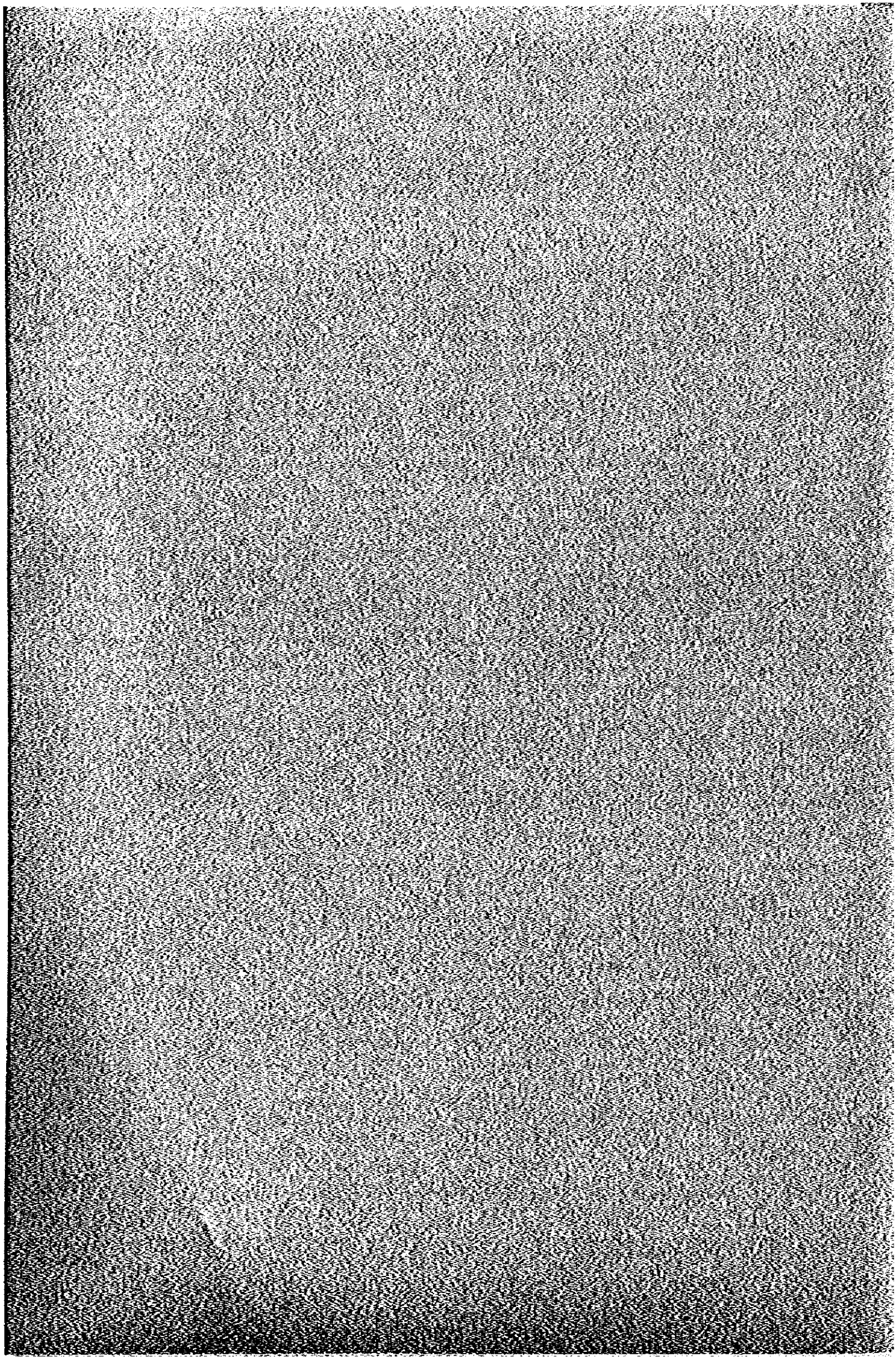
APPENDICES TO CHAPTER 13



APPENDIX 13.1 A RELATIONSHIP BETWEEN TOLL FARE AND REVENUE

13.1.1 Simulation

In order to find the toll fare level which will maximize the revenue, two simulation works were conducted as the following (2) and (3).

(1) Conditions

1. Zones : 85
2. Network : FES & SES
3. Vehicles : Cars, PVB, LT and HT
4. Year : 2000
5. The diversion model,

$$P = \frac{1}{1 + \alpha (X/G)^{\beta}}$$

where $X = \frac{F}{TG - TH}$

G = a shift ratio of 2.11 · TG & TH = Travelling time (min)

The parameters are stated in Chapter 6.

(2) Case I, with the Q-V Relationship

1. Traffic Assignment

The minimum time path selection for each of five sliced OD matrices were simulated. The network data and method were same to those stated in Chapter 6.

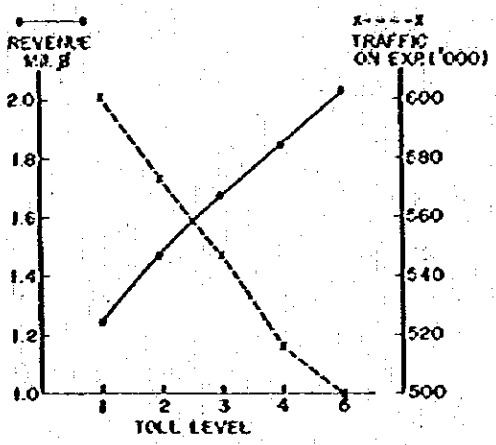
2. Road Capacity and Velocity

Capacity-volume-velocity restraints were assumed on every road section. They were same to those in Chapter 6.

