Accordingly, the medical cost reduction in the integrated area of both the Project Area and JSSP Area is estimated to be Rp. 16.1 billion per annum in the year 2000, which would increase to Rp. 17.1 billion in 2010 (Refer to Table 8.4).

8.4 Environmental Assessment

8.4.1 Project Description

(1) General

The Project Area covers the north central part of Jakarta City with an area of 4,300 ha in which 47 Kelurahans are included. The Area is the most developed region with the highest population density. Its total population and population density were 1.549 million and 360 person/ha in 1988.

However, the Project Area virtually lacks an environmentally and sanitarily acceptable means of wastewater disposal. Bulk of the gray water generated by miscellaneous domestic use of washing and bathing, and even a portion of toilet waste from households is discharged to nearby ditches and drains with no treatment. As the consequence, the waterways and rivers, have virtually become open sewers with no beneficial use. They are black in colour and emanate offensive odour with their stream BOD levels reaching even a 100 mg/l during dry season, not to mention the associated public health risk.

A sewerage system will be developed to improve such serious environmental and sanitary conditions in the Project Area. The proposed sewerage development system collects wastewater of the whole inhabited area of 3,847 ha in the Project Area. Out of 3,847 ha, 2,285 ha is collected by conventional collection system while, the remaining 1,562 ha by interceptor one. All the collected wastewater is treated by aerated lagoon system at Pluit Pond located in the northernmost of the Project Area.

Location of the proposed sewerage system is shown in Fig. 8.1.

(2) Project Activities

(a) Pre-construction Stage

Prior to construction of the treatment plant, 8 ha of land on the bank of the Pluit Pond will be acquired.

(b) Construction Stage

The sewerage system consists of sewer networks, lift pump station and treatment plant. The construction works will be carried out by both international and local contractors which employ _____ people and utilize local and imported materials and equipment. The construction works will be implemented in two (2) phases: first phase (1993-1996) and second phase (1997-2000). The included major construction works are as follows.

(i) First Phase (1993-1996)

i) Construction of sewer networks

- Conveyance sewer 10.34 km
- Trunk and main sewer 15.1 km
- Secondary and tertiary sewer 86.3 km
- Disposal of surplus soil 206,000 m^3

ii) Construction of treatment plant

- Excavation of Pluit Pond 340,000 m^3
- Embankment of aerated lagoon 1,600 m
- Installation of aerator 75 kW x 10 units
- Earth work for inflow pump station 17,280 m^3
- Concrete work for inflow pump station 5,800 m^3

- Installation of inflow pump
  ø900 x 98m^3/min x 20m(H) x 2 units
  ø600 x 40m^3/min x 20m(H) x 2 units
- Drying bed 2,000 m^2
- Control house 3,000 m^2

(ii) Second Phase (1997-2000)

i) Construction of sewer networks
- Trunk and main sewer 62.9 km
- Secondary and tertiary sewer 373.7 km
- Disposal of surplus soil 884,000 m^3

ii) Construction of lift pump station
- Earth work 6,800 m^3
- Concrete work 1,800 m^3
- Installation of pump
  ø600 x 36m^3/min x 17m(H) x 2 units
  ø350 x 18m^3/min x 17m(H) x 2 units

iii) Construction of treatment plant
- Installation of additional aerator 75 kW x 14 units
- Earth work for inflow pump station 17,280 m^3
- Concrete work for inflow pump station 5,800 m^3
- Installation of additional pump
  ø900 x 98m^3/min x 20m(H) x 2 units
  ø600 x 40m^3/min x 20m(H) x 2 units

Part of the surplus soil produced from sewer pipe construction works will be used for the embankment of the aerated lagoon in Pluit Pond and for the land reclamation of urban development. The excavated soil of Pluit Pond will be transported by burges for dumping to swamps located in the coastal areas.

(c) Operation Stage

After completion of the construction, the following operation and maintenance activities will be performed to demonstrate a full function of the sewerage system.

(i) Sewer networks
- Periodical cleaning of sewer
- Repairing of sewer
- Periodical cleaning of open ditches in interceptor area

(ii) Lift pump station
- Daily operation of pump
- Periodical maintenance of equipment
- Repairing of structure and equipment

(iii) Treatment plant
- Daily operation of treatment plant
- Periodical maintenance of equipment
- Repairing of structure and equipment

Detailed operation of the treatment plant is described below in order of the treatment process.

i) Pump-up of wastewater by inflow pump station
ii) Aeration of wastewater in aerated lagoon under aerobic condition
iii) Settlement of suspended solids in facultative pond and digestion of organic materials under anaerobic condition
iv) Chlorination of wastewater in disinfection tank
v) Discharging of wastewater into sea by the existing pump station of drainage
vi) Desludging in facultative pond by dredger
vii) Drying of sludge in drying bed and disposal

Among the above activities, operation i) ~ v) are daily, while operation vi) and vii) may be once in several years.

The above wastewater treatment will include wastewater of the JSSP area. The expected wastewater treatment volume is as follows.

- Year 1997 (after Phase I) : 185,400 m^3/d
- Year 2001 (after Phase II) : 441,000 m^3/d

The wastewater treatment operation will be conducted to attain the following targets.

- BOD and SS reduction : 85%
- Effluent water quality : BOD 30 mg/l
- Coliform count : less than 3,000 MPN/100 cc

8.4.2 Original Environmental Conditions

(1) Socio-economic Conditions

(a) Population

The Project Area covers 47 Kelurahans. The total population of the Area was 1.549 million in 1988. It is expected to increase to 1.741 million in 2010.

(b) Income Level

The existing average monthly income per capita of the Project Area ranges from Rp. 34,451 in Kel. Angke, Jembatan Besi and Kali Baru to Rp. 69,673 in Kel. Gondangdia with an average of Rp. 47,870.

(2) Physical Conditions

(a) Topography & Geology

The Project Area is low-lying and almost flat. Its ground elevation is in the range of P.P. 1.5 m and P.P. 12 m. The ground surface gently declines toward north.

Note: P.P. (Priok Pile) means the tidal gauging station located at Tanjung Priok harbour.

Most of the Project Area is covered either alluvium or young rocks. The alluvium soils spread mostly along the rivers while the young volcanic rocks cover the rest of the Project Area.

The alluvium soil layer lying beneath the top-soil one consists of sand, clay and silt. Its thickness ranges from 10 m to 30 m. The alluvium soil is comparatively soft of which average consistency is seven (7) in terms of N-value. Which N-value of the young rock is more than 50. It lies about 30 m below ground surface.

(b) Land Use

The Project Area is the most developed in Jakarta City and commercial & institutional land use is prevailing. The existing and future land use patterns are estimated as follows.

Land Use	Existing (1988)	Future (2010)
Residential	2,577 ha (60%)	2,427 ha (56%)
Commercial & Institutional	984 ha (23)	1,232 ha (29)
Industrial	114 ha (3)	92 ha (2)
Others	625 ha (14)	549 ha (13)
Total	4,300 ha(100)	4,300 ha(100)

(3) Hygienic Condition

The Project Area suffers from a high waterborne disease contraction rate due to its unsanitation conditions. The annual contraction rate per 1,000 population by Kecamatan ranges from 27.2 cases in Kec. Grogol Petamburan to 155.9 cases in Kec. Tanah Abang with an average of 73.8 cases in the last three (3) years.

(4) Water Resources

(a) Surface Water

The Cideng, Krukut and Kota Ciliwung rivers, and their tributaries and distributaries run through the Project Area. In the northernmost of the Area, Pluit Pond with an area of 80 ha is located. These rivers and pond are used only for storm water and wastewater drainage. Water quality of the above rivers ranges from 10 mg/l to 180 mg/l with an average of 54 mg/l as BOD and that of Pluit Pond is BOD 48 mg/l.

The above rivers and Pluit Pond are deposited by sediments and dumped garbages to a considerable extent. They are being periodically dredged by DKI Jakarta. Pluit Pond is black in colour and emanates an offensive odour.

(b) Groundwater

Groundwater in the Project Area is shallow and affected by sea water intrusion. It is also affected by organic pollution.

(c) Tide

The northern low-lying area is affected by tide of the Jakarta Bay. The tide level is shown below.

Spring High Tide (High High Tide)	:	P.P. + 1.15 m
Mean Sea Water	:	P.P. + 0.60 m
Spring Low Tide (Low Low Tide)	:	P.P. + 0.00 m

(5) Biological Resources

There are no rare and protected flora and fauna.

(6) Climate

The climate of the Project Area is characterized by two (2) distinct seasons: rainy season (November - May) and dry season (June - October). The average annual rainfall is 1,700 mm, out of which 70% occurs in rainy season. The average monthly rainfall is 146 mm. The highest rainfall of 340 mm is recorded in January, while the lowest one of 50 mm occurs in August.

The temperature ranges from 23°C in January to 31°C in May with an average of 27°C.

(7) Related Infrastructure

(a) Road Networks

The road networks in the Project Area have been considerably developed in recent years. However, most of the roads are affected by heavy traffic in the day time.

(b) Urban Drainage

The drainage system in the Project Area has been developed for a long time. However, the low-lying areas are still habitually flooded. Drainage improvement works including channel improvement and installation of pump station are on-going to cope with the above flooding. These works will be completed in advance of the sewerage development.

(c) Water Supply

The whole Project Area is included in the PDAM water supply service area. Most of the Area is served by piped water. However, some regions, especially northern low-lying areas are still supplied by well water.

(d) Electricity and Telecommunication

Cables of electricity and telecommunication are installed under the major roads with a shallow earth covering depth.

8.4.3 Assessment of Environmental Impact

(1) Environmental Impacts

The anticipated environmental impacts due to the project activities are mostly positive. However, occurrence of some negative impacts are also expected. The impacts in the pre-construction, construction and operation stages are listed in Table 8.5.

The anticipated negative impacts in the three (3) stages are described in detail as follows.

(a) Pre-construction Stage

All the required land for construction of the treatment plant belongs to government ownership. Hence, the land acquisition will not cause any negative impacts on the surrounding communities.

(b) Construction Stage

- Vibration and noise pollution during sewer pipe installation works, especially due to sheet piling of sewer trenches and construction of lift pump station.

- Lowering of groundwater table caused by dewatering of trenches during sewer pipe installation, in shallow groundwater table zones, especially in the northern coastal zones of the project area.
- Deterioration of water quality of Pluit Pond due to increased turbidity caused by earthworks involving excavation of aerated lagoon portion of the pond and embankment construction, especially the baffle and partition walls of aerated lagoon and facultative pond.

- Noise pollution due to construction works in Pluit Pond, especially caused by soil compaction of baffle and partition wall embankments of aerated lagoon and facultative pond.

- Dust caused by earth works during sewer pipe installation and construction of treatment plant

- Traffic disturbance caused by sewer pipe installation works, and transportation for soil dumping and of construction materials

- Damages to road caused by sewer pipe installation works, and transportation for soil dumping and of construction materials

(c) Operation Stage

- Effects on surrounding environment of Pluit Pond due to odour, foams and noise predominantly caused by the operation of aerators in the aerated lagoon.

- No negative imparts on groundwater quality in the surrounding areas is anticipated.

(2) Assessment and Management of Negative Impacts

(a) Pre-construction Stage

No negative impacts are anticipated.

(b) Construction Stage

The anticipated negative impacts are short term ones. They could be minimized by planning the proper construction method and schedule as follows.

- Vibration and Noise Pollution

Pile driving is the typical construction works which may cause vibration and noise pollution. Pre-boring method will be adopted instead of conventional hammering method, if necessary, to minimize vibration and noise pollution.

Construction works which cause a serious noise and vibration, if any, may not be allowed in night time.

- Lowering of Groundwater Table

Groundwater table will be lowered by dewatering of trenches during sewer pipe installation. However, it is considered to be limited to a small area around the construction site. Moreover, it is expected to be recovered to the original state immediately after completion of the construction works.

Sheet piling of trenches will be performed to minimize lowering of ground water table, if necessary.

- Deterioration of Water Quality in Pluit Pond

Construction works in Pluit Pond may make water in the pond muddy. Temporary fence surrounding the construction site will be provided to prevent spreading of turbid water, if necessary.

- Dust Pollution

Cleaning and water spraying of the roads in and/or around construction site will be enforced to minimize dust pollution.

Soil transfer vehicles will be operated carefully to prevent soil dropping from the vehicles. The loads on the vehicles will be covered by sheets to mitigate dust pollution.

- Traffic Disturbance

This is the heaviest negative impacts in the construction stage, which will be mainly caused by sewer pipes installation works.

Main, secondary and tertiary sewer installation works by open trench method can't avoid traffic disturbance. However, traffic interference due to conveyance sewer construction works by shield tunnelling method will be considered minor.

This traffic disturbance will be minimized by the following management measure.

Installation of sewer pipe, and transportation of construction materials and equipment will be scheduled to avoid peak hours of daily traffic. Heavy traffic roads will be avoided from the routes of project vehicle operation. By-pass roads will be constructed as required.

- Damages to Road

Over-loading of project vehicles may not be allowed to minimize damages to road. Damages to road by project vehicles, if caused, will be immediately repaired.

Road surface damaged by sewer pipe installation will be restored to the original condition immediately after completion of the sewer pipe installation.

(c) Operation Stage

- Water Quality of Pluit Pond

Beneficial effects of improvement in water quality of pond effluent and reduction of solid waste pollution are identified.

With the operation of the wastewater treatment plant in Pluit Pond, the effluent water quality will be enhanced to a BOD level less than 30 mg/l in contrast to the existing one of about 50 mg/l. The provision of screening facilities and the availability of operation and maintenance personnel of the plant would help in elimination of solid waste pollution, and hence enhancement of pond aesthetics.

Hence, no mitigatory measures are required.

- Odour, Foam and Noise Pollution

The existing Pluit Pond emanates on offensive odour. The proposed project will improve water quality of the pond, resulting in mitigation of the existing odour. However, the pond will still emit an odour inherent to the aerated lagoon treatment plant. Hence, it is proposed to institute a green belt around the pond as a buffer zone. The area around the pond having a width in the range of 50 m to more than 100 m is a reserved green area which is sufficient for green belt.

Noise pollution due to operation of pumps and aerators is considered minor. The above green belt will minimize noise pollution. Furthermore, pump house of noiseproof structure will be constructed, if necessary.

Foam pollution due to operation of the aerated lagoon treatment plant will be minimized by the above green belt. Moreover, water and/or chemical spraying and net fencing around the pond will be considered, if necessary.

The negative impacts and their management measures are summarized in Table 8.6.

8.4.4 Conclusion and Recommendation

The negative impacts in construction stage are temporary ones. They could be managed by proper construction method and schedule.

The negative impacts in operation stage is mainly odour, foam and noise pollution due to operation of the treatment plant. They could be managed by institution of green belt. Water and/or chemical spraying, and net fencing around the pond will be considered, if necessary.

A detailed environmental impact analysis is recommended to be conducted during the detailed engineering design stage in order to quantify objectively the requirements and effects of these proposed mitigatory measures.

Table 8.1(1) Number of Properties in the Central Sewerage Zone in 1988

Code No.	Name of Kelurahan	House	Shop	* Factory	Hotel	Restaurant	Hospital	Office	** School	Religious Institution	Others	High Rise Buildings
	FS Zone											
1402	Kwitang	2,903	66	4	1	5	5	101	10	20	21	1
1403	Kenari	1,666	48	1	4	1	9	4	23	11	10	10
1601	Kebon Sirih	4,335	225	4	10	26	5	55	14	16	36	4
1602	Gondangdia	1,435	1	3	3	4	10	107	22	8	16	10
1603	Cikini	2,325	56	2	7	12	2	62	17	9	17	0
1604	Menteng	6,231	41	0	2	12	6	62	27	10	16	6
1605	Pegangsaan	4,802	60	0	1	5	8	46	15	31	17	0
1701	Kampung Bali	3,905	47	3	11	0	4	0	34	32	13	2
1702	Kebon Kacang	4,822	265	0	2	3	5	8	17	34	33	0
1703	Kebon Melati	8,712	3	7	1	0	3	15	14	68	11	1
1101	Cideng	3,408	84	5	1	25	6	15	32	25	19	1
1102	Duri Pulo	5,977	200	4	0	1	8	4	21	42	28	0
1103	Petojo Utara	3,700	165	6	1	10	4	19	58	23	29	5
1104	Petojo Selatan	4,178	45	0	0	13	4	147	11	16	24	1
1105	Kebon Kelapa	2,698	216	3	6	26	2	175	24	18	47	9
1106	Gambir	720	15	0	3	6	2	44	9	12	9	19
1201	Mangga Dua Selatan	7,452	400	21	0	1	14	6	25	28	50	0
1202	Karang Anyar	5,380	21	3	0	0	6	10	15	27	8	0
1203	Kartini	4,705	10	6	0	0	5	2	9	32	6	0
1204	Pasar Baru	3,301	913	12	3	20	2	58	50	27	109	4

Notes: * Excluding large factories
** Primary, junior general high and senior high

Sources: Statistik Wilayah 1988 & JICA

Table 8.1(2) Number of Properties in the Central Sewerage Zone in 1988

Code No.	Name of Kelurahan	House	Shop	* Factory	Hotel	Restaurant	Hospital	Office	** School	Religious Institution	Others	High Rise Buildings
1205	Gunung Sahari Utara	3,102	20	9	0	12	2	70	12	16	14	2
1401	Senen	1,186	80	1	1	13	4	76	13	7	19	0
2206	Pademangan Barat	8,301	429	5	1	1	14	31	18	60	56	0
2207	Pademangan Timur	3,615	69	2	0	0	6	2	14	28	12	0
3201	Grogol	4,460	18	0	0	12	12	5	24	17	9	0
3202	Jelambar	6,535	28	4	0	24	6	9	27	28	13	0
3204	Tomang	7,036	35	0	0	48	9	11	30	35	17	6
3210	Jelambar Baru	7,210	35	14	0	33	8	6	30	31	16	0
3301	Pinangsia	3,119	25	4	3	6	0	56	17	25	14	0
3302	Mangga Besar	2,209	10	2	2	10	2	14	23	12	8	0
3303	Tangki	3,301	12	8	0	6	1	28	15	14	8	5
3304	Glodok	1,799	20	2	2	16	3	176	15	20	25	0
3305	Keagungan	4,128	17	6	0	1	2	18	12	17	7	1
3306	Krukut	3,735	27	4	3	14	5	42	10	27	13	1
3307	Taman Sari	3,431	27	7	2	22	8	52	24	27	17	0
3308	Mahpar	3,623	15	1	0	6	3	106	9	15	16	1
3401	Pekojan	4,950	22	42	0	2	6	56	14	36	18	0
3402	Roa Malaka	824	5	2	1	7	3	357	1	4	38	0
3403	Tambora	2,155	23	2	0	0	3	12	13	23	8	0
3404	Jembatan Lima	4,199	36	11	0	0	2	2	11	36	10	0

Notes: * Excluding large factories
** Primary, junior general high and senior high

Sources: Statistik Wilayah 1988 & JICA

Table 8.1(3) Number of Properties in the Central Sewerage Zone in 1988

Code No.	Name of Kelurahan	House	Shop	* Factory	Hotel	Restaurant	Hospital	Office	** School	Religious Institution	Others	High Rise Buildings
3405	Angke	5,275	34	35	0	5	6	8	23	34	15	0
3406	Jembatan Besi	4,878	53	0	0	0	14	2	11	53	13	0
3407	Krendang	4,094	35	8	0	2	6	2	5	35	9	0
3408	Tanah Sereal	5,919	43	4	1	1	4	1	11	43	11	0
3409	Duri Utara	4,017	23	6	0	0	2	5	19	23	8	0
3410	Kali Baru	4,663	28	4	0	0	2	1	11	28	7	0
3411	Duri Selatan	3,154	22	7	0	0	2	1	6	22	6	0
Sub-total		193,572	4,072	274	72	411	245	2,089	865	1,205	924	89
	JSSP Zone											
4101	Menteng Dalam	8,453	84	5	1	4	8	16	32	49	20	1
4102	Tebet Barat	5,010	118	3	2	14	11	21	21	50	24	0
4103	Tebet Timur	4,015	89	4	1	10	6	6	31	35	18	0
4104	Kebon Baru	5,926	125	1	0	4	6	6	20	32	19	1
4105	Bukit Duri	6,786	84	1	0	0	9	7	20	43	16	0
4106	Manggarai Selatan	5,003	52	0	0	2	5	4	9	26	10	0
4107	Manggarai	5,760	62	2	0	1	4	6	34	37	15	0
4201	Setia Budi	1,497	16	1	0	6	2	14	18	13	7	6
4202	Guntur	4,358	123	1	0	8	8	8	21	27	20	0
4203	Karet	5,704	41	3	0	10	12	22	30	28	15	8
4204	Karet Semanggi	1,957	91	34	0	6	5	0	9	10	16	13

Notes: * Excluding large factories
** Primary, junior general high and senior high

Sources: Statistik Wilayah 1988 & JICA

Table 8.1(4) Number of Properties in the Central Sewerage Zone in 1988

Code No.	Name of Kelurahan	House	Shop	* Factory	Hotel	Restaurant	Hospital	Office	** School	Religious Institution	Others	High Rise Buildings
4205	Karet Kuningan	6,621	62	26	1	4	7	3	25	33	16	8
4206	Kuningan Timur	1,665	39	5	0	12	0	11	7	22	10	9
4207	Pasar Manggis	4,227	4	0	0	12	9	17	27	28	10	0
4208	Menteng Atas	6,843	196	1	0	16	8	5	34	54	31	9
Sub-total		73,823	1,186	87	5	109	100	146	338	487	246	55
TOTAL		267,394	5,258	361	77	520	345	2,235	1,203	1,692	1,169	144

