

4. Overall Evaluation based on the Economic Analysis

From the results of economic analysis the following conclusions can be drawn:

- (a) From the viewpoint of national economy, at least 25% of IRR can be expected for the Phase I. Since IRR of transport projects in Egypt is about 15%, it may be said that Phase I is capable of producing a very high profit for the national economy.
- (b) The Phase I project is capable of producing benefits for the national economy of Egypt and, at the same time, world economy also can enjoy the saving of transportation costs from the avoidance of Cape routing and the shortening of transit time through the Canal. World economic IRR of this project estimated from these benefits is at least 50%. Of the 50% of IRR, about 25% is shared by the Egyptian economy through the increase in the toll revenue, and remaining 25% by shippers and shipowners in the world through the saving of transportation expenses.
- (c) In the case where Phase I is completed earlier than the scheduled time, sufficient IRR can be expected even if the traffic demand increases at the rate of Base Case. If the demand increases at the rate of High Case, nearly same percentage of IRR is obtained as in the case where the construction works were implemented according to the standard schedule. If the construction is completed earlier, waiting for transit attributable to the shortage of Canal capacity will not increase even if the traffic demand increases at a higher rate (High Case).
- (d) This project is capable of producing high internal rates of return against various kinds of sensitivity analysis and therefore, from the viewpoint of economic profitability, there is no problem which may obstruct the implementation of this project.
- (e) Even if the total doubling of the Canal is carried out to eliminate the waiting time for transit at the both ends of the Canal which before the completion of the total doubling is normally needed for the formation of convoys and, in addition, to meet unexpected increase of demand, sufficient effects of investment is expected. Further, early implementation of the doubling will result in such uncalculated effects as the prevention of the Canal closure due to shipping accidents.

Table 11-A-1 IRR Calculation Sheet
— Phase I, Base Case, Schedule-1, R-1 —
IRR = 24.2%

(Unit: 10⁶ US\$)

No.	Year	COSTS			BENEFITS		Net Profit
		Total	Construction & Equipment	Operation	Total	Increased Revenue	
1	1981	81.4	81.4				△ 81.4
2	1982	162.1	162.1				△ 162.1
3	1983	154.0	154.0				△ 154.0
4	1984	154.0	154.0				△ 154.0
5	1985	102.7	98.2	4.5	94.2	94.2	△ 8.5
6	1986	57.5	52.0	5.5	119.3	119.3	61.8
7	1987	6.6		6.6	144.4	144.4	137.8
8	1988	8.7		8.7	200.0	200.0	191.3
9	1989	11.1		11.1	255.7	255.7	244.6
10	1990	13.5		13.5	311.3	311.3	297.8
11	1991	15.0		15.0	353.6	353.6	338.6
12	1992	16.9		16.9	395.8	395.8	378.9
13	1993	16.9		16.9	395.8	395.8	378.9
14	1994	16.9		16.9	395.8	395.8	378.9
15	1995	16.9		16.9	395.8	395.8	378.9
16	1996	16.9		16.9	395.8	395.8	378.9
17	1997	16.9		16.9	395.8	395.8	378.9
18	1998	16.9		16.9	395.8	395.8	378.9
19	1999	16.9		16.9	395.8	395.8	378.9
20	2000	16.9		16.9	395.8	395.8	378.9
21	2001	16.9		16.9	395.8	395.8	378.9
22	2002	16.9		16.9	395.8	395.8	378.9
23	2003	16.9		16.9	395.8	395.8	378.9
24	2004	16.9		16.9	395.8	395.8	378.9
25	2005	8.2		8.2	195.8	195.8	187.6
26	2006	8.2		8.2	195.8	195.8	187.6
27	2007	8.2		8.2	195.8	195.8	187.6
Total		1,010.9	701.7	309.2	7,211.3	7,211.3	6,200.4

Table 11-A-2 IRR Calculation Sheet
-- Phase I, Base Case, Schedule-1, R-2 --
IRR = 28.3%

(Unit: 10⁶ US\$)

No.	Year	COSTS			BENEFITS		Net Profit
		Total	Construction & Equipment	Operation	Total	Increased Revenue	
1	1981	81.4	81.4				△ 81.4
2	1982	162.1	162.1				△ 162.1
3	1983	154.0	154.0				△ 154.0
4	1984	154.0	154.0				△ 154.0
5	1985	102.7	98.2	4.5	164.7	164.7	62.0
6	1986	57.5	52.0	5.5	202.0	202.0	144.5
7	1987	6.6		6.6	236.4	236.4	229.8
8	1988	8.7		8.7	268.0	268.0	259.3
9	1989	11.1		11.1	299.6	299.6	288.5
10	1990	13.5		13.5	331.3	331.3	317.8
11	1991	15.0		15.0	398.6	398.6	383.6
12	1992	16.9		16.9	473.7	473.7	456.8
13	1993	16.9		16.9	434.9	434.9	418.0
14	1994	16.9		16.9	410.7	410.7	393.8
15	1995	16.9		16.9	388.0	388.0	371.1
16	1996	16.9		16.9	366.6	366.6	349.7
17	1997	16.9		16.9	348.9	348.9	332.0
18	1998	16.9		16.9	329.3	329.3	312.4
19	1999	16.9		16.9	313.3	313.3	296.4
20	2000	16.9		16.9	300.2	300.2	283.3
21	2001	16.9		16.9	287.6	287.6	270.7
22	2002	16.9		16.9	275.6	275.6	258.7
23	2003	16.9		16.9	264.1	264.1	247.2
24	2004	16.9		16.9	253.1	253.1	236.2
25	2005	8.2		8.2	190.7	190.7	182.5
26	2006	8.2		8.2	181.2	181.2	173.0
27	2007	8.2		8.2	172.1	172.1	163.9
Total		1,010.9	701.7	309.2	6,890.6	6,890.6	5,879.2

Table 11-A-3 IRR Calculation Sheet
— Phase I, Base Case, Schedule-1, B-1 & Time Saving —
IRR = 49.8%

(Unit: 10⁵ US\$)

No.	Year	COSTS			BENEFITS			Net Profit
		Total	Construction & Equipment	Operation	Total	Turning Round Cost	Time Saving Cost	
1	1981	81.4	81.4					△ 81.4
2	1982	162.1	162.1					△ 162.1
3	1983	154.0	154.0					△ 154.0
4	1984	154.0	154.0					△ 154.0
5	1985	102.7	98.2	4.5	306.9	304.2	2.7	204.2
6	1986	57.5	52.0	5.5	390.7	387.8	2.9	333.2
7	1987	6.6		6.6	508.4	471.4	37.0	501.8
8	1988	8.7		8.7	703.6	665.0	38.6	694.9
9	1989	11.1		11.1	898.5	858.7	39.8	887.4
10	1990	13.5		13.5	1,093.7	1,052.3	41.4	1,080.2
11	1991	15.0		15.0	1,243.2	1,200.2	43.0	1,228.2
12	1992	16.9		16.9	1,392.2	1,348.0	44.2	1,375.3
13	1993	16.9		16.9	1,392.2	1,348.0	44.2	1,375.3
14	1994	16.9		16.9	1,392.2	1,348.0	44.2	1,375.3
15	1995	16.9		16.9	1,392.2	1,348.0	44.2	1,375.3
16	1996	16.9		16.9	1,392.2	1,348.0	44.2	1,375.3
17	1997	16.9		16.9	1,392.2	1,348.0	44.2	1,375.3
18	1998	16.9		16.9	1,392.2	1,348.0	44.2	1,375.3
19	1999	16.9		16.9	1,392.2	1,348.0	44.2	1,375.3
20	2000	16.9		16.9	1,392.2	1,348.0	44.2	1,375.3
21	2001	16.9		16.9	1,392.2	1,348.0	44.2	1,375.3
22	2002	16.9		16.9	1,392.2	1,348.0	44.2	1,375.3
23	2003	16.9		16.9	1,392.2	1,348.0	44.2	1,375.3
24	2004	16.9		16.9	1,392.2	1,348.0	44.2	1,375.3
25	2005	8.2		8.2	723.9	683.0	40.9	715.7
26	2006	8.2		8.2	723.9	683.0	40.9	715.7
27	2007	8.2		8.2	723.9	683.0	40.9	715.7
Total		1,010.9	701.7	309.2	25,415.3	24,512.6	902.7	24,404.4

Table 11-A-4 IRR Calculation Sheet
– Phase I, Base Case, Schedule-1, B-2 & Time Saving –
IRR = 59.0%

(Unit: 10⁶ US\$)

No.	Year	COSTS			BENEFITS			Net Profit
		Total	Construction & Equipment	Operation	Total	Turning Round Cost	Time Saving Cost	
1	1981	81.4	81.4					△ 81.4
2	1982	162.1	162.1					△ 162.1
3	1983	154.0	154.0					△ 154.0
4	1984	154.0	154.0					△ 154.0
5	1985	102.7	98.2	4.5	440.2	437.5	2.7	337.5
6	1986	57.5	52.0	5.5	539.6	536.7	2.9	482.1
7	1987	6.6		6.6	684.8	647.8	37.0	678.2
8	1988	8.7		8.7	975.4	936.8	38.6	966.7
9	1989	11.1		11.1	1,262.8	1,223.0	39.8	1,251.7
10	1990	13.5		13.5	1,559.6	1,518.2	41.4	1,546.1
11	1991	15.0		15.0	1,756.4	1,713.4	43.0	1,741.4
12	1992	16.9		16.9	1,979.5	1,935.3	44.2	1,962.6
13	1993	16.9		16.9	1,924.3	1,880.1	44.2	1,907.4
14	1994	16.9		16.9	1,893.4	1,849.2	44.2	1,876.5
15	1995	16.9		16.9	1,860.9	1,816.7	44.2	1,844.0
16	1996	16.9		16.9	1,829.3	1,784.9	44.2	1,812.4
17	1997	16.9		16.9	1,795.5	1,751.3	44.2	1,778.6
18	1998	16.9		16.9	1,757.0	1,712.8	44.2	1,740.1
19	1999	16.9		16.9	1,724.6	1,680.4	44.2	1,707.7
20	2000	16.9		16.9	1,694.2	1,650.0	44.2	1,677.3
21	2001	16.9		16.9	1,664.3	1,620.1	44.2	1,647.4
22	2002	16.9		16.9	1,635.0	1,590.8	44.2	1,618.1
23	2003	16.9		16.9	1,606.3	1,562.1	44.2	1,589.4
24	2004	16.9		16.9	1,578.0	1,533.8	44.2	1,561.1
25	2005	8.2		8.2	835.5	791.3	44.2	827.3
26	2006	8.2		8.2	792.7	751.8	40.9	784.5
27	2007	8.2		8.2	755.1	714.2	40.9	746.9
Total		1,010.9	701.7	309.2	32,544.2	31,638.2	906.0	32,084.8

Table 11-A-5 IRR Calculation Sheet
— Phase I, Low Case, Schedule-1, R-1 —
IRR = 18.1%

(Unit: 10⁶ US\$)

No.	Year	COSTS			BENEFITS		Net Profit
		Total	Construction & Equipment	Operation	Total	Increased Revenue	
1	1981	81.4	81.4				Δ 81.4
2	1982	162.1	162.1				Δ 162.1
3	1983	154.0	154.0				Δ 154.0
4	1984	154.0	154.0				Δ 154.0
5	1985	102.7	98.2	4.5	34.1	34.1	Δ 68.6
6	1986	57.5	52.0	5.5	53.3	53.3	Δ 4.2
7	1987	6.6		6.6	77.9	77.9	71.3
8	1988	8.7		8.7	102.4	102.4	93.7
9	1989	11.1		11.1	127.0	127.0	115.9
10	1990	13.5		13.5	151.7	151.7	138.2
11	1991	15.0		15.0	188.8	188.8	173.8
12	1992	16.9		16.9	232.1	232.1	215.2
13	1993	16.9		16.9	275.4	275.4	258.5
14	1994	16.9		16.9	318.9	318.9	302.0
15	1995	16.9		16.9	362.1	362.1	388.5
16	1996	16.9		16.9	405.4	405.4	388.5
17	1997	16.9		16.9	405.4	405.4	388.5
18	1998	16.9		16.9	405.4	405.4	388.5
19	1999	16.9		16.9	405.4	405.4	388.5
20	2000	16.9		16.9	405.4	405.4	388.5
21	2001	16.9		16.9	405.4	405.4	388.5
22	2002	16.9		16.9	405.4	405.4	388.5
23	2003	16.9		16.9	405.4	405.4	388.5
24	2004	16.9		16.9	405.4	405.4	388.5
25	2005	8.2		8.2	130.0	130.0	121.8
26	2006	8.2		8.2	130.0	130.0	121.8
27	2007	8.2		8.2	130.0	130.0	121.8
Total		1,010.9	701.7	309.2	5,962.3	5,962.3	4,994.7

Table 11-A-6 IRR Calculation Sheet
— Phase I, High Case, Schedule-1, R-1 —
IRR = 28.0%

(Unit: 10⁶US\$)

No.	Year	COSTS			BENEFITS		Net Profit
		Total	Construction & Equipment	Operation	Total	Increased Revenue	
1	1981	81.4	81.4				△ 81.4
2	1982	162.1	162.1				△ 162.1
3	1983	154.0	154.0				△ 154.0
4	1984	154.0	154.0				△ 154.0
5	1985	102.7	98.2	4.5	145.7	145.7	43.0
6	1986	57.5	52.0	5.5	204.0	204.0	146.5
7	1987	6.6		6.6	204.0	204.0	197.4
8	1988	8.7		8.7	204.0	204.0	195.3
9	1989	11.1		11.1	393.7	393.7	382.6
10	1990	13.5		13.5	393.7	393.7	380.2
11	1991	15.0		15.0	393.7	393.7	378.7
12	1992	16.9		16.9	393.7	393.7	376.8
13	1993	16.9		16.9	393.7	393.7	376.8
14	1994	16.9		16.9	393.7	393.7	376.8
15	1995	16.9		16.9	393.7	393.7	376.8
16	1996	16.9		16.9	393.7	393.7	376.8
17	1997	16.9		16.9	393.7	393.7	376.8
18	1998	16.9		16.9	393.7	393.7	376.8
19	1999	16.9		16.9	393.7	393.7	376.8
20	2000	16.9		16.9	393.7	393.7	376.8
21	2001	16.9		16.9	393.7	393.7	376.8
22	2002	16.9		16.9	393.7	393.7	376.8
23	2003	16.9		16.9	393.7	393.7	376.8
24	2004	16.9		16.9	393.7	393.7	376.8
25	2005	8.2		8.2	130.7	130.7	122.5
26	2006	8.2		8.2	130.7	130.7	122.5
27	2007	8.2		8.2	130.7	130.7	122.5
Total		1,010.9	701.7	309.2	7,449	7,449	6,438.1

Table 11-A-7 IRR Calculation Sheet

– Phase I, Base Case, Schedule-1, R-1, 10% Increase of Construction Cost –
IRR = 22.8%

(Unit: 10⁶ US\$)

No.	Year	COSTS			BENEFITS		Net Profit
		Total	Construction & Equipment	Operation	Total	Increased Revenue	
1	1981	89.5	89.5				△ 89.5
2	1982	178.3	178.3				△ 178.3
3	1983	169.4	169.4				△ 169.4
4	1984	169.4	169.4				△ 169.4
5	1985	112.5	108.0	4.5	94.2	94.2	△ 18.3
6	1986	62.7	57.2	5.5	119.3	119.3	56.6
7	1987	6.6		6.6	144.4	144.4	137.8
8	1988	8.7		8.7	200.0	200.0	191.3
9	1989	11.1		11.1	255.7	255.7	244.6
10	1990	13.5		13.5	311.3	311.3	297.8
11	1991	15.0		15.0	353.6	353.6	338.6
12	1992	16.9		16.9	395.8	395.8	378.9
13	1993	16.9		16.9	395.8	395.8	378.9
14	1994	16.9		16.9	395.8	395.8	378.9
15	1995	16.9		16.9	395.8	395.8	378.9
16	1996	16.9		16.9	395.8	395.8	378.9
17	1997	16.9		16.9	395.8	395.8	378.9
18	1998	16.9		16.9	395.8	395.8	378.9
19	1999	16.9		16.9	395.8	395.8	378.9
20	2000	16.9		16.9	395.8	395.8	378.9
21	2001	16.9		16.9	395.8	395.8	378.9
22	2002	16.9		16.9	395.8	395.8	378.9
23	2003	16.9		16.9	395.8	395.8	378.9
24	2004	16.9		16.9	395.8	395.8	378.9
25	2005	8.2		8.2	195.8	195.8	187.6
26	2006	8.2		8.2	195.8	195.8	187.6
27	2007	8.2		8.2	195.8	195.8	187.6
Total		1,081	771.8	309.2	7,211.3	7,211.3	6,130.3

Table 11-A-8 RR Calculation Sheet

– Phase I, Base Case, Schedule-1, R-1, 20% Increase of Construction Cost –
IRR = 21.5%

(Unit: 10⁶US\$)

No.	Year	COSTS			BENEFITS		Net Profit
		Total	Construction & Equipment	Operation	Total	Increased Revenue	
1	1981	97.7	97.7				△ 97.7
2	1982	194.5	194.5				△ 194.5
3	1983	184.8	184.8				△ 184.8
4	1984	184.8	184.8				△ 184.8
5	1985	122.3	117.8	4.5	94.2	94.2	△ 28.1
6	1986	67.9	62.4	5.5	119.3	119.3	51.4
7	1987	6.6		6.6	144.4	144.4	137.8
8	1988	8.7		8.7	200.0	200.0	191.3
9	1989	11.1		11.1	255.7	255.7	244.6
10	1990	13.5		13.5	311.3	311.3	297.8
11	1991	15.0		15.0	353.6	353.6	338.6
12	1992	16.9		16.9	395.8	395.8	378.9
13	1993	16.9		16.9	395.8	395.8	378.9
14	1994	16.9		16.9	395.8	395.8	378.9
15	1995	16.9		16.9	395.8	395.8	378.9
16	1996	16.9		16.9	395.8	395.8	378.9
17	1997	16.9		16.9	395.8	395.8	378.9
18	1998	16.9		16.9	395.8	395.8	378.9
19	1999	16.9		16.9	395.8	395.8	378.9
20	2000	16.9		16.9	395.8	395.8	378.9
21	2001	16.9		16.9	395.8	395.8	378.9
22	2002	16.9		16.9	395.8	395.8	378.9
23	2003	16.9		16.9	395.8	395.8	378.9
24	2004	16.9		16.9	395.8	395.8	378.9
25	2005	8.2		8.2	195.8	195.8	187.6
26	2006	8.2		8.2	195.8	195.8	187.6
27	2007	8.2		8.2	195.8	195.8	187.6
Total		1,151.2	842.0	309.2	7,211.3	7,211.3	6,060.1

Table 11-A-9 IRR Calculation Sheet

— Phase I, Base Case, Schedule-1, R-1, 30% of Increase of Construction Cost —
IRR = 20.3%

(Unit: 10⁶US\$)

No.	Year	COSTS			BENEFITS		Net Profit
		Total	Construction & Equipment	Operation	Total	Increased Revenue	
1	1981	105.8	105.8				△ 105.8
2	1982	211.1	211.1				△ 211.1
3	1983	200.2	200.2				△ 200.2
4	1984	200.2	200.2				△ 200.2
5	1985	131.9	127.4	4.5	94.2	94.2	△ 37.7
6	1986	73.1	67.6	5.5	119.3	119.3	46.2
7	1987	6.6		6.6	144.4	144.4	137.8
8	1988	8.7		8.7	200.0	200.0	191.3
9	1989	11.1		11.1	255.7	255.7	244.6
10	1990	12.5		13.5	311.3	311.3	297.8
11	1991	15.0		15.0	353.6	353.6	338.6
12	1992	16.9		16.9	395.8	395.8	378.9
13	1993	16.9		16.9	395.8	395.8	378.9
14	1994	16.9		16.9	395.8	395.8	378.9
15	1995	16.9		16.9	395.8	395.8	378.9
16	1996	16.9		16.9	395.8	395.8	378.9
17	1997	16.9		16.9	395.8	395.8	378.9
18	1998	16.9		16.9	395.8	395.8	378.9
19	1999	16.9		16.9	395.8	395.8	378.9
20	2000	16.9		16.9	395.8	395.8	378.9
21	2001	16.9		16.9	395.8	395.8	378.9
22	2002	16.9		16.9	395.8	395.8	378.9
23	2003	16.9		16.9	395.8	395.8	378.9
24	2004	16.9		16.9	395.8	395.8	378.9
25	2005	8.2		8.2	195.8	195.8	187.6
26	2006	8.2		8.2	195.8	195.8	187.6
27	2007	8.2		8.2	195.8	195.8	187.6
Total		1,221.5	912.3	309.2	7,211.3	7,211.3	5,989.8

Table 11-A-10 IRR Calculation Sheet

— Phase I, High Case, Schedule-1, R-1, 10% Increase of Construction Cost —
IRR = 24.6%

(Unit: 10⁶US\$)

No.	Year	COSTS			BENEFITS		Net Profit
		Total	Construction & Equipment	Operation	Total	Increased Revenue	
1	1981	98.5	98.5				△ 98.5
2	1982	196.1	196.1				△ 196.1
3	1983	186.3	186.3				△ 186.3
4	1984	186.3	186.3				△ 186.3
5	1985	123.2	118.8	4.5	145.7	145.7	22.4
6	1986	68.4	62.9	5.5	204.0	204.0	135.6
7	1987	6.6		6.6	204.0	204.0	197.4
8	1988	8.7		8.7	204.0	204.0	195.3
9	1989	11.1		11.1	393.7	393.7	382.6
10	1990	13.5		13.5	393.7	393.7	380.2
11	1991	15.0		15.0	393.7	393.7	378.7
12	1992	16.9		16.9	393.7	393.7	376.8
13	1993	16.9		16.9	393.7	393.7	376.8
14	1994	16.9		16.9	393.7	393.7	376.8
15	1995	16.9		16.9	393.7	393.7	376.8
16	1996	16.9		16.9	393.7	393.7	376.8
17	1997	16.9		16.9	393.7	393.7	376.8
18	1998	16.9		16.9	393.7	393.7	376.8
19	1999	16.9		16.9	393.7	393.7	376.8
20	2000	16.9		16.9	393.7	393.7	376.8
21	2001	16.9		16.9	393.7	393.7	376.8
22	2002	16.9		16.9	393.7	393.7	376.8
23	2003	16.9		16.9	393.7	393.7	376.8
24	2004	16.9		16.9	393.7	393.7	376.8
25	2005	8.2		8.2	130.7	130.7	122.5
26	2006	8.2		8.2	130.7	130.7	122.5
27	2007	8.2		8.2	130.7	130.7	122.5
Total		1,158.1	848.9	309.2	7,449.0	7,449.0	6,290.9

Table 11-A-11 IRR Calculation Sheet

— Phase I, High Case, Schedule-1, R-1, 20% Increase of Construction Cost —
IRR = 23.1%

(Unit: 10⁶US\$)