3. Result

No maximum revenue was found within the range of assumed toll fare. The result is summarized as follows in Appendix Fig. 13-1:

Toll Level	Toll Fare	Total Trips	Revenue '000 ฿
1	20 | 30	600,337	12,402
2	25 | 35	573,944	14,733
3	30 | 40	548,356	16,821
4	35 | 45	516,782	18,437
5	40 | 50	498,555	20,282



APPENDIX FIG. 13–1 REVENUE AND TOLL FARE, CASE I

(3) Case II, with Fixed Velocities and Sliced OD Tables

1. Traffic Assignment

The minimum time path and velocity of "Level 1" in the case I were used to estimate the time: TG & TH.

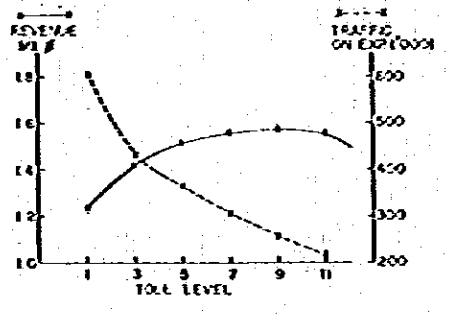
2. Road Capacity and Velocity

Capacity-volume-velocity restraints were not assumed. TG and TH were fixed as above. A relationship between the toll fare level and the diverted volume was simulated without taking into account the additional changes in traffic on ordinary roads.

3. Result

The revenue curve indicated the maximum value at the 60 Baht (small vehicles) ∿ 80 Baht (large vehicles) level. Revenue at different toll levels are shown below.

Toll Level	Toll Fare	Total Trips	Revenue '000 ฿
1	20 | 30	600,337	12,402
3	30 | 40	455,763	15,223
5	40 | 50	370,365	15,135
7	50 | 70	306,559	15,626
9	60 | 80	259,592	15,758
11	70 | 90	221,158	15,484



APPENDIX FIG. 13–2 REVENUE AND TOLL FARE, CASE II

13.1.2 Findings

(1) Determinations of the Diverted Volume

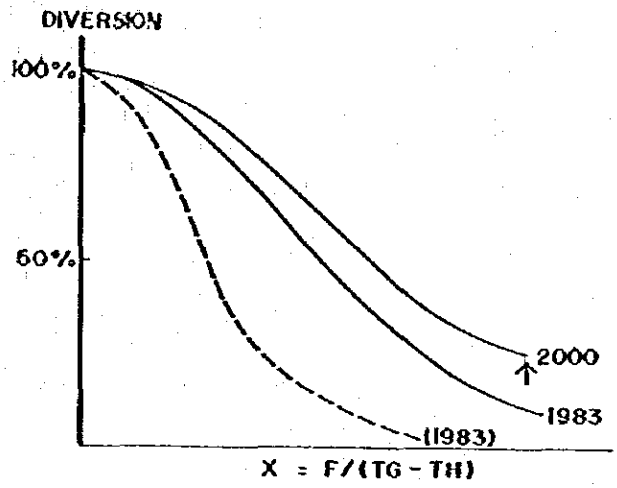
There are a number of factors which determine the diversion volume on the toll expressway. The diversion model used in this study takes up three factors: toll fare, travel time via ordinary roads and that via the expressway. In the traffic assignment simulation using the sliced OD matrices together with the Q-V relationship, these three factors are incorporated in the formula to determine the diverted volume. It is understood that the curve shown in Case I indicates that both the toll fare and the revenue move towards higher levels, while the diverted trips decreases but not sufficiently to indicate the existence of maximum revenue within these toll fare levels.

Generally, the expressway users access the payment of toll fare with the degree of traffic congestion on ordinary roads. If heavily congested, vehicles pay the fee and use the Expressway. If not congested, diverted trips are relatively less. Since this interrelationship is incorporated in the simulation of Case I, the above result may be agreeable.

(2) Maximum Revenue

A simplified relationship of the toll fare and the diverted volume was taken up and a computer simulation in Case II was conducted. Congestion and travelling speed on the roads were predetermined in the Case II simulation. The result showed the revenue was maximum at the 60 Baht ∿ 80 Baht level.

(3) The Diversion Curve



APPENDIX FIG. 13-3 A DIVERSION CURVE

The diversion curve was determined by a regression analysis using the OD data in Bang Na area in March, 1983.

In the study the diversion curve is assumed to shift upward because of the rising real income level of Thai people in the coming years. It means vehicle users become easy to pay the toll fare because of higher income resulting in more diverted trips. It is illustrated as I 2000 in Appendix Fig. 13-3. It becomes less steep which is likely to

result in a revenue curve with a continuous rising slope just like in Appendix Fig. 13–1. If the curve is determined with a steep slope as (1983) in Appendix Fig. 13–3, it is likely to indicate a revenue curve with a maximum point.

