

APPENDIX - 10

COST ESTIMATION FOR ENGINEERING SERVICES

1. Cost for Engineering Services

Item	Foreign Currency 10 ⁶ ¥	Local Currency 10 ⁶ Rp
1. Remuneration of Foreign Consulbant		
(1) Field Work	747	-
(2) Home Work	23	-
Sub Total	770	-
2. Direct Cost of Foreign Consultant		839
(1) Travel cost	43.7	
(2) Transportation cost	1.1	
(3) Communication cost	10.8	
(4) Computer charge	3.6	
(5) Office supply	3.6	
(6) Equipment cost	11.1	
Sub Total	73.9	839
3. Cost of Local Consultant	88	70
Total	931.9	909

2. Schedule of Engineering Service (Foreign Consultants)

Description of Engineer	Grade	1st year	2	3	4	5	6	Total M.M.
1. Project Director	I							6
2. Design Work								
(1) Team Leader	II							12
(2) Hydrologist	IV							4
(3) Sabo Engineer	III							19
(4) River "	III							19
(5) Structural "	IV							6
(6) Soil "	IV							4
(7) Concrete	IV							4
(8) Mechanical Engineer A	III							9
B	IV							12
(9) Electrical "	IV							3
(10) Procurement "	IV							5
(11) Sub Total								97
2. Construction Supervision								
(1) Team Leader	II							60
(2) Concrete Engineer	IV							15
(3) Mechanical " B	IV							12
(4) Civil Guidance	IV							66
(5) Sub Total								60
4. Home Work								213
(1) Mechanical Engineer	III							2
(2) Structural "	IV							2
(3) Computer Programming Engineer	IV							4
(4) Revers Engineer	II							2
Sub Total								10
Total								326

3. Schedule of Engineering Service (Local Consultants)

Description of Engineer	Grade	1st year	2	3	4	5	6	Total M.M.
1. Design Work								
(1) Structural Engineer								16
(2) "								16
(3) Mechanical Engineer								12
Sub Total								44
2. Construction Supervision								
(1) Civil Guidance Engineer								60
(2) "								60
(3) Mechanical Engineer								60
Sub Total								180
Total								224

4. Remuneration for Foreign Consultant

(Unit: 10³¥)

Description of Engineer	B.R.	1st year	2	3	4	5	6	Total
1. Field Work								
(1) Project Director	2,799	2,799	2,799	2,799	2,799	2,799	2,799	16,794
(2) Design Work								
Team Leader	2,727	32,724						32,724
Hydrologist	2,215	8,860						8,860
Sabo Engineer	2,358	28,296			7,074			44,802
River	2,358	28,296			7,074			44,802
Structural Engineer	2,215	13,290						13,290
Soil	2,215	8,860						8,860
Concrete Engineer	2,215	8,860						8,860
Mechanical Engineer A	2,358	14,148			7,074			21,222
Mechanical Engineer B		26,580						26,580
Electrical	2,215	6,645						6,645
Procurement Officer	2,215	6,645		886	886	886	886	11,075
(3) Supervision								
Team Leader	2,727	32,724	32,724	32,724	32,724	32,724	32,724	163,620
Concrete Engineer	2,215	6,645	26,580					33,225
Mechanical	2,215	26,580						26,580
Civil Guidance " A	2,215	13,290	26,580	26,580	26,580	26,580	26,580	146,190
Civil Guidance " B	2,215	26,580	26,580	26,580	26,580	26,580	26,580	132,900
Sub Total		199,293	116,149	110,791	89,569	89,569	89,569	747,029
2. Home Work								
Mechanical Engineer	2,358	472		613	613	613	613	4,103
Structure	2,215	3,100						4,430
Computer Programming Eng.	2,215	6,200						8,860
Rive Engineer	2,727	909		909	909	909	909	5,454
Sub Total		10,681		1,522	1,522	1,522	1,522	22,847
Total		209,974	147,736	117,671	112,313	90,091	91,091	769,876

5. Remuneration for Local Consultant

(Unit: 10³¥)

Description of Engineer	B.R.	1st year	2	3	4	5	6	Total
1. Design Work								
(1) Structural Engineer	400	4,800	1,600					6,400
(2) "	400	4,800						4,800
(3) Mechanical	400	4,800						4,800
2. Construction Supervision								
(1) Civil Guidance Engineer	400	4,800	4,800	4,800	4,800	4,800	4,800	24,000
(2) "	400	4,800	4,800	4,800	4,800	4,800	4,800	24,000
(3) Mechanical	400	4,800	4,800	4,800	4,800	4,800	4,800	24,000
Total		14,400	16,000	14,400	14,400	14,400	14,400	88,000

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6. Direct Cost (Foreign portion)

6.1 International Travel Cost (Tokyo-Jakarta-Surabaya)

(1) Air fare

	Unit Price (¥)	Trip	Amount (10 ³ ¥)
Engineer	395,000	35	13,825
Wife	395,000	10	3,950
Children	197,000	20	3,940
Sub Total			21,705

(2) Excess Baggages

	Unit Price (¥)	Trip	Amount (10 ³ ¥)
Engineer (20kg)	120,000	35	4,200
Wife (40kg)	240,000	10	2,400
Children (20kg)	120,000	20	2,400
Sub Total			9,000

