

2) Depreciation

Depreciation is a component of operational cost, although no cash outlay is incurred. The depreciation rate of 3.7 percent is estimated on the basis of the weighted average of the estimated life and estimated investment for each of the following types of fixed assets in service.

Category	Estimated Life (year)	Depreciation Rate (a)	Investment Distribution (b)	(a)x(b) (%)
Sewers, Ponds and Structures	30	3.3	87.1	3.7
Equipment and Machinery	15	6.7	12.9	

7.1.2. Sources for Capital Investment

The financing sources for the construction of the proposed sewerage system are as follows:

1) Loan

The local currency part of the construction cost, which is estimated about M\$40 million (71 percent of the total construction cost), is assumed to be financed by the Federal Government loan. On the other hand, the foreign currency portion of the total capital cost, which is estimated about M\$17 million (29 percent of the total construction cost), is assumed to be financed by loans arranged by international lending agencies or bilateral fund sources. However, the cases of the Federal Government loan covering local currency and foreign currency portions are also examined.

The federal Government loan is assumed to be made at 6 percent interest per annum and 30 equal annual repayments with a 5-year grace

period. As for the foreign loan, the current interest rate is considerably high, which reflects the high interest rate policy of the United State. Taking into account the current loan conditions of multilateral and bilateral lending agencies, the following three loan terms are assumed in the following financial projections.

- a) At 10 percent interest rate per annum, and 20 equal annual repayments with a 5-year grace period.
- b) At 12 percent per annum, 20 equal annual repayments with a 5-year grace period.
- c) At 5.75 percent interest per annum, and 15 equal annual repayments with a 5-year grace period.

2) Grant

Considering current practice in undertaking sewerage projects in Malaysia, a large amount of grant cannot be relied on. However, the State Government may be able to furnish a grant to meet the land acquisition cost since such costs are considered to be linked with social overhead costs. Therefore, in the following financial statements, cases including a grant are also examined.

7.1.3. Sources for Operation and Maintenance Cost and Other Costs

With adequate cost recovery mechanism provided for the sewerage system, sufficient revenue should be raised to meet the cost of operation and maintenance, and also debt service.

The following three sources are considered:

1) Water Surcharge on Water Bill

In the analysis of the financial alternatives, the following four surcharge rates on water bill are examined as presented in the Master Plan. These are shown in Table 7.4.

Table 7.4. Sewerage Surcharge Rate on Water Bill

Case	Sewerage Surcharge Rate (%)		Remarks *
	Domestic	Commercial	
a	33	50	Prevailing rate
b	50	70	Intermediate rate
c	70	90	Maximum rate from practical viewpoint
d	100	120	Maximum rate of ability-to-pay

* Refer to Master Plan Report for more details.

The projected revenues from the sewerage charge in these four cases are shown in Table 7.6, which are calculated on the basis of the domestic and commercial water consumption shown in Table 7.5.

2) Sewerage Surcharge Tax Rate

Judging from the prevailing tax rates, the maximum sewerage surcharge tax rate of 5 percent is considered to be rather severe; therefore, a tax rate lower than 5 percent is recommended. From the standpoint of equalization of income distribution, it is considered desirable that this tax be adjusted proportionally, according to their respective current property tax rates.

In the analysis of the financial alternative, five cases of the sewerage surcharge tax rate are examined, as shown in Table 7.7.

Table 7.5. Estimated Domestic and Commercial Water Consumption

		(Unit: M\$1,000)						
Item	Year	1989	1990	1991	1992	1993	1994	1995
Estimated Served Population		9,233	19,000	29,200	30,000	30,800	31,600	32,300
Annual Domestic Water Consumption (1,000 m ³)		852	1,786	2,744	2,880	2,988	3,128	3,220
Annual Commercial Consumption (1,000 m ³)		1,224	2,952	4,002	4,172	4,345	4,567	4,735

Table 7.6. Revenue from the Sewerage Charge

		(Unit: M\$1,000)						
Item	Year	1989	1990	1991	1992	1993	1994	1995
Domestic (33%)		77	160	250	259	269	282	291
Commercial (50%)		269	649	880	918	956	1,005	1,042
Total		346	809	1,130	1,177	1,225	1,287	1,333
Domestic (50%)		116	241	374	389	403	422	436
Commercial (70%)		377	909	1,233	1,285	1,338	1,407	1,458
Total		493	1,150	1,607	1,674	1,741	1,829	1,894
Domestic (70%)		162	338	524	544	565	591	610
Commercial (90%)		485	1,169	1,585	1,652	1,721	1,809	1,875
Total		647	1,507	2,109	2,196	2,286	2,400	2,485
Domestic (100%)		232	482	749	778	807	845	872
Commercial (120%)		646	1,559	2,113	2,203	2,294	2,411	2,500
Total		878	2,041	2,862	2,981	3,101	3,256	3,372

Note: () represents the sewerage surcharge rate on water bill.

Table 7.7. Cases of Sewerage Surcharge Tax Rate

Area	Prevailing Tax Rate (%)	Case				
		Max. 5 (%)	Max. 4 (%)	Max. 3 (%)	Max. 2 (%)	Max. 1 (%)
Within Sectors 1-32 (Inside the town)	15	5	4	3	2	1
Zone 'A' (Telok Gadong Rd)	15					
Zone 'B' (Eng Ann Estate)	15					
Mukin (Outside the town area)	14					
Extension Area	11	3	2.5	2	1	0.5
Village (Pandamaran) (Pandamaran Jaya)	10					
Kapar Town	10					
Meru Town	10					
Malay Reservation in Meru Town	8	2	1.5	1	0.5	0
Existing Malay Reservation Area	7					

The revenue from this surcharge tax is assumed at a 5 percent annual growth rate. This figure is considered to be acceptable as this rate is lower than the annual price escalation rate of 6.5 percent. In addition, the growth of general revenue from property assessment was 30 percent from 1980 to 1981 in MPK. Table 7.8 shows the revenue from this sewerage surcharge tax.

Table 7.8. Surcharge Tax Revenue

(Unit: M\$1,000)

Year	Surcharge Tax Rate				
	max 5%	max 4%	max 3%	max 2%	max 1%
1983	3,263	2,624	1,983	1,273	634
1988	4,591	3,692	2,790	1,791	892
1989	4,821	3,877	2,930	1,881	937
1990	5,062	4,071	3,076	1,975	984
Sub-Total	14,474	11,640	8,796	5,647	2,813
1991	5,315	4,274	3,230	2,074	1,033
1992	5,581	4,488	3,392	2,177	1,084
1993	5,860	4,712	3,561	2,286	1,139
1994	6,153	4,948	3,739	2,400	1,196
1995	6,461	5,195	3,926	2,520	1,225
Sub-Total	29,190	23,671	17,848	11,457	5,677

3) Municipality Contribution

It is inevitable that almost all the alternatives will require the MPK to bear some financial burden. However, judging from the current size of MPK's general revenues and expenditures, a contribution of less than M\$0.5 million (about M\$5 million up to 1995) may be possible. Actually, this amount is merely 2.7 percent of its 1981 revenues.

In addition, this contribution by MPK is justifiable partly because the staff payroll required for the sewerage project is included in the financial projection.

7.2. Recommended Financing Plan

7.2.1. Alternative Financing Plans

1) Setting of Alternatives

Based on the above-mentioned conditions, the following alternatives are set up on how to cover the capital cost. These alternatives are categorized into the following two groups, with each group further divided into several alternatives according to grant conditions. All alternatives are summarized in Table 7.9.

- A) Where the foreign currency portion of the construction cost is assumed to be financed by the foreign lending agencies and the local currency portion by the Federal Government.
- B) Where the entire construction cost is assumed to be financed by the Federal Government.

(a) Alternative A-1

The foreign currency portion is assumed to be financed by foreign lending agencies, with loan terms assumed at 10 percent per annum, 20 equal annual repayments and a 5-year grace period. On the other hand, the local currency portion is to be financed by the Federal Government, with loan terms assumed at 6 percent interest per annum and 30 equal annual repayments and a 5-year grace period. The acquisition cost of land required in only the First Phase Period is included in this alternative.

(b) Alternative A-2

Total land acquisition cost required for the Master Plan (up to 2000) is included in this alternative. The remaining conditions are the same as those of Alternative A-1.

(c) Alternative A-3

In this alternative, a grant for land acquisition cost is provided by the State Government. Other conditions are the same as in Alternative A-1.

(d) Alternative A-4

The conditions of this alternative are the same as those of Alternative A-1, except for the foreign loan terms from the foreign lending agencies. The foreign loan is assumed to be made at 12 percent per annum and 20 equal annual repayments and a 5-year grace period.

(e) Alternative A-5

Conditions for this alternative are the same as those of Alternative A-4, except for a grant for land acquisition cost is provided by the State Government.

(f) Alternative A-6

In this alternative, the foreign currency portion is assumed to be financed by bilateral capital sources. Since the terms of loan from these sources generally are softer, it is assumed to be made at 5.75 percent interest rate per annum, 15 equal annual repayments and a 5-year grace period. The remaining conditions are the same as those Alternative A-1.

(g) Alternative A-7

Conditions for this alternative are the same as for Alternative A-6, except that the State Government is assumed to supply a grant for the land acquisition cost.

(h) Alternative B-1

All construction cost is assumed to be financed by Federal Government loan under this alternative.

The acquisition cost of land required in only the First Phase Period is included in this alternative.

(i) Alternative B-2

In Alternative B-1, the total land acquisition cost required for the Master Plan period (up to 2000) is included in this alternative.

(j) Alternative B-3

In Alternative B-1, a grant for land acquisition cost is provided by the State Government.

Table 7.9. Alternative Financial Projections for
Sewerage System Feasibility Study

(Unit: M\$1,000)

Alter- native	Fund Source			Interest Rate of Foreign Loan (%)	Remarks
	Loan		Grant		
	Foreign Lending Agencies	Federal Govern- ment	State Govern- ment		
A-1	16,816	39,144	0	10	Including land cost required up to 2000
A-2	16,816	59,697	0	10	
A-3	16,816	34,998	4,146	10	
A-4	16,816	39,144	0	12	
A-5	16,816	34,998	4,146	12	
A-6	16,816	39,144	0	5.75	
A-7	16,816	34,998	4,146	5.75	
B-1	0	55,960	0	--	Including land cost required up to 2000
B-2	0	76,513	0	--	
B-3	0	51,814	4,146	--	

7.2.2. Evaluation Criteria

The financial projections are made under the assumption that the amount of required operating revenue in each financing scheme is estimated to cover at least four months' operating expenses of the following year as well as the operating expenses of this year. Therefore, whether a proposed sewerage project is feasible or not can be usually judged by factors such as net income or accumulated net income. The net loss of income indicates that the operating revenues are not sufficient to finance operating expenses, including amortization of the principal and the loan interest and the depreciation cost of the plants and facilities. This means that MPK will have difficulty in continuing operation of the proposed sewerage system due to consequent shortage of cash unless MPK can compensate for the loss of revenues.

Considering the foregoing, the following three points are adopted as evaluation criteria for a feasible financial plan.

- 1) Since sewerage service is a form of public service, MPK is not required to raise sufficient profit from the sewerage works. If the sewerage service becomes a profitable operation, MPK should lower the sewerage charge and/or the sewerage tax surcharge tax rather than profit from its operation. However, it would be difficult to cover a large amount of deficit from MPK's general revenue. Therefore, the most desirable and feasible financing plan is considered to be one which minimizes the financial burden on MPK's contribution as soon as possible. It is reasonable to consider the possible amount of MPK's contribution to be less than M\$0.5 million per annum (about M\$5 million up to 1995) as explained in Section 7.1.3 (3).
- (2) The sewerage surcharge rate on the water bill and the sewerage surcharge tax rate should be within 100 percent and 5 percent, respectively.
- (3) In case of approximately the same amount of deficit among the financial alternatives, the financial plan with the lowest sewerage surcharge tax rate should be selected because of the invisible

nature of benefits to be derived from the sewerage services, as explained in the Master Plan Report.

7.2.3. Examination of Alternatives

In order to develop feasible financial plans for each alternative, financial statements are prepared, based on various sewerage surcharge rates and sewerage surcharge tax rates. In these calculations, in the same way as Master Plan the sewerage surcharge rate varies at 33, 50, 70 and 100 percent on the water bill, and the maximum sewerage surcharge tax rate varies at 1, 2, 3, 4 and 5 percent of annual property value. According to the results of the calculation of the financial statements, Table 7.10 (1) and Table 7.10 (2) show the accumulated income (that is, MPK's contribution) up to 1995.

Table 7.10. Table of Cash Accumulated (MPK's Contribution) up to 1995

(Unit: M\$1,000)

Alternative	Sewerage Surcharge Tax Rate (%)	Sewerage Surcharge Rate on Water Bill (%)			
		33	50	70	100
A-1	1	Δ29,171	Δ26,233	Δ23,143	Δ18,509
	2	Δ20,667	Δ17,729	Δ14,639	Δ10,005
	3	Δ11,022	Δ 8,084	Δ 4,994	Δ 360
	4	Δ 2,434	504	3,594	8,228
	5	6,153	9,091	12,181	16,815
A-2	1	Δ41,115	Δ38,177	Δ35,087	Δ30,435
	2	Δ32,611	Δ29,673	Δ26,583	Δ21,949
	3	Δ22,966	Δ20,028	Δ16,938	Δ12,304
	4	Δ14,378	Δ11,440	Δ 8,350	Δ 3,716
	5	Δ 5,791	Δ 2,853	237	4,871
A-3	1	Δ26,763	Δ23,825	Δ20,735	Δ16,101
	2	Δ18,259	Δ15,321	Δ12,231	Δ 7,597
	3	Δ 8,614	Δ 5,676	Δ 2,586	2,048
	4	Δ 26	2,894	6,002	10,636
	5	8,561	11,499	14,589	19,223
A-4	1	Δ30,827	Δ27,889	Δ24,793	Δ20,165
	2	Δ22,323	Δ19,385	Δ16,289	Δ11,661
	3	Δ12,678	Δ 9,740	Δ 6,644	Δ 2,016
	4	Δ 4,090	Δ 1,152	1,944	6,572
	5	4,497	7,435	10,531	15,159
A-5	1	Δ28,419	Δ25,481	Δ22,391	Δ17,757
	2	Δ19,915	Δ16,977	Δ13,887	Δ 9,253
	3	Δ10,270	Δ 7,332	Δ 4,242	392
	4	Δ 1,682	1,256	4,346	8,980
	5	6,905	9,843	12,933	17,567

Table 7.10. (cont.)