(4) Problems with the Maximum Revenue Point

The above case II suggests the revenue is at the maximum when the toll fare is revised to a 60 Baht ∿ 80 Baht level in 2000 from the 10 Baht ∿ 20 Baht level of 1983. However, no one seems to support the suggestion as a realistic solution. The following points should be noticed:

a) The expressway started with a toll fare level of 10 Baht ∿ 20 Baht in 1981 and was not revised in January 1983 even when it was extended to Bang Na. Prices in public service cannot be easily revised. It is also controlled by the Government.

b) ETA is a public corporation, not the profit maximizing private enterprise. Accordance within the transport policy and pricing of the Government cannot be ignored.

c) In the study of SES, the basic toll fare level of 20 Baht ∿ 30 Baht was proposed under a staged program from 1985 to 1995. It was determined after looking into the most likely timing of the expressway development (Table 13–1). It will not maximize the revenue but will certainly result in a higher revenue to ETA and a high economic return to the society.

d) If the toll fare is set at a higher level, the revenue will increase, but traffic is less causing much congestion on ordinary roads. This would mean unbalanced and less inefficient traffic flow on the road network. Consequently, it would mean a smaller value in the economic return.

e) The diversion curve was determined by the data of the roadside interviewing on drivers in Bang Na area in March 1983. The survey did not cover the vehicle trips using the Din Daeng-Port section. An extensive OD survey is necessary to find a diversion tendency which may modify the slope (the parameters) of the model shown as "1983" in Appendix Fig. 13–3 or lead to develop a different formula with other variable(s).

APPENDIX TABLE 13-1 TOLL OPERATION AND ROAD MAINTENANCE COST

APPENDIX TABLE 13-1 TOLL OPERATION AND ROAD MAINTENANCE COST

(Million Baht of 1983 prices)

	Administration		Toll Operation		Road Maintenance		Periodic Main.		Total	
	SES	FESSSES	SES	FESSSES	SES	FESSSES	SES	FESSSES	SES	FESSSES
75	-	3.41	-	-	-	-	-	-	-	3.41
76	-	6.95	-	-	-	-	-	-	-	6.95
77	-	7.06	-	-	-	-	-	-	-	7.06
78	-	12.99	-	-	-	-	-	-	-	12.99
79	-	14.35	-	-	-	-	-	-	-	14.35
80	-	16.83	-	-	-	-	-	-	-	16.83
81	-	19.14	-	-	-	-	-	-	-	19.14
82	-	20.70	-	12.88	-	12.20	-	-	-	39.68
83	-	33.51	-	34.65	-	12.20	-	-	-	76.26
84	-	40.48	-	40.37	-	12.20	-	-	-	86.95
85	-	42.59	-	42.39	-	12.20	-	-	-	97.03
86	-	44.63	-	44.51	-	12.20	-	-	-	101.34
87	-	46.86	-	46.74	-	12.20	-	-	-	105.80
88	-	49.80	-	58.83	-	19.51[1]	-	311.63	-	439.17
89	-	51.66	-	61.77	-	19.51	-	-	-	132.94
90	-	54.24	30.65	95.51	6.80	26.31	-	-	37.45	176.06
91	-	56.95	30.65	98.75	6.80	26.31	-	-	37.45	182.01
92	-	59.89	30.65	102.16	6.80	27.29	-	-	37.45	189.25
93	-	62.79	49.58	124.67	11.05[1]	31.54	-	-	69.63	219.00
94	-	65.9	49.58	128.42	11.05	31.54	-	-	60.63	225.89
95	-	69.23	49.58	132.36	11.05	31.54	-	472.16	60.63	705.29
96	36.35	72.65	99.24	177.06	21.25[1]	41.74	-	-	147.74	291.49
97	38.16	76.32	94.65	185.92	21.25	42.76	-	-	154.06	305.00
98	40.07	80.14	100.62	196.45	21.25	42.76	146.76	146.76	308.70	466.11
99	42.08	84.15	105.65	206.27	21.25	42.76	-	-	168.98	333.18
00	44.18	88.36	110.93	216.58	21.25	42.76	-	-	176.36	347.70
01	46.39	92.78	116.48	227.41	22.31	43.82	-	-	185.18	364.01
02	48.71	97.42	122.30	238.78	22.31	44.90	282.24	754.40	475.56	1135.50
03	51.51	102.65	128.42	250.72	22.31	44.90	-	-	202.24	398.27
04	53.70	107.49	134.84	263.26	22.31	44.90	-	-	210.85	415.55
05	56.39	112.77	141.58	276.42	22.31	44.93	-	-	220.28	434.09
06	59.21	118.41	148.66	290.24	23.43	46.02	-	-	231.30	454.67
07	62.17	124.33	156.09	304.75	23.43	47.15	-	-	241.69	476.23
08	65.28	130.55	163.90	319.99	23.43	47.15	-	-	252.61	497.69
09	68.54	137.08	172.09	335.99	23.43	47.15	282.24	754.40	545.30	1274.62
10	71.97	143.93	180.70	352.79	23.43	47.15	-	-	276.10	543.87
11	75.63	151.27	189.73	370.43	24.60	48.32	-	-	289.95	570.02
12	75.63	151.27	189.73	370.43	24.60	48.32	-	-	289.96	570.02
13	75.63	151.27	189.73	370.43	24.60	48.32	-	-	289.96	570.02
14	75.63	151.27	189.73	370.43	24.60	48.32	-	-	289.96	570.02

Notes: 1) Toll operation and road maintenance cost increase when the Expressway opens a new section. Administration and toll operation cost is assured to increase by 5% p.a. and road maintenance cost 5% by every 5 years.