No.	Year	COSTS			BENEFITS		Net Profit
		Total	Construction & Equipment	Operation	Total	Increased Revenue	
1	1981	107.4	107.4				△ 107.4
2	1982	214.0	214.0				△ 214.0
3	1983	203.3	203.3				△ 203.3
4	1984	203.3	203.3				△ 203.3
5	1985	134.1	129.6	4.5	145.7	145.7	11.6
6	1986	74.1	68.6	5.5	204.0	204.0	129.9
7	1987	6.6		6.6	204.0	204.0	197.4
8	1988	8.7		8.7	204.0	204.0	195.3
9	1989	11.1		11.1	393.7	393.7	382.6
10	1990	13.5		13.5	393.7	393.7	380.2
11	1991	15.0		15.0	393.7	393.7	378.7
12	1992	16.9		16.9	393.7	393.7	376.8
13	1993	16.9		16.9	393.7	393.7	376.8
14	1994	16.9		16.9	393.7	393.7	376.8
15	1995	16.9		16.9	393.7	393.7	376.8
16	1996	16.9		16.9	393.7	393.7	376.8
17	1997	16.9		16.9	393.7	393.7	376.8
18	1998	16.9		16.9	393.7	393.7	376.8
19	1999	16.9		16.9	393.7	393.7	376.8
20	2000	16.9		16.9	393.7	393.7	376.8
21	2001	16.9		16.9	393.7	393.7	376.8
22	2002	16.9		16.9	393.7	393.7	376.8
23	2003	16.9		16.9	393.7	393.7	376.8
24	2004	16.9		16.9	393.7	393.7	376.8
25	2005	8.2		8.2	130.7	130.7	122.5
26	2006	8.2		8.2	130.7	130.7	122.5
27	2007	8.2		8.2	130.7	130.7	122.5
Total		1,235.4	926.2	309.2	7,449.0	7,499.0	6,213.6

Table 11-A-12 IRR Calculation Sheet

— Phase I, High Case, Schedule-1, R-1, 30% Increase of Construction Cost —
IRR = 21.8%

(Unit: 10⁶US\$)

No.	Year	COSTS			BENEFITS		Net Profit
		Total	Construction & Equipment	Operation	Total	Increased Revenue	
1	1981	116.4	116.4				△ 116.4
2	1982	231.8	231.8				△ 231.8
3	1983	220.2	220.2				△ 220.2
4	1984	220.2	220.2				△ 220.2
5	1985	144.9	140.4	4.5	145.7	145.7	0.8
6	1986	79.9	74.4	5.5	204.0	204.0	124.1
7	1987	6.6		6.6	204.0	204.0	197.4
8	1988	8.7		8.7	204.0	204.0	195.3
9	1989	11.1		11.1	393.7	393.7	382.6
10	1990	13.5		13.5	393.7	393.7	380.2
11	1991	15.0		15.0	393.7	393.7	378.7
12	1992	16.9		16.9	393.7	393.7	376.8
13	1993	16.9		16.9	393.7	393.7	376.8
14	1994	16.9		16.9	393.7	393.7	376.8
15	1995	16.9		16.9	393.7	393.7	376.8
16	1996	16.9		16.9	393.7	393.7	376.8
17	1997	16.9		16.9	393.7	393.7	376.8
18	1998	16.9		16.9	393.7	393.7	376.8
19	1999	16.9		16.9	393.7	393.7	376.8
20	2000	16.9		16.9	393.7	393.7	376.8
21	2001	16.9		16.9	393.7	393.7	376.8
22	2002	16.9		16.9	393.7	393.7	376.8
23	2003	16.9		16.9	393.7	393.7	376.8
24	2004	16.9		16.9	393.7	393.7	376.8
25	2005	8.2		8.2	130.7	130.7	122.5
26	2006	8.2		8.2	130.7	130.7	122.5
27	2007	8.2		8.2	130.7	130.7	122.5
Total		1,312.6	1,003.4	309.2	7,449.0	7,449.0	6,136.4

Table 11-A-13 IRR Calculation Sheet
— Phase I, Base Case, Schedule-2, R-1 —
IRR = 22.1%

(Unit: 10⁶US\$)

No.	Year	COSTS			BENEFITS		Net Profit
		Total	Construction & Equipment	Operation	Total	Increased Revenue	
1	1981	125.7	126.1				△ 126.1
2	1982	200.4	200.3				△ 200.3
3	1983	203.9	203.6				△ 203.6
4	1984	190.0	190.0				△ 190.0
5	1985	4.5		4.5	94.2	94.2	87.7
6	1986	5.5		5.5	119.3	119.3	113.8
7	1987	6.6		6.6	144.4	144.4	137.8
8	1988	8.7		8.7	200.0	200.0	191.3
9	1989	11.1		11.1	255.7	255.7	244.6
10	1990	13.5		13.5	311.3	311.3	297.8
11	1991	15.0		15.0	353.6	353.6	338.6
12	1992	16.9		16.9	395.8	395.8	378.9
13	1993	16.9		16.9	395.8	395.8	378.9
14	1994	16.9		16.9	395.8	395.8	378.9
15	1995	16.9		16.9	395.8	395.8	378.9
16	1996	16.9		16.9	395.8	395.8	378.9
17	1997	16.9		16.9	395.8	395.8	378.9
18	1998	16.9		16.9	395.8	395.8	378.9
19	1999	16.9		16.9	395.8	395.8	378.9
20	2000	16.9		16.9	395.8	395.8	378.9
21	2001	16.9		16.9	395.8	395.8	378.9
22	2002	16.9		16.9	395.8	395.8	378.9
23	2003	16.9		16.9	395.8	395.8	378.9
24	2004	16.9		16.9	395.8	395.8	378.9
25							
26							
27							
Total		1,004.6	720.0	284.6	6,623.9	6,623.9	5,619.3

Table 11-A-14 IRR Calculation Sheet

– Phase I, High Case Schedule-2, R-1 –
IRR = 25.3%

(Unit: 10⁶US\$)

No.	Year	COSTS			BENEFITS		Net Profit
		Total	Construction & Equipment	Operation	Total	Increased Revenue	
1	1981	126.1	126.1				△ 126.1
2	1982	200.3	200.3				△ 200.3
3	1983	203.6	203.6				△ 203.6
4	1984	190.0	190.0				△ 190.0
5	1985	4.5		4.5	145.7	145.7	141.2
6	1986	5.5		5.5	204.0	204.0	198.5
7	1987	6.6		6.6	204.0	204.0	197.4
8	1988	8.7		8.7	204.0	204.0	195.3
9	1989	11.1		11.1	393.7	393.7	382.6
10	1990	13.5		13.5	393.7	393.7	380.2
11	1991	15.0		15.0	393.7	393.7	378.7
12	1992	16.9		16.9	393.7	393.7	376.8
13	1993	16.9		16.9	393.7	393.7	376.8
14	1994	16.9		16.9	393.7	393.7	376.8
15	1995	16.9		16.9	393.7	393.7	376.8
16	1996	16.9		16.9	393.7	393.7	376.8
17	1997	16.9		16.9	393.7	393.7	376.8
18	1998	16.9		16.9	393.7	393.7	376.8
19	1999	16.9		16.9	393.7	393.7	376.8
20	2000	16.9		16.9	393.7	393.7	376.8
21	2001	16.9		16.9	393.7	393.7	376.8
22	2002	16.9		16.9	393.7	393.7	376.8
23	2003	16.9		16.9	393.7	393.7	376.8
24	2004	16.9		16.9	393.7	393.7	376.8
25							
26							
27							
Total		1,004.6	720.0	284.6	7,056.9	7,056.9	6,052.3

Table 11-A-15 IRR Calculation Sheet
— Whole Project, Base Case, Schedule-1, R-1 —
IRR = 23.8%

(Unit: 10⁶ US\$)

No.	Year	COSTS			BENEFITS		Net Profit
		Total	Con- struction Equipment	Operation	Total	Increased Revenue	
1	1981	81.7	81.7				△ 81.7
2	1982	162.2	162.2				△ 162.2
3	1983	154.0	154.0				△ 154.0
4	1984	154.0	154.0				△ 154.0
5	1985	105.9	101.4	4.5	94.2	94.2	△ 11.7
6	1986	71.0	65.5	5.5	119.3	119.3	48.3
7	1987	87.0	80.4	6.6	144.5	144.5	57.5
8	1988	110.8	102.1	8.7	200.0	200.0	89.2
9	1989	56.8	45.7	11.1	255.7	255.7	198.9
10	1990	59.2	45.7	13.5	311.3	311.3	252.1
11	1991	60.7	45.7	15.0	353.6	353.6	292.9
12	1992	71.5	54.6	16.9	395.8	395.8	324.3
13	1993	73.3	54.6	18.7	441.6	441.6	368.3
14	1994	53.2	32.6	20.6	482.0	482.0	428.8
15	1995	22.6		22.6	529.3	529.3	506.7
16	1996	24.9		24.9	573.4	573.4	548.5
17	1997	27.4		27.4	613.6	613.6	586.2
18	1998	30.1		30.1	660.0	660.0	629.9
19	1999	33.1		33.1	708.6	708.6	675.5
20	2000	36.4		36.4	752.6	752.6	716.2
21	2001	40.1		40.1	790.2	790.2	750.1
22	2002	44.1		44.1	829.7	829.7	785.6
23	2003	48.5		48.5	871.2	871.2	822.7
24	2004	53.4		53.4	914.8	914.8	861.4
25	2005	52.2		52.2	760.6	760.6	708.4
26	2006	58.1		58.1	798.6	798.6	740.5
27	2007	64.7		64.7	838.5	838.5	773.8
Total		1,836.9	1,180.2	656.7	12,439.1	12,439.1	10,602.2

Table 11-A-16 IRR Calculation Sheet
— Whole Project, Base Case, Schedule-2, R-1 —
IRR = 20.4%

(Unit: 10⁶US\$)

No.	Year	COSTS			BENEFITS		Net Profit
		Total	Construction & Equipment	Operation	Total	Increased Revenue	
1	1981	126.1	126.1				△ 126.1
2	1982	200.3	200.3				△ 200.3
3	1983	207.0	207.0				△ 207.0
4	1984	245.4	245.4				△ 245.4
5	1985	157.1	152.6	4.5	94.2	94.2	△ 62.9
6	1986	140.8	135.3	5.5	119.3	119.3	△ 21.5
7	1987	84.0	77.4	6.6	144.5	144.5	60.5
8	1988	53.3	44.6	8.7	200.0	200.0	146.7
9	1989	11.1		11.1	255.7	255.7	244.6
10	1990	113.5		13.5	311.3	311.3	297.8
11	1991	15.0		15.0	353.6	353.6	338.6
12	1992	16.9		16.9	395.8	395.8	378.9
13	1993	18.7		18.7	441.6	441.6	422.9
14	1994	20.6		20.6	482.0	482.0	461.4
15	1995	22.6		22.6	529.3	529.3	506.7
16	1996	24.9		24.9	573.4	573.4	548.5
17	1997	27.4		27.4	613.6	613.6	586.2
18	1998	30.1		30.1	660.0	660.0	629.9
19	1999	33.1		33.1	708.6	708.6	675.5
20	2000	36.4		36.4	752.6	752.6	716.2
21	2001	40.1		40.1	790.2	790.2	750.1
22	2002	44.1		44.1	829.7	829.7	785.6
23	2003	48.5		48.5	871.2	871.2	822.7
24	2004	53.4		53.4	914.8	914.8	861.4
25	2005	52.2		52.2	760.6	760.6	708.4
26	2006	58.1		58.1	798.6	798.6	740.5
27	2007	64.7		64.7	838.5	773.8	773.8
Total		1,845.4	1,188.7	656.7	12,439.1	12,439.1	10,591.7

Table 11-A-17 IRR Calculation Sheet
— Whole Project, Base Case, Schedule-3, R-1 —
IRR = 19.3%

(Unit: 10⁶ US\$)

No.	Year	COSTS			BENEFITS		Net Profit
		Total	Construction & Equipment	Operation	Total	Increased Revenue	
1	1981	126.1	126.1				△ 126.1
2	1982	248.3	248.3				△ 248.3
3	1983	326.4	326.4				△ 326.4
4	1984	297.9	297.9				△ 297.9
5	1985	121.2	116.7	4.5	94.2	94.2	△ 27.0
6	1986	78.9	73.4	5.5	119.3	119.3	40.4
7	1987	6.6		6.6	144.5	144.5	137.9
8	1988	8.7		8.7	200.0	200.0	191.3
9	1989	11.1		11.1	255.7	255.7	244.6
10	1990	13.5		13.5	311.3	311.3	297.8
11	1991	15.0		15.0	353.6	353.6	338.6
12	1992	16.9		16.9	395.8	395.8	378.9
13	1993	18.7		18.7	441.6	441.6	422.9
14	1994	20.6		20.6	482.0	482.0	461.4
15	1995	22.6		22.6	529.3	529.3	506.7
16	1996	24.9		24.9	573.4	573.4	548.5
17	1997	27.4		27.4	613.6	613.6	586.2
18	1998	30.1		30.1	660.0	660.0	629.9
19	1999	33.1		33.1	708.6	708.6	675.5
20	2000	36.4		36.4	752.6	752.6	716.2
21	2001	40.1		40.1	790.2	790.2	750.1
22	2002	44.1		44.1	829.7	829.7	785.6
23	2003	48.5		48.5	871.2	871.2	822.7
24	2004	53.4		53.4	914.8	914.8	861.4
25	2005	52.2		52.2	760.6	760.6	708.4
26	2006	58.1		58.1	798.6	798.6	740.5
27	2007	64.7		64.7	838.5	838.5	773.8
Total		1,845.5	1,038.3	656.7	12,439.1	12,439.1	10,593.6

Table 11-A-18 IRR Calculation Sheet
— Whole Project, High Case, Schedule-1, R-1 —
IRR = 28.2%

(Unit: 10⁶ US\$)

No.	Year	COSTS			BENEFITS		Net Profit
		Total	Construction & Equipment	Operation	Total	Increased Revenue	
1	1981	81.7	81.7				△ 81.7
2	1982	162.2	162.2				△ 162.2
3	1983	154.0	154.0				△ 154.0
4	1984	154.0	154.0				△ 154.0
5	1985	105.9	101.4	4.5	145.7	145.7	△ 39.8
6	1986	71.0	65.5	5.5	204.0	204.0	133.0
7	1987	87.0	80.4	6.6	204.0	204.0	117.0
8	1988	110.8	102.1	8.7	204.0	204.0	93.2
9	1989	56.8	45.7	11.1	393.7	393.7	336.9
10	1990	59.2	45.7	13.5	393.7	393.7	334.5
11	1991	60.7	45.7	15.0	393.7	393.7	333.0
12	1992	71.5	54.6	16.9	570.4	570.4	498.9
13	1993	73.3	54.6	18.7	570.4	570.4	497.1
14	1994	53.2	32.6	20.6	570.4	570.4	517.2
15	1995	22.6		22.6	743.2	743.2	720.6
16	1996	24.9		24.9	802.6	802.6	777.7
17	1997	27.4		27.4	860.8	860.8	833.4
18	1998	30.1		30.1	927.3	927.3	897.2
19	1999	33.1		33.1	997.3	997.3	964.2
20	2000	36.4		36.4	1,065.1	1,065.1	1,028.7
21	2001	40.1		40.1	1,118.4	1,118.4	1,078.3
22	2002	44.1		44.1	1,174.3	1,174.3	1,130.2
23	2003	48.5		48.5	1,233.0	1,233.0	1,184.5
24	2004	53.4		53.4	1,295.6	1,295.6	1,242.2
25	2005	52.2		52.2	1,156.4	1,156.4	1,104.2
26	2006	58.1		58.1	1,214.2	1,214.2	1,156.1
27	2007	64.7		64.7	1,274.9	1,274.9	1,210.2
Total		1,836.9	1,180.2	656.7	17,513.1	17,513.1	15,676.2

Table 11-A-19 IRR Calculation Sheet
— Whole Project, High Case, Schedule-2, R-1 —
IRR = 25.4%

(Unit: 10⁶ US\$)

No.	Year	COSTS			BENEFITS		Net Profit
		Total	Construction & Equipment	Operation	Total	Increased Revenue	
1	1981	126.1	126.1				△ 126.1
2	1982	200.3	200.3				△ 200.3
3	1983	207.0	207.0				△ 207.0
4	1984	245.4	245.4				△ 245.4
5	1985	157.1	152.6	4.5	145.7	145.7	△ 11.4
6	1986	140.8	135.3	5.5	204.0	204.0	63.2
7	1987	84.0	77.4	6.6	204.0	204.0	120.0
8	1988	53.3	44.6	8.7	204.0	204.0	150.7
9	1989	11.1		11.1	393.7	393.7	382.6
10	1990	13.5		13.5	407.4	407.4	393.9
11	1991	15.0		15.0	514.8	514.8	499.8
12	1992	16.9		16.9	570.4	570.4	553.5
13	1993	18.7		18.7	627.6	627.6	608.9
14	1994	20.6		20.6	681.4	681.4	660.8
15	1995	22.6		22.6	743.2	743.2	720.6
16	1996	24.9		24.9	802.6	802.6	777.7
17	1997	27.4		27.4	860.8	860.8	833.4
18	1998	30.1		30.1	927.3	927.3	897.2
19	1999	33.1		33.1	997.3	997.3	964.2
20	2000	36.4		36.4	1,065.1	1,065.1	1,028.7
21	2001	40.1		40.1	1,118.4	1,118.4	1,078.3
22	2002	44.1		44.1	1,174.3	1,174.3	1,130.2
23	2003	48.5		48.5	1,233.0	1,233.0	1,184.5
24	2004	53.4		53.4	1,295.6	1,295.6	1,242.2
25	2005	52.2		52.2	1,156.4	1,156.4	1,104.2
26	2006	58.1		58.1	1,214.2	1,214.2	1,156.1
27	2007	64.7		64.7	1,274.9	1,274.9	1,210.2
Total		1,845.4	1,188.7	656.7	17,816.1	17,816.1	15,970.7

Table 11-A-20 IRR Calculation Sheet
– Whole Project, High Case Schedule-3, R-1 –
IRR = 24.6%

(Unit: 10⁶ US\$)

No.	Year	COSTS			BENEFITS		Net Profit
		Total	Construction & Equipment	Operation	Total	Increased Revenue	
1	1981	126.1	126.1				△ 126.1
2	1982	248.3	248.3				△ 248.3
3	1983	326.4	326.4				△ 326.4
4	1984	297.9	297.9				△ 297.9
5	1985	121.2	116.7	4.5	145.7	145.7	24.5
6	1986	78.9	73.4	5.5	204.0	204.0	125.1
7	1987	6.6		6.6	263.0	263.0	256.4
8	1988	8.7		8.7	322.7	322.7	314.0
9	1989	11.1		11.1	393.7	393.7	382.6
10	1990	13.5		13.5	407.4	407.4	393.9
11	1991	15.0		15.0	514.8	514.8	499.8
12	1992	16.9		16.9	570.4	570.4	553.5
13	1993	18.7		18.7	627.6	627.6	608.9
14	1994	20.6		20.6	681.4	681.4	660.8
15	1995	22.6		22.6	743.2	743.2	720.6
16	1996	24.9		24.9	802.6	802.6	777.7
17	1997	27.4		27.4	860.8	860.8	833.3
18	1998	30.1		30.1	927.3	927.3	897.2
19	1999	33.1		33.1	997.3	997.3	964.2
20	2000	36.4		36.4	1,065.1	1,065.1	1,028.7
21	2001	40.1		40.1	1,118.4	1,118.4	1,078.3
22	2002	44.1		44.1	1,174.3	1,174.3	1,130.2
23	2003	48.5		48.5	1,233.0	1,233.0	1,184.5
24	2004	53.4		53.4	1,295.6	1,295.6	1,242.2
25	2005	52.2		52.2	1,156.4	1,156.4	1,104.2
26	2006	58.1		58.1	1,214.2	1,214.2	1,156.1
27	2007	64.7		64.7	1,274.9	1,274.9	1,210.2
Total		1,845.5	1,188.8	656.7	17,993.8	17,993.8	16,148.3

Table 11-A-21 IRR Calculation Sheet
— Whole Project, Base Case, Schedule-1, B-1 & Time Saving —
IRR = 49.0%

(Unit: 10⁶ US\$)

No.	Year	COSTS			BENEFITS				Net Profit
		Total	Con- struction & Equip- ment	Operation	Total	Turning Round Cost	Time Saving		
							Canal Transit Time	Waiting Time	
1	1981	81.7	81.7						△ 81.7
2	1982	162.2	162.2						△ 162.2
3	1983	154.0	154.0						△ 154.0
4	1984	105.9	154.0						△ 154.0
5	1985	170.6	101.4	4.5	306.9	304.2	2.7		201.0
6	1986	71.0	65.5	5.5	385.6	382.7	2.9		314.6
7	1987	87.0	80.4	6.6	508.4	471.4	37.0		421.4
8	1988	110.8	102.1	8.7	684.1	645.5	38.6		573.3
9	1989	56.8	45.7	11.1	885.7	845.9	39.8		828.9
10	1990	59.2	45.7	13.5	1,093.7	1,052.3	41.4		1,034.5
11	1991	60.7	45.7	15.0	1,231.4	1,188.4	43.0		1,170.7
12	1992	71.5	54.6	16.9	1,392.2	1,348.0	44.2		1,320.7
13	1993	73.3	54.6	18.7	1,556.8	1,511.4	45.4		1,483.5
14	1994	53.2	32.6	20.6	1,712.4	1,665.4	47.0		1,659.2
15	1995	22.6		22.6	2,006.2	1,837.9	48.3	120.0	1,983.6
16	1996	24.9		24.9	2,180.4	2,006.5	49.9	124.0	2,155.5
17	1997	27.4		27.4	2,349.8	2,170.3	51.5	128.0	2,322.4
18	1998	30.1		30.1	2,536.8	2,351.7	53.1	132.0	2,506.7
19	1999	33.1		33.1	2,731.6	2,540.9	54.7	136.0	2,698.5
20	2000	36.4		36.4	2,920.0	2,723.7	56.3	140.0	2,883.6
21	2001	40.1		40.1	3,061.8	2,859.9	57.9	144.0	3,021.7
22	2002	44.1		44.1	3,209.0	3,002.9	59.1	147.0	3,164.9
23	2003	48.5		48.5	3,364.7	3,153.0	60.7	151.0	3,316.2
24	2004	53.4		53.4	3,528.0	3,310.7	62.3	155.0	3,474.6
25	2005	52.2		52.2	3,094.7	3,004.8	26.9	63.0	3,042.5
26	2006	58.1		58.1	3,274.1	3,178.6	28.5	67.0	3,216.0
27	2007	64.7		64.7	3,463.7	3,362.5	30.2	71.0	3,399.0
Total		1,836.0	1,180.2	656.7	47,478.0	44,918.6	981.4	1,578.0	45,641.1

Table 11-A-22 IRR Calculation Sheet

— Whole Project, Base Case, Schedule-2, B-1 & Time Saving —
IRR = 42.4%

(Unit: 10⁶US\$)

