

Table 33 CONSTRUCTION COST FOR CIUYAH TUNNEL (1/2)

Work item	Unit	Quantity	Unit price (Rp.)		Amount (Rp.)	
			PC	LC	PC	LC
1. Preparation Works						
1.1 Access Road	km	0.3	866,671,990	389,461,480	260,001,597	116,838,444
1.2 20 kv Distribution Line for Construction and Operation use	km	0.3	11,040,990	2,205,140	3,312,297	661,542
1.3 Other works (2% of items 2)	L.S.	1			205,531,767	87,637,523
Total of Item 1					468,845,661	205,137,509
2. Civil Works						
2.1 Inlet and Outlet						
(1) Clearing and stripping	m2	3,100	1,210	690	3,751,000	2,139,000
(2) Excavation, Common	m3	8,100	3,870	1,830	31,347,000	14,823,000
(3) Excavation, W. Rock	m3	13,500	6,930	3,230	93,555,000	43,605,000
(4) Excavation, Hard Rock	m3	5,400	18,010	6,890	97,254,000	37,206,000
(5) Slope protection, Sod facing	m2	280	270	2,730	75,600	764,400
(6) Slope Protection, Shotcrete	m2	1,420	26,180	12,840	37,175,600	18,232,800
(7) Backfill	m3	540	4,080	2,320	2,203,200	1,252,800
(8) Leveling concrete	m3	30	102,160	51,340	3,064,800	1,540,200
(9) Structural concrete (180 kg/cm2)	m3	740	105,840	53,920	78,321,600	39,900,800
(10) Form	m	1,900	8,780	19,280	16,682,000	36,632,000
(11) Reinforcing bar	ton	74	1,064,770	691,240	78,792,980	51,151,760
(12) Waterstop 300mm	m	20	38,010	11,470	760,200	229,400
(13) Others (5 %)	L.S.				22,149,149	12,373,858
Total of Item 2.1					465,132,129	259,851,018
2.2 Tunnel						
(1) Excavation	m3	27,600	105,770	56,130	2,919,252,000	1,549,188,000
(2) Shotcrete (t=0.15m)	m2	13,400	79,240	28,440	1,061,816,000	381,096,000
(3) Rock bolt (D=25mm, L=2.5m)	m	13,400	40,890	7,130	547,926,000	95,542,000
(4) Steel support (H-150x150mm)	ton	24	2,666,660	1,066,410	63,999,840	25,593,840
(5) Concrete (180 kg/cm ²)	m3	8,200	120,730	63,540	989,986,000	521,028,000
(6) Form	m2	15,300	46,760	5,620	715,428,000	85,986,000
(7) Reinforcing bar	ton	170	1,107,300	802,610	188,241,000	136,443,700
(8) Consolidation grout	m	560	169,770	51,940	95,071,200	29,086,400
(9) Curtain grout	m	1,800	183,820	57,920	330,876,000	104,256,000
(10) Weep hole (D=75mm)	m	270	15,830	4,530	4,274,100	1,223,100
(11) Others (5 %)	L.S.				345,843,507	146,472,152
Total of Item 2.2					7,262,713,647	3,075,915,192
2.3 Intake Shaft						
(1) Clearing and stripping	m2	710	1,210	690	859,100	489,900
(2) Excavation, Open	m3	1,000	3,870	1,830	3,870,000	1,830,000
(3) Excavation, Shaft	m3	7,300	78,730	31,470	574,729,000	229,731,000
(4) Embankment	m3	500	5,475	2,687	2,737,500	1,343,500
(5) Slope protection, Sod facing	m2	140	270	2,730	37,800	382,200
(6) Shotcrete in shaft (t=150)	m2	2,300	79,240	28,440	182,252,000	65,412,000
(7) Rock bolt (l=3m, Dia.=25)	m2	1,400	49,070	8,560	68,698,000	11,984,000
(8) Leveling concrete	m3	50	102,160	51,340	5,108,000	2,567,000
(9) Structural concrete (180 kg/cm2)	m3	2,200	120,730	63,540	265,606,000	139,788,000
(10) Form	m2	5,800	66,080	8,960	383,264,000	51,968,000
(11) Reinforcing bar	ton	220	1,107,300	802,610	243,606,000	176,574,200
(12) Architectural work	m2	190	1,996,000	533,000	379,240,000	101,270,000
(13) Others (5 %)	L.S.				105,500,370	39,166,990
Total of Item 2.3					2,215,507,770	822,506,790
2.4 Approach Channel						
(1) Clearing and stripping	m2	3,800	1,210	690	4,598,000	2,622,000
(2) Excavation, Common	m3	12,800	3,870	1,830	49,536,000	23,424,000
(3) Leveling concrete	m3	150	102,160	51,340	15,324,000	7,701,000
(4) Structural concrete (180 kg/cm2)	m3	1,400	105,840	53,920	148,176,000	75,488,000
(5) Form	m2	2,870	8,780	19,280	25,198,600	55,333,600
(6) Reinforcing bar	ton	70	1,064,770	691,240	74,533,900	48,386,800
(7) Others (5 %)	L.S.				15,868,325	10,647,770
Total of Item 2.4					333,234,825	223,603,170
Total of Item 2					10,276,588,371	4,381,876,170

Table 34 CONSTRUCTION COST FOR CIUYAH TUNNEL (2/2)

Work item	Unit	Quantity	Unit price (Rp.)		Amount (Rp.)	
			FC	LC	FC	LC
3. Metal Works						
3.1 Intake and Outlet						
(1) Trash rack (3.0mH x 7.0mW x 2 sets)	ton	15	9,246,270	1,027,360	138,694,050	15,410,400
(2) Stop log (3.0mH x 7.0mW x 2 sets)	ton	10	15,410,450	1,712,270	154,104,500	17,122,700
Total of Item 3.1					292,798,550	32,533,100
3.2 Intake Shaft						
(1) Sluice gate for gard valve (Dia=1.40m)	set	1	540,328,830	60,036,540	540,328,830	60,036,540
(2) Stop log (4.0mH x 4.0mW x 1 set)	ton	8	15,410,450	1,712,270	123,283,600	13,698,160
(3) Slide gate (4.0mH x 4.0mW x 1 set)	ton	32	15,410,450	1,712,270	493,134,400	54,792,640
(4) Sleeve valve (Dia=1.40m)	set	1	540,328,830	60,036,540	540,328,830	60,036,540
(5) Miscellaneous metal work	ton	4	7,705,220	856,140	30,820,880	3,424,560
Total of Item 3.2					1,727,896,540	191,988,440
Total of Item 3					2,020,695,090	224,521,540
Construction Cost (Total of Items 1 to 3)					12,766,129,122	4,811,535,219
(Rounded up to)					12,766,130,000	4,811,536,000

Note : 1) Price level : August, 1994

2) Exchange Rate : Yen 1.00 = Rp. 21.84, US\$ 1.00 = Rp. 2,177.25

Table 35 CONSTRUCTION COST FOR CILAWANG DAM (1/2)

Work item	Unit	Quantity	Unit price (Rp.)		Amount (Rp.)	
			FC	LC	FC	LC
1. Preparation Works						
1.1 Access Road Improvement of Existing Village Road	km	7	866,672,000	389,461,480	6,066,704,000	2,726,230,360
1.2 Base Camp	L.S.	1	1,005,010,140	2,285,248,680	1,005,010,140	2,285,248,680
1.3 20 kv Distribution Line for Construction and Operation use	km	7	11,041,000	2,205,140	77,287,000	15,435,980
1.4 Telecommunication System	L.S.	1	3,059,350,290	123,076,800	3,059,350,290	123,076,800
1.5 Other works (2% of items 2)	L.S.	1			8,760,301	4,430,987
Total of Item 1					10,217,111,731	5,154,422,807
2. Civil Works						
2.1 River Diversion Works (Tunnel D= 6.6m, L= 350.6m)						
(1) Clearing and Stripping	m2	6,300	1,220	690	7,686,000	4,347,000
(2) Excavation, Common	m3	11,800	3,870	1,830	45,666,000	21,594,000
(3) Excavation, W. Rock	m3	11,800	6,940	3,240	81,892,000	38,232,000
(4) Excavation, Hard Rock	m3	23,500	18,010	6,890	423,235,000	161,915,000
(5) Excavation, Tunnel	m3	18,400	105,770	56,140	1,946,168,000	1,032,976,000
(6) Shotcrete (t=100mm)	m2	1,400	52,830	18,960	73,962,000	26,544,000
(7) Rock bolt (D=25mm, L=2.5m)	m	1,800	40,900	7,140	73,620,000	12,852,000
(8) Steel support (H-150x150mm)	ton	10	2,666,660	1,066,420	26,666,600	10,664,200
(9) Backfill, Random material	m3	14,100	4,090	2,330	57,669,000	32,853,000
(10) Slope protection with shotcrete	m2	4,200	26,190	12,850	109,998,000	53,970,000
(11) Concrete, Open (180 kg/cm2)	m3	2,500	105,840	53,920	264,600,000	134,800,000
(12) Concrete, Tunnel (180 kg/cm2)	m3	6,600	120,730	63,540	796,818,000	419,364,000
(13) Concrete, Plug (150 kg/cm2)	m3	500	113,320	58,910	56,660,000	29,455,000
(14) Form, Open	m2	2,500	8,780	19,290	21,950,000	48,225,000
(15) Form, Tunnel	m2	7,300	46,760	5,630	341,348,000	41,099,000
(14) Re-bar, Open	ton	100	1,064,780	691,240	106,478,000	69,124,000
(15) Re-bar, Tunnel	ton	140	1,107,310	802,610	155,023,400	112,365,400
(16) Curtain grout tunnel	m	3,600	183,830	57,930	661,788,000	208,548,000
(17) Others (5 %)	L.S.				262,561,400	122,946,380
Total of Item 2.1					5,513,789,400	2,581,873,980
2.2 Cofferd Dam						
(1) Clearing and Stripping	m2	10,200	1,220	690	12,444,000	7,038,000
(2) Excavation, Common	m3	18,300	3,870	1,830	70,821,000	33,489,000
(3) Excavation, W. Rock	m3	7,900	6,940	3,240	54,826,000	25,596,000
(4) Embankment, Core	m3	10,800	13,590	6,370	146,772,000	68,796,000
(5) Embankment, Filter	m3	10,100	11,640	5,340	117,564,000	53,934,000
(6) Embankment, Rock	m3	54,900	30,630	10,750	1,681,587,000	590,175,000
(7) Others (3 %)	L.S.				62,520,420	23,370,840
Total of Item 2.2					2,146,534,420	802,398,840
2.3 Main Dam						
(1) Clearing and Stripping	m2	39,700	1,220	690	48,434,000	27,393,000
(2) Excavation, Common	m3	101,400	3,870	1,830	392,418,000	185,562,000
(3) Excavation, W. Rock	m3	43,400	6,940	3,240	301,196,000	140,616,000
(4) Embankment, Core	m3	59,800	13,590	6,370	812,682,000	380,926,000
(5) Embankment, Filter	m3	55,600	11,640	5,340	647,184,000	296,904,000
(6) Embankment, Rock	m3	303,800	30,630	10,750	9,305,394,000	3,265,850,000
(7) Blanket grouting	m	5,300	101,700	33,660	539,010,000	178,398,000
(8) Curtain grouting	m	13,100	183,560	57,840	2,404,636,000	757,704,000
(9) Others (5 %)	L.S.				722,547,700	261,667,650
Total of Item 2.3					15,173,501,700	5,495,020,650
2.4 Saddle Dam						
(1) Clearing and Stripping	m2	30,000	1,220	690	36,600,000	20,700,000
(2) Excavation, Common	m3	26,000	3,870	1,830	100,620,000	47,580,000
(3) Excavation, W. Rock	m3	11,000	6,940	3,240	76,340,000	35,640,000
(4) Embankment, Core	m3	5,600	13,590	6,370	76,104,000	35,672,000
(5) Embankment, Filter	m3	5,200	11,640	5,340	60,528,000	27,768,000
(6) Embankment, Rock	m3	28,300	30,630	10,750	866,829,000	304,225,000
(7) Blanket grouting	m	500	101,700	33,660	50,850,000	16,830,000
(8) Curtain grouting	m	1,200	183,560	57,840	220,272,000	69,408,000
(9) Others (5 %)	L.S.				74,407,150	27,891,150
Total of Item 2.4					1,562,550,150	585,714,150

Table 36 CONSTRUCTION COST FOR CILAWANG DAM (2/2)

Work item	Unit	Quantity	Unit price (Rp.)		Amount (Rp.)	
			FC	LC	FC	LC
2.5 Spillway						
(1) Clearing and Stripping	m2	13,500	1,220	690	16,470,000	9,315,000
(2) Excavation, Common	m3	13,500	5,380	2,580	72,630,000	34,830,000
(3) Excavation, W. Rock	m3	20,900	8,640	3,990	180,576,000	83,391,000
(4) Excavation, Hard Rock	m3	80,200	28,230	8,390	2,264,046,000	672,878,000
(5) Backfill, Impervious material	m3	4,300	4,340	2,470	18,662,000	10,621,000
(6) Backfill, Pervious material	m3	12,900	17,860	7,510	230,394,000	96,879,000
(7) Slope protection with shotcrete	m2	2,200	26,190	12,850	57,618,000	28,270,000
(8) Concrete, Open (210 kg/cm2)	m3	29,900	106,710	54,610	3,190,629,000	1,632,839,000
(9) Form, Open	m2	29,900	8,620	14,410	257,738,000	430,859,000
(10) Re-bar, Open	ton	1,500	1,064,780	691,240	1,597,170,000	1,036,860,000
(11) Others (5 %)	L.S.				394,296,650	201,837,100
Total of Item 2.5					8,280,229,650	4,238,579,100
2.6 Intake						
(1) Clearing and Stripping	m2	6,600	1,220	690	8,052,000	4,554,000
(2) Excavation, Common	m3	1,460	4,690	2,370	6,847,400	3,460,200
(3) Excavation, W. Rock	m3	2,920	7,410	3,470	21,637,200	10,132,400
(4) Excavation, Hard Rock	m3	10,220	20,120	7,880	205,626,400	80,533,600
(5) Embankment	m3	410	5,640	2,910	2,312,400	1,193,100
(6) Backfill, Random	m3	4,800	4,340	2,470	20,832,000	11,856,000
(7) Slope protection with sodfacing	m2	560	280	2,950	156,800	1,652,000
(8) Slope protection with shotcrete	m2	2,170	26,190	12,850	56,832,300	27,884,500
(9) Gravel bedding	m3	750	18,950	9,670	14,212,500	7,252,500
(10) Concrete, Open (210 kg/cm2)	m3	300	106,710	54,610	32,013,000	16,383,000
(11) Form, Open	m2	1,040	8,780	19,290	9,131,200	20,061,600
(12) Re-bar, Open	ton	30	1,064,780	691,240	31,943,400	20,737,200
(13) Waterstop	m	20	39,150	12,400	783,000	248,000
(14) Gravel metalling	m3	30	44,630	20,260	1,338,900	607,800
(15) Base course (Crushed stone)	m3	50	46,530	21,180	2,326,500	1,059,000
(16) Side ditch (U-300x300)	m	70	44,460	48,350	3,112,200	3,384,500
(17) Others (5 %)	L.S.				20,857,860	10,549,970
Total of Item 2.5					438,015,060	221,549,370
Total of Item 2					33,114,620,380	13,925,136,090
3. Metal Works						
3.1 Spillway						
(1) Radial gate (B9.0m*H9.5m*2sets)	ton	130	16,373,610	1,819,290	2,128,569,300	236,507,700
(2) Stoplogs (B9.0m*H9.5m*1set)	ton	90	15,410,450	1,712,280	1,386,940,500	154,105,200
Total of Item 3.1					3,515,509,800	390,612,900
3.2 Intake						
(1) Trash racks	ton	60	9,246,270	1,027,370	554,776,200	61,642,200
(2) Steel pipe	ton	40	9,631,530	1,070,170	385,261,200	42,806,800
(3) Hollow jet valve (Dia. 0.9 m)	set	1	279,314,370	31,034,930	279,314,370	31,034,930
(4) Sluice gate (Dia. 0.9 m)	set	1	224,394,770	24,932,820		
(5) Slid gate (1.0 mW X 0.5 m H)	set	1	224,394,770	24,932,820	224,394,770	24,932,820
(6) Stop logs	ton	60	15,410,450	1,712,280	924,627,000	102,736,800
Total of Item 3.2					2,368,373,540	263,153,550
3.3 Emergency River Outlet						
(1) Steel pipe	ton	40	9,631,530	1,070,170	385,261,200	42,806,800
(2) Hollow jet valve (Dia. 1.5m)	set	1	577,891,800	64,210,200	577,891,800	64,210,200
(3) Ring follower gate (Dia. 1.5m)	set	1	635,680,980	70,631,220	635,680,980	70,631,220
Total of Item 3.3					1,598,833,980	177,648,220
Total of Item 3					7,482,717,320	831,414,670
Construction Cost (Total of Items 1 to 3)					50,814,449,431	19,910,973,567
(Rounded up to)					50,814,450,000	19,910,974,000

Note : 1) Price level : August, 1994

2) Exchange Rate : Yen 1.00 = Rp. 21.84, US\$ 1.00 = Rp. 2,177.25

Table 37 CONSTRUCTION COST FOR TANJUNG DAM (1/3)

Work item	Unit	Quantity	Unit price (Rp.)		Amount (Rp.)	
			FC	LC	FC	LC
1. Preparation Works						
1.1 Relocation Road by Improvement of the Existing Road Detouring the Reservoir Area	km	20	866,672,000	391,561,480	17,333,440,000	7,831,229,600
1.2 Base Camp	L.S.	1	1,829,188,330	4,486,428,000	1,829,188,330	4,486,428,000
1.3 20 kv Distribution Line for Construction and Operation use	km	-	-	-	-	-
1.4 Telecommunication System	L.S.	1	3,059,350,290	123,076,800	3,059,350,290	123,076,800
1.5 Other works (2% of Item 2)	L.S.	1	-	-	5,309,369,213	2,148,832,593
Total of Item 1					27,531,347,833	14,589,566,993
2. Civil Works						
2.1 River Diversion Works (Tunnel D= 6.6m, L= 471m and 515m)						
(1) Clearing and Stripping	m2	3,600	1,220	690	4,392,000	2,484,000
(2) Excavation, Common	m3	334,000	3,870	1,830	1,292,580,000	611,220,000
(3) Excavation, W. Rock	m3	-	6,940	3,240	-	-
(4) Excavation, Hard Rock	m3	119,000	18,010	6,890	2,143,190,000	819,910,000
(5) Excavation, Tunnel	m3	13,200	105,770	56,140	1,396,164,000	741,048,000
(6) Shotcrete	m2	-	52,830	18,960	-	-
(7) Rock bolt (D=25mm, L=2.5m)	m	-	40,900	7,140	-	-
(8) Steel support (H-150x150mm)	ton	65.5	2,666,660	1,066,420	174,666,230	69,850,510
(9) Backfill, Random material	m3	-	4,090	2,330	-	-
(10) Slope protection with shotcrete	m2	-	26,190	12,850	-	-
(11) Concrete, Open (180 kg/cm2)	m3	-	105,840	53,920	-	-
(12) Concrete, Tunnel (180 kg/cm2)	m3	5,260	120,730	63,540	635,039,800	334,220,400
(13) Concrete, Plug (150 kg/cm2)	m3	460	113,320	58,910	52,127,200	27,098,600
(14) Form, Open	m2	-	8,780	19,290	-	-
(15) Form, Tunnel	m2	9,800	46,760	5,630	458,248,000	55,174,000
(14) Re-bar, Open	ton	-	1,064,780	691,240	-	-
(15) Re-bar, Tunnel	ton	263	1,107,310	802,610	291,222,530	211,086,430
(16) Consolidation grout, Tunnel	m	5,040	169,770	51,950	855,640,800	261,828,000
(17) Curtain grout, Tunnel	m	200	183,830	57,930	36,766,000	11,586,000
(18) Others (5 %)	L.S.	-	-	-	367,001,828	157,275,297
Total of Item 2.1					7,707,038,388	3,302,781,237
2.2 Cofferdam						
(1) Clearing and Stripping	m2	56,000	1,220	690	68,320,000	38,640,000
(2) Excavation, Common	m3	146,000	3,870	1,830	565,020,000	267,180,000
(3) Excavation, W. Rock	m3	-	6,940	3,240	-	-
(4) Embankment, Core	m3	161,000	12,380	5,830	1,993,180,000	938,630,000
(5) Embankment, Filter	m3	31,000	13,200	6,030	409,200,000	186,930,000
(6) Embankment, Rock	m3	211,000	35,990	13,140	7,593,890,000	2,772,540,000
(7) Others (5 %)	L.S.	-	-	-	531,480,500	210,196,000
Total of Item 2.2					11,161,090,500	4,414,116,000
2.3 Main Dam						
(1) Clearing and Stripping	m2	60,000	1,220	690	73,200,000	41,400,000
(2) Excavation, Common	m3	2,803,000	3,870	1,830	10,847,610,000	5,129,490,000
(3) Excavation, W. Rock	m3	-	6,940	3,240	-	-
(4) Excavation, Rock	m3	311,000	18,010	6,890	5,601,110,000	2,142,790,000
(5) Embankment, Core	m3	3,549,000	12,380	5,830	43,936,620,000	20,690,670,000
(6) Embankment, Filter	m3	703,000	13,200	6,030	9,279,600,000	4,239,090,000
(7) Embankment, Rock	m3	3,736,000	35,990	13,140	134,458,640,000	49,091,040,000
(8) Clay blanket	m3	400,000	12,380	5,830	4,952,000,000	2,332,000,000
(9) Blanket grouting	m	-	101,700	33,660	-	-
(10) Curtain grouting	m	40,000	183,560	57,840	7,342,400,000	2,313,600,000
(11) Others (2.5 %)	L.S.	-	-	-	10,824,559,000	4,299,004,000
Total of Item 2.3					227,315,739,000	90,279,084,000

Table 38 CONSTRUCTION COST FOR TANJUNG DAM (2/3)

Work item	Unit	Quantity	Unit price (Rp.)		Amount (Rp.)	
			FC	LC	FC	LC
2.4 Saddle Dam						
(1) Clearing and Stripping	m2	15,000	1,220	690	18,300,000	10,350,000
(2) Excavation, Common	m3	78,000	3,870	1,830	301,860,000	142,740,000
(3) Excavation, W. Rock	m3	-	6,940	3,240	-	-
(4) Excavation, Rock	m3	-	18,010	6,890	-	-
(4) Embankment, Core	m3	52,000	12,380	5,830	643,760,000	303,160,000
(5) Embankment, Filter	m3	4,930	13,200	6,030	65,076,000	29,727,900
(6) Embankment, Rock	m3	-	35,990	13,140	-	-
(7) Riprap	m3	3,690	53,000	22,550	195,570,000	83,209,500
(8) Blanket grouting	m	-	101,700	33,660	-	-
(9) Curtain grouting	m	-	183,560	57,840	-	-
(10) Sod facing	m2	10,600	280	2,950	2,968,000	31,270,000
(11) Others (5 %)	L.S.	-	-	-	61,376,700	30,022,870
Total of Item 2.4					1,288,910,700	630,480,270
2.5 Spillway						
(1) Clearing and Stripping	m2	48,000	1,220	690	58,560,000	33,120,000
(2) Excavation, Common	m3	20,000	5,380	2,580	107,600,000	51,600,000
(3) Excavation, W. Rock	m3	-	8,640	3,990	-	-
(4) Excavation, Hard Rock	m3	80,000	28,230	8,390	2,258,400,000	671,200,000
(5) Backfill, Impervious material	m3	20,000	4,340	2,470	86,800,000	49,400,000
(6) Backfill, Pervious material	m3	-	17,860	7,510	-	-
(7) Slope protection with shotcrete	m2	-	26,190	12,850	-	-
(8) Concrete, Open (210 kg/cm2)	m3	38,000	106,710	54,610	4,054,980,000	2,075,180,000
(9) Form, Open	m2	38,000	8,620	14,410	327,560,000	547,580,000
(10) Re-bar, Open	ton	1,450	1,064,780	691,240	1,543,931,000	1,002,298,000
(11) Wet masonry	m3	8,600	44,590	37,060	383,474,000	318,716,000
(12) Curtain grouting	m	2,000	183,560	57,840	367,120,000	115,680,000
(13) Others (5 %)	L.S.	-	-	-	459,421,250	243,238,700
Total of Item 2.5					9,647,846,250	5,108,012,700
2.6 Low Level Outlet and Shaft						
(1) Clearing and Stripping	m2	-	1,220	690	-	-
(2) Excavation, Common	m3	3,400	4,690	2,370	15,946,000	8,058,000
(3) Excavation, W. Rock	m3	-	7,410	3,470	-	-
(4) Excavation, Hard Rock	m3	300	20,120	7,880	6,036,000	2,364,000
(5) Excavation, Tunnel	m3	-	105,770	56,140	-	-
(6) Excavation, Shaft	m3	624	149,960	70,980	93,575,040	44,291,520
(7) Shotcrete, Tunnel	m2	-	52,830	18,960	-	-
(8) Rock bolt (D=25mm,L=2.5m)	m	-	40,900	7,140	-	-
(9) Steel support (H-125x125mm)	ton	2,400	2,666,660	1,066,420	6,399,984,000	2,559,408,000
(10) Slope protection with shotcrete	m2	-	26,190	12,850	-	-
(11) Concrete, Open (180 kg/cm2)	m3	400	105,840	53,920	42,336,000	21,568,000
(12) Concrete, Tunnel (180 kg/cm2)	m3	-	120,730	63,540	-	-
(13) Concrete, Shaft (180 kg/cm2)	m3	305	120,730	63,540	36,822,650	19,379,700
(14) Form, Open	m2	700	8,780	19,290	6,146,000	13,503,000
(15) Form, Tunnel	m2	-	46,760	5,630	-	-
(16) Re-bar, Open	ton	38	1,064,780	691,240	40,461,640	26,267,120
(17) Re-bar, Tunnel	ton	-	1,107,310	802,610	-	-
(18) Others (5 %)	L.S.	-	-	-	332,065,367	134,741,967
Total of Item 2.6					6,973,372,697	2,829,581,307

Table 39 CONSTRUCTION COST FOR TANJUNG DAM (3/3)

Work item	Unit	Quantity	Unit price (Rp.)		Amount (Rp.)	
			FC	LC	FC	LC
2.7 Intake for Tanjung Canal						
(1) Clearing and Stripping	m2	3,300	1,220	690	4,026,000	2,277,000
(2) Excavation, Common	m3	23,490	4,690	2,370	110,168,100	55,671,300
(3) Excavation, W. Rock	m3	-	7,410	3,470	-	-
(4) Excavation, Hard Rock	m3	2,610	20,120	7,880	52,513,200	20,566,800
(5) Excavation, Tunnel	m3	-	105,770	56,140	-	-
(6) Excavation, Shaft	m3	-	149,960	70,980	-	-
(7) Backfill, Impervious material	m3	5,200	4,340	2,470	22,568,000	12,844,000
(8) Shotcrete, Tunnel	m2	-	52,830	18,960	-	-
(9) Rock bolt (D=25mm,L=2.5m)	m	-	40,900	7,140	-	-
(10) Steel support (H-125x125mm)	ton	-	2,666,660	1,066,420	-	-
(11) Slope protection with sod facing	m2	520	280	2,950	145,600	1,534,000
(12) Slope protection with shotcrete	m2	2,300	26,190	12,850	60,237,000	29,555,000
(13) Concrete, Open (180 kg/cm2)	m3	4,700	105,840	53,920	497,448,000	253,424,000
(14) Concrete, Tunnel (180 kg/cm2)	m3	-	120,730	63,540	-	-
(15) Concrete, Shaft (180 kg/cm2)	m3	-	120,730	63,540	-	-
(16) Form, Open	m2	7,000	8,780	19,290	61,460,000	135,030,000
(17) Form, Tunnel	m2	-	46,760	5,630	-	-
(18) Re-bar, Open	ton	470	1,064,780	691,240	500,446,600	324,882,800
(19) Re-bar, Tunnel	ton	-	1,107,310	802,610	-	-
(20) Others (5 %)	L.S.	-	-	-	65,450,625	41,789,245
Total of Item 2.7					1,374,463,125	877,574,145
Total of Item 2					265,468,460,660	107,441,629,659
3. Metal Works						
3.1 River Diversion Gate (4mx4m)	ton	18	15,410,450	1,712,280	277,388,100	30,821,040
3.2 Low Level Outlet						
(1) Screen	ton	6	9,246,270	1,027,370	55,477,620	6,164,220
(2) Intake gate	ton	20	15,410,450	1,712,280	308,209,000	34,245,600
(3) Steel pipe (Dia. 1.7 m)	ton	8	9,631,530	1,070,170	77,052,240	8,561,360
(4) Guard valve (Dia. 1.7 m)	set	1	589,449,640	65,494,410	589,449,640	65,494,410
(5) Hollow jet valve (Dia. 1.7 m)	set	1	720,438,450	80,048,720	720,438,450	80,048,720
Total of Item 3.2					1,750,626,950	194,514,310
3.3 Intake for Tanjung Canal						
(1) Stoplog (1.5mW x 11.3mH x 1 set)	ton	9	15,410,450	1,712,280	138,694,050	15,410,520
(2) Roller gate (1.5mW x 2.0mH x 2 sets)	ton	12	15,410,450	1,712,280	184,925,400	20,547,360
Total of Item 3.3					323,619,450	35,957,880
Total of Item 3					2,351,634,500	261,293,230
Construction Cost (Total of Items 1 to 3)					295,351,442,993	122,292,489,882
(Rounded up to)					295,351,443,000	122,292,490,000

Note : 1) Price level : August, 1994

2) Exchange Rate : Yen 1.00 = Rp. 21.84, US\$ 1.00 = Rp. 2,177.25

Table 40 CONSTRUCTION COST FOR PASIR KOPO DAM IN THE SCENARIO C (1/2)

Work item	Unit	Quan- tity	Unit price (Rp.)		Amount (Rp.)		
			FC	LC	FC	LC	
1. Preparation Works							
1.1 Access road by improvement of existing village road	km	2	866,671,990	389,461,480	1,733,343,980	778,922,960	
1.2 Base camp	L.S.	1	1,005,010,140	2,285,248,680	1,005,010,140	2,285,248,680	
1.3 20 kv distribution line for construction and operation use	km	2	11,040,990	2,205,140	22,081,980	4,410,280	
1.4 Telecommunication system	L.S.	1	3,059,350,290	123,076,800	3,059,350,290	123,076,800	
1.5 Other works (2% of item 2)	L.S.	1			116,395,728	63,833,174	
Total of Item 1					5,936,182,118	3,255,491,894	
2. Civil Works							
2.1 River Diversion Works (Tunnel D= 6.6m, L= 471m and 515m)							
(1) Clearing and stripping	m2	3,900	1,210	690	4,719,000	2,691,000	
(2) Excavation, common	m3	6,000	3,870	1,830	23,220,000	10,980,000	
(3) Excavation, weathered rock	m3	5,900	6,930	3,230	40,887,000	19,057,000	
(4) Excavation, hard rock	m3	14,300	18,010	6,890	257,543,000	98,527,000	
(5) Excavation, tunnel	m3	19,200	105,770	56,130	2,030,784,000	1,077,696,000	
(6) Shotcrete t=10 cm, tunnel	m2	10,400	52,830	18,960	549,432,000	197,184,000	
(7) Rock bolt (D=25mm,L=2.5m)	m	5,300	40,890	7,130	216,717,000	37,789,000	
(8) Steel support (H-150x150mm)	ton	27	2,666,660	1,066,410	71,999,820	28,793,070	
(9) Backfill, random material	m3	-	4,080	2,320	-	-	
(10) Slope protection (shotcrete t=10cm)	m2	3,000	26,180	12,840	78,540,000	38,520,000	
(11) Concrete, open (180 kg/cm2)	m3	6,200	105,840	53,920	656,208,000	334,304,000	
(12) Concrete, tunnel (180 kg/cm2)	m3	4,700	120,730	63,540	567,431,000	298,638,000	
(13) Concrete, plug (150 kg/cm2)	m3	300	113,320	58,900	33,996,000	17,670,000	
(14) Form, open	m2	2,700	8,780	19,280	23,706,000	52,056,000	
(15) Form, tunnel	m2	8,300	46,760	5,620	388,108,000	46,646,000	
(16) Re-bar, open	ton	310	1,064,770	691,240	330,078,700	214,284,400	
(17) Re-bar, tunnel	ton	94	1,107,300	802,610	104,086,200	75,445,340	
(18) Curtain grout, tunnel	m	5,800	183,820	57,920	1,066,156,000	335,936,000	
(19) Others (5 %)	L.S.				322,180,586	144,310,841	
Total of Item 2.1					6,765,792,306	3,030,527,651	
2.2 Cofferdam							
(1) Clearing and stripping	m2	9,700	1,210	690	11,737,000	6,693,000	
(2) Excavation, common	m3	17,200	3,870	1,830	66,564,000	31,476,000	
(3) Excavation, weathered rock	m3	2,100	6,930	3,230	14,553,000	6,783,000	
(4) Excavation, hard rock	m3	400	18,010	6,890	7,204,000	2,756,000	
(5) Embankment, core	m3	15,800	13,590	6,360	214,722,000	100,488,000	
(6) Embankment, filter	m3	9,700	11,640	5,330	112,908,000	51,701,000	
(7) Embankment, rock	m3	94,800	30,620	10,740	2,902,776,000	1,018,152,000	
(8) Others (5 %)	L.S.				166,523,200	60,902,450	
Total of Item 2.2					3,496,987,200	1,278,951,450	
2.3 Main Dam							
(1) Clearing and stripping	m2	33,000	1,210	690	39,930,000	22,770,000	
(2) Excavation, common	m3	70,500	3,870	1,830	272,835,000	129,015,000	
(3) Excavation, weathered rock	m3	27,100	6,930	3,230	187,803,000	87,533,000	
(4) Excavation, hard rock	m3	14,000	28,230	8,390	395,220,000	117,460,000	
(5) Embankment, core	m3	88,800	13,590	6,360	1,206,792,000	564,768,000	
(6) Embankment, filter	m3	92,000	11,640	5,330	1,070,880,000	490,360,000	
(7) Embankment, rock	m3	520,200	30,620	10,740	15,928,524,000	5,586,948,000	
(8) Blanket grouting	m	4,360	101,700	33,660	443,412,000	146,757,600	
(9) Curtain grouting	m	10,300	183,550	57,830	1,890,565,000	595,649,000	
(10) Back fill with spoil material	m3	33,000	4,340	2,460	143,220,000	81,180,000	
(11) Slope protection	m2	8,000	105,840	53,920	846,720,000	431,360,000	
(12) Others (5 %)	L.S.				1,121,295,050	412,690,030	
Total of Item 2.3					23,547,196,050	8,666,490,630	

Table 41 CONSTRUCTION COST FOR PASIR KOPO DAM IN THE SCENARIO C (2/2)

Work item	Unit	Quantity	Unit price (Rp.)		Amount (Rp.)	
			FC	LC	FC	LC
2.4 Spillway						
(1) Clearing and stripping	m2	38,000	1,210	690	45,980,000	26,220,000
(2) Excavation, common	m3	90,000	5,370	2,570	483,300,000	231,300,000
(3) Excavation, weathered rock	m3	96,000	8,640	3,980	829,440,000	382,080,000
(4) Excavation, hard rock	m3	172,000	28,230	8,390	4,855,560,000	1,443,080,000
(5) Backfill, random material	m3	42,400	4,340	2,460	184,016,000	104,304,000
(6) Slope Protection (shotcrete t=210cm)	m2	13,200	26,180	12,840	345,576,000	169,488,000
(7) Concrete, open (210 kg/cm2)	m3	80,000	106,700	54,610	8,536,000,000	4,368,800,000
(8) Form, open	m2	41,000	8,620	14,400	353,420,000	590,400,000
(9) Re-bar, open	ton	4,000	1,064,770	691,240	4,259,080,000	2,764,960,000
(10) Others (5 %)	L.S.				994,618,600	504,031,600
Total of Item 2.4					19,892,372,000	10,080,632,000
2.5 Intake and Emergency Outlet						
(1) Clearing and stripping	m2	3,750	1,210	690	4,537,500	2,587,500
(2) Excavation, common	m3	7,100	4,680	2,370	33,228,000	16,827,000
(3) Excavation, weathered rock	m3	9,500	7,410	3,470	70,395,000	32,965,000
(4) Excavation, hard rock	m3	14,000	20,120	7,880	281,680,000	110,320,000
(5) Excavation, tunnel	m3	2,400	105,770	56,130	253,848,000	134,712,000
(6) Shotcrete, tunnel	m2	1,500	52,830	18,960	79,245,000	28,440,000
(7) Rock bolt (D=25mm,L=2.5m)	m	1,330	40,890	7,130	54,383,700	9,482,900
(8) Steel support (H-150x150mm)	ton	4	2,666,660	1,066,410	10,666,640	4,265,640
(9) Slope protection with shotcrete	m2	3,000	26,180	12,840	78,540,000	38,520,000
(10) Concrete, open (180 kg/cm2)	m3	1,700	105,840	53,920	179,928,000	91,664,000
(11) Concrete, tunnel (180 kg/cm2)	m3	770	120,730	63,540	92,962,100	48,925,800
(12) Form, open	m2	2,900	8,780	19,280	25,462,000	55,912,000
(13) Form, tunnel	m2	400	46,760	5,620	18,704,000	2,248,000
(14) Re-bar, open	ton	85	1,064,770	691,240	90,505,450	58,755,400
(15) Re-bar, tunnel	ton	20	1,107,300	802,610	22,146,000	16,052,200
(16) Others (5 %)	L.S.				64,811,570	32,583,872
Total of Item 2.5					1,361,042,960	684,261,312
Total of Item 2					55,063,390,516	23,740,863,043
3. Metal Works						
3.1 Intake						
(1) Trash racks	ton	430	9,246,270	1,027,360	3,975,896,100	441,764,800
(2) Hollow jet valve (diameter of 1.6 m)	set	1	649,165,120	72,129,460	649,165,120	72,129,460
(3) Intake gate	ton	32	15,410,450	1,712,270	493,134,400	54,792,640
Total of Item 3.1					5,118,195,620	568,686,900
3.2 Emergency outlet						
(1) Steel pipe (diameter of 3.5 m)	ton	350	9,631,530	1,070,170	3,371,035,500	374,559,500
(2) Hollow jet valve (diameter of 3.0 m)	set	1	1,984,095,180	220,455,020	1,984,095,180	220,455,020
(3) Emergency gate	ton	90	15,410,450	1,712,270	1,386,940,500	154,104,300
Total of Item 3.2					6,742,071,180	749,118,820
Total of Item 3					11,860,266,800	1,317,805,720
Construction Cost (Total of Items 1 to 3)					72,859,839,433	28,314,160,657
(Rounded up to)					72,859,840,000	28,314,161,000

Note : 1) Price level : August, 1994

2) Exchange Rate : Yen 1.00 = Rp. 21.84, US\$ 1.00 = Rp. 2,177.25

Remarks The estimated work quantities are based on preliminary design at the master plan level.