2) The economic cost is estimated at 0.95 of the annual cost. For the economic cost of periodic maintenance, 0.85 is applied. All in 1983 prices.

APPENDIX TABLE 13-2 GROSS REVENUE AND NET REVENUE

(In 1983 prices)

	Gross Revenue				Maintenance		Net Revenue	
	SES '000฿/D	FES&SES '000฿/D	SES mil.฿/yr.	FES&SES mil.฿/yr	SES mil.฿/yr	FES&SES mil.฿/yr.	SES mil.฿/yr.	FES&SES Mil.฿/yr.
75	-	-	-	-	-	3.41	-	-3.41
76	-	-	-	-	-	4.95	-	-4.95
77	-	-	-	-	-	7.06	-	-7.06
78	-	-	-	-	-	12.99	-	-12.99
79	-	-	-	-	-	14.35	-	-14.35
80	-	-	-	-	-	18.83	-	-18.85
81	-	-	-	-	-	19.14	-	-19.14
82	-	786	-	102.44	-	39.68	-	62.76
83	-	853	-	311.35	-	74.26	-	237.09
84	-	927	-	338.36	-	86.95	-	251.41
85	-	1007	-	367.56	-	97.09	-	270.47
86	-	1094	-	399.31	-	101.34	-	297.97
87	-	1189	-	433.99	-	105.80	-	328.19
88	-	1767	-	644.96	-	439.17	-	205.79
89	-	1918	-	700.07	-	132.94	-	567.13
90	1058	3139	386.17	1145.74	37.45	176.06	348.72	969.68
91	1176	3427	429.27	1250.89	37.45	182.01	391.82	1068.88
92	1309	3743	477.79	1366.20	37.45	189.25	440.34	1176.95
93	2354	4987	859.21	1820.26	60.63	219.00	798.58	1601.26
94	2616	5464	954.84	1994.36	60.63	225.89	894.21	1768.47
95	2907	5987	1061.06	2185.26	60.63	705.29	1000.43	1479.97
96	5055	8382	1845.07	3059.43	147.74	291.49	1697.33	2767.94
97	5620	9218	2051.80	3364.57	154.06	305.00	1897.24	3059.57
98	6246	10138	2279.79	3700.37	308.70	451.76	1971.09	3248.61
99	6939	11149	2532.74	4069.39	168.98	333.18	2363.76	3736.21
00	7702	12261	2811.23	4475.27	176.36	347.70	2634.87	4127.57
01	7925	12624	2892.62	4607.76	185.18	364.01	2707.44	4243.75
02	8155	12998	2976.57	4744.27	475.56	1135.50	2500.99	3608.77
03	8391	13383	3062.72	4884.80	202.24	398.27	2860.48	4486.53
04	8634	13779	3151.41	5029.34	210.85	415.56	2940.56	4613.78
05	8883	14187	3242.30	5178.26	220.28	434.09	3022.02	4744.17
06	9141	14607	3336.47	5331.56	231.30	454.67	3105.17	4876.89
07	9406	15040	3433.19	5489.60	241.69	476.23	3191.50	5013.37
08	9678	15485	3532.47	5652.03	252.61	497.69	3279.86	5154.34
09	9958	15944	3634.67	5819.56	546.30	1274.62	3088.37	4544.94
10	10246	16416	3739.79	5991.84	276.10	543.87	3463.63	5447.97
11	10303	16662	3760.59	6081.63	289.96	570.02	3470.63	5511.61
12	10303	16662	3760.59	6081.63	289.96	570.02	3470.63	5511.61
13	10303	16662	3760.59	6081.63	289.96	570.02	3470.63	5511.61
14	10303	16662	3760.59	6081.63	289.96	570.02	3470.63	5511.61

APPENDIX TABLE 13-3 FINANCIAL COST REVENUE STREAMS

(In million Baht of 1983 prices)

Yr.	SES(R-1)		FES & SES	
	Cost[1]	Net Revenue	Cost[2]	Net Revenue
78	-	-	37.60	-12.99
79	-	-	108.86	-14.35
80	-	-	272.44	-18.85
81	-	-	403.13	-19.14
82	-	-	658.33	62.76
33	-	-	726.21	237.09
84	-	-	751.60	251.41
85	80.54	-	1285.54	270.47
86	790.44	-	2311.74	297.97
87	1763.82	-	2251.62	328.19
88	821.26	-	821.26	205.79
89	1939.44	-	1939.44	567.13
90	1896.95	348.72	1896.95	969.68
91	1129.66	391.82	1129.66	1068.88
92	844.09	440.34	844.09	1176.95
93	1958.38	798.58	1958.38	1601.26
94	1742.55	894.21	1742.55	1768.47
95	467.25	1000.43	467.25	1479.07
96	-	1697.33	-	2767.94
97	-	1897.24	-	3059.57
98	-	1971.09	-	3249.61
99	-	2363.76	-	3736.21
100	-	2634.87	-	4127.57

Yr.	SES(R-1)		FES & SES	
	Cost[1]	Net Revenue	Cost[2]	Net Revenue
01	-	2707.44	-	4243.75
02	-	2500.99	-	3608.77
03	-	2860.48	-	4486.53
04	-	2940.56	-	4613.78
05	-	3022.02	-	4744.17
06	-	3105.17	-	4876.89
07	-	3191.50	-	5013.37
08	-	3279.86	-	5154.34
09	-	3088.37	-	4544.94
10	-	3463.63	-	5447.97
11	-	3470.60	-	5511.61
12	-	3470.60	-	5511.61
13	-	3470.60	-	5511.61
14	-	3470.60	-	5511.61
Total				
	13934.38	58480.81	19606.65	95941.64
Rev.(i=12%)		7606.3		6676.9
Cost(i=12%)		7606.1	6641.1	
Rev/c ratio		1.00		1.01

Notes: 1) It is assumed for SES that the Government will invest 20% of the total cost. It is not included here since it is treated not as the loan.