No.	Year	COSTS			BENEFITS				Net Profit
		Total	Con- struction & Equip- ment	Operation	Total	Turning Round Cost	Time Saving		
							Canal Transit Time	Waiting Time	
1	1981	126.1	126.1						△ 126.1
2	1982	200.3	200.3						△ 200.3
3	1983	207.0	207.0						△ 207.0
4	1984	245.4	245.4						△ 245.4
5	1985	157.1	152.6	4.5	306.9	304.2	2.7		149.8
6	1986	140.8	135.3	5.5	385.6	382.7	2.9		244.8
7	1987	84.0	77.4	6.6	508.4	471.4	37.0		424.4
8	1988	53.3	44.6	8.7	684.1	645.5	38.6		630.8
9	1989	11.1		11.1	984.7	845.9	39.8	99.0	973.6
10	1990	13.5		13.5	1,196.7	1,052.3	41.4	103.0	1,183.2
11	1991	15.0		15.0	1,338.4	1,188.4	43.0	107.0	1,323.4
12	1992	16.9		16.9	1,502.2	1,348.0	44.2	110.0	1,485.3
13	1993	18.7		18.7	1,624.4	1,511.4	45.4	113.0	1,605.7
14	1994	20.6		20.6	1,829.4	1,665.4	47.0	117.0	1,808.8
15	1995	22.6		22.6	2,006.2	1,837.9	48.3	120.0	1,983.6
16	1996	24.9		24.9	2,180.4	2,006.5	49.9	124.0	2,155.5
17	1997	27.4		27.4	2,349.8	2,170.3	51.5	128.0	2,322.4
18	1998	30.1		30.1	2,536.8	2,351.7	53.1	132.0	2,506.7
19	1999	33.1		33.1	2,731.6	2,540.9	54.7	136.0	2,698.5
20	2000	36.4		36.4	2,920.0	2,723.7	56.3	140.0	2,883.6
21	2001	40.1		40.1	3,061.8	2,859.9	57.9	144.0	3,021.7
22	2002	44.1		44.1	3,209.0	3,002.9	59.1	147.0	3,164.9
23	2003	48.5		48.5	3,364.7	3,153.0	60.7	151.0	3,316.2
24	2004	53.4		53.4	3,528.0	3,310.7	62.3	155.0	3,474.6
25	2005	52.2		52.2	3,094.7	3,004.8	26.9	63.0	3,042.5
26	2006	58.1		58.1	3,274.1	3,178.6	28.5	67.0	3,216.0
27	2007	64.7		64.7	3,463.7	3,362.5	30.2	71.0	3,399.0
Total		1,845.4	1,188.7	656.7	48,081.6	44,918.6	981.4	2,227.0	46,236.2

Table 11-A-23 IRR Calculation Sheet

– Whole Project, Base Case, Schedule, B-1 & Time Saving –
IRR = 40.4%

(Unit: 10⁶ US\$)

(Cont. to C-3)

No.	Year	COSTS			BENEFITS				Net Profit
		Total	Con- struction & Equip- ment	Operation	Total	Turning Round Cost	Time Saving		
							Canal Transit Time	Waiting Time	
1	1981	126.1	126.1						△ 126.1
2	1982	248.3	248.3						△ 248.3
3	1983	326.4	326.4						△ 322.4
4	1984	297.9	297.9						△ 297.9
5	1985	121.2	116.7	4.5	306.9	304.2	2.7		185.7
6	1986	78.9	73.4	5.5	385.6	382.7	2.9		306.7
7	1987	6.6		6.6	600.4	471.4	37.0	92.0	593.8
8	1988	8.7		8.7	780.1	645.5	38.6	96.0	771.4
9	1989	11.1		11.1	984.7	845.9	39.8	99.0	973.6
10	1990	13.5		13.5	1,196.7	1,052.3	41.4	103.0	1,183.2
11	1991	15.0		15.0	1,338.4	1,188.4	43.0	107.0	1,323.4
12	1992	16.9		16.9	1,502.2	1,348.0	44.2	110.0	1,485.3
13	1993	18.7		18.7	1,624.4	1,511.4	45.4	113.0	1,605.7
14	1994	20.6		20.6	1,829.4	1,665.4	47.0	117.0	1,808.8
15	1995	22.6		22.6	2,006.2	1,837.9	48.3	120.0	1,983.6
16	1996	24.9		24.9	2,180.4	2,006.5	49.9	124.0	2,155.5
17	1997	27.4		27.4	2,349.8	2,170.3	51.5	128.0	2,322.4
18	1998	30.1		30.1	2,536.8	2,351.7	53.1	132.0	2,506.7
19	1999	33.1		33.1	2,731.6	2,540.9	54.7	136.0	2,698.5
20	2000	36.4		36.4	2,920.0	2,723.7	56.3	140.0	2,883.6
21	2001	40.1		40.1	3,061.8	2,859.9	57.9	144.0	3,021.7
22	2002	44.1		44.1	3,209.0	3,002.9	59.1	147.0	3,164.9
23	2003	48.5		48.5	3,364.7	3,153.0	60.7	151.0	3,316.2
24	2004	53.4		53.4	3,528.0	3,310.7	62.3	155.0	3,474.6
25	2005	52.2		52.2	3,094.7	3,004.8	26.9	63.0	3,042.5
26	2006	58.1		58.1	3,274.1	3,178.6	28.5	67.0	3,216.0
27	2007	64.7		64.7	3,463.7	3,362.5	30.2	71.0	3,399.0
Total		1,845.5	1,188.8	656.7	48,269.6	44,918.6	981.4	2,415.0	46,424.1

Table 11-A-24. IRR Calculation Sheet

— Whole Project, Base Case, Schedule-1, R-1 & Time Saving —
IRR = 26.3%

(Unit: 10⁶ US\$)

No.	Year	COSTS			BENEFITS				Net Profit
		Total	Con- struction & Equip- ment	Operation	Total	Turning Round Cost	Time Saving		
							Canal Transit Time	Waiting Time	
1	1981	81.7	81.7						△ 81.7
2	1982	162.2	162.2						△ 162.2
3	1983	154.0	154.0						△ 154.0
4	1984	154.0	154.0						△ 154.0
5	1985	105.9	101.4	4.5	96.9	94.2	2.7		△ 9.0
6	1986	71.0	65.5	5.5	122.2	119.3	2.9		51.2
7	1987	87.0	80.4	6.6	181.5	144.5	37.0		94.5
8	1988	110.8	102.1	8.7	238.6	200.0	38.6		127.8
9	1989	56.8	45.7	11.1	295.5	255.7	39.8		238.7
10	1990	59.2	45.7	13.5	352.7	311.3	41.4		293.5
11	1991	60.7	45.7	15.0	396.6	353.6	43.0		335.9
12	1992	71.5	54.6	16.9	440.0	395.8	44.2		368.5
13	1993	73.3	54.6	18.7	487.0	441.6	45.4		413.7
14	1994	53.2	32.6	20.6	529.0	482.0	47.0		475.8
15	1995	22.6		22.6	697.6	529.3	48.3	120.0	675.0
16	1996	24.9		24.9	747.3	573.4	49.9	124.0	722.4
17	1997	27.4		27.4	793.1	613.6	51.5	128.0	765.7
18	1998	30.1		30.1	845.1	660.0	53.1	132.0	815.0
19	1999	33.1		33.1	899.3	708.6	54.7	136.0	866.2
20	2000	36.4		36.4	948.9	752.6	56.3	140.0	912.5
21	2001	40.1		40.1	992.1	790.2	57.9	144.0	952.0
22	2002	44.1		44.1	1,035.8	829.7	59.1	147.0	991.7
23	2003	48.5		48.5	1,082.9	871.2	60.7	151.0	1,034.4
24	2004	53.4		53.4	1,132.1	914.8	62.3	155.0	1,078.7
25	2005	52.2		52.2	850.5	760.6	26.9	63.0	798.3
26	2006	58.1		58.1	894.1	798.6	28.5	67.0	836.0
27	2007	64.7		64.7	939.7	838.5	30.2	71.0	875.0
Total		1,836.9	1,180.2	656.7	14,998.5	12,439.1	981.4	1,578.0	13,161.6

Table 11-A-25 IRR Calculation Sheet

– Whole Project, Base Case, Schedule-2, R-1 & Time Saving –
IRR = 24.0%

(Unit: 10⁶ US\$)

No.	Year	COSTS			BENEFITS				Net Profit
		Total	Con- struction & Equip- ment	Operation	Total	Turning Round Cost	Time Saving		
							Canal Transit Time	Waiting Time	
1	1981	126.1	126.1						△ 126.1
2	1982	200.3	200.3						△ 200.3
3	1983	207.0	207.0						△ 207.0
4	1984	245.4	245.4						△ 245.4
5	1985	157.1	152.6	4.5	96.9	94.2	2.7		△ 60.2
6	1986	140.8	135.3	5.5	122.2	119.3	2.9		△ 18.6
7	1987	84.0	77.4	6.6	181.5	144.5	37.0		97.5
8	1988	53.3	44.6	8.7	238.6	200.0	38.6		185.3
9	1989	11.1		11.1	394.5	255.7	39.8	99.0	383.4
10	1990	13.5		13.5	455.7	311.3	41.4	103.0	442.2
11	1991	15.0		15.0	506.6	353.6	43.0	107.0	491.6
12	1992	16.9		16.9	550.0	395.8	44.2	110.0	533.1
13	1993	18.7		18.7	600.0	441.6	45.4	113.0	581.3
14	1994	20.6		20.6	646.0	482.0	47.0	117.0	625.4
15	1995	22.6		22.6	697.6	529.3	48.3	120.0	675.0
16	1996	24.9		24.9	747.3	573.4	49.9	124.0	722.4
17	1997	27.4		27.4	793.1	613.6	51.5	128.0	765.7
18	1998	30.1		30.1	845.1	660.0	53.1	132.0	815.0
19	1999	33.1		33.1	899.3	708.6	54.7	136.0	866.2
20	2000	36.4		36.4	948.9	752.6	56.3	140.0	912.5
21	2001	40.1		40.1	992.1	790.2	57.9	144.0	952.0
22	2002	44.1		44.1	1,035.8	829.7	59.1	147.0	991.7
23	2003	48.5		48.5	1,082.9	871.2	60.7	151.0	1,034.4
24	2004	53.4		53.4	1,132.1	914.8	62.3	155.0	1,078.7
25	2005	52.2		52.2	850.5	760.6	26.9	63.0	798.3
26	2006	58.1		58.1	894.1	798.6	28.5	67.0	836.0
27	2007	64.7		64.7	939.7	838.5	30.2	71.0	875.0
Total		1,845.4	1,241.2	656.7	15,647.5	12,439.1	981.4	2,227.0	13,801.1

Table 11-A-26 IRR Calculation Sheet

– Whole Project, Base Case, Schedule-3, R-1 & Time Saving –
IRR = 23.4%

(Unit: 10⁶ US\$)

No.	Year	COSTS			BENEFITS				Net Profit
		Total	Con- struction & Equip- ment	Operation	Total	Turning Round Cost	Time Saving		
							Canal Transit Time	Waiting Time	
1	1981	126.1	126.1						△ 126.1
2	1982	248.3	248.3						△ 248.3
3	1983	326.4	326.4						△ 326.4
4	1984	297.9	297.9						△ 297.9
5	1985	121.2	116.7	4.5	96.9	94.2	2.7		24.3
6	1986	78.9	73.4	5.5	122.2	119.3	2.9		43.3
7	1987	6.6		6.6	273.5	144.5	37.0	92.0	266.9
8	1988	8.7		8.7	334.6	200.0	38.6	96.0	325.9
9	1989	11.1		11.1	394.5	255.7	39.8	99.0	383.4
10	1990	13.5		13.5	455.7	311.3	41.4	103.0	442.2
11	1991	15.0		15.0	503.6	353.6	43.0	107.0	488.6
12	1992	16.9		16.9	550.0	395.8	44.2	110.0	533.1
13	1993	18.7		18.7	600.0	441.6	45.4	113.0	581.3
14	1994	20.6		20.6	646.0	482.0	47.0	117.0	625.4
15	1995	22.6		22.6	697.6	529.3	48.3	120.0	675.0
16	1996	24.9		24.9	747.3	573.4	49.9	124.0	722.4
17	1997	27.4		27.4	793.1	613.6	51.5	128.0	765.7
18	1998	30.1		30.1	845.1	660.0	53.1	132.0	815.0
19	1999	33.1		33.1	899.3	708.6	54.7	136.0	866.2
20	2000	36.4		36.4	948.9	752.6	56.3	140.0	912.5
21	2001	40.1		40.1	992.1	790.2	57.9	144.0	952.0
22	2002	44.1		44.1	1,035.8	829.7	59.1	147.0	991.7
23	2003	48.5		48.5	1,082.9	871.2	60.7	151.0	1,034.4
24	2004	53.4		53.4	1,132.1	914.8	62.3	155.0	1,078.7
25	2005	52.2		52.2	850.5	760.6	26.9	63.0	798.3
26	2006	58.1		58.1	894.1	798.6	28.5	67.0	836.0
27	2007	64.7		64.7	939.7	838.5	30.2	71.0	875.0
Total		1,845.5	1,188.8	656.7	15,835.5	12,439.1	981.4	2,415.0	13,990.0

Table 11-A-27 IRR Calculation Sheet

– Whole Project, High Case, Schedule-1, R-1 & Time Saving –
IRR = 30.2%

(Unit: 10⁶US\$)

Cont. to CS-1

No.	Year	COSTS			BENEFITS				Net Profit
		Total	Con- struction & Equip- ment	Operation	Total	Increased Revenue	Time Saving		
							Canal Transit Time	Waiting Time	
1	1981	81.7	81.7						△ 81.7
2	1982	162.2	162.2						△ 162.2
3	1983	154.0	154.0						△ 154.0
4	1984	154.0	154.0						△ 154.0
5	1985	105.9	101.4	4.5	148.7	145.7	3.0		42.8
6	1986	71.0	65.5	5.5	207.2	204.0	3.2		136.2
7	1987	87.0	80.4	6.6	212.9	204.0	8.9		125.9
8	1988	110.8	102.1	8.7	213.4	204.0	9.4		102.6
9	1989	56.8	45.7	11.1	403.5	393.7	9.8		346.7
10	1990	59.2	45.7	13.5	404.0	393.7	10.3		344.8
11	1991	60.7	45.7	15.0	404.5	393.7	10.8		343.8
12	1992	71.5	54.6	16.9	581.6	570.4	11.2		510.1
13	1993	73.3	54.6	18.7	582.1	570.4	11.7		508.8
14	1994	53.2	32.6	20.6	582.4	570.4	12.0		529.2
15	1995	22.6		22.6	897.7	743.2	12.5	142.0	875.1
16	1996	24.9		24.9	962.5	802.6	12.9	147.0	937.6
17	1997	27.4		27.4	1,027.2	860.8	13.4	153.0	999.8
18	1998	30.1		30.1	1,100.2	927.3	13.9	159.0	1,070.1
19	1999	33.1		33.1	1,176.8	997.3	14.5	165.0	1,143.7
20	2000	36.4		36.4	1,251.1	1,065.1	15.0	171.0	1,214.7
21	2001	40.1		40.1	1,309.8	1,118.4	15.4	176.0	1,269.7
22	2002	44.1		44.1	1,371.2	1,174.3	15.9	181.0	1,327.1
23	2003	48.5		48.5	1,435.3	1,233.0	16.3	186.0	1,386.8
24	2004	53.4		53.4	1,503.4	1,295.6	16.8	191.0	1,450.0
25	2005	52.2		52.2	1,253.3	1,156.4	7.9	89.0	1,201.1
26	2006	58.1		58.1	1,316.3	1,214.2	8.1	94.0	1,258.2
27	2007	64.7		64.7	1,382.3	1,274.9	8.4	99.0	1,317.6
Total		1,863.9	1,180.2	656.7	19,727.4	17,513.1	261.3	1,953.0	17,890.5

Table 11-A-28 IRR Calculation Sheet

– Whole Project, High Case, Schedule-2, R-1 & Time Saving –
IRR = 27.3%

(Unit: 10⁶ US\$)

No.	Year	COSTS			BENEFITS				Net Profit
		Total	Con- struction & Equip- ment	Operation	Total	Increased Revenue	Time Saving		
							Canal Transit Time	Waiting Time	
1	1981	126.1	126.1						△ 126.1
2	1982	200.3	200.3						△ 200.3
3	1983	207.0	207.0						△ 207.0
4	1984	245.4	245.4						△ 245.4
5	1985	157.1	152.6	4.5	148.7	145.7	3.0		△ 8.4
6	1986	140.8	135.3	5.5	207.2	204.0	3.2		66.4
7	1987	84.0	77.4	6.6	212.9	204.0	8.9		128.9
8	1988	53.3	44.6	8.7	213.4	204.0	9.4		160.1
9	1989	11.1		11.1	515.5	393.7	9.8	112.0	504.4
10	1990	13.5		13.5	522.0	393.7	10.3	118.0	508.5
11	1991	15.0		15.0	527.5	393.7	10.8	123.0	512.5
12	1992	16.9		16.9	709.6	570.4	11.2	128.0	692.7
13	1993	18.7		18.7	715.1	570.4	11.7	133.0	696.4
14	1994	20.6		20.6	719.4	570.4	12.0	137.0	698.8
15	1995	22.6		22.6	897.7	743.2	12.5	142.0	875.1
16	1996	24.9		24.9	962.5	802.6	12.9	147.0	937.6
17	1997	27.4		27.4	1,027.2	860.8	13.4	153.0	999.8
18	1998	30.1		30.1	1,100.2	927.3	13.9	159.0	1,070.1
19	1999	33.1		33.1	1,176.8	997.3	14.5	165.0	1,143.7
20	2000	36.4		36.4	1,251.1	1,065.1	15.0	171.0	1,214.7
21	2001	40.1		40.1	1,304.8	1,118.4	15.4	176.0	1,264.7
22	2002	44.1		44.1	1,371.2	1,174.3	15.9	181.0	1,327.1
23	2003	48.5		48.5	1,435.3	1,233.0	16.3	186.0	1,386.8
24	2004	53.4		53.4	1,503.4	1,295.6	16.8	191.0	1,450.0
25	2005	52.2		52.2	1,253.3	1,156.4	7.9	89.0	1,201.1
26	2006	58.1		58.1	1,316.3	1,214.2	8.1	94.0	1,258.2
27	2007	64.7		64.7	1,382.3	1,274.9	8.4	99.0	1,317.6
Total		1,845.4	1,188.7	656.7	20,473.4	17,513.1	261.3	2,704.0	18,628.0

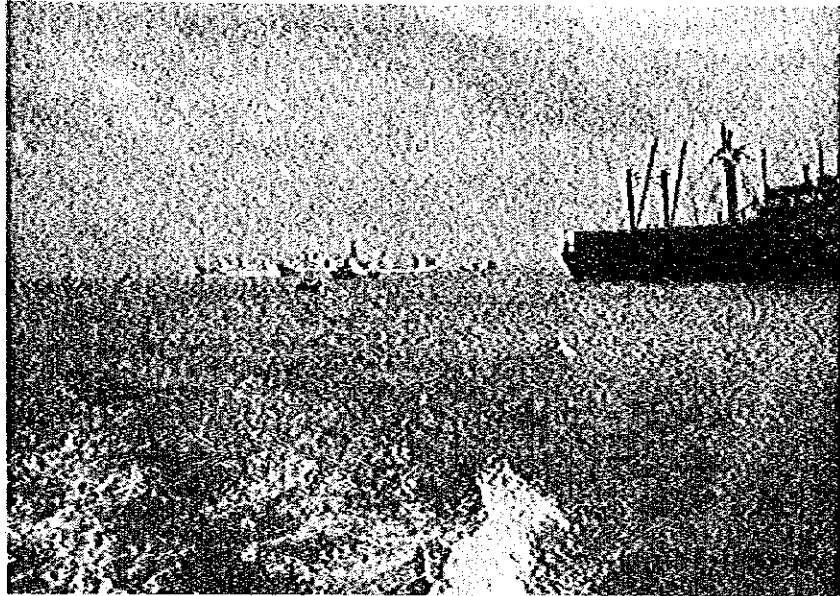
Table 11-A-29 IRR Calculation Sheet

– Whole Project, High Case Schedule-3, R-1 & Time Saving

IRR = 26.6%

(Unit: 10⁶US\$)

No.	Year	COSTS			BENEFITS				Net Profit
		Total	Con- struction & Equip- ment	Operation	Total	Increased Revenue	Time Saving		
							Canal Transit Time	Waiting Time	
1	1981	126.1	126.1						126.1
2	1982	248.3	248.3						248.3
3	1983	326.4	326.4						326.4
4	1984	297.9	297.9						297.9
5	1985	121.2	116.7	4.5	148.7	145.7	3.0		27.5
6	1986	78.9	73.4	5.5	207.2	204.0	3.2		128.3
7	1987	6.6		6.6	314.9	204.0	8.9	102.0	308.3
8	1988	8.7		8.7	320.4	204.0	9.4	107.0	311.7
9	1989	11.1		11.1	515.5	393.7	9.8	112.0	504.4
10	1990	13.5		13.5	522.0	393.7	10.3	118.0	508.5
11	1991	15.0		15.0	527.5	393.7	10.8	123.0	512.5
12	1992	16.9		16.9	709.6	570.4	11.2	128.0	692.7
13	1993	18.7		18.7	715.1	570.4	11.7	133.0	696.4
14	1994	20.6		20.6	719.4	570.4	12.0	137.0	698.8
15	1995	22.6		22.6	897.7	743.2	12.5	142.0	875.1
16	1996	24.9		24.9	962.5	802.6	12.9	147.0	937.6
17	1997	27.4		27.4	1,027.2	860.8	13.4	153.0	999.8
18	1998	30.1		30.1	1,100.2	927.3	13.9	159.0	1,070.1
19	1999	33.1		33.1	1,176.8	997.3	14.5	165.0	1,143.7
20	2000	36.4		36.4	1,251.1	1,065.1	15.0	171.0	1,214.7
21	2001	40.1		40.1	1,309.8	1,118.4	15.4	176.0	1,269.7
22	2002	44.1		44.1	1,371.2	1,174.3	15.9	181.0	1,327.1
23	2003	48.5		48.5	1,435.3	1,233.0	16.3	186.0	1,386.8
24	2004	53.4		53.4	1,503.4	1,295.6	16.8	191.0	1,450.0
25	2005	52.2		52.2	1,253.3	1,156.4	7.9	89.0	1,201.1
26	2006	58.1		58.1	1,316.3	1,214.2	8.1	94.0	1,258.2
27	2007	64.7		64.7	1,382.3	1,274.9	8.4	99.0	1,317.6
Total		1,845.5	1,188.8	656.7	20,687.4	17,513.1	261.3	2,913.0	18,841.9



XII. Sensitivity Analysis of Canal Revenue

PART XII. SENSITIVITY ANALYSIS OF CANAL REVENUE

1. Introduction

In this study, major elements affecting Canal revenue shall be selected, and changes in Canal revenue resulting from changes in such elements shall be quantitatively analysed. The following five items shall be studied:

- (1) The effect of Canal capacity on revenue and savings in shipping cost
- (2) The effect of the escalation of bunker oil price
- (3) The effect of Canal transit toll changes
- (4) The effect of the tanker market in the revenue from transiting tankers

2. The Effect of Canal Capacity on Revenue and Shipping Cost Saving

The Canal capacity is determined from the length of single lane, convey diagram, and the number of VLCCs or ULCCs in the total transit ships.