(3) Mobilization

	Unit Price (¥)	Trip	Amount (10 ³ ¥)
Engineer 1st Trip	315,000	14	4,410
2nd "	181,000	21	3,801
Wives 1st "	315,000	4	1,260
2nd "	181,000	8	1,448
Children 1st "	158,000	6	948
2nd "	90,000	12	1,080
Sub Total			12,947
Total			43,652 x 10 ³ ¥

6.2. International Transportation Cost

	Unit Price (¥)	Trip	Amount (10 ³ ¥)
(1) Mobilization of Equipment and Books for the Project Use	1,600	500	800
(2) Demobilization of Equipment and Books for the Project Use	1,600	200	320
Total			1,120

6.3 International Communication Cost

150,000 ¥/month x 72 months = 10,800 x 10³¥

6.4 Computer Charge

200,000 ¥/month x 18 months = 3,600 x 10³¥

6.5 Office Supply

50,000 ¥/month x 72 months = 3,600 x 10³¥

6.6 Equipment Cost

Equipment Supply List in Engineering Services

Description	Unit	Unit Price (10 ³ ¥)	Quantity	Amount (10 ³ ¥)
1. Topographical Survey				
(1) Light Wave Distancer	NO	3,000	1	3,000
(2) Theodolite	"	650	1	650
(3) Auto-level	"	250	1	250
Sub Total				3,900
2. Wireless Telecommunication System				
(Radiophone, Antenna, Battery)	NO	1,400	3	4,200
3. Testing Apparatus				
(1) Bouyoucos Hydrometer	NO	18	5	90
(2) Triple Beam Balance	"	180	1	180
(3) Grain-size distribution Testing set	"	200	1	200
(4) Compaction Testing Apparatus	LS	50	1	50
(5) Field Density Test Apparatus	"	70	1	70
(6) Auto Recording Penetrometer	NO	550	1	550
(7) Plate Bearing Test Apparatus	LS	550	1	550
(8) Direct Shear Apparatus	"	720	1	720
(9) Field Permeability "	"	580	1	580
Sub Total				2,990
Total				11,090

7. Direct Cost (Local Portion)

7.1 Inland Travel Cost

(1) Air fare (Jakarta - Surabaya)

	Unit Price (₹)	Trip	Amount (10 ³ ₹)
Foreign Engineer	65,000	288	18,720
Local Engineer	"	10	650
Wife of Local Engineer	"	10	650
Children "	32,500	20	650
Sub Total			20,670

(2) Excess Baggages

	Unit Price (₹)	Trip	Amount (10 ³ ₹)
Foreign Engineer	8,000	288	2,304
Local "	"	10	80
Wife of Local Engineer	"	10	80
Children "	4,000	20	80
Sub Total			2,544

(3) Mobilization

500,000 Rp x 5 families = 2,500 (10³Rp)

(4) Other transportation

50,000 Rp/month x 72 = 3,600 (10³Rp)

(5) Perdiem for Foreign Engineer

120,000 Rp/day x 3 days x 288 Trips = 103,680 (10³Rp)

Total = 132,994 (10³Rp)

7.2 Entry and Exist Cost

(1) Departure/Exit Tax 150,000 Rp x 44 = 6,600 (10³Rp)

(2) Customs Clearance

100,000 Rp/month x 72 month = 7,200 (10³Rp)

Total = 13,800 (10³Rp)

7.3 Report Preparation Cost

10 Reports x 2,000,000 Rp = 20,000 (10³ Rp)

7.4 Inland Communication Cost

100,000 Rp/month x 72 months = 7,200 x 10³ Rp

7.5 Office Supply

200,000 Rp/month x 72 months = 14,400 x 10³ Rp

7.6 Office Employee Cost

	Unit Price (Rp)	M.M	Amount (10 ³ ¥)
Typist	80,000	84	6,720
Draftman	80,000	108	8,640
Driver	70,000	216	15,120
Boy	35,000	72	2,520
Total			30,000

7.7 Housing Allowance

	Unit Price (Rp)	M.M	Amount (10 ³ ¥)
Foreign Consultant	25,000	9,780	244,500
Local Consultant	16,000	6,720	107,520
Total			352,020

7.8 Car Rental Cost

1,150,000 x Rp x 3 vehicles x 72 months = 248,400 (10³ Rp)

7.9 Government Tax (2.5% of total Rupiah Portion)

818,800 x 10³Rp x 2.5% = 20,500 x 10³Rp
Total 839,300 x 10³Rp

APPENDIX - 11

Sand Pocket Maintenance

1. Work Item

- (1) Transference of the spillway with length of 100 m.
- (2) Excavation of river course with width of 20 m, depth of 1.5 m and length of 1,000 m.

2. Direct Cost by Economic Cost

(1) Transference of the spillway

Steel basket volume per meter = $61.6 \text{ m}^3/\text{m}$
Unit cost for construction = $30,700 \text{ Rp}/\text{m}^3$
Unit cost for transference = 10% (Unit cost for construction)

Direct cost for transference
= $61.6 \times 100 \times 30,700 \times 0.1 = 18.9 \times 10^6 \text{ Rp}$

(2) Excavation by Bulldozer (25 t)

Excavation volume per meter = 30 m^3
Performance = $100 \text{ m}^3/\text{hr}$
Unit cost for excavation = $\frac{37,568}{100} = 380 \text{ Rp}/\text{m}^3$
Direct for excavation

= $30 \times 1,000 \times 380 = 11.4 \times 10^6 \text{ Rp}$

3. Project Cost

Project cost = Direct cost + Indirect cost + Government administration cost
= $1.15 \times \text{Direct cost} (1 + 0.04)$
= 1.20 Direct Cost