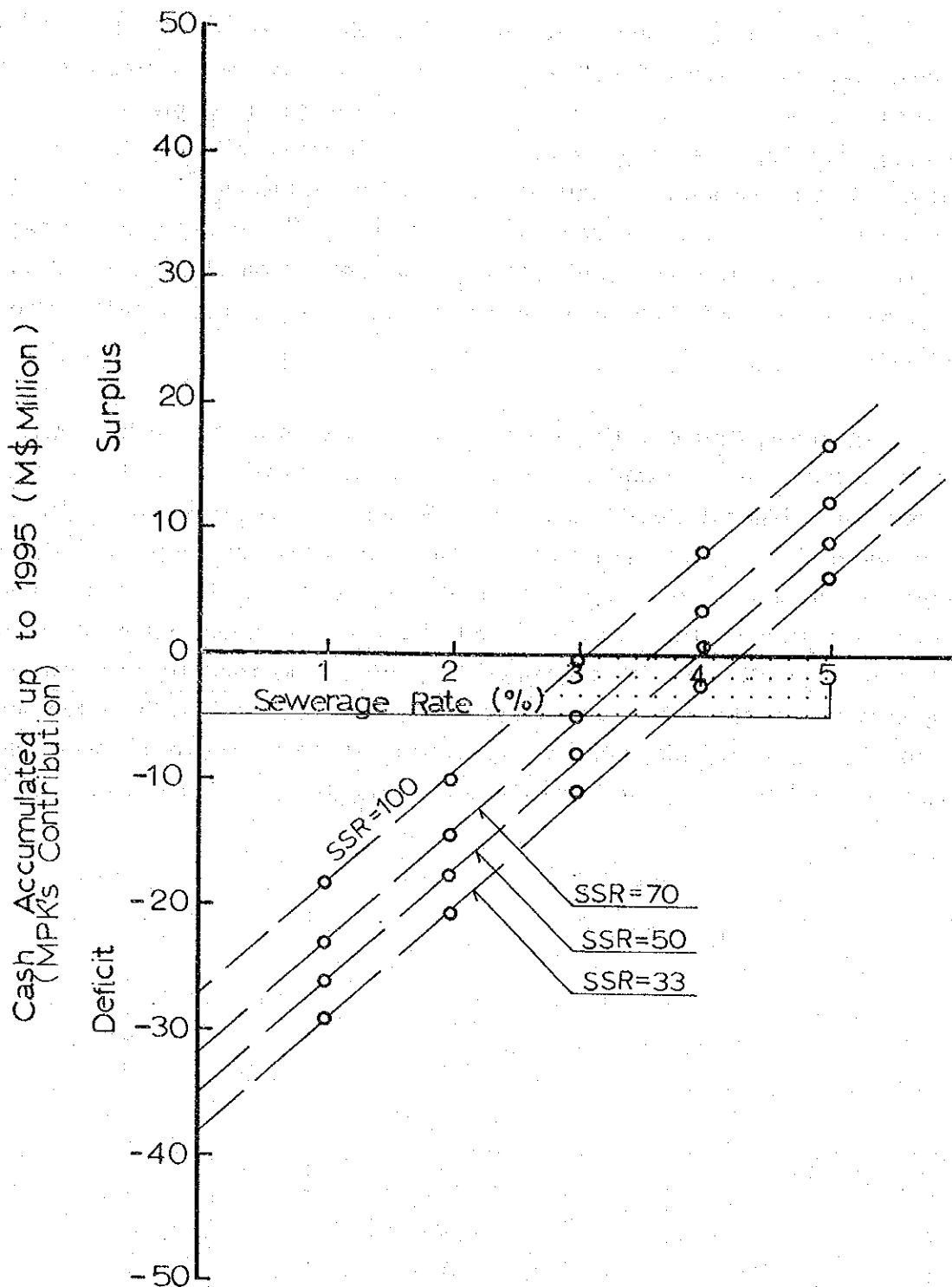
(Unit: M\$1,000)

Alternative	Sewerage Surcharge Tax Rate (%)	Sewerage Surcharge Rate on Water Bill (%)			
		33	50	70	100
A-6	1	Δ27,539	Δ24,601	Δ21,511	Δ16,877
	2	Δ19,035	Δ16,097	Δ13,007	Δ 8,373
	3	Δ 9,390	Δ 6,452	Δ 3,362	1,272
	4	Δ 802	2,136	5,226	9,860
	5	7,785	10,723	13,813	18,447
A-7	1	Δ25,131	Δ22,193	Δ19,103	Δ14,469
	2	Δ16,627	Δ13,689	Δ10,599	Δ 5,965
	3	Δ 6,982	Δ 4,044	Δ 954	3,780
	4	1,606	4,544	7,634	12,268
	5	10,193	13,131	16,221	20,855
B-1	1	Δ27,089	Δ24,151	Δ21,061	Δ16,427
	2	Δ18,585	Δ15,647	Δ12,557	Δ 7,926
	3	Δ 8,940	Δ 6,002	Δ 2,912	1,719
	4	Δ 352	2,586	5,676	10,307
	5	8,235	11,173	14,263	18,894
B-2	1	Δ39,041	Δ36,103	Δ33,013	Δ28,379
	2	Δ30,537	Δ27,599	Δ24,509	Δ19,875
	3	Δ20,892	Δ17,954	Δ14,864	Δ10,230
	4	Δ12,304	Δ 9,366	Δ 6,276	Δ 1,642
	5	Δ 3,717	Δ 779	2,311	6,945
B-3	1	Δ24,681	Δ21,743	Δ18,653	Δ14,019
	2	Δ16,177	Δ13,239	Δ10,149	Δ 5,515
	3	Δ 6,532	Δ 3,594	Δ 504	4,130
	4	2,056	4,994	8,084	12,718
	5	10,643	13,581	16,671	21,305

Based on the above-mentioned criteria; that is, the sewerage surcharge rate on water bill within 100 percent, the sewerage surcharge tax rate within 5 percent, and the amount of MPK's contribution within M\$5 million up to 1995, feasible financial plans for each alternative can be selected. These are shown within the feasible are indicated in Fig. 7.1 (1) through Fig. 7.1 (10), which represent the relationship of (1) the sewerage surcharge rates on the water bill (2) the sewerage surcharge tax rates and (3) the amount of MPK's contribution (cash accumulated) up to 1995, based on Table 7.10.

In these figures, the vertical line represents the cash accumulated up to 1995, the horizontal line represents the sewerage surcharge tax rate, and the diagonal lines represent different sewerage surcharge rates on the water bill. The space above the horizontal line represents the surplus and the space below the horizontal line represents the deficit. The intersecting points of the horizontal and the diagonal lines represent zero contribution by MPK; that is, there are no profits from the proposed sewerage operation and there will be no need for any contribution. The further down to the right the diagonal line is moved, the less viable becomes the financial projection, since the sewerage surcharge tax rate increases.

Fig.7.1.(1) Cash Accumulated (MPK's Contribution) by Cases
Alternative A-1

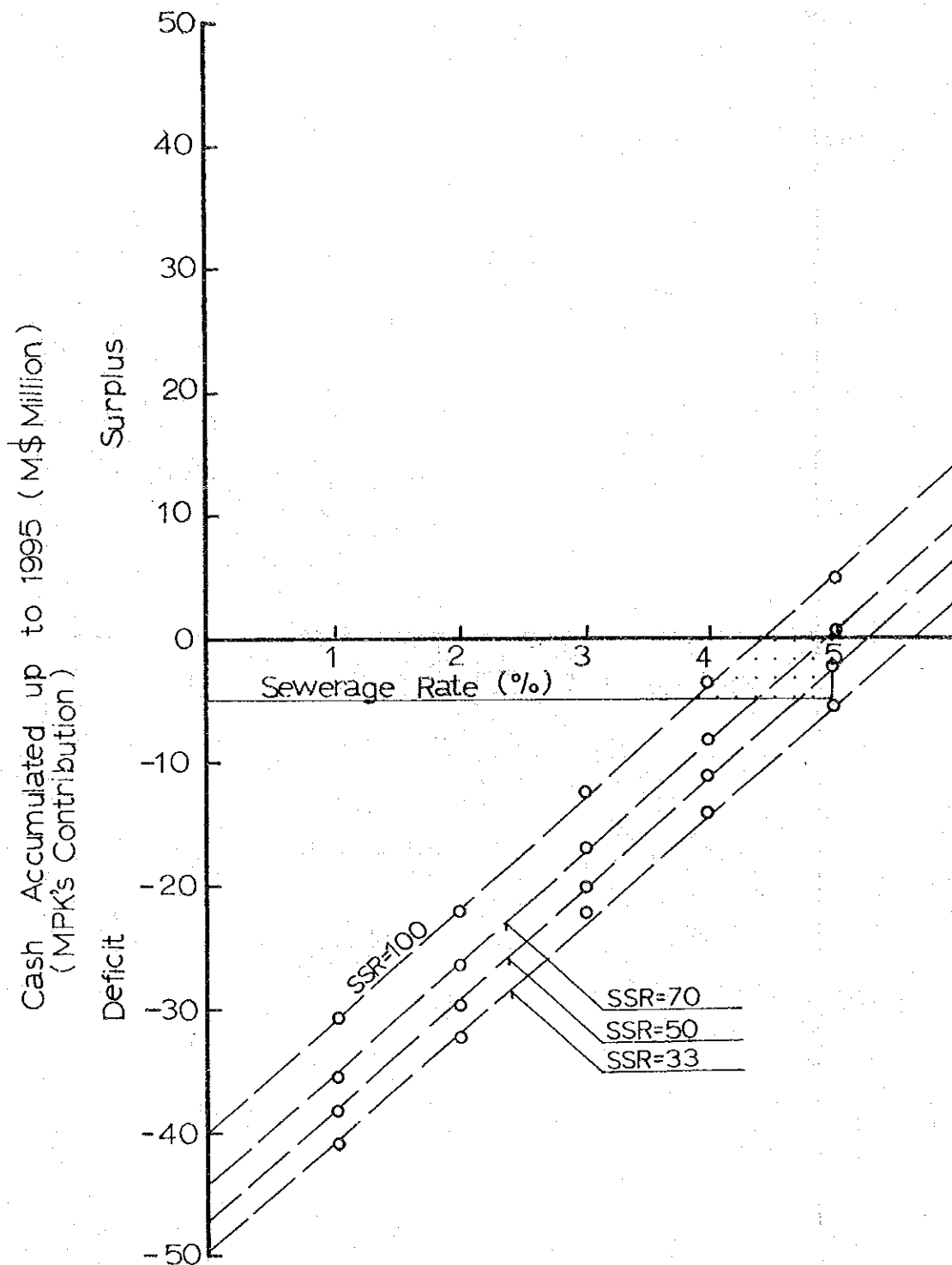


SSR : Sewerage Surcharge Rate (%)

Feasible Area

- within (1) 100% of the Sewerage Surcharge Rate on the Water Bill,
 (2) 5% of the Property Surcharge Tax for the Sewerage Service, and
 (3) M\$ 5 Million of MPK's Contribution up to 1995

Fig.7.1.(2) Cash Accumulated (MPK's Contribution) by Cases
Alternative A-2

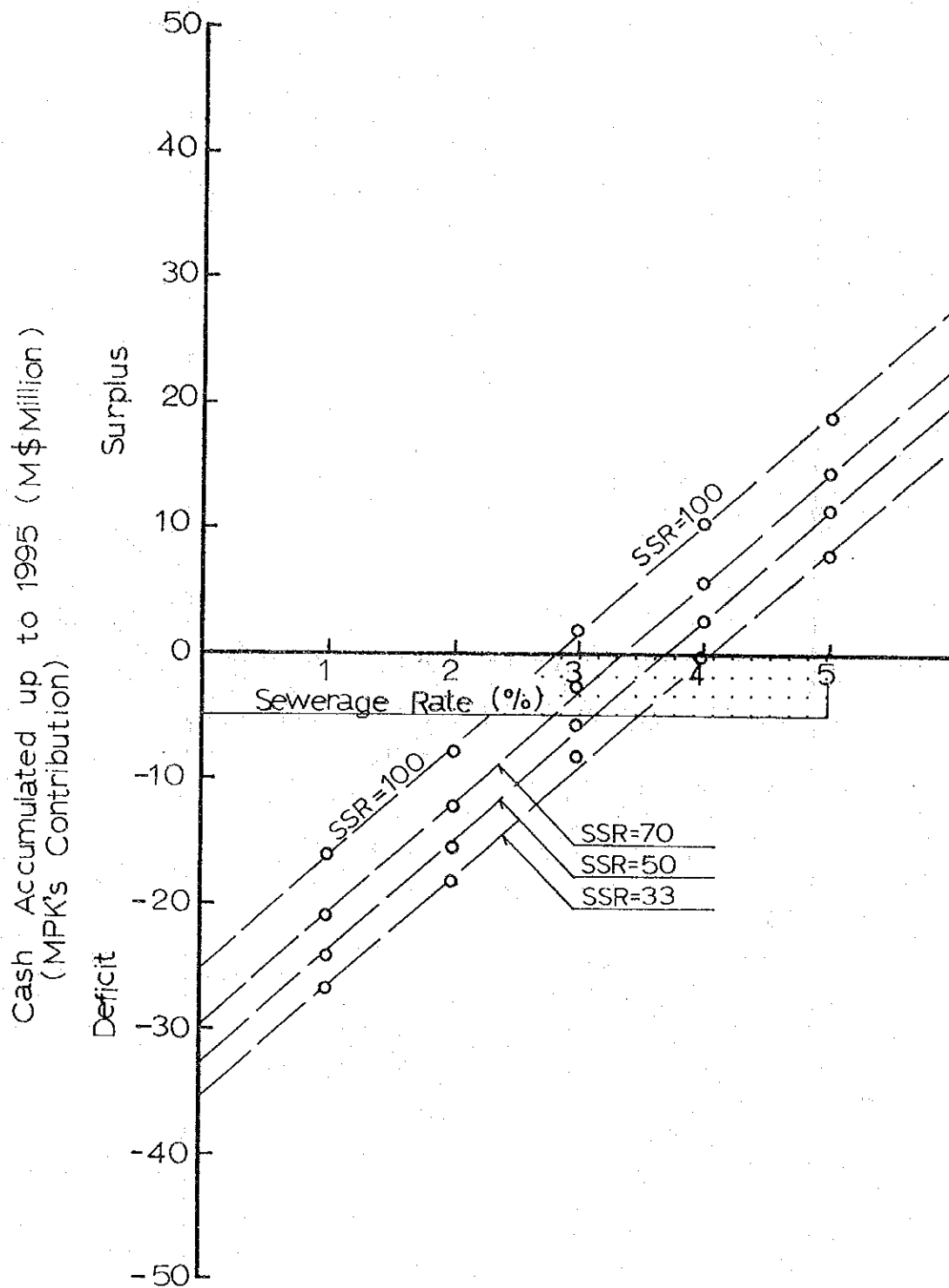


SSR : Sewerage Surcharge Rate (%)