Table 42 CONSTRUCTION COST FOR PASIR KOPO DAM IN THE SCENARIO A (1/2)

Work item	Unit	Quantity	Unit price (Rp.)		Amount (Rp.)	
			FC	LC	FC	LC
1. Preparation Works						
1.1 Access road by improvement of existing village road	km	2	866,671,990	389,461,480	1,733,343,980	778,922,960
1.2 Base Camp	L.S.	1	1,005,010,140	2,285,248,680	1,005,010,140	2,285,248,680
1.3 20 kv Distribution Line for Construction and operation use	km	2	11,040,990	2,205,140	22,081,980	4,410,280
1.4 Telecommunication system	L.S.	1	3,059,350,290	123,076,800	3,059,350,290	123,076,800
1.5 Other works (2% of item 2)	L.S.	1			116,395,728	63,833,174
<i>Total of Item 1</i>					5,936,182,118	3,255,491,894
2. Civil Works						
2.1 River Diversion Works (Tunnel D= 6.6m, L= 471m and 515m)						
(1) Clearing and stripping	m2	1,700	1,210	690	2,057,000	1,173,000
(2) Excavation, common	m3	2,800	3,870	1,830	10,836,000	5,124,000
(3) Excavation, weathered rock	m3	3,500	6,930	3,230	24,255,000	11,305,000
(4) Excavation, hard rock	m3	5,800	18,010	6,890	104,458,000	39,962,000
(5) Excavation, tunnel	m3	16,300	105,770	56,130	1,724,051,000	914,919,000
(6) Shotcrete t=10 cm, tunnel	m2	9,100	52,830	18,960	480,753,000	172,536,000
(7) Rock bolt (D=25mm,L=2.5m)	m	4,500	40,890	7,130	184,005,000	32,085,000
(8) Steel support (H-150x150mm)	ton	28	2,666,660	1,066,410	74,666,480	29,859,480
(9) Backfill, random material	m3		4,080	2,320		
(10) Slope protection (shotcrete t=10cm)	m2	1,000	26,180	12,840	26,180,000	12,840,000
(11) Concrete, open (180 kg/cm2)	m3	6,200	105,840	53,920	656,208,000	334,304,000
(12) Concrete, tunnel (180 kg/cm2)	m3	4,200	120,730	63,540	507,066,000	266,868,000
(13) Concrete, plug (150 kg/cm2)	m3	500	113,320	58,900	56,660,000	29,450,000
(14) Form, open	m2	2,700	8,780	19,280	23,706,000	52,056,000
(15) Form, tunnel	m2	7,300	46,760	5,620	341,348,000	41,026,000
(16) Re-bar, open	ton	310	1,064,770	691,240	330,078,700	214,284,400
(17) Re-bar, tunnel	ton	84	1,107,300	802,610	93,013,200	67,419,240
(18) Curtain grout, tunnel	m	5,800	183,820	57,920	1,066,156,000	335,936,000
(19) Others (5 %)	L.S.				285,274,869	128,057,356
<i>Total of Item 2.1</i>					5,990,772,249	2,689,204,476
2.2 Cofferdam						
(1) Clearing and stripping	m2	9,700	1,210	690	11,737,000	6,693,000
(2) Excavation, common	m3	17,200	3,870	1,830	66,564,000	31,476,000
(3) Excavation, weathered rock	m3	2,100	6,930	3,230	14,553,000	6,783,000
(4) Embankment, core	m3	8,510	13,590	6,360	115,650,900	54,123,600
(5) Embankment, filter	m3	5,400	11,640	5,330	62,856,000	28,782,000
(6) Embankment, rock	m3	46,000	30,620	10,740	1,408,520,000	494,040,000
(7) Others (5 %)	L.S.				83,994,045	31,094,880
<i>Total of Item 2.2</i>					1,763,874,945	652,992,480
2.3 Main Dam						
(1) Clearing and stripping	m2	28,000	1,210	690	33,880,000	19,320,000
(2) Excavation, common	m3	45,900	3,870	1,830	177,633,000	83,997,000
(3) Excavation, weathered rock	m3	14,000	6,930	3,230	97,020,000	45,220,000
(4) Excavation, hard rock	m3	9,100	28,230	8,390	256,893,000	76,349,000
(5) Embankment, core	m3	55,600	13,590	6,360	755,604,000	353,616,000
(6) Embankment, filter	m3	58,700	11,640	5,330	683,268,000	312,871,000
(7) Embankment, rock	m3	306,300	30,620	10,740	9,378,906,000	3,289,662,000
(8) Blanket grouting	m	3,040	101,700	33,660	309,168,000	102,326,400
(9) Curtain grouting	m	8,600	183,550	57,830	1,578,530,000	497,338,000
(10) Back fill with spoil material	m3	37,500	4,340	2,460	162,750,000	92,250,000
(11) Slope protection	m2	6,900	105,840	53,920	730,296,000	372,048,000
(12) Others (5 %)	L.S.				708,197,400	262,249,870
<i>Total of Item 2.3</i>					14,872,145,400	5,507,247,270

Table 43 CONSTRUCTION COST FOR PASIR KOPO DAM IN THE SCENARIO A (2/2)

Work item	Unit	Quantity	Unit price (Rp.)		Amount (Rp.)	
			FC	LC	FC	LC
2.4 Spillway						
(1) Clearing and stripping	m2	43,000	1,210	690	52,030,000	29,670,000
(2) Excavation, common	m3	93,000	5,370	2,570	499,410,000	239,010,000
(3) Excavation, weathered rock	m3	108,000	8,640	3,980	933,120,000	429,840,000
(4) Excavation, hard rock	m3	159,000	28,230	8,390	4,488,570,000	1,334,010,000
(5) Backfill, random material	m3	18,200	4,340	2,460	78,988,000	44,772,000
(6) Slope Protection (shotcrete t=210cm)	m2	13,200	26,180	12,840	345,576,000	169,488,000
(7) Concrete, open (210 kg/cm2)	m3	82,600	106,700	54,610	8,813,420,000	4,510,786,000
(8) Form, open	m2	37,000	8,620	14,400	318,940,000	532,800,000
(9) Re-bar, open	ton	4,200	1,064,770	691,240	4,472,034,000	2,903,208,000
(10) Others (5 %)	L.S.				1,000,104,400	509,679,200
Total of Item 2.4					20,002,088,000	10,193,584,000
2.5 Intake and Emergency Outlet						
(1) Clearing and stripping	m2	1,900	1,210	690	2,299,000	1,311,000
(2) Excavation, common	m3	3,100	4,680	2,370	14,508,000	7,347,000
(3) Excavation, weathered rock	m3	3,800	7,410	3,470	28,158,000	13,186,000
(4) Excavation, hard rock	m3	15,000	20,120	7,880	301,800,000	118,200,000
(5) Excavation, tunnel	m3	1,500	105,770	56,130	158,655,000	84,195,000
(6) Shotcrete, tunnel	m2	800	52,830	18,960	42,264,000	15,168,000
(7) Rock bolt (D=25mm,L=2.5m)	m	660	40,890	7,130	26,987,400	4,705,800
(8) Steel support (H-150x150mm)	ton	-	2,666,660	1,066,410	-	-
(9) Slope protection with shotcrete	m2	800	26,180	12,840	20,944,000	10,272,000
(10) Concrete, open (180 kg/cm2)	m3	2,040	105,840	53,920	215,913,600	109,996,800
(11) Concrete, tunnel (180 kg/cm2)	m3	370	120,730	63,540	44,670,100	23,509,800
(12) Form, open	m2	1,800	8,780	19,280	15,804,000	34,704,000
(13) Form, tunnel	m2	680	46,760	5,620	31,796,800	3,821,600
(14) Re-bar, open	ton	102	1,064,770	691,240	108,606,540	70,506,480
(15) Re-bar, tunnel	ton	10	1,107,300	802,610	11,073,000	8,026,100
(16) Others (5 %)	L.S.				51,173,972	25,247,479
Total of Item 2.5					1,074,653,412	530,197,059
Total of Item 2					43,703,534,006	19,573,225,285
3. Metal Works						
3.1 Intake						
(1) Trash racks	ton	150	9,246,270	1,027,360	1,386,940,500	154,104,000
(2) Steel pipe (diameter of 1.7 m)	ton	90	9,631,530	1,070,170	866,837,700	96,315,300
(3) Hollow jet valve (diameter of 1.5 m)	set	1	577,891,800	64,210,200	577,891,800	64,210,200
(4) Intake gate	ton	21	15,410,450	1,712,270	323,619,450	35,957,670
(5) Stop log	ton	160	15,410,450	1,712,270	2,465,672,000	273,963,200
Total of Item 3.1					5,620,961,450	624,550,370
3.2 Emergency outlet						
(1) Steel pipe (diameter of 2.2 m)	ton	110	9,631,530	1,070,170	1,059,468,300	117,718,700
(2) Hollow jet valve (diameter of 2.0 m)	set	1	963,153,000	107,017,000	963,153,000	107,017,000
(3) Emergency gate	ton	100	15,410,450	1,712,270	1,541,045,000	171,227,000
Total of Item 3.2					3,563,666,300	395,962,700
Total of Item 3					9,184,627,750	1,020,513,070
Construction Cost (Total of Items 1 to 3)					58,824,343,874	23,849,230,249
(Rounded up to)					58,824,344,000	23,849,231,000

Note : 1) Price level : August, 1994

2) Exchange Rate : Yen 1.00 = Rp. 21.84, US\$ 1.00 = Rp. 2,177.25

Remarks The estimated work quantities are based on preliminary design at the master plan level.

Table 44 CONSTRUCTION COST FOR RIVER IMPROVEMENT WORKS

Work item	Unit	Quantity	Unit price (Rp.)		Amount (Rp.)	
			FC	LC	FC	LC
1. Preparation Works						
1.1 Access Road Improvement of Existing Village Road	km	10	179,897,740	117,011,520	1,798,977,400	1,170,115,200
1.2 Base Camp	L.S.	1	502,505,070	1,142,624,340	502,505,070	1,142,624,340
1.3 Other Work (2% of Item 2)	L.S.				357,228,780	227,842,919
Total of Item 1					2,658,711,250	2,540,582,459
2. Civil Works						
2.1 Earth Works						
(1) Clearing and Stripping	m2	1,300,000	1,210	690	1,573,000,000	897,000,000
(2) Dredging	m3	559,900	4,320	3,120	2,418,768,000	1,746,888,000
(3) Excavation, Common	m3	810,500	3,297	1,600	2,672,218,500	1,296,800,000
(4) Excavation, Short-cut	m3	580,000	4,870	2,350	2,824,600,000	1,363,000,000
(5) Excavation, Soft rock	m3	13,500	6,930	3,230	93,555,000	43,605,000
(6) Embankment, Borrowed material (L=1.0 km)	m3	69,100	5,640	2,900	389,724,000	200,390,000
(7) Embankment, Borrowed material (L=0.5 km)	m3	302,300	5,230	2,760	1,581,029,000	834,348,000
(8) Embankment, Excavated material	m3	302,900	3,690	2,220	1,117,701,000	672,438,000
(9) Sod facing	m2	370,800	270	2,950	100,116,000	1,093,860,000
(10) Drainage ditch	m3	16,500	6,050	2,920	99,825,000	48,180,000
(11) Others (10 %)	L.S.				1,287,053,650	819,650,900
Total of Item 2.1					14,157,590,150	9,016,159,900
2.2 Structural Works						
(1) Wet masonry	m3	2,800	44,590	37,050	124,852,000	103,740,000
(2) Dry masonry	m3	47,400	12,870	9,480	610,038,000	449,352,000
(3) Gabion	m3	6,700	32,960	17,650	220,832,000	118,255,000
(4) Groyn	pc	180	822,160	2,568,310	147,988,800	462,295,800
(5) Box culvert (1.5mx1.5mx1box)	m	25	1,301,880	585,030	32,547,000	14,625,750
(6) Box culvert (2.5mx2.0mx2boxes)	m	25	2,733,940	1,228,570	68,348,500	30,714,250
(7) Box culvert (3.0mx3.0mx2boxes)	m	50	2,994,320	1,345,570	149,716,000	67,278,500
(8) Others (10 %)	L.S.				135,432,230	124,626,130
Total of Item 2.2					1,489,754,530	1,370,887,430
2.3 Road Works						
(1) Inspection road (Gravel)	m3	45,100	44,630	20,260	2,012,813,000	913,726,000
(2) Others (10 %)	L.S.				201,281,300	91,372,600
Total of Item 2.3					2,214,094,300	1,005,098,600
Total of Item 2					17,861,438,980	11,392,145,930
Construction Cost (Total of Items 1 and 2)					20,520,150,230	13,932,728,389
(Rounded up to)					20,520,151,000	13,932,729,000

Note : 1) Price level : August, 1994

2) Exchange Rate : Yen 1.00 = Rp. 21.84, US\$ 1.00 = Rp. 2,177.25

Table 45 DISBURSEMENT SCHEDULE IN FIRST PHASE (1/2)

Karian Dam

Description	Disbursement (F.C. in million Rp)										Disbursement (L.C. in million Rp)								
	Total	1995	1996	1997	1998	1999	2000	2001	2002	Total	1995	1996	1997	1998	1999	2000	2001	2002	
I. Basic Cost																			
1) Preparatory Works	11,032				8,274	2,758				7,266				5,450	1,817				
2) Civil Works																			
River diversion	13,930				4,040	7,940	1,950			6,451				1,871	3,677	903			
Coffer dam	4,237						4,237			1,605						1,605			
Main dam	51,844				7,777	15,553	15,553	12,961		19,309				2,896	5,793	5,793	4,827		
Saddle dam	6,414				2,117	4,297				2,429				802	1,627				
Spillway	10,491					2,623	3,882	3,987		4,616					1,154	1,708	1,754		
Intake	849					340	509			482					193	289			
Subtotal	87,765				13,933	30,753	26,131	16,948		34,892				5,569	12,444	10,298	6,581		
3) Metal Works	11,390					3,417	3,417	3,417	1,139	1,266					380	380	380	127	
Total of 1 to 3	110,187				22,207	36,928	29,548	20,365	1,139	43,424				11,018	14,640	10,678	6,961	127	
4) Engineering Service	15,426	1,620	2,314	694	2,052	2,700	2,700	2,700	648	3,908	410	586	176	520	684	684	684	164	
5) Administration										7,681	768	768	768	1,152	1,152	1,152	1,152	768	
6) Compensation Cost										58,714			39,338	19,376					
7) Tax (PPN)										17,295	203	290	87	3,580	5,495	4,361	3,071	208	
Total of 1 to 7	125,613	1,620	2,314	694	24,259	39,628	32,248	23,064	1,787	131,021	1,381	1,644	40,369	35,645	21,971	16,875	11,868	1,267	
II. Contingency																			
1) Physical	12,561	162	231		2,426	3,963	3,225	2,306	179	13,102	138	164	4,037	3,565	2,197	1,687	1,187	127	
2) Price Escalation	21,647	49	141	64	3,045	6,312	6,258	5,302	477	53,483	111	274	10,484	12,850	10,312	9,903	8,472	1,078	
Total of 1 & 2	34,208	211	372		5,471	10,274	9,483	7,608	655	66,585	249	438	14,521	16,414	12,509	11,591	9,659	1,204	
III. Interest during Construction	14,946	48	117	135	908	2,206	3,291	4,088	4,152										
Financial Cost	174,767	1,878	2,804	830	30,638	52,108	45,022	34,761	6,594	197,606	1,630	2,082	54,891	52,060	34,480	28,466	21,527	2,471	
IV. O & M	935									355								1,290	

Ciyuh Tunnel

Description	Disbursement (F.C. in million Rp)										Disbursement (L.C. in million Rp)								
	Total	1995	1996	1997	1998	1999	2000	2001	2002	Total	1995	1996	1997	1998	1999	2000	2001	2002	
I. Basic Cost																			
1) Preparatory Works	469				469					205				205					
2) Civil Works																			
Inlet and Outlet	465				465					260				260					
Tunnel	7,263				436	2,542	1,307	2,542	436	3,076				185	1,077	554	1,077	185	
Intake Shaft	2,216						1,418	798		823						527	296		
Approach Channel	333							266	67	224						179	45		
Subtotal	10,277				901	2,542	2,726	3,606	502	4,383				445	1,077	1,260	1,418	185	
3) Metal Works	2,021					606	606	606	202	225					68	68	68	23	
Total of 1 to 3	12,767				1,370	3,148	3,332	4,213	704	4,813				650	1,144	1,327	1,485	207	
4) Engineering Service	1,787	188	268	80	238	313	313	313	75	433	45	65	19	58	76	76	76	18	
5) Administration										879	88	88	88	132	132	132	132	88	
6) Compensation Cost										1,980	23	33	10	231	468	505	609	100	
7) Tax (PPN)																			
Total of 1 to 7	14,554	188	268	80	1,608	3,461	3,645	4,525	780	8,105	157	186	117	1,070	1,820	2,040	2,301	414	
II. Contingency																			
1) Physical	1,455	19	27	8	161	346	364	453	78	811	16	19		107	182	204	230	41	
2) Price Escalation	2,738	6	16	7	202	551	707	1,040	208	4,506	13	31	30	386	854	1,197	1,643	352	
Total of 1 & 2	4,193	24	43	16	363	897	1,072	1,493	286	5,316	28	50	30	493	1,036	1,401	1,873	393	
III. Interest during Construction	1,534	6	14	16	67	181	303	460	487										
Financial Cost	20,281	218	325	112	2,037	4,539	5,020	6,478	1,553	13,422	185	236	148	1,563	2,856	3,440	4,174	807	
IV. O & M	113									45								158	

Note: Engineering service FC : 14 % and LC : 9 % for total of items I.1 to I.3.
Administration FC : 5 % and LC : 5 % for total of items I.1 to I.3.
Tax FC : 10 % and LC : 10 % for total of items I.1 to I.4.
O&M 1 % for Item I.2 and 0.5 % for Item I.3 in both FC and LC

Physical Contingency FC : 10 % and LC : 10 % for total of items I.
Price escalation FC : 3 % and LC : 8 % for total of items I.
Interest rate 2.6 % for FC

Table 46 DISBURSEMENT SCHEDULE IN FIRST PHASE (2/2)

Karia-Serpong Conveyance System (KSCS)

Description	Disbursement (F.C. in million Rp)										Disbursement (L.C. in million Rp)									
	Total	1995	1996	1997	1998	1999	2000	2001	2002	Total	1995	1996	1997	1998	1999	2000	2001	2002	Total	1995
I. Basic Cost																				
1) Preparatory Works	10,703				10,703					8,799				8,799						
2) Civil Works																				
Waterway	72,652				9,445	19,616	19,616	19,616	4,359	45,794				5,953	12,364	12,364	12,364	2,748		
Syphon	4,455				579	1,292	1,292	1,292		2,769				360	803	803	803			
Railway Crossing	6,537							6,014	523	1,863							1,714	149		
Road Crossing	3,589				251	1,113	1,113	1,113		2,272				159	704	704	704			
Spillway at Cicinta	191							191		123							123			
Division Structure at Tenjo	856						856			543						543				
Division Structure at Parumpanjang	194					194				124					124					
Inspection Road	5,164						2,582	2,582		3,988						1,994	1,994			
Foot path	132				25	36	36	36		61				12	16	16	16			
Cross Drain	3,232				420	937	937	937		2,317				301	672	672	672			
Subtotal	97,002				10,720	23,188	26,432	31,781	4,882	59,854				6,785	14,684	17,097	18,391	2,897		
3) Metal Works																				
Syphon	59				8	17	17	17		7				1	2	2	2			
Spillway at Cicinta	372							372		41							41			
Division Structure at	945						945			105						105				
Division Structure at	518					518				58					58					
Subtotal	1,894				8	535	962	389		211				1	60	107	43			
Total of 1 to 3	109,599				21,431	23,723	27,394	32,170	4,882	68,864				15,585	14,744	17,204	18,434	2,897		
4) Engineering Service	15,344	1,611	2,302	690	2,041	2,685	2,685	2,685	644	6,198	651	930	279	824	1,085	1,085	1,085	260		
5) Administration										8,923	892	892	892	1,338	1,338	1,338	1,338	892		
6) Compensation Cost										6,266				4,198						
7) Tax (PPN)										20,001	226	323	97	3,988	4,224	4,837	5,437	868		
Total of 1 to 7	124,943	1,611	2,302	690	23,472	26,408	30,079	34,855	5,527	110,251	1,769	2,145	5,466	23,804	21,391	24,464	26,295	4,918		
II. Contingency																				
1) Physical	12,494	161	230		2,347	2,641	3,008	3,485	553	11,025	177	215		2,380	2,139	2,446	2,629	492		
2) Price Escalation	22,728	48	140	64	2,946	4,206	5,837	8,012	1,474	57,850	142	357	1,420	8,581	10,039	14,357	18,770	4,185		
Total of 1 & 2	35,222	209	370		5,293	6,847	8,845	11,498	2,027	68,875	318	571	1,420	10,961	12,178	16,804	21,399	4,676		
III. Interest during Construction	13,813	47	117	135	883	1,747	2,759	3,964	4,161											
Financial Cost	173,978	1,868	2,789	825	29,648	35,002	41,683	50,317	11,714	179,127	2,088	2,717	6,886	34,765	33,569	41,268	47,694	9,594		
IV. O & M	979									600								1,579		

First Phase : River Improvement Works

Description	Disbursement (F.C. in million Rp)										Disbursement (L.C. in million Rp)									
	Total	1995	1996	1997	1998	1999	2000	2001	2002	Total	1995	1996	1997	1998	1999	2000	2001	2002	Total	1995
I. Basic Cost																				
1) Preparatory Works	2,659				2,659					2,541				2,541						
2) Civil Works																				
Earth Works	14,158				2,690	3,823	3,823	3,823		9,016				1,713	2,434	2,434	2,434			
Structural Works	1,490				283	402	402	402		1,371				260	370	370	370			
Road Works	2,214						1,107	1,107		1,005						503	503			
Subtotal	17,862				2,973	4,225	5,332	5,332		11,392				1,974	2,804	3,307	3,307			
Total of 1 & 2	20,521				5,632	4,225	5,332	5,332		13,933				4,515	2,804	3,307	3,307			
3) Engineering Service	2,873	302	431	129	382	503	503	503	121	1,254	132	188	56	167	219	219	219	53		
4) Administration										1,723	172	172		258	258	258	258	172		
5) Compensation Cost										1,926				636						
6) Tax (PPN)										3,858	43	62	19	1,070	775	936	936	17		
Total of 1 to 6	23,394	302	431	129	6,014	4,728	5,835	5,835	121	22,694	347	422	1,538	6,645	4,058	4,721	4,721	242		
II. Contingency																				
1) Physical	3,503	45	65	13	902	709	875	875	18	3,404	52	63	231	997	609	708	708	36		
2) Price Escalation	4,061	9	26	12	755	753	1,132	1,341	32	11,144	28	70	399	2,395	1,904	2,771	3,370	206		
Total of 1 & 2	7,563	54	91	25	1,657	1,462	2,007	2,216	50	14,548	80	134	630	3,392	2,513	3,479	4,078	242		
III. Interest during Construction	2,869	9	23	27	226	387	591	800	805											
Financial Cost	33,826	365	545	181	7,897	6,577	8,433	8,852	976	37,242	427	556	2,168	10,037	6,570	8,200	8,799	485		
IV. O & M	205									139								345		

Note: Engineering service FC : 14 % and LC : 9 % for total of items I.1 to I.3.
Administration FC : 5 % and LC : 5 % for total of items I.1 to I.3.
Tax FC : 10 % and LC : 10 % for total of items I.1 to I.4.
O&M 0.5 % for civil work and metal work in both FC and LC
Physical Contingency FC : 10 % and LC : 10 % for total of items I. (KSCS)
FC : 15 % and LC : 15 % for total of items I. (River improvement)

Price escalation FC : 3 % and LC : 8 % for total of items I.
Interest rate 2.6 % for FC

Table 47 DISBURSEMENT SCHEDULE OF PHASE IIA (1/2)
Pasir Kopo Dam

Description	Disbursement (F.C. in million Rp)										Disbursement (L.C. in million Rp)									
	Total	2008	2009	2010	2011	2012	2013	2014	2015	Total	2008	2009	2010	2011	2012	2013	2014	2015		
I. Basic Cost																				
1) Preparatory Works	5,936				4,452	1,484				3,255				2,441	814					
2) Civil Works																				
River diversion	5,991				1,737	3,415	839			2,689				780	1,533	376				
Coffer dam	1,764						1,764			653						653				
Main dam	14,872				2,231	4,462	4,462	3,718		5,507				826	1,652	1,652	1,377			
Spillway	20,002					5,001	7,401	7,601		10,194					2,549	3,772	3,874			
Intake and	1,075					430	645			530					212	318				
Emergency Outlet																				
Subtotal	43,704				3,968	13,307	15,110	11,319		19,573				1,606	5,945	6,771	5,250			
3) Metal Works	9,185					2,756	2,756	2,756	919	1,021					306	306	306	102		
Total of 1 to 3	58,825				8,420	17,546	17,866	14,074	919	23,849				4,047	7,065	7,078	5,557	102		
4) Engineering Service	8,236	865	1,235	371	1,095	1,441	1,441	1,441	346	2,146	225	322	97	285	376	376	376	90		
5) Administration										4,134	413	413	413	620	620	620	620	413		
6) Compensation Cost										20,138			13,492	6,646						
7) Tax (PPN)										9,306	109	156	47	1,385	2,643	2,676	2,145	146		
Total of 1 to 7	67,061	865	1,235	371	9,516	18,988	19,307	15,515	1,264	59,573	748	891	14,049	12,983	10,704	10,749	8,697	751		
II. Contingency																				
1) Physical	6,706	86	124	37	952	1,899	1,931	1,552	126	5,957	75	89	1,405	1,298	1,070	1,075	870	75		
2) Price Escalation	17,890	231	330	99	2,538	5,065	5,150	4,139	337	50,692	636	758	11,954	11,048	9,108	9,147	7,401	639		
Total of 1 & 2	24,596	317	453	136	3,490	6,964	7,081	5,691	464	56,649	711	847	13,359	12,346	10,179	10,222	8,270	714		
III. Interest during Construction																				
Financial Cost	8,228	31	75	88	426	1,101	1,787	2,338	2,383											
IV. O & M																				
Financial Cost	99,884	1,213	1,763	594	13,431	27,052	28,175	23,544	4,111	116,222	1,459	1,738	27,408	25,330	20,883	20,971	16,968	1,466		
O & M	483									201								684		

Note: Engineering service FC: 14 % and LC: 9 % for total of items I.1 to I.3.
Administration FC: 5 % and LC: 5 % for total of items I.1 to I.3.
Tax FC: 10 % and LC: 10 % for total of items I.1 to I.4.
O&M 1 % for Item I.2 and 0.5 % for Item I.3 in both FC and LC

Physical Copntingency FC: 10 % and LC: 10 % for total of items I.
Price escalation FC: 3 % and LC: 8 % for total of items I till 2002.
0 % after 2002
Interest rate 2.6 % for FC

Table 48 DISBURSEMENT SCHEDULE OF PHASE IIA (2/2)

Cilawang Dam

Description	Disbursement (F.C. in million Rp)										Disbursement (L.C. in million Rp)									
	Total	2008	2009	2010	2011	2012	2013	2014	2015		Total	2008	2009	2010	2011	2012	2013	2014	2015	
I. Basic Cost																				
1) Preparatory Works	10,217				7,663	2,554					5,154				3,866	1,289				
2) Civil Works																				
River diversion	5,514				1,599	3,143	772				2,582				749	1,472	361			
Coffer dam	2,147						2,147				802						802			
Main dam	15,174				2,276	4,552	4,552	3,794			5,495				824	1,649	1,649	1,374		
Saddle dam	1,563				516	1,047					586				193	393				
Spillway	8,280					2,070	3,064	3,146			4,239					1,060	1,568	1,611		
Intake	438					175	263				222					89	133			
Subtotal	33,116				4,391	10,988	10,798	6,940			13,926				1,766	4,661	4,514	2,985		
3) Metal Works	7,483					2,245	2,245	2,245	748		831					249	249	249	83	
Total of 1 to 3	50,816				12,054	15,787	13,042	9,185	748		19,911				5,632	6,199	4,763	3,234	83	
4) Engineering Service	7,114	747	1,067	320	946	1,245	1,245	1,245	299		1,792	188	269	81	238	314	314	314	75	
5) Administration											3,536	354	354	354	530	530	530	530	354	
6) Compensation Cost											25,226			16,901	8,325					
7) Tax (PPN)											7,963	94	134	40	1,887	2,354	1,936	1,398	121	
Total of 1 to 7	57,930	747	1,067	320	13,000	17,032	14,287	10,430	1,047		58,429	635	756	17,376	16,612	9,398	7,543	5,476	633	
II. Contingency																				
1) Physical	5,793	75	107	32	1,300	1,703	1,429	1,043	105		5,843	64	76	1,738	1,661	940	754	548	63	
2) Price Escalation	15,454	199	285	85	3,468	4,544	3,811	2,782	279		49,719	541	643	14,786	14,136	7,997	6,419	4,659	538	
Total of 1 & 2	21,247	274	391	117	4,768	6,247	5,240	3,825	384		55,562	604	719	16,523	15,797	8,937	7,173	5,207	602	
III. Interest during Construction	7,578	27	64	76	538	1,143	1,651	2,021	2,059											
Financial Cost	86,756	1,048	1,523	513	18,306	24,422	21,178	16,277	3,490		113,990	1,239	1,475	33,899	32,409	18,334	14,717	10,683	1,234	
IV. O & M	369										143									512

KSCS II & III and Cilawang Canal

Description	Disbursement (F.C. in million Rp)										Disbursement (L.C. in million Rp)									
	Total	2008	2009	2010	2011	2012	2013	2014	2015		Total	2008	2009	2010	2011	2012	2013	2014	2015	
I. Basic Cost																				
1) Preparatory Works	8,763					8,763					7,602					7,602				
2) Civil Works																				
Waterway	41,404					7,453	14,905	14,905	4,140		29,535					5,316	10,633	10,633	2,954	
Aqueduct	2,549					510	1,020	1,020			499					100	200	200		
Syphon	2,826						1,413	1,413			1,445						723	723		
Railway Crossing	5,989							5,510	479		1,502							1,382	120	
Road Crossing	3,738					897	1,420	1,420			2,348					564	892	892		
Spillway at Cicinta	202							202			130							130		
Inspection Road	3,971						1,986	1,986			2,632						1,316	1,316		
Foot Path	137					36	51	51			56					15	21	21		
Cross Drain	490					108	191	191			352					77	137	137		
Parunpanjang P.S.	2,908					291	1,163	1,163	291		1,175					118	470	470	118	
Pipeline	25,261					4,547	9,094	9,094	2,526		15,961					2,873	5,746	5,746	1,596	
Subtotal	89,475					13,841	31,243	36,955	7,436		55,635					9,062	20,137	21,649	4,787	
3) Metal Works																				
Aqueduct	2,294						1,147	1,147			255						128	128		
Syphon	61						31	31			7						4	4		
Spillway at Cicinta	178							178			20							20		
Division Structure at Tenjo	388							388			43							43		
Division Structure at Parunpanjang	210							210			23							23		
P.S. at Parunpanjang	34,067						10,220	10,220	3,407		3,785					1,136	1,136	1,136	379	
Pipeline	12,743					2,294	4,587	4,587	1,274		1,416					255	510	510	142	
Subtotal	49,941					12,514	15,985	16,761	4,681		5,549					1,390	1,776	1,862	520	
Total of 1 to 3	148,179					35,118	47,228	53,716	12,117		68,786					18,054	21,913	23,511	5,307	
4) Engineering Service	20,745		2,178	3,112	934	2,614	5,228	5,228	1,452		6,191		650	929	279	780	1,560	1,560	433	
5) Administration											10,848		1,085	1,085	1,085	2,170	2,170	2,170	1,085	
6) Compensation Cost											1,270				851	419				
7) Tax (PPN)											24,390		283	404	121	5,657	7,593	8,401	1,931	
Total of 1 to 7	168,924		2,178	3,112	934	37,732	52,456	58,944	13,570		111,485		2,018	2,417	2,336	27,080	33,236	35,642	8,757	
II. Contingency																				
1) Physical	16,892		218	311	93	3,773	5,246	5,894	1,357		11,149		202	242	234	2,708	3,324	3,564	876	
2) Price Escalation	45,064		581	830	249	10,066	13,994	15,724	3,620		94,866		1,717	2,057	1,987	23,043	28,281	30,329	7,451	
Total of 1 & 2	61,956		799	1,141	342	13,839	19,239	21,619	4,977		106,015		1,919	2,299	2,221	25,751	31,605	33,893	8,327	
III. Interest during Construction	16,998		77	188	221	1,562	3,426	5,521	6,003											
Financial Cost	247,879		3,055	4,441	1,497	53,132	75,121	86,083	24,549		217,500		3,936	4,716	4,556	52,831	64,841	69,535	17,083	
IV. O&M	1,636										900									

Note: Engineering service FC: 14 % and LC: 9 % for total of items 1.1 to 1.3.
Administration FC: 5 % and LC: 5 % for total of items 1.1 to 1.3.
Tax FC: 10 % and LC: 10 % for total of items 1.1 to 1.4.
O&M 1 % for Item 1.2 and 0.5 % for Item 1.3 in both FC and LC

Physical Contingency FC: 10 % and LC: 10 % for total of items 1.
Price escalation FC: 3 % and LC: 8 % for total of items 1 till 2002.
0 % after 2002
Interest rate 2.6 % for FC

Table 49 DISBURSEMENT SCHEDULE OF PHASE IIC (1/3)

Pasir Kopo Dam		Disbursement (F.C. in million Rp)										Disbursement (L.C. in million Rp)									
Description		Total	2004	2005	2006	2007	2008	2009	2010	2011	Total	2004	2005	2006	2007	2008	2009	2010	2011		
I. Basic Cost																					
1) Preparatory Works		5,936				4,452	1,484				3,255				2,441	814					
2) Civil Works																					
River diversion		6,766				1,962	3,857	947			2,689				780	1,533	376				
Coffer dam		3,497						3,497			653						653				
Main dam		23,547				3,532	7,064	7,064	5,887		5,507				826	1,652	1,652	1,377			
Spillway		19,892					4,973	7,360	7,559		10,194					2,549	3,772	3,874			
Intake and Emergency Outlet		1,361					544	817			530					212	318				
Subtotal		55,063				5,494	16,438	19,685	13,446		19,573				1,606	5,945	6,771	5,250			
3) Metal Works		11,860					3,558	3,558	3,558	1,186	1,021					306	306	306	102		
Total of 1 to 3		72,859				9,946	21,480	23,243	17,004	1,186	23,849				4,047	7,065	7,078	5,557	102		
4) Engineering Service		10,200	1,071	1,530	459	1,357	1,785	1,785	1,785	428	2,146	225	322	97	285	376	376	376	90		
5) Administration											4,835	484	484	484	725	725	725	725	484		
6) Compensation Cost											33,579			22,498	11,081						
7) Tax (PPN)											10,905	130	185	56	1,564	3,071	3,248	2,472	181		
Total of 1 to 7		83,059	1,071	1,530	459	11,303	23,265	25,028	18,789	1,614	75,315	839	991	23,134	17,702	11,237	11,427	9,130	856		
II. Contingency																					
1) Physical		8,306	107	153	46	1,130	2,327	2,503	1,879	161	7,532	84	99	2,313	1,770	1,124	1,143	913	86		
2) Price Escalation		22,158	286	408	122	3,015	6,206	6,677	5,012	431	64,088	714	843	19,685	15,064	9,562	9,723	7,769	729		
Total of 1 & 2		30,464	393	561	168	4,146	8,533	9,180	6,891	592	71,620	797	942	21,999	16,834	10,686	10,866	8,682	814		
III. Interest during Construction		10,159	38	92	109	510	1,337	2,227	2,894	2,952											
Financial Cost		123,682	1,502	2,184	736	15,959	33,135	36,434	28,574	5,158	146,935	1,636	1,933	45,132	34,536	21,922	22,293	17,812	1,671		
IV. O & M		610									201								811		

Note: Engineering service FC: 14 % and LC: 9 % for total of items I.1 to I.3.
Administration FC: 5 % and LC: 5 % for total of items I.1 to I.3.
Tax FC: 10 % and LC: 10 % for total of items I.1 to I.4.
O&M 1 % for Item I.2 and 0.5 % for Item I.3 in both FC and LC

Physical Contingency FC: 10 % and LC: 10 % for total of items I.
Price escalation FC: 3 % and LC: 8 % for total of items I till 2002.
0 % after 2002
Interest rate 2.6 % for FC

Table 50 DISBURSEMENT SCHEDULE IN SECOND PHASE IIC (2/3)

Tanjung Dam

Description	Disbursement (F.C. in million Rp)												Disbursement (L.C. in million Rp)											
	Total	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
I. Basic Cost																								
1) Preparatory Works	27,531				20,648	6,883						14,590				10,943	3,648							
2) Civil Works																								
River diversion	7,707				2,235	4,393	1,079					3,303				958	1,883	462						
Coffer dam	11,161					3,663	7,478					4,414					1,457	2,957						
Main dam	227,316				18,185	43,190	43,190	43,190	43,190	36,371		90,279				7,222	17,153	17,153	17,153	17,153	14,445			
Saddle dam	1,289				425	864						630				208	422							
Spillway	9,648						1,833	2,798	2,798	2,219		5,108						971	1,481	1,481	1,175			
Low level outlet	6,973								3,068	3,905		2,830								1,245	1,585			
Intake	1,374							605	769			878							386	492				
Subtotal	265,468				20,846	52,130	53,580	46,593	49,826	42,494		107,442				8,388	20,914	21,543	19,021	20,371	17,204			
3) Metal Works	2,352							706	706	706	235	261							78	78	78	26		
Total of 1 to 3	295,351				41,494	59,013	53,580	47,298	50,531	43,200	235	122,293				19,331	24,562	21,543	19,099	20,450	17,283	26		
4) Engineering Service	41,349	4,342	6,202	1,861	2,026	5,210	5,210	5,210	5,210	5,210	868	17,121	1,798	2,568	770	839	2,157	2,157	2,157	2,157	2,157	360		
5) Administration												20,882	1,044	1,044	1,253	1,253	2,506	3,132	3,132	3,132	3,132	1,253		
6) Compensation Cost												89,246			59,795	29,451								
7) Tax (PPN)												47,611			263	6,369	9,094	8,249	7,376	7,835	6,785	149		
Total of 1 to 7	336,700	4,342	6,202	1,861	43,520	64,223	58,790	52,508	55,741	48,410	1,104	297,154	2,842	3,612	62,081	57,242	38,319	35,082	31,765	33,574	29,357	1,787		
II. Contingency																								
1) Physical	33,670	434	620	186	4,352	6,422	5,879	5,251	5,574	4,841	110	29,715	284	361	6,208	5,724	3,832	3,508	3,176	3,357	2,936	179		
2) Price Escalation	87,009	1,158	1,655	496	11,610	17,133	15,683	14,008	14,870	12,914	294	246,096	2,418	3,074	52,827	48,709	32,607	29,852	27,030	28,569	24,981	1,521		
Total of 1 & 2	120,679				682	15,962	23,555	21,562	19,258	20,444	405	275,812	2,702	3,435	59,035	54,434	36,439	33,361	30,206	31,926	27,917	1,700		
III. Interest during Construction	54,960	113	274	340	1,887	4,169	6,258	8,124	10,105	11,825	11,864													
Financial Cost	512,339	4,455	6,477	2,883	61,369	91,946	86,611	79,891	86,290	77,991	13,373	572,965	5,544	7,047	121,117	111,676	74,758	68,442	61,971	65,500	57,274	3,487		
IV. O & M	2,666											1,076											3,742	

KSCS II & III and Tanjung Canal

Description	Disbursement (F.C. in million Rp)												Disbursement (L.C. in million Rp)											
	Total	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
I. Basic Cost																								
1) Preparatory Works	7,741							7,741				7,371							7,371					
2) Civil Works																								
Waterway	34,001							6,120	12,240	12,240	3,400	22,687							4,084	8,167	8,167	2,269		
Aqueduct	2,549							510	1,020	1,020		499							100	200	200			
Syphon	1,904								952	952		1,064								532	532			
Railway Crossing	6,532									6,009	523	1,853									1,705	148		
Road Crossing	2,313							555	879	879		1,306							313	496	496			
Inspection Road	2,763								1,382	1,382		1,827								914	914			
Foot Path	158							41	58	58		73							19	27	27			
Cross Drain	557							123	217	217		401							88	156	156			
Parurpanjang P.S.	2,908							291	1,163	1,163	291	1,175							118	470	470	118		
Pipeline	25,261							4,547	9,094	9,094	2,526	15,961							2,873	5,746	5,746	1,596		
Subtotal	78,946							12,187	27,005	33,015	6,740	46,846							7,595	16,708	18,413	4,131		
3) Metal Works																								
Aqueduct	2,294								1,147	1,147		255								128	128			
Syphon	61								31	31		7								4	4			
Division Structure at Tenjo	388									388		43									43			
Division Structure at P.panjang	275										275	31									31			
P.S.at P.panjang	34,067							10,220	10,220	10,220	3,407	3,785							1,136	1,136	1,136	379		
Pipeline	12,743							2,294	4,587	4,587	1,274	1,416							255	510	510	142		
Subtotal	49,828							12,514	15,985	16,648	4,681	5,537							1,390	1,776	1,850	520		
Total of 1 to 3	136,515							32,441	42,990	49,663	11,421	59,754							16,356	18,484	20,263	4,651		
4) Engineering Service	19,112				2,007	2,867	860	2,408	4,816	4,816	1,338	5,378					565	807	242	678	1,355	1,355	376	
5) Administration												9,813					981	981	981	1,963	1,963	981		
6) Compensation Cost												1,512							1,013	499				
7) Tax (PPN)												22,076					257	367	110	5,188	6,765	7,610	1,779	
Total of 1 to 7	155,627				2,007	2,867	860	34,849	47,807	54,479	12,758	98,533					1,803	2,155	2,347	24,684	28,567	31,191	7,787	
II. Contingency																								
1) Physical	15,563				201	287	86	3,485	4,781	5,448	1,276	9,853					180	216	235	2,468	2,857	3,119	779	
2) Price Escalation	41,517				535	765	229	9,297	12,753	14,533	3,404	83,845					1,334	1,834	1,997	21,004	24,308	26,541	6,626	
Total of 1 & 2	57,079				736	1,051	315	12,782	17,534	19,981	4,679	93,698					1,715	2,050	2,231	23,472	27,165	29,660	7,405	
III. Interest during Construction	15,639				71	173	204	1,442	3,141	5,077	5,530													
Financial Cost	228,345				2,814	4,091	1,379	49,073	68,482	79,537	22,968	192,231					3,518	4,205	4,578	48,156	55,732	60,851	15,192	
IV. O&M	1,077											533											1,610	

Note:

Engineering service
Administration
Tax
O&M

FC: 14 % and LC: 9 % for total of items I.1 to I.3.
FC: 5 % and LC: 5 % for total of items I.1 to I.3.
FC: 10 % and LC: 10 % for total of items I.1 to I.4.
1 % for Item I.2 and 0.5 % for Item I.3 in both FC and LC (Cilawang dam)
0.5 % for Items I.2 and I.3 in both FC and LC (KSCS)

Physical Contingency
Price escalation
Interest rate

FC: 10 % and LC: 10 % for total of items I.
FC: 3 % and LC: 8 % for total of items I till 2002.
0 % after 2002
2.6 % for FC

Table 51 DISBURSEMENT SCHEDULE OF PHASE IIC (3/3)

Cilawang Dam

Description	Disbursement (F.C. in million Rp)										Disbursement (L.C. in million Rp)									
	Total	2011	2012	2013	2014	2015	2016	2017	2018	Total	2011	2012	2013	2014	2015	2016	2017	2018		
I. Basic Cost																				
1) Preparatory Works	10,217				7,663	2,554				5,154				3,866	1,289					
2) Civil Works																				
River diversion	5,514				1,599	3,143	772			2,582				749	1,472	361				
Coffer dam	2,147						2,147			802						802				
Main dam	15,174				2,276	4,552	4,552	3,794		5,495				824	1,649	1,649	1,374			
Saddle dam	1,563				516	1,047				586				193	393					
Spillway	8,280					2,070	3,064	3,146		4,239					1,060	1,568	1,611			
Intake	438					175	263			222					89	133				
Subtotal	33,116				4,391	10,988	10,798	6,940		13,926				1,766	4,661	4,514	2,985			
3) Metal Works	7,483					2,245	2,245	2,245	748	831					249	249	249	83		
Total of 1 to 3	50,816				12,054	15,787	13,042	9,185	748	19,911				5,632	6,199	4,763	3,234	83		
4) Engineering Service	7,114	747	1,067	320	946	1,245	1,245	1,245	299	1,792	188	269	81	238	314	314	314	75		
5) Administration										3,536	354	354	354	530	530	530	530	354		
6) Compensation Cost										25,226			16,901	8,325						
7) Tax (PPN)										7,963	94	134	40	1,887	2,354	1,936	1,398	121		
Total of 1 to 7	57,930	747	1,067	320	13,000	17,032	14,287	10,430	1,047	58,429	635	756	17,376	16,612	9,398	7,543	5,476	633		
II. Contingency																				
1) Physical	5,793	75	107	32	1,300	1,703	1,429	1,043	105	5,843	64	76	1,738	1,661	940	754	548	63		
2) Price Escalation	15,454	199	285	85	3,468	4,544	3,811	2,782	279	49,719	541	643	14,786	14,136	7,997	6,419	4,659	538		
Total of 1 & 2	21,247	274	391	117	4,768	6,247	5,240	3,825	384	55,562	604	719	16,523	15,797	8,937	7,173	5,207	602		
III. Interest during Construction	7,578	27	64	76	538	1,143	1,651	2,021	2,059											
Financial Cost	86,756	1,048	1,523	513	18,306	24,422	21,178	16,277	3,490	113,990	1,239	1,475	33,899	32,409	18,334	14,717	10,683	1,234		
IV. O & M	369									143								512		