For the part of FES, the Government investment already scheduled in the ETA budget is also excluded.

If these investment are included in the cost stream, the return is calculated as shown in the main report.

APPENDIX TABLE 13-4 A. CASH FLOW TABLE, SOURCES OF FUNDS : SES

(In million Baht of 1983 prices)

	Net Oper. Income	Govert. Invest.	Loan(a) (i=12%)	Loan(b) (i=3%)	Operat. Loan	Total	Interest on Oper. Loan	Loan in Operat. Loan	Repayment of Oper. Loan	Due in Debt
85	-	20.13	39.27	41.27	-	100.67	-	-	-	-
86	-	197.61	772.75	17.69	5.95	994.00	-	5.95	-	5.95
87	-	440.98	1763.82	-	99.92	2304.70	0.71	99.92	-	105.87
88	-	205.31	308.49	512.77	323.57	1350.14	12.70	323.57	-	429.44
89	-	484.86	718.62	1220.82	414.80	2839.10	51.53	414.80	-	844.24
90	348.72	474.24	906.42	990.53	238.72	2958.63	101.31	238.72	-	1082.67
91	391.82	282.41	524.35	605.31	813.65	2617.54	129.92	813.65	-	1896.32
92	440.34	211.02	301.44	542.65	889.74	2385.19	227.56	889.74	-	2786.06
93	798.58	489.59	697.18	1261.20	586.61	3883.16	334.33	536.61	-	3322.67
94	894.21	435.64	618.66	1123.89	672.76	3745.16	398.72	672.76	-	3995.43
95	1000.43	116.81	165.45	301.80	704.11	2285.60	479.45	704.11	-	4699.54
96	1697.33	-	-	-	294.21	1991.54	563.94	294.21	-	5127.96
97	1897.24	-	-	-	63.92	1961.16	615.36	63.92	-	5191.88
98	1971.09	-	-	-	-	1971.09	623.03	0	84.06	5107.82
99	2363.76	-	-	-	-	2363.76	612.94	-	568.61	4539.21
00	2634.87	-	-	-	-	2634.87	544.71	-	659.88	3879.33
01	2707.44	-	-	-	-	2707.44	465.52	-	1353.28	2526.05
02	2501.01	-	-	-	-	2501.01	303.13	-	1346.86	1179.19
03	2860.48	-	-	-	-	2860.48	141.50	-	1179.19	0
04	2940.56	-	-	-	-	2922.03	0	-	0	-
05	3022.02	-	-	-	-	3022.02	-	-	-	-
06	3105.17	-	-	-	-	3105.17	-	-	-	-
07	3191.50	-	-	-	-	3191.50	-	-	-	-
08	3279.86	-	-	-	-	3279.86	-	-	-	-
09	3088.37	-	-	-	-	3088.37	-	-	-	-
10	3463.69	-	-	-	-	3463.69	-	-	-	-
11	3470.63	-	-	-	-	3470.63	-	-	-	-
12	3470.63	-	-	-	-	3470.63	-	-	-	-
13	3470.63	-	-	-	-	3470.63	-	-	-	-
14	3470.63	-	-	-	-	3470.63	-	-	-	-
15	3566.61	-	-	-	-	3566.61	-	-	-	-
16	3566.61	-	-	-	-	3566.61	-	-	-	-
17	3566.61	-	-	-	-	3566.61	-	-	-	-
18	3566.61	-	-	-	-	3566.61	-	-	-	-
19	3566.61	-	-	-	-	3566.61	-	-	-	-

APPENDIX TABLE 13-4 B. CASH FLOW TABLE, APPLICATION OF FUNDS : SES

(In million Baht of 1983 prices)