Project cost = $30 \times 10^6 \text{ Rp} \times 1.20 = 36 \times 10^6 \text{ Rp}$

APPENDIX - 12

CALCULATION OF ECONOMIC COST

Facility	Construction		Breakdown of Economic Cost (10 ⁶ Rp)		Government Administration Cost (3)	Engineering Service Cost (4)	Contingencies For Item (1) Price Escalation		For Item (2)(3)(4)		(5) Economic Cost (10 ⁶ Rp)		Maintenance Cost (10 ⁶ Rp)					
	Type	Cost	Foreign Portion (7)	Local Portion (8)			Physical	Foreign Portion (11)	Local Portion (12)	Foreign Portion (13)	Local Portion (14)	Foreign Portion (16)		Local Portion (17)	Total (18)			
																Foreign Portion	Local Portion	Foreign Portion
Onah Robo'an	3	17 2,305	117	2,422 2,439	4.1	98	488	244	1	372	27	36	680	403	3,386	3,709	0	
"	4	2,385	3,538	326	2,983	3,864	6,853	8.2	274	3,371	303	137	2,802	4,638	5,851	10,549	0	
"	4	5	377	39	5	396	401	1.1	16	60	6	8	138	71	565	636	0	
"	4	25	2,138	107	25	2,237	2,242	5.7	90	448	36	46	776	394	3,167	3,562	0	
"	2	2	130	7	2	137	139	0.6	6	28	14	1	30	24	180	204	0	
Diversion Channel	5	966	928	95	966	1,023	1,989	211.5	80	398	125	275	38	115	752	1,816	3,444	0
"	5	8	216	7	8	343	351	2.7	6	30	15	3	62	35	217	252	0	
"	5	1,498	1,470	118	1,098	1,808	2,906	6.6	116	582	291	242	486	55	75	1,049	2,829	4,658
Carah Langkung	3	1	64	3	1	67	68	1.0	3	14	7	0	10	1	19	12	92	104
"	3	3	206	10	3	216	219	1.2	9	44	22	0	33	2	3	60	37	296
Lapak Sandpocket	3	1,235	741	99	1,235	840	2,075	111.4	83	415	208	47	501	1,778	1,406	3,184	36	
Intake & Channel	1	25	167	10	25	177	202	0	16	40	20	1	32	59	232	291	2	

CMI: Check dam
 (0) = 5% (Direct Construction Cost)
 (1) = 4% x (1)
 (2) = 20% x (1)
 Physical Contingency = 20% x (1)
 Price Escalation Foreign Portion = 5%/year
 Local Portion = 10%/year
 (10) = 5% (Direct Construction Cost)
 (11) = (10 + 0.05) n/2 - 11 (7)
 (12) = (11 + 1.10) n/2 - 11 (8)
 (13) = (12 + 1.05) n/2 - 11 (9)
 (14) = (13 + 0.95) n/2 - 11 (10) x 0.27 + (11) x 0.73
 (15) = (14 + 0.90) n/2 - 11 (11) x 0.27 + (12) x 0.73
 (16) = (15 + 0.85) n/2 - 11 (12) x 0.27 + (13) x 0.73
 (17) = (16 + 0.80) n/2 - 11 (13) x 0.27 + (14) x 0.73
 (18) = (17 + 0.75) n/2 - 11 (14) x 0.27 + (15) x 0.73
 (19) = 0.1 x (12)
 (20) = (19 + 0.05) n/2 - 11 (7)
 (21) = (20 + 1.10) n/2 - 11 (8)
 (22) = (21 + 1.05) n/2 - 11 (9)
 (23) = (22 + 1.00) n/2 - 11 (10) x 0.27 + (21) x 0.73
 (24) = (23 + 0.95) n/2 - 11 (11) x 0.27 + (22) x 0.73
 (25) = (24 + 0.90) n/2 - 11 (12) x 0.27 + (23) x 0.73
 (26) = (25 + 0.85) n/2 - 11 (13) x 0.27 + (24) x 0.73
 (27) = (26 + 0.80) n/2 - 11 (14) x 0.27 + (25) x 0.73
 (28) = (27 + 0.75) n/2 - 11 (15) x 0.27 + (26) x 0.73

APPENDIX - 13

ESTIMATION OF SEDIMENT REMOVAL EXPENSE
FOR POSSIBLE DISASTER AREA

ESTIMATION OF SEDIMENT REMOVAL EXPENSE
FOR POSSIBLE DISASTER AREA

1. Possible Disaster Area

(Unit: km²)

River System	Zone					Total
	I	II	III	IV	V	
K. Rejali	-	1.68	9.89	26.28	2.67	40.52
K. Glidik	4.99	0	0	9.23	8.35	17.58

2. Average Deposit Depth in Possible Disaster Area

	K. Rejali	K. Glidik
Zone II	0.60 m	-
Zone III	0.47 m	-
Zone IV	0.36 m	0.60 m
Zone V	0.42 m	0.42 m
Zone VI	-	-

3. Sediment Deposit Volume in Possible Disaster Area

(Unit: 10³ m³)

River system \ Zone	I	II	III	IV	V	Total
	Mean Depth					
		0.60 m	0.47 m	0.36 m	0.42 m	
				*0.60 m		
K. Rejali	-	1,008	4,648	9,461	1,121	16,238
K. Glidik	-	-	-	5,538	3,507	9,045

* Average deposit depth in K. Glidik

4. Ratio of Land Use Classification in Possible Disaster Area

(Unit: %)

Basin	Zone	Total	Housing Site	Paddy Field	Farm	Estimate	River Channel	Forests, Others
	I	100	2.7	45.1	2.9	1.8	0.5	47.0
	II	100	7.7	75.0	0	4.8	3.0	9.5
K.	III	100	5.1	65.4	0	1.3	1.8	26.4
Rejali	IV	100	10.3	78.7	3.9	0	1.3	5.8
	V	100	0	36.7	0	0	6.7	56.6
K.	IV	100	3.0	45.4	6.6	3.7	36.1	5.2
Glidik	V	100	7.1	16.5	24.6	0	48.2	3.6

5. Unit Price of Sediment Removal

The Unit price of sediment removal is settled in every land use classification and estimated as the economic cost.