Notes: * Excluding large factories
** Primary, junior general high and senior high

Sources: Statistik Wilayah 1988 & JICA

Table 8.2 Existing and Future Pollution Load as BOD by Pollution Sources in the Project Area

ITEM	Existing (1988)	Future (2000)	
Area (ha)	3,847	3,847	
Population	1,548,509	1,659,000	
Population Density (person/ha)	402.5	431.2	
Pollution Load (kg/d)			
Domestic Waste	31,762	38,515	(Toilet + Gray)
Toilet Wastewater	4,690	4,852	
Gray Water	27,072	33,663	
Commercial & Institutional	11,066	19,016	
Industry	1,744	1,614	
Total	44,572	59,145	
Specific Pollution Load (kg/ha/d)	11.6	15.4	

Table 8.3(1) Number of Properties in the Central Sewerage Zone in 2010

Code No.	Name of Kelurahan	House	Shop	* Factory	Hotel	Restaurant	Hospital	Office	** School	Religious Institution	Others	High Rise Buildings
	F/S Zone											
1402	Kwitang	3,088	218	4	5	15	20	287	27	39	61	8
1403	Kenari	1,900	285	1	16	12	44	149	66	45	62	44
1601	Kebon Sirih	5,025	1,132	13	58	141	37	441	64	56	194	30
1602	Gondangdia	2,813	335	3	35	64	57	660	85	40	128	54
1603	Cikini	3,063	622	2	55	106	32	559	83	48	151	21
1604	Menteng	7,913	44	0	2	13	6	66	32	12	17	6
1605	Pegangsaan	5,725	60	0	1	5	8	46	16	34	17	0
1701	Kampung Bali	4,563	640	0	54	5	31	32	121	184	107	11
1702	Kebon Kacang	5,487	942	0	14	10	21	35	51	103	118	2
1703	Kebon Melati	9,875	245	7	13	2	18	60	53	178	58	5
1101	Cideng	3,825	162	5	2	33	8	56	38	30	33	3
1102	Duri Pulo	6,275	246	4	1	7	9	31	25	40	36	1
1103	Petojo Utara	4,162	357	6	3	31	11	119	77	45	65	9
1104	Petojo Selatan	5,325	227	0	2	32	10	234	38	38	58	5
1105	Kebon Kelapa	3,013	369	3	8	42	7	250	45	36	76	12
1106	Gambir	3,163	15	0	3	6	2	44	24	32	13	19
1201	Mangga Dua Selatan	7,950	1,740	25	0	4	78	46	89	134	212	0
1202	Karang Anyar	5,587	159	4	0	0	21	29	30	54	30	0
1203	Kartini	4,925	225	7	0	0	24	13	27	72	37	0
1204	Pasar Baru	4,075	913	15	3	20	2	58	56	30	110	4

Notes: * Excluding large factories
** Primary, junior general high and senior high

Sources: Statistik Wilayah 1988 & JICA

Table 8.3(2) Number of Properties in the Central Sewerage Zone in 2010

Code No.	Name of Kelurahan	House	Shop	* Factory	Hotel	Restaurant	Hospital	Office	** School	Religious Institution	Others	High Rise Buildings
1205	Gunung Sahari Utara	3,125	20	60	0	13	2	70	12	16	20	2
1401	Senen	1,250	94	1	1	15	4	89	14	8	23	0
2206	Pademangan Barat	8,375	1,224	0	3	3	47	82	54	151	156	0
2207	Pademangan Timur	6,000	171	2	0	0	11	7	18	39	25	0
3201	Grogol	4,962	18	0	0	12	12	5	25	18	9	0
3202	Jelambar	7,125	28	5	0	24	6	9	28	29	13	0
3204	Tomang	7,813	35	0	0	48	9	11	32	37	17	6
3210	Jelambar Baru	7,800	35	9	0	33	8	6	31	32	15	0
3301	Pinangsia	3,513	25	4	3	6	0	56	18	27	14	0
3302	Mangga Besar	2,388	10	2	2	10	2	14	24	12	8	0
3303	Tangki	3,450	46	8	2	23	6	138	28	33	28	11
3304	Glodok	1,875	59	2	5	39	9	378	28	40	56	2
3305	Keagungan	4,262	59	6	2	17	8	138	27	39	30	5
3306	Krukut	3,963	82	0	7	41	14	200	28	55	43	5
3307	Taman Sari	3,700	27	7	2	22	8	52	25	28	17	0
3308	Mahpar	3,863	15	1	0	6	3	106	9	15	16	1
3401	Pekojan	5,250	22	26	0	2	6	56	14	37	16	0
3402	Roa Malaka	1,037	5	0	1	7	3	357	1	5	38	0
3403	Tambora	2,275	23	0	0	0	3	12	13	24	8	0
3404	Jembatan Lima	4,388	172	2	0	3	14	12	35	101	34	0

Notes: * Excluding large factories
** Primary, junior general high and senior high

Sources: Statistik Wilayah 1988 & JICA

Table 8.3(3) Number of Properties in the Central Sewerage Zone in 2010

Code No.	Name of Kelurahan	House	Shop	* Factory	Hotel	Restaurant	Hospital	Office	** School	Religious Institution	Others	High Rise Buildings
3405	Angke	5,600	237	15	1	18	32	34	69	140	55	0
3406	Jembatan Besi	5,100	53	0	0	0	14	2	11	54	13	0
3407	Krendang	4,225	139	2	0	7	21	10	19	82	28	0
3408	Tanah Sereal	6,175	230	1	3	7	23	13	44	135	46	0
3409	Duri Utara	4,300	149	1	0	3	15	21	49	88	33	0
3410	Kali Baru	4,775	91	1	0	1	7	4	21	54	18	0
3411	Duri Selatan	3,287	106	1	0	2	11	7	21	63	21	0
	Sub-total	217,627	12,111	256	309	911	743	5,106	1,747	2,614	2,380	264
	JSSP Zone											
4101	Menteng Dalam	10,900	84	7	1	4	8	16	37	56	21	1
4102	Tebet Barat	6,612	131	4	2	16	12	23	26	61	28	0
4103	Tebet Timur	5,300	89	4	1	10	6	6	36	41	19	0
4104	Kebon Baru	7,150	125	2	0	4	6	6	22	35	20	1
4105	Bukit Duri	7,800	84	3	0	0	9	7	21	46	17	0
4106	Manggarai Selatan	5,487	52	0	0	2	5	4	9	27	10	0
4107	Manggarai	6,663	209	4	0	3	13	20	77	84	41	0
4201	Setia Budi	2,125	16	1	0	6	2	14	22	16	8	6
4202	Guntur	4,900	134	1	0	9	9	9	23	30	21	0
4203	Karet	6,550	73	0	0	18	21	39	44	41	24	14
4204	Karet Semanggi	2,770	307	0	0	20	17	0	22	24	39	44

Notes: * Excluding large factories
** Primary, junior general high and senior high

Sources: Statistik Wilayah 1988 & JICA

Table 8.3(4) Number of Properties in the Central Sewerage Zone in 2010

Code No.	Name of Kelurahan	House	Shop	* Factory	Hotel	Restaurant	Hospital	Office	** School	Religious Institution	Others	High Rise Buildings
4205	Karet Kuningan	8,275	98	0	2	6	11	5	35	47	20	13
4206	Kuningan Timur	3,475	69	0	0	21	0	19	13	42	16	16
4207	Pasar Manggis	4,950	14	0	0	41	31	58	62	64	27	0
4208	Menteng Atas	7,638	235	1	0	19	10	6	39	63	37	11
Sub-total		90,593	1,720	26	6	180	160	233	489	677	349	105
Total		308,219	13,831	282	314	1,089	904	5,338	2,237	3,290	2,731	370

Notes: * Excluding large factories
** Primary, junior general high and senior high

Sources: Statistik Wilayah 1988 & JICA

Table 8.4 Benefits in Terms of Reduction of Medical Costs

(Unit: Rp.million)

No.	Year	Medical Costs		Benefits
		'Without' Case	'With' Case	
		(1)	(2)	(3)=(1)-(2)
1	1992	32,087	31,521	566
2	1993	32,290	31,719	571
3	1994	32,494	31,917	577
4	1995	32,698	32,116	582
5	1996	32,902	32,314	588
6	1997	33,106	28,240	4,866
7	1998	33,310	24,784	8,526
8	1999	33,514	20,982	12,532
9	2000	33,717	17,601	16,116
10	2001	33,921	17,711	16,210
11	2002	34,125	17,822	16,303
12	2003	34,329	17,932	16,397
13	2004	34,533	18,042	16,491
14	2005	34,737	18,152	16,584
15	2006	34,940	18,263	16,678
16	2007	35,144	18,373	16,771
17	2008	35,348	18,483	16,865
18	2009	35,552	18,594	16,958
19	2010	35,756	18,704	17,052
20	2011	35,960	18,814	17,145
21	2012	36,163	18,924	17,239
22	2013	36,367	19,035	17,333
23	2014	36,571	19,145	17,426
24	2015	36,775	19,255	17,520
25	2016	36,979	19,366	17,613
26	2017	37,183	19,476	17,707
27	2018	37,386	19,586	17,800
28	2019	37,590	19,697	17,894
29	2020	37,794	19,807	17,987
30	2021	37,998	19,917	18,081
31	2022	38,202	20,027	18,174
32	2023	38,406	20,138	18,268
33	2024	38,610	20,248	18,362
34	2025	38,813	20,358	18,455
35	2026	39,017	20,469	18,549
36	2027	39,221	20,579	18,642
37	2028	39,425	20,689	18,736
38	2029	39,629	20,799	18,829
39	2030	39,833	20,910	18,923
40	2031	40,036	21,020	19,016
41	2032	40,240	21,130	19,110
42	2033	40,444	21,241	19,204
43	2034	40,648	21,351	19,297
44	2035	40,852	21,461	19,391
45	2036	41,056	21,571	19,484
46	2037	41,259	21,682	19,578
47	2038	41,463	21,792	19,671
48	2039	41,667	21,902	19,765
49	2040	41,871	22,013	19,858
50	2041	42,075	22,123	19,952

Note: Benefits are at 1990 prices.

Source: JICA

Table 8.5 Environmental Impacts

Environmental Components / Activities Components	(1) Economic condition	(2) Education	(3) Income	(4) Health	(5) Perception	(6) Sanitary	(7) Traffic	(8) Esthetic	(9) Soil stability	(10) Land use	(11) River water	(12) Water of Pluit Pond	(13) Groundwater	(14) Water use	(15) Roads	(16) Fauna &flora	(17) Odour	(18) Noise	(19) Vibration	(20) Dust	(21) Foam
I. Pre -construction stage																					
1. Land Acquisition																					
II. Construction stage																					
1. Sewer networks	(+)		(+)				(-)						(-)		(-)			(-)	(-)	(-)	
2. Lift pump station	(+)		(+)															(-)	(-)	(-)	
3. Treatment plant	(+)		(+)				(-)					(-)						(-)	(-)	(-)	
III. Operation &Maintenance																					
1. Sewer networks	(+)			(+)		(+)		(+)		(+)	(+)		(+)	(+)							
2. Lift pump station	(+)			(+)		(+)		(+)		(+)	(+)		(+)	(+)				(-)			
3. Treatment plant	(+)			(+)		(+)		(+)		(+)	(+)		(+)	(+)		(+)	(-)	(-)			(-)

Table 8.6 Negative Impact and Management Measures

No.	Stage	Project Activities	Affected Objectives	Negative Impact	Management Measures	Monitoring
I.	Pre-construction	Land Acquisition	-	No negative impact	-	-
II.	Construction	Sewer Networks	Community	Noise, Vibration	Proper construction method & schedule	-
			Traffic	Interference	Proper construction method & schedule	-
			Road	Damage	Road repairing	-
			Groundwater	Groundwater table lowering	Proper construction method & schedule	Groundwater table
		Lift Pump Station	Community	Noise, Vibration	Proper construction method & schedule	-
			Traffic	Interference	Proper construction method & schedule	-
		Treatment Plant	Community	Noise, Vibration & Water Pollution	Proper construction method & schedule	-
			Traffic	Interference	Proper construction method & schedule	-
III.	Operation	Sewer Networks	-	No negative impact	-	-
		Lift Pump Station	Community	Noise	Noiseproof structure	-
		Treatment Plant	Community	Noise, Odour, & Foam	Greenbelt, net fence water and/or chemical spray	Periodical observation

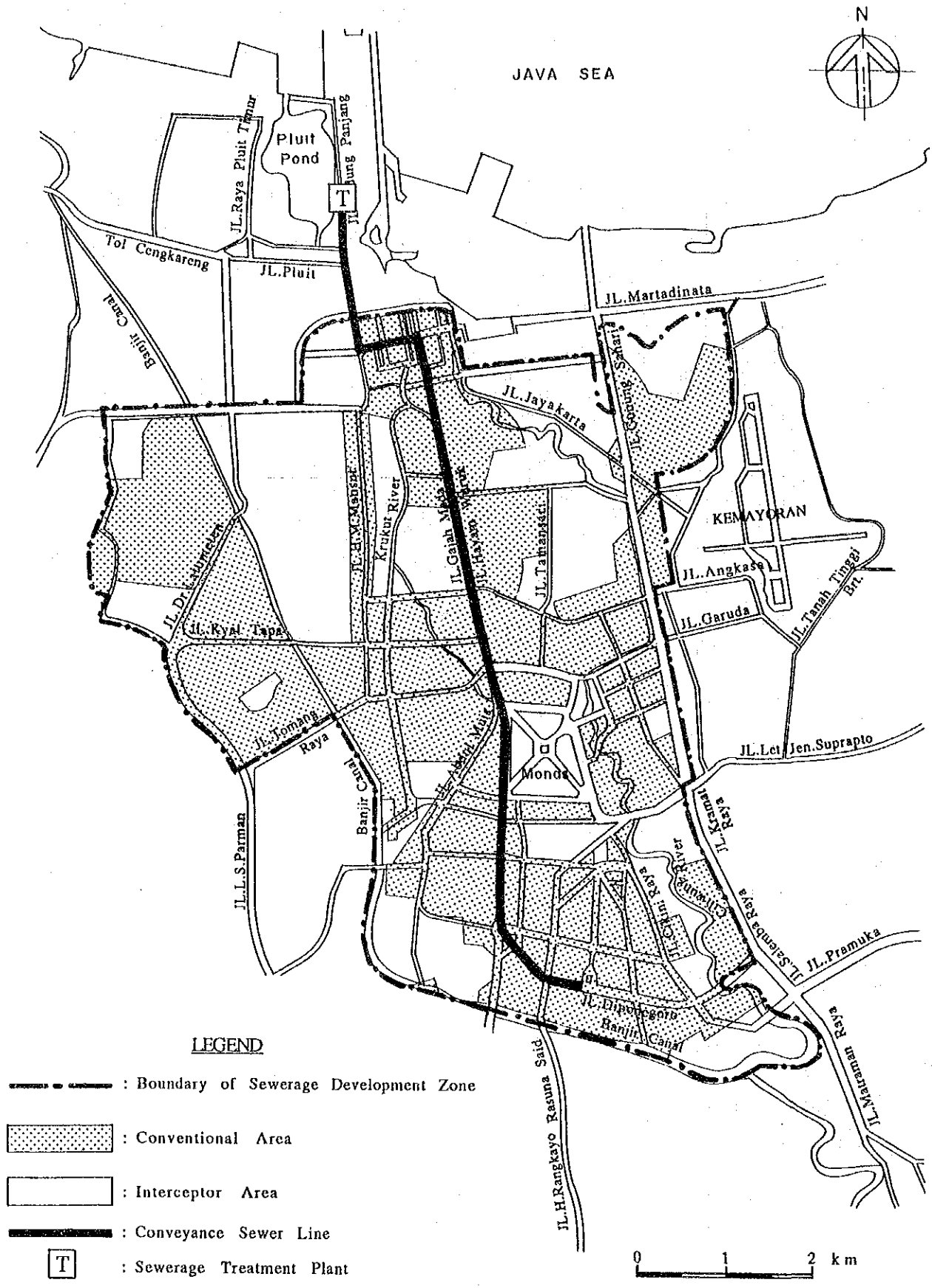

FIG. 8.1 LOCATION OF PROJECT AREA

THE STUDY ON URBAN DRAINAGE AND WASTE WATER DISPOSAL PROJECT IN THE CITY OF JAKARTA

Chapter 9 FINANCIAL EVALUATION

9.1 People's Willingness to Pay

9.1.1. Methodology for the Calculation of Willingness to Pay

The steps for the calculation of total amount of people's willingness to pay for sewerage services by Kelurahan are presented in Fig. J.22 of Appendix J, Supporting Report of Master Plan.

As regards households, firstly the correlation between the average household income and the average willingness to pay for sewerage services per household is established. Then, through the regression equation constructed as a result of such an analysis the average willingness to pay per household in a Kelurahan is calculated from the average household income in that Kelurahan. Lastly, the average willingness to pay per household is multiplied by the number of households to arrive at the total willingness to pay of households in the same Kelurahan. Regarding other properties such as shops and factories, the average willingness to pay per shop (factory) is multiplied by the number of shops (factories) to get the total willingness to pay of shops (factories) in a Kelurahan. Eventually, total willingness to pay of each property is added together.

When household income grows in the coming years, willingness to pay of a household will also rise. However, the growth rate of the latter will be less than that of the former. It is because the elasticity of willingness to pay to income is less than 1 (Refer to Table J.24 and J.25 of Appendix J, Supporting Report of Master Plan).

9.1.2 Total Willingness to Pay

The average willingness to pay per month in 1988 is Rp. 1,846 for a household. Likewise, it is Rp. 5,394 for a shop, Rp. 6,050 for a factory, Rp. 10,332 for a hotel, Rp. 5,328 for a restaurant, Rp. 8,047 for a hospital, Rp. 6,670 for an office, Rp. 7,783 for a school and Rp. 6,235 for a religious institution.

The total number of units by type of properties by Kelurahan for 1988 and 2010 is shown in Table 8.1 and 8.2, respectively.

As a result of EDP processing the total amount of the willingness to pay for sewerage services across the entire Central Sewerage Zone in 1988 worked out at Rp. 8,620 million for households and Rp. 1,278 million for establishments/institutions, adding up to Rp. 9,897 million. Likewise, the total willingness to pay in 2010 is estimated at Rp. 17,195 million for households and Rp. 5,267 million for establishments/institutions, summing up to Rp. 22,462 million. The willingness to pay for households accounts for 87.1% in 1988, and 76.6% in 2010 (Refer to Table 9.1 and 9.2). Property-wise willingness to pay is presented in Table 9.3.

9.2 Sewerage Service Charge of JSSP

The underlying philosophy of JSSP regarding cost recovery is to redeem O/M cost at the least. Based on it, official tariff of sewerage discharge services to be applied for beneficiaries with direct connections to the sewers was legalized in 1989 by the decree of the Ministry of Public Works. The tariff structure is based on the floor area of the client's house/building and the quantity/quality of wastewater.

Clients are classified into five (5) categories, i.e. Residential, Small Commercial, Large Commercial, Industry and Social institution. Each category is further broken down to specific types of customers. Unit price per square meter is different in accordance with the nature of effluents. The unit price is Rp. 28 for Residential, Rp. 50 for Small Commercial, Rp. 182 for Large Commercial, Rp. 108 for Industry and Rp. 56 for Social Institution on simple average basis (Refer to Table 9.4).

Indirect charges are being contemplated for those without direct connections to the sewers. Discharge License Fees may be levied to the non-domestic beneficiaries and Environmental Charges to the PDAM customers. Also, inspection/cleaning fees will be collected on request basis.

The ultimate number of clients BPAL now envisages is 3,327 for Residential, 217 for Small Commercial, 56 for Large Commercial, 69 for Industry and 16 for Social Institution, coming to 3,681 in total. With that number of clients it wants to raise annual revenues of around one (1) billion rupiahs.

9.3 Affordability and Contribution of High Rise Building

According to the current thinking prevalent in connection with sewerage revenue raising, high rise buildings occupy a central position as the major revenue source. Defining high rise buildings as the buildings with more than four (4) stories, the JICA Study Team conducted an on-the-spot survey to determine the existing number and locations of those buildings in the Central Sewerage Zone.

The result is shown in Fig.9.1. According to the figure, high rise buildings are concentrated especially along Jl. M.H. Thamrin, Jl. H. Rangkayo Rasuna Said and Jl. Jend. Sudirman. The total number of them reaches 144. Kelurahan-wise distribution of them is shown in Table 8.1. Based on the land use plan for 2010 and economic growth forecast, the number of high rise buildings is projected to reach 370 in 2010 as shown in Table 8.2.

High rise buildings consist of shops, hotels, restaurants, banks, offices (private and governmental), hospitals and schools. Commercial businesses dominate high rise buildings accounting for 60%, the rest being categorized as social institution.

According to the questionnaire survey conducted for high rise buildings concerning the costs actually incurred for the construction of on-site sanitation facilities, such costs are on the average calculated at Rp. 181,500,048 at 1990 prices per building. On the other hand, the average capacity of wastewater discharges per day per high rise building works out to 226 cubic meter. That is to say, construction costs of on-site sanitation facilities per cubic meter of daily wastewater discharges capacity come to Rp. 803,098. It means that new high rise buildings to be erected in the future can afford to pay that amount of unit costs when they construct property connections to the sewer.