Cilawang Canal

Description	Disbursement (F.C. in million Rp)										Disbursement (L.C. in million Rp)									
	Total	2011	2012	2013	2014	2015	2016	2017	2018	Total	2011	2012	2013	2014	2015	2016	2017	2018		
I. Basic Cost																				
1) Preparatory Works	6,708						6,708			4,977						4,977				
2) Civil Works																				
Waterway	19,446						5,639	11,084	2,722	14,037						4,071	8,001	1,965		
Syphon	1,099							1,099		694							694			
Spillway at Cicinta	202							202		130							130			
Division structure at	287							287		207							207			
Road Crossing	1,833						697	1,136		1,133						431	702			
Inspection Road	1,819							1,819		1,226							1,226			
Foot Path	39						13	26		13						4	9			
Cross Drain	411						148	263		290						104	186			
Subtotal	25,136						6,497	15,917	2,722	17,730						4,610	11,155	1,965		
3) Metal Works																				
Syphon	49							49		5							5			
Spillway at Cicinta	178							178		20							20			
Division Structure at	42							42		5							5			
Tenjo																				
Subtotal	269							269		30							30			
Total of 1 to 3	32,113							13,205	16,186	2,722	22,737					9,587	11,185	1,965		
4) Engineering Service	4,496			472	674	202	913	1,794	441	2,046			215	307	92	415	816	201		
5) Administration										2,743			274	274	527	724	724	219		
6) Compensation Cost										171					115	56				
7) Tax (PPN)										6,139			69	98	29	2,412	2,998	533		
Total of 1 to 7	36,609			472	674	202	14,117	17,980	3,163	33,836			558	679	763	13,194	15,723	2,918		
II. Contingency																				
1) Physical	3,661			47	67	20	1,412	1,798	316	3,384			56	68	76	1,319	1,572	292		
2) Price Escalation	9,766			126	180	54	3,766	4,796	844	28,792			475	578	649	11,227	13,380	2,483		
Total of 1 & 2	13,427			173	247	74	5,178	6,594	1,160	32,176			530	646	726	12,547	14,952	2,775		
III. Interest during Construction	3,145			17	41	48	550	1,189	1,301											
Financial Cost	53,180				662	962	324	19,845	25,763	5,624	66,012			1,088	1,325	1,489	25,741	30,675	5,693	
IV. O&M	286										202									

Note: Engineering service
Administration
Tax
O&M

FC: 14 % and LC: 9 % for total of items 1.1 to 1.3.
FC: 5 % and LC: 5 % for total of items 1.1 to 1.3.
FC: 10 % and LC: 10 % for total of items 1.1 to 1.4.
1 % for Item 1.2 and 0.5 % for Item 1.3 in both FC and LC
0.5 % for Items 1.2 and 1.3 in both FC and LC (KSCS)

Physical Contingency
Price escalation
Interest rate

FC: 10 % and LC: 10 % for total of items 1.
FC: 3 % and LC: 8 % for total of items 1 till 2002.
0 % after 2002
2.6 % for FC

Table 52 FINANCIAL COST FOR CIUJUNG-CIDURIAN INTEGRATED WATER RESOURCES DEVELOPMENT

First Phase Development

(Unit : million Rp)

Description	Karian Dam		Ciuyah Tunnel		KSCS I		River Improvement		Total	
	FC	LC	FC	LC	FC	LC	FC	LC	FC	LC
I. Basic Cost										
1) Preparatory Works	11,032	7,266	469	205	10,703	8,799	2,659	2,541	24,863	18,811
2) Civil Works	87,765	34,892	10,277	4,383	97,002	59,854	17,862	11,392	212,906	110,521
3) Metal Works	11,390	1,266	2,021	225	1,894	211	0	0	15,305	1,702
4) Engineering Service	15,426	3,908	1,787	433	15,344	6,198	2,873	1,254	35,430	11,793
5) Administration	0	7,681	0	879	0	8,923	0	1,723	0	19,205
6) Compensation Cost	0	58,714	0	0	0	6,266	0	1,926	0	66,906
7) Tax (PPN)	0	17,295	0	1,980	0	20,001	0	3,858	0	43,133
Sub-total	125,613	131,021	14,554	8,105	124,943	110,251	23,394	22,694	288,504	272,072
II. Contingency										
1) Physical Contingency	12,561	13,102	1,455	811	12,494	11,025	3,503	3,404	30,014	28,342
2) Price Escalation	21,647	53,483	2,738	4,506	22,728	57,850	4,061	11,144	51,173	126,982
Sub-total	34,208	66,585	4,193	5,316	35,222	68,875	7,563	14,548	81,187	155,324
III. Interest During Construction	14,946	0	1,534	0	13,813	0	2,869	0	33,162	0
Total	174,767	197,606	20,281	13,422	173,978	179,127	33,826	37,242	402,853	427,396
Grand Total (FC+LC)	372,373		33,703		353,105		71,068		830,249	

Second Phase Development (IIA) in Scenario A

(Unit : million Rp)

Description	Posir Kopo Dam		Cilawang Dam		KSCS II&III Cilawang Canal		Total	
	FC	LC	FC	LC	FC	LC	FC	LC
I. Basic Cost								
1) Preparatory Works	5,936	3,255	10,217	5,154	8,763	7,602	24,916	16,011
2) Civil Works	43,704	19,573	33,116	13,926	89,475	55,635	166,295	89,134
3) Metal Works	9,185	1,021	7,483	831	49,941	5,549	66,609	7,401
4) Engineering Service	8,236	2,146	7,114	1,792	20,745	6,191	36,095	10,129
5) Administration	0	4,134	0	3,536	0	10,848	0	18,518
6) Compensation Cost	0	20,138	0	25,226	0	1,270	0	46,634
7) Tax (PPN)	0	9,306	0	7,963	0	24,390	0	41,659
Sub-total	67,061	59,573	57,930	58,429	168,924	111,485	293,915	229,486
II. Contingency								
1) Physical Contingency	6,706	5,957	5,793	5,843	16,892	11,149	29,391	22,949
2) Price Escalation	17,890	50,692	15,454	49,719	45,064	94,866	78,408	195,277
Sub-total	24,596	56,649	21,247	55,562	61,956	106,015	107,799	218,226
III. Interest During Construction	8,228	0	7,578	0	16,998	0	32,804	0
Total	99,884	116,222	86,756	113,990	247,879	217,500	434,518	447,712
Grand Total (FC+LC)	216,106		200,746		465,378		882,230	

Second Phase Development (IIC) in Scenario C

(Unit : million Rp)

Description	Posir Kopo Dam		Tanjung Dam		Cilawang Dam		KSCS II&III Tanjung Canal		Cilawang Canal		Total	
	FC	LC	FC	LC	FC	LC	FC	LC	FC	LC	FC	LC
I. Basic Cost												
1) Preparatory Works	5,936	3,255	27,531	14,590	10,217	5,154	7,741	7,371	6,708	4,977	58,133	35,347
2) Civil Works	55,063	19,573	265,468	107,442	33,116	13,926	78,946	46,846	25,136	17,730	457,729	205,517
3) Metal Works	11,860	1,021	2,352	261	7,483	831	49,828	5,537	269	30	71,792	7,680
4) Engineering Service	10,200	2,146	41,349	17,121	7,114	1,792	19,112	5,378	4,496	2,046	82,272	28,484
5) Administration	0	4,835	0	20,882	0	3,536	0	9,813	0	2,743	0	41,810
6) Compensation Cost	0	33,579	0	89,246	0	25,226	0	1,512	0	171	0	149,734
7) Tax (PPN)	0	10,905	0	47,611	0	7,963	0	22,076	0	6,139	0	94,695
Sub-total	83,059	75,315	336,700	297,154	57,930	58,429	155,627	98,533	36,609	33,836	669,926	563,267
II. Contingency												
1) Physical Contingency	8,306	7,532	33,670	29,715	5,793	5,843	15,563	9,853	3,661	3,384	66,993	56,327
2) Price Escalation	22,158	64,088	87,009	246,096	15,454	49,719	41,517	83,845	9,766	28,792	175,903	472,540
Sub-total	30,464	71,620	120,679	275,812	21,247	55,562	57,079	93,698	13,427	32,176	242,896	528,867
III. Interest During Construction	10,159	0	54,960	0	7,578	0	15,639	0	3,145	0	91,481	0
Total	123,682	146,935	512,339	572,965	86,756	113,990	228,345	192,231	53,180	66,012	1,004,302	1,092,134
Grand Total (FC+LC)	270,617		1,085,304		200,746		420,577		119,192		2,096,436	

FIGURES

Fig. 1

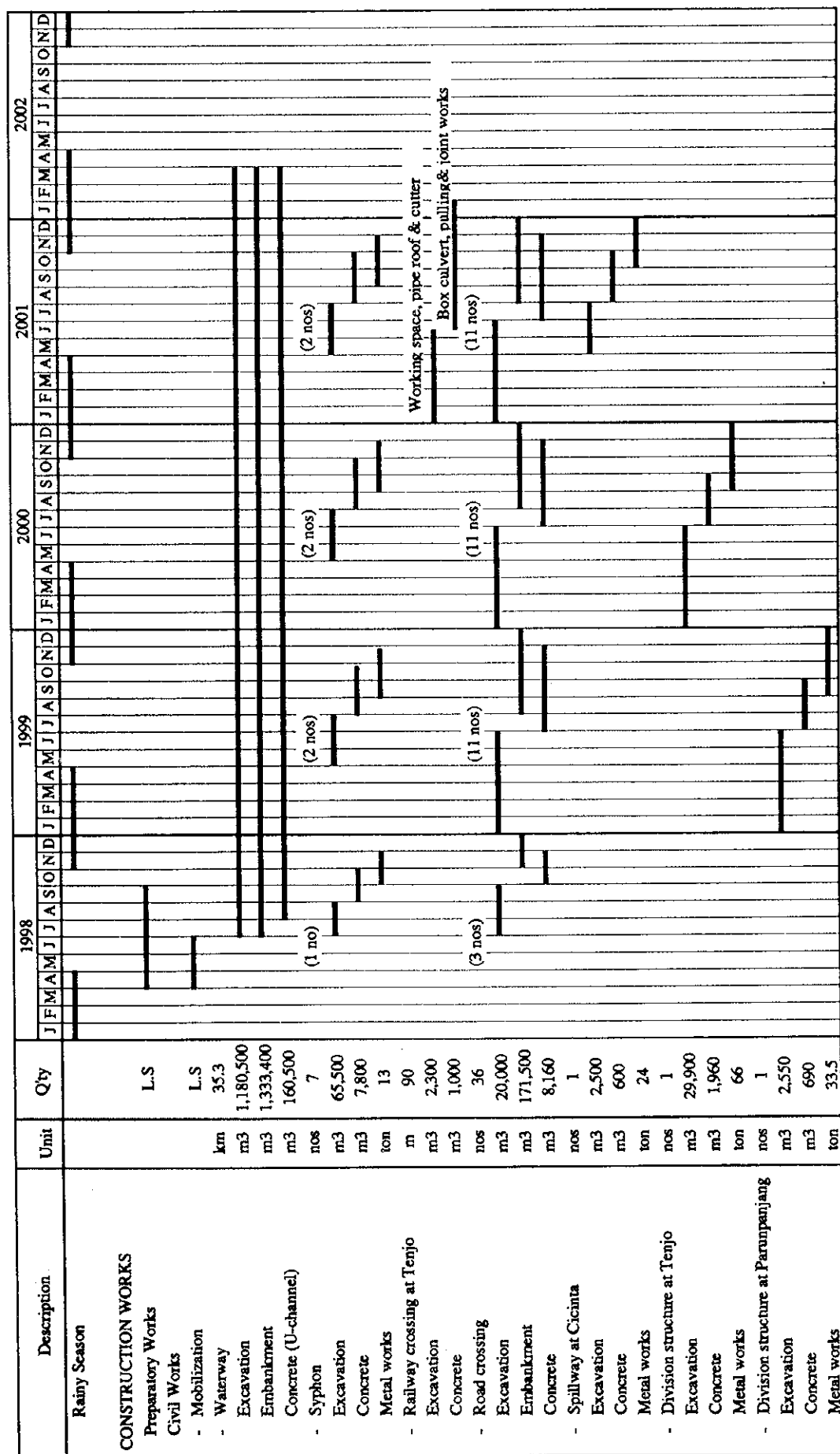


Fig. 2 CONSTRUCTION TIME SCHEDULE FOR FIRST PHASE OF KSCS (2/2)

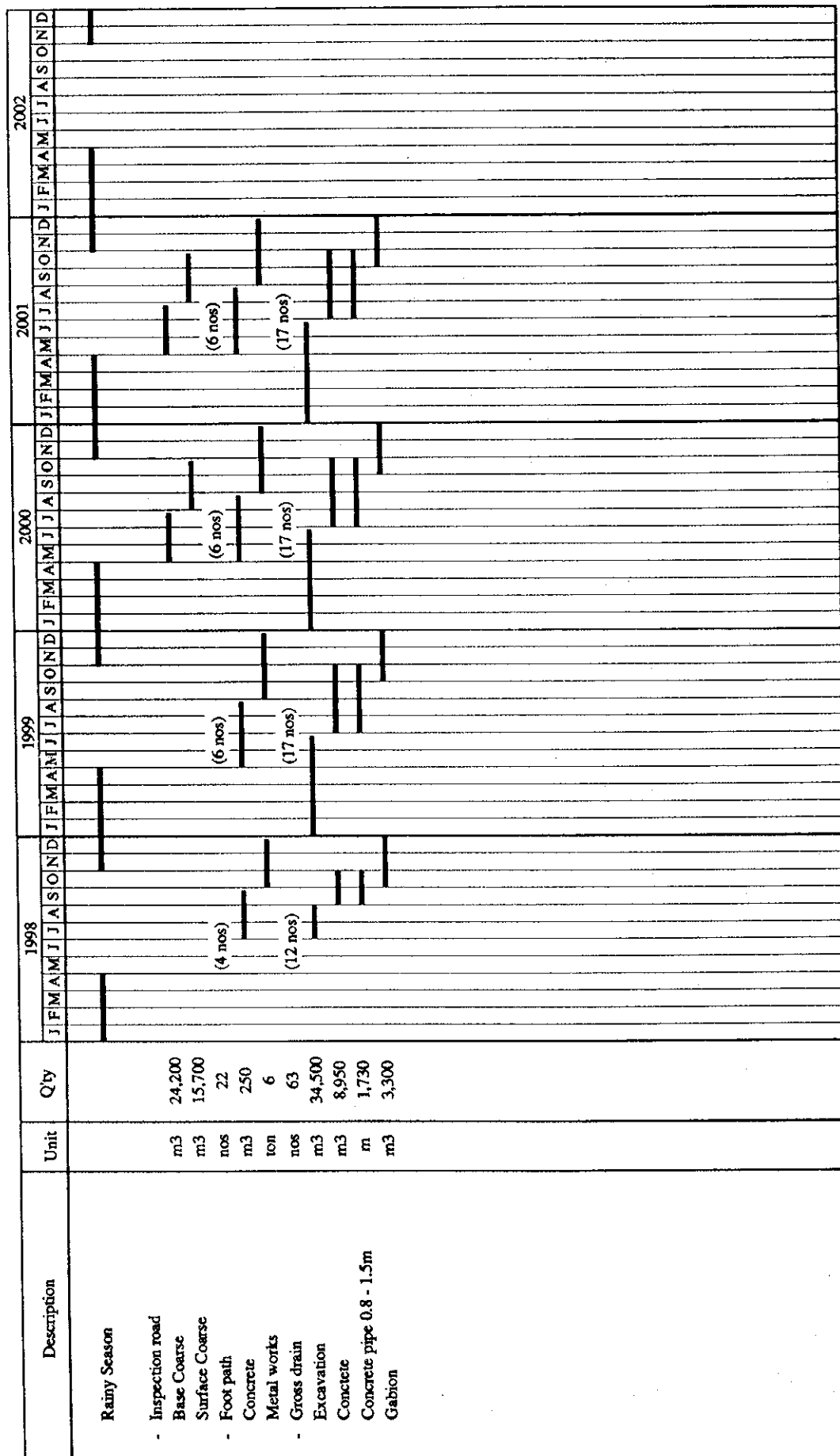


Fig. 4 CONSTRUCTION TIME SCHEDULE FOR PHASE IIA IN SCENARIO A (2/2)

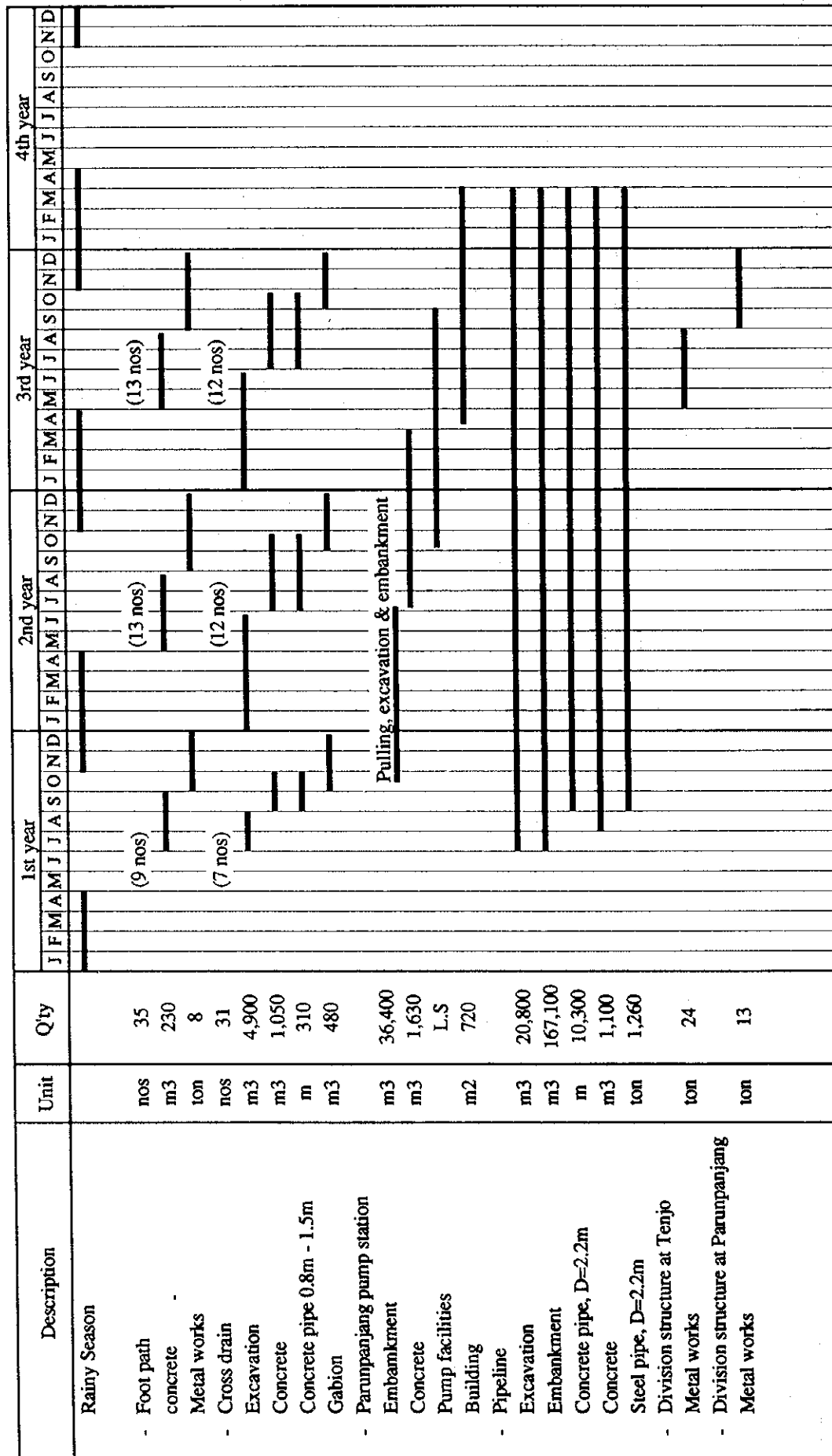


Fig. 5 CONSTRUCTION TIME SCHEDULE FOR PHASE IIC-a OF KSCS IN SCENARIO C (1/2)

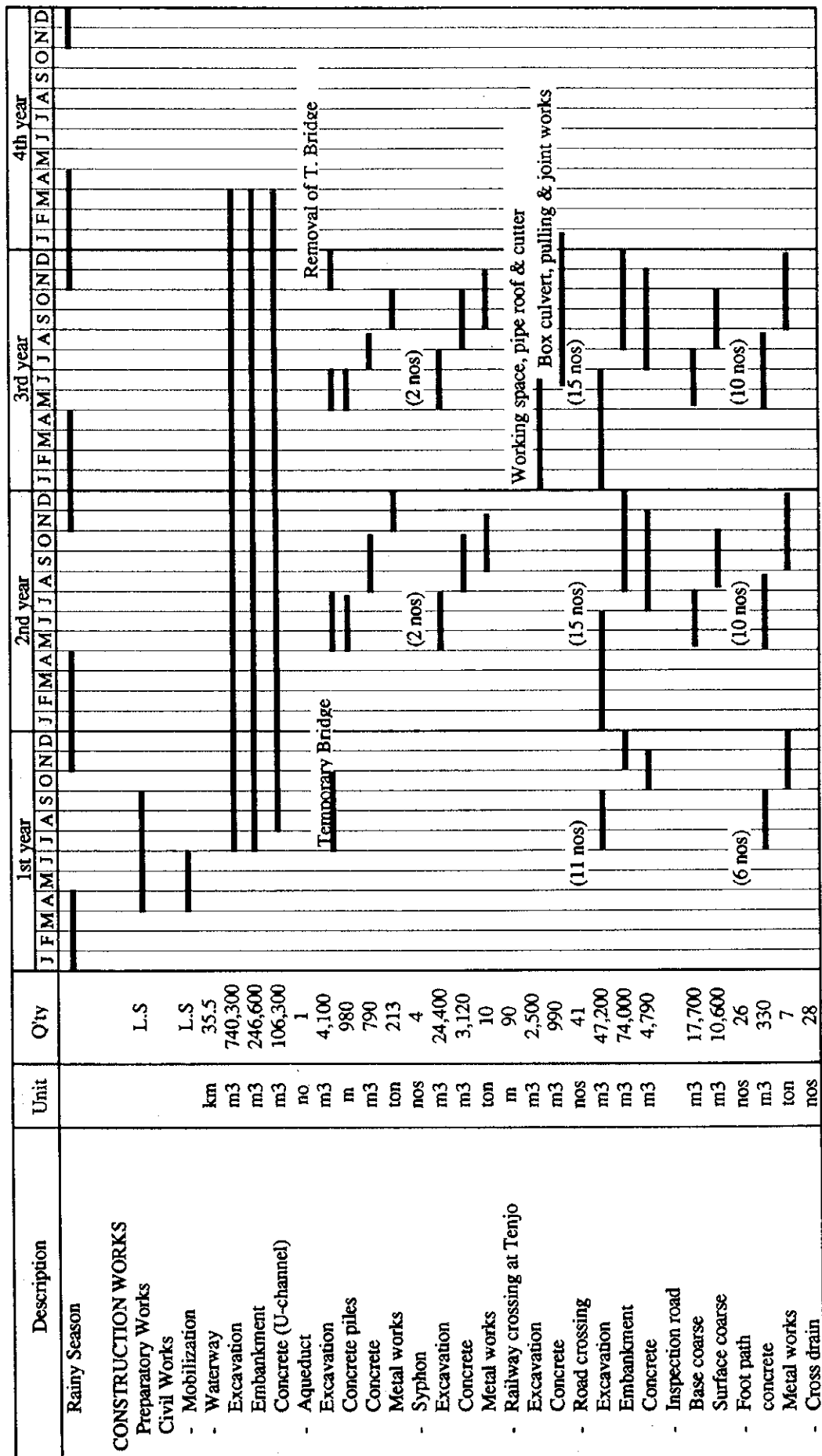
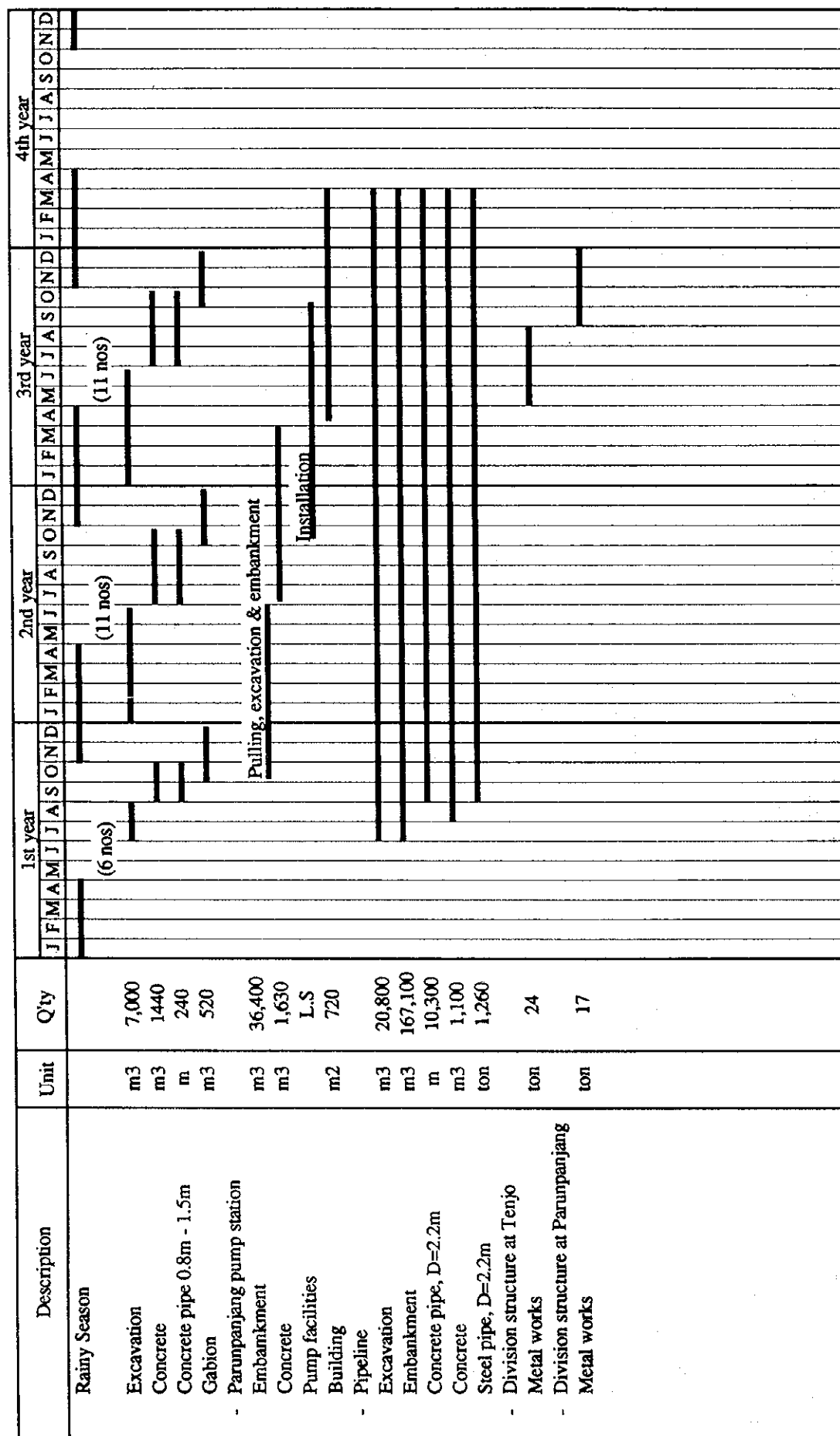
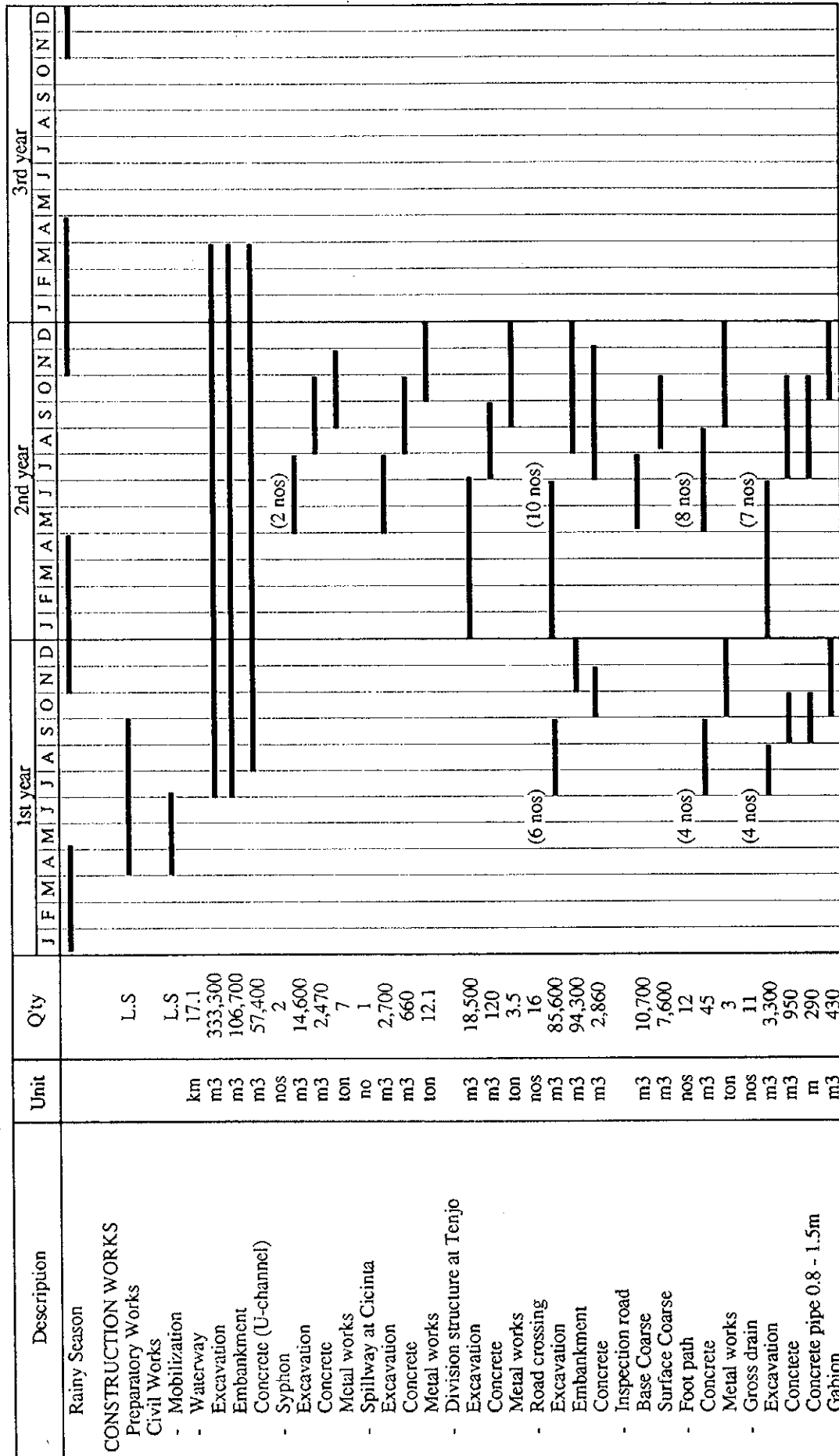


Fig. 6 CONSTRUCTION TIME SCHEDULE FOR PHASE IIC-a OF KSCS IN SCENARIO C (2/2)





ANNEX 10

***FINANCIAL AND ECONOMIC
ANALYSES***

**THE STUDY
ON
CIUJUNG-CIDURIAN INTEGRATED WATER RESOURCES**

Annex 10 : Financial and Economic Analyses

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1. PROJECT BENEFITS

The water resources development in the Ciujung and Cidurian river basins has been assigned to supply municipal and industrial water to Kabs. Serang and Tangerang and DKI Jakarta, and to supplement irrigation water in the existing Ciujung and/or Rancasmur areas. Of the proposed dam schemes, the Karian dam and reservoir, also, has flood control purpose to the middle reaches of the Ciujung river between existing Pamarayan weir and Rangkasbitung.

From the above mentioned, the project benefit are assumed to be derived from; 1) municipal and industrial water supply; 2) flood mitigation; and 3) supplemental water supply to irrigation areas in the downstream of the Ciujung and Cidurian rivers.

1.1 Benefits on Municipal and Industrial Water Supply

Among the several evaluation methods for benefit of municipal and industrial water supply, the second alternative cost method assuming the groundwater source and willingness to pay are examined by using the available data collected in this study.

As of 1992, the coverage rates of piped water system were still low as 19 % against the total population in the served area in whole Jakarta, 10 % in southern part of Bogor, 10 % in central part of Tangerang, 5 % in central part of Bekasi. It means that most of water users have abstracted ground water.

The JWRMS has studied the raw water price for groundwater resources development using new data obtained. As results, the total economic costs are Rp.730/m³ for south zone of Jakarta and Rp.2,240/m³ for north zone of Jakarta at 1994-price level including ground water extraction, incremental cost on increasing drawn down of water table, cost of land subsidence, cost of pollution and cost of ground water management as shown in Table 1. The weighted average amount of raw water using abstraction volume in North and South zones of Jakarta is estimated as 1,540/m³ for the whole area of Jakarta.

This amount will be applicable for the study area because that it also has a potential ground water for constructing deep wells together with possibly to induce the similar problems such as land subsidence and water quality, and this amount may be used for second alternative cost for water users without the Project.

On the other hand, the amount of Rp.15,000/month of willingness to pay as of 1992 on water use studied by the JWRMS was converted to Rp.18,000/month at 1994-price level using the annual inflation rate of 8.39 % as shown in Table 2. From this amount, the average willingness to pay per unit water volume can be estimated as 670/m³ assuming an average water consumption of water of 27 m³/month per connection (180 little/day x 30 days x 5 persons/family) including treatment and distribution costs. This result indicates that the willingness to pay is almost equal to the existing water tariff for house connection for used volume up to 30 m³ in the study area as shown in Table 3.

While, the JWRMS also estimated the share rate of raw water price against the end price of water as about 60 %. Using this share rate, the raw water price in the willingness to pay can be estimated at Rp.400/m³ for house connection at the price level in 1994. The average existing tariff in the study area is evaluated at Rp. 414/m³ as shown in Table 3 in average based on used volume of 21m³ to 30 m³ and the raw water price of it can be calculated at Rp.248 /m³ for house connection.

From the above mentioned, the existing water tariff, which gives the lower benefit for the project and corresponds to the willingness to pay, was applied for economic evaluation in the current study.

On the other hand, the water price considering the whole use for non-trading sector, trading sector, industrial sector and public sector is estimated at Rp.1,013/m³ and its raw water price can be calculated as Rp.608/m³ as shown in Table 3. Using this rate of raw water price, the benefit on the municipal and industrial water supply was estimated because of its most economical price as mentioned above.

According to the JWRMS, share rates of domestic use, public services use and industrial use of water will become 45 %, 20 % and 35 % in 2025 from 55.6 %, 41.9 % and 2.5 % in 1992 respectively based on intensity of water use. For estimation of the benefit on municipal and industrial water supply, these intensity rates for water use are applied. During the period from 1992 to 2025, it is assumed that these rates will increase proportionally year by year. Table 3 (B) shows calculation results. Total benefit on municipal and industrial water supply is calculated on the basis of raw water prices shown in this Table multiplied by water demand.

1.2 Flood Control Benefit

1.2.1 Flood damages

In rainy season, the flood from three tributaries of Ciujung river as Upper Ciujung, Ciberang and Cisimeut joins at Rangkasbitung, so that the areas in and around of Rangkasbitung and the downstream reaches are frequently inundated by floods and have suffered serious damages.

A large scale flood has occurred in the middle and lower reaches of the Ciujung river bringing with the inundation area of 9,317 ha in total consisting of 3,030 ha in Kab. Lebak and 6,287 ha in Kab. Serang in December, 1993 as shown in Figure 1. Among those inundated areas, the area of 5,563 ha was along the river reach between Rangkasbitung and the Pamarayan weir consisting of three (3) kecamatans of Rangkasbitung (in Kab. Lebak), Petir and Pamarayan (both in Kab. Serang) with 3,030 ha, 1,676 ha and 857 ha respectively and about 17,000 houses or buildings in total are suffered from the flood as shown in Table 4.

Table 5 shows the detail inundated areas by land use categories and number of houses and/or buildings inundated by the recorded large scale floods in 1981 and 1983 both reported on the feasibility study on Karian multipurpose dam construction project made by JICA in 1985, and the flood in 1993. As shown in this Table, the flood in 1993 is the largest flood among those three (3) floods.

In order to estimate the annual mean flood damages, flood damages by the above-mentioned floods were reviewed on crops, houses and/or buildings and their properties, and irrigated crops mainly paddy including second crops in local term such as maize, soybeans and mungbeans, peanuts and groundnuts and so on. The results are expressed in detail hereunder.

(1) Damages to crops

Detail of damages to crops caused by those floods are shown in Table 6 and summarized below. In this case, unit damages per ha were converted into price level in 1994 using consumer price index on foodstuffs.

(million Rp.)	
Flood	Damages to crops
1981	212
1983	115
1993	822

(2) Damages to houses and/or buildings and their properties

Such necessary parameters for estimating damages as appraisalment of houses and buildings and their properties, rates of appraisalment of household effects and stored goods by inundated depth above floor level, rates of damages and buildings submerged by inundated depth, and rates of damages to submerged properties are shown in Table 7. The results are shown in Table 8, and summarized as follows:

(million Rp.)			
Flood	Damages to houses	Damages to properties	Whole damages
1981-flood	2,826	6,190	9,016
1983-flood	764	1,924	2,688
1993-flood	16,914	40,197	57,111

(3) Suspension loss of business activities

According to the aforesaid feasibility study on the Karian dam project, suspension losses of business activities correspond to the damages to houses/buildings and their properties by certain rate, namely 8 %. Since there is no sufficient data on suspension losses for review of it, the rate of 8 % was applied for this study.

As results, the amount of suspension losses due to the said three (3) floods were estimated as the sums of Rp.541 million in 1981, Rp.161 million in 1983 and Rp. 3,427 million in 1993.

(4) Damages to public facilities including restoration cost

In the F/S on Karian Dam Project, damages to public facilities were estimated based on the actual damage records. In the flood in 1993, the cost of Rp. 10,784 million was reported to be expensed for restoration of the damaged public facilities and this cost amount will be mitigated by the river improvement works.

Consequently, damages to public facilities were updated at Rp.8,159 million in 1981, Rp.2,433 million in 1983 and Rp.11,647 million in 1993 at the price level in 1994, respectively.

(5) Total direct damages

Total direct damages to houses and/or buildings and their properties, upland crops, suspension losses of business activities and public facilities are shown in Table 9 in detail, and summarized below.

(million Rp.)	
Flood	Total direct damages
1981	17,928
1983	5,397
1993	73,007

(6) Annual average flood damages

1993-flood is assumed to correspond to the probable flood with the return period of 25 years. On the other hand, 1981-flood and 1983-flood have been estimated as the probable flood with the return period of 8 years and 2 years respectively in the F/S on Karian Dam Project. However, 1983-flood seems to be more reasonable to correspond to the probable flood with the return period of 5 years considering a scale of 1993-flood damages with normal probability curve as illustrated in Figure 2.

The estimation process is shown in Table 10, and the annual mean flood damages at 10-year probable flood is estimated at Rp.8,242 million at the price level in 1994.

1.2.2 Flood control benefit

Flood control benefit is the expected reduction of flood damages. The reduction of flood damages is expressed as difference of damages between with and without the Project. The annual average flood damages at 10-year flood was estimated at Rp.8,242 million as mentioned above.

Even if the Project will be completed, damages caused by interior water will be still remained. This remaining damages is assumed with 5 % of the total damages. Therefore, the reduction of flood damages is then calculated amounting to Rp.7,830 million (95 % of the total damages).

1.3 Irrigation Benefit

Irrigation benefit is estimated based on the existing profit of farmers getting from wet season paddy, dry season paddy, and second crops named Palawija in local term representing as maize, peanuts/groundnuts, soybeans and mungbeans assuming that cropping pattern of those crops will not be changed in the future unless otherwise the farmers would not diversify it to new one.

For estimation of farmers profit, income and production costs are reviewed. In this case, farmers gross income was calculated by price of crops per unit volume and production volume per unit harvested area, and the production costs were calculated based on such necessary input costs as cost for seeds, fertilizers as UREA, TSP, and KCL, agro-chemicals such as insecticide and rodenticide, labor, and animal draft at farm gate price.

The economic farm gate prices of crops are calculated as shown in Tables 11, 13 and 14 and summarized as below.

Crops	(Rp/kg)
	Farm gate price
Paddy	412
Maize	686
Soybeans/mungbeans	1,055
Peanuts/groundnuts	1,755
Cassava	94

While, the main production costs are calculated as shown in Tables 12 and 14 and summarized as follows:

Inputs	Crops	(Rp/kg)
		Farm gate price
Seeds	Paddy	723
	Maize	676
	Soybeans/mungbeans	1,164
	Peanuts/groundnuts	2,346
	Cassava	0
Fertilizer	UREA	411
	TSP	476
	KCL	405
Agro-chemicals	Insecticide	9,667
	Rodenticide	8,635
Power	Labor *	2,253
	Animal draft**	7,500

Note : * Rp/man.day
 ** Rp/workday

The production volume and necessary costs are usually different by farm scale. On this view-point, the Cisadane River Basin Development Project has clarified this situation, i.e.,

yield of crops and costs per unit area by large scale (0.6 ha in average), medium scale farm (0.3 ha in average). This method is applied for estimation of average net profit of farmers in this Study. Calculation processes are shown in Tables 15 to 19 for paddy, maize, peanuts/groundnuts, soybeans, and mungbeans respectively. Following is a summary of these calculation results.

Crops	(thousand Rp/ha)
	Farm gate price
Wet season paddy	1,293
Dry season paddy	1,196
Maize	1,272
Peanuts/groundnuts	837
Soybeans	630
Mungbeans	496

The water supply master plan by the JWRMS expected the increase of cropping intensity of palawija including vegetables by providing additional water supply in order to save the limited water resources and meet vegetable requirement in the urbanized Jabotabek area. Therefore, the project benefit will be derived from increase of cropping intensity of palawija including vegetables.

Based on the above table, the mathematical average profit of Rp. 809 million for maize, peanuts, soybean and mungbean are adopted as unit benefit per ha.

Using this unit benefit, incremental cropping intensity and irrigation area estimated by the JWRMS, total irrigation benefits with the Project in three (3) scenarios are derived as follows at 2025 and details are shown in Table 20.