Feasible Area

- within (1) 100% of the Sewerage Surcharge Rate on the Water Bill,
(2) 5% of the Property Surcharge Tax for the Sewerage Service, and
(3) M\$ 5 Million of MPK's Contribution up to 1995

Fig.7.1.(3) Cash Accumulated (MPK's Contribution) by Cases
Alternative A-3

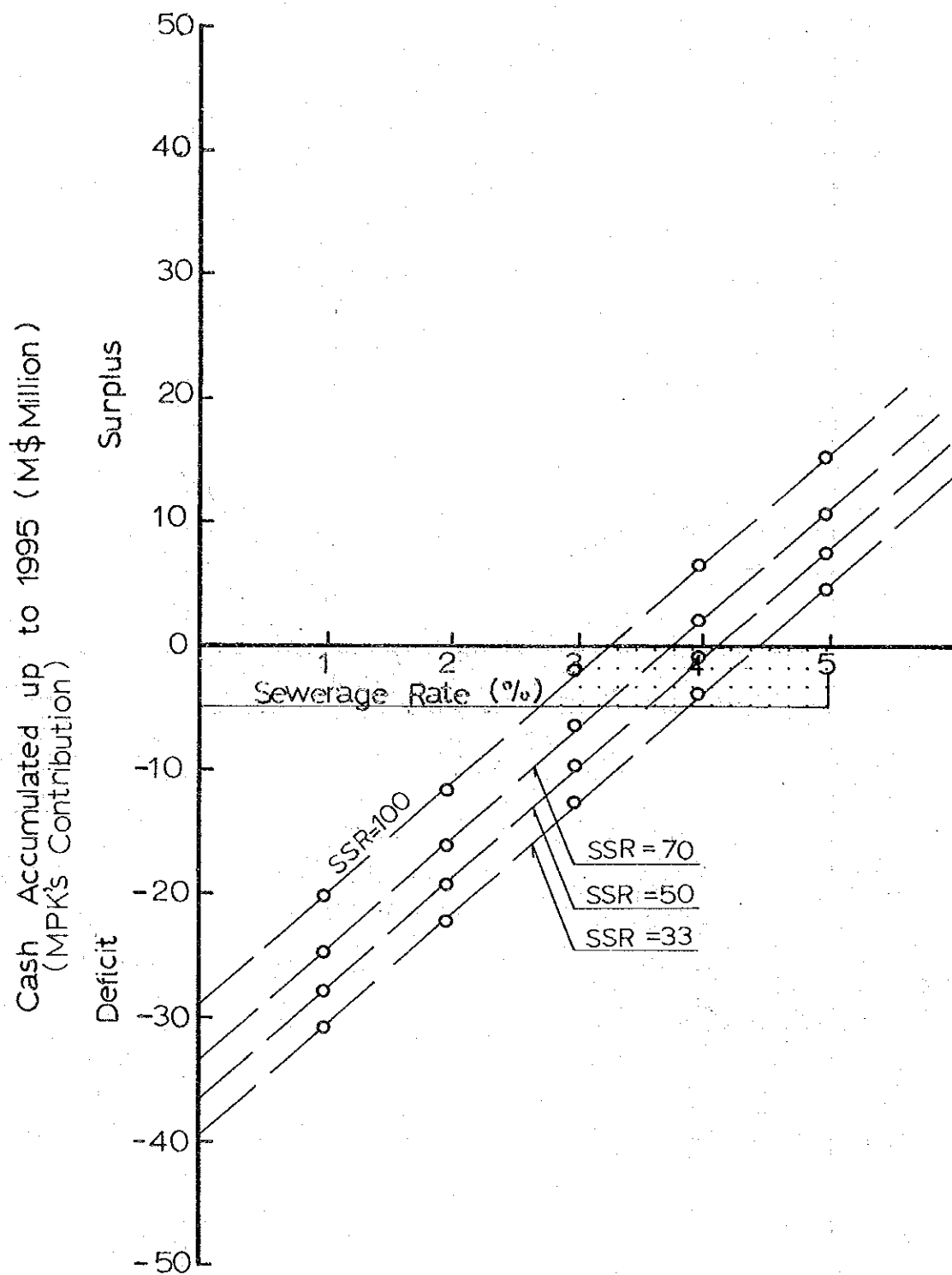


SSR : Sewerage Surcharge Rate (%)

Feasible Area

within (1) 100% of the Sewerage Surcharge Rate on the Water Bill,
(2) 5% of the Property Surcharge Tax for the Sewerage Service, and
(3) M\$ 5 Million of MPK's Contribution up to 1995

Fig.7.1.(4) Cash Accumulated (MPK's Contribution) by Cases
Alternative A-4



SSR : Sewerage Surcharge Rate (%)

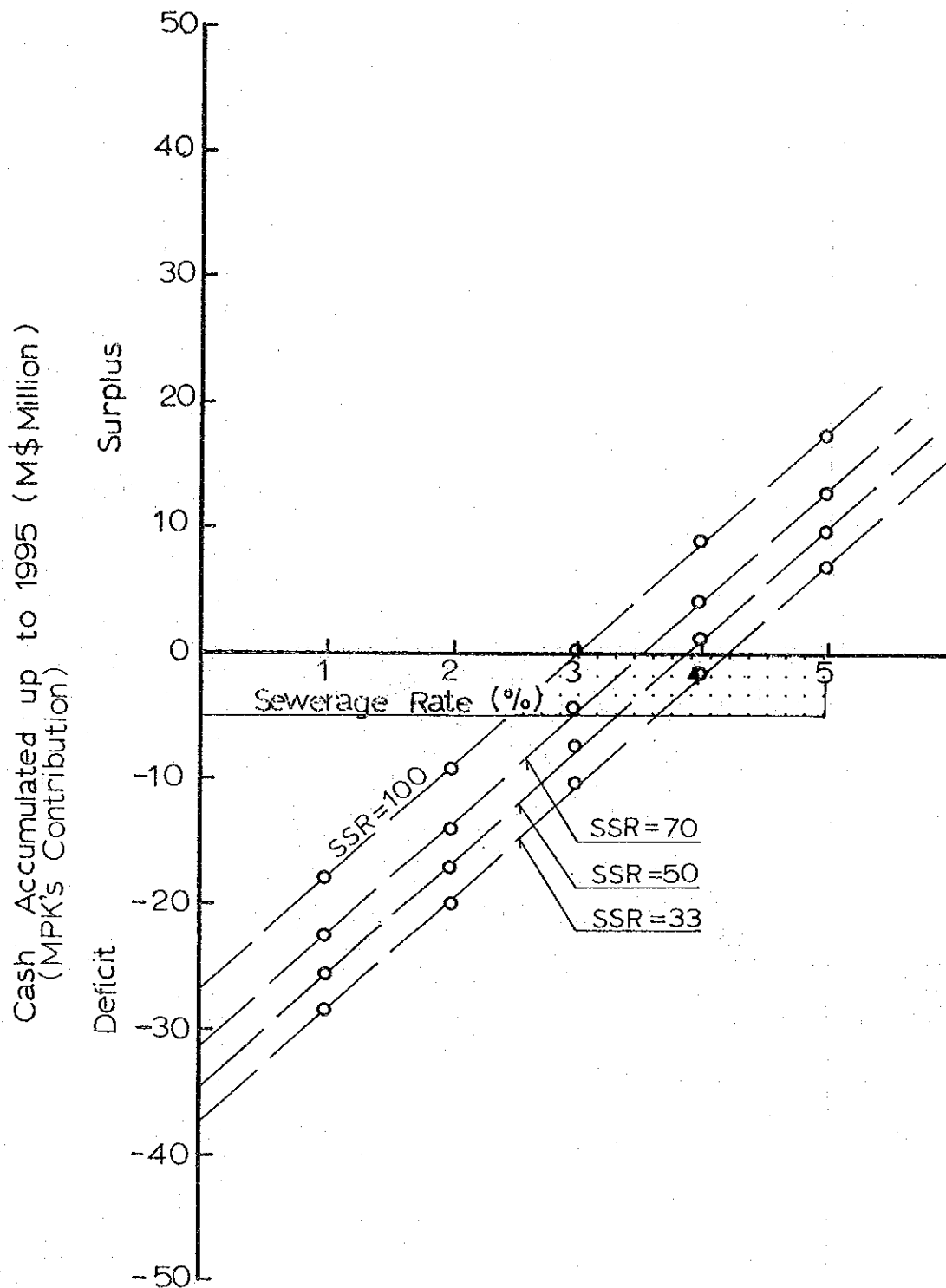
Feasible Area

within (1) 100% of the Sewerage Surcharge Rate on the Water Bill,

(2) 5% of the Property Surcharge Tax for the Sewerage Service, and

(3) M\$ 5 Million of MPK's Contribution up to 1995

Fig.7.1.(5) Cash Accumulated (MPK's Contribution) by Cases
Alternative A-5



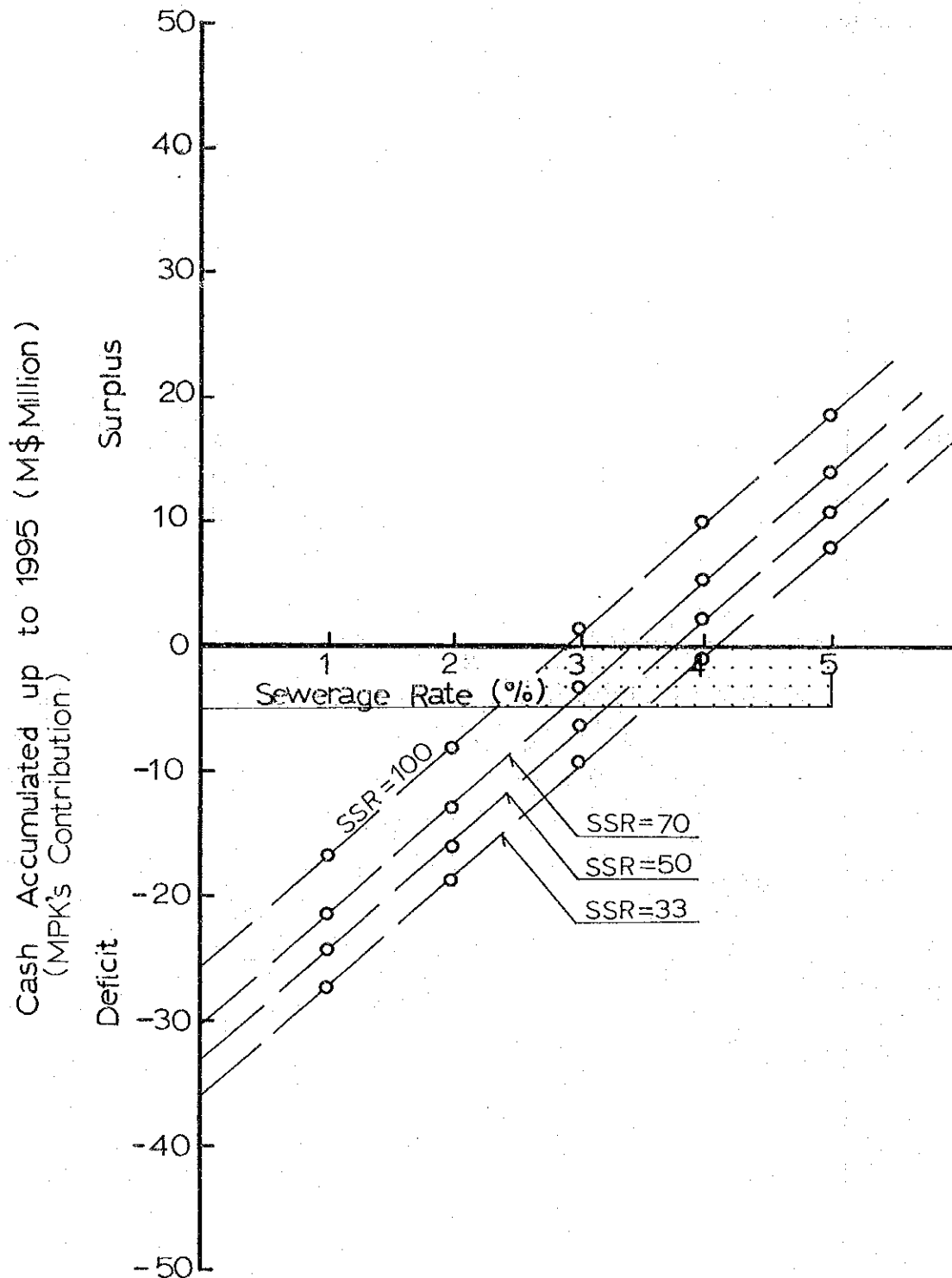
SSR : Sewerage Surcharge Rate (%)

 Feasible Area

- within (1) 100% of the Sewerage Surcharge Rate on the Water Bill,
 (2) 5% of the Property Surcharge Tax for the Sewerage Service, and
 (3) M\$ 5 Million of MPK's Contribution up to 1995

Fig.7.1.(6) Cash Accumulated (MPK's Contribution) by Cases

Alternative A-6



SSR : Sewerage Surcharge Rate (%)