Also, the average floor area per high rise building in the Central Sewerage Zone works out to 14,138 square meter. It means that new high rise buildings to be erected in the future can afford to pay Rp. 12,873 per square meter when they construct property connections to the sewer.

It is assumed that the entire O/M cost and a part of capital cost will be recovered. To recover such cost the tariff of Sewerage Discharge Services of JSSP will be applied to the direct beneficiaries. Besides, based on the results of affordability survey Rp. 10,000 per square meter of the floor area of the building will be collected from every high-rise building at the time of the construction of connection.

Upon such assumptions the revenues from high rise buildings were estimated for 30 years from 1992 to 2021 in present value. As Table 9.5 shows, they reach Rp. 55,497 million. On the other hand, the cumulative revenues from the entire beneficiaries over the 30 years are estimated in present value at Rp. 109,742 million. That is to say, the revenues from high rise buildings account for 50.6% of the total revenues.

In the Project Area, the revenues from high rise buildings for the 30 years are estimated to reach Rp. 36,338 million in terms of present value. On the other hand, the cumulative revenues from the entire beneficiaries over the same period are estimated at Rp. 82,237 million. That is to say, the revenues from high rise buildings account for 44.2% of the total revenues(Refer to Table 9.6). In the same way, in the JSSP Area, the revenues from high rise buildings for the 30 years are estimated to reach Rp. 19,159 million in present value. On the other hand, the cumulative revenues from the entire beneficiaries over the same period are estimated at Rp. 27,505 million. That is to say, the revenues from high rise buildings account for 69.7% of the total revenues (Refer to Table 9.7).

Turning one's eyes to the cost side of this project, it is revealed as Table 9.8 shows that the cumulative O/M and capital costs over the 30 years come to Rp. 391,621 million in terms of present value. Cost recovery rate is therefore calculated at 28.0%. So far as high rise buildings are concerned, their contribution to the cost recovery works out to 14.2%.

In the Project Area, cumulative O/M and capital costs over the 30 years come to Rp. 284,343 million in present value. Cost recovery rate is therefore calculated at 28.9%. Also, the contribution of high rise buildings to the cost recovery works out to 12.8% (Refer to Table 9.9). In the same way, in the JSSP Area, cumulative O/M and capital costs over the three decades come to Rp. 107,278 million in present value. Cost recovery rate is therefore calculated at 25.6%. Also, the contribution of high rise buildings to the cost recovery works out to 17.9% (Refer to Table 9.10).

Further, cumulative revenues from Capital Works Charge to be paid by high rise buildings over the 30 years reach Rp. 16,899 million in terms of present value, while cumulative capital costs to be incurred over the same period amount to Rp. 357,361 million. Thus, the involvement of Capital Works Charge in the recovery of capital costs works out at 4.7%.

In the Project Area, cumulative revenues from Capital Works Charge to be paid by high rise buildings over the 30 years reach Rp. 12,286 million in present value, while cumulative capital costs to be incurred over the same period amount to Rp. 260,482 million. Thus, the involvement of Capital Works Charge in the recovery of capital costs works out at 4.7%. Similarly, in the JSSP Area, cumulative revenues from Capital Works Charge to be paid by high rise buildings over the 30 years reach Rp. 4,613 million in present value, while cumulative capital costs to be incurred over the same period amount to Rp. 96,879 million. Thus, the involvement of Capital Works Charge in the recovery of capital costs works out at 4.8%.

9.4 Proposed Sewerage Charges

As already mentioned in the preceding section, the tariff of Sewerage Discharge Services now being enforced by BPAL is also recommended by the JICA Study team as a major sewerage charge.

The detailed structure of the tariff is given in Table 9.4. The property type wise translation of the tariff is shown in Table 9.12(2) as Sewerage Services Charge.

The charge is applied to all types of properties having direct connections to the sewer based on the floor area of buildings. Properties were classified

into 11 types for the sake of convenience. The house will be charged Rp. 28 per square meter per month. Likewise, on a simplified average basis the shop, office, school and religious institution will be charged Rp. 40, the restaurant Rp. 60, the factory, hotel and hospital Rp. 100, and the high rise building Rp. 140.

Along with Sewerage Services Charge, Capital Works Charge will be applied to the high rise buildings in lump sum payment upon the construction of property connections. Based on the floor area of the building Rp. 10,000 per square meter will be levied on every high rise building having direct connections.

Regarding the application of Capital Works Charge to those high rise buildings which will have been erected before the sewer is constructed, the full rate of 100% will be applied to those with on-site sanitation facilities treating toilet waste only. Likewise, the rate of 50% will be applied to those with facilities treating both toilet waste and gray water, but not equipped with aerators. Those high rise buildings with facilities treating both toilet waste and gray water by means of aerators will be exempted from this charge.

The underlying concept of the sewerage charges proposed above is that those charges are expressed as the function of floor area of beneficiaries' buildings. This concept is itself logical and has been supported by the analysis of the relationship between floor area and willingness to pay.

However, it cannot be denied that such sewerage charges are not directly connected to the actual quantity/quality of wastewater discharges by beneficiaries. In the event the Central Sewerage Zone is entirely served with piped water, they can be switched for sewerage charges directly based on wastewater discharges. In such a case, the house will be charged Rp. 133 per cubic meter of wastewater discharges. Similarly, the establishment or institution excluding the high rise building will be charged Rp. 232 on average. In case of the high rise building Rp. 350 will be charged (The average price of wastewater discharges per cubic meter across the three types of properties works out at Rp. 167. Refer to Table 9.11).

In other words, the unit price of wastewater discharged by establishment/institution is 1.7 times higher than the unit price for the house under the proposed sewerage charges. Also, the unit price for the high rise building is 2.6 times higher than that for the house. This is an example of the so-called cross-subsidy.

According to the questionnaire survey, the price of piped water per cubic meter for the household is calculated at Rp. 523. It means that so far as households are concerned the unit price of wastewater discharges is 25.4% of that of piped water. The average piped household consumes 19.8 cubic meter of water per month, paying monthly water supply charge of Rp. 10,347. The average monthly household income is estimated at Rp. 261,167. That is to say, water supply charge corresponds to 4% of household income. Under the proposed sewerage charges the average household will monthly pay Rp. 2,633 for wastewater discharges. It accounts for 1% of household income. Thus, the combined share of water supply and sewerage charges in household income comes to 5%.

9.5 Financial Analysis

9.5.1 Preconditions and Assumptions

Financial analysis was done in the form of income statement and funds statement projections for 30 years starting in 1992 and ending in 2021.

The sewerage enterprise is a full-fledged business entity serving its beneficiaries over the entire Central Sewerage Zone.

Already sewerage facilities have been constructed in some part of JSSP areas and an interim organization by the name of BPAL (Badan Pengelola Air Limbah) has started taking charge of the operation and maintenance of those facilities. At the same time, BPAL has begun collecting sewerage charges from beneficiaries.

BPAL is expected to become a permanent enterprise in 1991 under the name of PDAL Jakarta (Perusahaan Daerah Air Limbah Jakarta). The construction of sewerage facilities in the Project Area will start in 1993, ending in 2000. Sewerage construction in the JSSP areas will start again in

1997 succeeding the on-going JSSP pilot project and will finish in 2000. PDAL Jakarta as one continuing entity will take care of all these developments. However, so far as financial analysis is concerned, it will be confined to the proposed two (2) future projects, including the on-going JSSP project.

The JICA Study Team does not want to burden the beneficiaries unduly with heavy sewerage charges because it considers the provision of sewerage system to the public is essentially of a social nature like the construction of public road. At the same time, it cannot be denied that sewerage construction demands enormous financial resources. It seems wise and proper, therefore, to assume that both the public and private sectors share the costs: the private sector will shoulder O/M costs and a part of capital costs. Also, the sewerage charges will be cross-subsidized so that non-domestic and commercial beneficiaries will be charged higher.

The sewerage enterprise will be a self-supporting financial entity with its own bank and account. It will conduct daily activities seeking its own benefits and profits. At the same time, it is essentially a social entity serving the general public. In this light, it is proposed that the governments not attach hard terms when they provide financial resources to the sewerage enterprise.

Based on the above considerations and convictions a series of preconditions and assumptions were given as shown in Table 9.12.

The sewerage enterprise's collection efficiency of sewerage charges is estimated at 90% because it is not practical to expect that the entire beneficiaries are ready to pay. Prices are estimated to rise six (6) percent on average per annum based on the behavior of GDP implicit deflator in the last several years. Corporate income tax will be levied at the rate of 35%.

Average floor area by type of property is estimated as shown in Table 9.6(1) based on the questionnaire survey. It provides a basic information in estimating revenues along with the number of properties.

Loans will be provided by the central government to the sewerage enterprise at an annual interest of 9% with the repayment period of 25 years and the grace period of five (5) years.

Regarding financial sources of initial costs, 90% will be granted by the governments, of which 60% will be borne by the central government and 30% by the DKI Jakarta government. The balance of 10% will be lent by the central government at afore-mentioned terms. Replacement costs of equipment such as pumps and aerators will be financed by the sewerage enterprise out of its own coffer.

All depreciable items will be subject to full depreciation. Sewerage facilities will be depreciated over 50 years, while pumps and aerators will be depreciated over 15 years. Depreciation will be done in the straight line method. Sewerage tariffs will be as described in 9.4. They are tabulated in Table 9.12(2).

9.5.2 Results of Financial Analysis

Upon the above-mentioned preconditions and assumptions financial analysis was performed. It was revealed as Table 9.17 shows that the sewerage enterprise will be financially sound and stable in terms of earnings as well as solvency except for initial few years.

To provide referential information the financial analysis focusing on the Project Area only was conducted. This is a strictly theoretical trial because financial analysis, having factors that are not reconcilable with regional or departmental division of an enterprise, is essentially intended for the entire enterprise. Nevertheless, it is revealed as a result of the analysis that what is true for the entire enterprise holds true for the project area as well as Table 9.18 shows.

9.5.3 Alternative Assumptions

Although the JICA Study Team proposes the above-mentioned preconditions and assumptions so that the three parties concerned, that is the governments, the sewerage enterprise and the private sector may be involved in the disbursement and recovery of the costs in a balanced

manner as a middle-of-the-way plan, it will add four (4) cases of alternative assumptions.

(1) Case I

In this case the conditions under which the government will provide investment funds to the sewerage enterprise will be harder so as to reduce the loads and stresses on the government budget (Refer to Table 9.13).

60% of the initial costs will be supplied by the central government as grant, while the balance of 40% will be provided by the central government or the DKI Jakarta government as loan at terms already mentioned in 9.5.1. As regards replacement costs, they will be entirely self-financed by the sewerage enterprise.

In such a case Sewerage Services Charge will be higher than the proposed one by 25%. Also, Environmental Charge will be levied on beneficiaries having no direct connections to the sewer. It will be a lump sum charge on the monthly basis, i.e. Rp. 1,000 for a household, Rp. 2,500 for an establishment/institution and Rp. 50,000 for a high rise building. Further, Capital Works Charge will be applied to the ordinary establishment/institutions at the rate of Rp. 12,000 per square meter of their buildings. It will be levied on high rise buildings at the rate of Rp. 20,000 per square meter.

Under the above-mentioned assumptions the sewerage enterprise will be financially viable except for initial few years as Table 9.19 shows.

This alternative demands a bigger role or involvement for the private sector and the sewerage enterprise in the cost recovery. This approach is more in line with the recommendations of World Bank.

(2) Case II

In this case the government will take care of the entire initial costs. Consequently, the sewerage enterprise can concentrate on the recovery of O/M and replacement costs, and financial burden on the beneficiaries will

be less. However, the squeeze on the government budget will be harder (Refer to Table 9.14).

Initial costs will be entirely granted by the central government and/or the DKI Jakarta government. But, replacement costs will be shouldered by the sewerage enterprise. Depreciation of assets will not be done in any way.

Sewerage Services Charge lower than the proposed one by 40% will be applied. Capital Works Charge will not be enforced.

Under the above assumptions one can work out a viable financial plan for the sewerage enterprise as shown in Table 9.20.

This approach is more in line with the viewpoint that sewerage is one of the basic human needs to be commonly used like public road.

(3) Case III

In this case it is assumed regarding the financial sources of capital costs that the entire initial costs will be lent to the sewerage enterprise by the central government at the interest rate of zero with the repayment period of 25 years and the grace period of five (5) years. On the other hand, replacement costs will be entirely self-financed by the sewerage enterprise.

This is another instance where the central government wants to lessen the stresses on its budget to the extent possible. It in turn means that there will be an added burden on the part of the beneficiaries.

The sewerage enterprise will enforce the sewerage tariffs exactly the same as in Case I. That is to say, the Sewerage Services Charge will be by 25% higher than the corresponding charge of JSSP. For instance, a house shall pay Rp. 35 per square meter per month. In the same way, a shop and a high rise building shall pay Rp. 50 and Rp. 175 per square meter per month, respectively. Besides, Environmental Charge will be levied on the beneficiaries in the intercepter areas at the monthly rates of Rp. 1,000 for a house, Rp. 2,500 for an ordinary establishment/institution and Rp. 50,000 for a high rise building. Furthermore, Capital Works Charge will be

imposed on establishments/institutions at the time of the construction of their buildings. The per square meter rates will be Rp. 12,000 for ordinary establishments/institutions and Rp. 20,000 for high rise buildings (Refer to Table 9.15).

Under the above-mentioned alternative assumptions one can work out a viable financial plan for the sewerage enterprise as shown in Table 9.21.

(4) Case IV

In the last case 85% of the required initial costs are assumed to be lent to the sewerage enterprise by the central government at the annual interest rate of 2.5% with the repayment period of 30 years and the grace period of 10 years (Loan conditions of OECF to Indonesia for 1990). The remaining 15% will be granted. As regards replacement costs, the entire amount will be internally financed by the sewerage enterprise.

In this alternative also the central government wants to avoid heavy budgetary involvement in the sewerage development. In this sense there will be a greater dependence on the beneficiaries in cost recovery.

The three kinds of sewerage charges will be enforced. Sewerage Services Charge will be based on the corresponding charge of JSSP. Environmental Charge will be the same as in Case I or Case III. Also, Capital Works Charge will be the same as in Case I or Case III (Refer to Table 9.16).

Under the above-mentioned assumptions one can expect that the sewerage enterprise will be financially viable in the years to come (Refer to Table 9.22).

Table 9.1(1) Total Willingness to Pay of Households and Establishments/ Institutions for Sewerage Services by Kelurahan in 1988

(Unit : Rp.)

Code No.	Name of Kelurahan	Households	Estbalishments/ Institutions	Total
	FS ZONE			
1402	Kwitang	91,544,740	19,916,140	111,460,900
1403	Kenari	52,523,030	32,565,450	85,088,480
1601	Kebon Sirih	125,544,800	37,326,310	162,871,100
1602	Gondangdia	56,126,670	25,382,070	81,508,750
1603	Cikini	70,553,060	14,051,110	84,604,180
1604	Menteng	235,383,400	28,003,330	263,386,700
1605	Pegangsaan	141,895,900	13,731,360	155,627,300
1701	Kampung Bali	122,215,200	16,308,370	138,523,500
1702	Kebon Kacang	150,894,200	25,233,750	176,127,900
1703	Kebon Melati	272,667,300	11,901,650	284,568,900
1101	Cideng	112,317,700	17,929,880	130,247,600
1102	Duri Pulo	196,959,700	21,521,100	218,480,800
1103	Petojo Utara	121,931,500	34,992,230	156,923,800
1104	Petojo Selatan	131,007,100	22,250,290	153,257,400
1105	Kebon Kelapa	88,896,910	59,340,640	148,237,600
1106	Gambir	22,552,430	53,321,440	75,873,880
1201	Mangga Dua Selatan	246,837,600	37,357,330	284,194,900
1202	Karang Anyar	184,833,700	6,956,448	191,790,100
1203	Kartini	161,683,300	5,394,456	167,077,700
1204	Pasar Baru	113,174,900	90,602,950	203,777,800
1205	Gunung Sahari Utara	102,763,800	16,629,870	119,393,600
1401	Senen	37,479,870	15,787,100	53,266,970
2206	Pademangan Barat	280,120,000	42,372,170	322,492,200
2207	Pademangan Timur	124,554,500	9,621,144	134,175,700
3201	Grogol	154,062,400	7,655,556	161,718,000
3202	Jelambar	225,720,700	10,493,700	236,214,400
3204	Tomang	256,744,000	28,099,340	284,843,300
3210	Jelambar Baru	249,029,800	12,922,810	261,952,600
3301	Pinangsia	104,653,200	11,617,010	116,270,200
3302	Mangga Besar	74,130,950	6,617,940	80,748,880
3303	Tangki	110,764,400	19,077,030	129,841,400
3304	Glodok	60,360,900	21,792,580	82,153,480
3305	Keagungan	138,514,200	8,526,892	147,041,100
3306	Krukut	125,327,200	13,438,020	138,765,200
3307	Taman Sari	115,109,800	14,335,960	129,445,700
3308	Mahpar	121,560,700	15,715,180	137,275,900
3401	Pekojan	141,267,700	14,965,390	156,233,000
3402	Roa Malaka	23,516,670	33,044,880	56,561,550
3403	Tambora	61,492,230	6,397,620	67,889,840
3404	Jembatan Lima	119,852,200	7,926,012	127,778,200
3405	Angke	146,053,600	12,057,800	158,111,400
3406	Jembatan Besi	135,041,000	10,875,430	145,916,500
3407	Krendang	116,830,600	7,450,104	124,280,700
3408	Tanah Sereal	168,936,800	8,767,968	177,704,800

Table 9.1(2) Total Willingness to Pay of Households and Establishments/ Institutions for Sewerage Services by Kelurahan in 1988

(Unit : Rp.)

Code No.	Name of Kelurahan	Households	Estbalishments/ Institutions	Total
3409	Duri Utara	114,622,300	6,591,552	121,213,900
3410	Kali Baru	129,088,300	6,004,452	135,092,700
3411	Duri Selatan	89,996,180	4,845,672	94,841,860
Sub-Total		6,227,138,000	947,715,500	7,174,853,000
JSSP ZONE				
4101	Menteng Dalam	281,680,600	18,728,380	300,408,930
4102	Tebet Barat	166,930,800	19,179,620	186,110,410
4103	Tebet Timur	133,788,700	14,689,750	148,478,440
4104	Kebon Baru	197,436,300	17,509,310	214,945,620
4105	Bukit Duri	191,982,500	13,181,280	205,163,700
4106	Manggarai Selatan	141,526,500	7,805,712	149,332,160
4107	Manggarai	162,956,500	12,117,250	175,073,780
4201	Setia Budi	49,448,270	20,331,060	69,779,328
4202	Guntur	152,308,800	15,386,160	167,694,930
4203	Karet	188,455,200	31,566,220	220,021,420
4204	Karet Semanggi	66,798,150	43,096,160	109,894,320
4205	Karet Kuningan	218,777,500	32,791,770	251,569,300
4206	Kuningan Timur	53,590,050	29,106,300	82,696,340
4207	Pasar Manggis	147,738,400	8,595,672	156,334,072
4208	Menteng Atas	239,177,000	45,960,690	285,137,680
Sub-Total		2,392,595,000	330,045,400	2,722,641,000
TOTAL		8,619,733,000	1,277,761,000	9,897,494,000

Table 9.2(1) Total Willingness to Pay of Households and Establishments/ Institutions for Sewerage Services by Kelurahan in 2010

(Unit : Rp.)

Code No.	Name of Kelurahan	Households	Estbalishments/ Institutions	Total
	FS ZONE			
1402	Kwitang	166,271,100	119,371,300	285,642,400
1403	Kenari	102,320,700	267,834,600	370,155,300
1601	Kebon Sirih	238,422,300	384,850,300	623,272,600
1602	Gondangdia	204,442,000	406,755,800	611,197,800
1603	Cikini	155,814,800	297,843,300	453,658,100
1604	Menteng	548,787,100	49,995,480	598,782,580
1605	Pegangsaan	280,023,400	23,996,730	304,020,130
1701	Kampung Bali	242,985,500	193,244,200	436,229,700
1702	Kebon Kacang	292,248,300	160,503,800	452,752,100
1703	Kebon Melati	525,913,800	100,911,600	626,825,400
1101	Cideng	219,450,900	57,773,450	277,224,300
1102	Duri Pulo	360,014,200	52,028,030	412,042,200
1103	Petojo Utara	238,814,200	125,185,200	363,999,400
1104	Petojo Selatan	284,379,800	101,184,300	385,564,100
1105	Kebon Kelapa	172,835,500	153,021,700	325,857,200
1106	Gambir	168,892,200	96,518,400	265,410,600
1201	Mangga Dua Selatan	459,511,100	272,569,500	732,080,600
1202	Karang Anyar	340,124,600	40,895,230	381,019,800
1203	Kartini	299,796,600	49,557,860	349,354,400
1204	Pasar Baru	248,055,000	156,590,200	404,645,200
1205	Gunung Sahari Utara	180,625,400	35,579,110	216,204,510
1401	Senen	67,542,020	31,289,990	98,832,000
2206	Pademangan Barat	497,056,200	202,428,400	699,484,600
2207	Pademangan Timur	366,642,300	36,318,590	402,960,900
3201	Grogol	304,272,200	13,363,380	317,635,500
3202	Jelambar	436,864,300	18,335,060	455,199,360
3204	Tomang	516,910,800	48,569,660	565,480,500
3210	Jelambar Baru	478,251,500	21,616,570	499,868,070
3301	Pinangsia	206,781,600	20,257,520	227,039,100
3302	Mangga Besar	140,552,600	11,463,280	152,015,900
3303	Tangki	203,102,200	85,995,720	289,097,900
3304	Glodok	110,381,600	89,924,680	200,306,300
3305	Keagungan	250,934,200	63,176,870	314,111,100
3306	Krukut	233,273,200	81,931,180	315,204,400
3307	Taman Sari	217,819,700	24,773,820	242,593,600
3308	Mahpar	227,386,100	26,842,280	254,228,400
3401	Pekojan	243,636,800	23,458,310	267,095,100
3402	Roa Malaka	48,147,270	56,322,020	104,469,300
3403	Tambora	105,575,900	10,807,230	116,383,200
3404	Jembatan Lima	203,610,800	46,231,530	249,842,300
3405	Angke	248,016,600	75,857,910	323,874,500
3406	Jembatan Besi	225,872,300	18,703,550	244,575,900
3407	Krendang	196,069,600	38,179,460	234,249,100
3408	Tanah Sereal	286,563,200	62,476,130	349,039,400

Table 9.2(2) Total Willingness to Pay of Households and Establishments/ Institutions for Sewerage Services by Kelurahan in 2010

(Unit : Rp.)