	Capital Exp.	Loan Amortization (a)	Loan Amortization (b)	Interest on (a, 12%)	Interest on (b, 3%)	Operational Loan Repayment	Operational Loan Int.12%	Sub-Total	Surplus	Total
85	100.67	-	-	-	-	-	-	100.67	-	100.67
86	988.05	-	-	4.71	1.24	-	-	994.00	-	994.00
87	2204.78	-	-	97.44	1.77	-	0.71	2304.70	-	2304.70
88	1026.57	-	-	309.10	1.77	-	12.70	1350.14	-	1350.14
89	2424.30	-	-	346.12	17.15	-	51.53	2839.10	-	2839.10
90	2371.19	-	-	432.35	53.78	-	101.31	2958.63	-	2958.63
91	1412.07	450.94	-	541.12	83.49	-	129.92	2617.54	-	2617.54
92	1055.11	450.94	-	549.93	101.65	-	227.56	2385.19	-	2385.19
93	2447.97	450.94	-	531.99	117.93	-	334.33	3883.16	-	3883.16
94	2178.19	450.94	-	561.54	155.77	-	398.72	3745.16	-	3745.16
95	584.06	450.94	-	581.67	189.48	-	479.45	2285.60	-	2285.60
96	-	681.65	-	547.41	198.54	-	563.94	1991.54	-	1991.54
97	-	681.65	-	465.61	198.54	-	615.36	1961.16	-	1961.16
98	-	681.65	-	383.81	198.54	84.06	623.03	1971.09	-	1971.09
99	-	681.65	-	302.02	198.54	568.61	612.94	2363.76	-	2363.76
00	-	681.62	330.90	220.22	198.54	659.88	544.71	2634.87	-	2634.87
01	-	230.71	330.90	138.42	188.61	1353.28	465.52	2707.44	-	2707.44
02	-	230.71	330.90	110.73	178.68	1346.86	303.13	2501.01	-	2501.01
03	-	230.71	330.90	83.05	168.76	1179.19	141.50	2034.82	825.66	2860.48
04	-	230.71	330.90	55.37	158.83	-	-	775.81	2146.22	2922.03
05	-	230.69	330.90	27.68	148.90	-	-	738.17	2283.85	3022.02
06	-	-	330.90	-	138.98	-	-	469.88	2635.29	3105.17
07	-	-	330.90	-	129.05	-	-	459.95	2731.55	3191.50
08	-	-	330.90	-	119.12	-	-	450.02	2829.84	3279.86
09	-	-	330.90	-	109.19	-	-	440.09	2648.28	3088.37
10	-	-	330.90	-	99.30	-	-	430.20	3033.49	3463.69
11	-	-	330.90	-	89.34	-	-	420.24	3050.39	3470.63
12	-	-	330.90	-	79.41	-	-	410.31	3060.32	3470.63
13	-	-	330.90	-	69.49	-	-	400.39	3070.24	3470.63
14	-	-	330.90	-	59.56	-	-	390.46	3080.17	3470.63
15	-	-	330.90	-	49.63	-	-	380.53	3186.08	3566.61
16	-	-	330.90	-	39.71	-	-	370.61	3196.00	3566.61
17	-	-	330.90	-	29.78	-	-	360.68	3205.93	3566.61
18	-	-	330.90	-	19.84	-	-	350.74	3215.87	3566.61
19	-	-	330.83	-	9.92	-	-	340.75	3225.86	3566.61

APPENDIX TABLE 13-5 A. CASH FLOW TABLE : SOURCES OF FUNDS : FES & SES

(In million Baht of 1983 prices)