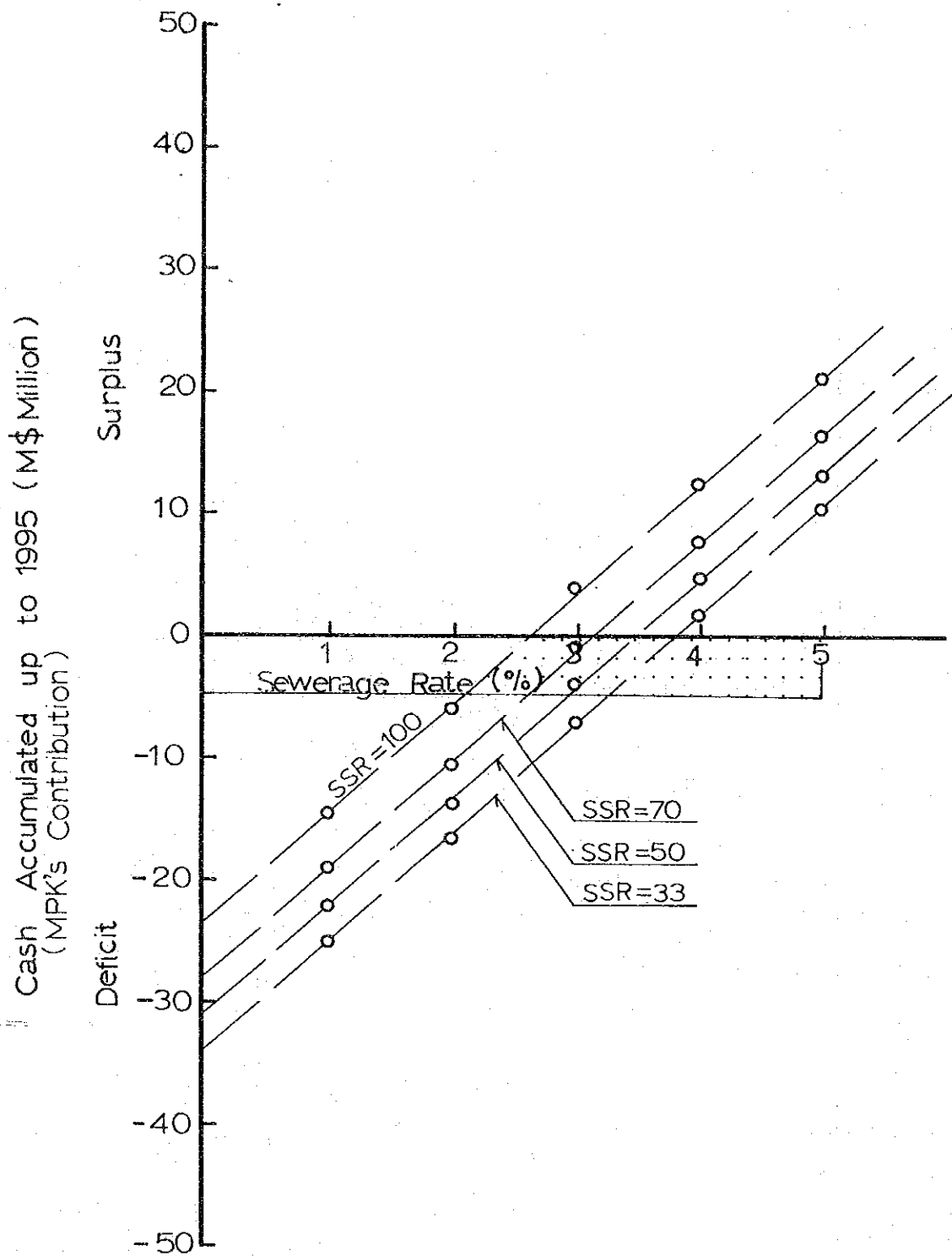
Feasible Area

within (1) 100% of the Sewerage Surcharge Rate on the Water Bill,

(2) 5% of the Property Surcharge Tax for the Sewerage Service, and

(3) M\$ 5 Million of MPK's Contribution up to 1995

Fig.7.1.(7) Cash Accumulated (MPK's Contribution) by Cases
Alternative A-7

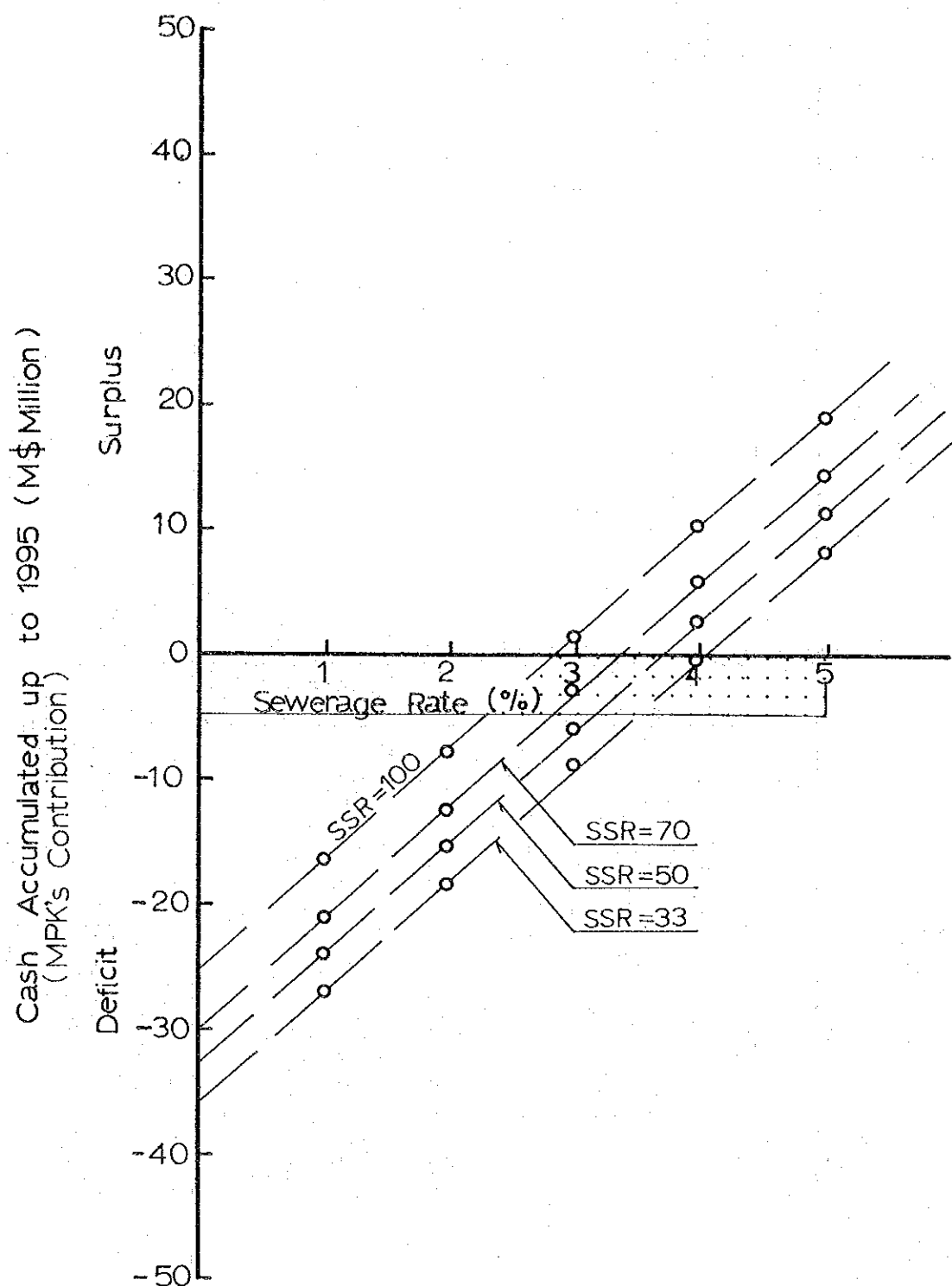


SSR : Sewerage Surcharge Rate (%)

Feasible Area

- within (1) 100% of the Sewerage Surcharge Rate on the Water Bill,
 (2) 5% of the Property Surcharge Tax for the Sewerage Service, and
 (3) M\$ 5 Million of MPK's Contribution up to 1995

Fig.7.1.(8) Cash Accumulated (MPK's Contribution) by Cases
Alternative B - 1



SSR : Sewerage Surcharge Rate (%)

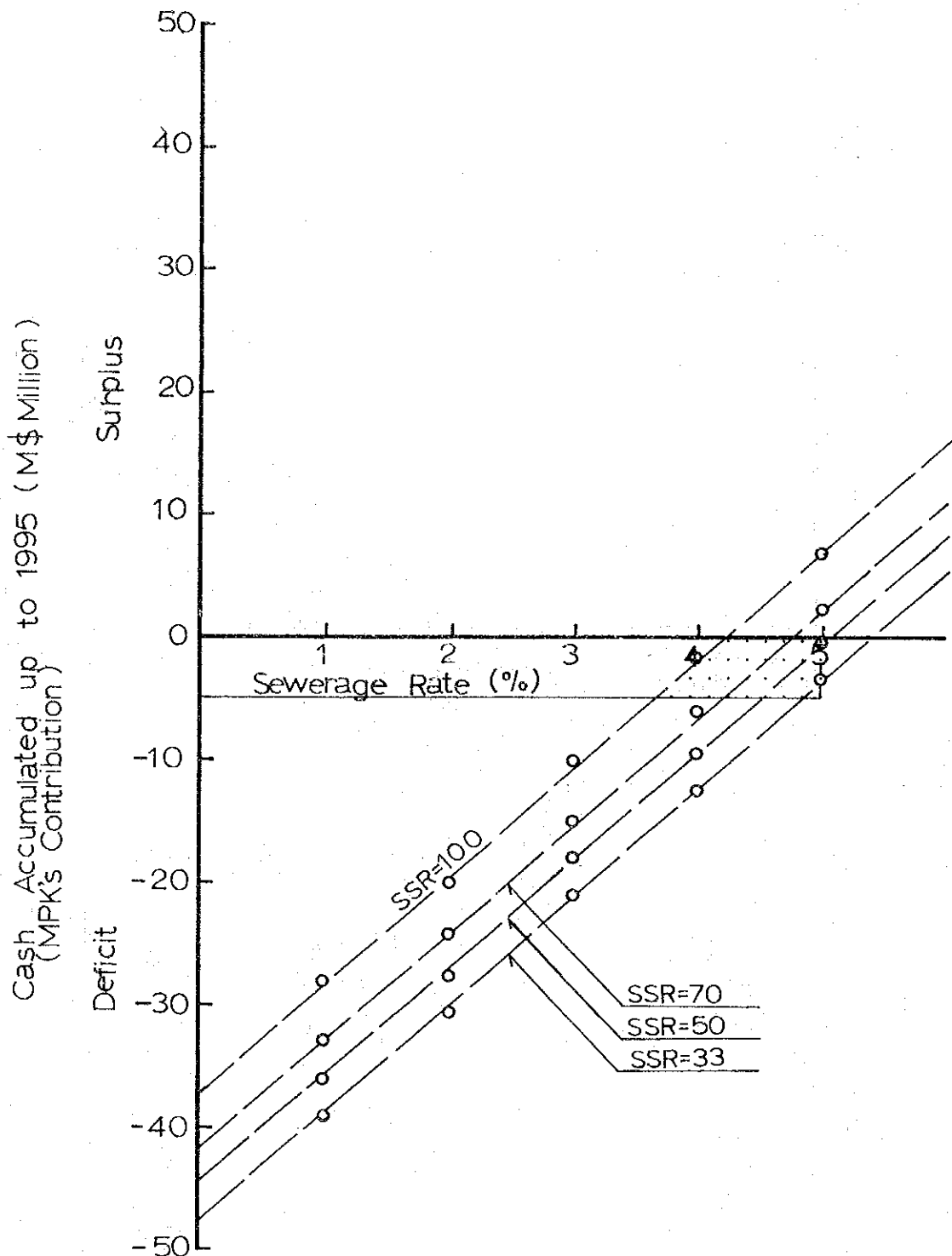
Feasible Area

within (1) 100% of the Sewerage Surcharge Rate on the Water Bill,

(2) 5% of the Property Surcharge Tax for the Sewerage Service, and

(3) M\$ 5 Million of MPK's Contribution up to 1995

Fig.7.1.(9) Cash Accumulated (MPK's Contribution) by Cases
Alternative B-2



SSR : Sewerage Surcharge Rate (%)

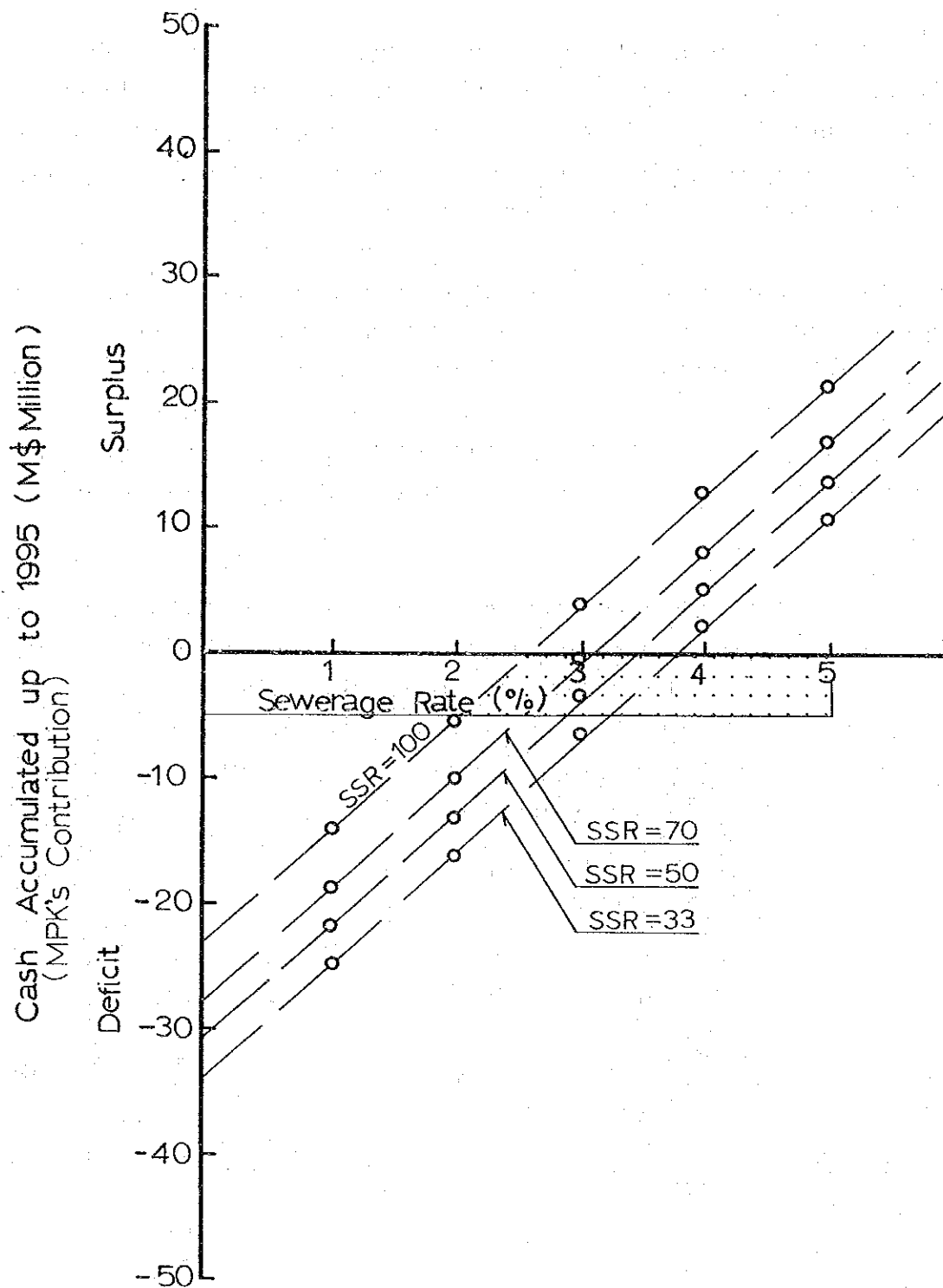
Feasible Area

within (1) 100% of the Sewerage Surcharge Rate on the Water Bill,


(2) 5% of the Property Surcharge Tax for the Sewerage Service, and

(3) M\$ 5 Million of MPK's Contribution up to 1995

Fig.7.1.(10) Cash Accumulated (MPK's Contribution) by Cases
Alternative B-3



SSR : Sewerage Surcharge Rate (%)

 Feasible Area

- within (1) 100% of the Sewerage Surcharge Rate on the Water Bill,
 (2) 5% of the Property Surcharge Tax for the Sewerage Service, and
 (3) M\$ 5 Million of MPK's Contribution up to 1995

This analysis indicates that each alternative has several feasible financial plans which comply with the above-mentioned criteria. However, as mentioned in Section 8.2.4 of the Master Plan report, maximum rate of the sewerage surcharge rate is considered to be 70 percent of water bill, instead of 100 percent from the practical viewpoint.