Code No.	Name of Kelurahan	Households	Estbalishments/ Institutions	Total
3409	Duri Utara	199,550,100	45,408,520	244,958,700
3410	Kali Baru	211,478,500	24,469,670	235,948,100
3411	Duri Selatan	152,563,000	28,827,830	181,390,900
Sub-Total		12,108,580,000	4,353,240,000	16,461,820,000
	JSSP ZONE			
4101	Menteng Dalam	635,356,800	34,052,680	669,409,430
4102	Tebet Barat	385,440,100	37,675,180	423,115,260
4103	Tebet Timur	308,935,000	26,778,710	335,713,680
4104	Kebon Baru	416,770,800	30,856,700	447,627,460
4105	Bukit Duri	357,144,200	23,428,690	380,572,920
4106	Manggarai Selatan	251,260,100	13,460,320	264,720,470
4107	Manggarai	305,060,700	56,891,070	361,951,710
4201	Setia Budi	122,379,800	35,871,420	158,251,260
4202	Guntur	305,517,300	28,733,250	334,250,590
4203	Karet	377,217,700	91,307,960	468,525,710
4204	Karet Semanggi	167,336,700	230,261,200	397,597,820
4205	Karet Kuningan	476,561,400	81,634,930	558,196,320
4206	Kuningan Timur	192,838,600	87,368,880	280,207,490
4207	Pasar Manggis	308,634,900	40,471,900	349,106,810
4208	Menteng Atas	476,201,800	94,476,890	570,678,700
Sub-Total		5,086,656,000	913,269,800	5,999,925,000
TOTAL		17,195,240,000	5,266,510,000	22,461,750,000

Table 9.3 Total Willingness to Pay for Sewerage Service by Type of Properties

(Unit : Rp.)

Property	Project Area	JSSP Area	Total
1. Year 1988			
Household	6,227,138,000	2,392,595,000	8,619,733,000
Shop	263,572,400	76,767,410	340,339,800
Factory	19,892,400	6,316,200	26,208,600
Hotel	8,554,896	619,920	9,174,816
Restaurant	26,021,950	6,969,024	32,990,980
Hospital	22,692,540	9,656,400	32,348,940
Office	158,639,300	12,166,080	170,805,400
School	78,732,840	31,567,850	110,300,700
Religeous Institutions	89,559,560	36,437,340	125,996,900
Others	66,960,910	17,861,060	84,821,980
High Rise Building	213,088,800	131,684,100	344,772,800
2. Year 2010			
Household	12,108,580,000	5,086,656,000	17,195,240,000
Shop	1,338,974,000	190,160,600	1,529,135,000
Factory	31,621,090	3,348,115	34,969,200
Hotel	65,013,570	1,270,624	66,284,190
Restaurant	99,377,200	19,547,820	118,925,000
Hospital	122,712,400	26,389,750	149,102,100
Office	697,778,800	31,717,210	729,496,000
School	278,370,800	77,848,110	356,218,900
Religeous Institutions	337,254,000	86,517,970	423,772,000
Others	294,329,900	42,982,290	337,312,200
High Rise Building	1,087,808,000	433,487,200	1,521,295,000

Table 9.4 Tariff of Sewerage Discharge Services based on Floor Area

(Unit : Rp./m2/month)

Classification of Customers	Class A	B	C	D
I. Residential	28			
II. Small Commercial				
1 Shop or Retailer	40	-	-	-
2 Office	40	-	-	-
3 Building Materials	40	-	-	-
4 Hair Dresser	-	44	-	-
5 Catering	-	-	56	-
6 Restaurant	-	-	-	60
7 Motel	-	-	-	60
8 Others	-	-	-	60
III. Large Commercial				
1 High Rise Building	140	-	-	-
2 Offices including Restaurant and Fitness Centre	-	154	-	-
3 Apartment	-	-	210	-
4 Amusement Centre	-	-	-	224
5 Private Hospital	-	-	-	224
6 Hotel	-	-	-	224
IV. Industry				
1 Home Industry	40	-	-	-
2 Craftmen	40	-	-	-
3 Pharmaceutical Industry	-	44	-	-
4 Ice Making Plant	-	-	168	-
5 Beverage Factory	-	-	-	172
6 Fabric Industry	-	-	-	172
7 Fishery Industry	-	-	-	172
V. Social Institution				
1 Mosque, Church, Kuil	40	-	-	-
2 School	40	-	-	-
3 Public Swimming Pool	40	-	-	-
4 Government Institution	40	-	-	-
5 District's Clinic	-	44	-	-
6 Other Government Institutions	40	-	-	-
7 School Including Dormitory	-	-	68	-
8 Public Clinic	-	-	-	72
9 Public Hospital	-	-	-	72

Definition :

Class A = Basic Tariff

Class B = Wastewater Quality > Domestic Waste Quality (BOD 5 = 300 mg/l)

Class C = Wastewater Quantity > Domestic Waste Quantity (Q = 40 m3/month)

Class D = Wastewater Quality & Quantity > Domestic Waste Quality & Quantity

Source : BPAL

Table 9.5 Estimated Revenues from High Rise Buildings - Central Sewerage Zone

(Unit: Rp.Million)

No.	Year	Sewerage Sevices Charge			Capital Works Charge			Total		
		Total	High Rise Bldg.	Ratio	Total	High Rise Bldg.	Ratio	Total	High Rise Bldg.	Ratio
		(1)	(2)	(3)=(2)/(1)x100	(1)	(2)	(3)=(2)/(1)x100	(1)	(2)	(3)=(2)/(1)x100
1	1992	753	620	82.29	0	0	-	753	620	82.29
2	1993	1,364	1,154	84.66	0	0	-	1,364	1,154	84.66
3	1994	1,406	1,197	85.13	0	0	-	1,406	1,197	85.13
4	1995	1,408	1,187	84.99	0	0	-	1,408	1,187	84.99
5	1996	1,408	1,187	84.99	0	0	-	1,408	1,187	84.99
6	1997	4,184	2,055	49.13	4,214	4,214	100.00	8,398	6,270	74.66
7	1998	7,132	2,998	42.04	5,227	5,227	100.00	12,359	8,225	66.55
8	1999	11,161	4,283	38.38	9,426	9,426	100.00	20,586	13,709	66.59
9	2000	15,427	5,702	36.96	9,715	9,715	100.00	25,142	15,417	61.32
10	2001	15,838	5,920	37.38	1,301	1,301	100.00	17,139	7,222	42.14
11	2002	16,249	6,139	37.78	1,301	1,301	100.00	17,550	7,440	42.40
12	2003	16,659	6,358	38.16	1,301	1,301	100.00	17,961	7,659	42.64
13	2004	17,070	6,576	38.52	1,301	1,301	100.00	18,371	7,878	42.88
14	2005	17,481	6,795	38.87	1,301	1,301	100.00	18,782	8,096	43.11
15	2006	17,892	7,013	39.20	1,301	1,301	100.00	19,193	8,315	43.32
16	2007	18,302	7,232	39.51	1,301	1,301	100.00	19,604	8,533	43.53
17	2008	18,713	7,451	39.82	1,301	1,301	100.00	20,014	8,752	43.73
18	2009	19,124	7,669	40.10	1,301	1,301	100.00	20,425	8,971	43.92
19	2010	19,535	7,888	40.38	1,301	1,301	100.00	20,836	9,189	44.10
20	2011	19,535	7,888	40.38	0	0	-	19,535	7,888	40.38
21	2012	19,535	7,888	40.38	0	0	-	19,535	7,888	40.38
22	2013	19,535	7,888	40.38	0	0	-	19,535	7,888	40.38
23	2014	19,535	7,888	40.38	0	0	-	19,535	7,888	40.38
24	2015	19,535	7,888	40.38	0	0	-	19,535	7,888	40.38
25	2016	19,535	7,888	40.38	0	0	-	19,535	7,888	40.38
26	2017	19,535	7,888	40.38	0	0	-	19,535	7,888	40.38
27	2018	19,535	7,888	40.38	0	0	-	19,535	7,888	40.38
28	2019	19,535	7,888	40.38	0	0	-	19,535	7,888	40.38
29	2020	19,535	7,888	40.38	0	0	-	19,535	7,888	40.38
30	2021	19,535	7,888	40.38	0	0	-	19,535	7,888	40.38
Total		435,986	176,214	40.42	41,595	41,595	100.00	477,581	217,809	45.61
Total in Present Value		92,843	38,598	41.57	16,899	16,899	100.00	109,742	55,497	50.57

Note : Revenues are at 1990 prices.
: Present values are estimated at the discount rate of 9.0 % per annum.

Source : JICA

Table 9.6 Estimated Revenues from High Rise Buildings - Project Area

(Unit: Rp.Million)

No.	Year	Sewerage Sevices Charge			Capital Works Charge			Total		
		Total	High Rise Bldg.	Ratio	Total	High Rise Bldg.	Ratio	Total	High Rise Bldg.	Ratio
		(1)	(2)	(3)=(2)/(1)x100	(1)	(2)	(3)=(2)/(1)x100	(1)	(2)	(3)=(2)/(1)x100
1	1992	0	0	-	0	0	-	0	0	-
2	1993	0	0	-	0	0	-	0	0	-
3	1994	0	0	-	0	0	-	0	0	-
4	1995	0	0	-	0	0	-	0	0	-
5	1996	0	0	-	0	0	-	0	0	-
6	1997	2,775	858	30.92	4,214	4,214	100.00	6,990	5,073	72.57
7	1998	5,724	1,801	31.47	5,227	5,227	100.00	10,950	7,028	64.18
8	1999	8,845	2,830	31.99	5,227	5,227	100.00	14,072	8,056	57.25
9	2000	12,140	3,843	32.48	5,227	5,227	100.00	17,366	9,170	52.80
10	2001	12,486	4,113	32.94	1,012	1,012	100.00	13,498	5,125	37.97
11	2002	12,832	4,283	33.38	1,012	1,012	100.00	13,845	5,295	38.25
12	2003	13,178	4,453	33.79	1,012	1,012	100.00	14,191	5,465	38.51
13	2004	13,525	4,623	34.18	1,012	1,012	100.00	14,537	5,635	38.76
14	2005	13,871	4,793	34.55	1,012	1,012	100.00	14,884	5,805	39.01
15	2006	14,218	4,963	34.91	1,012	1,012	100.00	15,230	5,975	39.23
16	2007	14,564	5,133	35.25	1,012	1,012	100.00	15,576	6,145	39.45
17	2008	14,910	5,303	35.57	1,012	1,012	100.00	15,923	6,316	39.66
18	2009	15,257	5,473	35.88	1,012	1,012	100.00	16,269	6,486	39.86
19	2010	15,603	5,643	36.17	1,012	1,012	100.00	16,615	6,656	40.06
20	2011	15,603	5,643	36.17	0	0	-	15,603	5,643	36.17
21	2012	15,603	5,643	36.17	0	0	-	15,603	5,643	36.17
22	2013	15,603	5,643	36.17	0	0	-	15,603	5,643	36.17
23	2014	15,603	5,643	36.17	0	0	-	15,603	5,643	36.17
24	2015	15,603	5,643	36.17	0	0	-	15,603	5,643	36.17
25	2016	15,603	5,643	36.17	0	0	-	15,603	5,643	36.17
26	2017	15,603	5,643	36.17	0	0	-	15,603	5,643	36.17
27	2018	15,603	5,643	36.17	0	0	-	15,603	5,643	36.17
28	2019	15,603	5,643	36.17	0	0	-	15,603	5,643	36.17
29	2020	15,603	5,643	36.17	0	0	-	15,603	5,643	36.17
30	2021	15,603	5,643	36.17	0	0	-	15,603	5,643	36.17
Total		341,564	120,293	35.22	30,016	30,016	100.00	371,580	150,309	40.45
Total in Present Value		69,951	24,052	34.38	12,286	12,286	100.00	82,237	36,338	44.19

Note : Revenues are at 1990 prices.
: Present values are estimated at the discount rate of 9.0 % per annum.

Source : JICA

Table 9.7 Estimated Revenues from High Rise Buildings - JSSP Area

(Unit: Rp.Million)

No.	Year	Sewerage Sevices Charge			Capital Works Charge			Total		
		Total	High Rise Bldg.	Ratio	Total	High Rise Bldg.	Ratio	Total	High Rise Bldg.	Ratio
		(1)	(2)	(3)=(2)/(1)x100	(1)	(2)	(3)=(2)/(1)x100	(1)	(2)	(3)=(2)/(1)x100
1	1992	753	620	82.29	0	0	-	753	620	82.29
2	1993	1,364	1,154	84.66	0	0	-	1,364	1,154	84.66
3	1994	1,406	1,197	85.13	0	0	-	1,406	1,197	85.13
4	1995	1,408	1,197	84.99	0	0	-	1,408	1,197	84.99
5	1996	1,408	1,197	84.99	0	0	-	1,408	1,197	84.99
6	1997	1,408	1,197	84.99	0	0	-	1,408	1,197	84.99
7	1998	1,408	1,197	84.99	0	0	-	1,408	1,197	84.99
8	1999	2,316	1,454	62.77	4,199	4,199	100.00	6,515	5,653	86.77
9	2000	3,287	1,759	53.50	4,488	4,488	100.00	7,776	6,247	80.34
10	2001	3,352	1,807	53.92	289	289	100.00	3,641	2,096	57.58
11	2002	3,416	1,856	54.33	289	289	100.00	3,705	2,145	57.89
12	2003	3,481	1,904	54.72	289	289	100.00	3,770	2,194	58.19
13	2004	3,545	1,953	55.09	289	289	100.00	3,834	2,242	58.48
14	2005	3,609	2,002	55.46	289	289	100.00	3,899	2,291	58.76
15	2006	3,674	2,050	55.81	289	289	100.00	3,963	2,339	59.03
16	2007	3,738	2,099	56.14	289	289	100.00	4,027	2,388	59.29
17	2008	3,803	2,147	56.47	289	289	100.00	4,092	2,437	59.55
18	2009	3,867	2,196	56.79	289	289	100.00	4,156	2,485	59.79
19	2010	3,931	2,245	57.09	289	289	100.00	4,221	2,534	60.03
20	2011	3,931	2,245	57.08	0	0	-	3,931	2,245	57.09
21	2012	3,931	2,245	57.09	0	0	-	3,931	2,245	57.09
22	2013	3,931	2,245	57.09	0	0	-	3,931	2,245	57.09
23	2014	3,931	2,245	57.09	0	0	-	3,931	2,245	57.09
24	2015	3,931	2,245	57.09	0	0	-	3,931	2,245	57.09
25	2016	3,931	2,245	57.08	0	0	-	3,931	2,245	57.09
26	2017	3,931	2,245	57.09	0	0	-	3,931	2,245	57.09
27	2018	3,931	2,245	57.09	0	0	-	3,931	2,245	57.09
28	2019	3,931	2,245	57.09	0	0	-	3,931	2,245	57.08
29	2020	3,931	2,245	57.08	0	0	-	3,931	2,245	57.09
30	2021	3,931	2,245	57.09	0	0	-	3,931	2,245	57.09
Total		94,422	55,921	59.22	11,578	11,578	100.00	106,001	67,500	63.68
Total in Present Value		22,892	14,546	63.54	4,613	4,613	100.00	27,505	19,159	69.66

Note : Revenues are at 1990 prices.
: Present values are estimated at the discount rate of 9.0 % per annum.

Source : JICA

Table 9.8 Estimated Project Costs - Central Sewerage Zone

(Unit: Rp. million)

No.	Year	O/M Costs	Capital Costs	Total
1	1992	532	58,500	59,032
2	1993	552	34,700	35,252
3	1994	573	56,600	57,173
4	1995	594	76,100	76,694
5	1996	617	69,900	70,517
6	1997	968	53,000	53,968
7	1998	1,936	61,200	63,136
8	1999	2,941	100,700	103,641
9	2000	3,947	95,800	99,747
10	2001	4,432	0	4,432
11	2002	4,918	0	4,918
12	2003	5,403	0	5,403
13	2004	5,889	0	5,889
14	2005	6,375	0	6,375
15	2006	6,860	0	6,860
16	2007	7,346	0	7,346
17	2008	7,831	0	7,831
18	2009	8,317	0	8,317
19	2010	8,803	0	8,803
20	2011	8,803	6,800	15,603
21	2012	8,803	3,800	12,603
22	2013	8,803	1,900	10,703
23	2014	8,803	1,900	10,703
24	2015	8,803	12,800	21,603
25	2016	8,803	0	8,803
26	2017	8,803	0	8,803
27	2018	8,803	0	8,803
28	2019	8,803	0	8,803
29	2020	8,803	0	8,803
30	2021	8,803	0	8,803
	Total	175,667	633,700	809,367
Total in Present Value		34,260	357,478	391,738

Note : Costs are at 1990 prices.
O/M costs include overhead costs.
Present values are estimated at the annual discount rate of 9.0 %.

Source : JICA

Table 9.9 Estimated Project Costs - Project Area

(Unit: Rp. million)

No.	Year	O/M Costs	Capital Costs	Total
1	1992	0	9,500	9,500
2	1993	0	34,700	34,700
3	1994	0	56,600	56,600
4	1995	0	76,100	76,100
5	1996	0	67,400	67,400
6	1997	328	23,000	23,328
7	1998	1,271	35,400	36,671
8	1999	2,206	73,700	75,906
9	2000	2,960	68,900	71,860
10	2001	3,324	0	3,324
11	2002	3,688	0	3,688
12	2003	4,053	0	4,053
13	2004	4,417	0	4,417
14	2005	4,781	0	4,781
15	2006	5,145	0	5,145
16	2007	5,509	0	5,509
17	2008	5,874	0	5,874
18	2009	6,238	0	6,238
19	2010	6,602	0	6,602
20	2011	6,602	6,800	13,402
21	2012	6,602	2,000	8,602
22	2013	6,602	0	6,602
23	2014	6,602	0	6,602
24	2015	6,602	10,900	17,502
25	2016	6,602	0	6,602
26	2017	6,602	0	6,602
27	2018	6,602	0	6,602
28	2019	6,602	0	6,602
29	2020	6,602	0	6,602
30	2021	6,602	0	6,602
	Total	129,018	465,000	594,017
Total in Present Value		23,861	260,482	284,343

Note : Costs are at 1990 prices.
O/M costs include overhead costs.
Present values are estimated at the annual discount rate of 9.0 %.

Source : JICA

Table 9.10 Estimated Project Costs - JSSP Area

(Unit: Rp. million)

No.	Year	O/M Costs	Capital Costs	Total
1	1992	532	49,000	49,532
2	1993	552	0	552
3	1994	573	0	573
4	1995	594	0	594
5	1996	617	2,500	3,117
6	1997	640	30,000	30,640
7	1998	664	25,800	26,464
8	1999	735	27,000	27,735
9	2000	987	26,900	27,887
10	2001	1,108	0	1,108
11	2002	1,229	0	1,229
12	2003	1,351	0	1,351
13	2004	1,472	0	1,472
14	2005	1,594	0	1,594
15	2006	1,715	0	1,715
16	2007	1,836	0	1,836
17	2008	1,958	0	1,958
18	2009	2,079	0	2,079
19	2010	2,201	0	2,201
20	2011	2,201	0	2,201
21	2012	2,201	1,800	4,001
22	2013	2,201	1,900	4,101
23	2014	2,201	1,900	4,101
24	2015	2,201	1,900	4,101
25	2016	2,201	0	2,201
26	2017	2,201	0	2,201
27	2018	2,201	0	2,201
28	2019	2,201	0	2,201
29	2020	2,201	0	2,201
30	2021	2,201	0	2,201
	Total	46,645	168,700	215,345
Total in Present Value		10,399	96,879	107,278

Note : Costs are at 1990 prices.
O/M costs include overhead costs.
Present values are estimated at the annual discount rate of 9.0 %.