Scenario	(million Rp.)	
	Total irrigation benefit	
	Ciujung	Cidurian-Rancasumur
Scenario A	3,357	-
Scenario C	7,020	3,302

While, these crops are able to grow up under the present flow situation with normal dry season but in severe drought with a return period more than 3 years, these are considered not to be planted due to water shortage. The project is planned to maintain irrigation water requirement even in the drought with a return period of 5 years. Therefore, the irrigation benefit was estimated as the mathematical expected value under the condition with and without the project. So the irrigation benefit with the Project was estimated as follows.

Scenario	(million Rp.)	
	Irrigation benefit with Project	
	Ciujung	Cidurian
Scenario A	436	-
Scenario C	913	429

The project will get the incremental benefit as described. But, the diversification of agricultural crops expected by the JWRMS is still under the concept or idea, and therefore, it

needs the further definitive study and plan on agricultural diversification. Consequently, irrigation benefits were not counted in the economic evaluation.

2. ECONOMIC CONSTRUCTION COST

To evaluate the proposed water resources development schemes from the economic aspects, the financial costs described in Annex 9 of the Final Report was converted into economic costs by the foreign and local currency portions deducting such transfer costs as income tax, contractor's profit and so on. Also, it was considered some parameters as shadow wage rate, and shadow prices of equipment and materials both in foreign and local currency portions. Table 21 shows a cost allocation of labor, equipment and materials for this purpose.

The economic costs of the projects are nominal figures that duly reflected the economic value of goods and services involved. These costs are applied for the economic evaluation of the Project.

2.1 Internal Transfer Cost

Internal transfer, which is just a shift of money from one party to another and is not related with substantial economic activities, should be excluded in converting the financial construction cost to economic cost of the Project. Such transfer costs as value added tax (PPn in local term) and contractor's profit are exempted from the financial costs.

In this case, the amount of the value added taxes were already cleared because that those were calculated in separately from the civil and metal works in the financial cost estimation.

2.2 Shadow Wage Rate

Labor costs sharing with certain rate as mentioned above are estimated on the basis of wages to be actually paid to labors to be converted to economic costs. This economic cost for labors depends on its shadow wage of unskilled labors employed for the construction works. The shadow wage rate is assumed to be 75 % of the actual market wage taking into account of the employment opportunity of labors in Indonesia.

In this case, the share rates of skilled and unskilled labor costs to the total labor cost are assumed at 30 % and 70 % respectively.

2.3 Shadow Price of Equipment and Materials

As a conversion factor, a shadow price rate of local currency portion to be applied for local commodities is assumed to be 0.968 based on export and import statistics in recent years.

While the shadow price rate of 1.000 for foreign currency portion is applied because that those are border prices.

2.4 Land and House Compensation Cost

Regarding compensation, the following matters to be sacrificed are considered as economic cost from the economic point of view; (a) in case of farm land, annual production value is taken as negative benefit; and (b) in case of residents, prices to be newly built are applied as economic compensation cost.

2.5 Contingency

Price escalation is excluded from the financial costs, while physical contingency is included in the economic costs. In this case, average allocation rate of labor, equipment and materials to the total cost are applied for converting to the economic cost. Interest of the loan for foreign currency portion should be exempted for the economic evaluation.

2.6 Economic Construction Cost

Those conversion factors for labour, material and equipment based on the above conditions are summarized in Table 22.

On the basis of the estimated conversion factors, the financial cost of labors, equipment and materials for each construction scheme are derived as shown in Table 23 for the Karian dam, Ciuyah tunnel, river improvement and KSCS I for the first phase, Tables 24 to 25 for 2nd phase in the scenario C consisting of the Pasir Kopo dam, Tanjung dam, Cilawang dam and KSCS in the phase IIC-a and IIC-b, and Table 26 for another 2nd phase in the scenario A consisting of the Pasir Kopo dam, Cilawang dam and KSCS in the phase IIA.

Tables 27 to 29 show the calculation results of economic construction cost for each construction scheme and are summarized as below.

(million Rp.)			
Phase	Construction scheme	Cost	Total cost
1st Phase	Karian dam	247,649	
	Ciuyah tunnel	21,543	
	River improvement	44,359	
	KSCS I	224,573	538,124
2nd Phase (Scenario C)	Pasir Kopo dam	152,731	
	Tanjung dam	612,754	
	Cilawang dam	111,755	
	KSCS IIC-a	241,949	
	KSCS IIC-b	67,197	1,186,386
2nd Phase (Scenario A)	Pasir Kopo dam	121,730	
	Cilawang dam	111,755	-
	KSCS IIA	267,090	500,575

3. COMPARISON OF BENEFIT AND COST

3.1 Annual Allocation of Economic Cost

Economic evaluation of projects is generally made by comparison of benefit and cost. For this purpose, the annual allocation of the economic costs should be clarified firstly. Table 30 shows the annual allocation rate of the economic costs based on the construction schedule of each scheme, and annual economic cost allocation for the Project is given in Tables 31 and 32.

Operation and maintenance cost are shown in Table 33 in economic term, and summarized as below.

(million Rp.)	
Phase	Economic O/M cost
1st Phase	3,184
2nd Phase (Scenario C)	6,799
2nd Phase (Scenario A)	3,504

Those economic operation and maintenance costs are estimated based on the financial operation and maintenance cost in the same manner of the main construction cost, and these costs will be necessary in every year during the project life after completion of the Project.

Also the same manner as mentioned above, the economic replacement cost is estimated based on the financial one for the certain metal works for 2nd phases of the scenarios A and C as shown in Table 34, and summarized as below. And this cost will be necessary in 25th year after completion of the said metal works.

(million Rp.)	
Phase	Economic replacement cost
2nd Phase (Scenario C)	51,208
2nd Phase (Scenario A)	51,278

For comparison of benefit and cost, the project life is assumed at 50 years from the beginning of the Project, namely 1995.

Tables 35 and 36 show cash flows of economic construction costs for the whole works of the scenario A (1st Phase and 2nd Phase for Scenario A) and the scenario C (1st Phase and 2nd Phase for Scenario C) respectively.

3.2 Comparison of Benefit and Cost

The comparison of benefit and cost is made by following cases to make clear the Project's sensitivity:

Works	Cases
1st Phase	Works on water supply in case of Scenario A
	Works on flood control
	Whole works on flood control and water supply in case of Scenario A
	Works on water supply in case of Scenario C
	Whole works of flood control and water supply in case of Scenario C
Entire works	1st and 2nd phase works on water supply in case of Scenario A
	1st and 2nd whole works on flood control and water supply in case of Scenario A
	1st and 2nd phase works on water supply in case of Scenario C
	1st and 2nd whole works on flood control and water supply in case of Scenario C

The streams of economic construction cost and benefit of the above mentioned each case are summarized in Tables 37 to 45. Benefit-cost analysis is made by economic internal rate of return (EIRR), benefit-cost ratio (B/C) and net present value (B - C) using these Tables.

(1) Economic internal rate of return (EIRR)

Calculated economic internal rates of return for each case are shown in Tables mentioned above, and summarized as below:

Works	Works of 1st phase only		Entire works (1st + 2nd)	
	Scenario A	Scenario C	Scenario A	Scenario C
Water supply	16.1	20.2	21.7	24.2
Flood control		13.4		
Whole works (water supply + flood control)		19.8	21.3	23.7

(2) Net present value (B - C) and benefit-cost ratio (B/C)

Assuming that a discount rate is to be 12 %, the net present values (B - C) of each case are summarized as follows from Tables mentioned above:

Works	Works of 1st phase only		Entire works (1st + 2nd)	
	Scenario A	Scenario C	Scenario A	Scenario C
Water supply only	189,055	381,715	509,817	782,715
Flood control only		3,385		
Whole works (water supply + flood control)	192,441	385,100	513,202	786,101

And, benefit-cost ratios (B/C ratio) are summarized as follows also excerpted from Tables mentioned above at the discount rate of 12 %:

Works	Works of 1st phase only		Entire works (1st + 2nd)	
	Scenario A	Scenario C	Scenario A	Scenario C
Water supply only	1.66	2.32	2.44	2.68
Flood control only		1.13		
Whole works (water supply + flood control)	1.61	2.23	2.35	2.60

(3) Result of economic analysis

It is easily seen from the Tables mentioned above that the benefit exceeds the cost in all cases in case the discount rate is assumed at 12 %, and the value of EIRR indicates a good rate as high as 16 % or more in all cases in the whole works consisting of the works on water supply and flood control. Even if in case the works on river improvement only for flood control, the benefit exceeds the cost in the same condition of the whole works and value of EIRR indicates satisfactorily high as 13.4 % for executing the Project.

It may be said from the viewpoint of these results of benefit cost analysis that any of cases of the works are economically feasible.

4. FINANCIAL ASPECT

Based on the analytical data described in previous section in this Annex, several raw water prices in the case of house connection can be summarized as follows:

	(Rp./m ³)	
	Water tariff	Raw water price
• Groundwater tariff	-	1,540
• Willingness to pay	670	400
• Average current tariff among house connection, commercial and industrial sectors	1,013	608

As seen in the above table, the raw water price based on existing tariff system is the most economical one for water use in house connection. It means that the raw water price for whole sectors based on existing tariff system namely Rp.608/m³, must also be the most economical one because of the same tariff system. On the contrary, if in considering the whole sectors, the raw water price based on groundwater and on willingness to pay will be more expensive than that based on existing tariff system.

On the other hand, the raw water prices based on the construction cost are calculated as follows in the condition of annual interest rate of 9 % for the project life applied in the study of JWRMS.

	(Rp./m ³)	
Works	Scenario A	Scenario C
1st Phase	360	267
Entire works (1st + 2nd)	265	283

It is easily seen from the above two tables, the raw water prices based on any cases of works of the Project will be lower than that based on the current tariff system. From this result, it may be said that the Project sounds financially too to water plant authorities because that they can get raw water with low price.

TABLES

Table 1 ESTIMATION OF RAW WATER PRICE

		As of 1994			
Costs/benefits	Calculated/determined as:	Equation	Unit	South zone	North zone
1. Costs of ground water extra itself	O and M costs and yearly payments of investment costs for well and pump divided by extraction.	CDW/QA + ECOS	Rp/m ³	307	425
2. Total economic costs (Raw water price)	Consists of: Cost of ground water extraction Incremental cost on increasing drawn down Costs of salinization Costs of land subsidence Costs of pollution Costs of ground water management		Rp/m ³	730	2,240
3. Weight				0.4659	0.5341
4. Raw water price in average (weighted mean)			Rp/m ³	1,536	
Rounded off:			Rp/m ³	1,540	

Remarks:

Parameters are as follows (based on results of JWRMS);

CDW=Total investment cost and O & M costs of well and pump

QA=Average extraction volume per year per well.

ECOS=Energy cost for pumping ground water.

Incremental cost on increasing drawn down

Costs of salinization

Costs of land subsidence

Costs of pollution

Costs of ground water management

	As of 1992	
1,000Rp/m ³	8,743	13,894
m ³ /year	33,500	38,400
Rp/m ³	23	31
Rp/m ³	92	212
Rp/m ³	n.a.	n.a.
Rp/m ³	52	1,178
Rp/m ³	146	85
Rp/m ³	70	70

Notes:

(1) Weight factors are calculated based on average ground water extraction volume.

(2) Figures in 1994 is based on the results of JWRMS study multiplying an inflation rate of 1.0839 per year from 1992 to 1994.

Table 2 WILLINGNESS TO PAY ON WATER USE

Item	Unit	As of 1992	As of 1994
Monthly water bill for PAM Jaya customers			
Water demand per day	litre/day	180	
Water demand per month	m ³	27	
Water rate per month			
<15 m ³	Rp	350	411
>15 m ³	Rp	650	764
Fixed rate	Rp	2,400	2,820
Monthly water bill (willingness to pay per month)	Rp	15,450	18,151
Average water tariff (willingness to pay per unit volume of m ³)	Rp/m ³	572	672
Round off to:	Rp/m ³	570	670
Estimation of raw water price in willingness to pay			
Estimated raw water price in willingness to pay	Rp/m ³	343	403
Rounded off to:	Rp/m ³	340	400

Notes:

(1) Figures in 1992 is the results of JWRMS study.

(2) Figures in 1994 is based on the results of JWRMS study multiplying an inflation rate of 1.0839 per year from 1992 to 1994.

Table 3 AVERAGE EXISTING TARIFF OF WATER SUPPLY SYSTEM

A. Average Existing Tariff

	(Rp/m ³)						
	Whole study area (incl. Jakarta)				Average	Jakarta	
	0 - 10 m ³	11 - 20 m ³	21 - 30 m ³	30 m ³ over	21 - 30 m ³	31 - 50 m ³	51 m ³ over
Non trading							
House connection	414	577	744	1,038	414	1,175	1,356
Governmental institutes	833	900	1,125	1,508	157	1,175	1,950
Trading (average)			2,339		327		
Large scale firms	1,482	1,482	2,313	2,365		3,000	3,000
Small scale firms	1,135	1,135	2,365	2,365		1,450	2,050
Industrial sector (average)			2,218		55		
Large scale industries	1,775	1,775	2,755	2,965		3,275	3,275
Small scale industries	1,131	1,131	1,681	1,769		2,325	2,350
Public facilities (Social use) (average)			432		60		
General public facilities	284	284	309	324			
Special public facilities	376	425	554	694		625	930
Average (weighted mean)					1,013		
Raw water price					608		

B. Average Water Price Projection at 1994-Price Level

Year	Weight factor			Tariff	(Rp/m3)
	Domestic	Services	Industry		Raw Water Price
1992	0.556	0.419	0.025	1,013	608
1993	0.552	0.410	0.038	1,027	616
1994	0.549	0.401	0.050	1,041	624
1995	0.545	0.392	0.063	1,054	632
1996	0.542	0.383	0.075	1,067	640
1997	0.538	0.375	0.087	1,080	648
1998	0.535	0.366	0.099	1,093	656
1999	0.532	0.358	0.110	1,105	663
2000	0.528	0.350	0.122	1,118	671
2001	0.525	0.342	0.133	1,130	678
2002	0.521	0.335	0.144	1,142	685
2003	0.518	0.327	0.154	1,153	692
2004	0.515	0.320	0.165	1,165	699
2005	0.512	0.313	0.175	1,176	706
2006	0.508	0.306	0.186	1,187	712
2007	0.505	0.299	0.196	1,198	719
2008	0.502	0.293	0.205	1,209	726
2009	0.499	0.286	0.215	1,220	732
2010	0.495	0.280	0.225	1,231	738
2011	0.492	0.274	0.234	1,241	745
2012	0.489	0.268	0.243	1,251	751
2013	0.486	0.262	0.252	1,261	757
2014	0.483	0.256	0.261	1,271	763
2015	0.480	0.250	0.270	1,281	768
2016	0.477	0.245	0.279	1,290	774
2017	0.474	0.239	0.287	1,300	780
2018	0.471	0.234	0.295	1,309	786
2019	0.468	0.229	0.304	1,318	791
2020	0.465	0.224	0.312	1,328	797
2021	0.462	0.219	0.320	1,336	802
2022	0.459	0.214	0.327	1,345	807
2023	0.456	0.209	0.335	1,354	812
2024	0.453	0.205	0.343	1,362	817
2025	0.450	0.200	0.350	1,371	823

Table 4 AREA AND HOUSES INUNDATED BY FLOOD IN 1993

1. Inundated Area from Pamarayan to Rangkasbitung						(Unit:ha)
Land use	Inundated depth (m)					Total
	0.00 - 0.49	0.50 - 0.99	1.00 - 1.49	1.50 - 1.99	Over 2.00	
Kec. Rangkasbitung						
Wet paddy field	114	268	136	58	6	582
Upland crop field	264	408	384	480	240	1,776
Tree crops	47	111	56	24	2	241
Village	35	82	42	18	2	178
Others	49	116	59	25	2	252
Total	510	986	677	605	252	3,030
Kec. Petir						
Wet paddy field	127	298	151	65	6	647
Upland crop field	108	167	157	196	98	725
Tree crops	13	31	16	7	1	67
Village	42	98	50	21	2	212
Others	5	12	6	3	0	25
Total	294	605	379	291	107	1,676
Kec. Pamarayan						
Wet paddy field	65	152	77	33	3	331
Upland crop field	55	85	80	100	50	371
Tree crops	7	16	8	3	0	34
Village	21	50	25	11	1	109
Others	3	6	3	1	0	13
Total	150	309	194	149	55	857
Total inundated area from Pamarayan to Rangkasbitung						
Wet paddy field	306	719	364	156	15	1,560
Upland crop field	427	660	621	776	388	2,872
Tree crops	67	158	80	34	3	342
Village	98	230	116	50	5	499
Others	57	134	68	29	3	290
Total	954	1,900	1,249	1,045	415	5,563

2. Number of Inundated Houses and Buildings from Pamarayan to Rangkasbitung

Kind of houses and buildings	Inundated depth (m)					Total
	0.00 - 0.49	0.50 - 0.99	1.00 - 1.49	1.50 - 1.99	2.00 - 2.49	
Residence	2,738	6,895	4,749	2,195	59	16,637
Shop	49	115	93	50	0	307
School	1	2	2	0	0	5
Mosque	2	6	23	6	3	40
Total	2,790	7,018	4,867	2,251	62	16,989

Sources:

1. Result of field investigation.
2. Information taken from interview survey.
3. Materi Ekspose Bupati Kepala Daerah Tingkat II Lebak Dalam Rangka Kunjungan Ibu HJ.Siti Hardianti Rukmana, Rabu, 29 Desember 1993.
4. Daerah Pekampungan yang Tergenang Air Akibat Meluapnya Kali Ciujung, Ciberang dan Cisimeut.
5. Data Kejadian Bencana Alam, No.360/10/Sosial, Bupati Kepala Daerah Tingkat II Serang.
6. Laporan Bencana Alam pd Jaringan Irigasi Pemerintah(Akibat Turun Hujan Terus Menerus)di Kabupaten Daerah Tingkat II Serang, 28 Desember 1993.

Table 5 AREA AND HOUSES INUNDATED BY THE FLOODS APPLIED FOR DAMAGE ANALYSIS

1. Inundated Area from Pamarayan to Rangkasbitung (Unit:ha)						
Floods	Land Use	Inundated depth (m)				
		0.00 - 0.49	0.50 - 0.99	1.00 - 1.49	1.50 - 1.99	2.00 - 2.49
1981-Flood	Wet paddy field	180	30	10	0	10
	Upland crop field	110	170	160	200	100
	Tree crops	50	30	40	20	10
	Village	10	20	25	10	5
	Others	10	20	20	0	10
	Total	360	270	255	230	135
1983-Flood	Wet paddy field	10	10	0	0	0
	Upland crop field	180	150	50	0	0
	Tree crops	30	10	10	0	0
	Village	20	10	5	0	0
	Others	10	10	0	0	0
	Total	250	190	65	0	0
1993-Flood	Wet paddy field	306	719	364	156	15
	Upland crop field	427	660	621	776	388
	Tree crops	67	158	80	34	3
	Village	98	230	116	50	5
	Others	57	134	68	29	3
	Total	955	1,901	1,249	1,045	414

2. Number of Inundated Houses and Buildings from Pamarayan to Rangkasbitung						
Floods	Kind of houses and buildings	Inundated depth (m)				
		0.00 - 0.49	0.50 - 0.99	1.00 - 1.49	1.50 - 1.99	2.00 - 2.49
1981-Flood	Residence	280	600	1,020	440	60
	Shop	5	10	20	10	0
	School	0	2	0	0	2
	Mosque	1	4	15	4	2
	Total	286	616	1,055	454	64
1983-Flood	Residence	730	250	30	0	0
	Shop	15	5	0	0	0
	School	0	0	2	0	0
	Mosque	10	3	1	0	0
	Total	755	258	33	0	0
1993-Flood	Residence	2,738	6,895	4,749	2,195	59
	Shop	49	115	93	50	0
	School	1	2	2	0	0
	Mosque	2	6	23	6	3
	Total	2,790	7,018	4,867	2,251	62

Sources:

- (1) Features for 1981-flood and 1983-flood are cited from the Interim Report of this study.
 (2) Features for 1993-flood are summarized based on field investigation and interview survey.

Table 6 DAMAGE TO AGRICULTURAL CROPS

(1994-price level)						
Floods	Kind of crops	Gross inundated area (ha)	Net planted area (ha)	(**) Unit damages (Rp/ha)	Average damage factor	Damages to crops (million Rp)
1981-Flood (*)	Maize	600	480	430,360	1.00	207
	Cassava	140	56	917,183	0.10	5
	Sub-total	740	536	-	-	212
	Tree crops	150	75	-	-	-
	Total	890	611	-	-	212
1983-Flood (*)	Maize	330	264	430,360	1.00	114
	Cassava	50	20	917,183	0.10	2
	Sub-total	380	284	-	-	115
	Tree crops	50	25	-	-	-
	Total	430	309	-	-	115
1993-Flood	Maize	2,329	1,863	430,360	1.00	802
	Cassava	543	217	917,183	0.10	20
	Sub-total	2,872	2,080	-	-	822
	Tree crops	342	171	-	-	-
	Total	3,214	2,251	-	-	822

Notes:

- (*) : Based on Feasibility Study on Karian Multipurpose Dam Construction Project, July 1985.
 (**): Calculated based on 1992-price of each crops multiplied by consumer price index of foodstuffs in the Progress Report (2) of this Study.

Table 7 BASIC RATES FOR ESTIMATION OF DAMAGES TO HOUSES AND BUILDINGS

1. Appraisalment of Houses and Buildings, and Household Effects or stored goods

Kind of houses and buildings	1994-price level (million Rp.)		
	Houses and buildings	Household effects and stored goods	Total
Residence	11.67	4.18	15.85
shop	11.67	9.75	21.42
school	100.03	8.36	108.39
mosque	33.34	8.36	41.70

2. Rate of appraisalment of household effects and stored goods by inundated depth above floor level

Kind of houses and buildings	(unit:%)					
	Inundated depth above floor level (m)					
	0.00 - 0.49	0.50 - 0.99	1.00 - 1.49	1.50 - 1.99	2.00 - 2.49	2.50 - 3.00
Residence	55	80	90	95	99	100
Shop	40	65	75	90	95	99
School/mosque	55	85	95	99	100	100

3. Rate of damages to houses and buildings by inundation depth

Inundated depth above floor level (m)						
0.00 - 0.49	0.50 - 0.99	1.00 - 1.49	1.50 - 1.99	2.00 - 2.49	2.50 - 3.00	
0.053	0.072	0.109	0.109	0.152	0.220	

4. Rates of Damages to Submerged Properties

Kind of properties	Rate of damage
Household effects of residence	0.690
Stored goods of shops	0.597
Properties of school and mosque	0.632

Table 8 DAMAGES TO HOUSES/BUILDINGS AND PROPERTIES

Item	Inundated depth (m)					(million Rp)
	0.00 - 0.49	0.50 - 0.99	1.00 - 1.49	1.50 - 1.99	2.00 - 2.49	Total
1981-Flood Houses and buildings						
Residence	173	504	1,297	560	106	2,641
Shop	3	8	25	13	0	50
School	0	14	0	0	30	45
Mosque	2	10	55	15	10	91
Sub-total	178	537	1,377	587	147	2,826
Household effects and stored goods						
Residence	444	1,384	2,648	1,206	171	5,853
Shop	12	38	87	52	0	189
School	0	9	0	0	11	20
Mosque	3	18	75	21	11	128
Sub-total	459	1,449	2,810	1,279	192	6,190
Total	637	1,986	4,188	1,866	339	9,016
1983-Flood Houses and buildings						
Residence	452	210	38	0	0	700
Shop	9	4	0	0	0	13
School	0	0	22	0	0	22
Mosque	18	7	4	0	0	29
Sub-total	478	221	64	0	0	764
Household effects and stored goods						
Residence	1,158	577	78	0	0	1,813
Shop	35	19	0	0	0	54
School	0	0	10	0	0	10
Mosque	29	13	5	0	0	48
Sub-total	1,222	609	93	0	0	1,924
Total	1,700	831	157	0	0	2,688
1993-Flood Houses and buildings						
Residence	1,693	5,793	6,041	2,792	105	16,425
Shop	30	97	118	64	0	309
School	5	14	22	0	0	42
Mosque	4	14	84	22	15	139
Sub-total	1,733	5,919	6,265	2,878	120	16,913
Household effects and stored goods						
Residence	4,343	15,909	12,327	6,014	168	38,763
Shop	114	435	406	262	0	1,217
School	3	9	10	0	0	22
Mosque	6	27	115	31	16	195
Sub-total	4,466	16,380	12,859	6,308	184	40,197
Total	6,199	22,299	19,123	9,185	304	57,111

Table 9 ACTUAL FLOOD DAMAGES

Damage Item	(unit: million Rp)		
	1981-flood	1983-flood	1993-flood
Houses and buildings, household effects or stored goods	9,016	2,688	57,111
Upland crops	212	115	822
Suspension of business activities	541	161	3,427
Public facilities	8,159	2,433	11,647
Total	17,928	5,397	73,007

Table 10 ANNUAL AVERAGE FLOOD DAMAGE

Return period	Exceedance	Difference of exceedance	(unit: million Rp)			
			Damages (million Rp)		Damages (million Rp)	
			Amount	Mean	Segment	Cummulative
1.01	1.0000	-	0	0	0	0
2	0.5000	0.5000	5,397	2,699	1,349	1,349
5	0.2000	0.3000	17,928	11,663	3,499	4,848
10	0.1000	0.1000	49,950	33,939	3,394	8,242
25	0.0400	0.0600	73,007	61,479	3,689	11,931

Table 11 ECONOMIC PRICE OF PADDY

Item	Unit	Price
FOB price of rice in Bangkok (5% broken)*	US\$/ton	275
Quality adjustment (10 % discount)	US\$/ton	247
Freight and insurance from Bangkok to Jakarta	US\$/ton	66
Port handling, storage and transport to wholesaler**	Rp/ton	19,775
Transport and handling costs from mills to wholesaler***	Rp/ton	15,380
Ex-mill price of rice in project area (US\$ 1 = Rp.2,177.25)	Rp/ton	686,192
Conversion of milled rice to dry paddy (68 %)	Rp/ton	466,611
Losses of weight in storage and processing (5%)	Rp/ton	23,331
Milling cost of paddy	Rp/ton	22,412
Value of by-product per ton of paddy	Rp/ton	4,482
Transport cost from mills to farm (20km)	Rp/ton	4,394
Farm gate price of paddy	Rp/ton	411,992
Rounded off to:	Rp/ton	412,000

(Note) * : Commodity Price Forecasts (Current and 1985 Dollars), IBRD 1992.
 ** : 70 km x Rp.100/km.ton (as of 1984) x price index on food from 1984 to 1994.
 *** : For port handling cost:Rp.7,000 x price index on food from 1984 to 1994.

Table 12 ECONOMIC PRICE OF FERTILIZER

Item	Unit	Price
UREA		
FOB price in Europe	US\$/ton	99
Freight and insurance from Europe to Jakarta	US\$/ton	88
Port handling and storage cost	Rp/ton	19,775
Transport cost from Jakarta to project area	Rp/ton	15,380
Farm gate price	Rp/ton	411,297
Rounded off to:	Rp/ton	411,000
TSP		
FOB price in Gulf ports	US\$/ton	85
Freight and insurance from Gulf ports to Jakarta	US\$/ton	132
Port handling and storage cost	Rp/ton	19,775
Transport cost from Jakarta to project area	Rp/ton	15,380
Farm gate price	Rp/ton	476,493
Rounded off to:	Rp/ton	476,000
POTASSIUM CHLORIDE		
FOB price in Van Couver	US\$/ton	74
Freight and insurance from Van Couver to Jakarta	US\$/ton	110
Port handling and storage cost	Rp/ton	19,775
Transport cost from Jakarta to project area	Rp/ton	15,380
Farm gate price	Rp/ton	404,704
Rounded off to:	Rp/ton	405,000

(Note) : Commodity Price Forecasts (Current and 1985 Dollars), IBRD 1992.

Table 13 ECONOMIC PRICE OF MAIZE AND SOYBEANS

Item	Unit	Maize	Soybeans
International market price*, FOB, US\$	US\$/ton	69	161
Adjusted to 1993 value based on price index on food	US\$/ton	130	302
Freight and insurance	US\$/ton	205	205
Port handling, storage and transport to wholesaler**	Rp/ton	15,768	15,768
Transport and handling costs from warehouse to wholesaler***	Rp/ton	21,972	21,972
Market price in project area (US\$ 1=Rp.2,103.69)	Rp/ton	721,283	1,097,288
Losses of weight in storage (5%)	Rp/ton	30,294	37,308
Local transport cost, etc.	Rp/ton	4,693	4,693
Farm gate price	Rp/ton	686,296	1,055,287
Rounded off to:	Rp/ton	686,000	1,055,000

(Note) * : Commodity Price Forecasts (Current and 1985 Dollars), IBRD 1992.
 ** : 70 km x Rp.100/km.ton (as of 1984) x price index on food from 1986 to 1994.
 ***: For port handling cost:Rp.10,000 x price index on food from 1986 to 1994.

Table 14 ECONOMIC PRICES OF FARM PRODUCTS AND INPUTS AT FARM GATE

		Item	Unit	Price as of 1986	Multiplied by price index 86 to 94	Rounded off to
PRODUCT:		Paddy	Rp/kg	220		412
		Maize	Rp/kg	325		686
		Soybeans/Mungbeans	Rp/kg	610		1,055
		Peanuts/groundnuts	Rp/kg	935	1,755.1	1,755
		Cassava	Rp/kg	50	93.9	94
INPUTS	Seeds:	Paddy	Rp/kg	385	722.7	723
		Maize	Rp/kg	360	675.8	676
		Soybeans/Mungbeans	Rp/kg	620	1,163.8	1,164
		Peanuts/groundnuts	Rp/kg	1,250	2,346.4	2,346
		Cassava	Rp/cutting	5	9.4	9
	Fertilizer:	UREA	Rp/kg	250		411
		TSP	Rp/kg	210		476
		POTASSIUM CHLORIDE/KCL	Rp/kg	235		405
	Agro-chemical:	Insecticide	Rp/kg	5,150	9,667.3	9,667
		Rodenticide	Rp/kg	4,600	8,634.9	8,635
	Power:	Labor	Rp/man.day	1,200	2,252.6	2,253
		Animal draft	Rp/workday	4,000	7,508.6	7,509

Sources:

1. Commodity Price Forecasts (current and 1985 Dollars), IBRD, 1992.
2. Feasibility Study on Karian Multipurpose Dam Construction Project, JICA, 1985
3. Cisadane River Basin Development Feasibility Project
4. Jawa Barat Dalam Angka 1990 and 1991, Kantor Statistik Jawa Barat.
5. Indikator Ekonomi Juni 1981, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93 and 94, Biro Pusat Statistik, Jakarta.

Table 15 ECONOMIC PRIMARY PROFIT PER UNIT HARVESTED AREA FOR PADDY IN THE PRESENT CONDITION

				(thousand Rp/ha)				
Item		Unit	Unit price	Without Project				
				(Wet season paddy)		(Dry season paddy)		
				Quantity	Amount	Quantity	Amount	
LARGE SCALE FARM (0.6 ha farm system)								
1. Gross Income		kg/ha	412	5,100	2,101	4,800	1,978	
2. Production Cost		Seeds	kg/ha	723	30	22	30	22
	Fertilizers	UREA	kg/ha	411	200	82	200	82
		TSP	kg/ha	476	100	48	100	48
		KCL	kg/ha	405	10	4	10	4
	Agro-chemicals	Insecticide	lit./ha	9,667	3	29	3	29
		Rodenticide	kg/ha	8,635	1	4	1	4
	Labor	m.d/ha	2,253	162	365	168	379	
	Animal draft	wd/ha	7,509	20	150	20	150	
Total of production cost					704		718	
3. Primary Profit (1 - 2)					1,397		1,260	
MEDIUM SCALE FARM (0.3 ha farm system)								
1. Gross Income		kg/ha	412	4,500	1,854	4,400	1,813	
2. Production Cost		Seeds	kg/ha	723	34	25	34	25
	Fertilizers	UREA	kg/ha	411	200	82	200	82
		TSP	kg/ha	476	75	36	75	36
		KCL	kg/ha	405	5	2	5	2
	Agro-chemicals	Insecticide	lit./ha	9,667	2	19	2	19
		Rodenticide	kg/ha	8,635	1	4	1	4
	Labor	m.d/ha	2,253	151	340	158	356	
	Animal draft	wd/ha	7,509	21	158	21	158	
Total of production cost					666		682	
3. Primary Profit (1 - 2)					1,188		1,131	
Average					1,293		1,196	

(Note) Farm scale is accorded to the Cisadane River Basin Development Feasibility Study, 1987.

Table 16 ECONOMIC PRIMARY PROFIT PER UNIT HARVESTED AREA
FOR MAIZE IN THE PRESENT CONDITION

Item		Unit	Unit price	Without Project	
				Quantity	Amount
LARGE SCALE FARM (0.6 ha farm system)					
1. Gross Income		kg/ha	686	2,240	1,537
2. Production Cost	Seeds	kg/ha	676	38	26
	Fertilizers	UREA	kg/ha	411	37
		TSP	kg/ha	476	17
		KCL	kg/ha	405	0
	Agro-chemicals	Insecticide	lit./ha	9,667	13
		Rodenticide	kg/ha	8,635	0
	Labor	m.d/ha	2,253	61	137
	Animal draft	wd/ha	7,509	8	60
Total of production cost					289
3. Primary Profit (1 - 2)					1,247
MEDIUM SCALE FARM (0.3 ha farm system)					
1. Gross Income		kg/ha	686	2,280	1,564
2. Production Cost	Seeds	kg/ha	676	38	26
	Fertilizers	UREA	kg/ha	411	37
		TSP	kg/ha	476	17
		KCL	kg/ha	405	0
	Agro-chemicals	Insecticide	lit./ha	9,667	13
		Rodenticide	kg/ha	8,635	0
	Labor	m.d/ha	2,253	61	137
	Animal draft	wd/ha	7,509	5	38
Total of production cost					267
3. Primary Profit (1 - 2)					1,297
Average					1,272

(Note) Farm scale is accorded to the Cisadane River Basin Development Feasibility Study, 1987.

Table 17 ECONOMIC PRIMARY PROFIT PER UNIT HARVESTED AREA
FOR PEANUTS/GROUNDNUTS IN THE PRESENT CONDITION

Item		Unit	Unit price	Without Project		
				Quantity	Amount	
LARGE SCALE FARM (0.6 ha farm system)						
1. Gross Income		kg/ha	1,755	740	1,299	
2. Production Cost	Seeds	kg/ha	2,346	40	94	
	Fertilizers	UREA	kg/ha	411	80	33
		TSP	kg/ha	476	50	24
		KCL	kg/ha	405	0	0
	Agro-chemicals	Insecticide	lit./ha	9,667	1	6
		Rodenticide	kg/ha	8,635	0	0
	Labor	m.d/ha	2,253	91	205	
	Animal draft	wd/ha	7,509	12	90	
Total of production cost					451	
3. Primary Profit (1 - 2)					847	
MEDIUM SCALE FARM (0.3 ha farm system)						
1. Gross Income		kg/ha	1,755	720	1,264	
2. Production Cost	Seeds	kg/ha	2,346	40	94	
	Fertilizers	UREA	kg/ha	411	80	33
		TSP	kg/ha	476	50	24
		KCL	kg/ha	405	0	0
	Agro-chemicals	Insecticide	lit./ha	9,667	1	6
		Rodenticide	kg/ha	8,635	0	0
	Labor	m.d/ha	2,253	91	205	
	Animal draft	wd/ha	7,509	10	75	
Total of production cost					436	
3. Primary Profit (1 - 2)					827	
Average					837	

(Note) Farm scale is accorded to the Cisadane River Basin Development Feasibility Study, 1987.

Table 18 ECONOMIC PRIMARY PROFIT PER UNIT HARVESTED AREA
FOR SOYBEANS IN THE PRESENT CONDITION

Item		Unit	Unit price	Without Project	
				Quantity	Amount
LARGE SCALE FARM (0.6 ha farm system)					
1. Gross Income		kg/ha	1,055	890	939
2. Production Cost		kg/ha	1,164	40	47
	Seeds				
	Fertilizers	UREA	kg/ha	411	41
		TSP	kg/ha	476	24
		KCL	kg/ha	405	0
	Agro-chemicals	Insecticide	lit./ha	9,667	13
		Rodenticide	kg/ha	8,635	0
	Labor	m.d/ha	2,253	97	219
	Animal draft	wd/ha	7,509	5	38
Total of production cost					380
3. Primary Profit (1 - 2)					559
MEDIUM SCALE FARM (0.3 ha farm system)					
1. Gross Income		kg/ha	1,055	1,020	1,076
2. Production Cost		kg/ha	1,164	40	47
	Seeds				
	Fertilizers	UREA	kg/ha	411	41
		TSP	kg/ha	476	24
		KCL	kg/ha	405	0
	Agro-chemicals	Insecticide	lit./ha	9,667	13
		Rodenticide	kg/ha	8,635	0
	Labor	m.d/ha	2,253	97	219
	Animal draft	wd/ha	7,509	5	38
Total of production cost					380
3. Primary Profit (1 - 2)					696
Average					627
(Note) Farm scale is accorded to the Cisadane River Basin Development Feasibility Study, 1987.					

(Note) Farm scale is accorded to the Cisadane River Basin Development Feasibility Study, 1987.

Table 19 ECONOMIC PRIMARY PROFIT PER UNIT HARVESTED AREA
FOR MUNGBEANS IN THE PRESENT CONDITION

Item		Unit	Unit price	Without Project		
				Quantity	Amount	
LARGE SCALE FARM (0.6 ha farm system)						
1. Gross Income		kg/ha	1,055	830	876	
2. Production Cost	Seeds	kg/ha	1,164	25	29	
	Fertilizers	UREA	kg/ha	411	100	41
		TSP	kg/ha	476	50	24
		KCL	kg/ha	405	0	0
	Agro-chemicals	Insecticide	lit./ha	9,667	2	19
		Rodenticide	kg/ha	8,635	0	0
	Labor	m.d/ha	2,253	97	219	
	Animal draft	wd/ha	7,509	5	38	
Total of production cost					369	
3. Primary Profit (1 - 2)					506	
MEDIUM SCALE FARM (0.3 ha farm system)						
1. Gross Income		kg/ha	1,055	810	855	
2. Production Cost	Seeds	kg/ha	1,164	25	29	
	Fertilizers	UREA	kg/ha	411	100	41
		TSP	kg/ha	476	50	24
		KCL	kg/ha	405	0	0
	Agro-chemicals	Insecticide	lit./ha	9,667	2	19
		Rodenticide	kg/ha	8,635	0	0
	Labor	m.d/ha	2,253	97	219	
	Animal draft	wd/ha	7,509	5	38	
Total of production cost					369	
3. Primary Profit (1 - 2)					485	
Average					496	

(Note) Farm scale is accorded to the Cisadane River Basin Development Feasibility Study, 1987.