5.1 Housing Site

(1) Method of sediment removal

Excavation and loading by manpower → Transportation of 1 km and spoiling by dump truck

(2) Breakdown of unit price

Excavation	Labor	0.75 M.D x 600 Rp/M.D	= 450 Rp
	Foreman	0.025 " x 3,390 "	= 85 "
Loading	Labor	0.33 " x 600 "	= 198 "
	Foreman	0.01 " x 3,390 "	= 34 "
Transportation	Dump truck (8 ton)	6,810 Rp/hr ÷ 21 m ³ /hr	= 324 "
Driver cost		<u>3,770 Rp/day</u> 21.2 x 7	= 25 "
Total			<u>1,116 "</u>

5.2 Paddy Field

(1) Method of sediment removal

Dozing and transportation
by bulldozer (16 ton)

$$\text{Volume} = \frac{1}{2} (\text{removal volume})$$

(2) Breakdown of unit price

Dozing	Bulldozer (16 ton)		
	20,960 Rp/hr ÷ 50 m ³		=419 Rp
Spreading	Bulldozer (")		
	20,690 Rp/hr ÷ 80 m ³ x $\frac{1}{10}$		= 26 Rp
Operator Cost	$\frac{3,770 \text{ Rp/day}}{65 \times 7}$ x 2		= 16 Rp
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Total			<hr/> 461Rp

5.3 Farm

(1) Method of sediment removal

Dozing and transportation

(2) Breakdown of unit price

Dozing	Bulldozer (16 ton)		
	20,690 Rp/hr ÷ 50 m ³ /hr		= 419 Rp
Operator Cost	$\frac{3,770 \text{ Rp/day}}{50 \times 7}$		= 11 "
Total			= 430 "

5.4 Estate

(1) Method of sediment removal

Excavation by manpower → Transportation (Distance < 10 m)
by manpower

(2) Breakdown of unit price

Excavation and transportation

Labor	0.75 M.D x	600 Rp/M.D	=	450 Rp
<u>Foreman</u>	<u>0.025 "</u>	<u>x 3,390 "</u>	<u>=</u>	<u>85 "</u>
Total				535 "

5.5 River Channel

(1) Method of sediment removal

Dozing and transportation by bulldozer (16 ton)
 Transportation distance 50 m

(2) Breakdown of unit price

Dozing and transportation		
20,960 Rp/hr ÷	50 m ³ /hr	= 419 Rp
Operator cost	$\frac{3,770 \text{ Rp/day}}{50 \times 7}$	= 11 Rp
<u>Total</u>		<u>= 430 Rp</u>

6. Sediment Removal Expense in K. Rejali

Land Use	Unit Price Rp/m ³	Sediment Deposit (10 ³ m ³)				Total
		II	III	IV	V	
Housing site	1,116	77.6	237.0	974.5	0	
Paddy field	461	756.0	3,039.8	7,445.8	411.4	
Farm	430	0	0	369.0	0	
Estate	535	48.4	60.4	0	0	
River channel	430	30.2	83.7	123.0	75.1	
Forests & others	0	95.8	1,227.1	548.7	634.5	
Total		1,008.0	4,648.0	9,461.0	1,121.0	16,238
Sediment Removal Expense (10 ⁶ Rp)		474	1,734	4,732	222	7,162

7. Sediment Removal Expense in K. Glidik

Land Use	Unit Price Rp/m ³	Sediment Deposit (10 ³ m ³)				Total
		II	III	IV	V	
Housing site	1,116			166.1	249.0	
Paddy field	461			2,514.3	578.7	
Farm	430			365.5	862.7	
Estate	535			204.9	0	
River channel	430			1,999.2	1,690.3	
Forests & others	0			288.0	126.3	
Total				5,538	3,507	9,045
Sediment Removal Expense (10 ⁶ Rp)				2,471	1,642	4,113

APPENDIX - 14

CALCULATION OF FINANCIAL AND ECONOMIC COSTS
OF
FIRST-PRIORITY PROJECT

1. Financial Cost of The 1st Priority Project

Item	Foreign Currency 10 ⁶ Yen	Local Currency 10 ⁶ Rp.	Total 10 ⁶ Yen
1. Construction equipment	1,825	-	1,825
2. Spare parts and consumable materials	389	-	389
3. Civil works	411	9,745	4,020
4. Land acquisition	-	370	137
5. Engineering services	932	909	1,269
6. Government administration	-	584	216
7. Contingency	549	4,881	2,357
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Total	4,106	16,489	10,213

2. Annual Financial Cost of The 1st Priority Project

(Based on the Price level of fiscal year 1982)