Source : JICA

Table 9.11 Sewerage Charges per Unitary Discharges of Wastewater

Item		House	Establishment/ Institution	High Rise Building	Average
Average Monthly Discharges of Wastewater per Customer		28 m3	96 m3	6,780 m3	35 m3
Average Monthly Sewerage Charges per Customer	Sewerage Services Charge	Rp 3,724	Rp 22,237	Rp 1,979,320	Rp 5,588
	Capital Works Charge *	-	-	Rp 392,722	Rp 202
	Total	Rp 3,724	Rp 22,237	Rp 2,372,042	Rp 5,789
Average Sewerage Charges per m3 of Wastewater Discharges	Sewerage Services Charge	Rp 133	Rp 232	Rp 292	Rp 160
	Capital Works Charge *	-	-	Rp 58	Rp 6
	Total	Rp 133	Rp 232	Rp 350	Rp 167

Note : * Capital Works Charge is levied only once upon the construction of a building. However, it is recalculated here on monthly basis.

Above figures are based on the proposed tariffs.(Refer to Table 9.8(2).)

Source : JICA

Table 9.12(1) Proposed Preconditions and Assumptions for Financial Analysis

I. Preconditions

1. Collection rate of sewerage charges : 90 %
2. Annual rate of price escalation : 6 %
3. Rate of tax on corporate income : 35 %
4. Average floor area by type of property

(Unit: m^2 / building)

Type of Property	House	Shop	Factory	Hotel	Restaurant	Hospital
Floor Area	133	167	437	728	140	1,259
Type of Property	Office	School	Religious Institution	Others	High Rise Building	
Floor Area	692	1,150	513	636	14,138	

Note : Based on the questionnaire survey

II. Assumptions

1. Terms of loans from central government
   Annual rate of interest : 9 %
   Repayment period : 25 years
   Grace period : 5 years

2. Financial sources of capital costs

   1) Initial costs
      60% : Grant from central government
      30% : Grant from DKI Jakarta government
      10% : Loan from central government

   2) Replacement costs
      To be self-financed by PDAL Jakarta

3. Depreciation

   1) Depreciation periods
      (1) Facilities : 50 years
      (2) Pumps & Aerators : 15 years

   2) Depreciable assets
      All depreciable assets are subject to depreciation.

Table 9.12(2) Proposed Preconditions and Assumptions for Financial Analysis

4. Sewerage tariffs

1) Sewerage services charge

(Unit: Rp/ m^2/ month)

Type of Property	House	Shop	Factory	Hotel	Restaurant	Hospital
Floor Area	28	40	100	100	60	100

Type of Property	Office	School	Religions Institution	Others	High Rise Building		
					Commer-cial	Institu-tional	Aver-age
Floor Area	40	40	40	40	200	50	140

Note: Based on the JSSP tariff now in force

2) Capital works charge
Type of property : High rise building
Charge : Rp 10,000

5. Application of capital works charge for existing high rise buildings

Degree of Treatment	Rate of Application	Existing Share
Toilet waste only	100 %	70 %
Both toilet waste & gray water, without aerator	50 %	25 %
Both toilet waste & gray water, with aerator	-	5 %

Source: JICA

Table 9.13 Alternative Assumptions Case I for Financial Analysis

1. Financial sources of capital costs

1) Initial costs
60% : Grant from central government
40% : Loan from central government

2) Replacement costs
To be self-financed by PDAL Jakarta

2. Sewerage tariffs

1) Sewerage services charge

(Unit: Rp/ m^2/ month)

Type of Property	House	Shop	Factory	Hotel	Restaurant	Hospital
Charge	35	50	125	125	75	125

Type of Property	Office	School	Religious Institution	Others	High Rise Building		
					Commer-cial	Institu-tional	Aver-age
Charge	50	50	50	50	250	63	175

Note: Higher than the JSSP tariff by 25%

2) Environmental charge

(Unit: Rp/month)

Type of Property	Home	Shop - - - Others	High Rise Building
Charge	1,000	2,500	50,000

3) Capital works charge

(Unit: Rp/ m^2)

Type of Property	Home	Shop - - - Others	High Rise Building
Charge	-	12,000	20,000

Source: JICA

Table 9.14 Alternative Assumptions Case II for Financial Analysis

1. Financial sources of capital costs

1) Initial costs

To be granted by central government

2) Replacement costs

To be self-financed by PDAL Jakarta

2. Depreciation

No assets will be subject to depreciation.

3. Sewerage tariffs

1) Sewerage services charge

(Unit: Rp/ m^2/ month)

Type of Property	House	Shop	Factory	Hotel	Restaurant	Hospital	
Charge	17	24	60	60	36	60	
Type of Property	Office	School	Religious Institution	Others	High Rise Building		
					Commer-cial	Institu-tional	Aver-age
Charge	24	24	24	24	120	30	84

Note: Lower than the JSSP tariff by 40%

2) Capital works charge

Capital works charge will not be applied.

Source: JICA

Table 9.15 Alternative Assumptions Case III for Financial Analysis

1. Terms of loans from central government

Annual rate of interest	: 0 %
Repayment period	: 25 years
Grace period	: 5 years

2. Financial sources of capital costs

1) Initial costs

To be lent by central government

2) Replacement costs

To be self-financed by PDAL Jakarta

3. Sewerage tariffs

1) Sewerage services charge

(Unit: Rp/ m^2/ month)

Type of Property	House	Shop	Factory	Hotel	Restaurant	Hospital	
Charge	35	50	125	125	75	125	
Type of Property	Office	School	Religious Institution	Others	High Rise Building		
					Commercial	Institutional	Average
Charge	50	50	50	50	250	63	175

Note: Higher than the JSSP tariff by 25%

2) Environmental charge

(Unit: Rp/month)

Type of Property	Home	Shop - - - Others	High Rise Building
Charge	1,000	2,500	50,000

3) Capital works charge

(Unit: Rp/ m^2)

Type of Property	Home	Shop - - - Others	High Rise Building
Charge	-	12,000	20,000

Source: JICA

Table 9.16 Alternative Assumptions Case IV for Financial Analysis

1. Terms of loans from central government
   Annual rate of interest : 2.5 %
   Repayment period : 30 years
   Grace period : 10 years

2. Financial sources of capital costs

   1) Initial costs
      15% : Grant from central government
      85% : Loan from central government
      (Loan conditions of OECF to Indonesia for 1990)
   2) Replacement costs
      To be self-financed by PDAL Jakarta

3. Sewerage tariffs

   1) Sewerage services charge

(Unit: Rp/ m^2/ month)

Type of Property	House	Shop	Factory	Hotel	Restaurant	Hospital
Floor Area	28	40	100	100	60	100

Type of Property	Office	School	Religions Institution	Others	High Rise Building		
					Commer-cial	Institu-tional	Aver-age
Floor Area	40	40	40	40	200	50	140

Note: Based on the JSSP tariff now in force

   2) Environmental charge

(Unit: Rp/month)

Type of Property	Home	Shop - - - Others	High Rise Building
Charge	1,000	2,500	50,000

3) Capital works charge

(Unit: Rp/ m^2)

Type of Property	Home	Shop - - - Others	High Rise Building
Charge	-	12,000	20,000

Source: JICA

Table 9.17 (1) Financial Statement - Proposed Plan

(Unit: Rp.Million)

No.	1	2	3	4	5	6	7	8	9	10
Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Income Statement										
Sewerage Service Charge	846	1,624	1,775	1,885	1,998	6,291	11,367	18,856	27,628	30,065
Capital Works Charge	0	0	0	0	0	6,337	8,330	15,924	17,398	2,470
Other Revenues	0	0	0	0	0	0	0	0	0	0
Revenue	846	1,624	1,775	1,885	1,998	12,628	19,698	34,780	45,025	32,535
Operation and Maintenance	588	657	723	795	875	1,455	3,085	4,969	7,069	8,414
Depreciation	190	884	2,016	3,538	5,253	6,491	7,803	9,906	12,419	12,419
Payment of Interest	0	0	0	0	0	148	717	1,692	3,068	4,375
Expenditure	788	1,541	2,739	4,333	6,128	8,094	11,606	16,568	22,556	25,208
Profit before Tax	59	83	-964	-2,449	-4,130	4,534	8,092	18,213	22,470	7,327
Tax	21	29	0	0	0	1,587	2,832	6,374	7,864	2,565
Profit after Tax	38	54	-964	-2,449	-4,130	2,947	5,260	11,838	14,605	4,763
Funds Statement										
Profit after Tax	38	54	-964	-2,449	-4,130	2,947	5,260	11,838	14,605	4,763
Loans	1,067	4,133	7,146	10,184	9,915	7,969	9,754	17,013	17,156	0
Grants	58,807	37,195	64,311	91,655	89,239	71,723	87,789	153,117	154,407	0
Depreciation	190	884	2,016	3,538	5,253	6,491	7,803	9,906	12,419	12,419
Sources	59,902	42,266	72,508	102,928	100,277	89,130	110,607	191,875	198,588	17,182
Capital Works	59,674	41,328	71,456	101,839	99,154	79,692	97,543	170,130	171,563	0
Payment of Principal	0	0	0	0	0	32	159	389	730	1,094
Working Capital	228	938	1,052	1,089	1,123	9,406	12,904	21,356	26,295	16,088
Applications	59,902	42,266	72,508	102,928	100,277	89,130	110,607	191,875	198,588	17,182
Loan Liabilities	1,163	5,773	14,081	26,449	39,637	51,711	66,121	88,535	111,406	115,964

Source: JICA

Table 9.17 (2) Financial Statement - Proposed Plan

(Unit: Rp.Million)

No.	11	12	13	14	15	16	17	18	19	20
Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Income Statement										
Sewerage Service Charge	32,695	35,533	38,594	41,894	45,451	49,284	53,413	57,861	62,650	66,409
Capital Works Charge	2,619	2,776	2,942	3,119	3,306	3,504	3,714	3,937	4,174	0
Other Revenues	0	0	0	0	0	0	0	0	0	0
Revenue	35,314	38,309	41,536	45,013	48,757	52,788	57,128	61,798	66,824	66,409
Operation and Maintenance	9,896	11,525	13,315	15,277	17,427	19,781	22,354	25,164	28,231	29,825
Depreciation	12,419	12,419	12,419	12,419	12,419	12,419	12,419	12,419	12,419	12,873
Payment of Interest	5,380	6,602	8,791	10,939	10,644	10,323	9,972	9,590	9,174	8,720
Expenditure	27,695	30,547	34,525	38,635	40,491	42,523	44,745	47,174	49,825	51,518
Profit before Tax	7,619	7,762	7,011	6,377	8,266	10,266	12,383	14,625	16,999	14,891
Tax	2,667	2,717	2,454	2,232	2,893	3,593	4,334	5,119	5,950	5,212
Profit after Tax	4,952	5,045	4,557	4,145	5,373	6,673	8,049	9,506	11,049	9,679
Funds Statement										
Profit after Tax	4,952	5,045	4,557	4,145	5,373	6,673	8,049	9,506	11,049	9,679
Loans	0	0	0	0	0	0	0	0	0	0
Grants	0	0	0	0	0	0	0	0	0	0
Depreciation	12,419	12,419	12,419	12,419	12,419	12,419	12,419	12,419	12,419	12,873
Sources	17,372	17,465	16,977	16,564	17,792	19,092	20,468	21,925	23,469	22,553
Capital Works	0	0	0	0	0	0	0	0	0	23,117
Payment of Principal	1,432	1,854	2,532	3,276	3,571	3,893	4,243	4,625	5,041	5,495
Working Capital	15,940	15,611	14,444	13,288	14,221	15,199	16,225	17,300	18,428	-6,060
Applications	17,372	17,465	16,977	16,564	17,792	19,092	20,468	21,925	23,469	22,553
Loan Liabilities	119,589	121,896	121,543	118,267	114,696	110,803	106,560	101,935	96,894	91,399

Source: JICA

Table 9.17 (3) Financial Statement - Proposed Plan

(Unit: Rp.Million)

No.	21	22	23	24	25	26	27	28	29	30
Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Income Statement										
Sewerage Service Charge	70,393	74,617	79,094	83,840	88,870	94,202	99,854	105,846	112,196	118,928
Capital Works Charge	0	0	0	0	0	0	0	0	0	0
Other Revenues	0	0	0	0	0	0	0	0	0	0
Revenue	70,393	74,617	79,094	83,840	88,870	94,202	99,854	105,846	112,196	118,928
Operation and Maintenance	31,720	33,624	35,641	37,780	40,046	42,449	44,996	47,696	50,558	53,591
Depreciation	13,126	13,253	13,379	14,233	14,233	14,233	14,233	14,233	14,233	14,233
Payment of Interest	8,226	7,687	7,099	6,459	5,761	5,000	4,187	3,363	2,574	1,868
Expenditure	53,072	54,563	56,120	58,471	60,040	61,682	63,415	65,292	67,364	69,691
Profit before Tax	17,321	20,054	22,974	25,369	28,830	32,521	36,439	40,554	44,833	49,237
Tax	6,062	7,019	8,041	8,879	10,091	11,382	12,754	14,194	15,691	17,233
Profit after Tax	11,259	13,035	14,933	16,490	18,740	21,138	23,685	26,360	28,141	32,004
Funds Statement										
Profit after Tax	11,259	13,035	14,933	16,490	18,740	21,138	23,685	26,360	28,141	32,004
Loans	0	0	0	0	0	0	0	0	0	0
Grants	0	0	0	0	0	0	0	0	0	0
Depreciation	13,126	13,253	13,379	14,233	14,233	14,233	14,233	14,233	14,233	14,233
Sources	24,385	26,288	28,313	30,722	32,972	35,371	37,918	40,593	43,374	46,237
Capital Works	13,693	7,258	7,693	54,936	0	0	0	0	0	0
Payment of Principal	5,989	6,528	7,116	7,756	8,454	9,035	9,152	8,771	7,844	6,879
Working Capital	4,702	12,502	13,504	-31,970	24,518	26,336	28,766	31,822	35,530	39,358
Applications	24,385	26,288	28,313	30,722	32,972	35,371	37,918	40,593	43,374	46,237
Loan Liabilities	85,410	78,881	71,765	64,009	55,555	46,519	37,367	28,596	20,751	13,872

Source: JICA

Table 9.18 (1) Financial Statement (Project Area) - Proposed Plan

(Unit: Rp.Million)

No.	1	2	3	4	5	6	7	8	9	10
Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Income Statement										
Sewerage Service Charge	0	0	0	0	0	4,173	9,122	14,944	21,740	23,702
Capital Works Charge	0	0	0	0	0	6,337	8,330	8,830	9,360	1,921
Other Revenues	0	0	0	0	0	0	0	0	0	0
Revenue	0	0	0	0	0	10,510	17,453	23,774	31,101	25,624
Operation and Maintenance	0	0	0	0	0	493	2,026	3,727	5,301	6,310
Depreciation	190	884	2,016	3,538	5,203	5,757	6,465	7,939	9,825	9,825
Payment of Interest	0	0	0	0	0	148	717	1,692	3,068	4,326
Expenditure	190	884	2,016	3,538	5,203	6,397	9,208	13,358	18,194	20,462
Profit before Tax	-190	-884	-2,016	-3,538	-5,203	4,113	8,245	10,416	12,906	5,162
Tax	0	0	0	0	0	1,439	2,886	3,646	4,517	1,807
Profit after Tax	-190	-884	-2,016	-3,538	-5,203	2,673	5,359	6,770	8,389	3,355
Funds Statement										
Profit after Tax	-190	-884	-2,016	-3,538	-5,203	2,673	5,359	6,770	8,389	3,355
Loans	1,067	4,133	7,146	10,184	9,561	3,458	5,642	12,451	12,339	0
Grants	9,607	37,195	64,311	91,655	86,047	31,125	50,780	112,063	111,050	0
Depreciation	190	884	2,016	3,538	5,203	5,757	6,465	7,939	9,825	9,825
Sources	10,674	41,328	71,456	101,839	95,608	43,013	68,246	139,223	141,604	13,181
Capital Works	10,674	41,328	71,456	101,839	95,608	34,583	56,422	124,515	123,389	0
Payment of Principal	0	0	0	0	0	32	159	389	730	1,083
Working Capital	0	0	0	0	0	8,398	11,665	14,320	17,485	12,098
Applications	10,674	41,328	71,456	101,839	95,608	43,013	68,246	139,223	141,604	13,181
Loan Liabilities	1,163	5,773	14,081	26,449	39,251	46,373	55,820	72,335	88,497	91,053

Source: JICA

Table 9.18 (2) Financial Statement (Project Area) - Proposed Plan

(Unit: Rp.Million)

No.	11	12	13	14	15	16	17	18	19	20
Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Income Statement										
Sewerage Service Charge	25,821	28,109	30,579	33,244	36,118	39,218	42,559	46,161	50,041	53,044
Capital Works Charge	2,037	2,159	2,288	2,426	2,571	2,725	2,889	3,062	3,246	0
Other Revenues	0	0	0	0	0	0	0	0	0	0
Revenue	27,858	30,268	32,867	35,669	38,689	41,943	45,448	49,223	53,287	53,044
Operation and Maintenance	7,422	8,644	9,986	11,458	13,071	14,835	16,765	18,873	21,173	22,444
Depreciation	9,825	9,825	9,825	9,825	9,825	9,825	9,825	9,825	9,825	10,279
Payment of Interest	4,707	5,373	6,956	8,477	8,239	7,980	7,697	7,389	7,053	6,687
Expenditure	21,954	23,842	26,767	29,760	31,135	32,640	34,287	36,087	38,051	39,409
Profit before Tax	5,903	6,426	6,100	5,909	7,554	9,303	11,161	13,136	15,236	13,635
Tax	2,066	2,249	2,135	2,068	2,644	3,256	3,906	4,598	5,333	4,772
Profit after Tax	3,837	4,177	3,965	3,841	4,910	6,047	7,255	8,539	9,903	8,863
Funds Statement										
Profit after Tax	3,837	4,177	3,965	3,841	4,910	6,047	7,255	8,539	9,903	8,863
Loans	0	0	0	0	0	0	0	0	0	0
Grants	0	0	0	0	0	0	0	0	0	0
Depreciation	9,825	9,825	9,825	9,825	9,825	9,825	9,825	9,825	9,825	10,279
Sources	13,663	14,002	13,790	13,666	14,736	15,872	17,080	18,364	19,729	19,141
Capital Works	0	0	0	0	0	0	0	0	0	23,117
Payment of Principal	1,284	1,570	2,086	2,644	2,882	3,142	3,424	3,733	4,069	4,435
Working Capital	12,378	12,432	11,705	11,022	11,853	12,731	13,656	14,631	15,660	-8,410
Applications	13,663	14,002	13,790	13,666	14,736	15,872	17,080	18,364	19,729	19,141
Loan Liabilities	93,256	94,706	94,188	91,544	88,662	85,520	82,096	78,363	74,295	69,860

Source: JICA

Table 9.18 (3) Financial Statement (Project Area) - Proposed Plan

(Unit: Rp.Million)

No.	21	22	23	24	25	26	27	28	29	30
Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Income Statement										
Sewerage Service Charge	56,226	59,600	63,176	66,967	70,984	75,244	79,758	84,544	89,616	94,993
Capital Works Charge	0	0	0	0	0	0	0	0	0	0
Other Revenues	0	0	0	0	0	0	0	0	0	0
Revenue	56,226	59,600	63,176	66,967	70,984	75,244	79,758	84,544	89,616	94,993
Operation and Maintenance	23,780	25,218	26,731	28,335	30,035	31,837	33,747	35,772	37,918	40,193
Depreciation	10,412	10,412	10,412	11,139	11,139	11,139	11,139	11,139	11,139	11,139
Payment of Interest	6,287	5,852	5,378	4,861	4,298	3,684	3,031	2,381	1,782	1,283
Expenditure	40,490	41,482	42,521	44,335	45,471	46,659	47,916	49,292	50,839	52,615
Profit before Tax	15,737	18,118	20,655	22,632	25,513	28,584	31,842	35,252	38,777	42,378
Tax	5,508	6,341	7,229	7,921	8,930	10,005	11,145	12,338	13,572	14,832
Profit after Tax	10,229	11,777	13,426	14,711	16,584	18,580	20,697	22,914	25,205	27,546
Funds Statement										
Profit after Tax	10,229	11,777	13,426	14,711	16,584	18,580	20,697	22,914	25,205	27,546
Loans	0	0	0	0	0	0	0	0	0	0
Grants	0	0	0	0	0	0	0	0	0	0
Depreciation	10,412	10,412	10,412	11,139	11,139	11,139	11,139	11,139	11,139	11,139
Sources	20,641	22,189	23,838	25,849	27,722	29,718	31,836	34,052	36,344	38,684
Capital Works	7,207	0	0	46,781	0	0	0	0	0	0
Payment of Principal	4,834	5,269	5,743	6,260	6,823	7,258	7,214	6,659	5,542	4,429
Working Capital	8,600	16,920	18,095	-27,192	20,899	22,461	24,622	27,393	30,802	34,255
Applications	20,641	22,189	23,838	25,849	27,722	29,718	31,836	34,052	36,344	38,684
Loan Liabilities	65,026	59,757	54,014	47,754	40,931	33,673	26,458	19,800	14,258	9,829

Source: JICA

Table 9.19(1) Financial Statement - Alternative Case I

(Unit: Rp.Million)