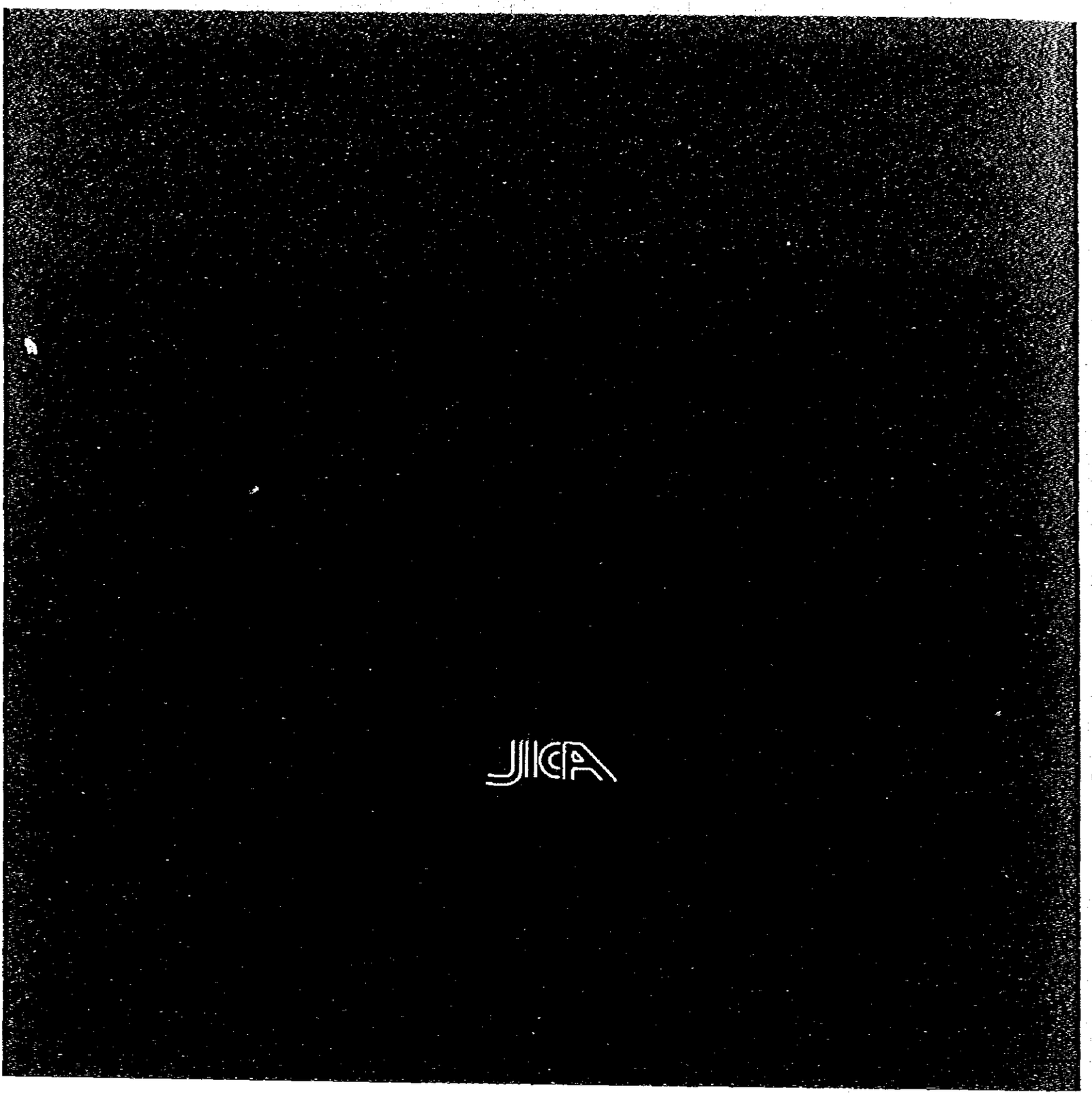
	Net oper. Revenue	Govern. Invest.	Loan1) (i=12%)	Loan (i=3%)	Operational Loan FES	Operational Loan SES	Total (p)	Int. on. Oper.loan	Loan in Oper..	Repayment of Op.loan	Due in debt
75	-	4.86	-	-	-	-	4.86	-	-	-	-
76	-	5.25	-	-	-	-	5.25	-	-	-	-
77	-	16.57	-	-	-	-	16.57	-	-	-	-
78	- 12.99	205.93	-	37.60	12.99	-	243.53	-	12.99	-	12.97
79	- 14.33	364.26	-	108.86	15.91	-	474.68	1.56	15.91	-	28.90
80	- 18.83	480.49	18.00	254.44	41.13	-	772.67	3.47	38.57	-	57.57
81	- 19.14	348.70	151.15	251.98	77.69	-	810.40	6.91	77.69	-	135.26
82	62.76	102.82	266.21	202.82	369.38	-	1004.19	16.23	369.38	-	504.64
83	237.09	529.03	229.65	593.62	-	-	1589.39	60.56	-	126.21	378.43
84	251.41	799.61	198.24	751.60	-	-	2000.86	43.41	-	207.01	171.42
85	270.47	1148.57	39.27	1246.27	21.49	-	2726.07	20.57	21.49	-	192.91
86	297.97	744.61	1267.25	1044.40	120.53	5.95	3480.80	23.15	126.48	-	319.39
87	328.19	466.46	1974.50	277.10	180.21	99.92	3326.40	38.32	280.13	-	599.52
88	203.79	205.31	308.49	512.77	372.16	323.57	1928.09	71.94	695.73	-	1295.25
89	567.13	484.86	718.62	1220.82	0	375.35	3366.78	155.43	375.35	-	1670.60
90	969.68	474.24	906.42	990.53	28.87	138.72	3508.46	200.47	167.59	-	1838.19
91	1068.88	282.41	524.35	605.31	0	661.43	3142.38	220.58	661.43	-	2499.62
92	1176.95	211.02	301.44	542.65	-	664.30	2896.36	299.95	664.30	-	3163.92
93	1601.26	489.59	697.18	1261.20	-	360.84	4410.07	379.67	360.84	-	3524.76
94	1768.47	435.64	618.66	1123.89	-	339.50	4286.16	422.97	339.50	-	3864.26
95	1479.97	116.81	165.45	301.80	-	700.64	2764.67	463.71	700.64	-	4564.90
96	2767.94	-	-	-	-	-	2767.94	547.79	0	319.60	4245.30
97	3059.57	-	-	-	-	-	3059.57	509.44	-	753.34	3491.96
98	3249.61	-	-	-	-	-	3249.61	419.04	-	1174.42	2317.54
99	3736.21	-	-	-	-	-	3736.21	278.10	-	1925.84	391.70
00	4127.57	-	-	-	-	-	4127.57	47.00	-	391.70	0
01	4243.75	-	-	-	-	-	4243.75	0	-	0	-
02	3608.77	-	-	-	-	-	3608.77	-	-	-	-
03	4486.53	-	-	-	-	-	4486.53	-	-	-	-
04	4613.78	-	-	-	-	-	4613.78	-	-	-	-
05	4744.17	-	-	-	-	-	4744.17	-	-	-	-
06	4876.89	-	-	-	-	-	4876.89	-	-	-	-
07	5013.37	-	-	-	-	-	5013.37	-	-	-	-
08	5154.34	-	-	-	-	-	5154.34	-	-	-	-
09	4544.94	-	-	-	-	-	4544.94	-	-	-	-
10	5447.97	-	-	-	-	-	5447.97	-	-	-	-
11	5511.61	-	-	-	-	-	5511.61	-	-	-	-
12	5511.61	-	-	-	-	-	5511.61	-	-	-	-
13	5511.61	-	-	-	-	-	5511.61	-	-	-	-
14	5511.61	-	-	-	-	-	5511.61	-	-	-	-
15	5676.96	-	-	-	-	-	5676.96	-	-	-	-
16	5676.96	-	-	-	-	-	5676.96	-	-	-	-
17	5676.96	-	-	-	-	-	5676.96	-	-	-	-
18	5676.96	-	-	-	-	-	5676.96	-	-	-	-
19	5676.96	-	-	-	-	-	5676.96	-	-	-	-