Table 20 IRRIGATION BENEFIT BY IRRIGATION AREA

Items	Scenario	Ciujung	Cidurian
Irrigation area (ha)	Scenario A	18,862	-
	Scenario B	20,375	-
	Scenario C	18,862	8,873
Increase of intensity (%)	Scenario A	22	-
	Scenario B	19	-
	Scenario C	46	46
Incremental Area (ha)	Scenario A	4,150	-
	Scenario B	3,871	-
	Scenario C	8,677	4,082
Irrigation benefit in total (million Rp.)	Scenario A	3,357	-
	Scenario B	345	-
	Scenario C	7,020	3,302

Table 21 OCCUPANCY RATE OF LABOR, EQUIPMENT AND MATERIAL COSTS IN CONSTRUCTION COST

Work Items		F.C.			L.C.			(%)
		Labor	Equipment	Material	Labor	Equipment	Material	
Karian, Cilawang and Pasir Kopo dams								
Preparatory works		25	10	65	25	10	65	
Civil works	River diversion works	10	60	30	25	37	38	
	Coffer dam	4	66	30	10	61	29	
	Main dam	4	66	30	10	61	29	
	Saddle dam	4	66	30	10	61	29	
	Spillway	7	55	38	12	62	26	
	Intake	2	27	71	6	17	77	
Metal works		25	10	65	25	10	65	
Ciuyah Tunnel								
Preparatory works		2	27	71	6	17	77	
Civil works	Inlet and outlet	0	94	6	9	68	23	
	Tunnel	10	60	30	25	37	38	
	Intake shaft	18	59	23	16	46	38	
	Approach channel	2	27	71	6	17	77	
Metal works		25	10	65	25	10	65	
River Improvement Works								
Preparatory works		2	27	71	6	17	77	
Civil works	Earth works	0	94	6	11	67	22	
	Structural works	0	0	100	39	0	61	
	Road works	0	2	98	1	1	98	
Tanjung dam								
Preparatory works		2	27	71	6	17	77	
Civil works	River diversion works	0	94	6	9	68	23	
	Coffer dam	4	65	31	10	61	29	
	Main dam	4	65	31	10	61	29	
	Saddle dam	0	83	17	11	61	28	
	Spillway	2	27	71	6	17	77	
	Low level outlet & shaft	3	3	94	15	2	83	
	Intake for Tanjung Canal	0	2	98	31	1	68	
Metal works		25	10	65	25	10	65	
KSCS IIA and IIC-a								
Preparatory works		2	27	71	6	17	77	
Civil works	Waterway	0	2	98	31	1	68	
	Aqueduct	10	23	67	15	41	44	
	Syphon	0	33	67	15	41	44	
	Railway crossing	13	65	22	6	17	77	
	Road crossing	0	2	98	31	1	68	
	Spillway	0	2	98	31	1	68	
	Inspection road	0	15	85	66	3	31	
	Foot path	0	2	98	31	1	68	
	Cross drain	0	3	97	1	2	97	
	Parungpanjang pump station	25	10	65	25	10	65	
	Pipe line	0	3	97	1	2	97	
Metal works		25	10	65	25	10	65	
KSCS I and IIC-b								
Preparatory works		2	27	71	6	17	77	
Civil works	Waterway	0	2	98	31	1	68	
	Syphon	0	33	67	15	41	44	
	Railway crossing	13	65	22	6	17	77	
	Road crossing	2	27	71	6	17	77	
	Spillway	0	2	98	31	1	68	
	Diversion structure	0	2	98	31	1	68	
	Inspection road	0	15	85	66	3	31	
	Foot path	0	2	98	31	1	68	
	Cross drain	0	2	98	31	1	68	
Metal works		25	10	65	25	10	65	

Table 22 CONVERSION FACTORS FROM FINANCIAL
COST TO ECONOMIC COST

	Item	Rate
Labor cost consist of	Skilled labor	0.300
	Unskilled labor	0.700
Rates for shadow price	Unskilled labor	0.750
	Local material	0.968
	Foreign material	1.000
	Equipment	1.000
Contractor's profit		0.030

Table 23 LABOUR, EQUIPMENT AND MATERIAL COSTS FOR FIRST PHASE

Work Items	P.C.				L.C.			
	Labor	Equipment	Material	Total	Labor	Equipment	Material	Total
(million Rp.)								
Karian Dam								
Compensation				0				58,714
Preparatory works	2,758	1,393	7,171	11,032	1,817	727	4,723	7,266
Civil works	4,644	55,604	27,517	87,765	4,530	19,570	10,792	34,892
River diversion works	1,393	8,358	4,179	13,930	1,613	2,387	2,451	6,451
Coffer dam	169	2,796	1,271	4,237	161	979	465	1,605
Main dam	2,074	34,217	15,553	51,844	1,931	11,778	5,600	19,309
Saddle dam	257	4,233	1,924	6,414	243	1,482	704	2,429
Spillway	734	5,770	3,987	10,491	554	2,862	1,200	4,616
Intake	17	229	603	849	29	82	371	482
Metal works	2,848	1,139	7,404	11,390	317	127	823	1,266
Engineering services				15,426				3,908
Administration				0				7,681
Income tax				0				17,295
Sub-total	10,250	58,136	42,091	125,613	6,663	20,423	16,338	131,022
Allocation rate in whole works	9.3%	52.8%	38.2%	100.3%	15.3%	47.0%	37.6%	100.0%
Contingency	3,182	18,049	13,067	34,208	10,203	31,275	25,019	66,498
Physical contingency	1,168	6,627	4,798	12,561	2,010	6,162	4,930	13,102
Price escalation	2,014	11,421	8,269	21,647	8,193	25,113	20,090	53,396
Interest during construction				14,946				0
Total cost				174,767				197,520
Ciuyah Tunnel								
Compensation				0				0
Preparatory works	9	127	333	469	12	35	158	205
Civil works	1,132	6,192	2,953	10,277	938	1,732	1,714	4,383
Inlet and outlet	0	437	28	465	23	177	60	260
Tunnel	726	4,358	2,179	7,263	769	1,138	1,169	3,076
Intake shaft	399	1,307	510	2,216	132	379	313	823
Approach channel	7	90	236	333	13	38	172	224
Metal works	505	202	1,314	2,021	56	23	146	225
Engineering services				1,787				433
Administration				0				879
Income tax				0				1,980
Sub-total	1,646	6,521	4,600	14,554	1,006	1,789	2,018	8,105
Allocation rate in whole works	12.9%	51.1%	36.0%	100.0%	20.9%	37.2%	41.9%	100.0%
Contingency	541	2,142	1,511	4,193	1,111	1,976	2,229	5,317
Physical contingency	188	743	524	1,455	170	301	340	811
Price escalation	353	1,398	986	2,738	942	1,675	1,889	4,506
Interest during construction				1,498				0
Total cost				20,245				13,422
River Improvement								
Compensation				0				1,926
Preparatory works	53	718	1,888	2,659	152	432	1,957	2,541
Civil works	0	13,353	4,509	17,862	1,537	6,051	3,805	11,392
Earth works	0	13,309	849	14,158	992	6,041	1,984	9,016
Structural works	0	0	1,490	1,490	535	0	836	1,371
Road works	0	44	2,170	2,214	10	10	985	1,005
Engineering services				2,873				1,254
Administration				0				1,723
Income tax				0				3,858
Sub-total	53	14,071	6,397	23,394	1,689	6,483	5,761	22,694
Allocation rate in whole works	0.3%	68.6%	31.2%	100.0%	12.1%	46.5%	41.4%	100.0%
Contingency	20	5,186	2,358	7,564	1,764	6,769	6,016	14,548
Physical contingency	9	2,402	1,092	3,503	413	1,584	1,408	3,404
Price escalation	11	2,785	1,266	4,061	1,351	5,185	4,608	11,144
Interest during construction				2,869				0
Total cost				33,827				37,242
KSCSI								
Compensation				0				6,266
Preparatory works	214	2,890	7,599	10,703	528	1,496	6,775	8,799
Civil works	922	9,008	87,072	97,002	18,474	2,448	38,933	59,854
Waterway	0	1,453	71,199	72,652	14,196	458	31,140	45,794
Syphon	0	1,470	2,985	4,455	415	1,135	1,218	2,769
Railway crossing	850	4,249	1,438	6,537	112	317	1,435	1,863
Road crossing	72	969	2,548	3,589	136	386	1,749	2,272
Spillway	0	4	187	191	38	1	84	123
Diversion structure	0	21	1,029	1,050	207	7	454	667
Inspection road	0	775	4,389	5,164	2,632	120	1,236	3,988
Foot path	0	3	129	132	19	1	41	61
Cross drain	0	65	3,167	3,232	718	23	1,576	2,317
Metal works	474	189	1,231	1,894	53	21	137	211
Engineering services				15,344				6,198
Administration				0				8,923
Income tax				0				20,001
Sub-total	1,609	12,087	95,903	124,943	19,054	3,964	45,845	110,252
Allocation rate in whole works	1.5%	11.0%	87.5%	100.0%	27.7%	5.8%	66.6%	100.0%
Contingency	517	3,884	30,820	35,222	19,031	3,959	45,788	68,778
Physical contingency	183	1,378	10,933	12,494	3,051	635	7,340	11,025
Price escalation	334	2,507	19,888	22,728	15,980	3,325	38,448	57,753
Interest during construction				13,514				0
Total cost				173,679				179,030

Table 24 LABOUR, EQUIPMENT AND MATERIAL COSTS FOR SECOND PHASE IN SCENARIO C (1/2)

Work Items	F.C.				L.C.			
	Labor	Equipment	Material	Total	Labor	Equipment	Material	Total
(million Rp.)								
Pasir Kopo Dam								
Compensation				0				33,579
Preparatory works	1,484	677	3,858	5,936	814	326	2,116	3,255
Civil works	3,178	33,217	18,668	55,063	2,543	11,163	5,867	19,573
River diversion works	677	4,060	2,030	6,766	672	995	1,022	2,689
Coffer dam	140	2,308	1,049	3,497	65	398	189	653
Main dam	942	15,541	7,064	23,547	551	3,359	1,597	5,507
Spillway	1,392	10,941	7,559	19,892	1,223	6,320	2,650	10,194
Intake	27	367	966	1,361	32	90	408	530
Metal works	2,965	1,186	7,709	11,860	255	102	664	1,021
Engineering services				10,200				2,146
Administration				0				4,835
Income tax				0				10,905
Sub-total	7,627	35,079	30,236	83,059	3,612	11,591	8,646	75,314
Allocation rate in whole work:	10.5%	48.1%	41.5%	100.1%	15.1%	48.6%	36.3%	100.0%
Contingency	5,554	25,546	22,019	53,059	22,180	71,167	53,088	146,435
Physical contingency	869	3,999	3,447	8,306	1,141	3,661	2,731	7,532
Price escalation	4,685	21,547	18,572	44,753	21,039	67,506	50,358	138,903
Interest during construction				11,770				0
Total cost				147,888				221,749
Tanjung Dam								
Compensation				0				89,246
Preparatory works	551	7,433	19,547	27,531	875	2,480	11,234	14,590
Civil works	9,941	166,166	89,361	265,468	10,839	61,327	35,276	107,442
River diversion works	0	7,245	462	7,707	297	2,246	760	3,303
Coffer dam	446	7,255	3,460	11,161	441	2,693	1,280	4,414
Main dam	9,093	147,755	70,468	227,316	9,028	55,070	26,181	90,279
Saddle dam	0	1,070	219	1,289	69	384	176	630
Spillway	193	2,605	6,850	9,648	306	868	3,933	5,108
Low level outlet & shaft	209	209	6,555	6,973	425	57	2,349	2,830
Intake for Tanjung Canal	0	27	1,347	1,374	272	9	597	878
Metal works	588	235	1,529	2,352	65	26	170	261
Engineering services				41,157				16,998
Administration				0				20,770
Income tax				0				47,355
Sub-total	11,080	173,835	110,436	336,508	11,780	63,833	46,680	296,662
Allocation rate in whole work:	3.8%	58.9%	37.4%	100.0%	9.6%	52.2%	38.2%	100.0%
Contingency	8,923	139,993	88,937	237,852	16,531	89,581	65,509	171,621
Physical contingency	1,257	19,725	12,531	33,513	2,849	15,439	11,290	29,578
Price escalation	7,666	120,268	76,406	204,339	13,682	74,142	54,219	142,043
Interest during construction				67,471				0
Total cost				641,831				468,283
Cilawang Dam								
Compensation				0				25,226
Preparatory works	2,554	1,022	6,641	10,217	1,289	515	3,350	5,154
Civil works	1,895	20,444	10,777	33,116	1,856	7,820	4,250	13,926
River diversion works	551	3,308	1,654	5,514	646	955	981	2,582
Coffer dam	86	1,417	644	2,147	80	489	233	802
Main dam	607	10,015	4,552	15,174	550	3,352	1,594	5,495
Saddle dam	63	1,032	469	1,563	59	357	170	586
Spillway	580	4,554	3,146	8,280	509	2,628	1,102	4,239
Intake	9	118	311	438	13	38	171	222
Metal works	1,871	748	4,864	7,483	208	83	540	831
Engineering services				7,114				1,792
Administration				0				3,536
Income tax				0				7,963
Sub-total	6,320	22,214	22,282	57,930	3,352	8,418	8,141	58,428
Allocation rate in whole work:	12.4%	43.7%	43.8%	100.0%	16.8%	42.3%	40.9%	100.0%
Contingency	7,055	24,799	24,874	56,728	38,667	97,109	93,904	229,681
Physical contingency	720	2,532	2,540	5,793	984	2,470	2,389	5,843
Price escalation	6,335	22,266	22,334	50,935	37,683	94,639	91,516	223,838
Interest during construction				10,620				0
Total cost				125,278				288,109

Table 25 LABOUR, EQUIPMENT AND MATERIAL COSTS FOR SECOND PHASE IN SCENARIO C (2/2)

Work Items	F.C.				L.C.			
	Labor	Equipment	Material	Total	Labor	Equipment	Material	Total
Compensation				0				1,270
Preparatory works	155	2,090	5,496	7,741	442	1,253	5,676	7,371
Civil works	1,831	7,670	69,445	78,946	9,469	1,696	35,681	46,846
Waterway	0	680	33,321	34,001	7,033	227	15,427	22,687
Aqueduct	255	586	1,708	2,549	75	205	220	499
Syphon	0	628	1,276	1,904	160	436	468	1,064
Railway crossing	849	4,246	1,437	6,532	111	315	1,427	1,853
Road crossing	0	46	2,267	2,313	405	13	888	1,306
Inspection road	0	414	2,349	2,763	1,206	55	566	1,827
Foot path	0	3	155	158	23	1	50	73
Cross drain	0	17	540	557	4	8	389	401
Parunpanjang pump station	727	291	1,890	2,908	294	118	764	1,175
Pipe line	0	758	24,503	25,261	160	319	15,482	15,961
Metal works	12,457	4,983	32,388	49,828	1,384	554	3,599	5,537
Engineering services				19,112				5,378
Administration				0				9,813
Income tax				0				22,076
Sub-total	14,443	14,742	107,330	155,627	11,296	3,503	44,955	98,291
Allocation rate in whole works	10.6%	10.8%	78.6%	100.0%	18.9%	5.9%	75.2%	100.0%
Contingency	13,371	13,648	99,361	126,379	58,197	18,047	231,613	307,856
Physical contingency	1,647	1,681	12,236	15,563	1,858	576	7,395	9,829
Price escalation	11,724	11,967	87,125	110,816	56,338	17,471	224,218	298,027
Interest during construction				20,478				0
Total cost				302,484				406,147
KSCS for Phase IIC-b								
Compensation				0				171
Preparatory works	134	1,811	4,763	6,708	299	846	3,832	4,977
Civil works	37	1,538	23,561	25,136	5,531	661	11,538	17,730
Waterway	0	389	19,057	19,446	4,351	140	9,545	14,037
Syphon	0	363	736	1,099	104	285	305	694
Road crossing	37	495	1,301	1,833	68	193	872	1,133
Spillway	0	4	198	202	40	1	88	130
Diversion structure	0	6	281	287	64	2	141	207
Inspection road	0	273	1,546	1,819	809	37	380	1,226
Foot path	0	1	38	39	4	0	9	13
Cross drain	0	8	403	411	90	3	197	290
Metal works	67	27	175	269	8	3	20	30
Engineering services				4,496				2,046
Administration				0				2,743
Income tax				0				6,139
Sub-total	238	3,376	28,499	36,609	5,837	1,510	15,390	33,836
Allocation rate in whole work:	0.7%	10.5%	88.7%	100.0%	25.7%	6.6%	67.7%	100.0%
Contingency	285	4,041	34,113	38,439	41,466	10,725	109,327	161,518
Physical contingency	27	385	3,249	3,661	869	225	2,291	3,384
Price escalation	258	3,656	30,864	34,778	40,597	10,500	107,036	158,134
Interest during construction				4,656				0
Total cost				79,704				195,354

Table 26 LABOUR, EQUIPMENT AND MATERIAL COSTS FOR SECOND PHASE IN SCENARIO A

Work Items	P.C.				L.C.			
	Labor	Equipment	Material	Total	Labor	Equipment	Material	Total
(million Rp.)								
Pasir Kopo Dam								
Compensation				0				20,138
Preparatory works	1,484	599	3,858	5,936	814	326	2,116	3,255
Civil works	2,686	25,866	15,152	43,704	2,543	11,163	5,867	19,573
River diversion works	599	3,595	1,797	5,991	672	995	1,022	2,689
Coffer dam	71	1,164	529	1,764	65	398	189	653
Main dam	595	9,816	4,462	14,872	551	3,359	1,597	5,507
Spillway	1,400	11,001	7,601	20,002	1,223	6,320	2,650	10,194
Intake	22	290	763	1,075	32	90	408	530
Metal works	2,296	919	5,970	9,185	255	102	664	1,021
Engineering services				8,236				2,146
Administration				0				4,134
Income tax				0				9,306
Sub-total	6,466	27,383	24,981	67,061	3,612	11,591	8,646	59,573
Allocation rate in whole works	11.0%	46.6%	42.5%	100.0%	15.1%	48.6%	36.3%	100.0%
Contingency	6,129	25,954	23,677	55,755	27,424	87,994	65,641	181,059
Physical contingency	737	3,122	2,848	6,706	902	2,895	2,160	5,957
Price escalation	5,392	22,833	20,829	49,049	26,522	85,099	63,481	175,102
Interest during construction				10,651				0
Total cost				133,467				240,632
Cilawang Dam								
Compensation				0				25,226
Preparatory works	2,554	1,022	6,641	10,217	1,289	515	3,350	5,154
Civil works	1,895	20,444	10,777	33,116	1,856	7,820	4,250	13,926
River diversion works	551	3,308	1,654	5,514	646	955	981	2,582
Coffer dam	86	1,417	644	2,147	80	489	233	802
Main dam	607	10,015	4,552	15,174	550	3,352	1,594	5,495
Saddle dam	63	1,032	469	1,563	59	357	170	586
Spillway	580	4,554	3,146	8,280	509	2,628	1,102	4,239
Intake	9	118	311	438	13	38	171	222
Metal works	1,871	748	4,864	7,483	208	83	540	831
Engineering services				7,114				1,792
Administration				0				3,536
Income tax				0				7,963
Sub-total	6,320	22,214	22,282	57,930	3,352	8,418	8,141	58,428
Allocation rate in whole works	12.4%	43.7%	43.8%	100.0%	16.8%	42.3%	40.9%	100.0%
Contingency	7,055	24,799	24,874	56,728	38,667	97,109	93,904	229,681
Physical contingency	720	2,532	2,540	5,793	984	2,470	2,389	5,843
Price escalation	6,335	22,266	22,334	50,935	37,683	94,639	91,516	223,838
Interest during construction				10,620				0
Total cost				125,278				288,109
KSCS for Phase IIA								
Compensation				0				1,270
Preparatory works	175	2,366	6,222	8,763	456	1,292	5,854	7,602
Civil works	1,760	7,980	79,734	89,475	12,517	1,896	41,222	55,635
Waterway	0	828	40,576	41,404	9,156	295	20,084	29,535
Aqueduct	255	586	1,708	2,549	75	205	220	499
Syphon	0	933	1,893	2,826	217	592	636	1,445
Railway crossing	779	3,893	1,318	5,989	90	255	1,157	1,502
Road crossing	0	75	3,663	3,738	728	23	1,597	2,348
Spillway	0	4	198	202	40	1	88	130
Inspection road	0	596	3,375	3,971	1,737	79	816	2,632
Foot path	0	3	134	137	17	1	38	56
Cross drain	0	15	475	490	4	7	341	352
Parunpanjang pump station	727	291	1,890	2,908	294	118	764	1,175
Pipe line	0	758	24,503	25,261	160	319	15,482	15,961
Metal works	12,485	4,994	32,462	49,941	1,387	555	3,607	5,549
Engineering services				20,745				6,191
Administration				0				10,848
Income tax				0				24,390
Sub-total	14,421	15,340	118,418	168,924	14,360	3,743	50,682	111,485
Allocation rate in whole works	9.7%	10.4%	79.9%	100.0%	20.9%	5.4%	73.7%	100.0%
Contingency	14,191	15,096	116,530	145,817	80,343	20,941	283,556	384,841
Physical contingency	1,644	1,749	13,499	16,892	2,328	607	8,215	11,149
Price escalation	12,547	13,347	103,031	128,925	78,016	20,335	275,342	373,692
Interest during construction				22,562				0
Total cost				337,303				496,326

Table 27 ECONOMIC CONSTRUCTION COST OF FIRST PHASE

Work Item	(million Rp.)				
	F.C.		L.C.		Total
	Financial cost	Economic cost	Financial cost	Economic cost	economic cost
Karian Dam					
Compensation	0	0	58,714	52,843	52,843
Preparatory works	11,032	10,514	7,266	6,571	17,086
Civil works	87,765	84,344	34,892	32,134	116,478
Metal works	11,390	10,566	1,266	1,146	11,712
Engineering services	15,426	15,426	3,908	3,908	19,334
Administration	0	0	7,681	7,681	7,681
Sub-total	125,613	120,850	113,727	104,283	225,132
Physical contingency	12,561	12,085	13,102	10,428	22,513
Total economic cost		132,935		114,711	247,645
Ciuyah Tunnel					
Compensation	0	0	0	0	0
Preparatory works	469	453	205	191	644
Civil works	10,277	9,777	4,383	3,986	13,763
Metal works	2,021	1,875	225	203	2,078
Engineering services	1,787	1,787	433	433	2,220
Administration	0	0	879	879	879
Sub-total	14,554	13,892	6,125	5,693	19,584
Physical contingency	1,455	1,389	811	569	1,958
Total economic cost		15,281		6,262	21,543
River Improvement					
Compensation	0	0	1,926	1,733	1,733
Preparatory works	2,659	2,570	2,541	2,365	4,935
Civil works	17,862	17,326	11,392	10,484	27,811
Metal works	0	0	0	0	0
Engineering services	2,873	2,873	1,254	1,254	4,127
Administration	0	0	1,723	1,723	1,723
Sub-total	23,394	22,769	18,836	17,560	40,329
Physical contingency	3,503	2,277	3,404	1,756	4,033
Total economic cost		25,046		19,316	44,362
KSCS I					
					(million Rp.)
Compensation	0	0	6,266	5,639	5,639
Preparatory works	10,703	10,346	8,799	8,189	18,534
Civil works	97,002	93,935	59,854	53,639	147,574
Metal works	1,894	1,757	211	191	1,947
Engineering services	15,344	15,344	6,198	6,198	21,542
Administration	0	0	8,923	8,923	8,923
Sub-total	124,943	121,382	90,251	82,779	204,160
Physical contingency	12,494	12,138	11,025	8,278	20,416
Total economic cost		133,520		91,057	224,577
Total of First Phase					
Compensation	0	0	66,906	60,215	60,215
Preparatory works	24,863	23,883	18,811	17,316	41,199
Civil works	212,906	205,382	110,521	100,243	305,625
Metal works	15,305	14,197	1,702	1,540	15,737
Engineering services	35,430	35,430	11,793	11,793	47,223
Administration	0	0	19,206	19,206	19,206
Sub-total	288,504	278,892	228,939	210,313	489,206
Physical contingency	30,013	27,889	28,342	21,031	48,921
Total economic cost		306,782		231,345	538,126

Table 28 ECONOMIC CONSTRUCTION COST OF SECOND PHASE IN SCENARIO C

Work Item	(million Rp.)				
	F.C.		L.C.		Total
	Financial cost	Economic cost	Financial cost	Economic cost	Economic cost
Pasir Kopo dam					
Compensation	0	0	33,579	30,221	30,221
Preparatory works	5,936	5,587	3,255	2,944	8,531
Civil works	55,063	52,872	19,573	18,026	70,897
Metal works	11,860	11,001	1,021	923	11,924
Engineering services	10,200	10,200	2,146	2,146	12,346
Administration	0	0	4,835	4,835	4,835
Sub-total	83,059	79,659	64,409	59,095	138,754
Physical contingency	8,306	7,966	7,532	5,910	13,875
Total economic cost		87,625		65,005	152,630
Tanjung Dam					
Compensation	0	0	89,246	80,321	80,321
Preparatory works	27,531	26,612	14,590	13,577	40,189
Civil works	265,468	255,816	107,442	99,380	355,197
Metal works	2,352	2,182	261	236	2,418
Engineering services	41,157	41,157	16,998	16,998	58,155
Administration	0	0	20,770	20,770	20,770
Sub-total	336,508	325,767	249,307	231,283	557,049
Physical contingency	33,513	32,577	29,578	23,128	55,705
Total economic cost		358,343		254,411	612,754
Cilawang Dam					
Compensation	0	0	25,226	22,703	22,703
Preparatory works	10,217	9,477	5,154	4,661	14,138
Civil works	33,116	31,801	13,926	12,819	44,619
Metal works	7,483	6,941	831	751	7,692
Engineering services	7,114	7,114	1,792	1,792	8,906
Administration	0	0	3,536	3,536	3,536
Sub-total	57,930	55,333	50,465	46,262	101,595
Physical contingency	5,793	5,533	5,843	4,626	10,159
Total economic cost		60,866		50,888	111,754
KSCS for Phase IIC-a					
Compensation	0	0	1,270	1,143	1,143
Preparatory works	7,741	7,482	7,371	6,860	14,342
Civil works	78,946	76,267	46,846	42,673	118,940
Metal works	49,828	46,219	5,537	5,007	51,226
Engineering services	19,112	19,112	5,378	5,378	24,490
Administration	0	0	9,813	9,813	9,813
Sub-total	155,627	149,080	76,215	70,874	219,954
Physical contingency	15,563	14,908	9,829	7,087	21,995
Total economic cost		163,988		77,961	241,949
KSCS for Phase IIC-b					
Compensation	0	0	171	154	154
Preparatory works	6,708	6,484	4,977	4,632	11,116
Civil works	25,136	24,376	17,730	15,881	40,256
Metal works	269	250	30	28	278
Engineering services	4,496	4,496	2,046	2,046	6,542
Administration	0	0	2,743	2,743	2,743
Sub-total	36,609	35,605	27,697	25,483	61,088
Physical contingency	3,661	3,561	3,384	2,548	6,109
Total economic cost		39,166		28,032	67,197
Total of Scenario C					
Compensation	0	0	149,492	134,543	134,543
Preparatory works	58,133	55,641	35,347	32,674	88,315
Civil works	457,729	441,131	205,517	188,778	629,909
Metal works	71,792	66,592	7,680	6,946	73,537
Engineering services	82,079	82,079	28,360	28,360	110,439
Administration	0	0	41,697	41,697	41,697
Sub-total	669,733	645,443	468,093	432,997	1,078,441
Physical contingency	66,836	64,544	56,166	43,300	107,844
Total economic cost		709,988		476,297	1,186,285

Table 29 ECONOMIC CONSTRUCTION COST OF SECOND PHASE IN SCENARIO A

Work Item	(million Rp.)				
	F.C.		L.C.		Total
	Financial cost	Economic cost	Financial cost	Economic cost	economic cost
Pasir Kopo dam					
Compensation	0	0	20,138	18,124	18,124
Preparatory works	5,936	5,587	3,255	2,944	8,531
Civil works	43,704	41,937	19,573	18,026	59,962
Metal works	9,185	8,520	1,021	923	9,443
Engineering services	8,236	8,236	2,146	2,146	10,382
Administration	0	0	4,134	4,134	4,134
Sub-total	67,061	64,279	50,267	46,297	110,577
Physical contingency	6,706	6,428	5,957	4,630	11,058
Total economic cost		70,707		50,927	121,634
Cilawang Dam					
Compensation	0	0	25,226	22,703	22,703
Preparatory works	10,217	9,477	5,154	4,661	14,138
Civil works	33,116	31,801	13,926	12,819	44,619
Metal works	7,483	6,941	831	751	7,692
Engineering services	7,114	7,114	1,792	1,792	8,906
Administration	0	0	3,536	3,536	3,536
Sub-total	57,930	55,333	50,465	46,262	101,595
Physical contingency	5,793	5,533	5,843	4,626	10,159
Total economic cost		60,866		50,888	111,754
KSCS for Phase IIA					
Compensation	0	0	1,270	1,143	1,143
Preparatory works	8,763	8,470	7,602	7,075	15,545
Civil works	89,475	86,491	55,635	50,503	136,994
Metal works	49,941	46,323	5,549	5,018	51,341
Engineering services	20,745	20,745	6,191	6,191	26,936
Administration	0	0	10,848	10,848	10,848
Sub-total	168,924	162,030	87,095	80,777	242,807
Physical contingency	16,892	16,203	11,149	8,078	24,281
Total economic cost		178,233		88,855	267,088
Total of Scenario A					
Compensation	0	0	46,634	41,971	41,971
Preparatory works	24,916	23,534	16,011	14,680	38,214
Civil works	166,295	160,229	89,134	81,347	241,576
Metal works	66,609	61,784	7,401	6,693	68,477
Engineering services	36,095	36,095	10,129	10,129	46,224
Administration	0	0	18,518	18,518	18,518
Sub-total	293,915	281,642	187,827	173,337	454,978
Physical contingency	29,391	28,164	22,949	17,334	45,498
Total economic cost		309,806		190,670	500,476

Table 30 RATE OF ANNUAL DISBURSEMENT COST FOR TOTAL ECONOMIC CONSTRUCTION COST

First Phase		(%)									
Scheme	Work item	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Karian Dam	Compensation			67.0	33.0						
	Construction works				21.6	33.6	26.2	17.8	0.8		
	Engineering services	10.5	15.0	4.5	13.3	17.5	17.5	17.5	4.2		
	Administration	10.0	10.0	10.0	15.0	15.0	15.0	15.0	10.0		
Ciuyah Tunnel	Compensation										
	Construction works				11.5	24.4	26.5	32.4	5.2		
	Engineering services	10.5	15.0	4.5	13.3	17.5	17.5	17.5	4.2		
	Administration	10.0	10.0	10.0	15.0	15.0	15.0	15.0	10.0		
River Improvement	Compensation			67.0	33.0						
	Construction works				29.5	20.4	25.1	25.1			
	Engineering services	10.5	15.0	4.5	13.3	17.5	17.5	17.5	4.2		
	Administration	10.0	10.0	10.0	15.0	15.0	15.0	15.0	10.0		
KSCSI	Compensation			67.0	33.0						
	Construction works				20.7	21.6	25.0	28.4	4.4		
	Engineering services	10.5	15.0	4.5	13.3	17.5	17.5	17.5	4.2		
	Administration	10.0	10.0	10.0	15.0	15.0	15.0	15.0	10.0		
Second Phase in Scenario C		(%)									
Scheme	Work item	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Pasir Kopo Dam	Compensation			67.0	33.0						
	Construction works				14.5	29.5	31.4	23.3	1.3		
	Engineering services	10.5	15.0	4.5	13.3	17.5	17.5	17.5	4.2		
	Administration	10.0	10.0	10.0	15.0	15.0	15.0	15.0	10.0		
Scheme	Work item	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Tanjung Dam	Compensation			67.0	33.0						
	Construction works				14.6	20.0	18.0	15.9	17.0	14.5	0.1
	Engineering services	10.5	15.0	4.5	4.9	12.6	12.6	12.6	12.6	12.6	2.1
	Administration	5.0	5.0	6.0	6.0	12.0	15.0	15.0	15.0	15.0	6.0
KSCS for Phase IIC-a	Compensation						67.0	33.0			
	Construction works							24.9	31.3	35.6	8.2
	Engineering services				10.5	15.0	4.5	12.6	25.2	25.2	7.0
	Administration				10.0	10.0	10.0	20.0	20.0	20.0	10.0
Scheme	Work item	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Cilawang Dam	Compensation			67.0	33.0						
	Construction works				25.0	31.1	25.2	17.6	1.2		
	Engineering services	10.5	15.0	4.5	13.3	17.5	17.5	17.5	4.2		
	Administration	10.0	10.0	10.0	15.0	15.0	15.0	15.0	10.0		
KSCS for Phase IIC-b	Compensation					67.3	32.7				
	Construction works						41.6	49.9	8.5		
	Engineering services			10.5	15.0	4.5	20.3	39.9	9.8		
	Administration			10.0	10.0	19.2	26.4	26.4	8.0		
Second Phase in Scenario A		(%)									
Scheme	Work item	2008	2009	2010	2011	2012	2013	2014	2015	2016	2018
Pasir Kopo Dam	Compensation			67.0	33.0						
	Construction works				15.1	29.8	30.2	23.7	1.2		
	Engineering services	10.5	15.0	4.5	13.3	17.5	17.5	17.5	4.2		
	Administration	10.0	10.0	10.0	15.0	15.0	15.0	15.0	10.0		
Cilawang Dam	Compensation			67.0	33.0						
	Construction works				25.0	31.1	25.2	17.6	1.2		
	Engineering services	10.5	15.0	4.5	13.3	17.5	17.5	17.5	4.2		
	Administration	10.0	10.0	10.0	15.0	15.0	15.0	15.0	10.0		
KSCS for Phase IIA	Compensation				67.0	33.0					
	Construction works					24.5	31.9	35.6	8.0		
	Engineering services		10.5	15.0	4.5	12.6	25.2	25.2	7.0		
	Administration		10.0	10.0	10.0	20.0	20.0	20.0	10.0		

Table 31 ANNUAL DISBURSEMENT OF ECONOMIC CONSTRUCTION COST (1/2)

First Phase		(million Rp.)										
Scheme	Work Item	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Total
Karian Dam	Compensation			35,404	17,439							52,843
	Construction works				31,422	48,770	38,043	25,843	1,197			145,276
	Engineering services	2,030	2,900	870	2,572	3,384	3,384	3,384	812			19,336
	Administration	768	768	768	1,152	1,152	1,152	1,152	768			7,680
	Sub-total	2,798	3,668	37,042	52,585	53,306	42,579	30,379	2,777			225,135
	Physical contingency	280	367	3,704	5,258	5,331	4,258	3,038	278			22,514
	Total	3,078	4,035	40,747	57,843	58,636	46,837	33,417	3,055			247,649
Ciuyah Tunnel	Compensation											0
	Construction works				1,894	4,025	4,369	5,343	854			16,485
	Engineering services	233	333	99	296	389	389	389	93			2,221
	Administration	88	88	88	132	132	132	132	88			880
	Sub-total	321	421	187	2,322	4,546	4,890	5,864	1,035			19,586
	Physical contingency	32	42	19	232	455	489	586	104			1,959
	Total	353	463	206	2,554	5,000	5,379	6,450	1,139			21,545
River Improvement	Compensation			1,161	572							1,733
	Construction works				9,644	6,681	8,211	8,211				32,746
	Engineering services	434	619	185	549	722	722	722	174			4,127
	Administration	172	172	172	258	258	258	258	172			1,720
	Sub-total	606	791	1,518	11,023	7,661	9,191	9,191	346			40,326
	Physical contingency	61	79	152	1,102	766	919	919	35			4,033
	Total	667	870	1,670	12,126	8,427	10,110	10,110	381			44,359
KSCS I	Compensation			3,778	1,861							5,639
	Construction works				34,857	36,224	41,997	47,653	7,325			168,056
	Engineering services	2,262	3,232	969	2,865	3,770	3,770	3,770	904			21,542
	Administration	892	892	892	1,338	1,338	1,338	1,338	892			8,920
	Sub-total	3,154	4,124	5,639	40,921	41,332	47,105	52,761	9,121			204,157
	Physical contingency	315	412	564	4,092	4,133	4,711	5,276	912			20,416
	Total	3,469	4,536	6,203	45,013	45,465	51,816	58,037	10,033			224,573
Second Phase In Scenario C		(million Rp.)										
Scheme	Work Item	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
Pasir Kopo Dam	Compensation			20,248	9,973							30,221
	Construction works				13,218	26,964	28,642	21,311	1,217			91,352
	Engineering services	1,305	1,866	560	1,654	2,177	2,177	2,177	522			12,437
	Administration	484	484	484	725	725	725	725	484			4,836
	Sub-total	1,789	2,350	21,292	25,570	29,866	31,543	24,213	2,222			138,846
	Physical contingency	179	235	2,129	2,557	2,987	3,154	2,421	222			13,885
	Total	1,968	2,584	23,421	28,127	32,852	34,698	26,635	2,445			152,731
Tanjung Dam	Compensation			53,815	26,506							80,321
	Construction works				57,936	79,605	71,554	63,243	67,609	57,610	249	397,805
	Engineering services	6,107	8,723	2,617	2,850	7,327	7,327	7,327	7,327	7,327	1,221	58,154
	Administration	1,038	1,038	1,246	1,246	2,493	3,115	3,115	3,115	3,115	1,246	20,769
	Sub-total	7,145	9,761	57,678	88,537	89,425	81,997	73,685	78,052	68,052	2,716	557,049
	Physical contingency	715	976	5,768	8,854	8,942	8,200	7,369	7,805	6,805	272	55,705
	Total	7,860	10,737	63,446	97,391	98,367	90,197	81,054	85,857	74,858	2,988	612,754
KSCS for Phase IIC-a	Compensation						766	377				1,143
	Construction works							45,873	57,790	65,736	15,109	184,508
	Engineering services				2,572	3,674	1,102	3,086	6,171	6,171	1,714	24,490
	Administration				981	981	981	1,963	1,963	1,963	981	9,813
	Sub-total				3,553	4,655	2,849	51,299	65,924	73,870	17,804	219,954
	Physical contingency				355	466	285	5,130	6,592	7,387	1,780	21,995
	Total				3,908	5,121	3,134	56,429	72,517	81,257	19,584	241,949

Table 32 ANNUAL DISBURSEMENT OF ECONOMIC CONSTRUCTION COST (2/2)

Second Phase In Scenario C												(million Rp.)
Scheme	Work Item	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Cilawang Dam	Compensation			15,211	7,492							22,703
	Construction works				16,616	20,656	16,728	11,668	781			66,449
	Engineering services	935	1,336	401	1,184	1,559	1,559	1,559	374			8,907
	Administration	354	354	354	530	530	530	530	354			3,536
	Sub-total	1,289	1,690	15,966	25,823	22,745	18,817	13,757	1,509			101,595
	Physical contingency	129	169	1,597	2,582	2,275	1,882	1,376	151			10,160
	Total	1,418	1,859	17,562	28,405	25,020	20,699	15,133	1,660			111,755
KSCS for Phase IIC-b	Compensation					104	50					154
	Construction works						21,462	25,774	4,414			51,650
	Engineering services			687	981	294	1,328	2,610	642			6,542
	Administration			274	274	527	724	724	219			2,742
	Sub-total			961	1,255	925	23,565	29,108	5,275			61,088
	Physical contingency			96	126	92	2,356	2,911	527			6,109
	Total			1,057	1,381	1,017	25,921	32,019	5,802			67,197
Second Phase In Scenario A												(million Rp.)
Scheme	Work Item	2008	2009	2010	2011	2012	2013	2014	2015	2016	2018	Total
Pasir Kopo Dam	Compensation			12,203	6,011							18,214
	Construction works				11,753	23,201	23,514	18,506	962			77,936
	Engineering services	1,090	1,557	468	1,380	1,817	1,817	1,817	436			10,382
	Administration	413	413	413	620	620	620	620	413			4,132
	Sub-total	1,503	1,970	13,084	19,764	25,638	25,951	20,943	1,811			110,664
	Physical contingency	150	197	1,308	1,976	2,564	2,595	2,094	181			11,066
	Total	1,653	2,167	14,392	21,740	28,201	28,547	23,037	1,993			121,730
Cilawang Dam	Compensation			15,211	7,492							22,703
	Construction works				16,616	20,656	16,728	11,668	781			66,449
	Engineering services	935	1,336	401	1,184	1,559	1,559	1,559	374			8,907
	Administration	354	354	354	530	530	530	530	354			3,536
	Sub-total	1,289	1,690	15,966	25,823	22,745	18,817	13,757	1,509			101,595
	Physical contingency	129	169	1,597	2,582	2,275	1,882	1,376	151			10,160
	Total	1,418	1,859	17,562	28,405	25,020	20,699	15,133	1,660			111,755
KSCS for Phase IIA	Compensation				766	377						1,143
	Construction works					49,965	64,971	72,569	16,373			203,879
	Engineering services		2,828	4,041	1,213	3,394	6,788	6,788	1,885			26,937
	Administration		1,085	1,085	1,085	2,170	2,170	2,170	1,085			10,850
	Sub-total		3,913	5,126	3,064	55,906	73,929	81,527	19,343			242,809
	Physical contingency		391	513	306	5,591	7,393	8,153	1,934			24,281
	Total		4,304	5,639	3,370	61,497	81,322	89,680	21,277			267,090

Table 33 ECONOMIC OPERATION AND MAINTENANCE COST

FIRST PHASE					(million Rp.)
Schemes	F.C.		L.C.		Total
	Financial cost	Economic cost	Financial	Estimated	economic cost
Karian dam	935	895	355	325	1,220
Ciuyah tunnel	113	107	45	41	148
River improvement	205	199	139	128	327
Waterway (1st phase)	979	947	600	541	1,488
Total		2,148		1,035	3,184
2ND PHASE (Scenario C)					
Pasir Kopo dam (C)	610	581	201	185	766
Tanjung dam (C)	2,666	2,571	1,076	996	3,567
Cilawang dam (C)	369	350	143	131	481
Waterway (IIC-a)	1,077	1,025	533	486	1,512
Waterway (IIC-b)	286	285	202	188	473
Total		4,813		1,986	6,799
2ND PHASE (Scenario A)					
Pasir Kopo dam (A)	483	460	201	185	644
Cilawang dam (A)	369	350	143	131	481
Waterway (IIA)	1,636	1,560	900	819	2,379
Total		2,370		1,134	3,504

Table 34 ECONOMIC REPLACEMENT COST

2ND PHASE (Scenario C)					(million Rp.)
Schemes	F.C.		L.C.		Total
	Financial cost	Economic cost	Financial	Estimated	economic cost
KSCS for IIC-a	49,767	46,162	5,530	5,001	51,163
KSCS for IIC-b	42	40	5	5	45
Total		46,202		5,005	51,208
2ND PHASE (Scenario A)					
KSCS for IIA	49,880	46,267	5,542	5,012	51,278
Total		46,267		5,012	51,278

Table 35 ANNUAL DISBURSEMENT OF ECONOMIC CONSTRUCTION COST IN SCENARIO A

Year	First phase				Second phase			Total
	Karian dam	Ciuyah tunnel	KSCS I	River improvt.	Pasir Kopo dam	Cilawang dam	KSCS IIA	
1995	3,078	353	3,469	667				7,567
1996	4,035	463	4,536	870				9,904
1997	40,747	206	6,203	1,670				48,825
1998	57,843	2,554	45,013	12,126				117,537
1999	58,636	5,000	45,465	8,427				117,528
2000	46,837	5,379	51,816	10,110				114,141
2001	33,417	6,450	58,037	10,110				108,014
2002	3,055	1,139	10,033	381				14,608
2003								0
2004								0
2005								0
2006								0
2007								0
2008					1,653	1,418	0	3,071
2009					2,167	1,859	4,304	8,330
2010					14,392	17,562	5,639	37,593
2011					21,740	28,405	3,370	53,515
2012					28,201	25,020	61,497	114,718
2013					28,547	20,699	81,322	130,567
2014					23,037	15,133	89,680	127,850
2015					1,993	1,660	21,277	24,930
2016								0
2017								0
2018								0
2019								0
2020								0
Total	247,649	21,545	224,573	44,359	121,730	111,755	267,090	1,038,699

Table 36 ANNUAL DISBURSEMENT OF ECONOMIC CONSTRUCTION COST IN SCENARIO C

Year	First phase				Second phase					Total
	Karian dam	Ciuyah tunnel	KSCS I	River improvt.	Pasir Kopo dam	Tanjung dam C	KSCS IIC-a	Cilawang dam C	KSCS IIC-b	
1995	3,078	353	3,469	667						7,567
1996	4,035	463	4,536	870						9,904
1997	40,747	206	6,203	1,670						48,825
1998	57,843	2,554	45,013	12,126						117,537
1999	58,636	5,000	45,465	8,427						117,528
2000	46,837	5,379	51,816	10,110						114,141
2001	33,417	6,450	58,037	10,110						108,014
2002	3,055	1,139	10,033	381						14,608
2003										0
2004					1,968					1,968
2005					2,584	7,860				10,444
2006					23,421	10,737				34,159
2007					28,127	63,446				91,573
2008					32,852	97,391	0			130,243
2009					34,698	98,367	0			133,065
2010					26,635	90,197	0			116,831
2011					2,445	81,054	3,908	1,418	0	88,825
2012						85,857	5,121	1,859	0	92,836
2013						74,858	3,134	17,562	1,057	96,610
2014						2,988	56,429	28,405	1,381	89,202
2015							72,517	25,020	1,017	98,553
2016							81,257	20,699	25,921	127,877
2017							19,584	15,133	32,019	66,736
2018								1,660	5,802	7,462
2019										0
2020										0
Total	247,649	21,545	224,573	44,359	152,731	612,754	241,949	111,755	67,197	1,724,510

Table 37 COST AND BENEFIT FLOW OF FIRST PHASE (SCENARIO A)
(WATER SUPPLY)

Year in order	Year	Cost			Benefit		Cash balance
		Construction	O/M	Total	Water supply		
0	1994	0	0	0	0		0
1	1995	6,900	0	6,900	0		-6,900
2	1996	9,034	0	9,034	0		-9,034
3	1997	47,155	0	47,155	0		-47,155
4	1998	105,411	0	105,411	0		-105,411
5	1999	109,101	0	109,101	0		-109,101
6	2000	104,032	0	104,032	0		-104,032
7	2001	97,905	0	97,905	0		-97,905
8	2002	14,227	0	14,227	24,410		10,183
9	2003	0	2,857	2,857	58,704		55,847
10	2004		2,857	2,857	68,556		65,699
11	2005		2,857	2,857	78,593		75,736
12	2006		2,857	2,857	88,916		86,059
13	2007		2,857	2,857	99,767		96,910
14	2008		2,857	2,857	110,584		107,727
15	2009		2,857	2,857	121,655		118,798
16	2010		2,857	2,857	132,659		129,802
17	2011		2,857	2,857	145,665		142,808
18	2012		2,857	2,857	158,443		155,586
19	2013		2,857	2,857	171,645		168,788
20	2014		2,857	2,857	184,796		181,939
21	2015		2,857	2,857	198,117		195,260
22	2016		2,857	2,857	212,357		209,500
23	2017		2,857	2,857	227,040		224,183
24	2018		2,857	2,857	241,676		238,819
25	2019		2,857	2,857	265,664		262,807
26	2020		2,857	2,857	267,679		264,822
27	2021		2,857	2,857	269,358		266,501
28	2022		2,857	2,857	269,358		266,501
29	2023		2,857	2,857	269,358		266,501
30	2024		2,857	2,857	269,358		266,501
31	2025		2,857	2,857	269,358		266,501
32	2026		2,857	2,857	269,358		266,501
33	2027		2,857	2,857	269,358		266,501
34	2028		2,857	2,857	269,358		266,501
35	2029		2,857	2,857	269,358		266,501
36	2030		2,857	2,857	269,358		266,501
37	2031		2,857	2,857	269,358		266,501
38	2032		2,857	2,857	269,358		266,501
39	2033		2,857	2,857	269,358		266,501
40	2034		2,857	2,857	269,358		266,501
41	2035		2,857	2,857	269,358		266,501
42	2036		2,857	2,857	269,358		266,501
43	2037		2,857	2,857	269,358		266,501
44	2038		2,857	2,857	269,358		266,501
45	2039		2,857	2,857	269,358		266,501
46	2040		2,857	2,857	269,358		266,501
47	2041		2,857	2,857	269,358		266,501
48	2042		2,857	2,857	269,358		266,501
49	2043		2,857	2,857	269,358		266,501
50	2044		2,857	2,857	269,358		266,501
Total		493,766	119,994	613,760	9,321,529		8,707,769
In the condition of discount rate at 12 %:							
Present value:				288,097	477,152		189,055
Internal rate of return (BIRR):							16.10%
B/C							1.66

Table 38 COST AND BENEFIT FLOW OF RIVER IMPROVEMENT WORKS IN FIRST PHASE

(million Rp.)							
Year in order	Year	Cost			Benefit		Cash balance
		Construction	O/M	Total	Flood control	Total	
0	1994	0	0	0	0	0	0
1	1995	667	0	667	0	0	-667
2	1996	870	0	870	0	0	-870
3	1997	1,670	0	1,670	0	0	-1,670
4	1998	12,126	0	12,126	0	0	-12,126
5	1999	8,427	0	8,427	0	0	-8,427
6	2000	10,110	0	10,110	0	0	-10,110
7	2001	10,110	0	10,110	0	0	-10,110
8	2002	381	0	381	7,830	7,830	7,449
9	2003	0	327	327	7,830	7,830	7,503
10	2004		327	327	7,830	7,830	7,503
11	2005		327	327	7,830	7,830	7,503
12	2006		327	327	7,830	7,830	7,503
13	2007		327	327	7,830	7,830	7,503
14	2008		327	327	7,830	7,830	7,503
15	2009		327	327	7,830	7,830	7,503
16	2010		327	327	7,830	7,830	7,503
17	2011		327	327	7,830	7,830	7,503
18	2012		327	327	7,830	7,830	7,503
19	2013		327	327	7,830	7,830	7,503
20	2014		327	327	7,830	7,830	7,503
21	2015		327	327	7,830	7,830	7,503
22	2016		327	327	7,830	7,830	7,503
23	2017		327	327	7,830	7,830	7,503
24	2018		327	327	7,830	7,830	7,503
25	2019		327	327	7,830	7,830	7,503
26	2020		327	327	7,830	7,830	7,503
27	2021		327	327	7,830	7,830	7,503
28	2022		327	327	7,830	7,830	7,503
29	2023		327	327	7,830	7,830	7,503
30	2024		327	327	7,830	7,830	7,503
31	2025		327	327	7,830	7,830	7,503
32	2026		327	327	7,830	7,830	7,503
33	2027		327	327	7,830	7,830	7,503
34	2028		327	327	7,830	7,830	7,503
35	2029		327	327	7,830	7,830	7,503
36	2030		327	327	7,830	7,830	7,503
37	2031		327	327	7,830	7,830	7,503
38	2032		327	327	7,830	7,830	7,503
39	2033		327	327	7,830	7,830	7,503
40	2034		327	327	7,830	7,830	7,503
41	2035		327	327	7,830	7,830	7,503
42	2036		327	327	7,830	7,830	7,503
43	2037		327	327	7,830	7,830	7,503
44	2038		327	327	7,830	7,830	7,503
45	2039		327	327	7,830	7,830	7,503
46	2040		327	327	7,830	7,830	7,503
47	2041		327	327	7,830	7,830	7,503
48	2042		327	327	7,830	7,830	7,503
49	2043		327	327	7,830	7,830	7,503
50	2044		327	327	7,830	7,830	7,503
Total		44,359	13,734	58,093	336,690	336,690	278,597
In the condition of discount rate at 12 %:							
Present value:				25,905		29,290	3,385
Internal rate of return (EIRR):							13.36%
B/C							1.13

Table 39 COST AND BENEFIT FLOW OF FIRST PHASE (SCENARIO A)
(WATER SUPPLY + FLOOD CONTROL.)