No.	1	2	3	4	5	6	7	8	9	10
Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Income Statement										
Sewerage Service Charge	1,305	2,276	2,480	2,632	2,790	8,807	15,887	26,624	39,146	42,501
Capital Works Charge	0	0	0	0	0	38,558	49,251	70,692	76,146	11,266
Other Revenues	0	0	0	0	0	0	0	0	0	0
Revenue	1,305	2,276	2,480	2,632	2,790	47,364	65,138	97,316	115,292	53,767
Operation and Maintenance	598	657	723	795	875	1,455	3,085	4,969	7,069	8,414
Depreciation	190	884	2,016	3,538	5,253	6,491	7,803	9,906	12,419	12,419
Payment of Interest	0	0	0	0	0	591	2,869	6,770	12,271	17,500
Expenditure	788	1,541	2,739	4,333	6,128	8,537	13,757	21,645	31,759	38,333
Profit before Tax	518	735	-259	-1,701	-3,338	38,827	51,381	75,671	83,534	15,434
Tax	181	257	0	0	0	13,590	17,983	26,485	29,237	5,402
Profit after Tax	336	478	-259	-1,701	-3,338	25,238	33,397	49,186	54,297	10,032
Funds Statement										
Profit after Tax	336	478	-259	-1,701	-3,338	25,238	33,397	49,186	54,297	10,032
Loans	4,270	16,531	28,582	40,736	39,662	31,877	39,017	68,052	68,625	0
Grants	55,405	24,797	42,874	61,103	58,483	47,815	58,526	102,078	102,938	0
Depreciation	190	884	2,016	3,538	5,253	6,491	7,803	9,906	12,419	12,419
Sources	60,201	42,690	73,213	103,676	101,070	111,421	138,744	229,223	238,279	22,451
Capital Works	59,674	41,328	71,456	101,838	99,154	78,692	97,543	170,130	171,563	0
Payment of Principal	0	0	0	0	0	128	637	1,554	2,819	4,375
Working Capital	526	1,362	1,757	1,837	1,915	31,600	40,564	57,538	63,797	18,077
Applications	60,201	42,690	73,213	103,676	101,070	111,421	138,744	229,223	238,279	22,451
Loan Liabilities	4,654	23,082	56,325	105,796	158,549	206,845	264,484	354,141	445,625	463,857

Source: JICA

Table 9.19 (2) Financial Statement - Alternative Case I

(Unit: Rp.Million)

No.	11	12	13	14	15	16	17	18	19	20
Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Income Statement										
Sewerage Service Charge	46,119	50,017	54,217	58,741	63,612	68,857	74,502	80,577	87,113	92,339
Capital Works Charge	11,941	12,658	13,417	14,222	15,076	15,980	16,939	17,956	18,033	0
Other Revenues	0	0	0	0	0	0	0	0	0	0
Revenue	58,060	62,675	67,634	72,963	78,688	84,838	91,442	98,533	106,145	92,339
Operation and Maintenance	9,896	11,525	13,315	15,277	17,427	19,781	22,354	25,164	28,231	29,825
Depreciation	12,418	12,419	12,419	12,419	12,419	12,418	12,419	12,419	12,419	12,873
Payment of Interest	21,521	26,408	35,164	43,756	42,576	41,290	39,889	38,362	36,697	34,882
Expenditure	43,836	50,353	60,898	71,452	72,423	73,490	74,662	75,945	77,347	77,579
Profit before Tax	14,224	12,322	6,736	1,511	6,265	11,347	16,780	22,588	28,798	14,660
Tax	4,979	4,313	2,358	529	2,193	3,972	5,873	7,906	10,079	5,131
Profit after Tax	9,246	8,009	4,378	982	4,073	7,376	10,907	14,682	18,719	9,529
Funds Statement										
Profit after Tax	9,246	8,009	4,378	982	4,073	7,376	10,907	14,682	18,719	9,529
Loans	0	0	0	0	0	0	0	0	0	0
Grants	0	0	0	0	0	0	0	0	0	0
Depreciation	12,419	12,419	12,419	12,419	12,419	12,418	12,419	12,419	12,418	12,873
Sources	21,665	20,429	16,798	13,402	16,492	19,795	23,326	27,101	31,138	22,402
Capital Works	0	0	0	0	0	0	0	0	0	23,117
Payment of Principal	5,727	7,416	10,130	13,106	14,285	15,571	16,972	18,500	20,164	21,979
Working Capital	15,938	13,013	6,668	296	2,207	4,224	6,354	8,602	10,974	-22,695
Applications	21,665	20,429	16,798	13,402	16,492	19,795	23,326	27,101	31,138	22,402
Loan Liabilities	478,356	487,584	486,173	473,067	458,782	443,211	426,239	407,740	387,575	365,596

Source: JICA

Table 9.19 (3) Financial Statement - Alternative Case I

(Unit: Rp.Million)

No.	21	22	23	24	25	26	27	28	29	30
Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Income Statement										
Sewerage Service Charge	97,880	103,752	109,978	116,576	123,571	130,985	138,844	147,175	156,005	165,365
Capital Works Charge	0	0	0	0	0	0	0	0	0	0
Other Revenues	0	0	0	0	0	0	0	0	0	0
Revenue	97,880	103,752	109,978	116,576	123,571	130,985	138,844	147,175	156,005	165,365
Operation and Maintenance	31,720	33,624	35,641	37,780	40,046	42,449	44,996	47,696	50,558	53,591
Depreciation	13,126	13,253	13,379	14,233	14,233	14,233	14,233	14,233	14,233	14,233
Payment of Interest	32,904	30,747	28,397	25,836	23,043	20,000	16,747	13,452	10,294	7,471
Expenditure	77,750	77,624	77,418	77,848	77,322	76,681	75,976	75,381	75,085	75,294
Profit before Tax	20,130	26,129	32,560	38,728	46,249	54,304	62,868	71,794	80,920	90,071
Tax	7,045	9,145	11,396	13,555	16,187	19,006	22,004	25,128	28,322	31,525
Profit after Tax	13,084	16,984	21,164	25,173	30,062	35,297	40,865	46,666	82,598	58,546
Funds Statement										
Profit after Tax	13,084	16,984	21,164	25,173	30,062	35,297	40,865	46,666	82,598	58,546
Loans	0	0	0	0	0	0	0	0	0	0
Grants	0	0	0	0	0	0	0	0	0	0
Depreciation	13,126	13,253	13,379	14,233	14,233	14,233	14,233	14,233	14,233	14,233
Sources	26,210	30,236	34,543	39,406	44,294	49,530	55,097	60,899	66,831	72,779
Capital Works	13,693	7,258	7,693	54,936	0	0	0	0	0	0
Payment of Principal	23,957	26,114	28,464	31,026	33,818	36,142	36,608	35,085	31,377	27,516
Working Capital	-11,441	-3,135	-1,614	-46,555	10,476	13,388	18,489	25,814	35,454	45,263
Applications	26,210	30,236	34,543	39,406	44,294	49,530	55,097	60,899	66,831	72,779
Loan Liabilities	341,639	315,525	287,061	256,036	222,218	186,076	149,468	114,383	83,006	55,490

Source: JICA

Table 9.20 (1) Financial Statement - Alternative Case II

(Unit: Rp.Million)

No.	1	2	3	4	5	6	7	8	9	10
Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Income Statement										
Sewerage Service Charge	508	974	1,065	1,131	1,199	3,774	6,820	11,314	16,577	18,039
Capital Works Charge	0	0	0	0	0	0	0	0	0	0
Other Revenues	0	0	0	0	0	0	0	0	0	0
Revenue	508	974	1,065	1,131	1,199	3,774	6,820	11,314	16,577	18,039
Operation and Maintenance	598	657	723	795	875	1,455	3,085	4,969	7,069	8,414
Depreciation	0	0	0	0	0	0	0	0	0	0
Payment of Interest	0	0	0	0	0	0	0	0	0	0
Expenditure	598	657	723	795	875	1,455	3,085	4,969	7,069	8,414
Profit before Tax	-90	317	342	335	324	2,319	3,735	6,344	9,508	9,625
Tax	0	111	120	117	113	812	1,307	2,220	3,328	3,369
Profit after Tax	-90	206	222	218	210	1,507	2,428	4,124	6,180	6,256
Funds Statement										
Profit after Tax	-90	206	222	218	210	1,507	2,428	4,124	6,180	6,256
Loans	0	0	0	0	0	0	0	0	0	0
Grants	59,674	41,328	71,456	101,839	99,154	79,692	97,543	170,130	171,563	0
Depreciation	0	0	0	0	0	0	0	0	0	0
Sources	59,584	41,534	71,678	102,057	99,365	81,200	99,971	174,254	177,743	6,256
Capital Works	59,674	41,328	71,456	101,839	99,154	79,692	97,543	170,130	171,563	0
Payment of Principal	0	0	0	0	0	0	0	0	0	0
Working Capital	-90	206	222	218	210	1,508	2,428	4,124	6,180	6,256
Applications	59,584	41,534	71,679	102,057	99,365	81,200	99,971	174,254	177,743	6,256
Loan Liabilities	0	0	0	0	0	0	0	0	0	0

Source: JICA

Table 9.20 (2) Financial Statement - Alternative Case II

(Unit: Rp.Million)

No.	11	12	13	14	15	16	17	18	19	20
Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Income Statement										
Sewerage Service Charge	19,617	21,320	23,156	25,136	27,271	29,570	32,048	34,717	37,590	39,845
Capital Works Charge	0	0	0	0	0	0	0	0	0	0
Other Revenues	0	0	0	0	0	0	0	0	0	0
Revenue	19,617	21,320	23,156	25,136	27,271	29,570	32,048	34,717	37,590	39,845
Operation and Maintenance	9,896	11,525	13,315	15,277	17,427	19,781	22,354	25,164	28,231	29,925
Depreciation	0	0	0	0	0	0	0	0	0	0
Payment of Interest	0	0	0	0	0	0	0	0	0	0
Expenditure	9,896	11,525	13,315	15,277	17,427	19,781	22,354	25,164	28,231	29,925
Profit before Tax	9,722	9,795	9,842	9,859	9,843	9,790	9,695	9,553	9,359	9,920
Tax	3,403	3,428	3,445	3,451	3,445	3,426	3,393	3,343	3,276	3,472
Profit after Tax	6,318	6,367	6,397	6,408	6,398	6,363	6,301	6,209	6,083	6,448
Funds Statement										
Profit after Tax	6,319	6,367	6,397	6,408	6,398	6,363	6,301	6,209	6,083	6,448
Loans	0	0	0	0	0	0	0	0	0	0
Grants	0	0	0	0	0	0	0	0	0	0
Depreciation	0	0	0	0	0	0	0	0	0	0
Sources	6,319	6,367	6,397	6,408	6,398	6,363	6,301	6,209	6,083	6,448
Capital Works	0	0	0	0	0	0	0	0	0	23,117
Payment of Principal	0	0	0	0	0	0	0	0	0	0
Working Capital	6,319	6,367	6,397	6,408	6,398	6,363	6,301	6,209	6,083	-16,669
Applications	6,319	6,367	6,397	6,408	6,398	6,363	6,301	6,209	6,083	6,448
Loan Liabilities	0	0	0	0	0	0	0	0	0	0

Source: JICA

Table 9.20 (3) Financial Statement - Alternative Case II

(Unit: Rp.Million)

No.	21	22	23	24	25	26	27	28	29	30
Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Income Statement										
Sewerage Service Charge	42,236	44,770	47,456	50,304	53,322	56,521	59,913	63,507	67,318	71,357
Capital Works Charge	0	0	0	0	0	0	0	0	0	0
Other Revenues	0	0	0	0	0	0	0	0	0	0
Revenue	42,236	44,770	47,456	50,304	53,322	56,521	59,913	63,507	67,318	71,357
Operation and Maintenance	31,720	33,624	35,641	37,780	40,046	42,449	44,996	47,696	50,558	53,591
Depreciation	0	0	0	0	0	0	0	0	0	0
Payment of Interest	0	0	0	0	0	0	0	0	0	0
Expenditure	31,720	33,624	35,641	37,780	40,046	42,449	44,996	47,696	50,558	53,591
Profit before Tax	10,516	11,147	11,815	12,524	13,276	14,072	14,917	15,812	16,760	17,766
Tax	3,680	3,901	4,135	4,383	4,647	4,925	5,221	5,534	5,866	6,218
Profit after Tax	6,835	7,245	7,680	8,141	8,629	9,147	9,696	10,278	10,894	11,548
Funds Statement										
Profit after Tax	6,835	7,245	7,680	8,141	8,629	9,147	9,696	10,278	10,894	11,548
Loans	0	0	0	0	0	0	0	0	0	0
Grants	0	0	0	0	0	0	0	0	0	0
Depreciation	0	0	0	0	0	0	0	0	0	0
Sources	6,835	7,245	7,680	8,141	8,629	9,147	9,696	10,278	10,894	11,548
Capital Works	13,693	7,258	7,693	54,936	0	0	0	0	0	0
Payment of Principal	0	0	0	0	0	0	0	0	0	0
Working Capital	-6,858	-12	-13	-46,795	8,629	9,147	9,696	10,278	10,894	11,548
Applications	6,835	7,245	7,680	8,141	8,629	9,147	9,696	10,278	10,894	11,548
Loan Liabilities	0	0	0	0	0	0	0	0	0	0

Source: JICA

Table 9.21(1) Financial Statement - Alternative Case III

(Unit: Rp.Million)

No.	1	2	3	4	5	6	7	8	9	10
Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Income Statement										
Sewerage Service Charge	1,305	2,276	2,480	2,632	2,790	8,807	15,887	26,624	39,146	42,501
Capital Works Charge	0	0	0	0	0	38,558	49,251	70,692	76,146	11,266
Other Revenues	0	0	0	0	0	0	0	0	0	0
Revenue	1,305	2,276	2,480	2,632	2,790	47,364	65,138	97,316	115,292	53,767
Operation and Maintenance	598	657	723	795	875	1,455	3,085	4,969	7,069	8,414
Depreciation	190	884	2,016	3,538	5,253	6,491	7,803	8,906	12,419	12,419
Payment of Interest	0	0	0	0	0	0	0	0	0	0
Expenditure	788	1,541	2,739	4,333	6,128	7,946	10,888	14,875	19,488	20,833
Profit before Tax	518	735	-259	-1,701	-3,338	39,419	54,250	82,441	95,804	32,934
Tax	181	257	0	0	0	13,797	18,987	28,854	33,532	11,527
Profit after Tax	336	478	-259	-1,701	-3,338	25,622	35,262	53,587	62,273	21,407
Funds Statement										
Profit after Tax	336	478	-259	-1,701	-3,338	25,622	35,262	53,587	62,273	21,407
Loans	10,674	41,328	71,456	101,839	99,154	79,692	97,543	170,130	171,563	0
Grants	49,000	0	0	0	0	0	0	0	0	0
Depreciation	190	884	2,016	3,538	5,253	6,491	7,803	8,906	12,419	12,419
Sources	60,201	42,690	73,213	103,676	101,070	111,805	140,609	233,623	246,255	33,826
Capital Works	59,674	41,328	71,456	101,839	99,154	79,692	97,543	170,130	171,563	0
Payment of Principal	0	0	0	0	0	534	2,600	6,173	11,265	16,223
Working Capital	526	1,362	1,757	1,837	1,915	31,579	40,465	57,320	63,427	17,604
Applications	60,201	42,690	73,213	103,676	101,070	111,805	140,609	233,623	246,255	33,826
Loan Liabilities	10,674	52,002	123,459	225,298	324,452	403,611	498,554	662,512	822,810	806,587

Source: JICA

Table 9.21 (2) Financial Statement - Alternative Case III

(Unit: Rp.Million)

No.	11	12	13	14	15	16	17	18	19	20
Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Income Statement										
Sewerage Service Charge	46,119	50,017	54,217	58,741	63,612	68,857	74,502	80,577	87,113	92,339
Capital Works Charge	11,941	12,658	13,417	14,222	15,076	15,980	16,939	17,956	19,033	0
Other Revenues	0	0	0	0	0	0	0	0	0	0
Revenue	58,060	62,675	67,634	72,963	78,688	84,838	91,442	98,533	106,145	92,339
Operation and Maintenance	9,896	11,525	13,315	15,277	17,427	19,781	22,354	25,164	28,231	29,925
Depreciation	12,419	12,419	12,419	12,419	12,419	12,419	12,419	12,419	12,419	12,873
Payment of Interest	0	0	0	0	0	0	0	0	0	0
Expenditure	22,315	23,945	25,734	27,697	29,847	32,200	34,773	37,583	40,650	42,798
Profit before Tax	35,745	38,730	41,900	45,267	48,842	52,638	56,669	60,949	65,495	49,542
Tax	12,511	13,556	14,665	15,843	17,095	18,423	19,834	21,332	22,923	17,340
Profit after Tax	23,234	25,175	27,235	29,423	31,747	34,214	36,835	39,617	42,572	32,202
Funds Statement										
Profit after Tax	23,234	25,175	27,235	29,423	31,747	34,214	36,835	39,617	42,572	32,202
Loans	0	0	0	0	0	0	0	0	0	0
Grants	0	0	0	0	0	0	0	0	0	0
Depreciation	12,419	12,419	12,419	12,419	12,419	12,419	12,419	12,419	12,419	12,873
Sources	35,654	37,594	39,655	41,843	44,166	46,634	49,254	52,036	54,991	45,075
Capital Works	0	0	0	0	0	0	0	0	0	23,117
Payment of Principal	20,207	25,084	33,591	42,169	42,169	42,169	42,169	42,169	42,169	42,169
Working Capital	15,446	12,510	6,064	-326	1,997	4,465	7,085	9,867	12,822	-20,211
Applications	35,654	37,594	39,655	41,843	44,166	46,634	49,254	52,036	54,991	45,075
Loan Liabilities	786,380	761,296	727,705	685,536	643,366	601,197	559,028	516,859	474,690	432,521

Source: JICA

Table 9.21 (3) Financial Statement - Alternative Case III

(Unit: Rp.Million)

No.	21	22	23	24	25	26	27	28	29	30
Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Income Statement										
Sewerage Service Charge	97,880	103,752	109,978	116,576	123,571	130,985	138,844	147,175	156,005	165,365
Capital Works Charge	0	0	0	0	0	0	0	0	0	0
Other Revenues	0	0	0	0	0	0	0	0	0	0
Revenue	97,880	103,752	109,978	116,576	123,571	130,985	138,844	147,175	156,005	165,365
Operation and Maintenance	31,720	33,624	35,641	37,780	40,046	42,449	44,996	47,696	50,558	53,591
Depreciation	13,126	13,253	13,379	14,233	14,233	14,233	14,233	14,233	14,233	14,233
Payment of Interest	0	0	0	0	0	0	0	0	0	0
Expenditure	44,846	46,876	49,020	52,012	54,279	56,682	59,229	61,928	64,790	67,824
Profit before Tax	53,033	56,876	60,957	64,564	69,292	74,303	79,615	85,246	91,215	97,542
Tax	18,562	19,907	21,335	22,597	24,252	26,006	27,865	29,836	31,925	34,140
Profit after Tax	34,472	36,969	39,622	41,967	45,040	48,297	51,750	55,410	59,290	63,402
Funds Statement										
Profit after Tax	34,472	36,969	39,622	41,967	45,040	48,297	51,750	55,410	59,290	63,402
Loans	0	0	0	0	0	0	0	0	0	0
Grants	0	0	0	0	0	0	0	0	0	0
Depreciation	13,126	13,253	13,379	14,233	14,233	14,233	14,233	14,233	14,233	14,233
Sources	47,598	50,222	53,001	56,199	59,272	62,530	65,983	69,643	73,522	77,635
Capital Works	13,693	7,258	7,693	54,836	0	0	0	0	0	0
Payment of Principal	42,169	42,169	42,169	42,169	42,169	41,635	39,569	35,996	30,804	25,946
Working Capital	-8,265	796	3,139	-40,906	17,103	20,894	26,414	33,647	42,618	51,688
Applications	47,598	50,222	53,001	56,199	59,272	62,530	65,983	69,643	73,522	77,635
Loan Liabilities	390,352	348,183	306,014	263,845	221,676	180,040	140,471	104,475	73,571	47,625

Source: JICA

Table 9.22(1) Financial Statement - Alternative Case IV

(Unit: Rp.Million)

No.	1	2	3	4	5	6	7	8	9	10
Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Income Statement										
Sewerage Service Charge	1,094	1,870	2,036	2,161	2,291	7,234	13,045	21,910	32,239	34,985
Capital Works Charge	0	0	0	0	0	38,558	49,251	70,692	76,146	11,266
Other Revenues	0	0	0	0	0	0	0	0	0	0
Revenue	1,094	1,870	2,036	2,161	2,291	45,792	62,296	92,602	108,385	46,251
Operation and Maintenance	598	657	723	795	875	1,455	3,085	4,969	7,069	8,414
Depreciation	190	884	2,016	3,538	5,253	6,491	7,803	8,906	12,419	12,419
Payment of Interest	0	0	0	0	0	0	0	0	0	0
Expenditure	788	1,541	2,739	4,333	6,128	7,946	10,888	14,875	19,488	20,833
Profit before Tax	306	329	-703	-2,172	-3,838	37,846	51,408	77,727	88,887	25,417
Tax	107	115	0	0	0	13,246	17,993	27,204	31,114	8,896
Profit after Tax	199	214	-703	-2,172	-3,838	24,600	33,415	50,522	57,783	16,521
Funds Statement										
Profit after Tax	199	214	-703	-2,172	-3,838	24,600	33,415	50,522	57,783	16,521
Loans	9,073	35,129	60,738	86,563	84,281	67,739	82,912	144,611	145,829	0
Grants	50,601	6,199	10,718	15,276	14,873	11,954	14,632	25,520	25,734	0
Depreciation	190	884	2,016	3,538	5,253	6,491	7,803	8,906	12,419	12,419
Sources	60,063	42,426	72,769	103,205	100,570	110,783	138,762	230,559	241,766	28,941
Capital Works	59,674	41,328	71,456	101,839	99,154	78,692	97,543	170,130	171,563	0
Payment of Principal	0	0	0	0	0	0	0	0	0	0
Working Capital	389	1,098	1,313	1,366	1,416	31,091	41,218	60,428	70,203	28,941
Applications	60,063	42,426	72,769	103,205	100,570	110,783	138,762	230,559	241,766	28,941
Loan Liabilities	9,300	45,540	108,934	200,385	291,783	36,508	462,707	622,501	787,538	807,226