According to the results of the Canal capacity examined in Parts VI and VII, the Canal is expected to reach its saturation point in 1981 under the First Stage Project and in 1992 under Phase I of the Second Stage Project. The number of daily transit vessels in 1981 and 1992 was forecasted as shown below.

	Standard ships	Real ships
	ships/day	ships/day
1981	65.0	71.2
1992	98.3	109.6

The above figures for 1981 and 1992 are considered to be the daily average transit capacity of the Canal for the first stage development and second stage development of the canal, respectively (See Part VI).

Accordingly, the number of transit vessels reaches the daily average capacity under the First Stage Project in 1981 and then stays dormant.

Further, the daily average capacity of phase I of the second stage development of the Canal is to be reached in 1992, staying dormant thereafter. Since an increase in waiting time will increase the fixed cost and management cost per voyage, the shipping cost per ton of cargo (\$/ton) via Suez will be increased. As a result, tankers, bulk carriers and other large ships (whose difference in cost between via-Suez and via-Cape is very small) will most probably divert to via-Cape at even the slightest increase in waiting time. The potential number of transiting vessels will be about 140 in 2000, and it is quite certain that there will be chronic waits under such big demand. Consequently, the capacity after the First Stage Project will force half the ships to divert to via-Cape.

As stated above, the limited capacity will result in decreased canal revenues and increased global shipping costs. However, exact forecasts are difficult because forecasting the kind and type

of ship that would divert to Cape is dependent upon how a convoy system, SCA's toll policy, etc. would be.

Despite the difficulties, effects on the Canal revenue and on the global shipping cost are studied for the following two cases:

Case 1 : In case overflowed vessels have the same configuration in type and size of vessels each year as that obtained from the forecast after saturation is reached.

Case 2 : In case overflow begins from the largest vessel to the smaller one under the forecast proportion of vessel types, after saturation is reached.

Here, the Canal revenue each year is the same as the potential Canal revenue shown in Chapter 2 until the transit number reaches Canal capacity; after saturation, the revenue is calculated according to the limited number of transit vessels with the daily average capacity.

The relationship between Canal capacity and the transit number of vessels are shown in Fig. 12-2-1.

Within the limitation of this daily average capacity, the Canal revenue for Case 1 is shown in Fig. 12-2-2. As a matter of course, the revenue stays at a constant amount, not changing after saturation. The increase in shipping cost for ships diverted from Suez to Cape is shown in Fig. 12-2-3. After the First Stage Canal, the shipping cost will rapidly increase after 1981, at last reaching the enormous amount of 3195 million US\$ in 2000. This is equivalent to:

$$\frac{3195 \text{ mill. US\$}}{(139.6-71.2) \text{ ships/day} \times 365 \text{ days}} \div 128,000\$/\text{ship}$$

After the Second Stage Canal, the increased shipping cost will reach 1,376 million US dollars in 2000. The global shipping cost savings (benefits) in 2000 will be 1,819 million US dollars, if the Phase II Project is also performed after Phase I.

In the same manner, the Canal revenue for Case 2 under the capacity constraint of Fig. 12-2-1 is shown in Fig. 12-2-4. In this case, with the diversion to Cape of larger ships, the Canal revenue will rapidly decrease after the saturation year. This decrease will be very big, from 833.1 million US dollars in 1981 to 586 million US dollars in 1990 in the case of the First Stage Canal. The increase in shipping cost for ships diverted from Suez to Cape is shown on Fig. 12-2-5. It will reach 3,941 million US dollars in 2000, which is equivalent to:

$$\frac{3941 \text{ mill. US\$}}{(139.6-71.2) \text{ ships/day} \times 365 \text{ days}} \div 158,000\$/\text{ship}$$

After the Second Stage Canal, the increase in shipping cost will be 2,033 million US dollars in 2000. The global shipping cost savings (benefits) in 2000 will be 1,908 million US dollars, if the Phase II Project is additionally performed after Phase I.

In either case, effects of Canal capacity on global shipping costs is very large, and the importance of securing Canal capacity can be realized.

Also, the diversion of larger ships to Cape (this is well probable) will bring a drastic decrease in canal revenue. Therefore, it is also important to secure the capacity from the viewpoint of Canal revenue.

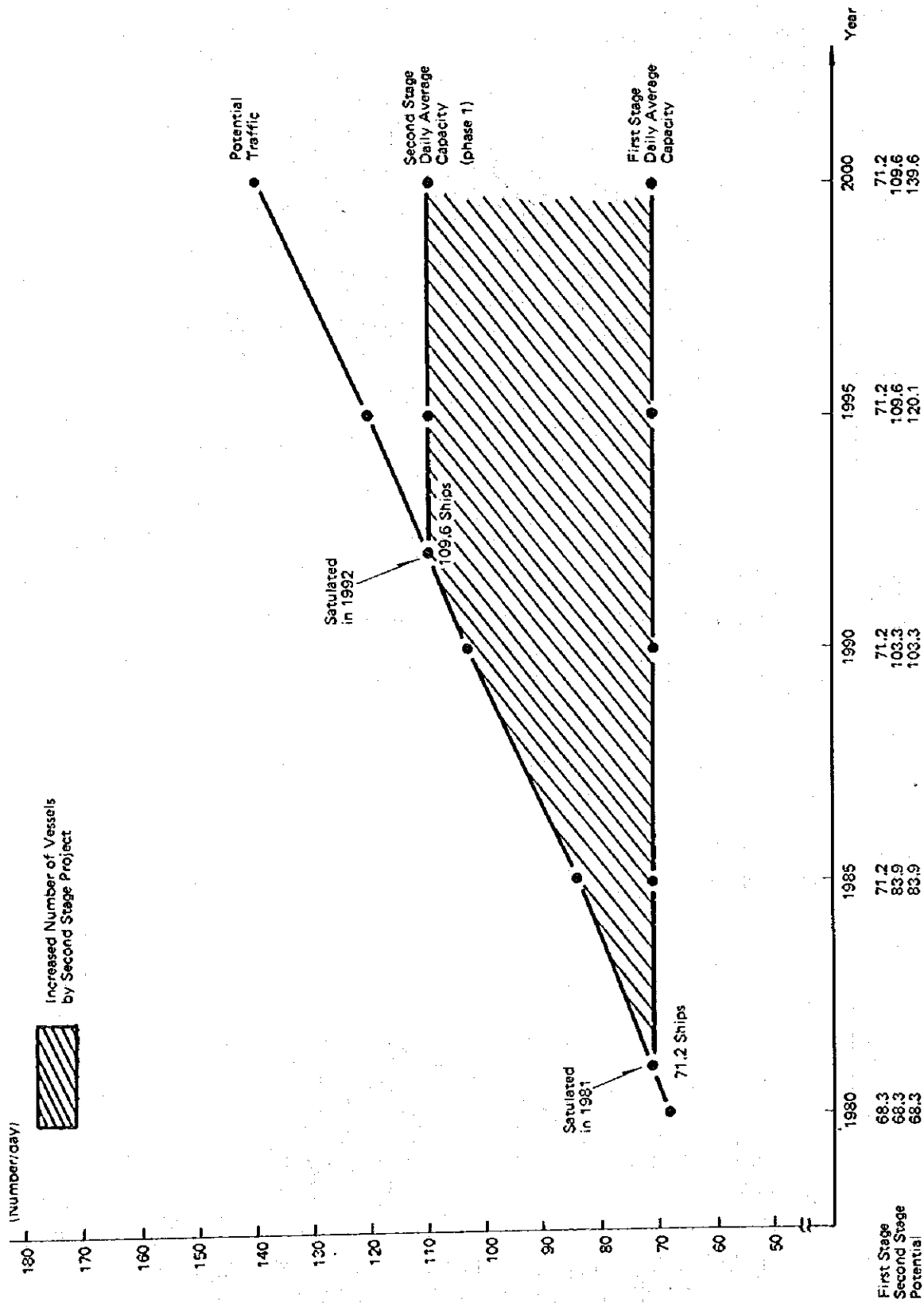


Fig. 12-2-1 Canal Capacity and Number of Vessels

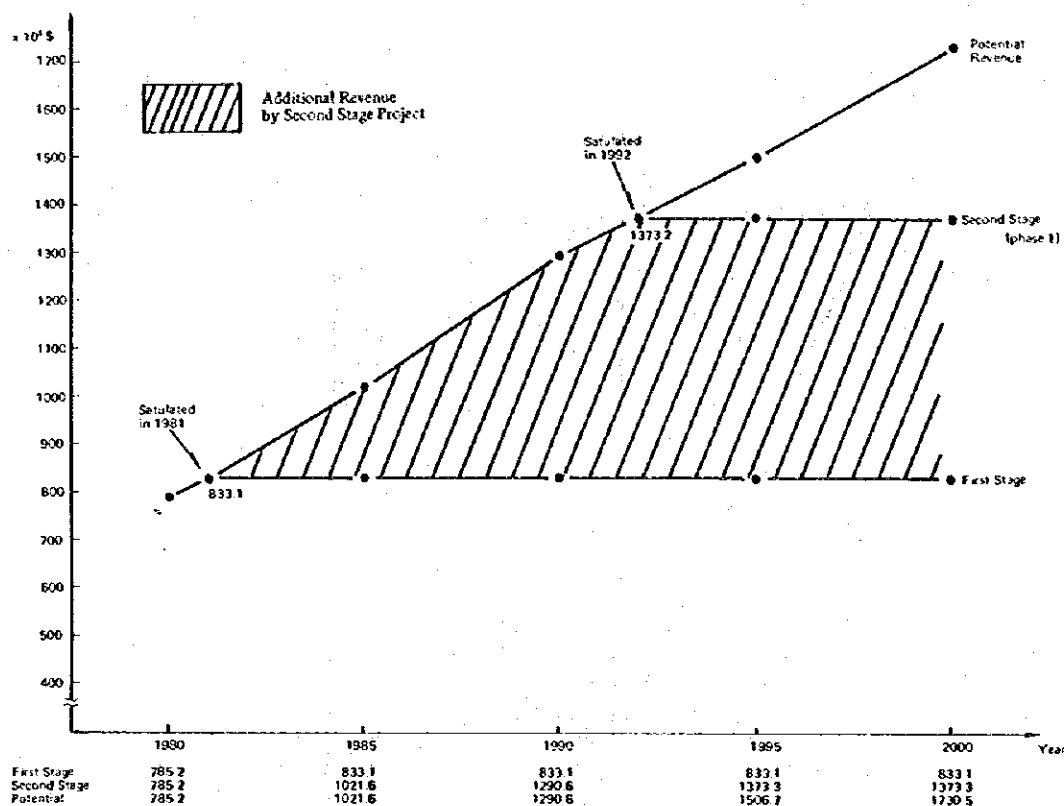


Fig. 12-2-2 Canal Capacity and Revenue
(The Case of Average Fleet diverted to the Cape)

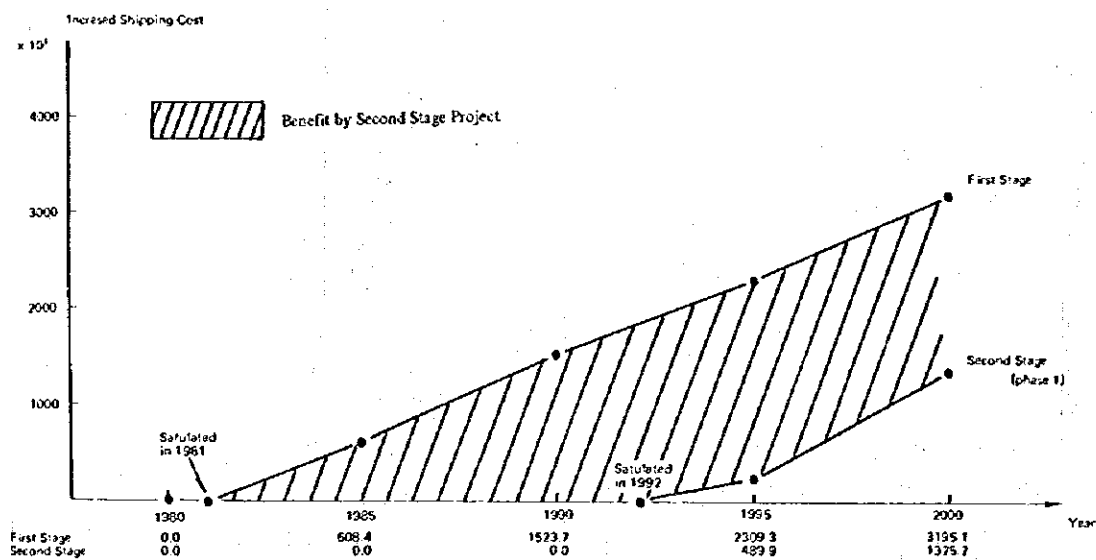


Fig. 12-2-3 Canal Capacity and Increase in Global Shipping Cost
(The Case of Average Fleet diverted to the Cape)

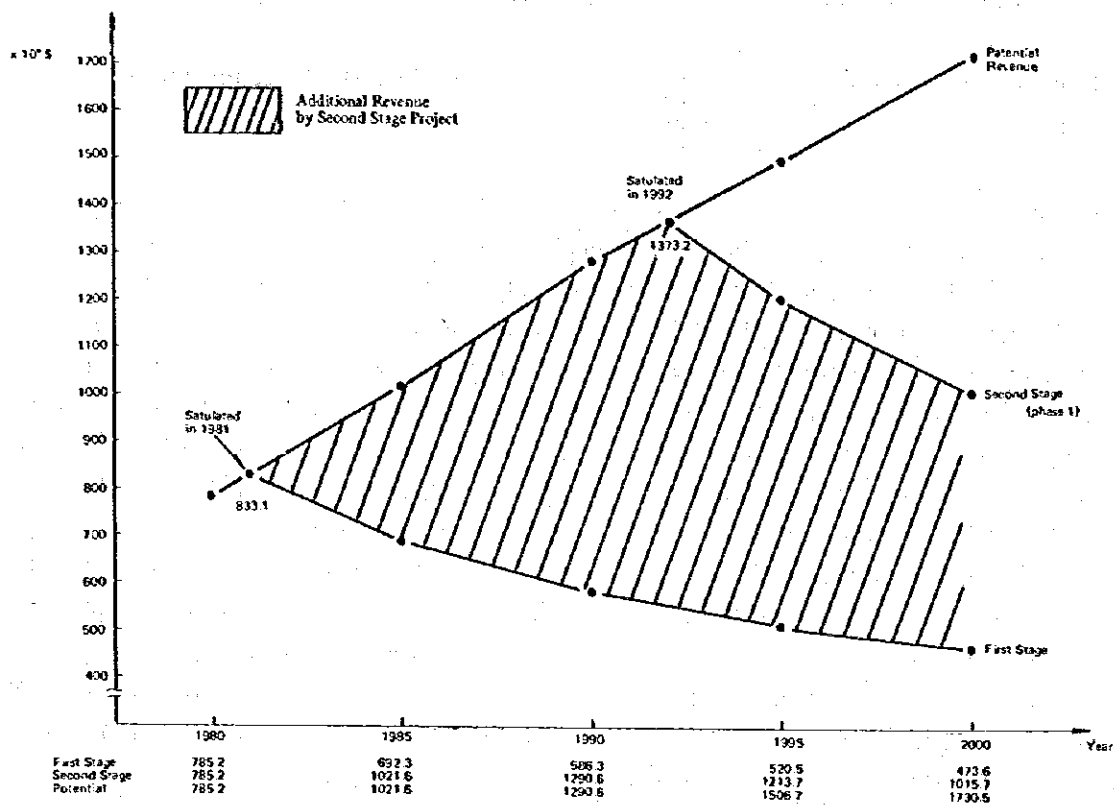


Fig. 12-2-4 Canal Capacity and Revenue
(The Case of Larger Ships diverted to the Cape)

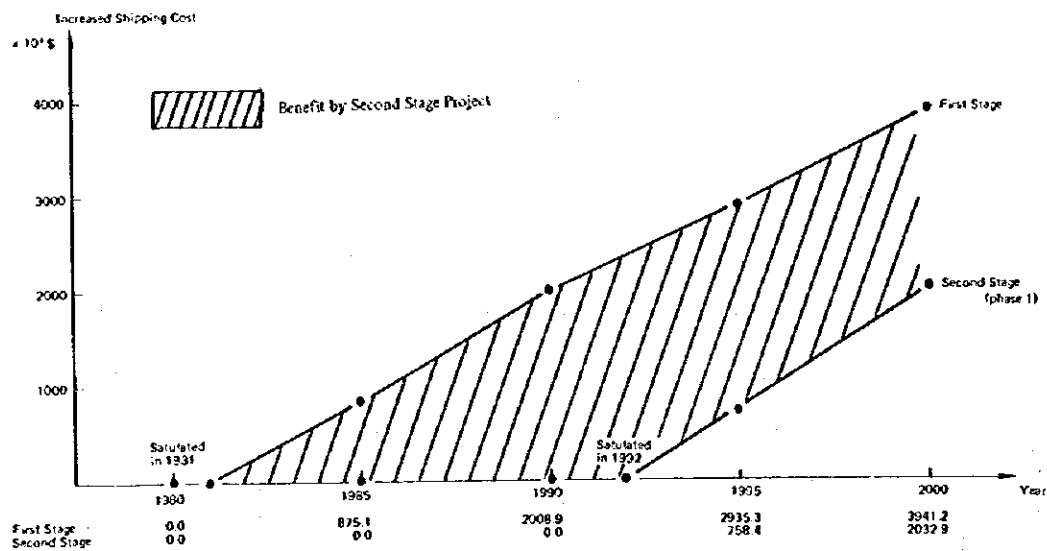


Fig. 12-2-5 Canal Capacity and Increase in Grobal Shipping Cost
(The Case of Larger Ships diverted to the Cape)

3. The Effect of the Escalation of Bunker Oil Price

In 1979, the bunker oil price suddenly increased and as of July 1979, the price of 'C' heavy oil is \$160 per ton, or two times the 1978 level.

The increase in bunker oil price not only brings about an increase in shipping cost per ton of cargo but also greatly effects the number of transit ships through Suez Canal.

A brief study will now be made on this effect from the shipping cost side. The fuel cost of a 100,000 DWT tanker on voyage is \$17,280 per day (where bunker oil price is \$160 per ton). If calculated in terms of a one-way voyage per ton, of cargo it is 0.485 \$/ton per 1,000 miles. Considering that the toll is about \$1 per ton, this is a very large amount. Where the bunker oil price is \$160/ton, in a 2,000 mile one-way voyage a tanker pays a bunker oil price roughly equivalent to the Canal toll. Increases in bunker oil price accelerate the trend to choose a shorter route to save oil price, and the Suez route becomes more advantageous than the Cape route.

Figs. 12-3-1 and 12-3-2 show the effect of bunker oil price on increases in transit ships and in canal revenue from tankers. It is understandable that during 1980 – 1990, when the tanker market condition will be bad, the increased price of bunker oil would increase the number of tankers via Suez, bringing about a considerable revenue increase. During the prosperous period after 1990, however, the additional number of ships diverted to Suez would be small and little revenue increase is expected. In other words, it is understood that increases in bunker oil price during a slack period largely contribute to the increased revenue of the SCA. From this point of view, the possibility of bunker oil price increases is a matter to which attention should be paid. However, judging from the move to save oil, etc. in developed countries after the Tokyo Summit, there is conceivably little possibility of a drastic price change as in 1979. Therefore, the effects of Bunker oil price will probably not be so important when compared with the tanker market condition.