On the other hand, considering the concurrent undertaking of the sewerage and drainage works, the legal maximum sewerage surcharge tax rate of 5 percent, is considered a heavy burden on the residents, because the proposed drainage project also needs revenue from the drainage surcharge tax. Therefore, it might be reasonable for the sewerage surcharge tax rate to be within three percent under the prevailing tax rate at most in the practical sense.

Under these conditions, the most viable financial plan among each alternative can be selected as shown in Table 7.11. The selected financial plans are considered to be viable. However, Alternative A-2 and B-2, which require the purchase of the total land up to 2000 during the First Phase Period, do not include any financial plans that are viable. Also, Alternative A-4 does not offer any viable plans.

Table 7.11. Viabie Financial Plans

Alter- native	Loan Source	Foreign Loan Inter- est Rate (%)	Grant for Land Acquisi- tion	Sewerage Surcharge Rate (%)	Sewerage Surcharge Tax Rate (%)	MPK's Contri- bution up to 1995 (M\$1,000)
A-1	International Lending Agencies and Federal Government	10	No	70	3	4,994
A-2			No*	No viable financial plan		
A-3			Yes	70	3	2,586
A-4		12	No	No viable financial plan		
A-5			Yes	70	3	4,242
A-6	Bilateral Sources and Federal Government	5.75	No	70	3	3,362
A-7			Yes	50 70	3 3	4,044 954
B-1	Federal Government	6	No	70	3	2,912
B-2			No*	No viable financial plan		
B-3			Yes	50 70	3 3	3,594 504

* Includes total land acquisition cost up to 2000

7.2.4. Recommended Financial Plan

According to the recommendation of the financial plan for the proposed sewerage system in the Master Plan, some amount of grant should be supplied to MPK. In the First Phase period, a grant for the land acquisition cost is proposed since land never depreciates and continues to be useful into the future.

Judging from this standpoint, Alternatives A-3, A-5, A-7 and B-3 are applicable. Among these four alternatives, Alternative A-3, which includes 70 percent sewerage surcharge rate and 3 percent sewerage surcharge tax rate, as shown in Table 7.11, is recommended for the following reasons:

- a) Alternative A-7 is not viable. Since it is based on loan from bilateral sources, there is not guarantee that such loans will be approved.
- b) Alternative A-3 is more desirable than A-5, since the loan condition is softer than that of Alternative A-5.
- c) Alternative B-3 depends on the financial situation of the Federal Government. If Government can afford to finance the total construction cost, Alternative B-3 is recommended instead of Alternative A-3. In addition, considering the prevailing high interest rate of the foreign lending agencies, it would be preferable for the construction cost of the proposed sewerage system to be financed only by Federal Government loan, if possible, rather than by a foreign loan.

Thus, Alternative B-3 can be ranked as the second-best financial plan. In this case, a 50 percent sewerage surcharge rate on the water bill can be applied, instead of the 70 percent alternative rate, which would be more desirable for the residents. (Ref.: Table 7.11.)

The proposed financial plans of Alternative A-3 and B-3 are summarized as follows:

Alternative	Sewerage Surcharge Rate on Water Bill (%)	Sewerage Surcharge Tax Rate (%)	MPK's Contri- bution (M\$1,000)	Foreign Loan (M\$1,000)	Federal/State Govt. (M\$1,000)	
					Loan	Grant
A-3	70	3	2,586	16,816	34,998	4,146
B-3	50	3	3,594	0	51,814	4,146

The financial statements for Alternative A-3 and Alternative B-3; namely, income statement, cash flow and balance sheet, from 1983 to 1995, are presented in Table 7.12 (1) and Table 7.12 (2).

7.2.5. Supplementary Recommendation

In recommended Alternative A-3 and B-3, MPK will inevitably be required to provide a considerable amount of money from 1988 to 1990. MPK will have been unable to collect all of the sewerage charge from users of the projected sewerage system as house connections will still be underway, as well as the initiation of foreign loan debt service. Therefore, the following three points should be noted:

- 1) On behalf of MPK, the Federal Government should request the foreign lending agencies and also the Federal Government for extension of the 5-year grace period to 6 or 8 years.
- 2) If the above is difficult, it is recommended that MPK save money for the year of 1988 to 1990, which should not be difficult. Property value assessment, which is conducted at 5-year intervals, is presently underway and scheduled to end within the year 1982. Each reassessment would increase MPK's revenues even more and might offset its burden to a great extent. Therefore, the compensation due in 1988 to 1990 is not expected to be as much of a burden on MPK as it may appear on the surface.
- 3) In the above-mentioned financial plans, the sewerage surcharge tax will be imposed from 1988, when the amortization of principal and the repayment of interest begin. However, if MPK desires to avoid this burden in the future, it is recommended that MPK impose the sewerage surcharge tax from the year 1983, and accumulate this money for subsequent expenditures. In this case, MPK would be to sufficiently afford undertaking the sewerage service, compared with the above-mentioned recommended financial plans.

Table 7.12. (1)-1 Projected Income Statement (1983 - 1995)

Alternative A-3 (70%, 3%)*

(Unit: M\$1,000)

Item	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
OPERATING REVENUE													
Sewerage Charge	-	-	-	-	-	-	647	1,507	2,109	2,196	2,286	2,400	2,485
Sewerage Tax	-	-	-	-	-	2,792	2,932	3,079	3,233	3,395	3,565	3,743	3,930
Municipality Contribution	221	200	235	260	342	355	(49)	1,060	387	195	28	(162)	(315)
Total Operating Revenue	221	200	235	260	342	3,147	3,530	5,646	5,729	5,786	5,879	5,981	6,100
OPERATING EXPENSES													
Billing and Collection Fees	-	-	-	-	-	-	13	30	42	44	46	48	50
Provision for Bad Debts	-	-	-	-	-	-	6	15	21	22	23	24	25
Payroll	155	166	212	226	262	415	575	613	653	695	740	788	840
Maintenance	-	-	-	-	-	-	278	309	350	408	443	487	529
Administration	16	17	21	23	26	42	58	61	65	70	74	79	84
Total Operating Expenses	171	183	233	249	288	457	930	1,028	1,131	1,239	1,326	1,426	1,528
NET OPERATING INCOME	50	17	2	11	54	2,690	2,600	4,618	4,598	4,547	4,553	4,555	4,572
Depreciation	-	-	-	-	-	-	1,987	2,022	2,073	2,073	2,073	2,073	2,073
Interest	-	-	-	-	-	2,100	2,073	3,727	3,667	3,604	3,535	3,460	3,380
Net Income (Deficit)	50	17	2	11	54	590	(1,460)	(1,131)	(1,142)	(1,130)	(1,055)	(978)	(881)

* (Sewerage surcharge rate, Sewerage surcharge tax rate)

Table 7.12. (1)-2 Projected Cash Flow Statement (1983 -1995)

Alternative A-3 (70%, 3%)

(Unit: M\$1,000)

Item	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
SOURCES OF FUNDS													
Net Operating Income	50	17	2	11	54	2,690	2,600	4,618	4,598	4,547	4,553	4,555	4,572
Increase in Account Payable	14	1	4	2	3	14	40	8	8	9	8	8	8
Decrease in Current Assets (Less Cash)	-	-	-	-	-	-	-	-	-	-	-	-	-
Foreign Loan	-	-	3,376	5,490	3,128	4,103	164	555	-	-	-	-	-
Government Loan	3,677	-	6,546	10,446	8,566	4,354	688	721	-	-	-	-	-
Government Contribution	-	4,146	-	-	-	-	-	-	-	-	-	-	-
Total Sources	3,741	4,164	9,928	15,949	11,751	11,161	3,492	5,902	4,806	4,556	4,561	4,563	4,580
APPLICATION OF FUNDS													
Capital Expenditure	3,677	4,146	9,922	15,936	11,694	8,457	852	1,276	-	-	-	-	-
Interest	-	-	-	-	-	-	-	-	-	-	-	-	-
Foreign Loan	-	-	-	-	-	-	-	1,682	1,652	1,620	1,585	1,546	1,503
Government Loan	-	-	-	-	-	2,100	2,073	2,045	2,015	1,984	1,950	1,914	1,877
Amortization of Principal	-	-	-	-	-	-	-	-	-	-	-	-	-
Foreign Loan	-	-	-	-	-	-	-	293	323	355	390	429	472
Government Loan	-	-	-	-	-	443	470	498	528	559	593	629	666
Total Debt Service	-	-	-	-	-	2,543	2,543	4,518	4,518	4,518	4,518	4,518	4,518
Increase in Current Assets (Less Cash)	3	1	1	-	1	3	64	74	52	9	10	11	9
Total Applications	3,680	4,147	9,923	15,936	11,695	11,003	3,459	5,868	4,570	4,527	4,528	4,529	4,527
Net Cash Increase (Decrease)	61	17	5	13	56	158	33	34	36	29	33	34	53
Cash Available at End of Year	61	78	83	96	152	310	343	377	413	442	475	509	562

Table 7.12. (1)-3 Projected Balance Sheet (1983 - 1995)

Alternative A-3 (70%,3%)

(Unit: M\$1,000)

Item	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
ASSETS													
Fixed Assets													
Land	-	4,146	4,146	4,146	4,146	4,146	4,146	4,146	4,146	4,146	4,146	4,146	4,146
Utility Plant in Service	-	-	-	-	-	-	49,686	50,538	51,814	51,814	51,814	51,814	51,814
Less Accumulative Depreciation	-	-	-	-	-	-	1,987	4,009	6,082	8,155	10,228	12,301	14,374
Net Fixed Assets in Service	-	-	-	-	-	-	51,845	50,675	49,878	47,805	45,732	43,659	41,586
Construction in Progress	3,677	3,677	13,599	29,535	41,229	49,686	852	1,276	-	-	-	-	-
Total Fixed Assets	3,677	7,823	17,745	33,681	45,375	53,832	52,697	51,951	49,878	47,805	45,732	43,659	41,586
Current Assets													
Cash	61	78	83	96	152	310	343	377	413	442	475	509	562
Account Receivable	-	-	-	-	-	-	54	126	176	183	191	200	207
Inventory	3	4	5	5	6	9	19	21	23	25	27	29	31
Total Current Assets	64	82	88	101	158	319	416	524	612	650	693	738	800
Total Assets	3,741	7,905	17,833	33,782	45,533	54,151	53,113	52,475	50,490	48,455	46,425	44,397	42,386
LIABILITIES AND EQUITY													
Long Term Debt													
Foreign Loan	-	-	3,376	8,866	11,994	16,097	15,968	16,200	15,845	15,455	15,026	14,554	14,034
Government Loan	3,677	3,677	10,223	20,669	28,792	32,676	32,866	33,059	32,500	31,907	31,278	30,612	29,906
Total Long Term Debt	3,677	3,677	13,599	29,535	40,786	48,773	48,834	49,259	48,345	47,362	46,304	45,166	43,940
Current Liabilities													
Accounts Payable	14	15	19	21	24	38	78	86	94	103	111	119	127
Current Debt Maturities	-	-	-	-	443	470	721	851	914	983	1,058	1,138	1,226
Total Current Liabilities	14	15	19	21	467	508	869	937	1,008	1,086	1,169	1,257	1,353
Equity													
Government Capital Contribution	-	4,146	4,146	4,146	4,146	4,146	4,146	4,146	4,146	4,146	4,146	4,146	4,146
Retained Earnings	50	67	69	80	134	724	(736)	(1,867)	(3,009)	(4,139)	(5,194)	(6,172)	(7,053)
Total Equity	50	4,213	4,215	4,226	4,280	4,870	3,410	2,279	1,137	7	(1,048)	(2,026)	(2,907)
Total Liabilities and Equity	3,741	7,905	17,833	33,782	45,533	54,151	53,113	52,475	50,490	48,455	46,425	44,397	42,386

Table 7.12. (2)-1 Projected Income Statement (1983 - 1995)

Alternative B-3 (50%, 3%)*		(Unit: M\$1,000)												
Item		1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
OPERATING REVENUE														
Sewerage Charge	-	-	-	-	-	-	-	493	1,150	1,607	1,674	1,741	1,829	1,894
Sewerage Tax	-	-	-	-	-	-	2,792	2,932	3,079	3,233	3,395	3,565	3,743	3,930
Municipality Contribution	221	200	235	260	260	342	1,575	1,307	634	108	(55)	(199)	(365)	(498)
Total Operating Revenue	221	200	235	260	260	342	4,367	4,732	4,863	4,948	5,014	5,107	5,207	5,326
OPERATING EXPENSES														
Billing and Collection Fees	-	-	-	-	-	-	-	10	23	32	33	35	37	38
Provision for Bad Debts	-	-	-	-	-	-	-	5	12	16	17	17	18	19
Payroll	155	166	212	226	262	262	415	575	613	653	695	740	788	840
Maintenance	-	-	-	-	-	-	-	278	309	350	408	443	487	529
Administration	16	17	21	23	26	26	42	58	61	65	70	74	79	84
Total Operating Expenses	171	183	233	249	288	288	457	926	1,018	1,116	1,223	1,309	1,409	1,510
NET OPERATING INCOME														
Depreciation	50	17	2	11	54	54	3,910	3,806	3,845	3,832	3,791	3,798	3,798	3,816
Interest	-	-	-	-	-	-	-	1,987	2,022	2,073	2,073	2,073	2,073	2,073
Net Income (Deficit)	-	-	-	-	-	-	3,109	3,070	3,028	2,984	2,937	2,887	2,835	2,779
	50	17	2	11	54	54	801	(1,251)	(1,205)	(1,225)	(1,219)	(1,162)	(1,110)	(1,036)

* (Sewerage surcharge rate, Sewerage surcharge tax rate)

