingkungan Hidup
 Ir. Parulian Sidabutar : Ka. Sub Dit. Penyusunan dan Pengendalian Program, Dit. Bina Program Cipta Karya
 Ir. Paul Adhi Natapradja : Ka. Sub Dit. Administrasi Bantuan Luar Negeri, Dit. Bina Program Cipta Karya
 Drs. Sahan Tarigan : Ka. Sub Dit. Pembinaan Lingkungan Perkotaan, Departemen Dalam Negeri
 Ir. Firdaus Muaf : Ka. Sub Dit. Bina Program Sektoral, Dit. Bina Program Direktorat Jenderal Kimia Dasar Departemen Perindustrian

ATTACHMENT 3

COST ESTIMATION

Attachment 3 PROJECT COST

The project cost required for implementation of the project is estimated under the following conditions:

- (1) The project cost is estimated on January 1987 price basis.
- (2) The price escalation rate and the physical contingency rate are assumed to be as follows:
 - Annual price escalation rate
 - 3% for foreign currency
 - 8% for local currency
 - Physical contingency rate
 - 10% for foreign and local currency excluding vehicle cost.
- (3) The exchange rate is assumed to be as follows:
$$\text{US\$1.0} = \text{¥160} = \text{RP. 1,600}$$
- (4) The construction equipment and their spare parts will be provided and maintained by the contractors.
- (5) The foreign currency portion and the local currency portion of the project cost are composed of the following cost elements:
 - a) Foreign currency portion
 - 70% for collection vehicle
 - 100% for heavy equipment
 - 100% for machines except installation cost
 - 20% for civil works
 - Remuneration and foreign direct cost of the consultant to be employed
 - Contingency cost for the above costs.

b) Local currency portion

- 30% for collection vehicle
 - 0% for heavy equipment
 - Installation cost for machinery
 - 80% for civil works
 - Labour cost
 - Management expense of the contractor and tax (PPN)
 - Local direct cost for the consultant
 - Government administration cost
 - Other local costs
 - Contingency cost for the above costs
- (6) The cost of material to be imported from abroad is estimated on the CIF price at Jakarta. The taxes on the cost shall be exempted.
- (7) The land acquisition cost and the government administration cost are estimated based on data obtained at the project site.

Cost estimation of Transfer Station

Items	quantity	Amount million Rp
1. Civil work and Building		
1) Earth work	46.000 m ³	460
2) Rampway and Reception	1 set	633
3) Transfer Building	2.100 m ²	2,541
4) Container yard	14.400 m ²	432
5) Water treatment	1 set	400
6) Other works	1 set	300
Sub total		4,765
2. Machinery		
1) Hopper and Compactor	6 unit	11,832
2) Water treatment	1 set	2,100
3) Maintenance	1 set	714
4) Other machine	1 set	230
Sub total		14,876
3. Electricic works	1 set	2,100
4. Equipment		
1) Tractor	32 unit	4,288
2) Trailor - container	63 unit	4,032
Sub total		8,320

Cost Estimation for Bekasi Disposal Site

1. Civil work and Building

1) Earth work	546.000 m ³	1,638
2) Dike for strage waste	2.840 m	1,037
3) Drainage	2.740 m	82
4) Leachate collection	9.545 m	500
6) Leachate treatment	1.980 m ²	1,584
7) Easth liner	344.000 m ²	3,990
8) Road	4.035 m	1.135
9) Administration facilities	1 set	364
Sub total		10,330

2. Machinery and electricity

1) Truck scale	1 set	80
2) Water treatment	1 set	6,000
Sub total		6,080

3. Equipment

1) Bulldozer	8 unit	1,600
2) Lanfill compactor	2 unit	480
3) Back - hoe	2 unit	290
4) Dump truck	8 unit	560
5) Others	5 unit	78
Sub total		3.008
Total		19,418

Cost Estimation for Sub Work Shop and Main Workshop

1. Civil work of Sub Workshop

1) Earth work	800 m ³	80
2) Building	2.030 m ²	832
3) Pavement	5.530 m ²	166
4) Others	-	150

Sub total 1,228

2. Machinery and electric

1) Maintenance machine	1 set	352
2) Maintenance equipment	1 set	587
3) Electric	1 set	200

Sub total 1,139

3. Equipment for main workshop 92

Total 2,459

Unit Price

1) Earth work	unit	
On site Material	m ³	3.000 Rp
Other Material	m ³	10.000 Rp
2) Concrete bridge	m ²	800.000 Rp
3) Concrete block wall	m ²	30.000 Rp
4) Pavement	m ²	30.000 Rp
5) Building Transfer Building	m ²	800.000 Rp
6) Building Other Building	m ²	410.000 Rp
7) Collecting Pipe ¢ 60	m	100.000 Rp
¢ 30	m	30.000 Rp
8) Earth liner t=2m	m ²	11.600 Rp
9) Light oil	l	200 Rp
10) Electricity	KW	65 Rp
11) Water	m ³	200 Rp
12) Personnel		
Administration	person/year	1.680.000 Rp
Engineer	"	1.680.000 Rp
Driver	"	1.680.000 Rp
Worker	"	960.000 Rp
13) Equipment		
Tractor	Unit	134.000.000
Trailor - Container	"	63.000.000
Bulldozer	"	200.000.000
Landfill compactor	"	240.000.000
Back - hoe	"	145.000.000
Damp truck	"	70.000.000

JICA