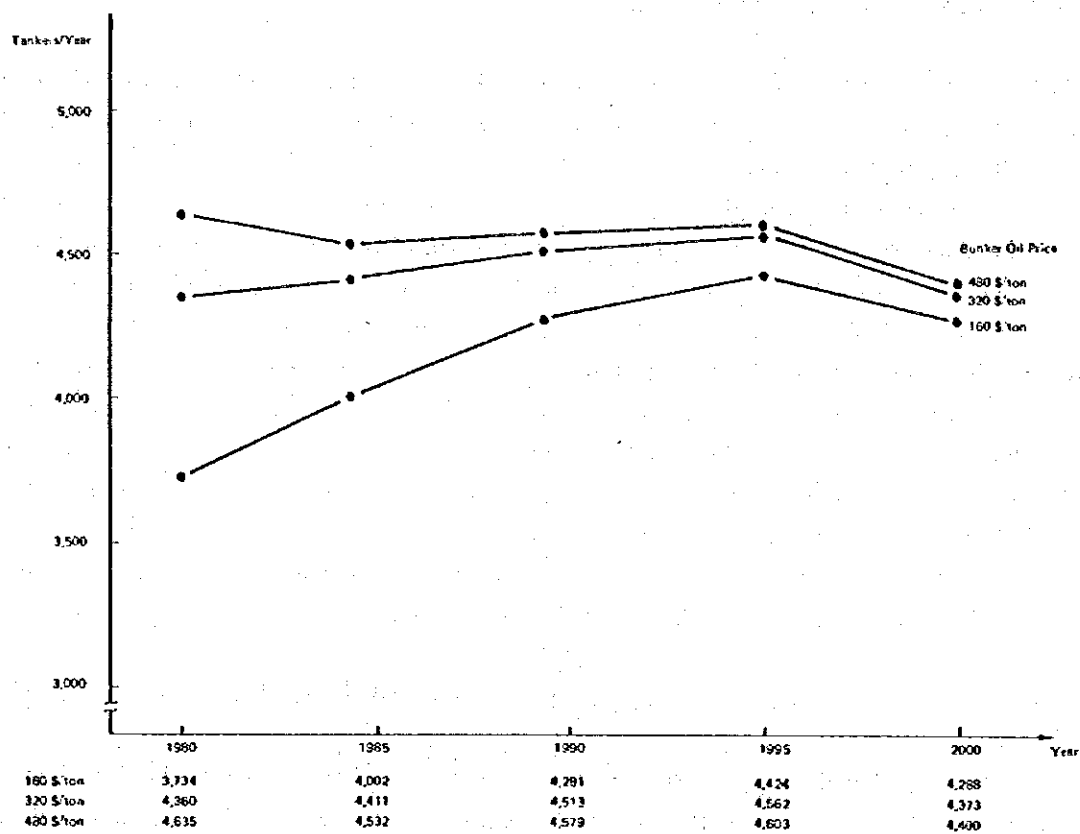


Fig. 12-3-1 Escalation of Bunker Oil Price and Number of Tankers through the Canal

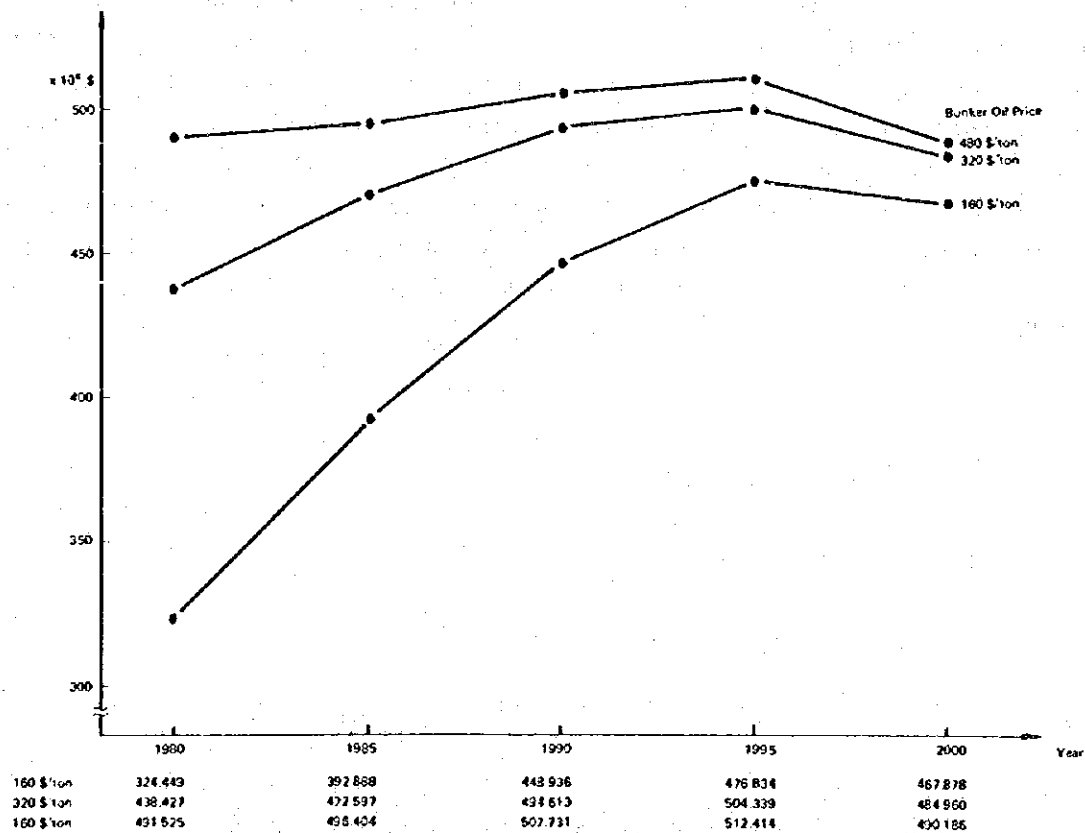


Fig. 12-3-2 Escalation of Bunker Oil Price and Revenue from Tankers

4. The Effect of Canal Transit Toll Changes

When the tanker market goes down, the C/C route becomes more competitive than the C/S route for VLCC and, therefore, fewer tankers will prefer the C/S route. The actual behavior of tankers after the reopening of the canal has verified this.

Even were the canal to expand in the future, if the tanker market is slack, the trading of VLCC and ULCC will be shifted from S/S to C/S and/or from C/S to C/C, and as a result, Canal revenue will decrease. On the other hand, if the market is prosperous, a shift from C/C to C/S and/or from C/S to S/S will take place, resulting in increased Canal revenue.

Here, a calculation was made to estimate the amount of increase or decrease in Canal revenue which can be expected, when the transit toll is raised or lowered. This calculation was made under the Canal condition of Phase I of the Second Stage Project. The results are shown in Figs. 12-4-1 and 12-4-2. Where the market is slack, the revenue from tankers increases when the transit toll is lowered. Where the market is prosperous, an increase in revenue can be expected from a raising of the transit toll. The figure also shows that, even when the market is depressed, lowered transit tolls can induce large tankers to switch from the Cape to the Canal.

5. The Effect of the Tanker Market on the Revenue from Transiting Tankers

The tanker market has the biggest effect on the number of tankers transiting the Suez Canal. Since the Suez Canal was reopened, the market has continued to be sluggish, resulting in slow steaming, and most ships are currently using the Cape route. It is wellknown that there exists a strong positive correlation between the world scale rate and the number of transit tankers.

Then, utilizing the Tanker Forecasting Model used under Part IV (Forecast of Suez Canal Traffic), effects of the market on the number of transit ships are revenue and analysed. The tanker market condition is expressed as a market parameter (α). The number of ships and revenue corresponding to changes in α are as shown in Figs. 12-4-1 and 12-4-2. The condition of the market in 1978 is somewhere around $\alpha \approx 0.3$, but is considered to go towards recovery in the future. With market recovery, the number of ships and revenue will possibly make a big increase. Incidentally, premises of the forecast other than market conditions are the same as those shown in Part IV-5.

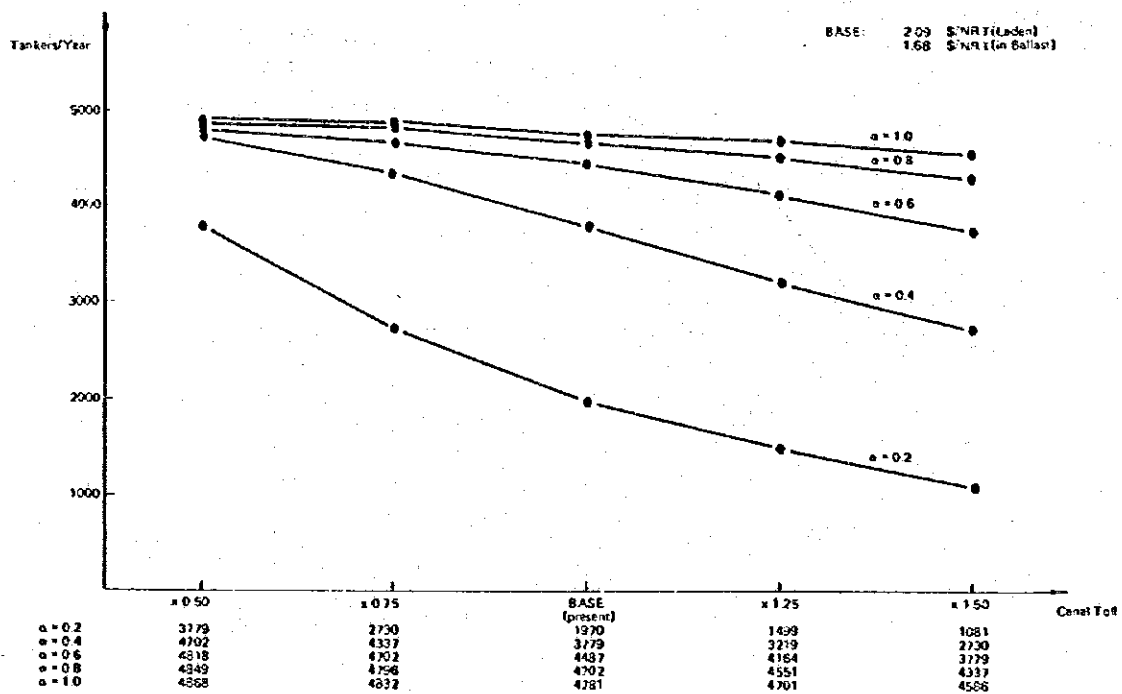


Fig. 12-4-1 Number of Transiting Tankers with Respect to Canal Toll

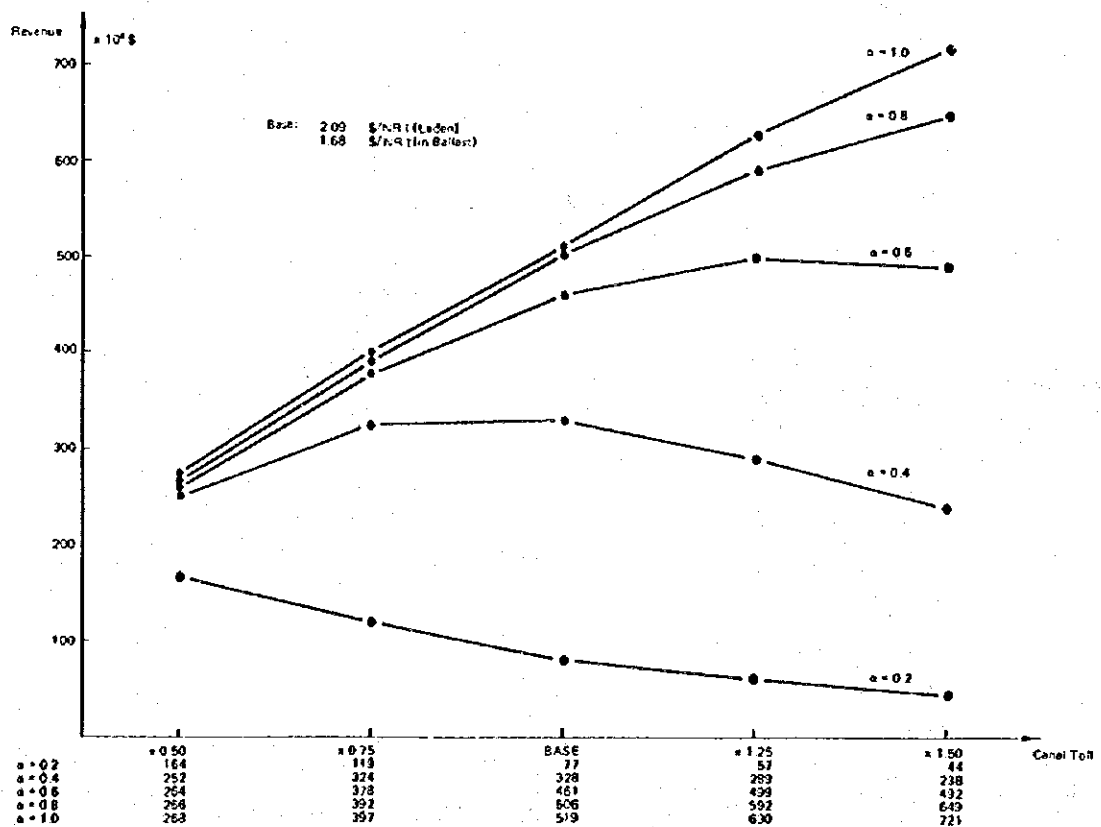


Fig. 12-4-2 Revenue from Tankers with Respect to Canal Toll

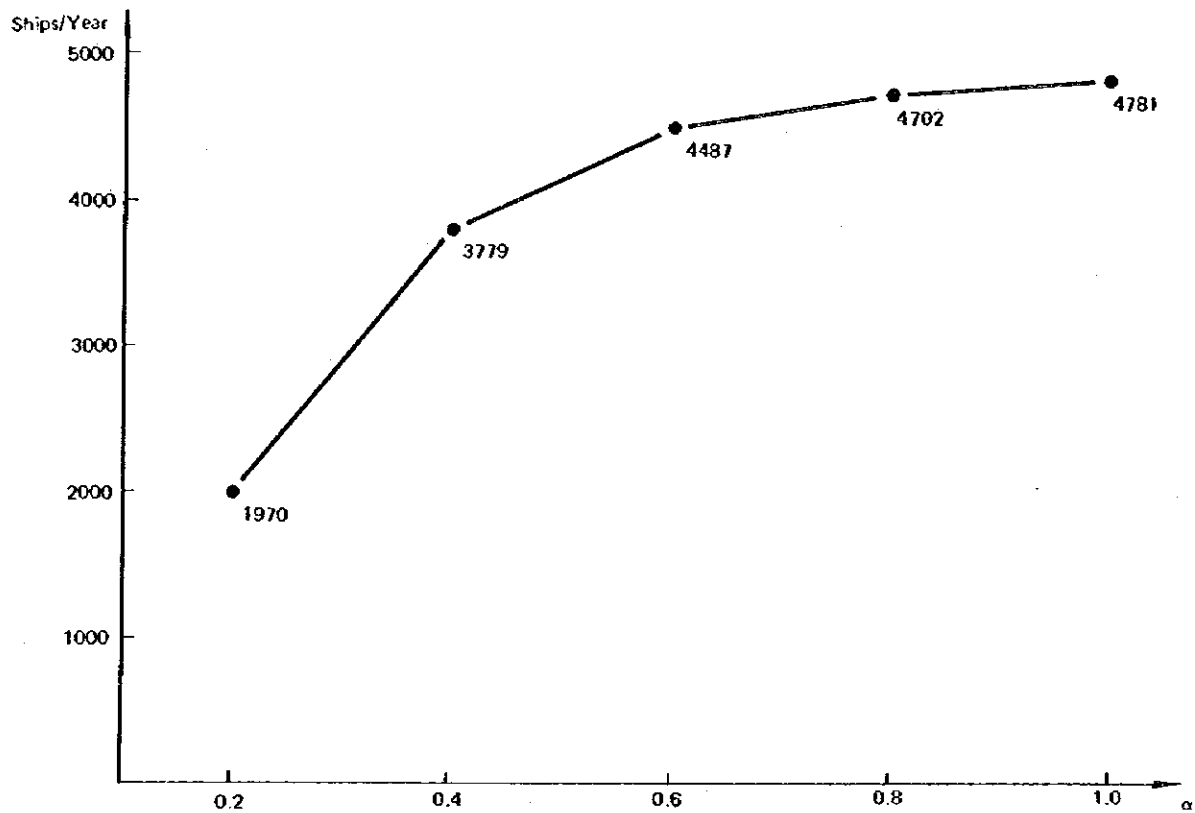


Fig. 12-5-1 Market Condition and Number of Transiting Tankers

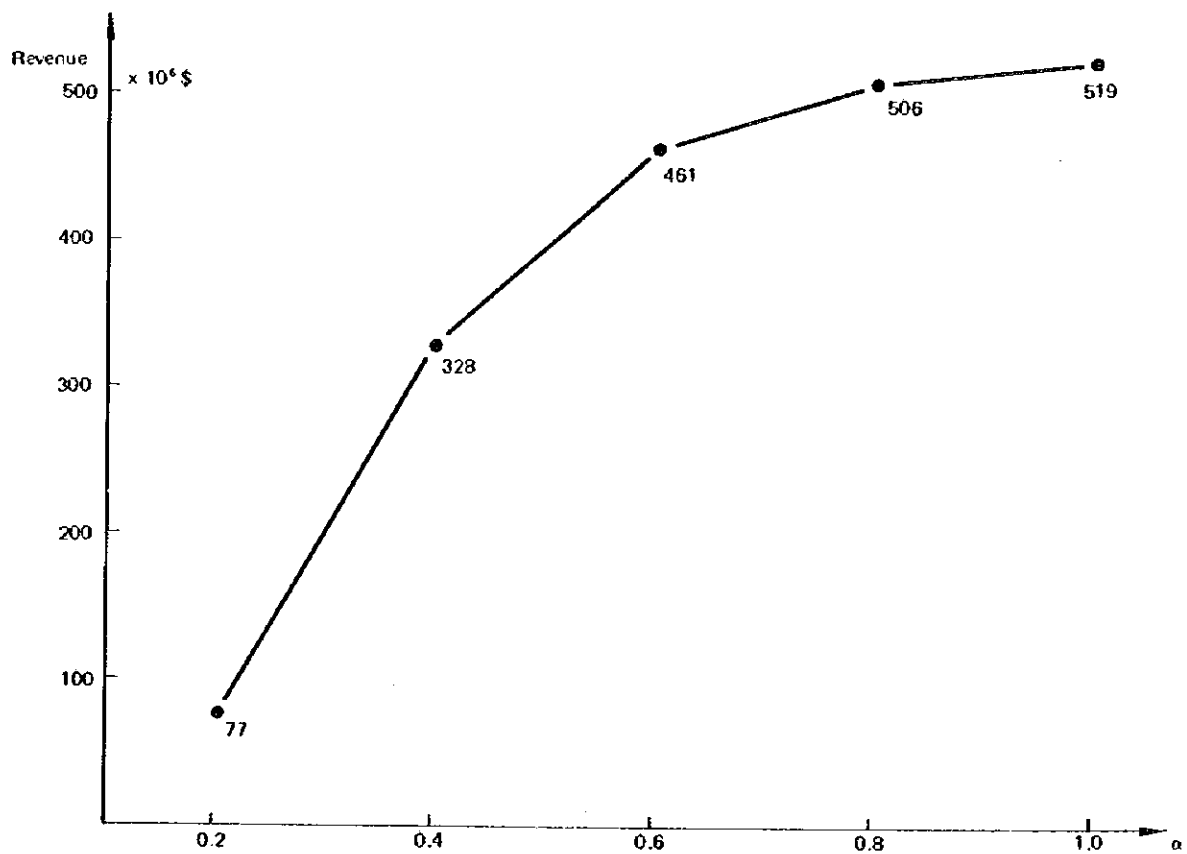
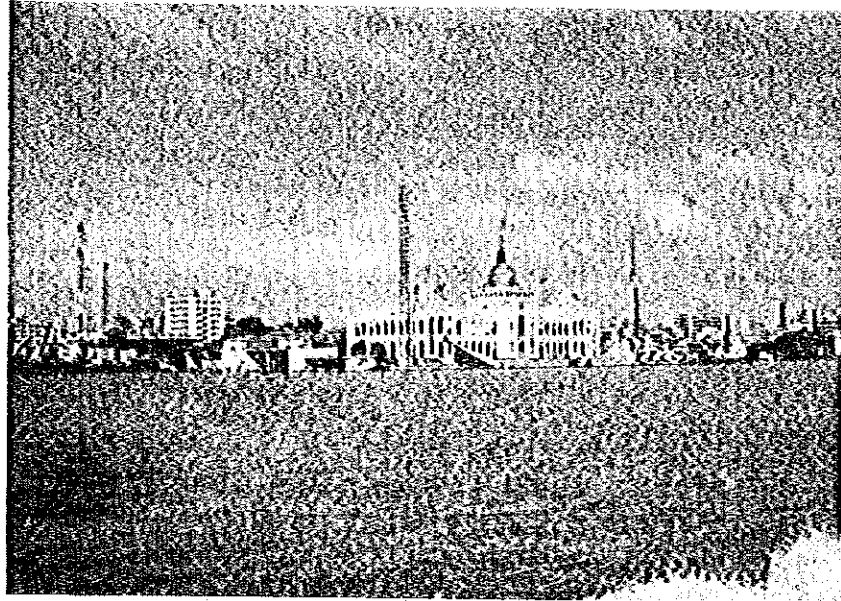


Fig. 12-5-2 Market Condition and Revenue from Tankers



XIII. Financial Analyseis

PART XIII FINANCIAL ANALYSIS

1. Project Evaluation by DCF Method

1-1 Method of Analysis

Analysis and evaluation are made by two methods to calculate the investment effect of the Phase I Project:

- (1) Analysis and evaluation of Project by DCF method
- (2) Analysis and evaluation of Project by financial ratio based upon financial statements.

Under this chapter, in case where Phase I is implemented, its investment effect is analysed and evaluated by DCF method.

Net Revenue from transit tolls with the implementation of Phase I is the "Benefit", while construction cost of Phase I is the "Cost", and Financial Rate of Return (FRR) is obtained. FRR to be obtained is computed in accordance with formula (11.1) specified in the Chapter 1 of Part XI.

1-2 Revenues from Transit Toll

On Table 13-1-1 (Income statement after Phase I Project), total Canal revenues after implementation of Phase I Project is shown. Table 13-1-2 (Income Statement after the First Stage Development Project) is the Income Statement after the completion of the First Stage Project showing the case where Phase I has not been implemented. Therefore, the increased revenue with the implementation of Phase I may be expressed by the following formula:

$$\text{Increased Revenue} = \left(\text{Canal Revenues after Completion of Phase I} \right) - \left(\text{Canal Revenues after completion of the 1st Stage Project} \right)$$

However, as already stated under the Chapter 2 of XI Economic Analysis, after the completion of the First Stage Project, the revenues will keep increasing to the capacity limit which would cause ship congestion. Therefore, a similar way is adopted for financial analysis, too. Increases in Canal revenue from 1981 to 1987 are counted as additional revenues after the completion of the First Stage Project. In 1987 the traffic capacity of the Canal will reach its physical limit. If the operating expenses are deducted from the balance between the Canal revenue after the completion of the First Stage Project and that of Phase I, the Net Revenue to be analysed is obtained. As in the case of XI Economic Analysis such three cases of Canal revenues as in (1) Base Case, (2) Low Case, and (3) High Case are analysed.