Table 7.12. (2)-2 Projected Cash Flow Statement (1983 - 1995)

Alternative B-3 (50%, 3%)

Item	(Unit: M\$1,000)												
	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
SOURCES OF FUNDS													
Net Operating Income	50	17	2	11	54	3,910	3,806	3,845	3,832	3,791	3,798	3,798	3,816
Increase in Account Payable	14	1	4	2	3	14	39	8	8	9	7	8	9
Decrease in Current Assets (Less Cash)	-	-	-	-	-	-	-	-	-	-	-	-	-
Foreign Loan	-	-	-	-	-	-	-	-	-	-	-	-	-
Government Loan	3,677	-	9,922	15,936	11,694	8,457	852	1,276	-	-	-	-	-
Government Contribution	-	4,146	-	-	-	-	-	-	-	-	-	-	-
Total Sources	3,741	4,164	9,928	15,949	11,751	12,381	4,697	5,129	3,840	3,800	3,805	3,806	3,825
APPLICATION OF FUNDS													
Capital Expenditure	3,677	4,146	9,922	15,936	11,694	8,457	852	1,276	-	-	-	-	-
Interest	-	-	-	-	-	-	-	-	-	-	-	-	-
Foreign Loan	-	-	-	-	-	-	-	-	-	-	-	-	-
Government Loan	-	-	-	-	-	3,109	3,070	3,028	2,984	2,937	2,887	2,835	2,779
Amortization of Principal	-	-	-	-	-	-	-	-	-	-	-	-	-
Foreign Loan	-	-	-	-	-	-	-	-	-	-	-	-	-
Government Loan	-	-	-	-	-	655	694	736	780	827	877	929	985
Total Debt Service	-	-	-	-	-	3,764	3,764	3,764	3,764	3,764	3,764	3,764	3,764
Increase in Current Assets (Less Cash)	3	1	1	0	1	3	51	56	40	8	7	9	8
Total Applications	3,680	4,147	9,923	15,936	11,695	12,224	4,667	5,096	3,804	3,772	3,771	3,773	3,772
Net Cash Increase (Decrease)	61	17	5	13	56	157	30	33	36	28	34	33	53
Cash Available at End of Year	61	78	83	96	152	309	339	372	408	436	470	503	556

Table 7.12. (2)-3 Projected Balance Sheet (1983 -1995)

Alternative B-3 (50%, 3%)

(Unit: M\$1,000)

Item	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
ASSETS													
Fixed Assets													
Land	-	4,146	4,146	4,146	4,146	4,146	4,146	4,146	4,146	4,146	4,146	4,146	4,146
Utility Plant in Service	-	-	-	-	-	-	49,686	50,538	51,814	51,814	51,814	51,814	51,814
Less Accumulative Depreciation	-	-	-	-	-	-	1,987	4,009	6,082	8,155	10,228	12,301	14,374
Net Fixed Assets in Service	-	-	-	-	-	-	51,845	50,675	49,878	47,805	45,732	43,659	41,586
Construction in Progress	3,677	3,677	13,599	29,535	41,229	49,686	852	1,276	-	-	-	-	-
Total Fixed Assets	3,677	7,823	17,745	33,681	45,375	53,832	52,697	51,951	49,878	47,805	45,732	43,659	41,586
Current Assets													
Cash	61	78	83	96	152	309	339	372	408	436	470	503	536
Account Receivable	-	-	-	-	-	-	41	96	134	140	145	152	158
Inventory	3	4	5	5	6	9	19	20	22	24	26	28	30
Total Current Assets	64	82	88	101	158	318	399	488	564	600	641	683	744
Total Assets	3,741	7,905	17,833	33,782	45,533	54,150	53,096	52,439	50,442	48,405	46,373	44,342	42,330
LIABILITIES AND EQUITY													
Long Term Debt													
Foreign Loan	-	-	-	-	-	-	-	-	-	-	-	-	-
Government Loan	3,677	3,677	13,599	29,535	40,574	48,337	48,453	48,949	48,122	47,245	46,316	45,331	44,287
Total Long Term Debt	3,677	3,677	13,599	29,535	40,574	48,337	48,453	48,949	48,122	47,245	46,316	45,331	44,287
Current Liabilities													
Accounts Payable	14	15	19	21	24	38	77	85	93	102	109	117	126
Current Debt Maturities	-	-	-	-	655	694	736	780	827	877	929	985	1,044
Total Current Liabilities	14	15	19	21	679	732	813	865	920	979	1,038	1,102	1,170
Equity													
Government Capital Contribution	-	4,146	4,146	4,146	4,146	4,146	4,146	4,146	4,146	4,146	4,146	4,146	4,146
Retained Earnings	50	67	69	80	134	935	(316)	(1,521)	(2,746)	(3,965)	(5,127)	(6,237)	(7,273)
Total Equity	50	4,213	4,215	4,226	4,280	5,081	3,830	2,625	1,400	181	(981)	(2,091)	(3,127)
Total Liabilities and Equity	3,741	7,905	17,833	33,782	45,533	54,150	53,096	52,439	50,442	48,405	46,373	44,342	42,330

CHAPTER 8

INSTITUTIONAL ORGANIZATION AND LEGAL ASPECT

CHAPTER 8 INSTITUTIONAL ORGANIZATION AND LEGAL ASPECT

8.1. Introduction

Comprehensive sewerage and urban drainage systems in Malaysia are a relatively new development concept which has recently been gaining increasing attention. Such programs have already been initiated or are planned for some municipal areas, being urgently needed for protection of water resources and flood control, including public health and environmental improvement.

The responsibility for carrying out these programs is vested in the local authorities under the Local Government Act; however, an adequate organization for administering the sewerage and drainage systems within the Kelang Municipality is lacking. Thus, instituting such an organization is of primary importance, especially since the work on these systems is scheduled to start in 1983, according to the proposed Master Plan.

For this purpose, studies on organization and management for Kelang Municipality's sewerage and drainage project in Selangor State are presented in this chapter, based on a review of the existing organizations dealing with sewerage and drainage activities at each governmental level -- federal, state and municipality.

8.2. Organizational Requirements

In contrast to Kelang Municipality's rapid commercial and industrial development, that of its sewerage and drainage systems has been negligible. No more than rudimentary works, such as septic tanks, night soil bucket collection, surface drains, and construction of the small drains, have been provided. Considering this situation and the increasing pace of commercial, industrial and urban development expected in the near future, a steady increase in the water consumption rate, the burden on the primitive sewerage and drainage systems and in waste discharges to the natural waterways and open seas can be expected. Consequently, there is an

urgent need for modern sewerage and drainage systems in the Project Area, for which an administrative organization will be required for implementation of the Project, as well as its operation and maintenance.

The existing organizations, such as the Engineering Department of Kelang Municipality, the Drainage and Irrigation Department and Public Works Department of the State Government, are more or less concerned with sewerage and drainage activities in the Project Area. It is possible for these agencies to operate the proposed sewerage and drainage systems efficiently if substantial aid in the form of staff and funds are provided. For this purpose, the following respective alternatives are considered.

8.2.1. Proposed Organization

1) General

As implementation of the sewerage project proposed for the Municipality would proceed according to schedule together with the on-going and proposed program for the drainage works, it is necessary to consider further detailed organization of the Sewer and Drain Section and its staffing pattern with clearly defined terms of reference. The following are recommended:

i. The current Work Shop Unit of the Sewer and Drain Section should be made a separate section, since most of its current work has little or no direct relation to sewerage and drainage services. As shown in Table 8.1, the Engineering Department will thus consist of six sections. Functional efficiency, including controlling operations, should be emphasized in this organizational expansion.

ii. Proper arrangements should be made with the Treasury Department for separate accounting of the sewerage activities from those of the Municipality's general finance. This arrangement is indispensable for incorporating the cost-recovery system into the sewerage service system. Also, aside from administrative advantages, it will be useful in loan arrangements with any lending agency.

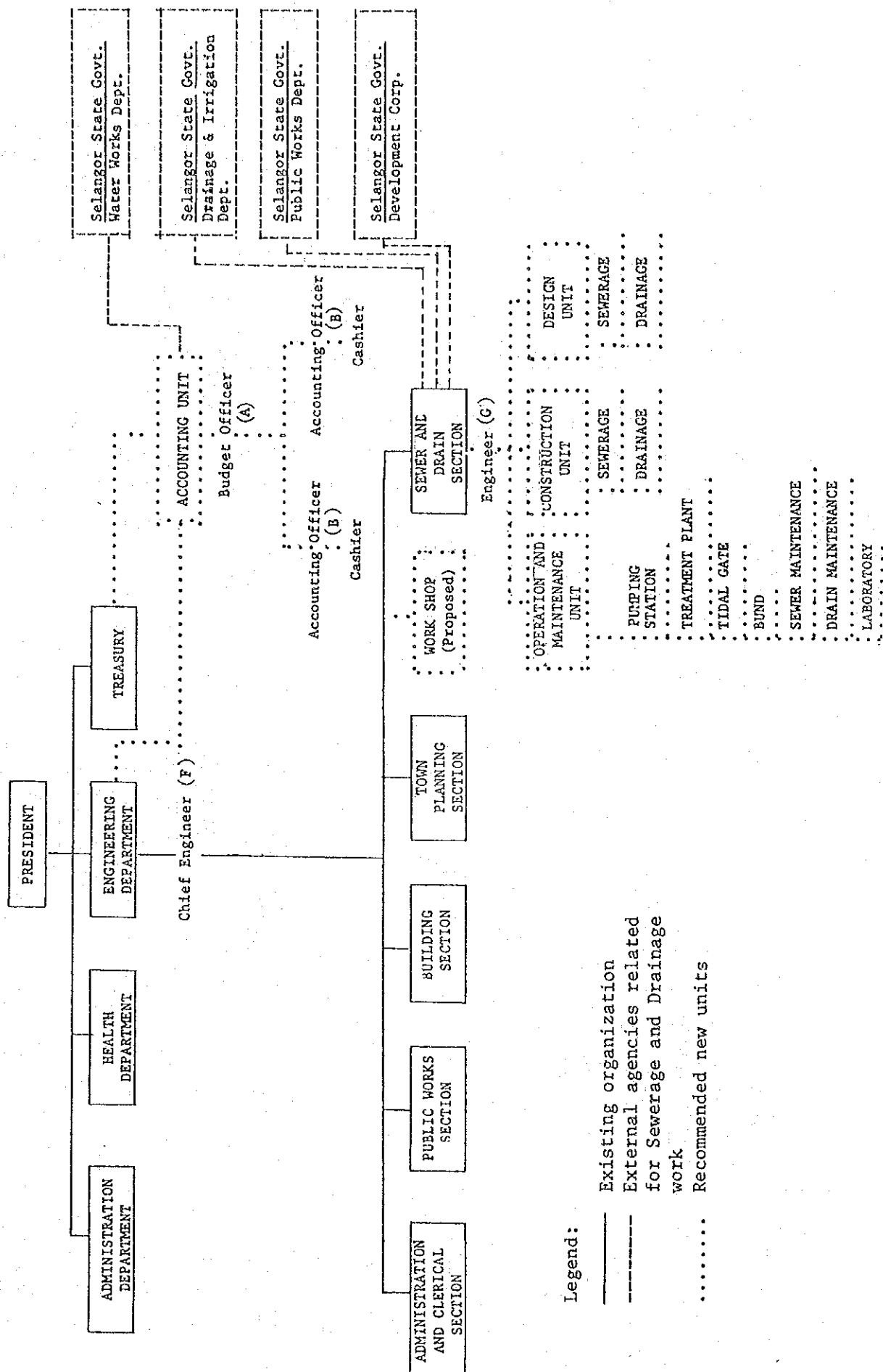
iii. The Engineering Department would take over the drain cleaning duties from the Health Department, which is presently in charge of cleaning the existing drains.

iv. Close coordination with other departments of the Municipality should not be neglected.

2) Proposed Functional Units of Sewer and Drain Section

It is recommended that the Sewer and Drain Section be divided into three new functional units: Design Unit, Construction Unit, and Operation/Maintenance Unit, as shown in Table 8.1. Each unit would cooperate with the other units in undertaking both sewerage and drainage work.

Table 8.1. Proposed Modification of Kelang Municipality Organization for Administration

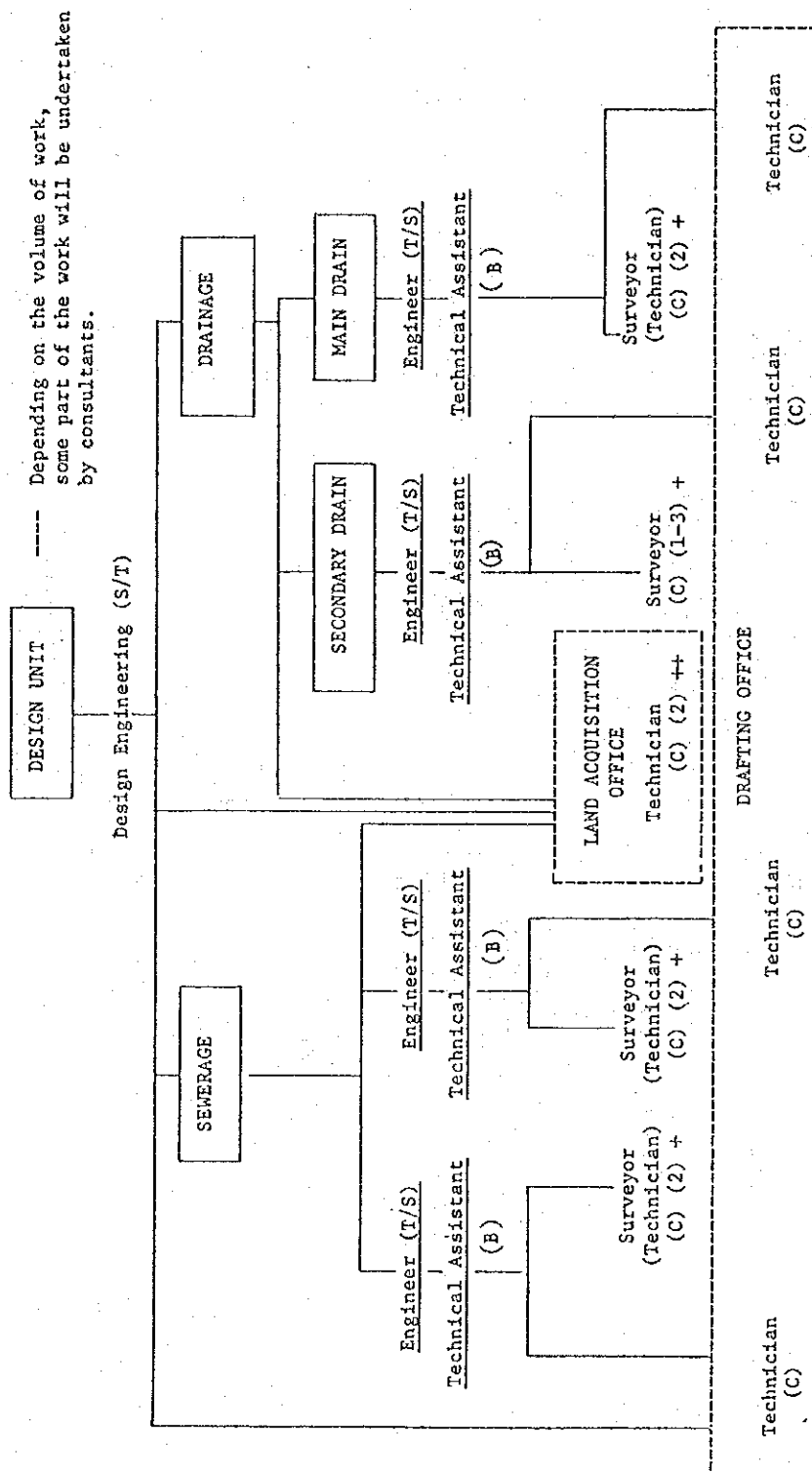


2-1) Design Unit

This unit would be responsible for preparation of engineering design and specifications of all sewerage and drainage projects and also for review and approval of the design plans submitted by private developers. It would also be responsible for collecting and compiling accurate information on the sewerage system, including priority areas, population trends, number of connections and persons served, sewage flows, receiving water quality, treatment plant performance, etc. The organization chart for this unit is shown in the following Table 8.2.