Notes: 1) Including all the loans from other sources except the 3% loan of the FES

APPENDIX TABLE 13-5 B. CASH FLOW TABLE, APPLICATION OF FUNDS : FES & SES

(In million Rehrof 1983 prices)

	Capital Expendi.	Amortization FES	Amortization SES	SES	Interest payment FES	Interest payment SES	Repaymt. of Oper. loan(12%)	Interest(12%) FES Op. loan	Interest(12%) SES Op. loan	Sub.total	Surplus	Total
75	4.86	-	-	-	-	-	-	-	-	4.86	-	4.86
76	5.25	-	-	-	-	-	-	-	-	5.25	-	5.25
77	16.57	-	-	-	-	-	-	-	-	16.57	-	16.57
78	243.55	-	-	-	-	-	-	-	-	243.55	-	243.55
79	473.12	-	-	-	-	-	-	1.56	-	474.68	-	474.68
80	752.93	-	-	-	16.27	-	-	3.47	-	772.67	-	772.67
81	751.83	-	-	-	51.66	-	-	6.91	-	810.40	-	810.40
82	867.15	-	-	-	120.81	-	-	16.23	-	1004.19	-	1004.19
83	1255.24	-	-	-	147.36	-	126.21	60.56	-	1589.39	-	1589.39
84	1551.21	33.29	-	-	163.94	-	207.01	45.41	-	2000.86	-	2000.86
85	2434.11	83.85	-	-	187.54	-	-	20.57	-	2726.07	-	2726.07
86	3056.35	101.10	-	-	294.25	5.95	-	23.15	-	3480.80	-	3480.80
87	2718.08	147.70	-	-	323.09	99.21	-	37.61	0.71	3326.40	-	3326.40
88	1026.57	211.64	-	-	307.07	310.87	-	59.24	12.70	1928.09	-	1928.09
89	2424.30	166.52	-	-	257.26	363.27	-	103.90	51.53	3366.78	-	3366.78
90	2371.19	196.20	-	-	254.47	486.23	-	99.16	101.31	3508.46	-	3508.46
91	1412.07	196.20	450.94	-	237.98	624.61	-	102.63	117.95	3142.38	-	3142.38
92	1055.11	223.30	450.94	-	215.28	651.58	-	85.80	214.15	2896.36	-	2896.36
93	2447.97	286.60	450.94	-	194.97	649.92	-	60.35	319.32	4410.07	-	4410.07
94	2176.19	343.80	450.94	-	172.95	717.31	-	29.06	393.91	4286.16	-	4286.16
95	584.06	343.90	450.94	-	150.91	771.15	-	-	463.71	2764.67	-	2764.67
96	-	344.10	681.65	-	128.83	745.95	319.60	-	547.79	2767.94	-	2767.94
97	-	344.20	681.65	-	106.79	664.15	753.34	-	509.44	3059.57	-	3059.57
98	-	294.70	681.65	-	97.45	582.35	1174.42	-	419.04	3249.61	-	3248.61
99	-	264.64	681.65	-	85.42	500.56	1925.84	-	278.10	3736.21	-	3736.21
00	-	238.98	681.62	330.90	76.37	418.76	391.70	-	47.00	2185.33	1942.24	4127.57
01	-	238.98	230.71	330.90	68.15	327.03	-	-	-	1195.77	3047.98	4243.75
02	-	228.38	230.71	330.90	61.68	289.41	-	-	-	1141.08	2467.69	3608.77
03	-	213.38	230.71	330.90	53.46	251.81	-	-	-	1080.26	3406.27	4486.53
04	-	213.38	230.71	330.90	46.99	214.20	-	-	-	1036.18	3577.60	4613.78
05	-	213.48	230.69	330.90	40.51	176.58	-	-	-	992.16	3732.01	4744.17
06	-	189.53	-	330.90	34.99	138.98	-	-	-	694.42	4182.47	4876.89
07	-	183.80	-	330.90	29.29	129.05	-	-	-	673.04	4340.33	5013.37
08	-	183.80	-	330.90	23.78	119.12	-	-	-	657.60	4496.74	5154.34
09	-	183.80	-	330.90	18.26	109.19	-	-	-	642.15	3902.79	4344.94
10	-	183.80	-	330.90	12.75	99.30	-	-	-	626.75	4821.22	5447.97
11	-	183.80	-	330.90	7.24	89.34	-	-	-	611.28	4900.33	5511.61
12	-	183.80	-	330.90	5.51	79.41	-	-	-	599.82	4911.79	5511.61
13	-	57.40	-	330.90	1.72	69.49	-	-	-	459.51	5052.10	5511.61
14	-	-	-	330.90	-	59.56	-	-	-	390.46	5121.15	5511.61
15	-	-	-	330.90	-	49.63	-	-	-	380.53	5296.43	5676.96
16	-	-	-	330.90	-	39.71	-	-	-	370.61	5306.35	5676.96
17	-	-	-	330.90	-	29.78	-	-	-	360.68	5316.28	5676.96
18	-	-	-	330.90	-	19.84	-	-	-	349.84	5327.12	5676.96
19	-	-	-	330.83	-	9.92	-	-	-	340.75	5336.21	5676.96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