Item	1		2		3		4		5		6		Total	Grand Total	
	F.C. 10 ⁶ Yen	L.C. 10 ⁶ Yen	F.C. 10 ⁶ Yen	L.C. 10 ⁶ Yen	F.C. 10 ⁶ Yen	L.C. 10 ⁶ Yen	F.C. 10 ⁶ Yen	L.C. 10 ⁶ Yen	F.C. 10 ⁶ Yen	L.C. 10 ⁶ Yen	F.C. 10 ⁶ Yen	L.C. 10 ⁶ Yen			
1. Construction equipment	1,825	-	-	-	-	-	-	-	-	-	-	-	1,825	-	1,825
2. Spare parts and consumable materials	149	-	60	-	60	-	60	-	-	-	-	-	389	-	389
3. Civil works	-	280	-	1,550	150	2,270	150	1,781	111	1,908	-	1,956	411	9,745	4,020
4. Land acquisition	-	250	-	110	-	0	-	10	-	0	-	0	-	370	137
5. Engineering services	266	184	169	145	137	145	131	145	112	145	117	145	932	909	1,269
6. Government administration	-	134	-	90	-	90	-	90	-	90	-	90	-	584	216
7. Contingency	224	84	34	380	70	777	88	875	89	1,204	44	1,557	549	4,881	2,357
Total	2,464	932	263	2,275	417	3,282	429	2,901	372	3,351	161	3,748	4,106	16,489	10,213
Japanese Yen	2,464	345	263	843	417	1,216	429	1,074	372	1,241	161	1,388	4,106	6,107	
Equivalent x 10 ⁶ YEN	2,809		1,106		1,633		1,503		1,613		1,549		10,213		

Yen Evaluation US\$ = ¥240 = Rp650 (1982)

3. Calculation Sheet of Financial Cost

Item	Foreign Currency 10 ⁶ YEN	Local Currency 10 ⁶ Rp	Financial Cost 10 ⁶ Yen
1. Construction equipment	1,825		1,825
Earth work	329		
Aggrigate plant	275		
Concrete plant	149		
Concrete setting	972		
General use	100		
2. Spare parts & consumable material	389		389
Earth work	60		
Aggrigate plant	47		
Concrete plant	44		
Concrete setting	203		
General use	35		
3. Civil works	411	9,745	4,020
3.1 Curah Kobo'an check dam - 6		4,328	
3.2 Diversion channel		1,161	
3.3 K. Lengkong check dam - 3		2,043	
3.4 " " - 7		183	
3.5 K. Leprak sand pocket	411	1,040	
3.6 Intake and channel		256	
3.7 Preparation works		734	
4. Land acquisition	0	370	137
5. Government administration	0	584	216
Sub total	2,625	10,699	
6. Contingency of Item 1 - 5	Total Price escalation	356 4,542 1,171 192 1,166 112 412 156 94 169 1,070	2,038
	3.1		
	3.2		
	3.3		
	3.4		
	3.5	63	
	3.6		
	3.7		
	Physical 1,2,4,5	31	
		262	
7. Engineering service	932	909	1,269
8. Contingency of Item 7	Total Price escalation Physical	193 99 94	319
Financial cost (Total of Item 1 to 8)	4,106	16,489	10,213
Japanese Yen evaluation (x 10 ⁶ YEN)	4,106	6,107	
9. Construction equipment hire cost	Total 3.1 3.2 3.3 3.4 3.5 3.6		
10. Contingency of Item 9	Total Price escalation Physical		
Economic cost (Total of Item 3 to 10)			
Japanese Yen evaluation (x 10 ⁶ YEN)			

4. Calculation Sheet of Annual Financial Cost (Foreign Portion)

Item	Year	Total	1	2	3	4	5	6
		10 ⁶ Yen	10 ⁶ Yen	10 ⁶ Yen	10 ⁶ Yen	10 ⁶ Yen	10 ⁶ Yen	10 ⁶ Yen
1. Construction equipment		1,825	1,825					
Earth work		329	329					
Aggregate plant		275	275					
Concrete plant		149	149					
Concrete setting		972	972					
General use		100	100					
2. Spare parts & consumable material		389	149	60	60	60	60	
Earth work		60	24	9	9	9	9	
Aggregate plant		47	19	7	7	7	7	
Concrete plant		44	16	7	7	7	7	
Concrete setting		203	75	32	32	32	32	
General use		35	15	5	5	5	5	
3. Civil works		411			150	150	111	
3.1 Curah Kobo'an check dam - 6								
3.2 Diversion channel								
3.3 K. Lengkong check dam - 3								
3.4 " " - 7								
3.5 K. Leprak sand pocket		411			150	150	111	
3.6 Intake and Channel								
3.7 Cultivating								
3.8 Preparation works								
4. Land acquisition								
5. Government administration								
Sub total		2,625	1,974	60	210	210	171	
6. Contingency of Item 1 - 5	Total	356	197	9	42	54	54	
	Price escalation							
	3.1							
	3.2							
	3.3							
	3.4							
	3.5	63			15	24	24	
	3.6							
	3.7							
	3.8							
	1&2	31	0	3	6	9	13	
	Physical	262	197	6	21	21	17	
7. Engineering service		932	266	169	137	131	112	117
8. Contingency of Item 7	Total	193	27	25	28	34	35	44
	Price escalation	99	0	8	14	21	24	32
	Physical	94	27	17	14	13	11	12
Financial cost (Total of Item 1 to 8)		4,106	2,464	263	417	429	372	161
Japanese Yen evaluation (x 10 ⁶ YEN)								
9. Construction equipment hire cost	Total							
	3.1							
	3.2							
	3.3							
	3.4							
	3.5							
	3.6							
10. Contingency of Item 9	Total							
	Price escalation							
	Physical							
Economic cost (Total of Item 3 to 10)								
Japanese Yen evaluation (x 10 ⁶ YEN)								