(million Rp.)

Year in order	Year	Cost			Benefit			Cash balance
		Construction	O/M cost	Total	Water supply	Flood control	Total	
0	1994	0	0	0	0	0	0	0
1	1995	7,567	0	7,567	0	0	0	-7,567
2	1996	9,904	0	9,904	0	0	0	-9,904
3	1997	48,825	0	48,825	0	0	0	-48,825
4	1998	117,537	0	117,537	0	0	0	-117,537
5	1999	117,528	0	117,528	0	0	0	-117,528
6	2000	114,141	0	114,141	0	0	0	-114,141
7	2001	108,014	0	108,014	0	0	0	-108,014
8	2002	14,608	0	14,608	24,410	7,830	32,240	17,633
9	2003	0	3,184	3,184	58,704	7,830	66,534	63,350
10	2004		3,184	3,184	68,556	7,830	76,386	73,202
11	2005		3,184	3,184	78,593	7,830	86,423	83,239
12	2006		3,184	3,184	88,916	7,830	96,746	93,562
13	2007		3,184	3,184	99,767	7,830	107,597	104,413
14	2008		3,184	3,184	110,584	7,830	118,414	115,230
15	2009		3,184	3,184	121,655	7,830	129,485	126,301
16	2010		3,184	3,184	132,659	7,830	140,489	137,305
17	2011		3,184	3,184	145,665	7,830	153,495	150,311
18	2012		3,184	3,184	158,443	7,830	166,273	163,089
19	2013		3,184	3,184	171,645	7,830	179,475	176,291
20	2014		3,184	3,184	184,796	7,830	192,626	189,442
21	2015		3,184	3,184	198,117	7,830	205,947	202,763
22	2016		3,184	3,184	212,357	7,830	220,187	217,003
23	2017		3,184	3,184	227,040	7,830	234,870	231,686
24	2018		3,184	3,184	241,676	7,830	249,506	246,322
25	2019		3,184	3,184	265,664	7,830	273,494	270,310
26	2020		3,184	3,184	267,679	7,830	275,509	272,325
27	2021		3,184	3,184	269,358	7,830	277,188	274,004
28	2022		3,184	3,184	269,358	7,830	277,188	274,004
29	2023		3,184	3,184	269,358	7,830	277,188	274,004
30	2024		3,184	3,184	269,358	7,830	277,188	274,004
31	2025		3,184	3,184	269,358	7,830	277,188	274,004
32	2026		3,184	3,184	269,358	7,830	277,188	274,004
33	2027		3,184	3,184	269,358	7,830	277,188	274,004
34	2028		3,184	3,184	269,358	7,830	277,188	274,004
35	2029		3,184	3,184	269,358	7,830	277,188	274,004
36	2030		3,184	3,184	269,358	7,830	277,188	274,004
37	2031		3,184	3,184	269,358	7,830	277,188	274,004
38	2032		3,184	3,184	269,358	7,830	277,188	274,004
39	2033		3,184	3,184	269,358	7,830	277,188	274,004
40	2034		3,184	3,184	269,358	7,830	277,188	274,004
41	2035		3,184	3,184	269,358	7,830	277,188	274,004
42	2036		3,184	3,184	269,358	7,830	277,188	274,004
43	2037		3,184	3,184	269,358	7,830	277,188	274,004
44	2038		3,184	3,184	269,358	7,830	277,188	274,004
45	2039		3,184	3,184	269,358	7,830	277,188	274,004
46	2040		3,184	3,184	269,358	7,830	277,188	274,004
47	2041		3,184	3,184	269,358	7,830	277,188	274,004
48	2042		3,184	3,184	269,358	7,830	277,188	274,004
49	2043		3,184	3,184	269,358	7,830	277,188	274,004
50	2044		3,184	3,184	269,358	7,830	277,188	274,004
Total		538,124	133,728	671,852	9,321,529	336,690	9,658,219	8,986,366

In the condition of discount rate at 12 %:

Present value: 314,002 506,443 192,441

Internal rate of return (EIRR): 15.95%

B/C 1.61

Table 40 COST AND BENEFIT FLOW OF FIRST PHASE (SCENARIO C)
(WATER SUPPLY)

		(million Rp.)				
Year in order	Year	Cost		Total	Benefit	Cash
		Construction	O/M		Water Supply	balance
0	1994	0	0	0	0	0
1	1995	6,900	0	6,900	0	-6,900
2	1996	9,034	0	9,034	0	-9,034
3	1997	47,155	0	47,155	0	-47,155
4	1998	105,411	0	105,411	0	-105,411
5	1999	109,101	0	109,101	0	-109,101
6	2000	104,032	0	104,032	0	-104,032
7	2001	97,905	0	97,905	0	-97,905
8	2002	14,227	0	14,227	45,581	31,353
9	2003	0	2,857	2,857	88,383	85,526
10	2004		2,857	2,857	105,810	102,953
11	2005		2,857	2,857	123,568	120,711
12	2006		2,857	2,857	144,826	141,969
13	2007		2,857	2,857	166,657	163,800
14	2008		2,857	2,857	188,885	186,028
15	2009		2,857	2,857	211,222	208,365
16	2010		2,857	2,857	233,899	231,042
17	2011		2,857	2,857	257,263	254,406
18	2012		2,857	2,857	259,335	256,478
19	2013		2,857	2,857	261,407	258,550
20	2014		2,857	2,857	263,479	260,622
21	2015		2,857	2,857	265,205	262,348
22	2016		2,857	2,857	267,277	264,420
23	2017		2,857	2,857	269,349	266,492
24	2018		2,857	2,857	271,421	268,564
25	2019		2,857	2,857	273,147	270,290
26	2020		2,857	2,857	275,219	272,362
27	2021		2,857	2,857	276,946	274,089
28	2022		2,857	2,857	278,673	275,816
29	2023		2,857	2,857	280,399	277,542
30	2024		2,857	2,857	282,126	279,269
31	2025		2,857	2,857	284,198	281,341
32	2026		2,857	2,857	284,198	281,341
33	2027		2,857	2,857	284,198	281,341
34	2028		2,857	2,857	284,198	281,341
35	2029		2,857	2,857	284,198	281,341
36	2030		2,857	2,857	284,198	281,341
37	2031		2,857	2,857	284,198	281,341
38	2032		2,857	2,857	284,198	281,341
39	2033		2,857	2,857	284,198	281,341
40	2034		2,857	2,857	284,198	281,341
41	2035		2,857	2,857	284,198	281,341
42	2036		2,857	2,857	284,198	281,341
43	2037		2,857	2,857	284,198	281,341
44	2038		2,857	2,857	284,198	281,341
45	2039		2,857	2,857	284,198	281,341
46	2040		2,857	2,857	284,198	281,341
47	2041		2,857	2,857	284,198	281,341
48	2042		2,857	2,857	284,198	281,341
49	2043		2,857	2,857	284,198	281,341
50	2044		2,857	2,857	284,198	281,341
Total		493,766	119,994	613,760	10,774,028	10,160,269
In the condition of discount rate at 12 %:						
Present value:				288,097	669,812	381,715
Internal rate of return (EIRR):						20.19%
B/C						2.32

Table 41 COST AND BENEFIT FLOW OF FIRST PHASE (SCENERIO C)
(WATER SUPPLY + FLOOD CONTROL.)

		(million Rp.)						
Year in order	Year	Cost			Benefit		Total	Cash balance
		Construction	O/M	Total	Water supply	Flood control		
0	1994	0	0	0	0	0	0	0
1	1995	7,567	0	7,567	0	0	0	-7,567
2	1996	9,904	0	9,904	0	0	0	-9,904
3	1997	48,825	0	48,825	0	0	0	-48,825
4	1998	117,537	0	117,537	0	0	0	-117,537
5	1999	117,528	0	117,528	0	0	0	-117,528
6	2000	114,141	0	114,141	0	0	0	-114,141
7	2001	108,014	0	108,014	0	0	0	-108,014
8	2002	14,608	0	14,608	45,581	7,830	53,411	38,803
9	2003	0	3,184	3,184	88,383	7,830	96,213	93,029
10	2004		3,184	3,184	105,810	7,830	113,640	110,456
11	2005		3,184	3,184	123,568	7,830	131,398	128,214
12	2006		3,184	3,184	144,826	7,830	152,656	149,472
13	2007		3,184	3,184	166,657	7,830	174,487	171,303
14	2008		3,184	3,184	188,885	7,830	196,715	193,531
15	2009		3,184	3,184	211,222	7,830	219,052	215,868
16	2010		3,184	3,184	233,899	7,830	241,729	238,545
17	2011		3,184	3,184	257,263	7,830	265,093	261,909
18	2012		3,184	3,184	259,335	7,830	267,165	263,981
19	2013		3,184	3,184	261,407	7,830	269,237	266,053
20	2014		3,184	3,184	263,479	7,830	271,309	268,125
21	2015		3,184	3,184	265,205	7,830	273,035	269,851
22	2016		3,184	3,184	267,277	7,830	275,107	271,923
23	2017		3,184	3,184	269,349	7,830	277,179	273,995
24	2018		3,184	3,184	271,421	7,830	279,251	276,067
25	2019		3,184	3,184	273,147	7,830	280,977	277,793
26	2020		3,184	3,184	275,219	7,830	283,049	279,865
27	2021		3,184	3,184	276,946	7,830	284,776	281,592
28	2022		3,184	3,184	278,673	7,830	286,503	283,319
29	2023		3,184	3,184	280,399	7,830	288,229	285,045
30	2024		3,184	3,184	282,126	7,830	289,956	286,772
31	2025		3,184	3,184	284,198	7,830	292,028	288,844
32	2026		3,184	3,184	284,198	7,830	292,028	288,844
33	2027		3,184	3,184	284,198	7,830	292,028	288,844
34	2028		3,184	3,184	284,198	7,830	292,028	288,844
35	2029		3,184	3,184	284,198	7,830	292,028	288,844
36	2030		3,184	3,184	284,198	7,830	292,028	288,844
37	2031		3,184	3,184	284,198	7,830	292,028	288,844
38	2032		3,184	3,184	284,198	7,830	292,028	288,844
39	2033		3,184	3,184	284,198	7,830	292,028	288,844
40	2034		3,184	3,184	284,198	7,830	292,028	288,844
41	2035		3,184	3,184	284,198	7,830	292,028	288,844
42	2036		3,184	3,184	284,198	7,830	292,028	288,844
43	2037		3,184	3,184	284,198	7,830	292,028	288,844
44	2038		3,184	3,184	284,198	7,830	292,028	288,844
45	2039		3,184	3,184	284,198	7,830	292,028	288,844
46	2040		3,184	3,184	284,198	7,830	292,028	288,844
47	2041		3,184	3,184	284,198	7,830	292,028	288,844
48	2042		3,184	3,184	284,198	7,830	292,028	288,844
49	2043		3,184	3,184	284,198	7,830	292,028	288,844
50	2044		3,184	3,184	284,198	7,830	292,028	288,844
Total		538,124	133,728	671,852	10,774,028	336,690	11,110,718	10,438,866
In the condition of discount rate at 12 %:								
Present value:				314,002			699,102	385,100
Internal rate of return (EIRR):								19.81%
B/C								2.23

Table 42 COST AND BENEFIT FLOW OF FIRST PHASE AND 2ND PHASE (SCENARIO A)
(WATER SUPPLY)

		(million Rp.)						
Year in order	Year	Cost of First Phase		Cost of 2nd Phase			Total	Benefit Water supply
		Construction	O/M	Construction	O/M	Replacement		
0	1994	0	0				0	0
1	1995	6,900	0				6,900	0
2	1996	9,034	0				9,034	0
3	1997	47,155	0				47,155	0
4	1998	105,411	0				105,411	0
5	1999	109,101	0				109,101	0
6	2000	104,032	0				104,032	0
7	2001	97,905	0				97,905	0
8	2002	14,227	0				14,227	63,294
9	2003	0	2,857				2,857	137,266
10	2004		2,857				2,857	147,913
11	2005		2,857				2,857	158,745
12	2006		2,857				2,857	169,749
13	2007		2,857	0			2,857	181,395
14	2008		2,857	3,071			5,928	193,006
15	2009		2,857	8,330			11,187	204,758
16	2010		2,857	37,593			40,450	216,444
17	2011		2,857	53,515			56,372	230,244
18	2012		2,857	114,718			117,575	243,704
19	2013		2,857	130,567			133,424	257,587
20	2014		2,857	127,850			130,707	271,419
21	2015		2,857	24,930			27,787	362,326
22	2016		2,857	0	3,504		6,361	377,849
23	2017		2,857		3,504		6,361	393,815
24	2018		2,857		3,504		6,361	409,734
25	2019		2,857		3,504		6,361	425,561
26	2020		2,857		3,504		6,361	441,859
27	2021		2,857		3,504		6,361	456,518
28	2022		2,857		3,504		6,361	471,071
29	2023		2,857		3,504		6,361	486,025
30	2024		2,857		3,504		6,361	500,870
31	2025		2,857		3,504		6,361	516,747
32	2026		2,857		3,504		6,361	516,747
33	2027		2,857		3,504		6,361	516,747
34	2028		2,857		3,504		6,361	516,747
35	2029		2,857		3,504		6,361	516,747
36	2030		2,857		3,504		6,361	516,747
37	2031		2,857		3,504		6,361	516,747
38	2032		2,857		3,504	0	6,361	516,747
39	2033		2,857		3,504	51,278	57,639	516,747
40	2034		2,857		3,504	0	6,361	516,747
41	2035		2,857		3,504		6,361	516,747
42	2036		2,857		3,504		6,361	516,747
43	2037		2,857		3,504		6,361	516,747
44	2038		2,857		3,504		6,361	516,747
45	2039		2,857		3,504		6,361	516,747
46	2040		2,857		3,504		6,361	516,747
47	2041		2,857		3,504		6,361	516,747
48	2042		2,857		3,504		6,361	516,747
49	2043		2,857		3,504		6,361	516,747
50	2044		2,857		3,504		6,361	516,747
Total		493,766	119,994	500,575	101,616	51,278	1,267,229	17,136,089
In the condition of discount rate at 12 %:								
Present value:							353,032	862,849
Internal rate of return (EIRR):								21.72%
B/C								2.44

Table 43 COST AND BENEFIT FLOW OF FIRST PHASE AND 2ND PHASE (SCENARIO A)
(WATER SUPPLY + FLOOD CONTROL)

		(million Rp.)								
Year in order	Year	Cost of First Phase		Cost of 2nd Phase			Total	Benefit		Cash balance
		Construction	O/M	Construction	O/M	Replacement		Water supply	Flood control	
0	1994	0					0			0
1	1995	7,567					7,567			-7,567
2	1996	9,904					9,904			-9,904
3	1997	48,825					48,825			-48,825
4	1998	117,537					117,537			-117,537
5	1999	117,528					117,528			-117,528
6	2000	114,141					114,141			-114,141
7	2001	108,014					108,014			-108,014
8	2002	14,608					14,608	63,294	7,830	56,516
9	2003	0	3,184				3,184	137,266	7,830	141,912
10	2004		3,184				3,184	147,913	7,830	152,559
11	2005		3,184				3,184	158,745	7,830	163,391
12	2006		3,184				3,184	169,749	7,830	174,395
13	2007		3,184	0			3,184	181,395	7,830	186,041
14	2008		3,184	3,071			6,255	193,006	7,830	194,581
15	2009		3,184	8,330			11,514	204,758	7,830	201,074
16	2010		3,184	37,593			40,777	216,444	7,830	183,497
17	2011		3,184	53,515			56,699	230,244	7,830	181,375
18	2012		3,184	114,718			117,902	243,704	7,830	133,632
19	2013		3,184	130,567			133,751	257,587	7,830	131,666
20	2014		3,184	127,850			131,034	271,419	7,830	148,215
21	2015		3,184	24,930			28,114	362,326	7,830	342,042
22	2016		3,184	0	3,504		6,688	377,849	7,830	378,991
23	2017		3,184		3,504		6,688	393,815	7,830	394,957
24	2018		3,184		3,504		6,688	409,734	7,830	410,876
25	2019		3,184		3,504		6,688	425,561	7,830	426,703
26	2020		3,184		3,504		6,688	441,859	7,830	443,001
27	2021		3,184		3,504		6,688	456,518	7,830	457,660
28	2022		3,184		3,504		6,688	471,071	7,830	472,213
29	2023		3,184		3,504		6,688	486,025	7,830	487,167
30	2024		3,184		3,504		6,688	500,870	7,830	502,012
31	2025		3,184		3,504		6,688	516,747	7,830	517,889
32	2026		3,184		3,504		6,688	516,747	7,830	517,889
33	2027		3,184		3,504		6,688	516,747	7,830	517,889
34	2028		3,184		3,504		6,688	516,747	7,830	517,889
35	2029		3,184		3,504		6,688	516,747	7,830	517,889
36	2030		3,184		3,504		6,688	516,747	7,830	517,889
37	2031		3,184		3,504		6,688	516,747	7,830	517,889
38	2032		3,184		3,504	0	6,688	516,747	7,830	517,889
39	2033		3,184		3,504	51,278	57,966	516,747	7,830	466,611
40	2034		3,184		3,504	0	6,688	516,747	7,830	517,889
41	2035		3,184		3,504		6,688	516,747	7,830	517,889
42	2036		3,184		3,504		6,688	516,747	7,830	517,889
43	2037		3,184		3,504		6,688	516,747	7,830	517,889
44	2038		3,184		3,504		6,688	516,747	7,830	517,889
45	2039		3,184		3,504		6,688	516,747	7,830	517,889
46	2040		3,184		3,504		6,688	516,747	7,830	517,889
47	2041		3,184		3,504		6,688	516,747	7,830	517,889
48	2042		3,184		3,504		6,688	516,747	7,830	517,889
49	2043		3,184		3,504		6,688	516,747	7,830	517,889
50	2044		3,184		3,504		6,688	516,747	7,830	517,889
Total		538,124	133,728	500,575	101,616	51,278	1,325,321	17,136,089	336,690	16,147,458
In the condition of discount rate at 12 %:										
Present value:							378,936		892,139	513,202
Internal rate of return (EIRR):										21.26%
B/C										2.35

Table 44 COST AND BENEFIT FLOW OF FIRST PHASE AND 2ND PHASE (SCENARIO C)
(WATER SUPPLY)

							(million Rp.)	
Year in order	Year	Cost of First Phase		Cost of 2nd Phase			Total	Cash balance
		Construction	O/M	Construction	O/M	Replacement	Water Supply	
0	1994	0	0				0	0
1	1995	6,900	0				6,900	-6,900
2	1996	9,034	0				9,034	-9,034
3	1997	47,155	0				47,155	-47,155
4	1998	105,411	0				105,411	-105,411
5	1999	109,101	0				109,101	-109,101
6	2000	104,032	0				104,032	-104,032
7	2001	97,905	0				97,905	-97,905
8	2002	14,227	0				14,227	60,300
9	2003	0	2,857	0			2,857	166,945
10	2004		2,857	1,968			4,825	185,167
11	2005		2,857	10,444			13,301	203,719
12	2006		2,857	34,159			37,016	225,659
13	2007		2,857	91,573			94,430	248,285
14	2008		2,857	130,243			133,100	271,307
15	2009		2,857	133,065			135,922	294,325
16	2010		2,857	116,831			119,688	317,684
17	2011		2,857	88,825			91,682	345,836
18	2012		2,857	92,836			95,693	373,726
19	2013		2,857	96,610			99,467	402,256
20	2014		2,857	89,202			92,059	430,950
21	2015		2,857	98,553			101,410	536,707
22	2016		2,857	127,877			130,734	563,112
23	2017		2,857	66,736			69,593	590,108
24	2018		2,857	7,462			10,319	617,204
25	2019		2,857	0	6,799		9,656	644,079
26	2020		2,857		6,799		9,656	671,837
27	2021		2,857		6,799		9,656	699,320
28	2022		2,857		6,799		9,656	726,839
29	2023		2,857		6,799		9,656	754,901
30	2024		2,857		6,799		9,656	782,996
31	2025		2,857		6,799		9,656	812,624
32	2026		2,857		6,799		9,656	812,624
33	2027		2,857		6,799		9,656	812,624
34	2028		2,857		6,799		9,656	812,624
35	2029		2,857		6,799		9,656	812,624
36	2030		2,857		6,799		9,656	812,624
37	2031		2,857		6,799		9,656	812,624
38	2032		2,857		6,799		9,656	812,624
39	2033		2,857		6,799		9,656	812,624
40	2034		2,857		6,799		9,656	812,624
41	2035		2,857		6,799		9,656	812,624
42	2036		2,857		6,799		9,656	812,624
43	2037		2,857		6,799		9,656	812,624
44	2038		2,857		6,799		9,656	812,624
45	2039		2,857		6,799		9,656	812,624
46	2040		2,857		6,799		9,656	812,624
47	2041		2,857		6,799		9,656	812,624
48	2042		2,857		6,799	0	9,656	812,624
49	2043		2,857		6,799	51,208	60,864	812,624
50	2044		2,857		6,799	0	9,656	812,624
Total		493,766	119,994	1,186,385	176,774	51,208	2,028,127	24,351,840
In the condition of discount rate at 12 %:								
Present value:							465,821	782,715
Internal rate of return (EIRR):								24.21%
B/C								2.68

Table 45 COST AND BENEFIT FLOW OF FIRST PHASE AND 2ND PHASE (SCENARIO C)
(WATER SUPPLY + FLOOD CONTROL)

		(million Rp.)								
Year in order	Year	Cost of First Phase		Cost of 2nd Phase			Total	Benefit		Cash balance
		Construction	O/M	Construction	O/M	Replacement		Water supply	Flood control	
0	1994	0	0				0	0	0	0
1	1995	7,567	0				7,567	0	0	-7,567
2	1996	9,904	0				9,904	0	0	-9,904
3	1997	48,825	0				48,825	0	0	-48,825
4	1998	117,537	0				117,537	0	0	-117,537
5	1999	117,528	0				117,528	0	0	-117,528
6	2000	114,141	0				114,141	0	0	-114,141
7	2001	108,014	0				108,014	0	0	-108,014
8	2002	14,608	0				14,608	74,527	7,830	67,750
9	2003	0	3,184				3,184	166,945	7,830	171,591
10	2004		3,184	1,968			5,152	185,167	7,830	187,844
11	2005		3,184	10,444			13,628	203,719	7,830	197,921
12	2006		3,184	34,159			37,343	225,659	7,830	196,146
13	2007		3,184	91,573			94,757	248,285	7,830	161,357
14	2008		3,184	130,243			133,427	271,307	7,830	145,710
15	2009		3,184	133,065			136,249	294,325	7,830	165,907
16	2010		3,184	116,831			120,015	317,684	7,830	205,499
17	2011		3,184	88,825			92,009	345,836	7,830	261,658
18	2012		3,184	92,836			96,020	373,726	7,830	285,536
19	2013		3,184	96,610			99,794	402,256	7,830	310,291
20	2014		3,184	89,202			92,386	430,950	7,830	346,394
21	2015		3,184	98,553			101,737	536,707	7,830	442,800
22	2016		3,184	127,877			131,061	563,112	7,830	439,882
23	2017		3,184	66,736			69,920	590,108	7,830	528,018
24	2018		3,184	7,462			10,646	617,204	7,830	614,388
25	2019		3,184	0	6,799		9,983	644,079	7,830	641,926
26	2020		3,184		6,799		9,983	671,837	7,830	669,684
27	2021		3,184		6,799		9,983	699,320	7,830	697,167
28	2022		3,184		6,799		9,983	726,839	7,830	724,686
29	2023		3,184		6,799		9,983	754,901	7,830	752,748
30	2024		3,184		6,799		9,983	782,996	7,830	780,843
31	2025		3,184		6,799		9,983	812,624	7,830	810,471
32	2026		3,184		6,799		9,983	812,624	7,830	810,471
33	2027		3,184		6,799		9,983	812,624	7,830	810,471
34	2028		3,184		6,799		9,983	812,624	7,830	810,471
35	2029		3,184		6,799		9,983	812,624	7,830	810,471
36	2030		3,184		6,799		9,983	812,624	7,830	810,471
37	2031		3,184		6,799		9,983	812,624	7,830	810,471
38	2032		3,184		6,799		9,983	812,624	7,830	810,471
39	2033		3,184		6,799		9,983	812,624	7,830	810,471
40	2034		3,184		6,799		9,983	812,624	7,830	810,471
41	2035		3,184		6,799		9,983	812,624	7,830	810,471
42	2036		3,184		6,799		9,983	812,624	7,830	810,471
43	2037		3,184		6,799		9,983	812,624	7,830	810,471
44	2038		3,184		6,799		9,983	812,624	7,830	810,471
45	2039		3,184		6,799		9,983	812,624	7,830	810,471
46	2040		3,184		6,799		9,983	812,624	7,830	810,471
47	2041		3,184		6,799		9,983	812,624	7,830	810,471
48	2042		3,184		6,799	0	9,983	812,624	7,830	810,471
49	2043		3,184		6,799	51,208	61,191	812,624	7,830	759,263
50	2044		3,184		6,799	0	9,983	812,624	7,830	810,471
Total		538,124	133,728	1,186,385	176,774	51,208	2,086,220	26,379,967	336,690	24,630,437
In the condition of discount rate at 12 %:										
Present value:							491,725		1,277,826	786,101
Internal rate of return (EIRR):										23.65%
B/C										2.60

FIGURES

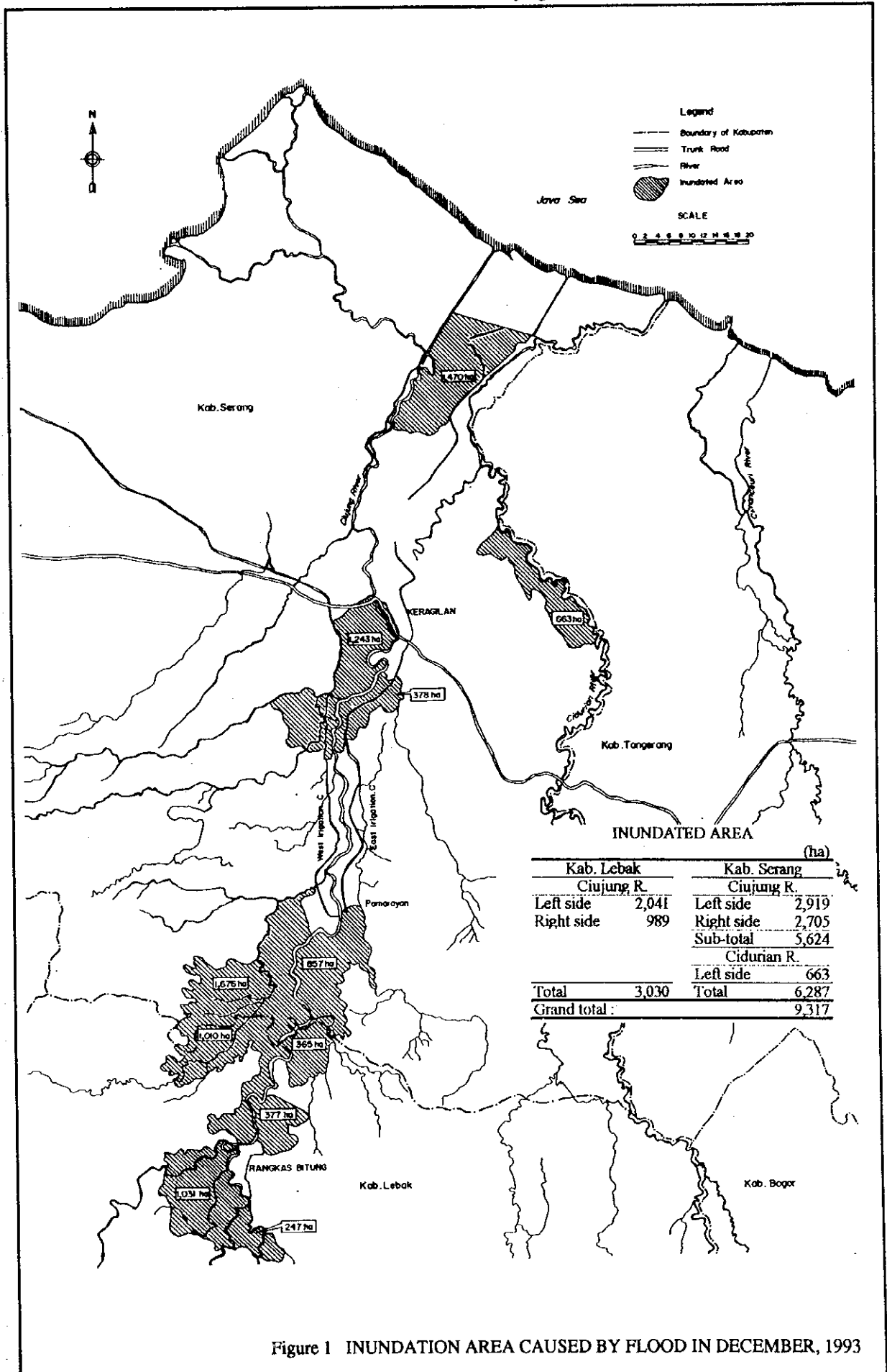


Figure 1 INUNDATION AREA CAUSED BY FLOOD IN DECEMBER, 1993

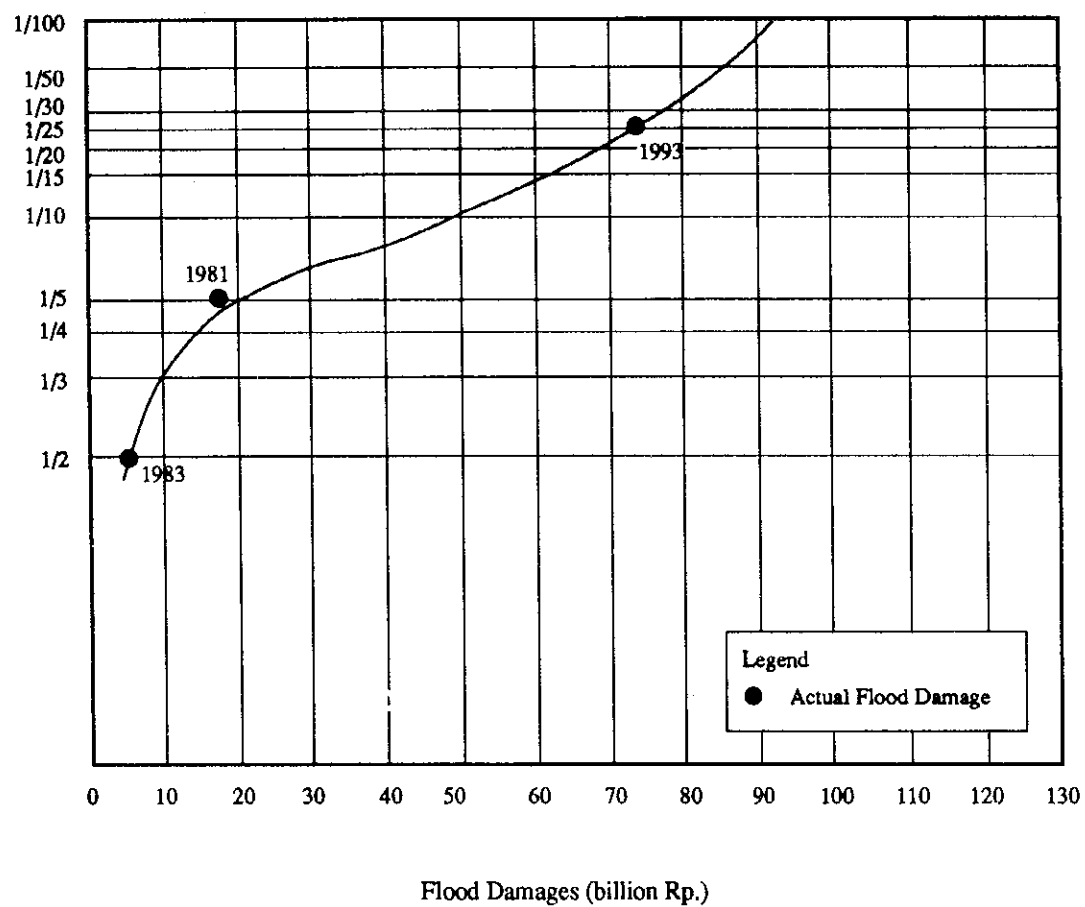


Figure 2 NORMAL PROBABILITY CURVE FOR FLOOD DAMGES

ANNEX 11

REFERENCE DRAWINGS PREPARED BY THE PREVIOUS STUDIES AND PROJECTS

**THE STUDY
ON
CIUJUNG-CIDURIAN INTEGRATED WATER RESOURCES**

Annex 11 : Reference Drawings Prepared by the Previous Studies and Projects

List of Drawings

- A. Karian Dam
 - A.1 Area and Storage Curves of Karian Dam
 - A.2 Plan of Karian Dam
 - A.3 Profile and Cross Section of Karian Dam
 - A.4 Diversion Tunnel and Saddle Dam of Karian Dam
 - A.5 Spillway of Karian Dam

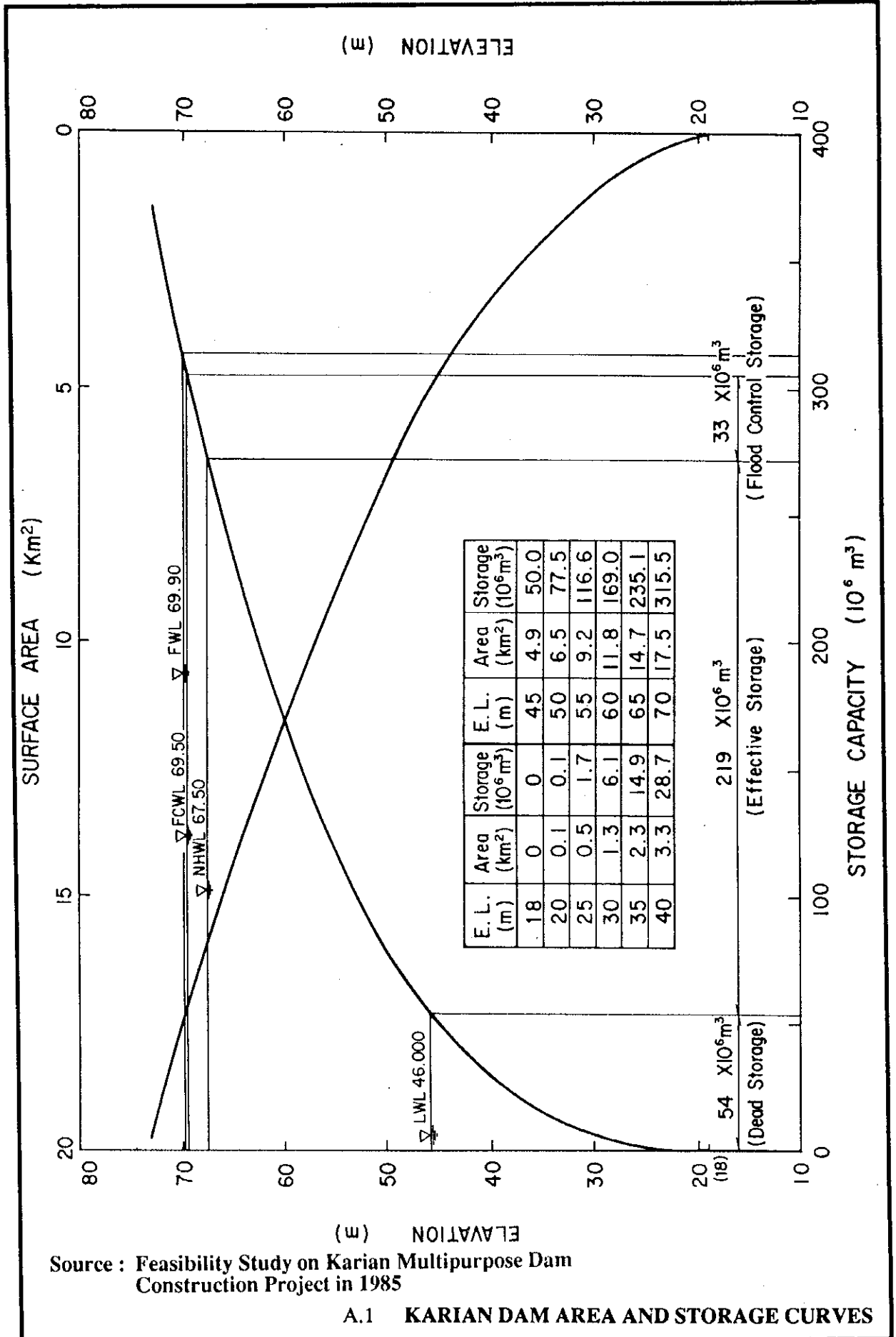
- B. Cilawang Dam
 - B.1 Area and Storage Curves of Cilawang Dam
 - B.2 Plan of Cilawang Dam
 - B.3 Profile and Cross Section of Cilawang Dam
 - B.4 Diversion Tunnel and Saddle Dam of Cilawang Dam
 - B.5 Spillway of Cilawang Dam