1-3 Operating Expenses

The operating expenses which correspond to the revenue increase with the implementation of Phase I is the amount which is obtained by allotting the total operating expenses after Phase I proportionately to this revenue increase. The total operating expenses consist of the (1) operation cost, (2) maintenance of equipment, (3) administration cost, and (4) others including

TABLE 13-1-1 INCOME STATEMENT AFTER PHASE I PROJECT

(10' LE)

(YEAR)		1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
OPERATING REVENUES											
PORT DIV.	SEC-1										
	1 (Transit Tolls)	285300	413160	541790	574840	574840	574840	574840	704900	737610	774110
	2 (Miscellaneous)	7100	8400	8800	9000	9000	9000	9000	10600	10600	10600
TOTAL	TOTAL	292400	421560	550590	583840	583840	583840	583840	715500	748210	784710
	1	285300	413160	541790	574840	574840	574840	574840	704900	737610	774110
	2	7100	8400	8800	9000	9000	9000	9000	10600	10600	10600
RENTAL DIV.	TOTAL	292400	421560	550590	583840	583840	583840	583840	715500	748210	784710
	OTHER DIV.	0	0	0	0	0	0	0	0	0	0
TOTAL	TOTAL	292400	421560	550590	583840	583840	583840	583840	715500	748210	784710
	OPERATING EXPENSES										
OPERATIONS	OPERATIONS	6500	6880	7470	7790	7790	7790	7790	9180	9540	9980
	MAINTENANCE	5300	5610	6090	6350	6350	6350	6350	7480	7780	8120
DEPRECIATION	DEPRECIATION	33281	41427	51228	65234	63521	60299	50299	60299	53799	57432
	ADMINISTRATION	10500	10720	11030	11710	11710	11710	11710	12450	12600	12700
OTHERS	OTHERS	0	3440	3740	3940	3940	3940	3940	4680	4680	4680
	TOTAL OPERATING EXPENSES	55581	68077	79558	83311	83311	80089	80089	84089	88399	92892
NET OPERATING INCOME (NOT)	NET OPERATING INCOME (NOT)	236819	353483	471032	488816	500529	503751	503751	631411	659811	691818
	(NOT BEFORE DEPRECIATION)	270100	394910	522260	554050	554050	554050	554050	681710	713610	749230
OTHER INCOME	OTHER INCOME	0	0	0	0	0	0	0	0	0	0
	INTEREST	1800	0	0	0	0	0	0	0	0	0
OTHERS	OTHERS	1800	0	0	0	0	0	0	0	0	0
	TOTAL	1800	0	0	0	0	0	0	0	0	0
OTHER EXPENSES	OTHER EXPENSES										
	INTEREST ON LONG-TERM LOANS	15833	27731	31716	32761	34265	36643	38495	39221	38265	35539
INTEREST ON SHORT-TERM LOANS	INTEREST ON SHORT-TERM LOANS	0	0	0	0	0	0	0	0	0	0
	OTHERS	3800	0	0	0	0	0	0	0	0	0
TOTAL	TOTAL	19633	27731	31716	32761	34265	36643	38495	39221	38265	35539
INCOME BEFORE TAX	INCOME BEFORE TAX	218986	325752	439376	456055	466264	437108	465256	592190	621546	656239
	ROYALTY	14265	20638	27089	28742	28742	28742	28742	35245	36880	38705
NET INCOME	NET INCOME	204721	305094	412227	427313	437522	438366	436514	556945	584666	617534
	LEGAL RESERVE	0	0	0	0	0	0	0	0	0	0
INDUST. AND COMMERCE TAX	INDUST. AND COMMERCE TAX	81274	121122	163654	169643	173696	174031	173296	221107	232112	245168
	SURPLUS	123447	183972	248573	257670	263826	264335	263218	335838	352554	372386

(10³ LE)

TABLE 13-1-1 INCOME STATEMENT AFTER PHASE I PROJECT

(YEAR)	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
OPERATING REVENUES										
PORT DIV.										
SEC. 1										
1 (Transit Tolls)	808270	849110	890510	916460	947580	947580	947580	947580	947580	947580
2 (Miscellaneous)	10600	10600	10600	10600	10600	10600	10600	10600	10600	10600
TOTAL	818870	859710	901110	927060	958180	958180	958180	958180	958180	958180
2	808270	849110	890510	916460	947580	947580	947580	947580	947580	947580
TOTAL	10600	10600	10600	10600	10600	10600	10600	10600	10600	10600
RENTAL DIV.	818870	859710	901110	927060	958180	958180	958180	958180	958180	958180
OTHER DIV.	0	0	0	0	0	0	0	0	0	0
TOTAL OPERATING REVENUES	818870	859710	901110	927060	958180	958180	958180	958180	958180	958180
OPERATING EXPENSES										
OPERATIONS	10380	10840	11300	11620	11620	11620	11620	11620	11620	11620
MAINTENANCE	8480	8830	9210	9470	9470	9470	9470	9470	9470	9470
DEPRECIATION	58329	58329	58329	58329	58329	58329	58329	58329	58329	58329
ADMINISTRATION	12900	13050	13230	13380	13380	13380	13380	13380	13380	13380
OTHERS	4680	4680	4680	4680	4680	4680	4680	4680	4680	4680
TOTAL OPERATING EXPENSES	97449	95729	96749	97479	97479	97479	97479	97479	97479	97479
NET OPERATING INCOME (NOI)	724121	763981	804361	829581	860701	860701	860701	860701	860701	860701
(NOT BEFORE DEPRECIATION)	782450	822310	862690	887910	919030	919030	919030	919030	919030	919030
OTHER INCOME	0	0	0	0	0	0	0	0	0	0
INTEREST	0	0	0	0	0	0	0	0	0	0
OTHERS	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0
OTHER EXPENSES										
INTEREST ON LONG-TERM LOANS	31945	28495	25334	22581	20362	18639	17174	15794	14466	13191
INTEREST ON SHORT-TERM LOANS	0	0	0	0	0	0	0	0	0	0
OTHERS	0	0	0	0	0	0	0	0	0	0
TOTAL	31945	28495	25334	22581	20362	18639	17174	15794	14466	13191
INCOME BEFORE TAX	692176	735486	779027	807000	840339	842062	843527	844907	846235	847510
ROYALTY	40413	42455	44525	45823	47379	47379	47379	47379	47379	47379
NET INCOME	651763	693031	734502	761177	792960	794683	796148	797528	798856	800131
LEGAL RESERVE	0	0	0	0	0	0	0	0	0	0
INDUST. AND COMMERCE TAX	258749	275133	291597	302187	312805	315269	316070	316878	317163	317652
SURPLUS	393014	417898	442905	458990	478155	479194	480078	480910	481711	482479

TABLE 13-1-1 INCOME STATEMENT AFTER PHASE I PROJECT (10³ LE)

	(YEAR)			
	1998	1999	2000	2001
OPERATING REVENUES				
PORT DIV.				
SEC. 1				
1 (Transist Tolls)	947580	947580	947580	947580
2 (Miscellaneous)	10600	10600	10600	10600
TOTAL	958180	958180	958180	958180
1	947580	947580	947580	947580
2	10600	10600	10600	10600
TOTAL	958180	958180	958180	958180
RENTAL DIV.	0	0	0	0
OTHER DIV.	0	0	0	0
TOTAL OPERATING REVENUES	958180	958180	958180	958180
OPERATING EXPENSES				
OPERATIONS	11620	11620	11620	11620
MAINTENANCE	9470	9470	9470	9470
DEPRECIATION	58329	58329	58329	58329
ADMINISTRATION	13380	13380	13380	13380
OTHERS	4680	4680	4680	4680
TOTAL OPERATING EXPENSES	97479	97479	97479	97479
NET OPERATING INCOME (NOI)	860701	860701	860701	860701
(NOI BEFORE DEPRECIATION)	919030	919030	919030	919030
OTHER INCOME				
INTEREST	0	0	0	0
OTHERS	0	0	0	0
TOTAL	0	0	0	0
OTHER EXPENSES				
INTEREST ON LONG-TERM LOANS	11926	10669	9414	8166
INTEREST ON SHORT-TERM LOANS	0	0	0	0
OTHERS	0	0	0	0
TOTAL	11926	10669	9414	8166
INCOME BEFORE TAX	848775	850032	851287	852301
ROYALTY	47379	47379	47379	47379
NET INCOME	801396	802653	803908	804922
LEGAL RESERVE	0	0	0	0
INDUST. AND COMMERCE. TAX	318154	318653	319151	319554
SURPLUS	483242	484000	484757	485368

TABLE 13-1-2 INCOME STATEMENT AFTER THE FIRST STAGE DEVELOPMENT PROJECT (10³ LE)

		(YEAR)									
		1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
OPERATING REVENUES											
PORT DIV.											
SEC. 1											
1	(Transit Tolls)	285300	413160	541790	574640	574840	574840	574840	574840	574840	574840
2	(Miscellaneous)	7100	3400	8500	9000	9000	9000	9000	9000	9000	9000
TOTAL		292400	421560	550590	583840	583840	583840	583840	583840	583840	583840
TOTAL											
1		285300	413160	541790	574640	574840	574840	574840	574840	574840	574840
2		7100	3400	8500	9000	9000	9000	9000	9000	9000	9000
TOTAL		292400	421560	550590	583840	583840	583840	583840	583840	583840	583840
RENTAL DIV.											
OTHER DIV.											
TOTAL OPERATING REVENUES		292400	421560	550590	583840	583840	583840	583840	583840	583840	583840
OPERATING EXPENSES											
OPERATIONS											
MAINTENANCE		6500	6880	7470	7790	7790	7790	7790	7790	7790	7790
DEPRECIATION		5300	5610	6090	6350	6350	6350	6350	6350	6350	6350
ADMINISTRATION		3281	41427	51228	65234	53521	50299	50299	50299	50299	50223
OTHERS		10500	10720	11030	11710	11710	11710	11710	11710	11710	11710
TOTAL OPERATING EXPENSES		55521	63077	79558	95024	83311	80089	80089	80089	80433	80013
NET OPERATING INCOME (NOL)		236879	353483	471032	488816	503751	503751	503751	503751	503407	503827
(NOL BEFORE DEPRECIATION)		270100	394910	522260	534050	534050	534050	534050	534050	534050	534050
OTHER INCOME											
INTEREST											
OTHERS		1600	0	0	0	0	0	0	0	0	0
TOTAL		1600	0	0	0	0	0	0	0	0	0
OTHER EXPENSES											
INTEREST ON LONG-TERM LOANS		15833	27731	31716	31436	29089	26611	23861	21199	19125	17586
INTEREST ON SHORT-TERM LOANS		7800	0	0	0	0	0	0	0	0	0
OTHERS		1600	0	0	0	0	0	0	0	0	0
TOTAL		19633	27731	31716	31436	29089	26611	23861	21199	19125	17586
INCOME BEFORE TAX											
ROYALTY		218986	325752	439316	457380	471440	477140	470890	482552	484282	486241
NET INCOME		14265	20658	27089	28742	28742	28742	28742	28742	28742	28742
LEGAL RESERVE		204721	305994	412227	428638	422698	448398	451148	453810	455540	457699
INDUST. AND COMMERCE. TAX		81274	121122	163634	170769	175751	178014	179105	180162	180849	181827
SUPPLUS		123447	183972	248573	258469	266947	270384	272043	273648	274691	275872

TABLE 13-1-2 INCOME STATEMENT AFTER THE FIRST STAGE DEVELOPMENT PROJECT (10³ LE)

(YEAR)		1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
OPERATING REVENUES											
PORT DIV.											
SEC. 1											
1 (Transit Tolls)		574840	574840	574840	574840	574840	574840	574840	574840	574840	574840
2 (Miscellaneous)		9000	9000	9000	9000	9000	9000	9000	9000	9000	9000
TOTAL		583840	583840	583840	583840	583840	583840	583840	583840	583840	583840
1		574840	574840	574840	574840	574840	574840	574840	574840	574840	574840
2		9000	9000	9000	9000	9000	9000	9000	9000	9000	9000
TOTAL		583840	583840	583840	583840	583840	583840	583840	583840	583840	583840
RENTAL DIV.		0	0	0	0	0	0	0	0	0	0
OTHER DIV.		0	0	0	0	0	0	0	0	0	0
TOTAL OPERATING REVENUES		583840	583840	583840	583840	583840	583840	583840	583840	583840	583840
OPERATING EXPENSES											
OPERATIONS		7790	7790	7790	7790	7790	7790	7790	7790	7790	7790
MAINTENANCE		6350	6350	6350	6350	6350	6350	6350	6350	6350	6350
DEPRECIATION		50223	50223	50223	50223	50223	50223	50223	50223	50223	50223
ADMINISTRATION		11710	11710	11710	11710	11710	11710	11710	11710	11710	11710
OTHERS		3940	3940	3940	3940	3940	3940	3940	3940	3940	3940
TOTAL OPERATING EXPENSES		80013	80013	80013	80013	80013	80013	80013	80013	80013	80013
NET OPERATING INCOME (MOL)		503827	503827	503827	503827	503827	503827	503827	503827	503827	503827
(NOT BEFORE DEPRECIATION)		554050	554050	554050	554050	554050	554050	554050	554050	554050	554050
OTHER INCOME		0	0	0	0	0	0	0	0	0	0
INTEREST		0	0	0	0	0	0	0	0	0	0
OTHERS		0	0	0	0	0	0	0	0	0	0
TOTAL		0	0	0	0	0	0	0	0	0	0
OTHER EXPENSES											
INTEREST ON LONG-TERM LOANS		16356	15224	14085	12943	11836	10826	9892	8988	8138	7338
INTEREST ON SHORT-TERM LOANS		0	0	0	0	0	0	0	0	0	0
OTHERS		0	0	0	0	0	0	0	0	0	0
TOTAL		16356	15224	14085	12943	11836	10826	9892	8988	8138	7338
INCOME BEFORE TAX											
ROYALTY		28742	28742	28742	28742	28742	28742	28742	28742	28742	28742
NET INCOME		458729	459861	461000	462142	463269	464259	465193	466097	466947	467747
LEGAL RESERVE		0	0	0	0	0	0	0	0	0	0
INDUST. AND COMMERCE. TAX		182115	182564	183017	183470	183909	184310	184681	185040	185377	185695
SURPLUS		276614	277297	277983	278672	279340	279949	280512	281057	281570	282052

TABLE 13-1-2 INCOME STATEMENT AFTER THE FIRST STAGE
DEVELOPMENT PROJECT (10³ LE)

		(YEAR)			
		1998	1999	2000	2001
OPERATING REVENUES					
PORT DIV.					
SEC.1					
1 (Transist Tolls)		574240	574340	574840	574940
2 (Miscellaneous)		9000	9000	9000	9000
TOTAL		583240	583340	583840	583940
TOTAL		574240	574340	574840	574940
2		9000	9000	9000	9000
TOTAL		583240	583340	583840	583940
RENTAL DIV.		0	0	0	0
OTHER DIV.		0	0	0	0
TOTAL OPERATING REVENUES		583240	583340	583840	583940
OPERATING EXPENSES					
OPERATIONS		7790	7790	7790	7790
MAINTENANCE		6350	6350	6350	6350
DEPRECIATION		50223	50223	50223	50204
ADMINISTRATION		11710	11710	11710	11710
OTHERS		3940	3940	3940	3940
TOTAL OPERATING EXPENSES		30013	30013	30013	30013
NET OPERATING INCOME(ROI)		503827	503827	503827	503827
(NOT BEFORE DEPRECIATION)		554050	554050	554050	554050
OTHER INCOME					
INTEREST		0	0	0	0
OTHERS		0	0	0	0
TOTAL		0	0	0	0
OTHER EXPENSES					
INTEREST ON LONG-TERM LOANS		6551	5769	4991	4218
INTEREST ON SHORT-TERM LOANS		0	0	0	0
OTHERS		0	0	0	0
TOTAL		6551	5769	4991	4218
INCOME BEFORE TAX		497276	498058	498836	499375
ROYALTY		26742	26742	26742	26742
NET INCOME		468534	469316	470094	470633
LEGAL RESERVE		0	0	0	0
INDUST. AND COMMERCE. TAX		186007	186318	186627	186841
SURPLUS		282527	282998	283467	283792
TOTAL		282527	282998	283467	283792

maintenance cost of dredging and revetment which are shown in Table 13-1-1. In other words, these are direct operating expenses, and the payable interests, depreciation and taxes are not included.

Computation of individual items of the operating expenses is described under 2-2.

1-4 Construction Cost

The construction cost for Phase I totals LE 649,769,000 (US\$941.7 mill.), whose breakdown is shown in Table 13-1-3 (Construction Cost for Phase I Project Plan). The construction cost to be analysed is a total of the cost computed on the price as of 1979, the contingency (10% annually), and the price contingency (grand average for all years 32.8%). In the financial analysis, a nominal value at the time of future investment is necessarily used for the future investment amount. The risk in the capital investment will increase as the investment timing is put towards the future.

Therefore, such a share for the risk is included as a price contingency due to inflation into the future investment amount. On the other hand, in case where the bidding price some years ahead is presumed, it is practical that the price contingency due to inflation, etc. is taken into account for the construction cost.

Note: Calculation method of Price Contingency

Composition rates of elements causing cost increase are established by kind of work as follows: Such elements are broken down into personnel cost, fuel cost, iron-steel products, each of which is the representative of the elements. Annual average rate of increase of such representatives is applied.

Annual average increased rate of bank revetment cost : $0.75 \times W1 + 0.25 \times Sf = 10\%$

Annual average increased rate of dry excavation cost : $0.10 \times W1 + 0.60 \times Sf + 0.30 \times P1 = 6\%$

Annual average increased rate of dredging work cost (local portion) : $0.10 + 0.50 \times W1 + 0.40 \times P1 = 6\%$

Annual average increased rate of dredging work cost (foreign portion) : $0.20 + 0.20 \times Wf + 0.60 \times Sf = 7\%$

Annual average growth rate of prices for personnel cost, fuel cost, and iron-steel products are as follows:

- (1) W1 : 11% = Annual Average Growth Rate (AAGR) of Wage in Egypt
Source : Central Agency for Public Mobilization and Statistics "Economic Bulletin 1978"
- (2) Wf : 8.9% = AAGR of Wage in Japan
Source: The Bank of Japan "Economic Statistics Annual 1978"
- (3) Sf : 8.1% = AAGR of Steel Products in Japan
Source : The Bank of Japan "Price Indexes Statistics Annual 1978"

(4) P1 : 1% = AAGR of Petroleum & Fuel in Egypt

Source : Central Agency for Public Mobilization and Statistics "Economic Bulletin 1978"

1-4-1 Construction Cost and Project Life

The construction cost to be analysed is broken down into the following 6 cases:

- 1) Construction cost for Phase I Project
- 2) 110% of construction cost for Phase I Project
- 3) 120% of construction cost for Phase I Project
- 4) 130% of construction cost for Phase I Project
- 5) Construction cost for Schedule 2 in case of earlier completion of work

The Project Life is 16 years when FRR is computed, provided the above construction cost is the Cost, and the revenues referred to under 1-2 in the preceeding section (Net Revenues from Transit Toll) is the Benefit. Use of the relatively short project life cycle is for the sake of expecting a conservative evaluation. Even if a project life of 20 years is used, the difference in FRRs is small. The reason for using a project life of 16 years is:

A slightly over 85% of the amount invested for Phase I is assumed to be financed by loan (the average value of the loan condition for the First Stage Project is used, see 2-4-3). Since the loan periods of this loan (local loan and foreign loan) are 16 years on an average, and the amount of the loan share is much of the amount invested, the project life is established as 16 years.

1-5 Evaluation of Phase I Project by FRR

In view of the above, FRRs computed by case are shown below:

Table 13-1-4 Comparison of FRR

Case No.	CASE	FRR	COST	BENEFIT
<u>Base Case</u>			Phase I Standard (LE 649.8 Mill.)	R-1 (LE 2,369.6 Mill.)
Case-1	Standard	17.3	Phase I Standard	R-1
Case-2	Cost up 10%	15.8	Cost up 10% to Phase I Standard	R-1
Case-3	Cost up 20%	14.3	Cost up 20% to Phase-I Standard	R-1
Case-4	Cost up 30%	13.2	Cost up 30% to Phase I Standard	R-1
Case-5	Base Case	20.6	Phase I Standard	R-2
Case-6	Low Case	9.8	Phase I Standard	R-1, Low Case
Case-7	High Case	23.4	Phase I Standard	R-1, High Case
<u>Earlier Completion of Work</u>			Schedule-2 (LE 631.7 Mill.)	
Case-8	Schedule-2	16.3	Schedule-2	R-1
Case-9	High Case	23.0	Schedule-2	R-1, High Case

1-5-1 Evaluation

Evaluation is made comparing the FRR for Case 1 shown in Table 13-1-4, which is a standard, with FRRs for other cases.

(1) Evaluation in the case of a standard work period

It can be said firstly that FRRs show favorably high values for all cases. Even in the Low Case (Case 6) where the trade flow is assumed low, the rate of investment benefit is about 10%. Even in cases where investment cost for Phase I is increased by 10%, 20% and 30%, decrease is slight at about 1% per 10% increase in investment. If compared with the High Case (Case 7), there is about 6% difference. In other words, it is shown that, in case where the trade flow have moved forward in the high case, there is a chance of a 6% increase in the investment profit rate.

(2) Comparison in the case of earlier completion of work

It can be said that, in case where Case 1 is compared with Case 8 (a case where Case 1's work is completed earlier), there hardly exists any substantial difference. The same could be said for Case 7 and 9. According to the demand forecast, it is most probable that the traffic demand will go along at a high level in the 1980s. Therefore, in case where the trade flow goes along on high case, an increase in investment profit rate (FRR) can be easily brought by Phase I (Case 8) whose work schedule is completed earlier. Furthermore, because of the lowered application rate of the price contingency as a result of earlier completion of work performance, the investment amount for Phase I is saved by about LE 16 million (a decrease of 2.5%) when compared with the standard work period.

(3) Conclusion of evaluation

As stated above, from the view point of investment profit rate by FRR, an investment for the Phase I Project is favorable.

In addition, an advantage of the shortened work period for Phase I (Case 8) is noteworthy in a fact that there is much possibility in saving some investment and in increasing the profit rate. And it goes without saying that the shortened work period (Case 8) is also beneficial to clients who are free from waiting.

2. Project Evaluation by Financial Ratios

2-1 Method of Analysis

The investment effect for Phase I is analysed and evaluated using the financial ratios. The financial ratio is evaluated by dividing the investment effect into two cases of (1) where Phase I is implemented, and (2) where Phase I is not implemented (i.e., financial ratio after completion of the 1st Stage Project).

The financial ratio can be obtained by preparing various financial statements based upon the principles of business accounting. In order to follow such principles, the followings are premised in this analysis:

- (1) The self-sustaining system based upon the cost principle is adopted, and the surplus money after tax for each year is retained as internal reserve.
- (2) The asset stated on the Balance Sheet provided by SCA is used.

The financial analysis is made by the judgement of the financial soundness through grasping the financial situation of the business as a whole. Therefore, the situation of revenue-expenditure, assets, etc. for only Phase I are not analysed, rather, the financial content of the whole SCA, including investment for Phase I, is analysed. Further, the Statement of Source & Application of Funds of SCA, in the case where investment for Phase I is realized, is prepared to judge the management situation of fund flow.

2-1-1 Financial ratios to be analysed

Financial ratios to be analysed are the following five ratios:

These ratios are selected in consideration of ratios which are principally used in the financial analysis of project feasibility studies by the World Bank and other international financing agencies. It should be remembered that this ratio computation method is not a uniform one, but there are another methods of computation.

Financial Ratio used for analysis

The following five financial ratios are to be used for analysis.

$$(1) \text{ Working Ratio} = \frac{(A) - \text{Depreciation Cost}}{(B)}$$

(Note: To ascertain the income position)

$$(2) \text{ Operating Ratio} = \frac{(A)}{(B)}$$

(Note: To ascertain the income position)

$$(3) \text{ Return on Net Fixed Assets} = \frac{(C)}{(D)}$$

(Note: To ascertain the earning capacity)

$$(4) \text{ Interest Earned Ratio (Time Interest covered)} = \frac{(C)}{(E)}$$

(Note: To ascertain the interest payment capacity)

$$(5) \text{ Debt Service Coverage (Time Debt Service Covered)} = \frac{(C)+\text{Depreciation Cost}}{(E)} \text{ or } = \frac{(C-\text{Tax})+\text{Depreciation Cost}}{(F)}$$

(Note: To ascertain repayment capacity of borrowings)

Remarks (items of denominator and numerator)

(A) Total Operating Expenses

= Total costs – Non-operating expenses – Extraordinary expenses

(B) Total Operating Revenues

= Total revenues – Non-operating revenues – Extraordinary revenues

(C) Net Operating Income

= Operating revenues – Operating expenses

(D) Balance of Fixed Assets

= Fixed Assets excluding Accumulated Depreciation

(E) Interest on Long-term Loans or Interest Payable

(F) Debt Service or Principal and Interest of Borrowings

It goes without saying that full studies are being made on the following points as prerequisite for the computation of such ratios:

(1) If the assets are properly evaluated, using the correct depreciation cost, and other accounting dispositions are properly made;

(2) If investments for equipment are made on the basis of a long-term plan.

(3) If there is a system where expenses could be elastically defrayed contingencies.

2-1-2 Revenues and Expenses

The revenue is broken down into the revenue after the implementation of Phase I and after only the First Stage Project (the case where Phase I is not implemented).