5. Calculation Sheet of Annual Financial Cost (Local Portion)

Item	Year							
	Total 10 ⁶ Rp	1 10 ⁶ Rp	2 10 ⁶ Rp	3 10 ⁶ Rp	4 10 ⁶ Rp	5 10 ⁶ Rp	6 10 ⁶ Rp	
1. Construction equipment								
Earth work								
Aggregate plant								
Concrete plant								
Concrete setting								
General use								
2. Spare parts & consumable material								
Earth work								
Aggregate plant								
Concrete plant								
Concrete setting								
General use								
3. Civil works	9,745	280	1,550	2,270	1,781	1,908	1,956	
3.1 Curah Kobo'an check dam - 6	4,328		740	1,470	1,470	648		
3.2 Diversion channel	1,161		530	580	51			
3.3 K. Lengkong check dam - 3	2,043	-	-	-	-	550	1,493	
3.4 " " - 7	183						183	
3.5 K. Leprak sand pocket	1,040			170	210	660		
3.6 Intake and Channel	256						256	
3.7 Preparation works	734	280	280	50	50	50	24	
4. Land acquisition	370	250	110	0	10	0	0	
5. Government administration	584	134	90	90	90	90	90	
Sub total	10,699	664	1,750	2,360	1,881	1,998	2,046	
6. Contingency of Item 1 - 5	Total 4,542	66	350	733	812	1,127	1,454	
Price escalation 3.1	1,171		74	309	487	301		
3.2	192		53	122	17	-		
3.3	1,166					255	911	
3.4	112						112	
3.5	412			36	70	306		
3.6	156						156	
3.7	94	0	28	11	17	23	15	
4,5	169	0	20	19	33	42	55	
Physical	1,070	66	175	236	188	200	205	
7. Engineering service	909	184	145	145	145	145	145	
8. Contingency of Item 7	Total 339	18	30	44	63	81	103	
Price escalation	248	0	15	30	48	67	88	
Physical	91	18	15	14	15	14	15	
Financial cost (Total of Item 1 to 8)	16,489	932	2,275	3,282	2,901	3,351	3,748	
Japanese Yen evaluation (x 10 ⁶ YEN)	6,107	345	843	1,216	1,074	1,241	1,388	
9. Construction equipment hire cost	Total							
3.1								
3.2								
3.3								
3.4								
3.5								
3.6								
10. Contingency of Item 9	Total							
Price escalation								
Physical								
Economic cost (Total of Item 3 to 10)								
Japanese Yen evaluation (x 10 ⁶ YEN)								

6. Financial Cost of the 1st Priority Project Excluding Contingency

Breakdown of Financial Cost Excluding Contingency (10 ⁶ Rp)														
Facility	Construc- tion Term	(1) Direct Construction Cost			Indirect Cost (= Local Portion)		Total Construction Cost			Land Acquisition Cost	Government Administra- tion Cost		Engineering Service Cost	
		Foreign Portion (2)	Local Portion (3)	Purchase of Cost of Equipment (12)	Prepara- tion (4)	Interests, Tax, etc. (5)	Foreign Portion (6)	Local Portion (7)	Total (8)		Foreign Portion (9)	Local Portion (10)	Foreign Portion (11)	Local Portion (11)
Curah Kobo'an CHD-6	4	-	3,639	3,252	345	689	3,252	4,673	7,925	8.2	275	1,185	428	
Diversion Channel	5	-	960	1,049	100	201	1,049	1,261	2,310	241.5	80	345	125	
K. Lengkong CHD-9	5	-	154	138	15	29	138	198	336	2.7	12	50	18	
K. Lengkong CHD-3	5	-	1,718	1,535	163	325	1,535	2,206	3,741	6.6	130	559	202	
Leprak Sandpocket	3	1,109	845	0	99	195	1,109	1,139	2,248	111.4	78	336	121	
Intake and Channel	1	-	233	0	12	23	0	268	268	0	9	40	14	
Total		1,109	7,549	5,974	734	1,462	7,083	9,745	16,838	370.4	584	2,516	909	

(4) = [(12) + (2) + (3)] 5%

(5) = [(12) + (2) + (3)] 10%

(6) = (2) + (12)

(7) = (3) + (4) + (5)

(8) = (6) + (7)

(9) = [(12) + (2) + (3)] 4%

7. Economic Cost of The 1st Priority Project

Item	Foreign Currency 10 ⁶ Yen	Local Currency 10 ⁶ Rp	Total 10 ⁶ Yen
1. Construction equipment hire cost	1,930	-	1,930
2. Civil works	411	7,855	3,320
3. Land acquisition	-	370	137
4. Engineering services	767	765	1,050
5. Government administration	-	575	213
6. Contingency	753	3,959	2,219

Total	3,861	13,524	8,869

8. Annual Economic Cost of The 1st Priority Project

(Based on the Price level of fiscal year 1982)