It will also maintain liaison with other Government departments for shifting squatters and service lines (e.g. cables & water mains) affected by proposed sewers, drains and culverts at the design stage.

Table 8.2. Proposed Organization of Design Unit



+ One is special grade and one is ordinary.

++ If all works are undertaken by Consultant, only one (1) surveyor (ordinary) will be required.

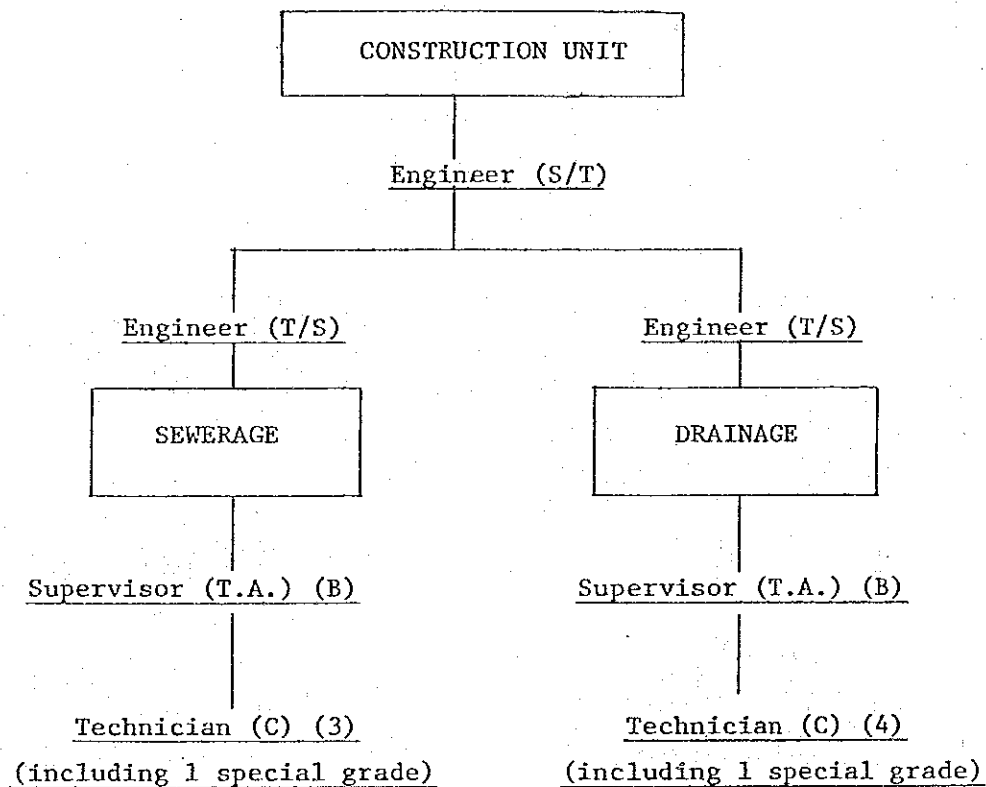
If all works are conducted by MPK, one (1) surveyor (special grade) and two (2) surveyors (ordinary) will be required.

Generally, in the organization of sewerage and drainage systems, each has its own Land Acquisition Office (LAO) and Drafting Office (DO). However, it is proposed that there be one LAO and one DO to serve both sewerage and drainage systems, for efficient manpower utilization.

2-2) Construction Unit

The Construction Unit would be responsible for management and supervision of all construction of facilities with attendant surveys and inspections to ensure compliance with required specifications and standards. The organization chart for this unit is shown in the following Table 8.3.

Table 8.3. Proposed Organization of Construction Unit



2-3) Operation and Maintenance Unit

As shown in Table 8.4, the function of this unit is divided into sewerage, drainage and laboratory. The sewerage function is to cover operation and maintenance of sewers, pumping stations and treatment plants, and the drainage function is for drains and culverts, bunds and tidal gates. The function of the laboratory is for monitoring and surveillance of industrial wastewater quality, and stabilization pond effluents.

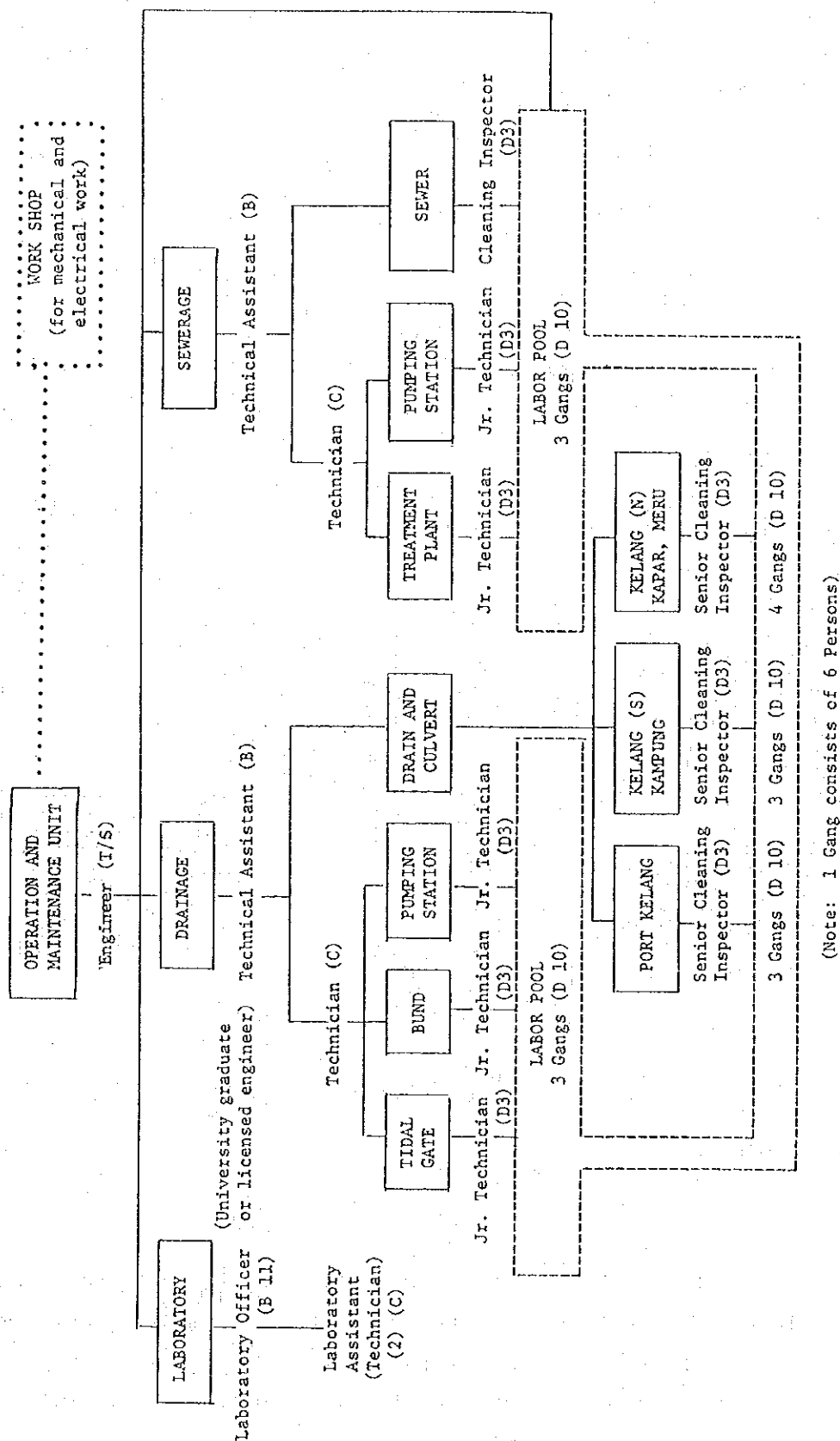
The work on sewers, drains and culverts require their proper maintenance through routine inspections for physical damage and obstruction in the sewers, including control of illegal industrial discharge into the main sewers. Proper maintenance and routine inspections are also required on bunds and tidal gates to prevent physical damage and obstruction.

The waste stabilization pond proposed for sewage treatment requires monitoring influent and effluent quantity and quality to obtain continuous records for controlling operation and as design reference for future expansion. Items to be monitored include incoming sewage, temperature, pH and DO, with daily sampling as a minimum. It is suggested that sampling of other items, such as BOD, SS, coliforms and oil/grease, be entrusted to external units because of insufficient staff. Such monitored data could form the basis for issuing necessary warnings to factories against discharging undesirable waste.

The Sewer and Drain Section would rely on the staff of the Work Shop Section concerning the relatively small volume of mechanical and electrical work, as it is recommended that mechanical and electrical staff members belong to the Work Shop Section, rather than the Sewer and Drain Section.

Assistance from a labor pool, as shown in Table 8.4, from which work gangs of appropriate number would be assigned to the Sewer and Drain Section, according to the volume of work, should also be agreed and arranged. This would have the advantage of limiting assignments only to the number of workers needed for each job. Some laborers now engaged in cleaning drains should be shifted from the Health Department to the Engineering Department.

Table 8.4. Proposed Organization of Operation and Maintenance Unit



3) Other Support Agencies

Supportive functions by other agencies of different levels should be also considered for the sake of efficiency and economy as described below:

i. Local Government

3-1) Work Shop Section

The Work Shop Section would cooperate with the Operation and Maintenance Unit concerning all mechanical and electrical equipment and facilities for the sewerage and drainage activities.

3-2) Administration and Clerical Section

This section would be responsible for the recruitment and selection of the new staff for the sewerage and drainage systems.

3-3) Public Works Section, Building Section and Town Planning Section

It is proposed that these sections be responsible for encouraging the residents to avail themselves of the sewerage and drainage systems.

3-4) Administration Department

This Department should expand its function as necessary for proper administration including the legal aspect of the sewerage and drainage systems.

3-5) Health Department

This Department should continue the work of night soil collection and desludging septic tanks until completion of the sewerage and drainage project, while cooperating with the Sewer and Drain Section in the gradual changeover. The existing duties of cleaning drains is recommended to be turned over to the Engineering Department.

3-6) Treasury Department

This Department should assist the new Accounting Unit in maintaining a separate accounting and financial system for the proposed sewerage program for a systematic and efficient cash flow of the operation.

Loans from international lending agencies and the Federal Government may be obtained for the initial sewerage construction work. International lending agencies stipulate that accounting should follow commercial practice and all revenues collected be kept separate from MPK's annual revenues and expenditures. Therefore, it is proposed that the new Accounting Unit perform the accounting work for the sewerage system, including budgeting and collection of sewerage fees with the cooperation of the Water Works Department, Selangor State. Administration of loans would be another main function of this unit.

ii. State Government

3-7) Water Works Department, Selangor State (WWD)

It is recommended that the sewerage charge be based on the users' water bill. As the Water Works Department of Selangor State is now handling water supply services, cooperation between MPK and WWD will be required for billing and collecting of sewerage charges on behalf of MPK. In this connection, agreement should be made on procedures for transfer of the collected charges and its administration fees.

3-8) Drainage and Irrigation Department (DID), Selangor State

DID should assist MPK in the work of planning, designing, constructing and maintaining the major drains up to the year 1990.

3-9) Public Works Department (JKR), Selangor State

This Department is responsible for the construction and maintenance of federal and state roads, including construction of roadside drains, which should continue. However, the maintenance work for these drains should be transferred to MPK.

3-10) Selangor State Development Corporation (PKNS)

It is recommended that the Sewer and Drain Section coordinate its sewerage and drainage facilities with PKNS concerning low cost housing projects, development of industrial areas, and general development of new towns.

8.2.2. Staffing Schedule

Staffing projections from 1983 up to the year 1990 shown in the following tables are intended as guidelines in determining the number of personnel and laborers necessary to undertake the required functions for the proposed sewerage and drainage program. The staffing estimates show a total of 11 in the initial year of 1983, 26 in 1990 at the end of the First Phase (excluding the labor pool and staff of other Departments or Sections).

It should be noted that the above estimates are so arranged as to keep the number required for the smooth operation of the sewerage and drainage services to a minimum. However, recruitment of the required number of qualified staff for the relatively short period is expected to be difficult and result in a shortage of the required staff, particularly in the Design and/or Construction Unit, which will impose restraints on implementation of the proposed sewerage and drainage systems. In this case, it is suggested that outside engineering consultants be contracted to undertake the detailed design work and preparation of tender documents and subsequent supervision of construction at the initial stage of the program.

A schedule of estimated staff requirement and the qualifications and job descriptions of each personnel for each unit follow:

1-1) Design Unit Staff Schedule

Job Title	1983	1984	1985	1986	1987	1988	1989	1990
Engineer (S/T)*	1	1	1	1	1	1	1	1
Engineer (T/S)	1	1	1	1	1	1	1	2
Technical Asst.	1	1	1	1	1	1	1	2
Technician	2	2	2	2	2	2	2	4
Sub-Professional* Pool (Technician)	2	2	2	2	2	2	2	4
Land Acquisition* Pool (Technician)	2	2	2	2	2	2	2	2
Total	9	9	9	9	9	9	9	15

Note: It is assumed one design engineer would engage in M\$ 4 million worth of project work a year. In case of excess work either local or foreign consultant may be assigned.