The expenditures for each of them are broken down into the following 4 items.

(1) Operating expenses (factor of inflation not considered)

(2) Depreciation

(3) Payable interest on long term loans

(4) Tax (Royalty: 5% of Transit Toll, Industrial & Commercial Tax: 39.7% of Net Profit)

2-1-3 Fixed assets and long-term loan

The amount of fixed assets is the balance amount on the Balance Sheet as of the end of 1978, plus the estimated amount of assets for the First Stage Project acquired in 1979 and 1980

and plus the amount of assets acquired for Phase I. The long-term loan is estimated and added up in a similar manner, provided that an average value of the loan balance for the First Stage Work is applicable to the loan conditions for Phase I. In other words, the same loan conditions is applicable to the Second Stage Project. The foreign loan balance as of the end of 1978 is re-evaluated and reappraised in terms of the new exchange rate against US dollar (1\$ = 0.69 LE). Consequently, the fixed asset as of the end of 1978 is also reevaluated corresponding to above portion only for the loan balance as of the end of 1978.

2-2 Operating Expenses

Operating expenses are estimated and computed after being broken down into the four items listed below:

2-2-1 Operation cost

This is the total amount for items appearing on the SCA's Income Statement as the Canal & Port Said Harbour Working Expenses and as the Canal & Port Said Harbour Maintenance. Since this is a management operation cost of non-fixed expense nature, it is computed by projecting the actual amount for 1978 in proportion to the growth in number of transit ships.

2-2-2 Maintenance of equipment

This is for the maintenance of equipment and is computed similarly by projecting the actual amount for 1978 in proportion to the growth in number of transit ships.

2-2-3 Administration cost

This is the total amount for items appearing on the SCA's Income Statement as the Administration General Expenses and the Public Service Activities (the personnel expenses, the welfare expenses, and headquarter's management cost with an increased number of employees). In addition, staff and workers for a dredger to be newly bought, tugboat staff, pilot, workers, etc. needed for the increased number of transit ships, and, increased management staff in Headquarters are computed one by one and added to get this cost. In this case, costs per employee or worker, including personnel cost and welfare cost, are as follows taking the actual cost for 1978 into account:

Personnel cost employee	:	2,000 LE/head/year
Personnel cost worker	:	700 LE/head/year
General administration cost	:	700 LE/head/year

2-2-4 Maintenance cost of dredging and revetment

Annual maintenance dredging cost is integrally computed in considering the siltation in channels within Port Said Port and in the 160 KM transit channel including the new channel. In the same way annual maintenance cost of revetment, including Phase I, is calculated.

2-3 Fixed Asset of SCA

An evaluation of SCA's asset is based upon the asset value stated in the Balance Sheet as of the end of 1978. An estimate of asset to be acquired in and after 1978 with the First Stage Project is computed, considering the Suez Canal Development Progress Reports. As to the assets acquired during Phase I, the construction cost on Table 13-1-3 is used.

2-3-1 Fixed asset by the First Stage Development Project

The work volume of the First Stage Project is shown in LE on Table 13-2-1 (Work Progress for the First Stage Development Project). There, an exchange rate between LE and US dollar is $1\$ = 0.40$ LE, and the rates after devaluations since 1979 are unapplicable.

Table 13-2-2 (Fixed Assets Statement) shows investment amounts for 1978, 1979 and 1980 which have been estimated, based upon the Balance Sheets for 1976, 1977 and 1978. In this table, asset values for 1978 or earlier are shown in the old rate. As a result of devaluation in January 1979, the amount in LE of SCA's foreign loan increase. Therefore, an increased amount in LE which corresponds to the reevaluated loan balance of foreign loan as of the end of 1978 is added to the fixed asset value as of the end of 1978. In other words, the asset is revaluated. This result is shown on Table 13-2-3.

2-3-2 Depreciation method and rate by SCA facility

(1) Assuming that the asset are invested at the middle of the fiscal period, the straight-line method expecting the remaining value of 0 is applied as in the case of SCA. As to the depreciated assets, at the same time when the depreciation finished, reinvesting of the same amount of original investment is assumed. The Canal is not an asset to be depreciated as in the case of SCA.

(2) Assets to be depreciated and depreciation rates are broken down as below, according to the SCA categories:

Facility Items	Depreciation Rate (%)	Life Cycle (Years)
1) Building	4	25
2) Heavy Equipment	15	7
3) Floating Equipment	20	5
4) Navigation Aids & Mooring	25	4
5) Small Tools	25	4
6) Furniture	10	10
7) Water Plant	10	10
8) Breakwater & Others	*2	*50

Source : SCA * Note : Set by Team

Table - 13.2.1 Work Progress for the First Stage Development Project

(10⁶ LE)

Work completed (Yearly)	~ 1977			1978			1979			1980			Total		
	Total	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign
Dredging	48.5	16.6	31.9	125.4	25.8	99.6	146.6	53.3	93.3	49.8	18.2	31.6	370.3	113.9	256.4
Civil Work	52.7	44.0	8.7	20.9	19.2	1.7	13.9	13.4	0.5	11.9	11.6	0.3	99.4	88.2	11.2
Equipment	1.4	1.1	0.3	16.1	0.1	16.0	8.3	1.4	6.9	33.0	5.2	27.8	58.8	7.8	51.0
Technical Assist	0.1	0.1	—	0.1	—	0.1	0.7	—	0.7	0.6	—	0.6	1.5	0.1	1.4
Contingency	—	—	—	—	—	—	—	—	—	*	6.2	4.2	*	6.2	4.2
Total	102.7	61.8	40.9	162.5	45.1	117.4	169.5	68.1	101.4	95.3	35.0	60.3	530	210	320

Source: SCA 'Suez Canal Development Progress Reports; No. 1, No. 5 and No. 7.'

Exchange Rate: 1US\$ = 0.4LE

* Note: Contingency is included in the above values.

Table 13-2-2 Fixed Assets Statement (A)

(10³ LE)

Year Fixed Assets	1978 at Beginning Fixed Assets Value	1978 Investment Amount	1978 at End Fixed Assets Value	1979 Investment Amount	1980 Investment Amount
(1) Canal	290,400	207,420	497,820	125,930	76,400
(2) Building	11,690	7,270	18,960 *(8,370)	8,370	0
(3) Heavy Equipment	19,260	1,620	20,880 *(3,980)	4,120	860
(4) Floating Equipment	74,210	14,560	88,770 *(16,900)	31,370	29,720
(5) Navigation Aids & Moorings	1,210	120	1,330	2,790	14,130
(6) Small Tools	540	1,000	1,540	1,100	2,430
(7) Furniture	1,470	600	2,070	500	500
(8) Water Plant	5,420	5,050	10,470	0	0
(9) Others (Break Water & Others)	0	0	0	5,090	11,310
Total	404,200	237,640	641,840 *(29,250)	179,280	135,350

Source: Derived from Financial Statements of the year of 1976, 1977 & 1978 and Suez Canal Development Project Progress Report(s).

* Note: Figures in parentheses show the construction cost in progress.

Table 13-2-3 Fixed Assets Statement (B)
(After Reevaluation) (10³ LE)

YEAR: 1	BALANCE BEGINNING	INVESTMENT(1) NEW REPLACE		DEPRECIA- TION(2)	BALANCE AT END	ACCUMULA- TED(3)	ACCUMULA- TED(4)	PROGRESS
CANAL								
PORT DIV.								
SEC. 1	330300	320080		320080	650380	650380		0
OTHERS	0	0		0	0	0		0
TOTAL	330300	320080		320080	650380	650380		0
RENTAL DIV.	0	0		0	0	0		0
OTHER DIV.	0	0		0	0	0		0
TOTAL (CANAL)	330300	320080		320080	650380	650380		0
OTHER PROPERTIES								
PORT DIV.								
SEC. 1								
1. Building	11690	7270	0	7270	18328	18960	632	8370
2. Heavy Equipment	25060	2920	0	2920	5220	22760	27980	3980
3. Floating Equipment	90780	26250	0	26250	25320	91710	117030	16900
4. Navigation Aids	1210	210	0	210	429	991	1420	429
5. Small Tools	540	1810	0	1810	406	1944	2350	406
6. Furniture	1420	1090	0	1090	217	2343	2560	217
7. Water Plants	5420	9110	0	9110	1057	13473	14530	1057
8. Others	0	0	0	0	0	0	0	0
TOTAL	136170	48660	0	48660	33281	184830	33281	29250
OTHERS								
1	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0
OTHER DIV.	0	0	0	0	0	0	0	0
TOTAL	466470	368740	0	368740	801929	835210	33281	29250

2-3-3 Fixed Assets Schedule

The Fixed Assets Schedule computed by the method stated in 2-3-2 is shown on Table 13-2-4 and Table 13-2-5.

Table 13-2-4 is a schedule table for the fixed assets of the whole SCA including Phase I, while Table 13-2-5 is that after the completion of the First Stage Development Project, not including Phase I.

2-4 Long Term Loans of SCA

Since SCA's foreign loan is in terms of foreign currency, it is necessary to add the increased amount in LE due to devaluation to the loan balance as of the end of 1978. On the other hand, it is also necessary to estimate amount of loan needed for the First Stage Development Project in and after 1979.

2-4-1 Long term loans amount

(1) Amount of loan for the First Stage Development Project

On Table 13-2-6 (Fund Raised Schedule for the First Stage Development Project) the amount of funds raised for the First Stage Development Project is shown. This is an amount estimated from the loan balance stated on the SCA Balance Sheet as of the end of 1978, the work volume since 1979 (See Table 13-2-7), and the agreed loan amount on the Loan Condition Table provided by SCA. The amount of loan since 1979 is LE 165.8 million (foreign loan) and LE 89 million (local loan).

Table 13-2-4 Fixed Assets Schedule (After Phase I)

(10³ LE)

Year	Balance Beginning	Investment (I)			Deprecia- tion (D)	Balance at End	Accumulated (Book Value)	Accumulated Depreciation	Progress
		New	Replace	Total					
1978	466,470	368,740	0	368,740	33,281	801,929	835,210	97,440	29,250
1979	801,929	203,440	0	203,440	41,427	963,942	1,038,650	138,867	5,090
1980	963,942	129,130	1,750	130,880	51,228	1,043,594	1,167,780	188,345	11,310
1981	1,043,594	11,310	90,780	102,090	65,234	1,080,450	1,179,090	162,799	59,606
1982	1,080,450	59,606	27,080	86,686	53,521	1,113,615	1,238,696	189,240	132,129
1983	1,113,615	132,129	30,150	162,279	50,299	1,225,595	1,370,825	209,389	139,060
1984	1,225,595	139,060	49,680	188,740	50,299	1,364,036	1,509,885	210,008	149,121
1985	1,364,036	149,121	32,640	181,761	50,299	1,495,498	1,659,006	227,667	103,362
1986	1,495,498	103,362	103,810	207,172	53,799	1,648,871	1,762,368	177,656	56,833
1987	1,648,871	56,833	4,760	61,593	57,432	1,653,032	1,819,201	230,328	0
1988	1,653,032	0	54,760	54,760	58,329	1,649,463	1,819,201	233,897	0
1989	1,649,463	0	56,930	56,930	58,329	1,648,034	1,819,201	235,296	0
1990	1,648,064	0	34,890	34,890	58,329	1,624,625	1,819,201	258,735	0
1991	1,624,625	0	123,130	123,130	58,329	1,039,426	1,819,201	193,932	0
1992	1,389,426	0	29,950	29,950	58,329	1,661,047	1,819,201	222,313	0
1993	1,681,047	0	30,370	30,370	58,329	1,633,088	1,817,201	250,272	0
1994	1,633,088	0	36,900	36,900	58,329	1,611,659	1,819,201	271,701	0
1995	1,611,659	0	33,820	33,820	58,329	1,587,150	1,819,201	296,210	0
1996	1,517,150	0	169,290	169,290	58,329	1,698,111	1,819,201	185,249	0
1997	1,698,111	0	3,720	8,720	58,329	1,648,502	1,819,201	234,858	0
1998	1,648,502	0	41,120	41,120	58,329	1,631,293	1,819,201	252,067	0
1999	1,631,293	0	38,890	38,890	58,329	1,611,854	1,819,201	271,506	0
2000	1,611,854	0	52,650	52,650	58,329	1,606,175	1,819,201	277,185	0
2001	1,606,175	0	131,580	131,580	58,563	1,679,192	1,819,201	204,168	0
2002	1,679,192	0	13,390	13,390	58,310	1,634,272	1,819,201	249,088	0

Table 13-2-5 Fixed Assets Schedule (After the First Stage Project)

(10³ LE)

Year	Balance Beginning	Investment (I)			Depreciation (D)	Balance at End	Accumulated (Book Value)	Accumulated Depreciation	Progress
		New	Replace	Total					
1978	46,670	368,740	0	368,740	33,281	801,929	83,521	97,440	29,250
1979	801,929	203,440	0	203,440	41,427	963,942	1,038,650	138,867	5,090
1980	963,942	129,130	1,750	130,880	51,228	1,043,594	1,167,780	188,345	11,310
1981	1,043,594	11,310	90,780	102,090	65,234	1,080,450	1,179,090	162,799	0
1982	1,080,450	0	27,080	27,080	53,521	1,054,009	1,179,090	189,240	0
1983	1,054,009	0	30,150	30,150	50,299	1,033,860	1,179,090	209,389	0
1984	1,033,860	0	49,680	49,680	50,299	1,033,241	1,179,090	210,008	0
1985	1,033,241	0	32,640	32,640	50,299	1,015,582	1,179,090	227,667	0
1986	1,015,582	0	103,810	103,810	50,643	1,068,749	1,179,090	174,550	0
1987	1,068,749	0	4,760	4,760	50,223	1,023,286	1,179,090	219,963	0
1988	1,023,286	0	54,760	54,760	50,223	1,027,823	1,179,090	215,426	0
1989	1,027,823	0	56,930	56,930	50,223	1,034,530	1,179,090	208,719	0
1990	1,034,530	0	32,240	32,240	50,223	1,016,547	1,179,090	226,702	0
1991	1,016,547	0	94,680	94,680	50,223	1,061,004	1,179,090	182,245	0
1992	1,061,004	0	21,230	21,230	50,223	1,032,011	1,179,090	211,238	0
1993	1,032,011	0	30,370	30,370	50,223	1,012,158	1,179,090	231,091	0
1994	1,012,158	0	34,250	34,250	50,223	996,185	1,179,090	247,064	0
1995	996,185	0	33,620	33,620	50,223	979,582	1,179,090	263,667	0
1996	979,582	0	141,040	141,040	50,223	1,070,399	1,179,090	172,850	0
1997	1,070,399	0	0	0	50,223	1,020,176	1,179,090	223,073	0
1998	1,020,176	0	38,470	38,470	50,223	1,008,423	1,179,090	234,826	0
1999	1,008,423	0	38,690	38,690	50,223	996,890	1,179,090	246,359	0
2000	996,890	0	52,650	52,650	50,223	999,317	1,179,090	243,932	0
2001	999,317	0	103,330	103,330	50,457	1,052,190	1,179,090	191,059	0
2002	1,052,190		2,020	2,020	50,204	1,004,006	1,179,090	239,243	0

Table 13-2-6 Fund Raised Schedule for The First Stage Development Project

(10³ LE)

Project Cost Items	1976~1978	1979	1980	Total
Local Currency Portion				
Loan by Bank	94.1	58.8	30.2	183.1 (87%)
SCA Fund	12.8	9.3	4.8	26.9 (13%)
Total (A)	106.9	68.1	35.0	210.0 (100%)
Foreign Currency Portion				
Loan by Foreign	279.4	82.8	83.0	445.2 (81%)
SCA Fund	41.4	31.1	34.3	106.8 (19%)
Total (B)	320.8	113.9	117.3	552.0 (100%)
Loan Ammount	373.5	141.6	113.2	628.3
SCA Fund	54.2	40.4	39.1	133.7
Grand Total (A + B)	427.7	182.0	152.3	762.0

Source: Derived from Balance Sheet at end of 1978, Loan Condition Table and Suez Canal Development Project, Progress Report(s).

Note: The currency value of LE is adjusted by the new exchange rate (1\$ = 0.69LE)

(2) Amount of loan for Phase I

The amount of loan for Phase I is shown on Table 13-2-7 (Investment Plan for Phase I), of which, foreign loan is LE 244.0 million, while local loan is LE 311.4 million.

The amount of loan for Phase I is established as below, being shared by the actual and estimated values for the First Stage Project (See Table 13-2-6):

Construction cost for foreign currency portion

Foreign loan : 81% of the annual investment cost by foreign currency

SCA fund : 19% of the annual investment cost by foreign currency

Construction cost for local currency portion

Local loan : 87% of the annual investment cost by local currency

SCA fund : 13% of the annual investment cost by local currency

Equipment, Foreign Loan : 100%

Table 13-2-7 Fund Raised Schedule for Phase I

(10³ LE)

Year	Foreign Currency			Local Currency			Grand Total
	Loan	SCA	tot.	Loan	SCA	tot.	
1981	11,350	2,670	14,020	43,740	6,530	50,270	64,290
1982	47,120	11,050	58,170	68,670	10,260	78,930	137,100
1983	46,140	10,820	56,960	71,430	10,670	82,100	139,060
1984	49,450	11,590	61,040	76,630	11,450	88,080	149,120
1985	56,620	6,040	62,660	35,410	5,290	40,700	103,360
1986	33,300	5,720	39,020	15,500	2,320	17,820	56,840
Total	243,980	47,890	291,870	311,380	46,520	357,900	649,770

2-4-2 Loan condition

The loan condition is assumed as a loan being realized at the middle of fiscal period and being repaid once a year (also at the middle of fiscal period). Interests to be paid are each computed through multiplying the average balance at mid-period by respective interest-rate for kinds of loan. On Table 13-2-8 (Loan Condition of Foreign Long Term Loan), loan conditions of foreign loans balance as of the end of 1978 are shown. Basing upon this table, loan condition is established by kind of foreign loan except Phase I. For local loans, the interest rate is 5%, grace period is one year, and term of loan is eight years.

For Phase I, and average of loan conditions for the First Stage Project stated above is used. Such an average is as follows:

Foreign loan	Term of loan	: 26 years
	Grace period	: 5 years
	Rate of interest	: 4.1%
Local loan	Term of loan	: 8 years
	Grace period	: 1 years
	Rate of interest	: 5.0%

Average value of local and foreign loan in Phase I

Term of loan	: 16 years
Grace period	: 3 years
Rate of interest	: 4.6%

Table 13-2-8 Loan Condition of Foreign Long Term Loan

Name of Loan	Term of Loan (Years)	Grace Period for Principle (Years)	Rate of Interest (%)	Beginning Date of Finance Use (Date)	Loan Ballance at End 1978 (10 ⁶ US\$)
KFAED No. 40	18	3.5	4	1974 Aug.	8.3
Katar Loan	18	3	2	1974 Sep.	2.5
Abou Dhabi Loan	18	3	4	1975 Jun.	10.3
SFAED 1/1	18	2.5	3.5	1975 Jul.	13.1
IBRD 1064	20	4	8	1975 Mar.	7.3
OECF EC 2	25	7	2	1975 Jul.	64.4
OECF EC22	25	7	3.5	1978 Feb.	33.5
OECF EC94	30.5	10	3.5	1979 Nov.	0
SFAED 39/10	20	5	3.5	1977 Aug.	11.4
KFAED 112	21	3.5	3	1978 May	1.2
IBRD 1482	20	5.5	8	1978 Jan.	10.6
Abou Dhabi Loan	20	4	3	1978 Mar.	1.0
Islamic Bank	18	3	3	1978 Sep.	1.0
Arab Fund	20	4	4	1978 Mar.	0
KFAED No. 8	18	3.5	4	1974	1.1
Kuwait Loan	*18	*3.5	*4	1978	4.8

Source: Loan Condition Table provided by SCA and Balance Sheet at End of 1978.

* Note: Estimated.

2-4-3 Long term loans statement

The Long Term loans Statement computed by the method stated under the preceeding 2-4-1 and 2-4-2 is shown on Table 13-2-9 and 13-2-10.

Table 13-2-9 is a schedule table for the repayment of principal interest of whole SCA showing the case where Phase I has been implemented, while Table 13-2-10 is that after the completion of the First Stage Project, not including Phase I.

2-5 Evaluation of Phase I Project

2-5-1 Evaluation by financial ratio

An average financial ratio for 10 years (1987 – 1996) after the completion of the Phase I project is shown on Table 13-2-11.

Table 13-2-9 Long-Term Loans Statement (Phase 1)
(10³ LE)

LONG-TERM LOANS TOTAL						
YEAR	BALANCE BEGINNING	DRAWING	REPAYMENT	BALANCE AT END (TOTAL) (CURRENT)	INTEREST	DEBT SERVICE
1978	159710	437153	6215	590650	31343	15833
1979	590650	161720	31841	720529	42090	27731
1980	720529	73200	42090	751639	47152	31716
1981	751639	55090	47352	759377	57128	32761
1982	759377	115790	57128	818039	70244	34265
1983	818039	117570	77244	855565	87433	36843
1984	855565	126080	87433	902012	89332	38495
1985	902012	92030	89332	904710	81928	39221
1986	904710	10800	81928	821582	77985	38265
1987	821582	0	77785	743797	76579	35559
1988	743797	0	76579	667218	72533	31945
1989	667218	0	72533	594685	65371	28495
1990	594685	0	65371	529314	56952	25354
1991	529314	0	56952	472362	44593	22581
1992	472362	0	44593	427769	35887	20362
1993	427769	0	35887	391882	32889	18539
1994	391882	0	32889	358993	32280	17174
1995	358993	0	32280	326713	31434	15794
1996	326713	0	31434	295279	30492	14486
1997	295279	0	30492	264787	30492	13191
1998	264787	0	30492	234295	30382	11928
1999	234295	0	30382	203913	30166	10689
2000	203913	0	30166	173747	30039	9414
2001	173747	0	30039	143708	29888	8185
2002	143708	0	29888	113820	29729	6929

Table 13-2-10 Long-Term Loans Statement (The First Stage Project)
(10³ LE)

LONG-TERM LOANS TOTAL						
YEAR	BALANCE BEGINNING	DRAWING	REPAYMENT	BALANCE AT END (TOTAL) (CURRENT)	INTEREST	DEBT SERVICE
1978	159710	437153	6215	590650	31343	15833
1979	590650	161720	31841	720529	42090	27731
1980	720529	73200	42090	751639	47152	31716
1981	751639	55090	47352	759377	57128	32761
1982	759377	115790	57128	818039	70244	34265
1983	818039	117570	77244	855565	87433	36843
1984	855565	126080	87433	902012	89332	38495
1985	902012	92030	89332	904710	81928	39221
1986	904710	10800	81928	821582	77985	38265
1987	821582	0	77785	743797	76579	35559
1988	743797	0	76579	667218	72533	31945
1989	667218	0	72533	594685	65371	28495
1990	594685	0	65371	529314	56952	25354
1991	529314	0	56952	472362	44593	22581
1992	472362	0	44593	427769	35887	20362
1993	427769	0	35887	391882	32889	18539
1994	391882	0	32889	358993	32280	17174
1995	358993	0	32280	326713	31434	15794
1996	326713	0	31434	295279	30492	14486
1997	295279	0	30492	264787	30492	13191
1998	264787	0	30492	234295	30382	11928
1999	234295	0	30382	203913	30166	10689
2000	203913	0	30166	173747	30039	9414
2001	173747	0	30039	143708	29888	8185
2002	143708	0	29888	113820	29729	6929

Table 13-2-11 Comparison of Financial Ratios

Financial Ratio (%)	Phase I	The First Stage (Without Phase I)
Working ratio	4.2	5.1
Operating ratio	10.6	13.7
Return on net fixed ratio	49.3	49.1
Interest earned ratio	3529.6	4002.6
Debt service coverage	1149.2	1167.9

First of all it can be said that all ratios with high values show the appropriateness of the investment effect for Phase I. Interest earned ratio and Debt service coverage ratio for Phase I are lower than those for the First Stage. The reason for this is that the repayment of long-term loan principal for the First Stage Development Project would have passed its peak sometime during 1980–1986. On the other hand, the difference between both values could be said no problem because of the largeness of each absolute value. SCA's type of business, if it were a business enterprise, could compare with chemical industries or real estate enterprises in that they are common in their high ratios of equipment assets. Therefore, if SCA's profit making potential is viewed in terms of Return on net fixed assets ratio, paying attention to its asset composition which is a source to secure such profits, it is noteworthy that the implementation of Phase I is more desirable and more profitable than no implementation.