Item	1		2		3		4		5		6		Total		Grand Total
	F.C. 10 ⁶ Yen	L.C. 10 ⁶ Rp	F.C. 10 ⁶ Yen	L.C. 10 ⁶ Rp	F.C. 10 ⁶ Yen	L.C. 10 ⁶ Rp	F.C. 10 ⁶ Yen	L.C. 10 ⁶ Rp	F.C. 10 ⁶ Yen	L.C. 10 ⁶ Rp	F.C. 10 ⁶ Yen	L.C. 10 ⁶ Rp	F.C. 10 ⁶ Yen	L.C. 10 ⁶ Rp	
1. Construction equipment hire cost	0	-	300	-	599	-	403	-	290	-	338	-	1,930	-	1,930
2. Civil works	-	260	-	1,290	148	1,825	148	1,433	115	1,504	-	1,543	411	7,855	3,320
3. Land acquisition	-	250	-	110	-	0	-	10	-	0	-	0	-	370	137
4. Engineering services	219	165	137	120	111	120	107	120	93	120	100	120	767	765	1,050
5. Government administration	-	125	-	90	-	90	-	90	-	90	-	90	-	575	213
6. Contingency	22	81	66	322	174	631	170	713	156	968	165	1,244	753	3,959	2,219
Total	241	881	503	1,932	1,032	2,666	828	2,366	654	2,682	603	2,997	3,861	13,524	8,869
Japanese Yen	241	326	503	716	1,032	987	828	876	654	993	603	1,110	3,861	5,008	
Equivalent x 10 ⁶ YEN	567		1,219		2,019		1,704		1,647		1,713		8,869		

Yen Evaluation IUS\$ = ¥240 = Rp650 (1982)

9. Calculation Sheet of Economic Cost

Item		Foreign Currency 10 ⁶ YEN	Local Currency 10 ⁶ Rp 10 ⁶ Yen	Economic Cost
1. Construction equipment				
Earth work				
Aggrigate plant				
Concrete plant				
Concrete setting				
General use				
2. Spare parts & consumable material				
Earth work				
Aggrigate plant				
Concrete plant				
Concrete setting				
General use				
3. Civil works		1,109	7,885	3,320
3.1 Curah Kobo'an check dam - 6			3,538	
3.2 Diversion channel			928	
3.3 K. Lengkong check dam - 3			1,670	
3.4 " - 7			136	
3.5 K. Leprak sand pocket		1,109	741	
3.6 Intake and channel			167	
3.7 Preparation works			675	
4. Land acquisition		0	370	137
5. Government administration		0	575	213
Sub total		1,109	8,800	
6. Contingency of Item 1 - 5	Total	282	3,676	1,466
	Price escalation		959	
	3.1		153	
	3.2		953	
	3.3		83	
	3.4		294	
	3.5	171	102	
	3.6		83	
	3.7		169	
	4,5		880	
	Physical	111		
7. Engineering service		2,070	765	1,050
8. Contingency of Item 7	Total	432	283	265
	Price escalation	225	206	
	Physical	207	77	
Financial cost (Total of Item 1 to 8)				
Japanese Yen evaluation (x 10 ⁶ YEN)				
9. Construction equipment hire cost	Total	5,212		1,930
	3.1	2,989		
	3.2	966		
	3.3	1,098		
	3.4	8		
	3.5	126		
	3.6	25		
10. Contingency of Item 9	Total	1,321		489
	Price escalation	800		
	Physical	521		
Economic cost (Total of Item 3 to 10)				
		10,426	13,524	8,869
Japanese Yen evaluation (x 10 ⁶ YEN)				
		3,861	5,009	
Yen Evaluation 1US\$ = ¥240 = Rp650 (1982)				

10. Calculation Sheet of Annual Economic Cost (Foreign Portion)

Item		Year						
		Total 10 ⁶ Yen	1 10 ⁶ Yen	2 10 ⁶ Yen	3 10 ⁶ Yen	4 10 ⁶ Yen	5 10 ⁶ Yen	6 10 ⁶ Yen
1. Construction equipment								
	Earth work							
	Aggregate plant							
	Concrete plant							
	Concrete setting							
	General use							
2. Spare parts & consumable material								
	Earth work							
	Aggregate plant							
	Concrete plant							
	Concrete setting							
	General use							
3. Civil works		1,109			400	400	309	
	3.1 Curah Kobo'an check dam - 6							
	3.2 Diversion channel							
	3.3 K. Lengkong check dam - 3							
	3.4 " - 7							
	3.5 K. Leprak sand pocket	1,109			400	400	309	
	3.6 Intake and Channel							
	3.7 Preparation works							
4. Land acquisition								
5. Government administration								
	Sub total	1,109			400	400	309	
6. Contingency of Item 1 - 5	Total	282			81	103	98	
	Price escalation 3.1							
	3.2							
	3.3							
	3.4							
	3.5	171			41	63	67	
	3.6							
	3.7							
	3.8							
	4,5							
	Physical	111			40	40	31	
7. Engineering service		2,070	590	370	300	290	250	270
8. Contingency of Item 7	Total	432	59	56	61	75	79	102
	Price escalation	225	0	19	31	46	54	75
	Physical	207	59	37	30	29	25	27
Financial cost (Total of Item 1 to 8)								
Japanese Yen evaluation (x 10 ⁶ YEN)								
9. Construction equipment hire cost	Total	5,212	0	810	1,616	1,090	783	913
	3.1	2,989		360	1,050	1,050	529	
	3.2	966		450	516			
	3.3	1,098					218	880
	3.4	8						8
	3.5	126			50	40	36	
	3.6	25						25
10. Contingency of Item 9	Total	1,321	0	122	328	281	247	343
	Price escalation	800		41	166	172	169	252
	Physical	521		81	162	109	78	91
Economic cost (Total of Item 3 to 10)		10,426	649	1,358	2,786	2,237	1,766	1,628
Japanese Yen evaluation (x 10 ⁶ YEN)		3,861	240	503	1,032	829	654	603