Source: JICA

Table 9.22 (2) Financial Statement - Alternative Case IV

(Unit: Rp.Million)

No.	11	12	13	14	15	16	17	18	19	20
Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Income Statement										
Sewerage Service Charge	37,945	41,134	44,568	48,267	52,250	56,536	61,149	66,112	71,450	75,737
Capital Works Charge	11,941	12,658	13,417	14,222	15,076	15,980	16,939	17,956	19,033	0
Other Revenues	0	0	0	0	0	0	0	0	0	0
Revenue	49,886	53,791	57,986	62,490	67,326	72,517	78,088	84,067	90,483	75,737
Operation and Maintenance	9,896	11,525	13,315	15,277	17,427	19,781	22,354	25,164	28,231	29,925
Depreciation	12,419	12,419	12,419	12,419	12,419	12,419	12,419	12,419	12,419	12,873
Payment of Interest	290	1,403	3,291	5,928	8,381	10,192	12,395	16,457	20,363	18,400
Expenditure	22,605	25,348	29,025	33,625	38,227	42,392	47,168	54,040	61,013	62,198
Profit before Tax	27,281	28,444	28,961	28,865	29,098	30,125	30,921	30,027	29,469	13,539
Tax	9,548	9,955	10,136	10,103	10,184	10,544	10,822	10,509	10,314	4,739
Profit after Tax	17,732	18,488	18,824	18,762	18,914	19,581	20,098	19,518	19,155	8,800
Funds Statement										
Profit after Tax	17,732	18,488	18,824	18,762	18,914	19,581	20,098	19,518	19,155	8,800
Loans	0	0	0	0	0	0	0	0	0	0
Grants	0	0	0	0	0	0	0	0	0	0
Depreciation	12,419	12,419	12,419	12,419	12,419	12,419	12,419	12,419	12,419	12,873
Sources	30,152	30,908	31,244	31,182	31,333	32,001	32,518	31,937	31,574	21,673
Capital Works	0	0	0	0	0	0	0	0	0	23,117
Payment of Principal	455	2,226	5,326	9,787	14,265	18,016	22,621	30,434	38,502	39,465
Working Capital	29,697	28,681	25,918	21,385	17,068	13,984	9,896	1,503	-6,928	-40,909
Applications	30,152	30,908	31,244	31,182	31,333	32,001	32,518	31,937	31,574	21,673
Loan Liabilities	826,662	843,699	856,174	861,853	860,754	854,065	840,400	814,520	776,017	736,552

Source: JICA

Table 9.22 (3) Financial Statement - Alternative Case IV

(Unit: Rp.Million)

No.	21	22	23	24	25	26	27	28	29	30
Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Income Statement										
Sewerage Service Charge	80,281	85,098	90,204	95,616	101,353	107,434	113,880	120,713	127,956	135,633
Capital Works Charge	0	0	0	0	0	0	0	0	0	0
Other Revenues	0	0	0	0	0	0	0	0	0	0
Revenue	80,281	85,098	90,204	95,616	101,353	107,434	113,880	120,713	127,956	135,633
Operation and Maintenance	31,720	33,624	35,641	37,780	40,046	42,449	44,996	47,696	50,558	53,591
Depreciation	13,126	13,253	13,379	14,233	14,233	14,233	14,233	14,233	14,233	14,233
Payment of Interest	18,414	17,403	16,366	15,303	14,214	13,098	11,954	10,781	9,579	8,347
Expenditure	63,260	64,279	65,386	67,316	68,493	69,780	71,183	72,710	74,369	76,171
Profit before Tax	17,021	20,819	24,818	28,301	32,860	37,654	42,698	48,004	53,587	59,463
Tax	5,957	7,287	8,686	9,905	11,501	13,179	14,944	16,801	18,755	20,812
Profit after Tax	11,064	13,533	16,131	18,395	21,359	24,475	27,754	31,202	34,831	38,651
Funds Statement										
Profit after Tax	11,064	13,533	16,131	18,395	21,359	24,475	27,754	31,202	34,831	38,651
Loans	0	0	0	0	0	0	0	0	0	0
Grants	0	0	0	0	0	0	0	0	0	0
Depreciation	13,126	13,253	13,379	14,233	14,233	14,233	14,233	14,233	14,233	14,233
Sources	24,190	26,785	29,511	32,628	35,592	38,708	41,986	45,435	49,064	52,883
Capital Works	13,693	7,258	7,693	54,936	0	0	0	0	0	0
Payment of Principal	40,451	41,463	42,499	43,562	44,651	45,767	46,911	48,084	49,286	50,518
Working Capital	-29,955	-21,935	-20,681	-65,870	-9,059	-7,059	-4,925	-2,649	-222	2,365
Applications	24,190	26,785	29,511	32,628	35,592	38,708	41,986	45,435	49,064	52,883
Loan Liabilities	696,101	654,638	612,139	568,577	523,926	478,159	431,248	383,164	333,878	283,359

Source: JICA

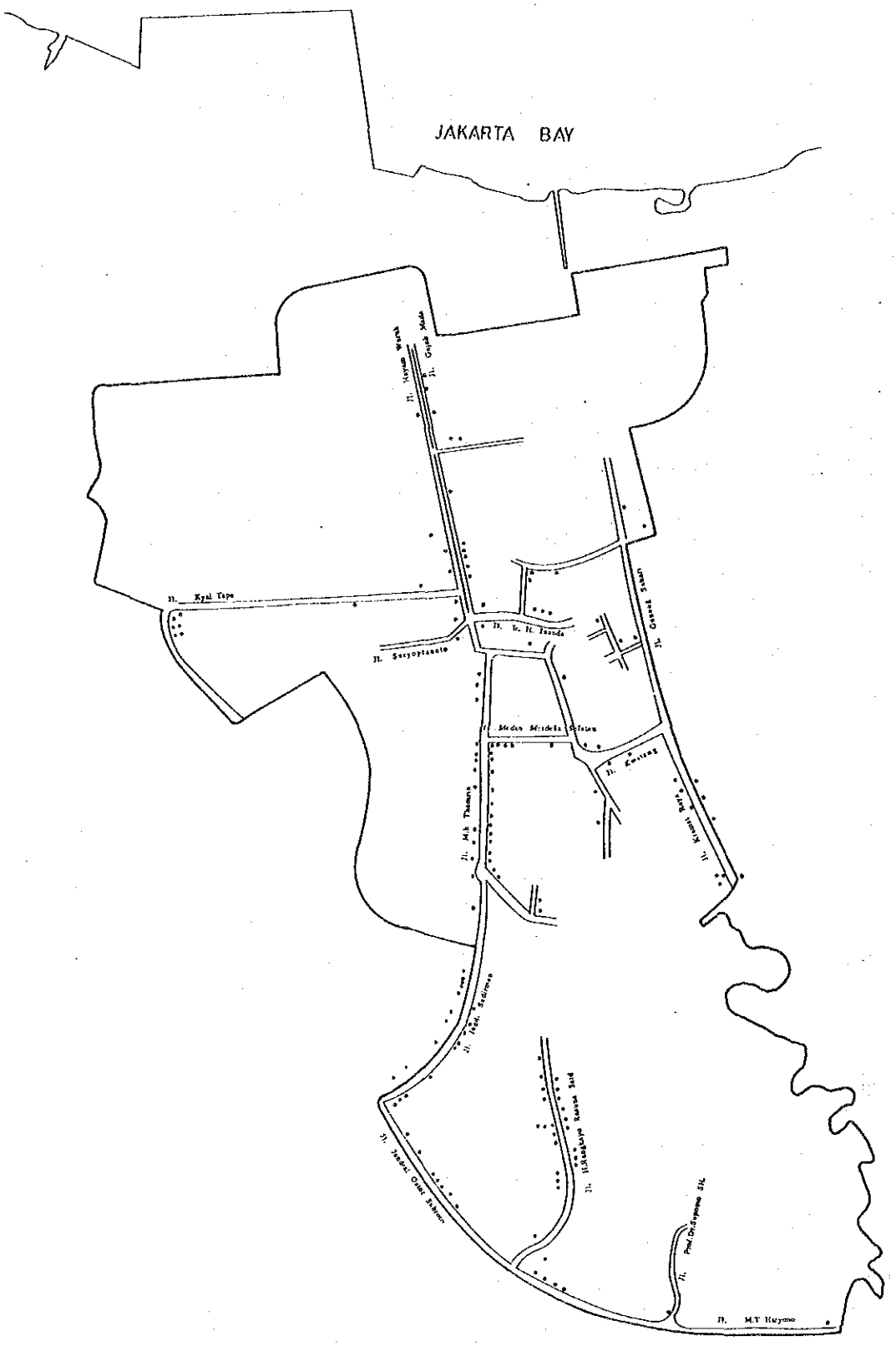

FIG. 9.1	LOCATIONS OF HIGH RISE BUILDINGS IN THE CENTRAL SEWERAGE ZONE IN 1990

THE STUDY ON URBAN DRAINAGE AND WASTE WATER DISPOSAL PROJECT IN THE CITY OF JAKARTA

Chapter 10 INSTITUTIONAL ASPECTS

10.1 Existing Status of Institutional Aspects of JSSP

An interim organization in charge of the operation and maintenance of the sewerage system now being constructed under the Jakarta Sanitation and Sewerage Project was established in 1989 by a decree of Directorate General of Human Settlements. This organization by the name of BPAL (Badan Pengelola Air Limbah), located in the vicinities of the Setia Budi Treatment Ponds has now three departments, i.e. Administration and Finance Dept., Maintenance Dept, and Control Dept, under the Chief of BPAL manned by 65 personnel in total.

Administration and Finance Dept. executes the management of administration and financing, personnel system and general administration as well as providing the people with information. Maintenance Dept. executes wastewater processing, network maintenance, and the maintenance of facilities and wastewater infrastructure. Control Dept. schedules work programs, and executes the controlling of safety work, sewerage connection as well as environmental pollution.

Along with the decree of Directorate General of Human Settlements (Ministry of Public Works) stipulating the organizational structure and functions of BPAL, a decree of DKI Jakarta Government was issued setting forth the provisions of wastewater management in the City of Jakarta. It is aimed to support and reinforce the functioning of BPAL.

It stipulates that every owner/inhabitant of houses/buildings that are located in the areas with the sewerage system is obliged to build and maintain connection, that he is prohibited to dispose garbage, chemicals and others that can impair or destroy sewerage facilities, that the wastewater to be disposed into the sewerage system must meet the fixed quality standard, that every connection to the sewerage system shall have prior confirmation from the authorities, that connections have to be constructed by the contractor owning the license, that every owner/inhabitant of houses/buildings having an advantage of the sewerage facilities is charged a fee.

BPAL is now in the midst of consolidating its foundation in terms of personnel training, assets transfer from DGCK to DKI, sewerage fee collection, Ponds operation and financial management.

The collection of fee based on the tariff of Sewerage Discharge Services has been legalized. Other charges such as Environmental Charges, Discharge License Fees and inspection/cleaning charges are being contemplated. The cost recovery goals are to redeem all civil works cost as well as O/M cost.

The JSSP, covering the two Kecamatans of Setia Budi and Tebet consists of two (2) stages. The first stage is to be completed in 1991, and the second in 1995.

BPAL is scheduled to develop into a permanent enterprise in 1991 by the name of PDAL Jakarta (Perusahaan Daerah Air Limbah Jakarta). The creation of PDAL Jakarta will entail the enforcement of new laws centering on the PDAL Jakarta Charter and The Sewerage Decree. The former will stipulate the organizational structure and job descriptions of the new organization, and the latter will deal with legal aspects of the use of sewerage facilities. Both of them will be based on the corresponding decrees now in force.

10.2 Basic Philosophy of PDAL Jakarta

World Bank recommends the creation of a new independent sewerage enterprise under DKI Jakarta Government after examining the merits and demerits of several alternatives for the sewerage organization. It appears that things are proceeding in this direction.

The Bank is convinced that the sewerage organization to be created must be financially self-sufficient. This forms the very basis of the Bank's philosophy. If it is to be self-supporting, the organization must be neither a department of DKI, nor a wing of a dual organization of water supply and sewerage.

If it were a department of DKI, it would lose profit incentive because the budgeting and accounting of DKI are not done on department basis, and

also because DKI is essentially not profit oriented. The idea of its integration into PDAM was recommended before, as it can avail itself of the manpower, equipment and institution of PDAM, which is financially in a good shape. However, in the course of time it turned out that PDAM is already burdened with many problems of its own, and the merge will only contribute to the aggravation and complication of such a situation. Besides, the sewerage organization as a part of PDAM is likely to be affected by the pre-established practices, sometimes inefficient, of the older organization.

If an organization is to be profit oriented, it must be able to decide out of its own volition on matters directly related to its own interest. But, at the same time wastewater management is essentially a public affair. Thus, PDAL Jakarta will be an independent enterprise having its own bank and accounting, but under the control of DKI Jakarta Government.

PDAL Jakarta as a successor of BPAL will want to recover not only annual O/M cost, but also capital cost. Various types of charges and fees will be legalized to ensure that the costs be recovered. However, charges must be within the affordability of beneficiaries.

The PDAL Jakarta Charter and the Sewerage Ordinance will be an extension and consummation of the corresponding decrees now being enforced.

10.3 Proposed Institutional Aspects

The JICA Study Team essentially follows the recommendations of World Bank on the legal and organizational aspects of the sewerage enterprise. At the same time, it has some points which it wants to emphasize or reconfirm.

10.3.1 Legal Aspects

PDAL Jakarta will be extended, reinforced and strengthened to control the entire Central Sewerage Zone. Eventually, it will be the sole organization in charge of wastewater disposal over the entire areas of Jakarta. The necessary legal provisions to ensure the growth and expansion of PDAL, so that it could take change of wastewater treatment and disposal of entire Jakarta area as proposed in the Master Plan, shall be made.

In order that PDAL Jakarta may perform its duty and functions smoothly and thoroughly, it must have the power and authority allowed and protected under the law.

Under PDAL Jakarta Charter this sewerage enterprise shall prepare a long-term corporate plan on sewerage facilities, finance and personnel in accordance with the Master Plan; plan, design and construct in an economical manner public sewers, sewage facilities; regulate and control the use of public sewers in order to ensure the reliability and efficiency of the system; operate and maintain the sewerage system in a reliable, efficient and economical manner; collect sewer fees and other levies on users and beneficiaries so that it will be financially viable.

Under the Charter The Board of Directors headed by President Director shall set up the broad corporate policy and targets, and be responsible for corporate accomplishments; the Board of Commissioners led by the Governor shall regulate the policy of the Board of Directors so that it meet the general policy of DKI Jakarta Government.

Under the Charter the annual budget of PDAL Jakarta shall be approved by the Governor; the functions, salaries and retirement benefits of PDAL Jakarta shall be based on the "Regional Government Regulations on Employee's Status, Salary and Retirement".

Along with PDAL Jakarta Charter Sewerage Ordinance is required to support, reinforce and complete the powers and functions stipulated by the Charter.

Under the Ordinance all wastewater, domestic and industrial, shall connect to a public sewer wherever and whenever such a sewer is provided; discharges to public sewers covering dangerous substances shall not be accepted into the sewerage system without some form for pre-treatment; property owners who are required to connect to the sewerage system and contractors wishing to carry out any sewerage works shall follow authorized procedures; contractors shall be licensed for executing construction works on sewers, property sewer connections and other disposal facilities; Inspectors of PDAL Jakarta will be authorized to inspect,

observe, measure and sample wastewater discharges to the public sewers and water courses; fees and charges shall be paid to PDAL Jakarta for connection to the public sewers on lump sum basis and for operation and maintenance on regular basis; penalties shall be enforced upon persons violating any of the regulations included in the Ordnance.

The JICA Study Team considers it essential that the greatest autonomy allowable within the framework of general policy of DKI Jakarta Government be bestowed on PDAL Jakarta. In this light the Team added the "corporate planning' functions to the other four major functions of the sewerage enterprise, i. e. 'construction", "control", "O/M" and "finance" which are recommended by World Bank and now under consideration by BPAL. At the same time, the Team is convinced that financial self-sufficiency forms the very basis of the raison d'etre of PDAL Jakarta. In other word, the Team wants to stress the Importance of financial management. In this sense it recommends that PDAL Jakarta be given a freedom of financial self-management to the extent possible including the power to revise sewerage tariffs.

An enterprise is said to be a continual process of plan-do-see cycles. "Corporate planning" corresponds to "plan", "construction", "control" and "O/M" pertain to "do", and "finance" belongs to "see". The Team wants to bring to one's notice the importance of the two elements, sometimes neglected, out of the three components of corporate activities.

10.3.2 Organizational Aspects

PDAL Jakarta will be composed of five (5) departments, i. e. Corporate Planning Dept., New Works Dept., Water Pollution Dept., Sewerage Operation Dept., and Administration and Finance Dept. under the Board of Directors as shown in Fig. 10.1 (1). The Board of Directors will be placed under the influence of the Board of Commissioners.

The total number of personnel in the year 2010 is assumed to be 1,000. Annual personnel expense in that year is expected to reach Rp 1,943 million based on the per capita expense of Rp 1,943,000 at 1990 prices.

The Board of Commissioners headed by the Governor will be composed of ten (10) members, functioning as a pipe connecting PDAL Jakarta with DKI Jakarta Government. It will see to it that PDAL Jakarta conduct its business within the broad framework of DKI Jakarta.

The Board of Directors led by President Director will be staffed by ten (10) members, functioning as a decision making organ regarding the future policy and immediate conduct of business of PDAL Jakarta.

Corporate Planning Dept. with 100 staff will work out long-term corporate plan in accordance with the policy of the Board of Directors. This department will consist of three (3) divisions, i. e. Facility Planning Div., Financial Planning Div. and Personnel Planning Div. Facility Planning Div. will make long-term demand projections in terms of the number of beneficiaries and will map out construction/replacement plan of sewerage facilities based on the projections. Financial Planning Div. will lay out long-term revenue, expense and funds plan based on the information from Facility Planning Div. This division will be committed to the formulation of a plan that will make this sewerage enterprise financially viable and solvent over a long period. Personnel Planning Dept. will be in charge of long-range planning of personnel requirements and staff remuneration based on the information from the aforementioned two divisions. (Refer to Fig. 10.1(2).)

New Works Dept., manned by 250 personnel, will be responsible for the planning, designing and construction of sewerage facilities. This department will be composed of three (3) divisions, i. e. Technical Research Div., Planning and Design Div. and Contracts Div. Technical Research Div. will conduct technical researches regarding sewerage system and water pollution control, although this division is not under consideration for the moment. Planning and Design Div. will carry out long-term planning of relevant project, designing of construction works and liaison with consultants. Contracts Div. will be responsible for the construction/repair of sewerage facilities conforming to the regulations by competent contractors. (Refer to Fig. 10.1(3).)

Water Pollution Control Dept. with 90 personnel will be in charge of the implementation of the Sewerage Ordinance regulations related to

wastewater discharges. This department has two (2) divisions, i. e. Water Pollution Control Div. and Water Pollutions Monitoring Div. Water Pollution Control Div. will be responsible for the implementation of regulations concerning the quantity and quality of discharges of wastewater from domestic, commercial and institutional buildings to the sewerage system or watercourses. It will also give approval to all waste water discharges, and impose restrictions and pretreatment conditions when applicable. Water Pollution Monitoring Div. will recommend measures to be taken based on the results of monitoring of pollution in rivers and drains. (Refer to Fig. 10.1(3).)

Sewerage Operations Dept., embracing the largest 350 staff, will undertake the central tasks of operations and maintenance of sewerage facilities in the Central Sewerage Zone. This department is comprised of five (5) divisions, i. e. Technical Records Div., Liaison Div., Inspection Div., Maintenance Div. and Workshop Div. Technical Records Div. maintains an up-to-date set of records, information data sheets, reports and construction drawings provided by the other divisions and the New Works Dept. The maintenance of records is considered vital for the effective operation and protection of the sewerage system and to provide a replacement or extension and also for the design of areas to be sewered in the future. Liaison Div. will maintain day to day liaison with other authorities in order to ensure close coordination of interactive responsibilities and avoid duplication of efforts and resources. Inspection Div. will be responsible for the inspection of all new sewer connections to ensure satisfactory standard of workmanship. It will continue to monitor and test the performance of connections, particularly, major commercial connections. It will carry out regular monitoring and testing of the pollution in watercourses. It will also be responsible for ensuring that all correct measures are observed for the health and safety of maintenance personnel.

Maintenance Div. will perform the key functions of operating and monitoring the physical elements of the sewerage system including sewers, manholes, pumping stations and treatment plants. This division will have the necessary equipment and teams of staff whose duties will be to carry out preventive, corrective and emergency maintenance on the sewer, manholes, kampong inlets, interceptors and pumping stations. Workshop Div. will be responsible for the maintenance of all vehicles and

equipment held by PDAL Jakarta. It will also control the storage and issue of all construction and repair materials required by the Contracts and Maintenance Division. (Refer to Fig. 10.1(4).)