- C. Tanjung Dam
 - C.1 Area and Storage Curves of Tanjung Dam
 - C.2 Plan of Tanjung Dam
 - C.3 Profile and Cross Section of Tanjung Dam
 - C.4 Diversion Tunnel of Tanjung Dam
 - C.5 Spillway of Tanjung Dam

- D. Serpong Treatment Plant
 - D.1 General Layout of the Raw Water Transmission Line
 - D.2 Land Boundary Plan of Serpong Water Treatment
 - D.3 Profile of Serpong Water Treatment Plant
 - D.4 Profile of Serpong Raw Water Pump Station
 - D.5 Plan of Serpong Raw Water Pump Station

- E. River Improvement Plan along the Middle Reach of the Ciujung River
 - E.1 General Plan of River Improvement Work
 - E.2 Typical Cross Section of River Improvement
 - E.3 Design Longitudinal Profile

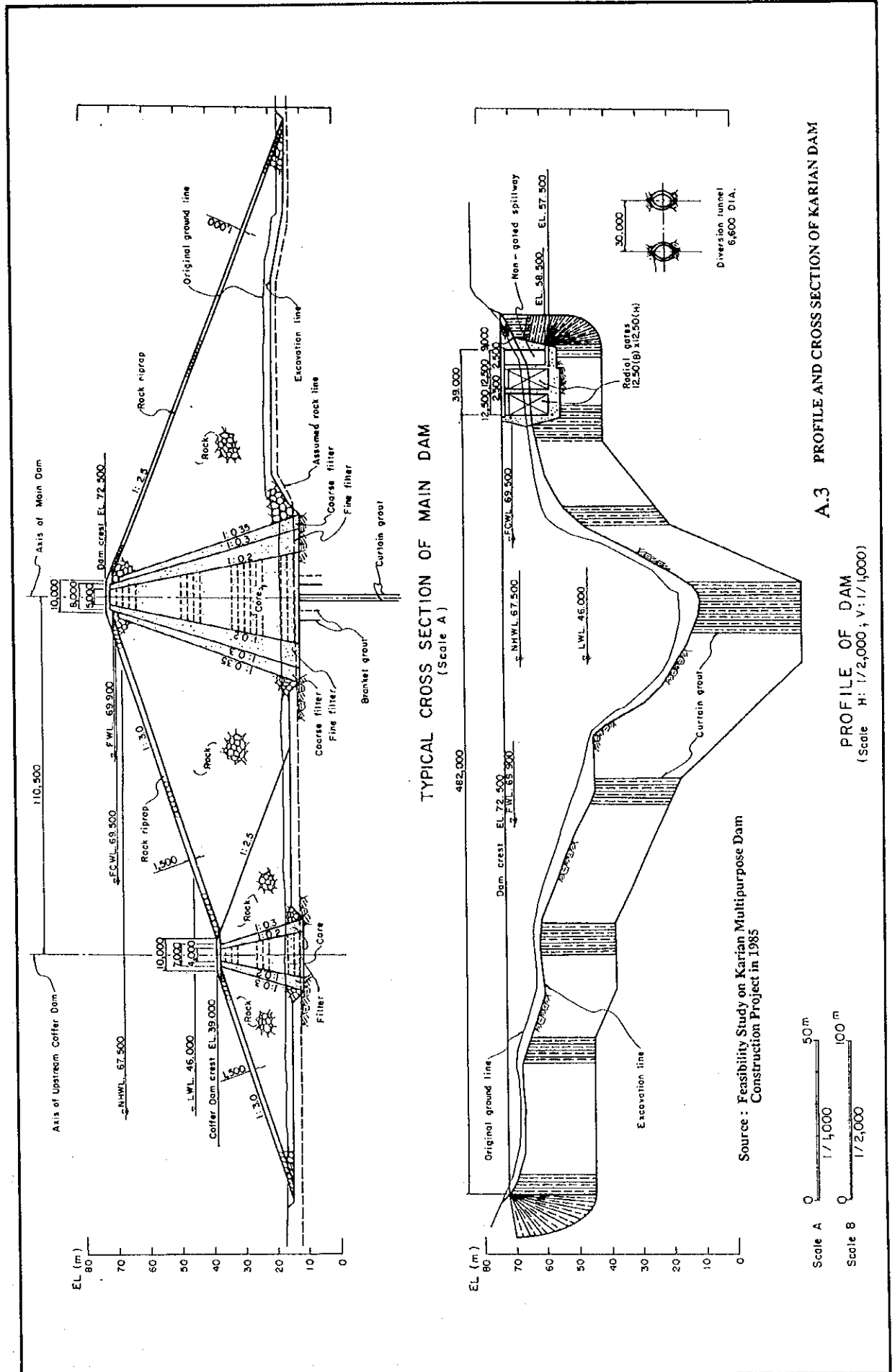
A. Karian Dam

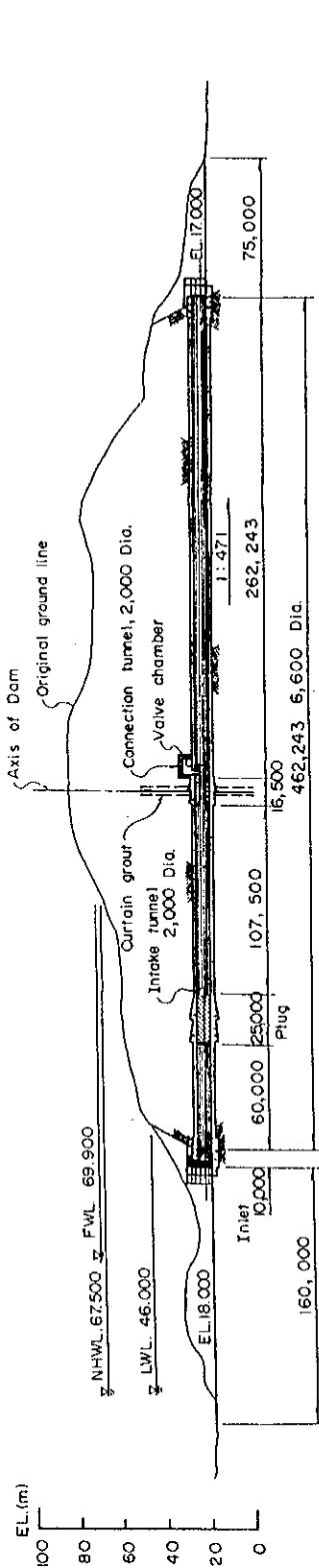




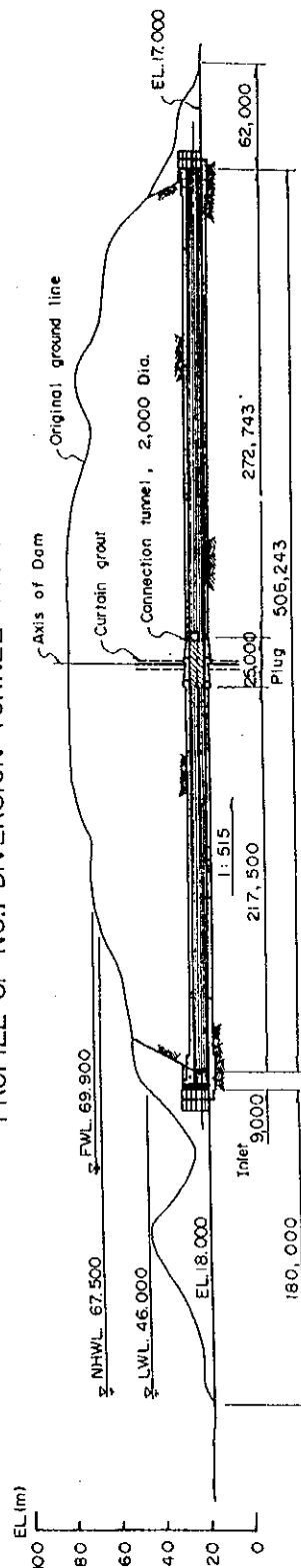
Source : Feasibility Study on Karian Multipurpose Dam Construction Project in 1985

A.2 PLAN OF KARIAN DAM



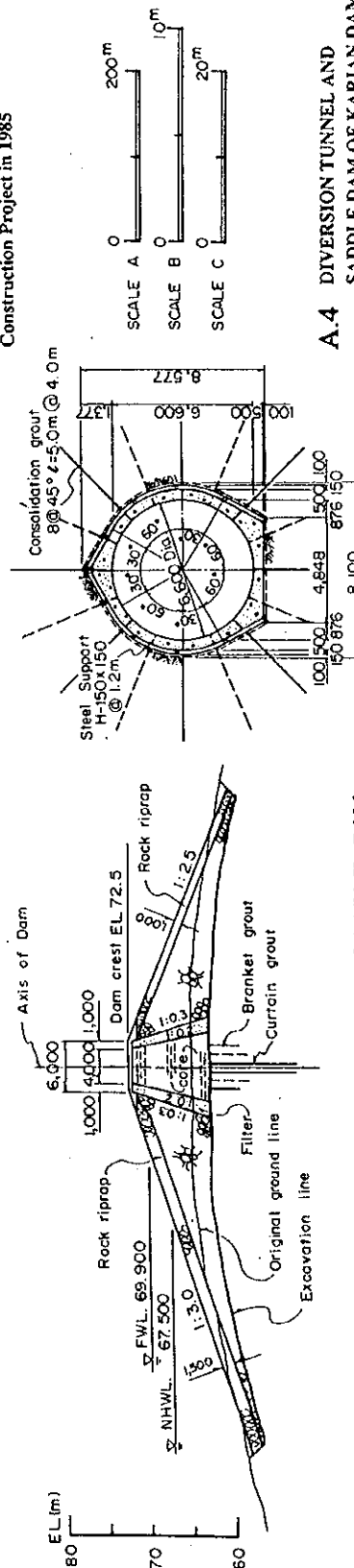


PROFILE OF NO.1 DIVERSION TUNNEL (SCALE A)

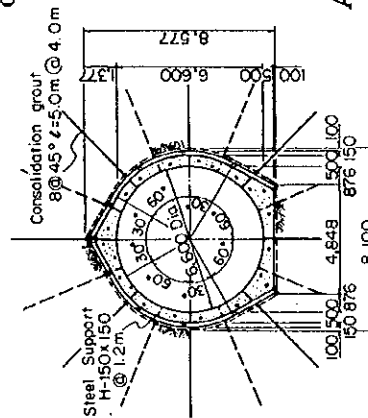


PROFILE OF NO.2 DIVERSION TUNNEL (SCALE A)

Source : Feasibility Study on Karian Multipurpose Dam Construction Project in 1985

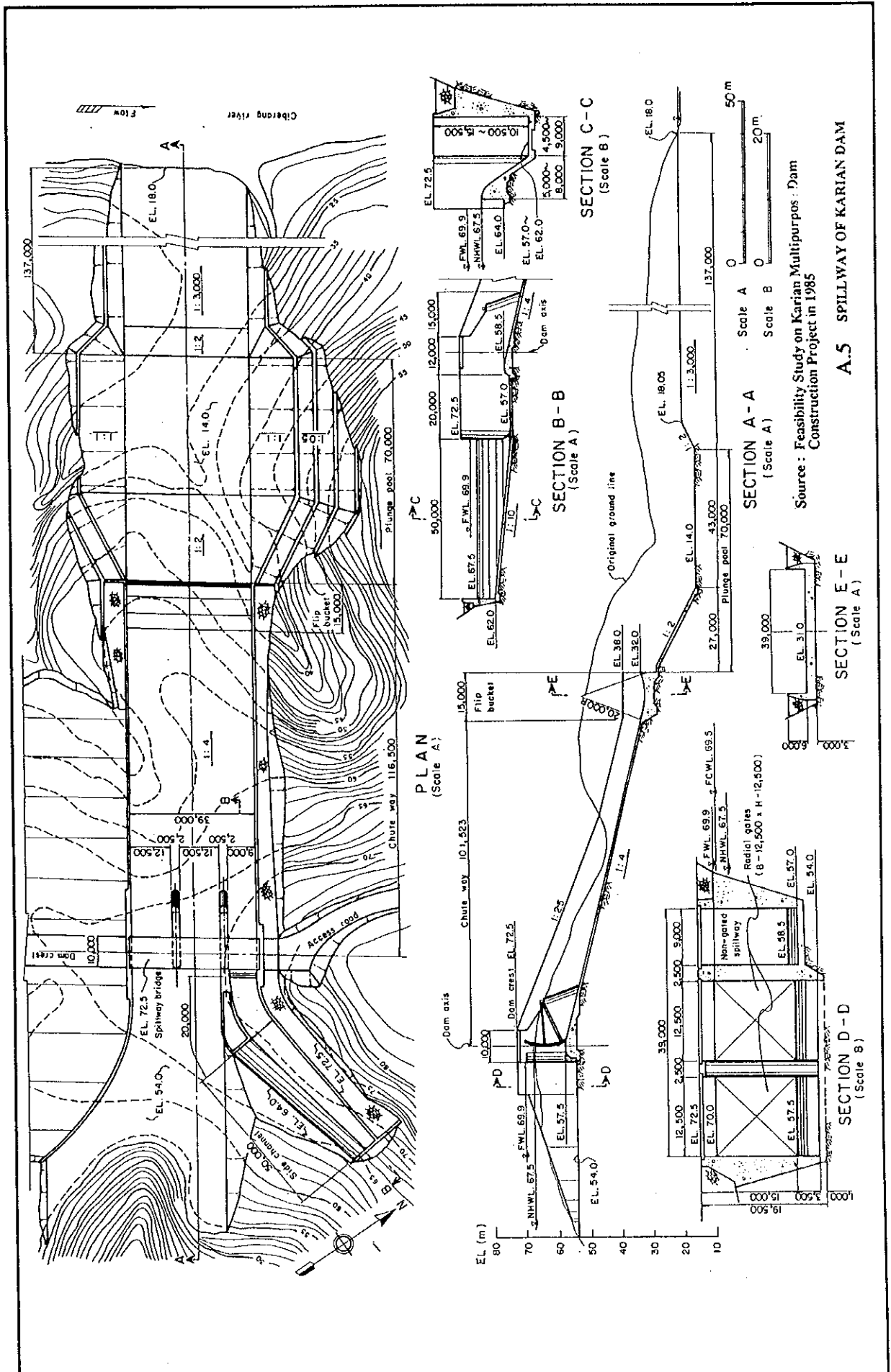


TYPICAL CROSS SECTION OF SADDLE DAM (SCALE C)

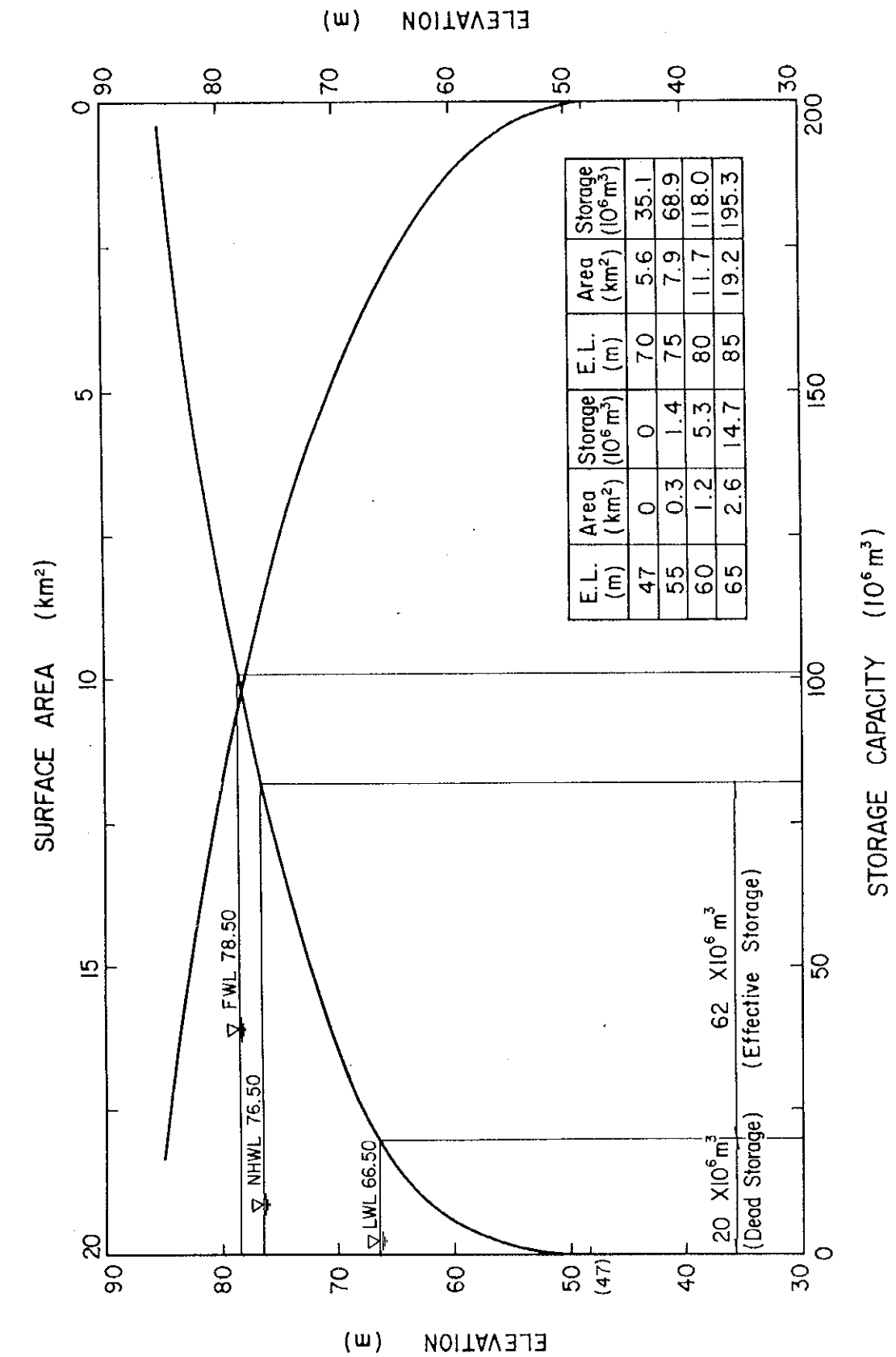


TYPICAL SECTION OF TUNNELS (SCALE B)

A.4 DIVERSION TUNNEL AND SADDLE DAM OF KARIAN DAM

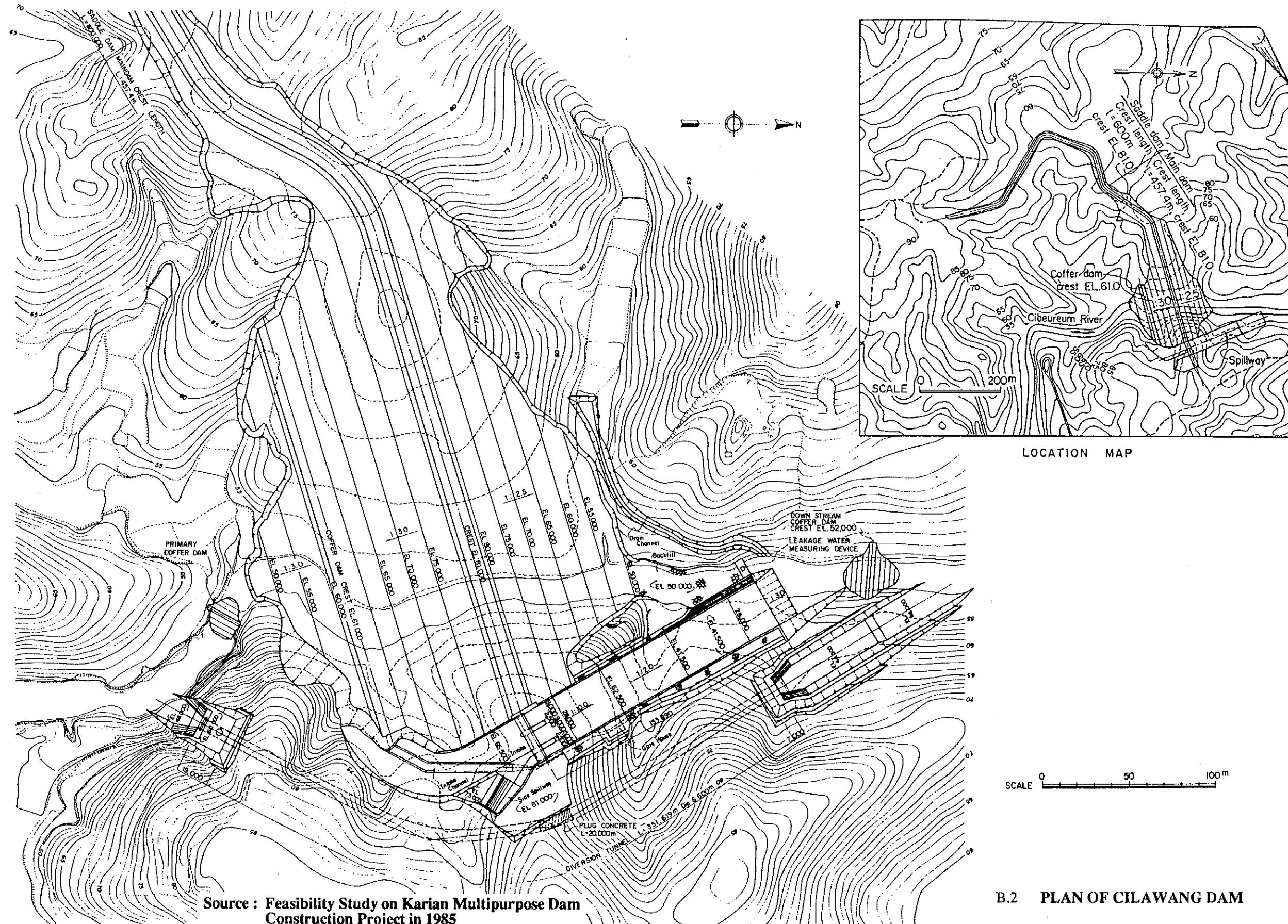


B. Cilawang Dam



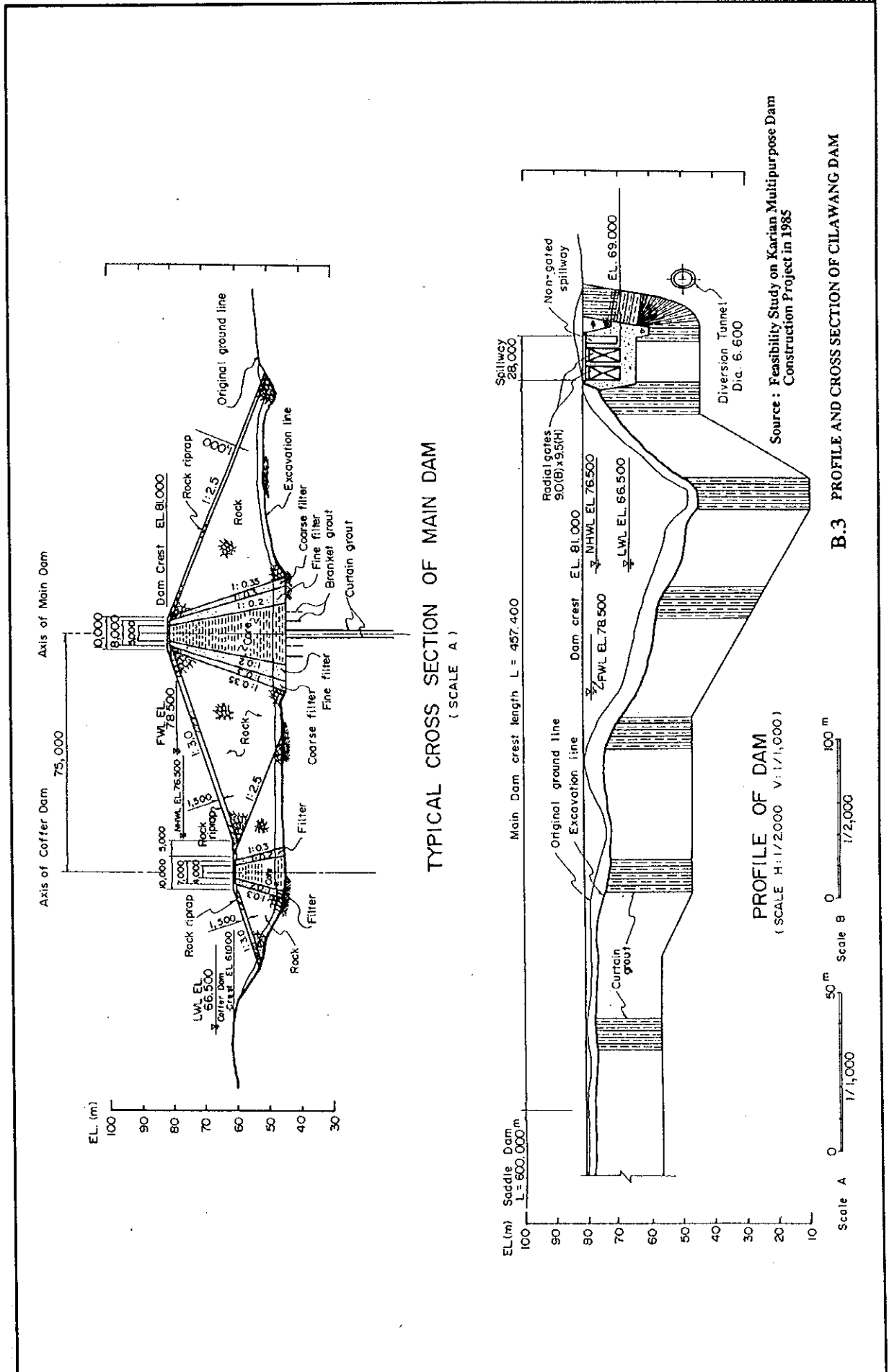
Source : Feasibility Study on Karian Multipurpose Dam Construction Project in 1985

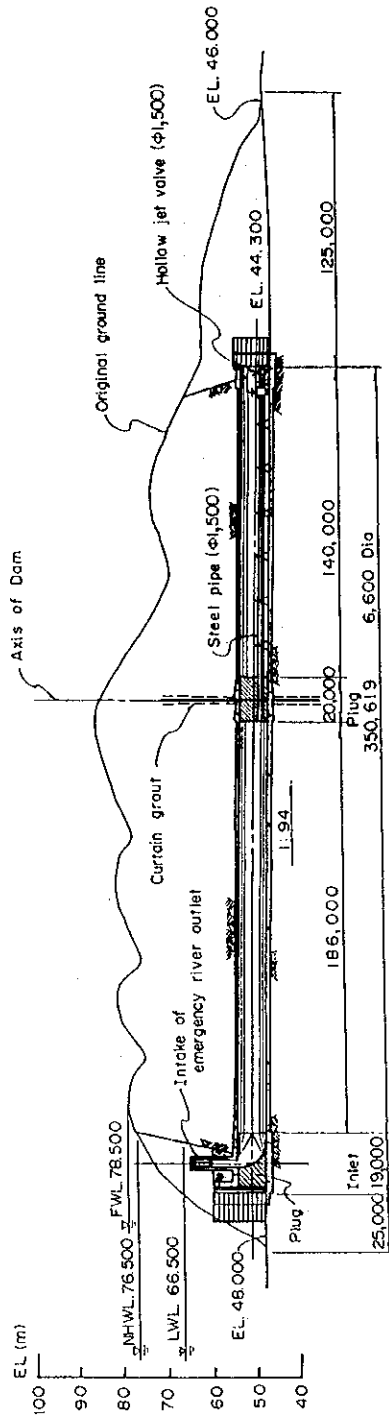
B.1 CILAWANG DAM AREA AND STORAGE CURVES



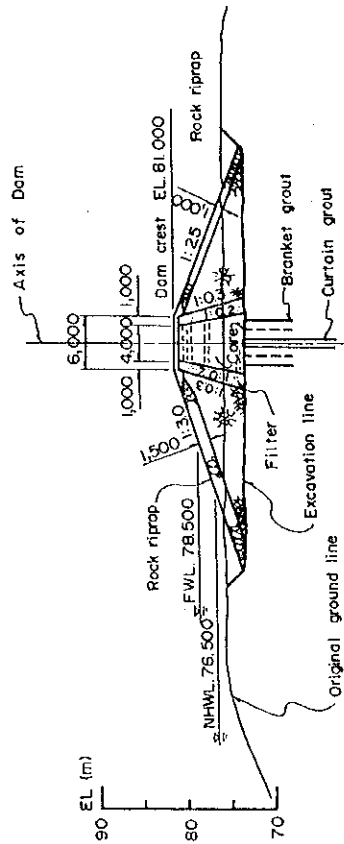
Source : Feasibility Study on Karian Multipurpose Dam Construction Project in 1985

B.2 PLAN OF CILAWANG DAM



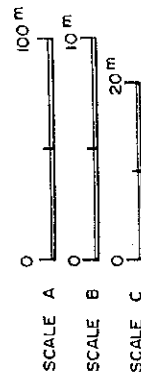


PROFILE OF DIVERSION TUNNEL (H-Scale A)

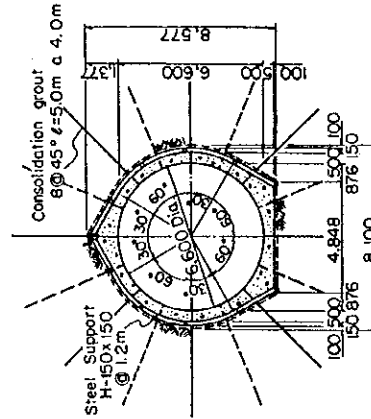


TYPICAL CROSS SECTION OF SADDLE DAM

(Scale C)



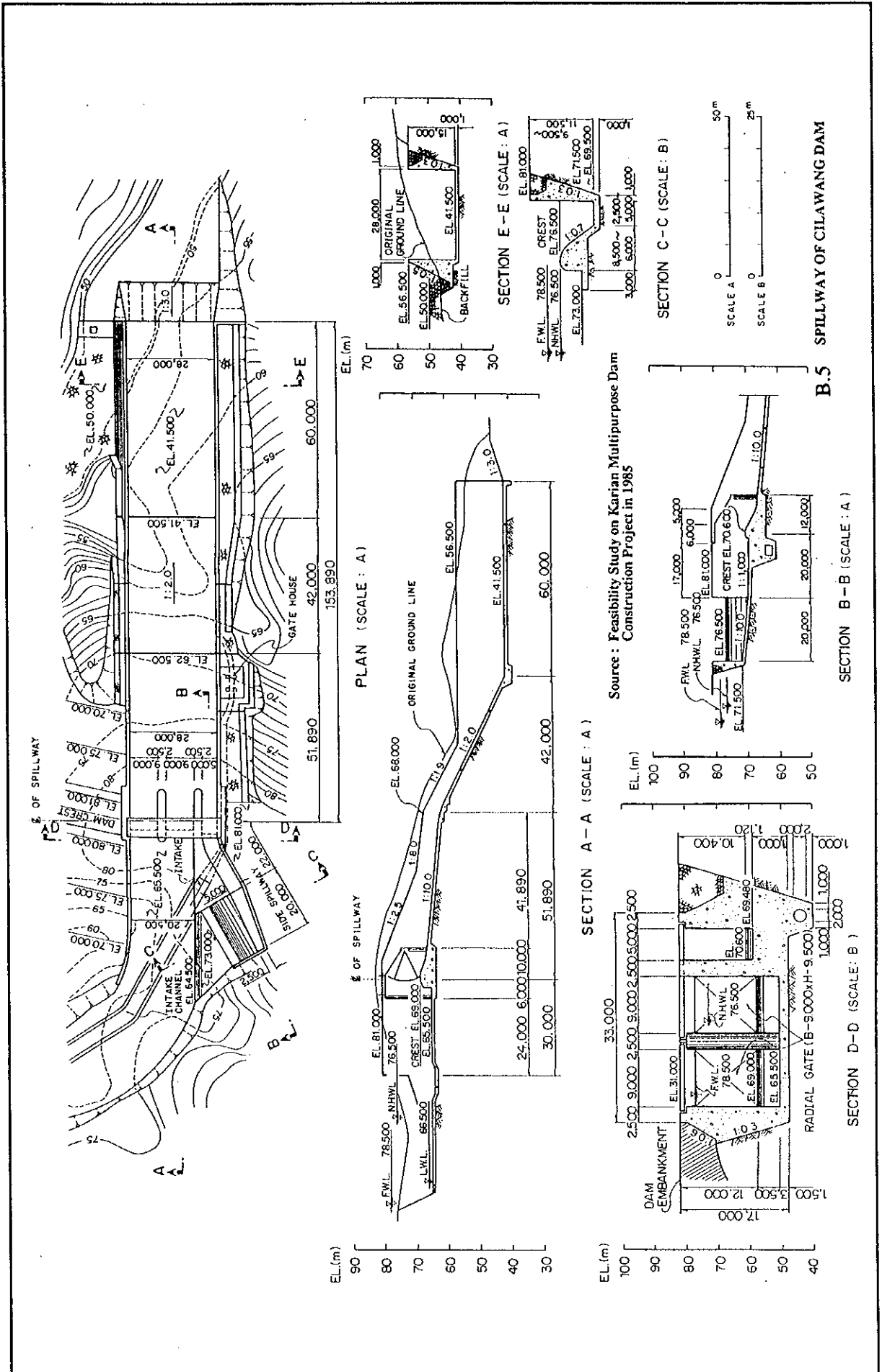
Source : Feasibility Study on Karian Multipurpose Dam Construction Project in 1985



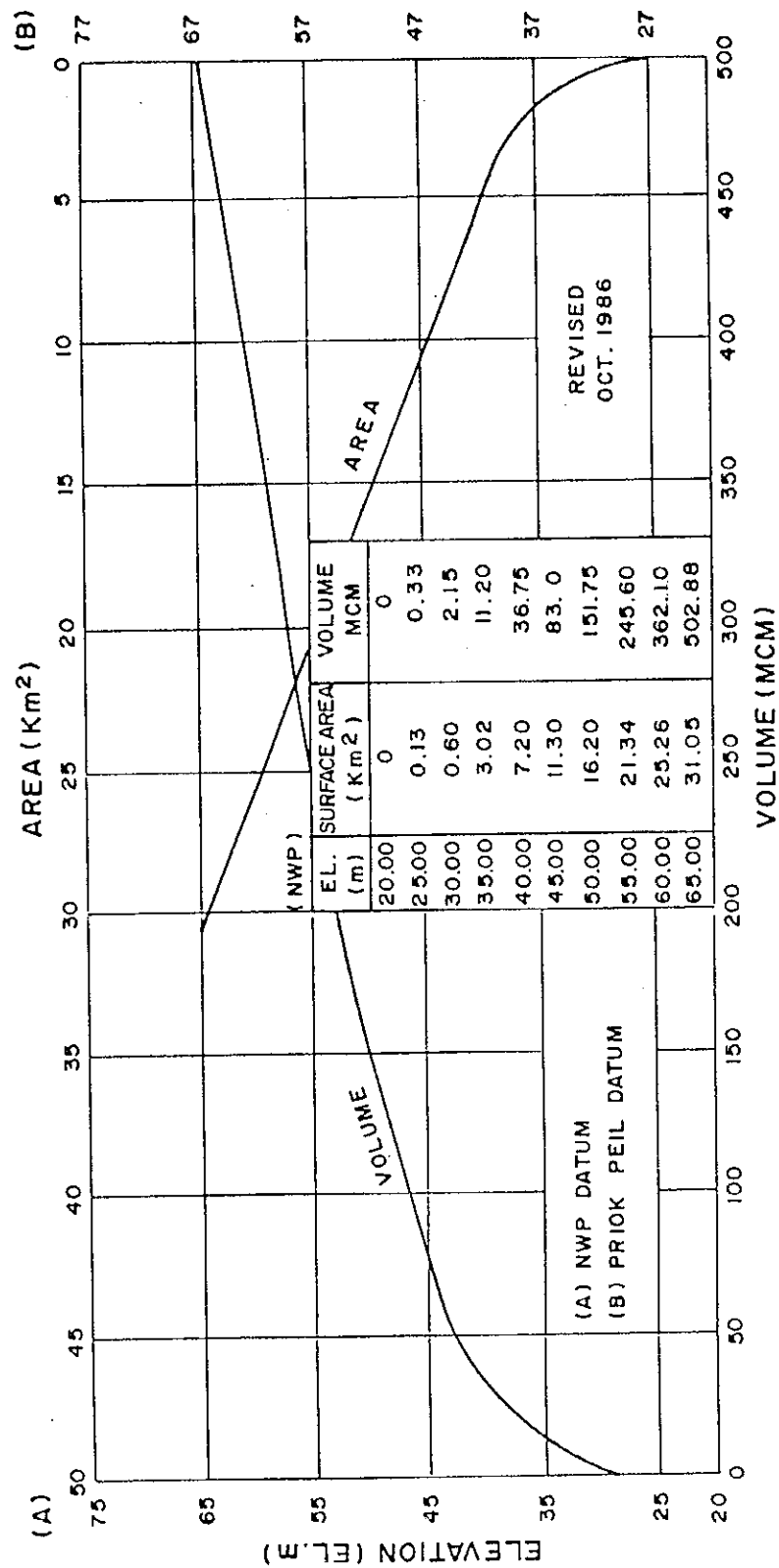
TYPICAL SECTION OF TUNNELS

(Scale B)

B.4 DIVERSION TUNNEL AND SADDLE DAM OF CILAWANG DAM

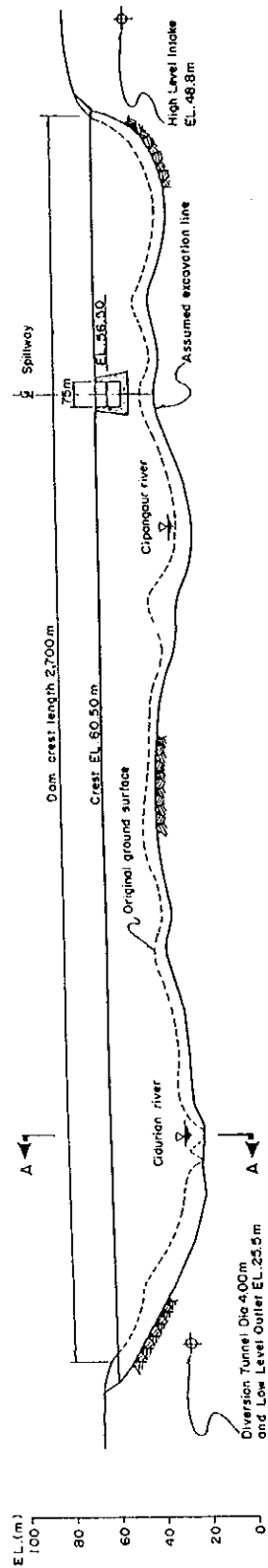


C. Tanjung Dam

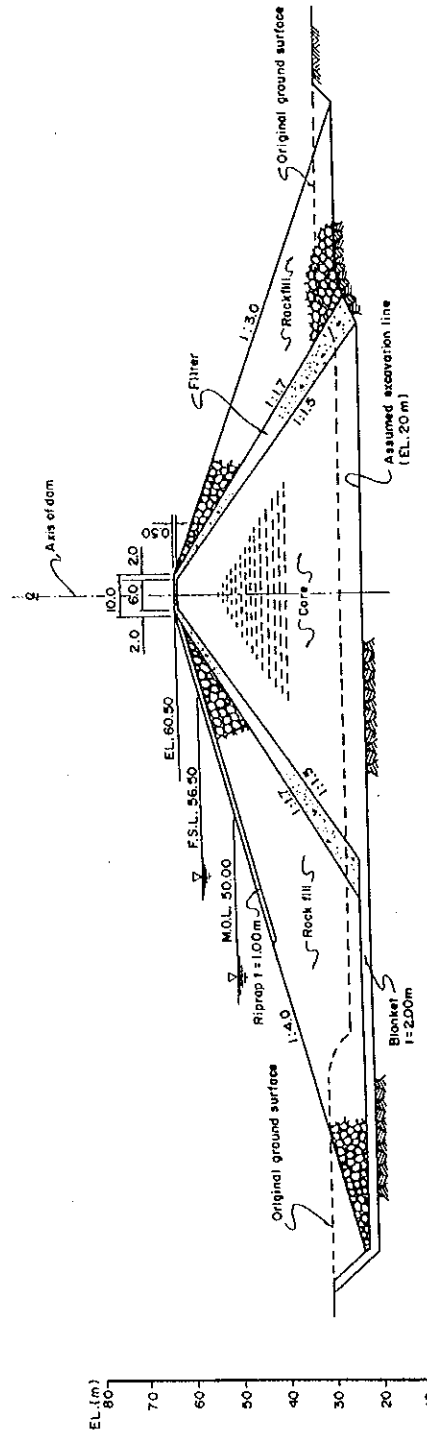


Source : Cisadane River Basin Development
Feasibility Study in 1987

C.1 TANJUNG DAM AREA AND STORAGE CURVES



PROFILE SCALE A



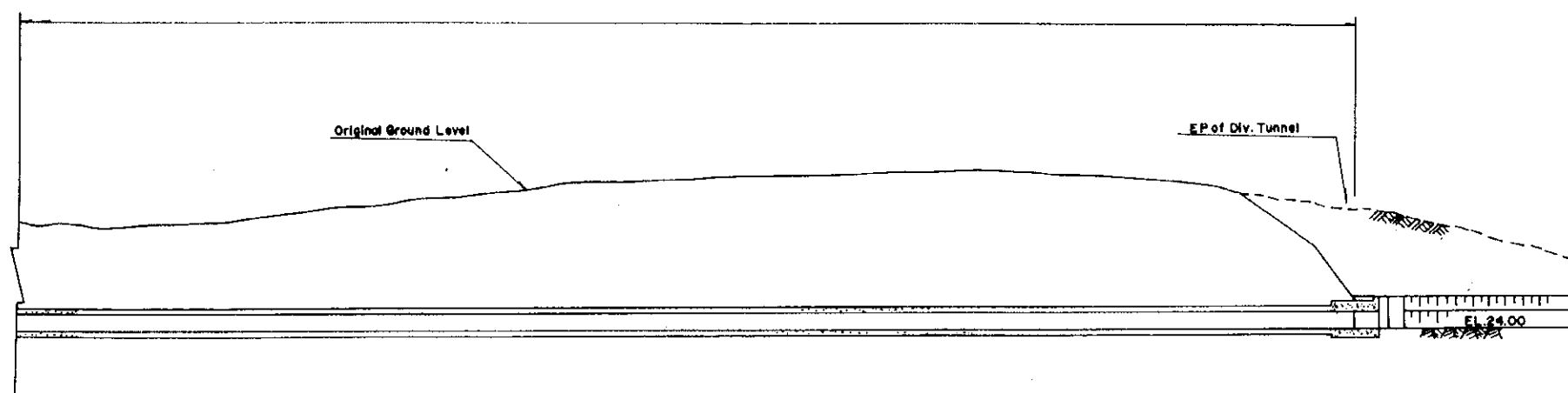
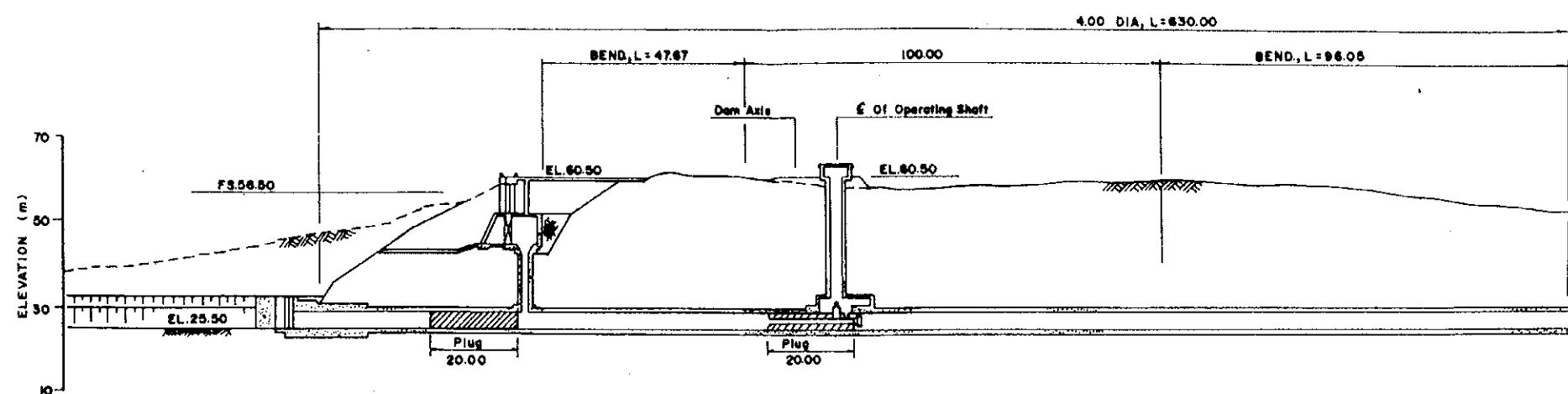
SECTION A - A SCALE B