* Concurrently serve as drainage staff.

1-2) Design Unit Staff Qualifications and Job Description

Position	Qualifications		Job Description Responsibilities
	Degree	Work Experience	
Engineer (S/T)	B.S. in C.E. (or S.E.)	8 years	Designs engineering specifications. Supervision of design engineers and draftsmen
Engineer (T/S)	B.S. in C.E. (or S.E.)	2 years	Preparation of plans and designs for construction improvement and repair of sewerage facilities, including house connections
Technical Assistant & Technician	Diploma (or H.S. Cert.)	—	Assist design engineer (as drawings and other miscellaneous work)

2-1) Construction Unit Staff Schedule

	1983	1984	1985	1986	1987	1988	1989	1990
Engineer (S/T)*	1	1	1	1	1	1	1	1
Engineer (T/S)	1	1	1	1	1	1	1	1
Supervisor (Technical Asst.)	-	-	1	1	1	1	1	1
Technician	-	-	2	2	2	2	2	2
Total	2	2	5	5	5	5	5	5

Note: It is assumed one design engineer would engage in M\$ 7 million worth of project work a year. In case of excess work either local or foreign consultant may be assigned.

* Concurrently serve as drainage staff.

2-2) Construction Unit Staff Qualifications and Job Description

Position	Qualifications		Job Description Responsibilities
	Degree	Work Experience	
Engineer (S/T)	B.S. in C.E.	8 years	All construction work and supervision of inspectors
Engineer (T/S)	B.S. in C.E.	2 years	Supervision of all construction work of sewerage or drainage facilities
Technical Assistant & Technician	Diploma (or Tech. H.S. Cert.)	—	Inspection of equipment and materials for construction, including house connections and public sewer laying (according to technical specifications)

3-1) Operation and Maintenance Unit Staff Schedule

Job Title	1983	1984	1985	1986	1987	1988	1989	1990
Engineer (T/S)	-	-	-	-	1	1	1	1
Technical Asst.	-	-	-	-	-	1	1	1
Technician	-	-	-	-		1	1	1
Jr. Technician	-	-	-	-		3	3	3
Chemist						1	1	1
Laboratory Asst.						1	1	1
Labor Pool*	-	-	-	-	-	-	6	6
Total	-	-	-	-	1	8	14	14

3-2) Operation and Maintenance Unit Staff Qualifications and
Job Description

Position	Qualifications		Job Description Responsibilities
	Degree	Work Experience	
Engineer (T/S)	B.S. in S.E.	5 years	All activities for operation and maintenance (O & M) of the sewerage and drainage systems
Technical Assistant, Technician and Junior Technician	Diploma (or Tech. H.S. Cert.)	2 years	All work related to O & M and supervising laborers
Chemist	B.S. in Chem.	---	Management and provision of laboratory services for regular monitoring tests concerning quantity and quality of wastewaters of the sewerage system and effluents from the sewage treatment plant
Laboratory Assistant	Diploma (or H.S. Cert.)	2 years	Collection of water samples and water quality examination of drains and stabilization ponds under the direction of the Chemist
Laborer	(None)	(None)	Routine work, such as de-silting and cleaning of sewers and drains

4-1) Other Departments or Sections

Code : S = Sewerage
D = Drainage
T = Total

Job Title	1983			1984			1985			1986			1987			1988			1989			1990		
	S	D	T	S	D	T	S	D	T	S	D	T	S	D	T	S	D	T	S	D	T	S	D	T
Budget Officer																1	-	1	1	-	1	1	-	1
Accounting Officer																			1	-	1	1	-	1
Senior Clerk*																			1	-	1	1	-	1
Engineer (Mechanical)																			1		1	1		1
Technical Asset. (Electrical)																								
Technician (Electrical)	1	1		1	1		1	1		1	1		1	1		1	1		1	1		1	1	
Senior Clerk**																								
Clerk and Typist	4	4		4	4		4	4		4	4		4	4		4	4		6	6		6	6	
Total	5			5			5			5			5			6			11			11		

* No direct handling of money

** Senior clerk for Drainage and Sewerage Section

4-2) Qualifications and Job Descriptions of Staff Members of Other Depts. or Sections

Position	Qualifications		Job Description Responsibilities
	Degree	Work Experience	
Budget Officer	B.S. in Accounting or Business Administration	5 years	Loan administration and reimbursement for the sewerage project
Cashier	Diploma (or H.S. Cert.)	—	Daily accounting work under the direction of the Budget Officer and Accounting Officer, preparing and keeping accounting records
Engineer (Mechanical)	B.S. in M.E.	5 years	O & M of treatment plant and pumping stations, including control and repair of cleaning machines and trucks and maintenance equipment
Engineer (Electrical)	B.S. in E.E.	5 years	Control, monitoring and repair of all electrical equipment required on treatment plant and pumping station. Safekeeping of all maintenance equipment
Personnel Officer	B.S. in Adm. (or liberal arts)	—	Recruitment of new staff and administration of personnel assignments and wage control
Clerk	Diploma (or H.S. Cert.)		Assist Personnel Officer in various clerical duties, such as recording and filing

8.2.3. Training

Parallel to the recruitment schedule of necessary staff of all levels, training programs should be considered for those recruited in an attempt to raise their level of qualification/experience for satisfactory performance of their assignment, by way of practical and effective approaches including the following, to be implemented as soon as possible when implementation of the First Phase of the proposed project is decided:

- (a) On-the-job training program will be arranged with foreign engineering consultants for training of sewerage engineers and other related technical staff during the period of consulting services for planning, designing and construction supervision, including procurement procedure, etc.
- (b) In particular, plant operators will be sent for an agreed period of time to receive training at existing plants elsewhere in Malaysia, where technical knowhow and accumulated experience on sewerage operation and management have been gained.

At present, no organization for training sewerage engineers and other related personnel exists in Malaysia. Due to the importance and urgent necessity of providing sewerage service, it is recommended that a training organization be set up in Malaysia as soon as possible under the leadership of the Local Government Division, Ministry of Housing and Local Government, which is responsible for carrying out urban engineering activities, inclusive of sewerage and sanitation.

In Japan, the Japan Sewerage Works Agency (JSWA), is set up for the purpose of promoting sewerage works, exploring technological aspects and training local government staff members. The following Tables 8.5 and 8.6, describing the type of training concerning sewers and wastewater treatment plants conducted by JSWA are provided for reference. (The background, legal aspect, functional outline, and financing of JSWA are explained in Appendix J, Vol. IV in detail.)

Table 8.5. Schedule for Trainee -- Sewer

	Sewer
Training Period	20 days
Trainee Prerequisite	More than $2\frac{1}{2}$ years' job experience.
Purpose	To enable determination of the appropriate methods of pipe selection and design and construction of the sewer.
Content of Training	<ul style="list-style-type: none"> • A general knowledge of the sewerage system. • Laws and regulations related to sewerage and construction. • Design of the sewers. • Exercises in layout planning and hydraulic calculation of sewers. • Lectures on wastewater treatment. • Experiments on soil testing. • Lectures on construction work and selection of construction method. • Lectures on the operation and maintenance of sewers. • Lectures on administration and finance of the sewerage system. • Tours of sewerage facilities.

Table 8.6. Schedule for Trainee -- Wastewater Treatment Plant

	Wastewater Treatment Plant
Training Period	20 days
Trainee Prerequisite	More than five years' sewerage-related work experience or technical knowledge equivalent to five years of sewerage-related work experience.
Purpose	To enable preparation and supervision of the basic design and detail design of the treatment plant.
Content of Training	<ul style="list-style-type: none"> • Laws and regulations related to sewerage works. • Lectures on principles of wastewater treatment. • Lectures on the wastewater treatment process and its selection. • Lectures and exercises on the design of wastewater treatment facilities. • Lectures on check points for works designed by consultants. • Lectures on the design of mechanical and electrical equipment. • Lectures on construction methods and schedule. • Exercises on planning layouts of treatment plant. • Lectures and exercises on the hydraulics of the wastewater treatment facilities. • A case study • Tours to sewerage facilities.

8.3. Legal Aspect

Concerning legal aspects of the project implementation, the Local Government Act (1976), the Street, Drainage and Building Act (1974), Town and Country Planning Act (1976), and The Environmental Quality Act (1974) are reviewed in the Master Plan report. The review of these Acts, and interviews with relevant officials, both in Federal and State agencies as well as the Kelang Municipality, reveal no raise any legal problems in implementing the sewerage and drainage projects under existing laws and regulations.

CHAPTER 9

PROJECT EVALUATION

CHAPTER 9 PROJECT EVALUATION

9.1. Introduction

Due to the rapid socio-economic development in Malaysia, the mean monthly household income of the lowest income group, comprising 40 percent of the population, increased from M\$76 in 1970 to M\$186 in 1979, according to the Fourth Malaysia Plan. This represents a rise of 145 percent, compared with the 66 percent increase in consumer price index.

As income increases, what once seemed tolerable comes to be recognized as being intolerable. Therefore, a higher civil minimization level is required. Considering that provision of sewerage service is recognized internationally as a form of civil minimization service, with income level in Malaysia becoming increasingly higher, the desirability for sewerage service is expected to increase and to come to be considered necessary, since benefits derived from sewerage service strongly affect the quality of life, especially sanitation and environment. The following Section explains these benefits.

9.2. Anticipated Benefits

Provision of the sewerage system is expected to substantially benefit the served population directly, which includes those of households, factories, shops and institutions. There will also be significant indirect benefits, such as the improvement and general environment which will cover even those who are not served by the system directly. Therefore, the benefits, direct or indirect, will properly be measured both in terms of quantifiable and unquantifiable manner, sometime in monetary terms, to serve as justification for a sewerage project.

Consideration is therefore made to identify the benefits according to the following two categories:

- 1) Environmental Improvement
- 2) Sanitation and Health

A description of the benefits in each of the above-mentioned categories and some attempt to quantify these benefits are presented in the following section.

9.3. Recognition and Quantification of Benefits

9.3.1. Environmental Improvement Aspect

Provision of the sewerage system is certain to improve the pollution in watercourses into which wastewaters would otherwise be discharged directly without treatment from their various sources. This will also result in aesthetic improvement of the watercourses and surroundings.

Benefits categorized from this aspect are difficult to measure in monetary terms, especially in the Project Area, where use of river water for agriculture, drinking water or any other purposes is almost negligible. Despite such difficulty, they should by no means be overlooked. There has been a rapidly increasing awareness of water pollution in recent years nation-wide, as well as in the Project Area. Elimination of the water pollution problem is an indispensable element for a clean and attractive community and there is virtually no technical alternative other than through provision of a properly planned and operated sewerage system to efficiently reduce pollutants originating from domestic and industrial wastewater.

9.3.2. Sanitation and Health

Improvement of health and sanitary condition by way of provision of the sewerage system is definitely one of the benefits to be counted for. While in the Project Area, as mentioned in the Master Plan report, the prevailing low incidence of diseases noted prevents a meaningful quantifiable measurement of benefit. It is, however, obvious that low level of incidence will at all times be maintained, through sewerage services, resulting in reduced medical expenses and increased man-power productivity.

It is noted, as cited in the Master Plan report, flush toilets with septic tanks are installed for approximately 77 percent of the households within the Area. The other 23 percent of the households are still covered by the bucket system (1,700 households) or pit privies (1,000 households). Desludging of septic tanks and bucket system collection of night soil from the households and disposal of these wastes are being carried out by Kelang Municipality. Another benefit of the proposed sewerage system will therefore be the savings of the cost being borne by the Municipality as well as the individuals concerned for these services.

According to the Health Department of the Municipality, the annual operating cost for desludging septic tanks and night soil collection and disposal are M\$98,000 and M\$254,000 respectively. Provided that the implementation schedule for the proposed sewerage system, expenditures will be reduced thereafter.

The amount saved is less than the operation and maintenance cost for the sewerage system according to the Master Plan report; however, the elimination of the septic tank and bucket system, which are limited for human excreta, will improve the water pollution problem caused by the direct discharge without treatment. Furthermore, significance of sewerage facilities to treat sullage water together with human excreta should be duly considered.

9.4. Project Evaluation

In general, the desirability of a specific project can be indicated by the concept of the willingness-to-pay.

Willingness-to-pay is considered to be a proxy indicator for all of the benefits to be gained from a proposed project. According to this concept, the benefits out of a proposed project, can generally be assessed in monetary terms. It is considered that the higher the level of the residents' indication of their willingness to pay, the greater the benefits to be generated by the proposed project.

In order to obtain information on the residents' willingness-to-pay for the proposed sewerage system project, two surveys were conducted in the Project Area. In the first survey conducted in May, 1981, questionnaires were distributed to two selected housing areas, comprised mainly of upper and middle class households. The second survey was conducted in November, 1981 in a commercial area as well as a different housing area of mainly lower income households. Of the total 142 questionnaires distributed, 23 were returned by stores and offices Table 9.1 provides a summary of the two surveys.

Table 9.1. Results of Survey

	Samplings	Average Household Size (Persons)	Average Income per Month (M\$)	Average Willingness-to-Pay, Based on Monthly Income (%)
Result of Second Survey	70	7.1	838	2.6
Result of First Survey	72	5.2	1,336	1.6
Result of Second and First Surveys	142	6.4	1,051	2.2

- (a) Average household size of 6.4 persons obtained from the two surveys is slightly larger than that the average 5.7 persons per household in the Project Area. The size of the lower income group is 7.1 persons, whereas that of the higher income group is 5.2 persons.
- (b) Average monthly income is M\$1,051, with that of the lower income group (M\$838) lower than that of the higher income group (M\$1,336) by M\$498. Willingness-to-pay is about M\$22 on the average; i.e., 2.2 percent of monthly income with the difference of 1.6 percent in the higher income group and 2.6 percent in the lower income group.

Based on the above-mentioned results, it can be said that the need for sewerage service is greater in the low income group than in the higher income group. This may be a reflection of the present living conditions in the Project Area, where the higher income class usually lives in an area of higher living standard, with improvements made at their own expense and therefore already provided with a certain degree of sanitary services without much inconventional. On the other hand, the lower income class would have realized the apparent advantage of sewerage service from observation or knowledge of the more desirable living situation, thus placing a high evaluation on sewerage service.

Conclusive results concerning the questionnaire results from stores and offices could not be obtained statistically because of insufficient valid samples.

In conclusion, the results of this field survey for the proposed sewerage system represent that the residents show the high level of willingness-to-pay for the proposed sewerage system compared with their ability-to-pay described in Chapter 8 of the Master Plan report. This indicates the residents' strong desire for the sewerage system. Therefore, the construction of the sewerage system is justified.