Such a ratio as of the end of 1978 was 18%, but will be 31% if the Net Profit due to devaluation is assumed to increase it at 1.725 times. Even if compared with this 31%, it could be said an extremely favorable value.

On the other hand, as can be estimated from Fig. 13-2-1, there is a trend that values for Phase I are improving and better than those in the non-performed case. Especially noteworthy is the Return on net fixed ratio, which could be said to be an exceedingly favorable value for profit-making potential, if the enormous amount of investment of Phase I is considered.

Table 13-2-12 shows the financial ratios for each fiscal year in case where Phase I is implemented, while on Table 13-2-13 are shown the financial ratios after the completion of the First Stage Project in the case where Phase I is not implemented.

2-5-2 Evaluation by financial statements

Table 13-1-1 (Income Statement after Phase I Project) shows the income position of SCA as whole in the case of implementation of Phase I. It's earning capacity is confirmed to be favorably high.

On Table 13-2-14 is shown the Statement of Source & Application of Funds of whole SCA in the case where Phase I is implemented. There is no problem as to fund management if viewed from this table, too.

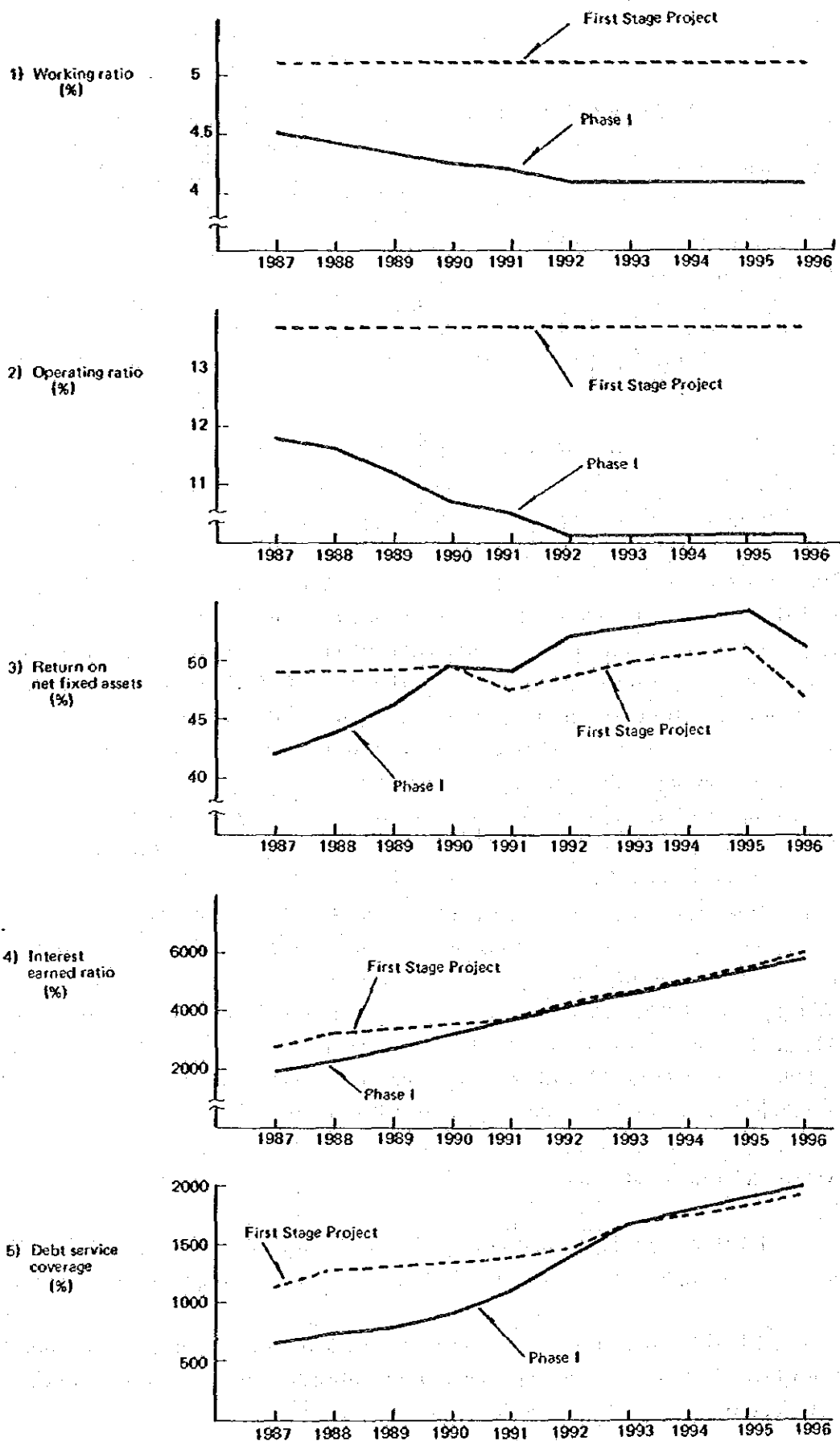


Fig. 13-2-1 Trend of Financial Ratios

Table 13-2-12 Financial Ratios Statement (Phase 1 Project)

(10³ LE)

(YEAR)	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
BASIC DATA										
1. TOTAL OPERATING REVENUES	9,247.5	49156.1	550590	583143	583143	583143	583143	583143	583143	583143
2. TOTAL OPERATING EXPENSES	221.1	25653	24530	29793	29793	29793	29793	29793	29793	29793
3. TOTAL OPERATING EXPENSES	555.1	61377	29553	55524	33111	40089	33087	40089	50433	83315
4. NET OPERATING INCOME	29019.3	194210	522250	554050	554050	554050	554050	554050	554050	554050
5. NET OPERATING INCOME	28553.2	551435	471032	483115	500529	503751	503751	503751	503407	503827
6. INTEREST ON LONG-TERM	15.43	27781	31716	31455	29089	26811	23561	21192	19125	17586
7. NET INCOME	28375	325752	439316	457143	471440	477140	479590	482552	484282	485241
8. DEBT SERVICE	22745	52572	73405	78735	79989	82797	87032	73322	58245	48197
9. FIXED ASSETS BALANCE	53122.2	451242	1043524	1080450	1054029	1033860	1033241	1015542	1068749	1023286
FINANCIAL RATIOS										
WORKING RATIO	0.0745	0.3532	0.0515	0.0510	0.0510	0.0510	0.0510	0.0510	0.0510	0.0510
OPERATING RATIO	0.1371	0.1515	0.1445	0.1521	0.1427	0.1372	0.1372	0.1372	0.1378	0.1370
RETURN ON NET FIXED ASSETS	0.2953	0.3557	0.4514	0.4524	0.4747	0.4873	0.4875	0.4980	0.4710	0.4924
INTEREST EARNED RATIO	14.0575	12.7459	14.8515	15.5496	17.2065	18.9332	21.1119	23.7830	26.3219	28.8493
DEBT SERVICE COVERAGE	12.2517	6.3291	7.0761	7.3322	6.9283	6.8573	6.3650	7.5584	9.5122	11.4594

Table 13-2-12 Financial Ratios Statement (Phase 1 Project)

(YEAR)	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
BASIC DATA										
1. TOTAL OPERATING REVENUES	812873	859710	901110	927050	958160	958160	958160	958160	958160	958160
2. TOTAL OPERATING EXPENSES	36420	37400	38420	39150	39150	39150	39150	39150	39150	39150
3. TOTAL OPERATING EXPENSES	91749	95729	96749	97479	97479	97479	97479	97479	97479	97479
4. NET OPERATING INCOME	782450	822310	862690	887910	919030	919030	919030	919030	919030	919030
5. NET OPERATING INCOME	724121	763961	804361	829561	860701	860701	860701	860701	860701	860701
6. INTEREST ON LONG-TERM	31945	29495	25334	22581	20362	18639	17174	15794	14456	13191
7. NET INCOME	692176	735466	779027	807000	840339	842062	845527	849007	846235	847510
8. DEBT SERVICE	108524	101160	90905	79533	64955	54326	50063	48074	45920	43693
9. FIXED ASSETS BALANCE	1649463	1618064	1624825	1689426	1661047	1653088	1611659	1587150	1698111	1668532
FINANCIAL RATIOS										
WORKING RATIO	0.0445	0.0435	0.0428	0.0422	0.0409	0.0409	0.0409	0.0409	0.0409	0.0405
OPERATING RATIO	0.1157	0.1114	0.1074	0.1051	0.1017	0.1017	0.1017	0.1017	0.1017	0.1011
RETURN ON NET FIXED ASSETS	0.4390	0.4636	0.4951	0.4910	0.5182	0.5270	0.5340	0.5423	0.5069	0.5221
INTEREST EARNED RATIO	22.6672	26.3111	31.7503	36.7360	42.2700	46.1774	50.1165	54.4934	59.4982	65.2491
DEBT SERVICE COVERAGE	7.2092	8.1272	9.4900	11.1640	14.1487	16.9759	18.3575	19.1170	20.0137	21.0381

Table 13-2-13 Financial Ratios Statement
(The First Stage Development)

(10³ LE)

(YEAR)	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
BASIC DATA										
1. TOTAL OPERATING REVENUES	292400	421560	550590	583849	583840	583840	583840	715500	748210	784710
2. TOTAL OPERATING EXPENSES BEFORE DEPRECIATION	22309	28650	28550	29790	29790	29790	29790	33790	34600	35480
3. TOTAL OPERATING EXPENSES AFTER DEPRECIATION	55581	65077	79558	95074	83311	80089	80089	84089	88399	92892
4. NET OPERATING INCOME BEFORE DEPRECIATION	270100	394910	522040	554050	554050	554050	554050	681710	713610	749230
5. NET OPERATING INCOME AFTER DEPRECIATION	236819	353483	471032	483816	500529	503751	503751	631411	659811	691818
6. INTEREST ON LONG-TERM LOANS	15835	27731	31716	32761	34265	36643	38493	39221	38265	35559
7. NET INCOME	216986	325752	439316	451055	466264	467108	465256	592190	621546	656259
8. DEBT SERVICE	22046	59572	73806	80113	91393	106887	127926	128553	120193	113564
9. FIXED ASSETS BALANCE	801929	963942	1043594	1090450	1113615	1225595	1364036	1495498	1648871	1653032
FINANCIAL RATIOS										
WORKING RATIO (2/1)	0.0763	0.0632	0.0515	0.0510	0.0510	0.0510	0.0510	0.0472	0.0462	0.0452
OPERATING RATIO (3/1)	0.1901	0.1615	0.1445	0.1628	0.1427	0.1372	0.1372	0.1175	0.1181	0.1184
RETURN ON NET FIXED ASSETS (5/9)	0.2953	0.3687	0.4514	0.4524	0.4195	0.4110	0.3693	0.4222	0.4002	0.4165
INTEREST EARNED RATIO (5/6)	14.9573	12.7489	14.8518	14.9207	14.6076	13.7475	13.0861	16.0988	17.2432	19.4555
DEBT SERVICE COVERAGE (6/8)	12.2517	6.0291	7.0761	6.9159	6.0923	5.1835	4.3310	5.3029	5.9372	6.5980

Table 13-2-13 Financial Ratios Statement
(The First Stage Development Project)

(YEAR)	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
BASIC DATA										
1. TOTAL OPERATING REVENUES	545443	545440	545440	545440	545440	545440	545440	545440	545440	545440
2. TOTAL OPERATING EXPENSES BEFORE DEPRECIATION	29773	29777	29790	29790	29790	29790	29790	29790	29790	29790
3. TOTAL OPERATING EXPENSES AFTER DEPRECIATION	43013	43013	43013	43013	43013	43013	43013	43013	43013	43013
4. NET OPERATING INCOME BEFORE DEPRECIATION	554053	554050	554050	554050	554050	554050	554050	554050	554050	554050
5. NET OPERATING INCOME AFTER DEPRECIATION	503827	503827	503827	503827	503827	503827	503827	503827	503827	503827
6. INTEREST ON LONG-TERM LOANS	16356	15224	14065	12745	11636	10226	9492	8728	8130	7338
7. NET INCOME	497471	495603	497762	492114	491991	493031	473935	476119	475519	476459
8. DEBT SERVICE	63474	62342	61203	60261	57542	52684	51164	49653	47977	46215
9. FIXED ASSETS BALANCE	1027423	1034533	1046547	1061024	1072011	1082153	975135	973532	1078199	1020126
FINANCIAL RATIOS										
WORKING RATIO (2/1)	0.0551	0.0550	0.0550	0.0551	0.0550	0.0550	0.0550	0.0550	0.0550	0.0550
OPERATING RATIO (3/1)	0.1370	0.1370	0.1370	0.1370	0.1370	0.1370	0.1370	0.1370	0.1370	0.1370
RETURN ON NET FIXED ASSETS (5/9)	0.4502	0.4773	0.4956	0.4749	0.4552	0.4978	0.5058	0.5143	0.4737	0.4939
INTEREST EARNED RATIO (5/6)	30.1074	33.0768	35.7795	38.9266	42.5673	48.5336	50.9328	55.0555	61.9104	68.5600
DEBT SERVICE COVERAGE (6/8)	17.7444	15.9851	15.4463	15.3132	14.7541	14.9517	17.7776	15.6645	17.8238	21.1345

Table 13-2-14 Source & Application of Funds

(10³ LE)

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
(A) Source of Funds																	
Net income before Tax and Interest	471.0	488.8	500.5	503.8	503.8	631.4	659.8	691.8	724.1	764.0	804.4	829.6	860.7	860.7	860.7	860.7	860.7
Depreciation	51.2	65.2	53.5	50.3	50.3	50.3	53.8	57.4	58.3	58.3	58.3	58.3	58.3	58.3	58.3	58.3	58.3
Long Term Loans	73.2	51.1	115.8	117.6	126.1	92.0	48.8	-	-	-	-	-	-	-	-	-	-
(Local)	(30.2)	(43.7)	(68.7)	(71.4)	(76.6)	(35.4)	(15.5)										
(Foreign)	(43.0)	(11.4)	(47.1)	(46.2)	(49.5)	(56.6)	(33.3)										
Total	595.4	609.1	669.8	671.7	680.2	773.7	762.4	749.2	782.4	722.3	862.7	887.9	919.0	919.0	919.0	919.0	919.0
(B) Application of Funds																	
Tax 190.7	190.7	198.4	202.4	202.8	202.0	256.4	269.0	283.9	299.2	317.6	336.1	348.0	362.2	362.9	363.4	364.0	364.5
Addition to Fixed Assets	135.4	59.6	132.1	139.1	149.1	103.4	56.8	-	-	-	-	-	-	-	-	-	-
Interest	31.7	32.8	34.3	36.6	38.5	39.2	38.3	35.6	31.9	28.5	25.3	22.6	20.4	18.6	17.2	15.8	14.5
(Local)	(9.8)	(8.7)	(10.6)	(11.7)	(12.5)	(7.4)	(10.3)	(8.2)	(5.8)	(3.8)	(3.0)	(1.0)	(0.3)	(0)			
(Foreign)	(21.9)	(24.1)	(23.7)	(24.9)	(26.0)	(31.8)	(28.0)	(27.4)	(26.1)	(24.7)	(22.3)	(21.6)	(20.1)	(18.6)	(17.2)	(15.8)	(14.5)
Principal	42.1	47.4	57.1	70.2	89.4	89.3	81.9	78.0	76.6	72.7	65.6	57.0	44.6	35.7	32.9	32.3	31.5
(Local)	(33.7)	(38.0)	(44.2)	(54.0)	(64.2)	(62.8)	(54.8)	(48.6)	(44.3)	(38.2)	(26.0)	(18.0)	(7.3)	(2.2)			
(Foreign)	(8.4)	(9.4)	(12.9)	(16.2)	(25.2)	(26.5)	(27.1)	(29.4)	(32.3)	(34.5)	(39.6)	(39.0)	(37.3)	(33.5)	(32.9)	(32.3)	(31.5)
Others	40.9	104.7	53.4	51.7	72.7	43.9	111.8	4.8	54.8	56.9	34.9	123.1	30.0	30.4	36.9	33.8	169.3
Total	440.8	442.9	479.3	500.4	551.7	532.2	557.8	402.3	462.5	475.7	461.9	550.7	457.2	447.6	450.4	445.9	579.8
(C) Increase of Net Current Assets	154.6	166.2	190.5	171.3	128.5	241.5	204.6	346.9	319.9	246.6	400.8	337.2	461.8	471.4	468.6	473.1	339.2

3. Financial Analysis Conclusion

The result of the financial analysis of Phase I, and the effect of the investment on SCA's financial situation, are as follows:

- 1) Judging from the financial statements of SCA, financial soundness and viability of an investment in Phase I is completely assured.
- 2) From the view point of an investment profit rate, the investment for Phase I is favorable, showing a very high value for all cases and a significant FRR of around 17% for the Base Case. After Phase I investment, when the management has been stabilized, the return on net fixed assets increases to around 50%. Thus, the earning capacity of the project is fully ascertained.
- 3) In the event of earlier completion of the work for Phase I, an improvement in the projected FRR is expected with the increase in the traffic demand at high case.

At the same time, the financial ratios will also increase due to a reduction in the total investment.

Table 13-A-1 FRR Calculation Sheet

Case-1: Base Case/Standard

FRR = 17.3%

(10⁶ LE)

No.	Year	COSTS				BENEFITS	
		Total	Con- struction	Equipment	Operation	Total	Increased Revenue of Transit Toll
1	1981	64.3	64.3				
2	1982	137.1	137.1				
3	1983	139.1	139.1				
4	1984	149.1	149.1				
5	1985	106.5	75.1	28.3	3.1	65.0	65.0
6	1986	60.6	48.1	8.7	3.8	80.4	80.4
7	1987	4.6			4.6	99.6	99.6
8	1988	6.0			6.0	133.8	133.8
9	1999	7.7			7.7	174.6	174.6
10	2000	9.3			9.3	216.0	216.0
11	2001	10.3			10.3	242.0	242.0
12	2002	11.7			11.7	273.1	273.1
13	2003	11.7			11.7	273.1	273.1
14	2004	11.7			11.7	273.1	273.1
15	2005	11.7			11.7	273.1	273.1
16	2006	11.7			11.7	273.1	273.1
Total		753.1	612.8	37.0	103.3	2,376.9	2,376.9

Table 13-A-2 FRR Calculation Sheet

Case-6: Low Case

FRR = 9.8%

(10⁶ LE)

No.	Year	COSTS				BENEFITS	
		Total	Con- struction	Equipment	Operation	Total	Increased Revenue of Transit Toll
1	1981	64.3	64.3				
2	1982	137.1	137.1				
3	1983	139.1	139.1				
4	1984	149.1	149.1				
5	1985	106.5	75.1	28.3	3.1	23.5	
6	1986	60.6	48.1	8.7	3.8	36.8	
7	1987	4.6			4.6	53.8	
8	1988	6.0			6.0	70.7	
9	1999	7.7			7.7	87.6	
10	2000	9.3			9.3	104.7	
11	2001	10.3			10.3	130.3	
12	2002	11.7			11.7	160.2	
13	2003	11.7			11.7	190.0	
14	2004	11.7			11.7	220.0	
15	2005	11.7			11.7	249.7	
16	2006	11.7			11.7	279.7	
Total		753.1	612.8	37.0	103.3		

Table 13-A-3 FRR Calculation Sheet

Case-7: High Case

FRR = 23.4%

(10⁶ LE)

No.	Year	COSTS				BENEFITS	
		Total	Con- struction	Equipment	Operation	Total	Increased Revenue of Transit Toll
1	1981	64.3	64.3				
2	1982	137.1	137.1				
3	1983	139.1	139.1				
4	1984	149.1	149.1				
5	1985	106.5	75.1	28.3	3.1	100.5	100.5
6	1986	60.6	48.1	8.7	3.8	140.8	140.8
7	1987	4.6			4.6	140.8	140.8
8	1988	6.0			6.0	140.8	140.8
9	1999	7.7			7.7	271.7	271.7
10	2000	9.3			9.3	271.7	271.7
11	2001	10.3			10.3	271.7	271.7
12	2002	11.7			11.7	393.6	393.6
13	2003	11.7			11.7	393.6	393.6
14	2004	11.7			11.7	393.6	393.6
15	2005	11.7			11.7	393.6	393.6
16	2006	11.7			11.7	393.6	393.6
Total		649.8	612.8	37.0	103.3	3,306.0	3,306.0

Table 13-A-4 FRR Calculation Sheet

Case-8: Earlier Completion of Work

FRR = 16.3%

(10⁶ LE)

No.	Year	COSTS				BENEFITS	
		Total	Con- struction	Equipment	Operation	Total	Increased Revenue of Transit Toll
1	1981	99.2	99.2				
2	1982	169.9	169.9				
3	1983	185.0	158.7	26.3			
4	1984	177.6	170.0	7.6			
5	1985	3.1			3.1	65.0	65.0
6	1986	3.8			3.8	80.4	80.4
7	1987	4.6			4.6	99.6	99.6
8	1988	6.0			6.0	133.8	133.8
9	1999	7.7			7.7	174.6	174.6
10	2000	9.3			9.3	216.0	216.0
11	2001	10.3			10.3	242.0	242.0
12	2002	11.7			11.7	273.1	273.1
13	2003	11.7			11.7	273.1	273.1
14	2004	11.7			11.7	273.1	273.1
15	2005	11.7			11.7	273.1	273.1
16	2006	11.7			11.7	273.1	273.1
Total		735.0	597.8	33.9	103.3	2,376.9	2,376.9

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