SCALE A 0 100 m
SCALE B 0 50 m

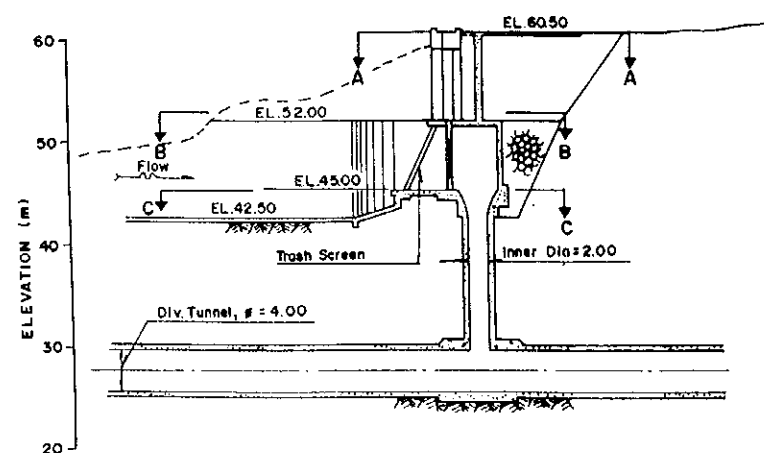
Source : Cisdane River Basin
Development Feasibility Study in
September 1987

C.3 PROFILE AND CROSS SECTION OF TANJUNG DAM

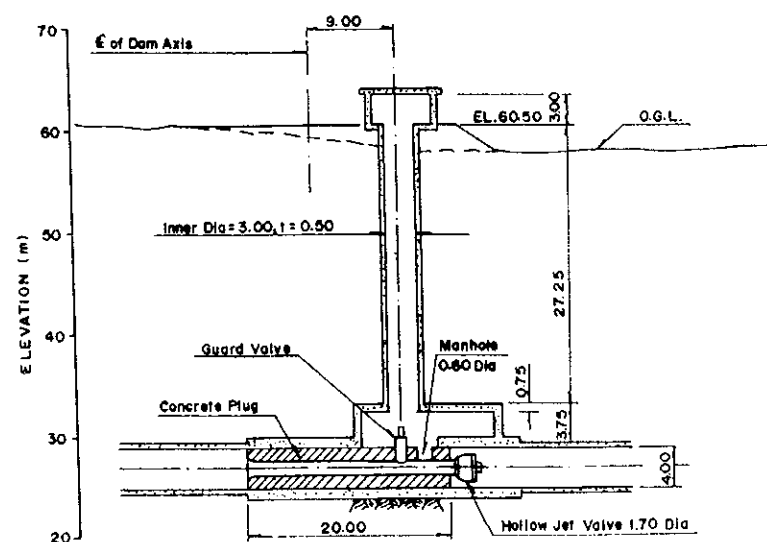
Source : Cisdane River Basin Development
Feasibility Study in 1987



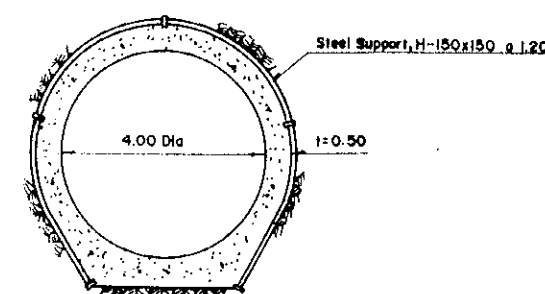
PROFILE OF DIVERSION TUNNEL SCALE A



PROFILE OF INTAKE SCALE B

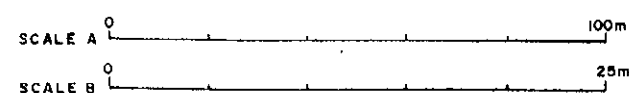


PROFILE OF OPERATING SHAFT SCALE B

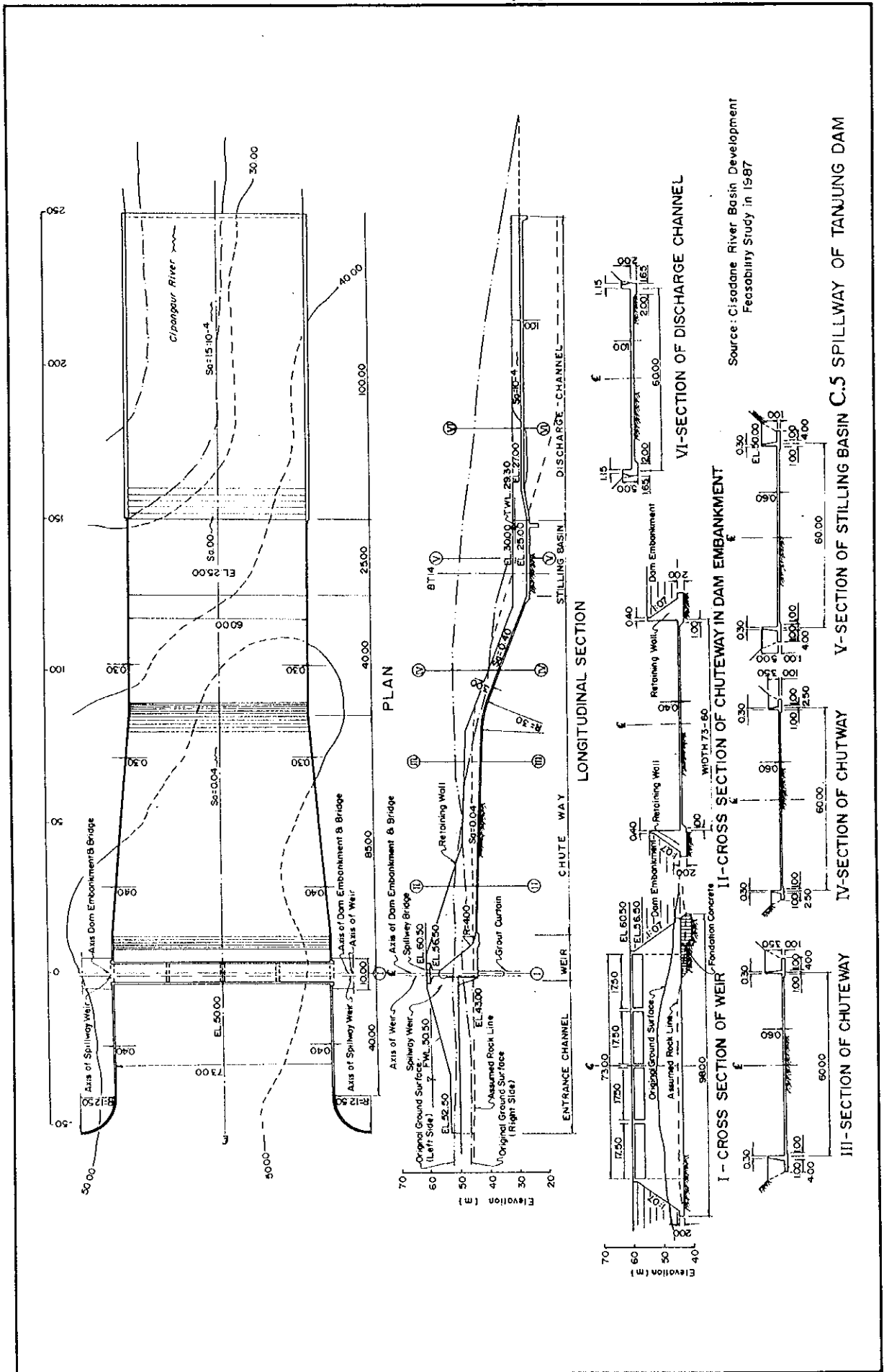


TYPICAL SECTION OF TUNNEL SCALE B

Source: Cisadane River Basin Development Feasibility Study in 1987

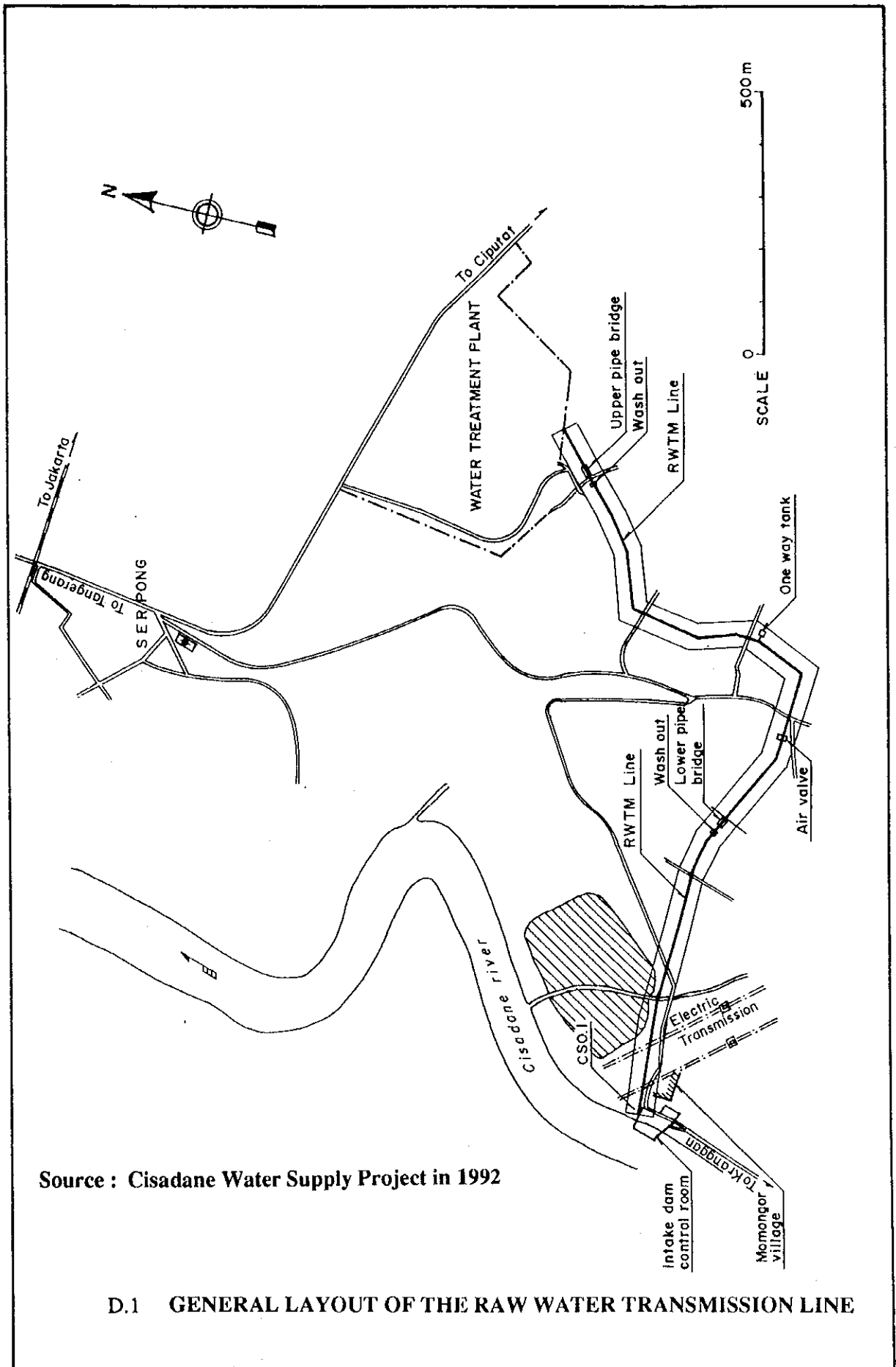


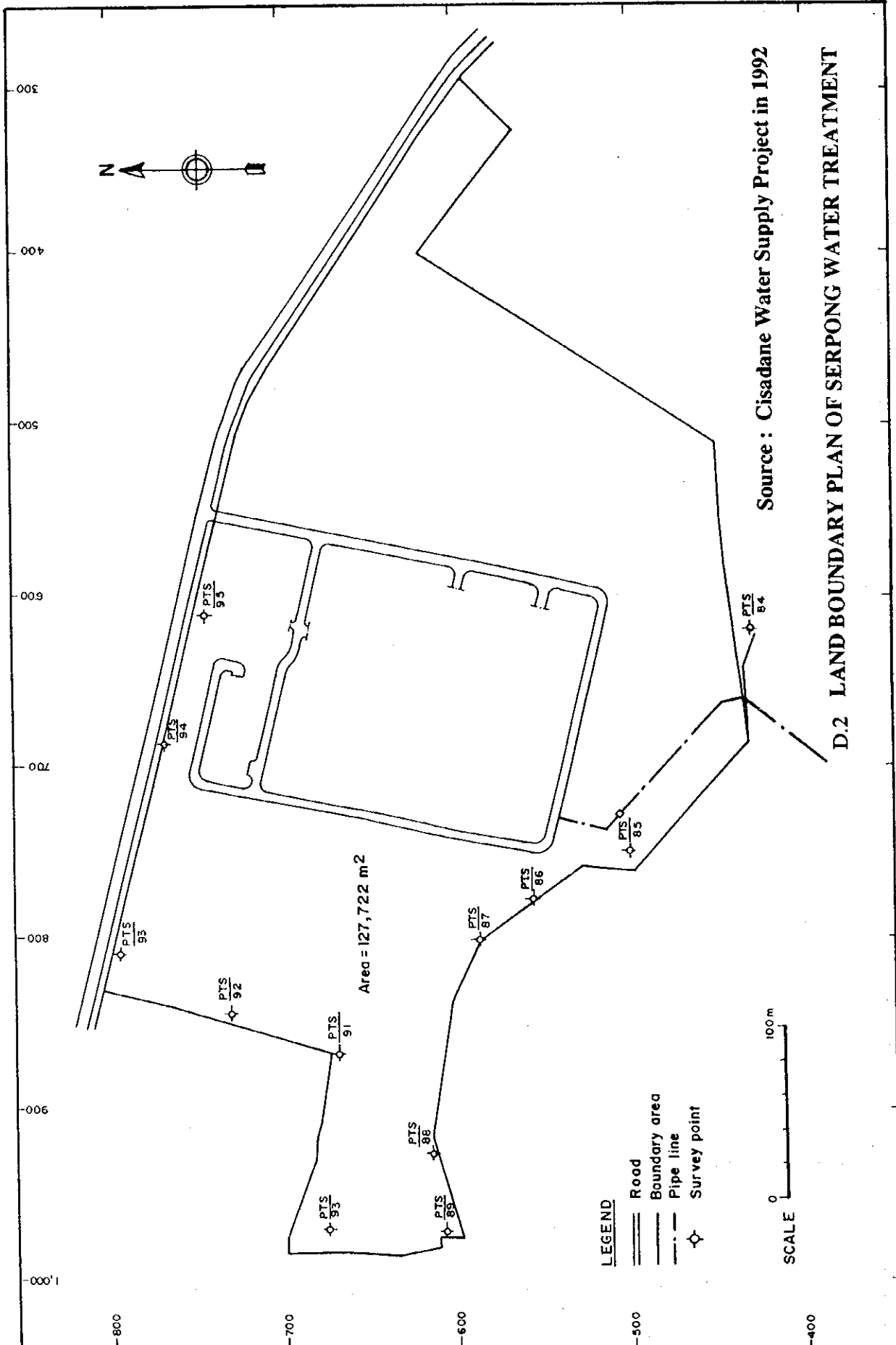
C.4 DIVERSION TUNNEL OF TANJUNG DAM

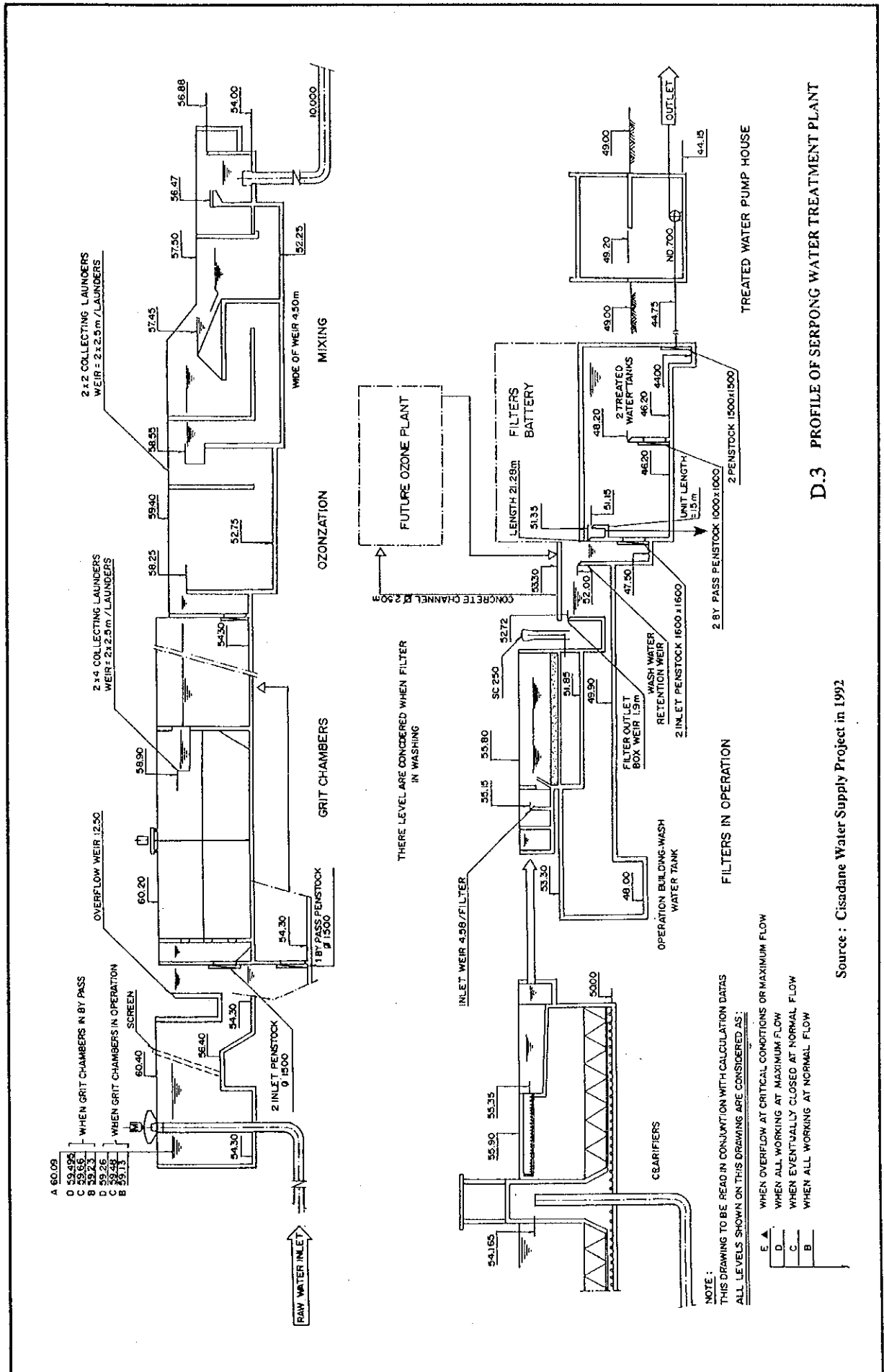


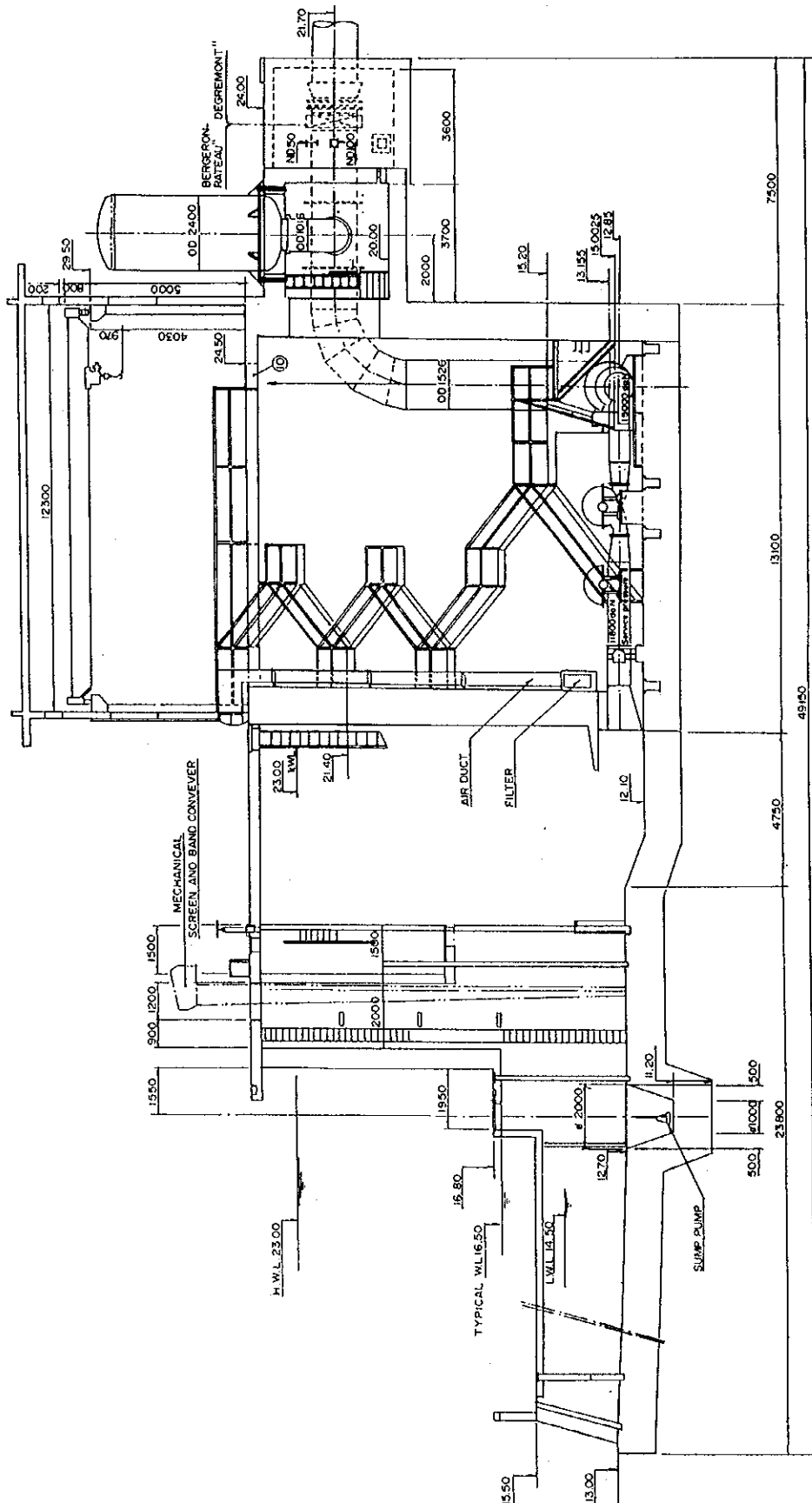
Source: Cisadane River Basin Development
Feasibility Study in 1987

D. Serpong Water Treatment Plant



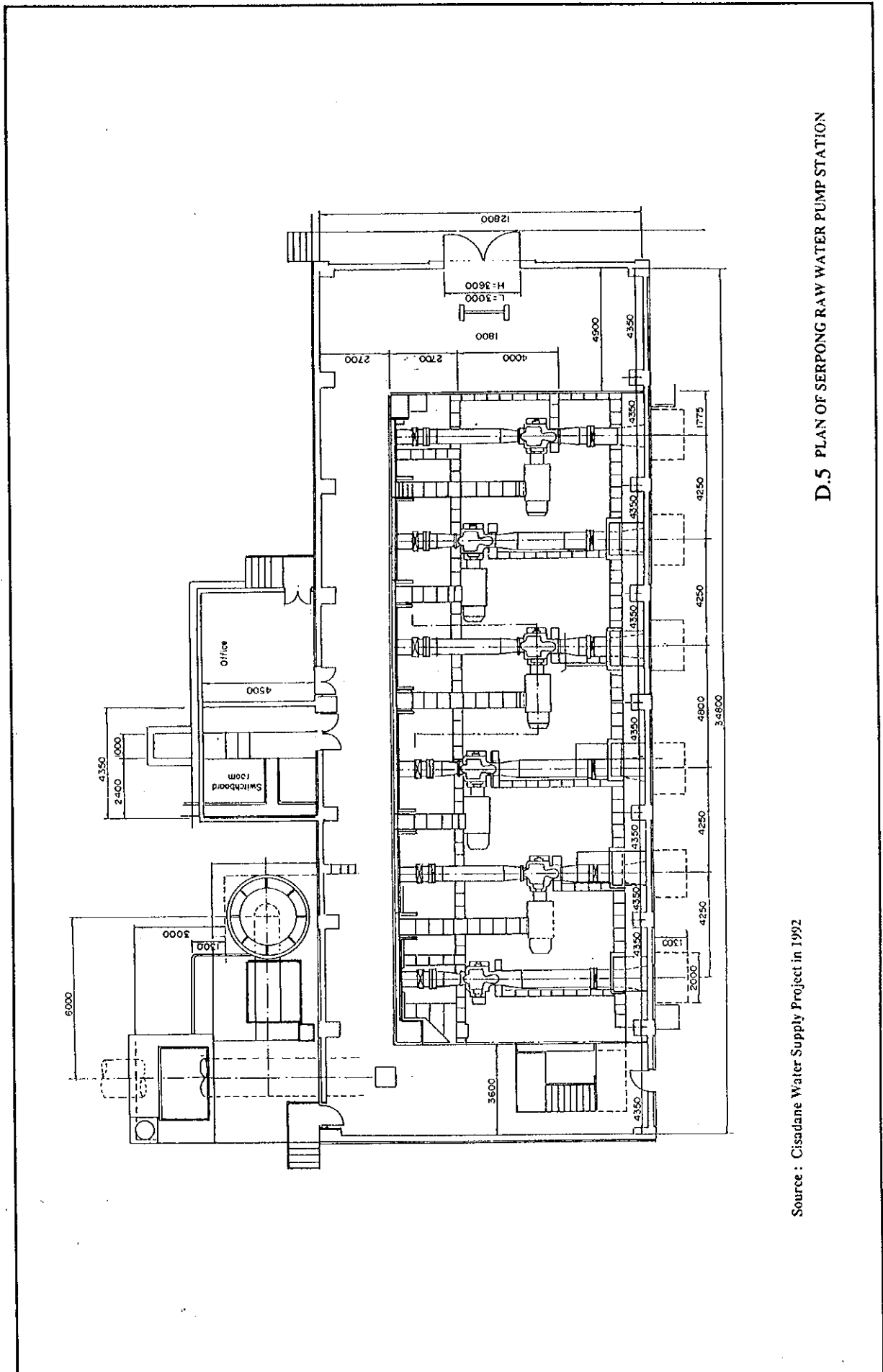






D.4 PROFILE OF SERPONG RAW WATER PUMP STATION

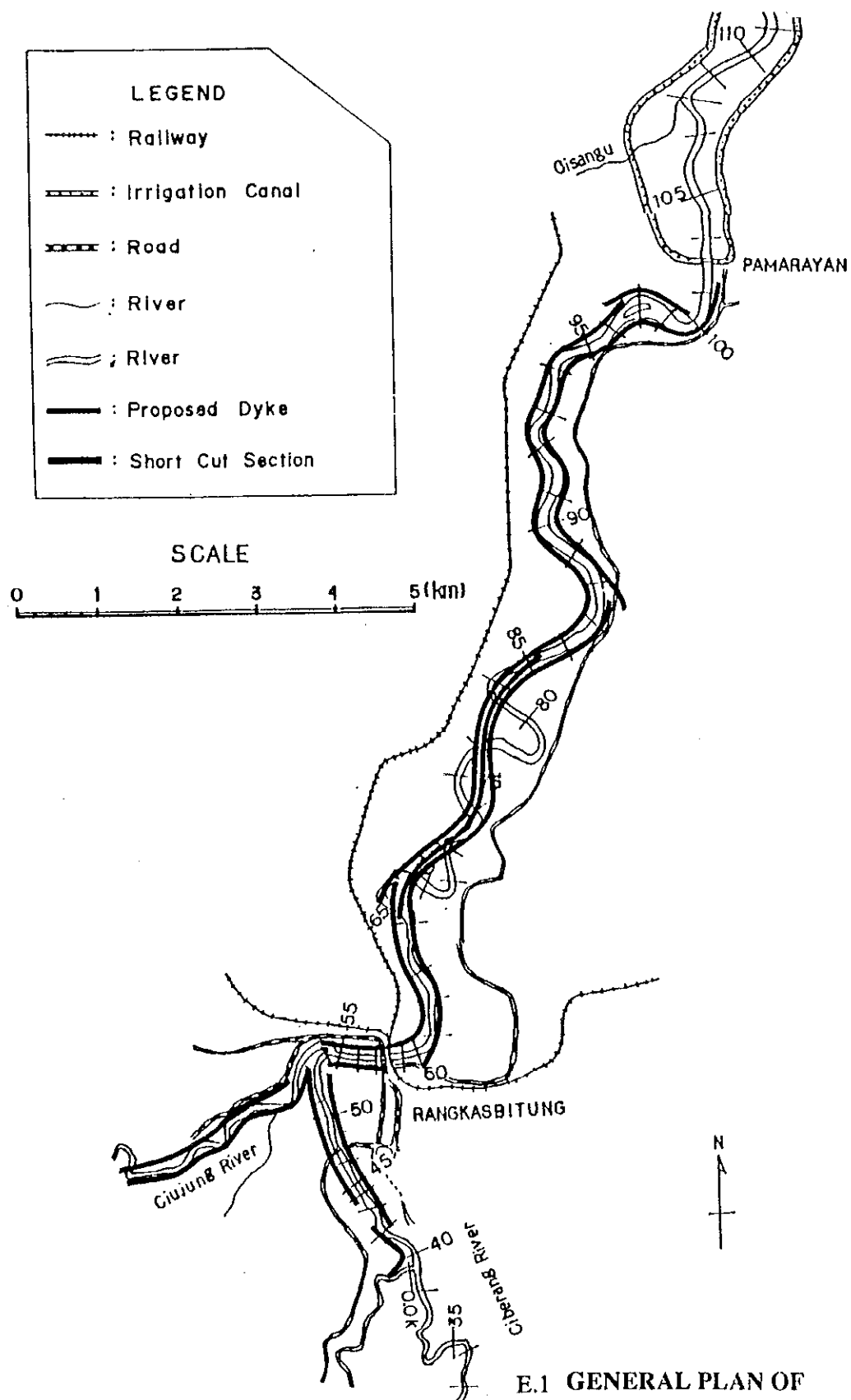
Source : Cisadane Water Supply Project in 1992



D.5 PLAN OF SERPONG RAW WATER PUMP STATION

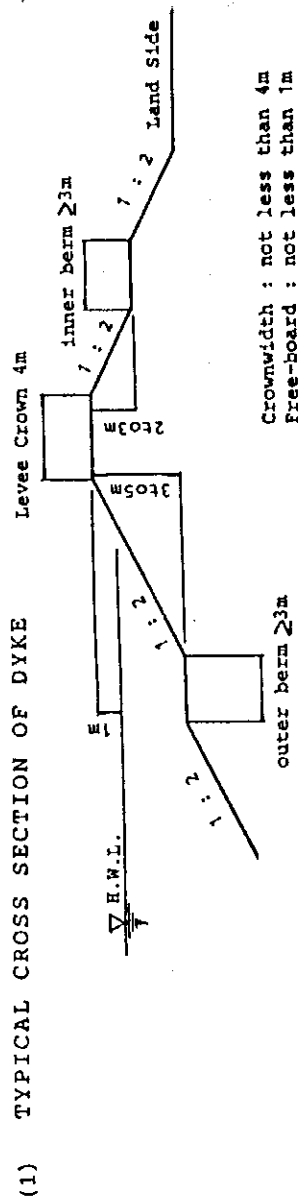
Source : Cisadane Water Supply Project in 1992

***E. River Improvement Plan
along the Middle Reach
of the Ciujung River***



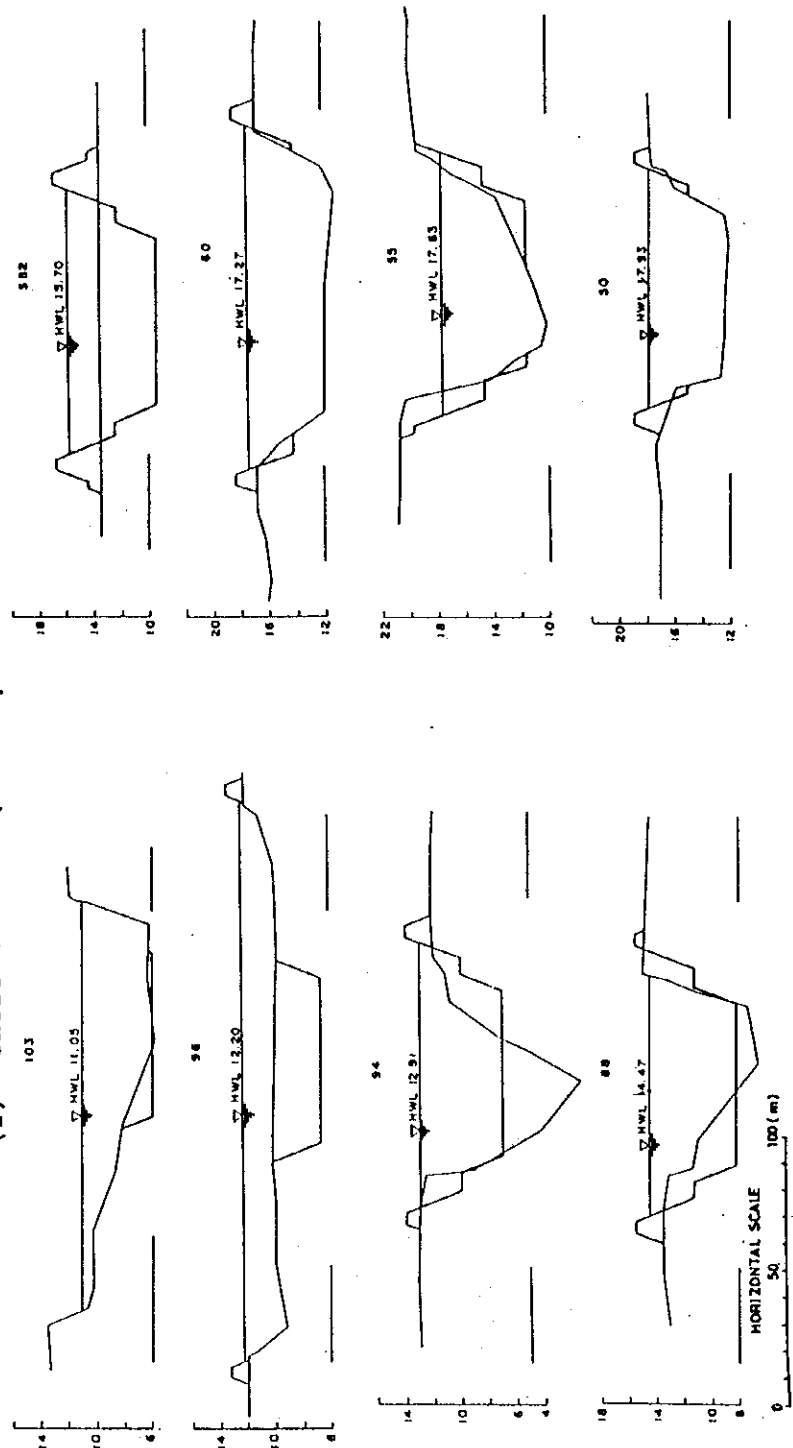
E.1 GENERAL PLAN OF RIVER IMPROVEMENT WORK

Source : Feasibility Study on Karian Multipurpose Dam Construction Project in 1985



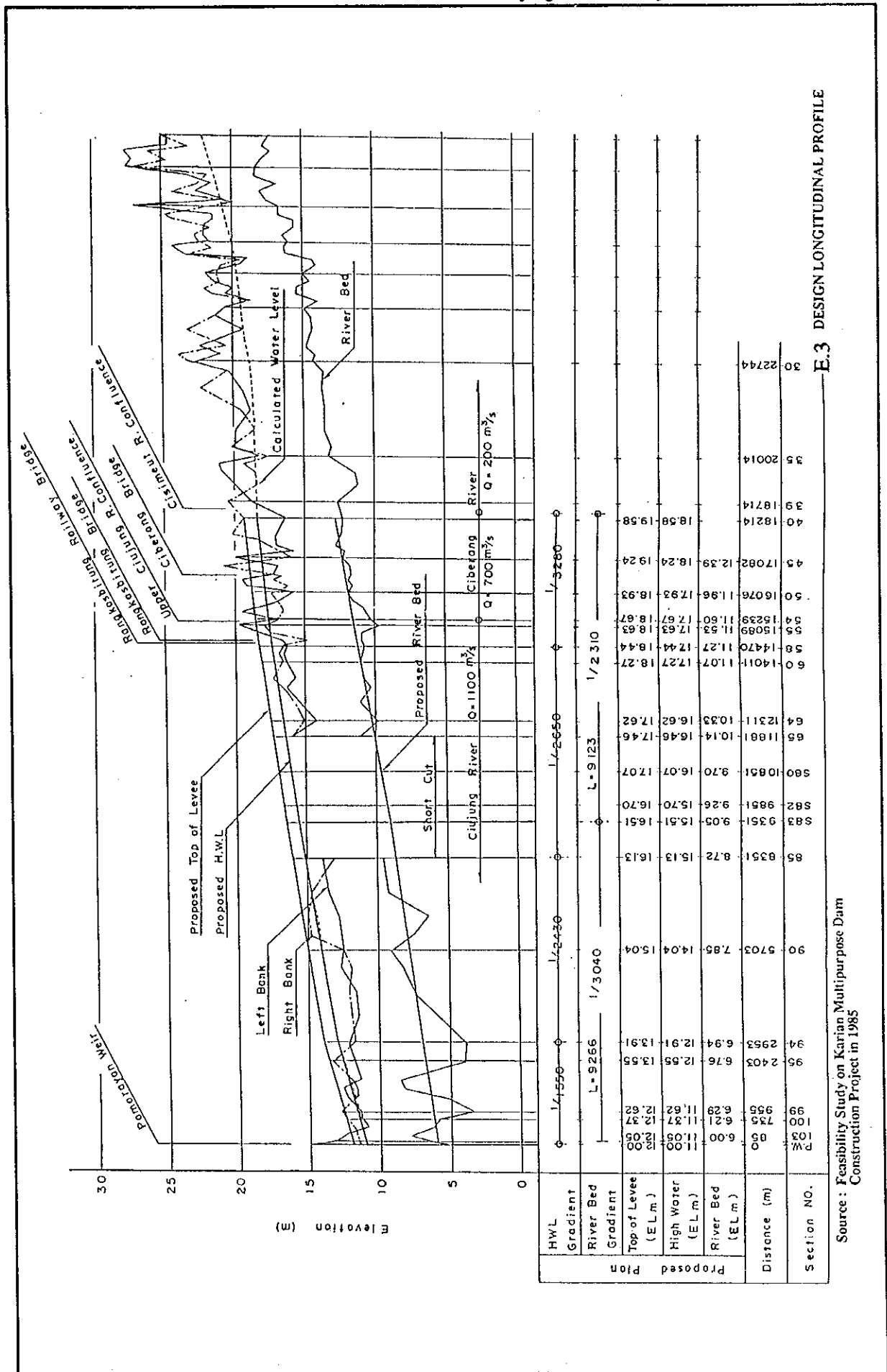
Crownwidth : not less than 4m
Free-board : not less than 1m

(2) CROSS SECTION (CASE-2)



Source : Feasibility Study on Karian Multipurpose Dam
Construction Project in 1985

E.2 TYPICAL CROSS SECTION OF RIVER IMPROVEMENT



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