Administration and Finance Dept., manned by 200 staff, will be responsible for all matters related to general administration and finance. This department will be made up of five (5) divisions, i. e. Internal Audit Div., Public Relations Div., Personnel/General Administration Div., Accounting Div. and Finance Div. Internal Audit Div. will assess assets, accounting and business management of PDAL Jakarta from the standpoint of internal auditors. Public Relations Div. will provide the people with information, take care of complaints and process subscribers' applications.

Personnel/General Administration Div. will be responsible for recruitment, assignment, training and promotion of personnel. It will be responsible for management , supplying, inventory and maintenance of goods/equipment. It will also take care of legal matters that may arise between PDAL Jakarta and beneficiaries, contractors or general public. Accounting Div. will be responsible for budgeting, book keeping, billing and preparing financial report. Financial Div. will be in charge of cash management and the collection of bills. (Refer to Fig. 10.1(5))

An excellent organization set-up based on a best plan would be destined to crumble, if the members of the organization were not motivated. It is said that the success of an enterprise depends on the mental attitudes of workers. It can be said that positive posture, sense of mission, strictness/precision and self-reliance of workers in conducting their day to day work are the key for the sewerage enterprise to succeed. In this connection the inclusion of such a subject in training courses is strongly recommended.

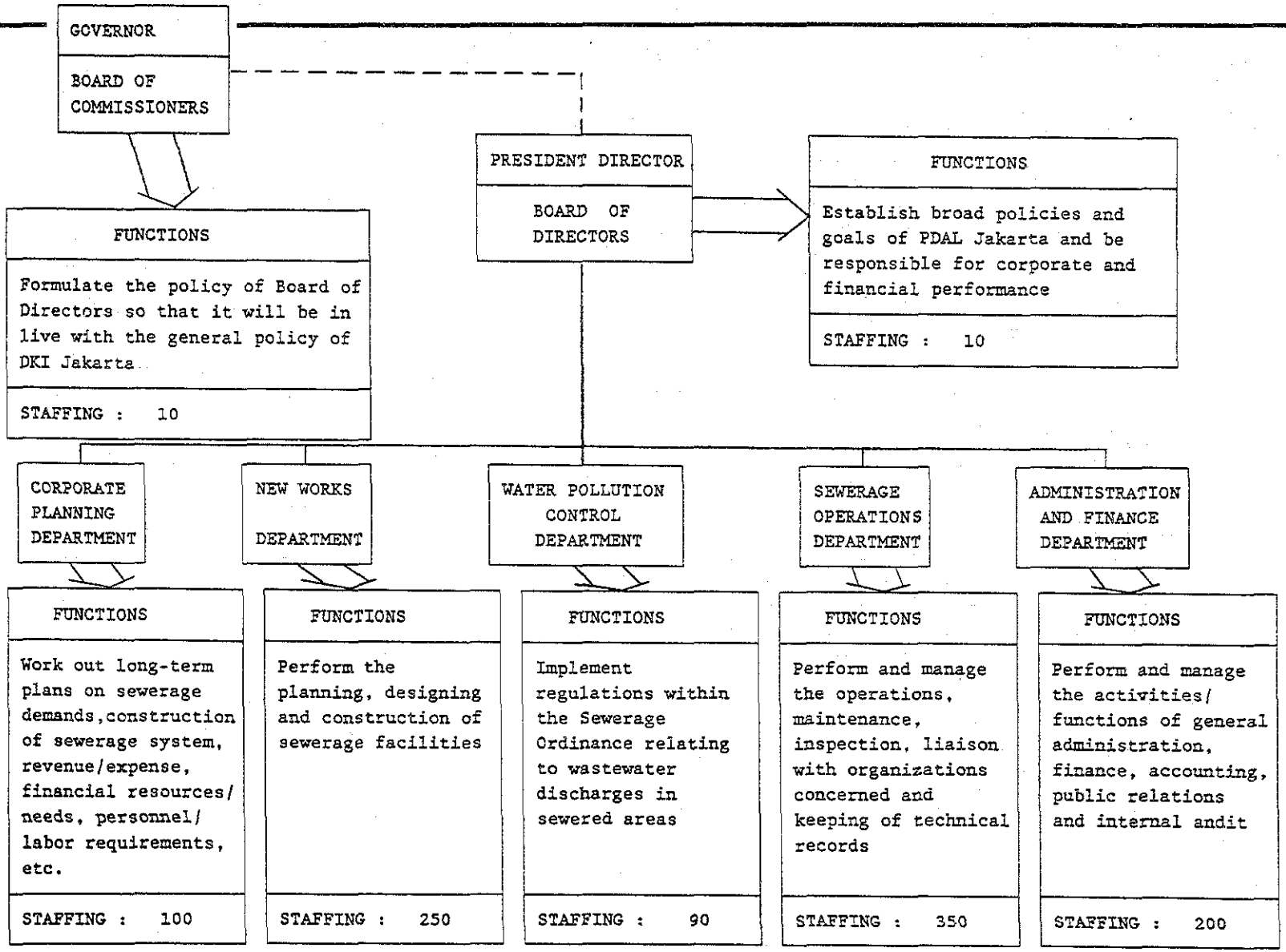

FIG. 10.1 (1) PROPOSED ORGANIZATIONAL STRUCTURE OF PDAL JAKARTA

THE STUDY ON URBAN DRAINAGE AND WASTE WATER DISPOSAL PROJECT IN THE CITY OF JAKARTA

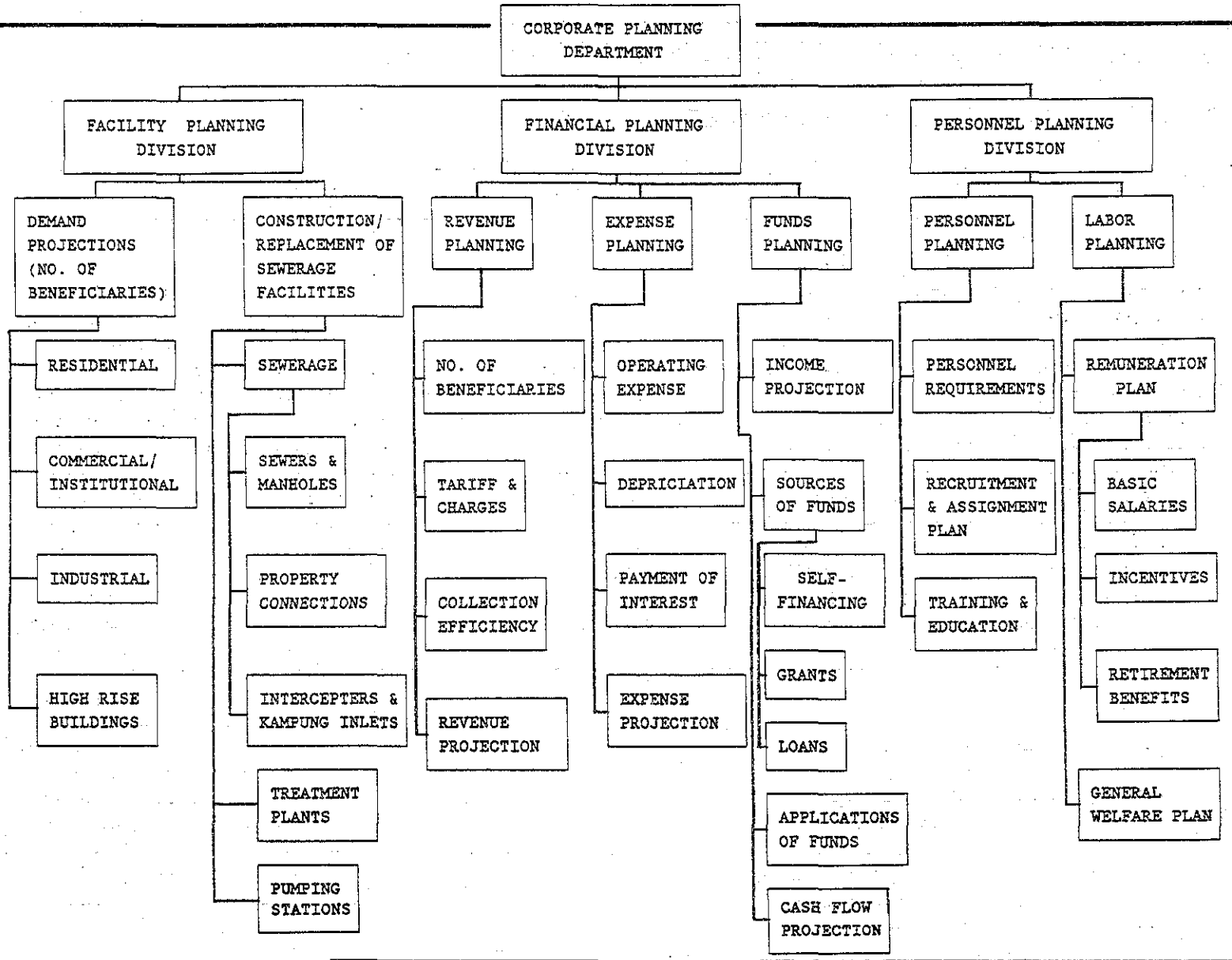

FIG. 10.1 (2) PROPOSED ORGANIZATIONAL STRUCTURE OF PDAL JAKARTA

THE STUDY ON URBAN DRAINAGE AND WASTE WATER DISPOSAL PROJECT IN THE CITY OF JAKARTA

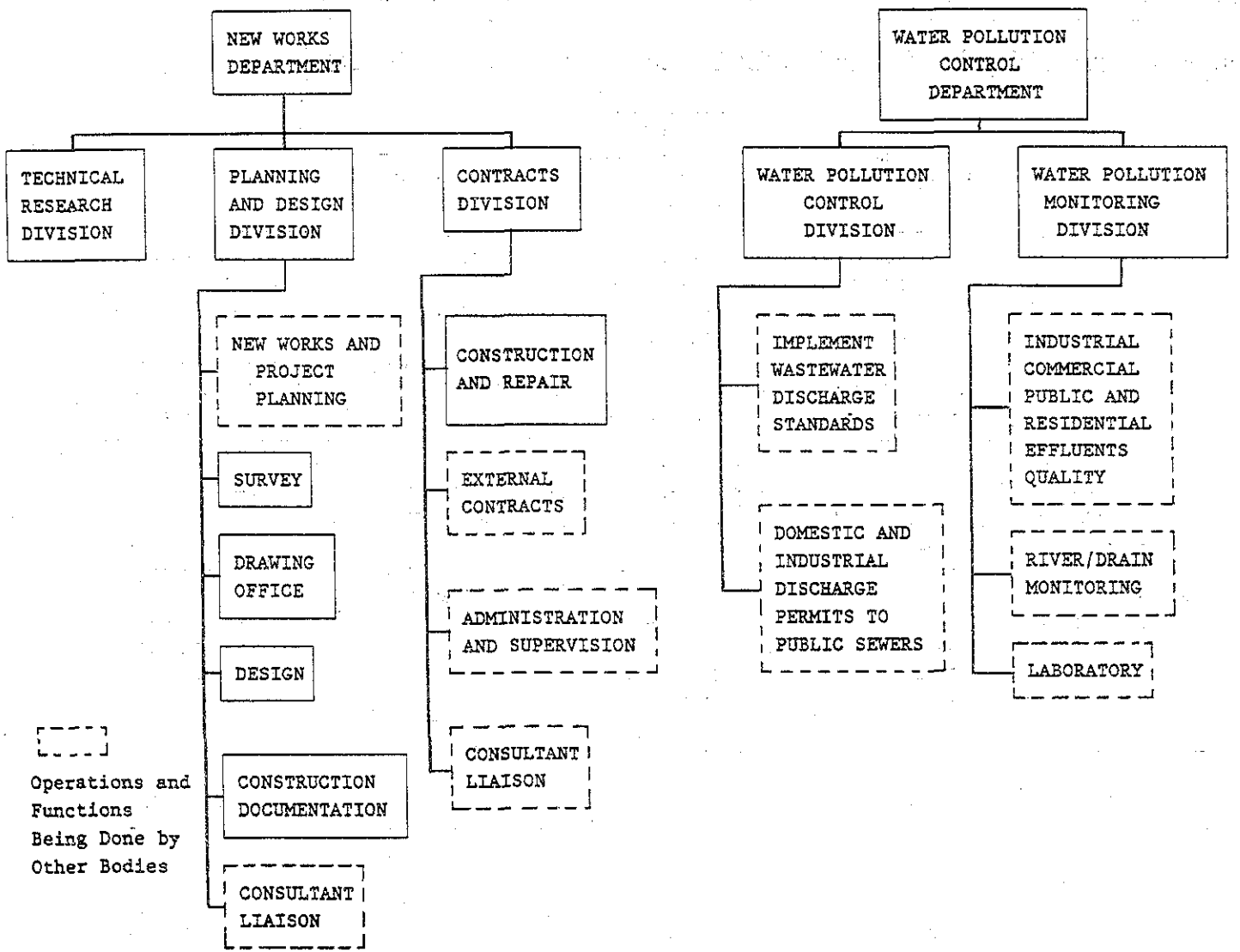

FIG. 10.1 (3) PROPOSED ORGANIZATIONAL STRUCTURE OF PDAL JAKARTA

THE STUDY ON URBAN DRAINAGE AND WASTE WATER DISPOSAL PROJECT IN THE CITY OF JAKARTA

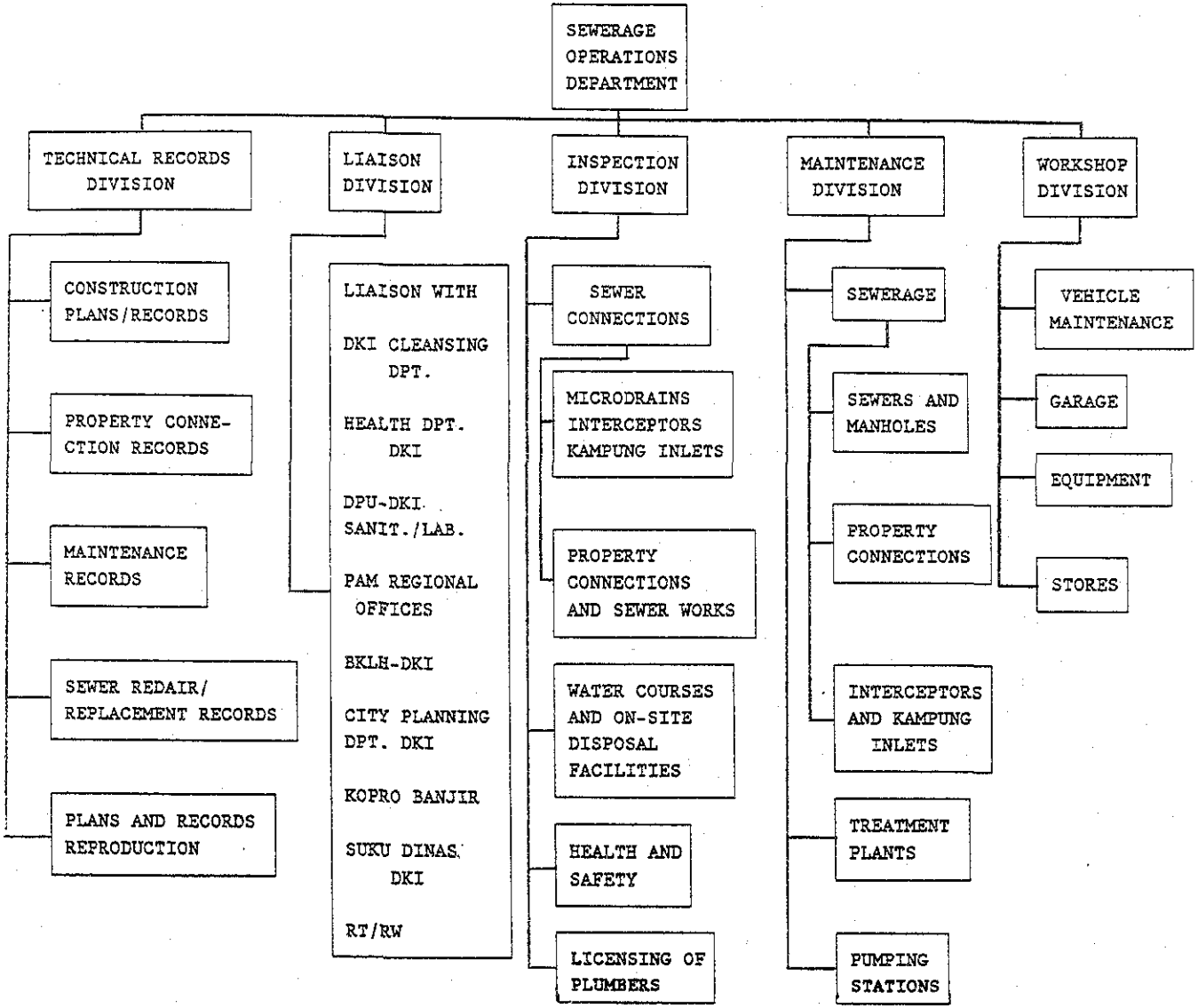

FIG. 10.1 (4) PROPOSED ORGANIZATIONAL STRUCTURE OF PDAL JAKARTA

THE STUDY ON URBAN DRAINAGE AND WASTE WATER DISPOSAL PROJECT IN THE CITY OF JAKARTA

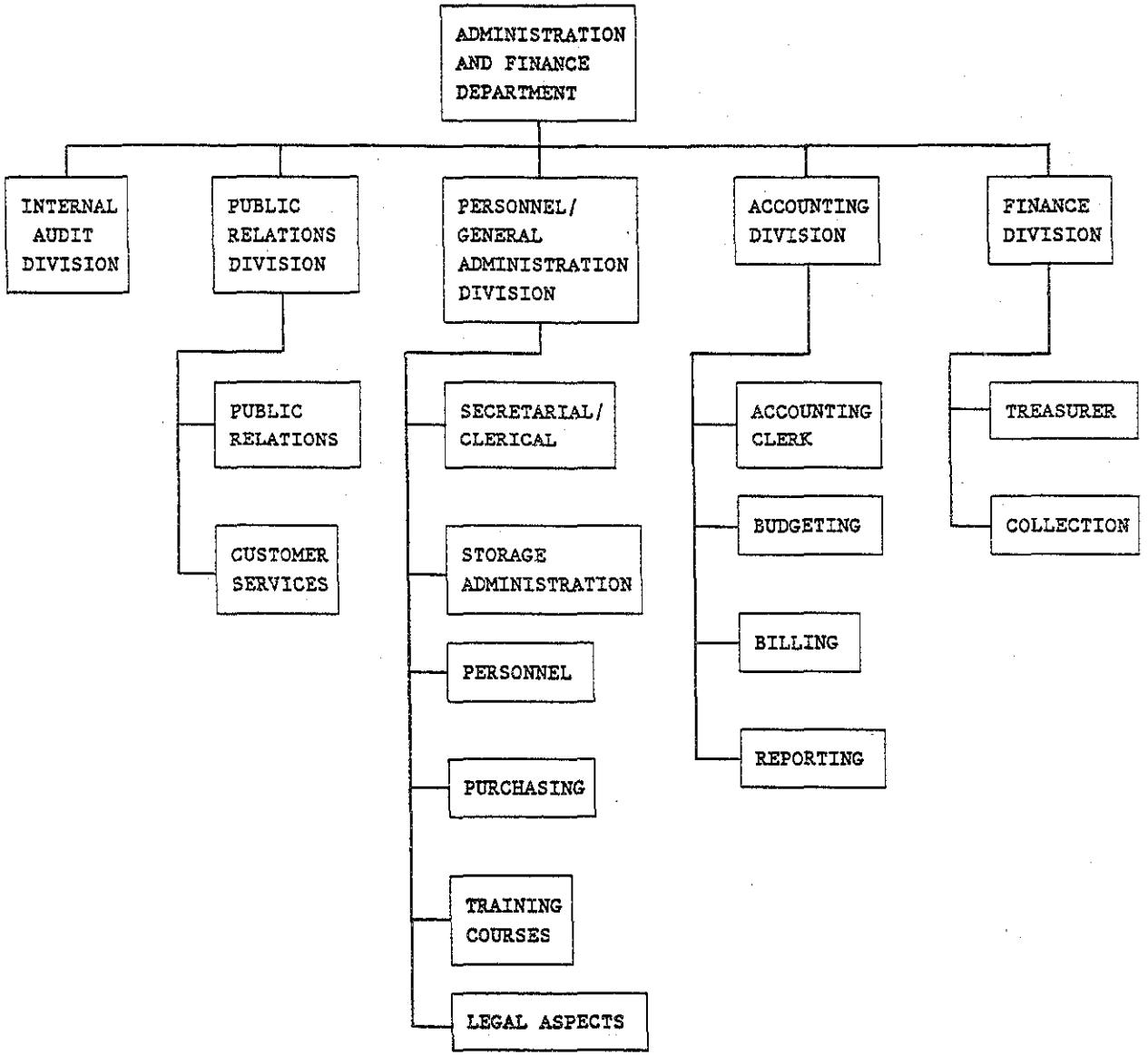

FIG. 10.1 (5) PROPOSED ORGANIZATIONAL STRUCTURE OF PDAL JAKARTA

THE STUDY ON URBAN DRAINAGE AND WASTE WATER DISPOSAL PROJECT IN THE CITY OF JAKARTA