11. Calculation Sheet of Annual Economic Cost (Local Portion)

Item	Year						
	Total 10 ⁶ Rp	1 10 ⁶ Rp	2 10 ⁶ Rp	3 10 ⁶ Rp	4 10 ⁶ Rp	5 10 ⁶ Rp	6 10 ⁶ Rp
1. Construction equipment							
Earth work							
Aggregate plant							
Concrete plant							
Concrete setting							
General use							
2. Spare parts & consumable material							
Earth work							
Aggregate plant							
Concrete plant							
Concrete setting							
General use							
3. Civil works	7,855	260	1,290	1,825	1,435	1,504	1,543
3.1 Curah Kobo'an check dam - 6	3,538		600	1,200	1,200	538	
3.2 Diversion channel	928		430	460	38		
3.3 K. Lengkong check dam - 3	1,670					450	1,220
3.4 " " - 7	136						136
3.5 K. Leprak sand pocket	741			120	150	471	
3.6 Intake and Channel	167						167
3.7 Preparation works	675	260	260	45	45	45	20
4. Land acquisition	370	250	110	0	10	0	0
5. Government administration	575	125	90	90	90	90	90
Sub total	8,800	635	1,490	1,915	1,533	1,594	1,633
6. Contingency of Item 1 - 5	Total 3,676	64	298	594	661	900	1,159
Price escalation 3.1	959		60	252	397	250	
3.2	153		43	97	13		
3.3	953					209	744
3.4	83						83
3.5	294			25	50	219	
3.6	102						102
3.7	83	0	26	9	15	21	12
4,5	169	0	20	19	33	42	53
Physical	880	64	149	192	153	159	163
7. Engineering service	765	165	120	120	120	120	120
8. Contingency of Item 7	Total 283	17	24	37	52	68	85
Price escalation	206	0	12	25	40	56	73
Physical	77	17	12	12	12	12	12
Financial cost (Total of Item 1 to 8)							
Japanese Yen evaluation (x 10 ⁶ YEN)							
9. Construction equipment hire cost	Total 3.1						
	3.2						
	3.3						
	3.4						
	3.5						
	3.6						
10. Contingency of Item 9	Total Price escalation						
	Physical						

APPENDIX - 15

Financial Cost of the 1st Priority Project Excluding Contingency

Facility	Construction Term	Breakdown of Financial Cost Excluding Contingency (10 ⁶ Rp)											
		(1) Direct Construction Cost		Indirect Cost (= Local Portion)		Total Construction Cost		Land Acquisition Cost	Government Administration Cost	Engineering Service Cost			
		Foreign Portion of Civil Work (2)	Local Portion of Civil Work (3)	Local Portion of Preparation Work (4)	Preparation, Interest, Tax, etc. (5)	Foreign Portion (6)	Local Portion (7)			Total (8)	Foreign Portion (9)	Local Portion (10)	Total (11)
Curah Kobo'an CHD-6	4	-	3,639	3,252	345	689	3,252	4,673	7,925	8.2	275	1,185	428
Diversion Channel	5	-	960	1,049	100	201	1,049	1,261	2,310	241.5	80	345	125
K. Lengkong CHD-9	5	-	154	138	15	29	138	198	336	2.7	12	50	18
K. " CHD-5	5	-	1,718	1,535	163	325	1,535	2,206	3,741	6.6	130	559	202
Leprak Sandpocket	3	1,109	845	0	99	195	1,109	1,139	2,248	111.4	78	336	121
Intake and Channel	1	-	233	0	12	23	0	268	268	0	9	40	14
Total		1,109	7,549	5,974	734	1,462	7,083	9,745	16,838	370.4	584	2,516	909

(4) = [(12) + (2) + (3)] 5%

(5) = [(12) + (2) + (3)] 10%

(6) = (2) + (12)

(7) = (3) + (4) + (5)

(8) = (6) + (7)

(9) = [(12) + (2) + (3)] 4%

APPENDIX - 16

CALCULATION SHEETS
OF
INTERNAL RATE OF RETURN

***** ALT 1 *****

YEAR	COST			BENEFIT				
	TOTAL	CONSTRUCTION	MAINTENANCE	TOTAL	DIRECT	INDIRECT	IRRIG.	SALVAGE V.
1987	4311.0	4311.0	.0	.0	.0	.0	.0	.0
1988	4311.0	4311.0	.0	.0	.0	.0	.0	.0
1989	4311.0	4311.0	.0	.0	.0	.0	.0	.0
1990	4312.0	4312.0	.0	.0	.0	.0	.0	.0
1991	1965.0	1965.0	.0	257.3	256.8	.6	.0	.0
1992	2.0	.0	2.0	1701.9	1105.5	2.4	594.0	.0
1993	2.0	.0	2.0	1708.1	1094.6	2.5	611.0	.0
1994	2.0	.0	2.0	1733.2	1101.7	2.5	629.0	.0
1995	2.0	.0	2.0	1757.4	1108.9	2.5	646.0	.0
1996	2.0	.0	2.0	1783.7	1116.2	2.6	665.0	.0
1997	2.0	.0	2.0	1809.2	1123.6	2.6	683.0	.0
1998	2.0	.0	2.0	1834.8	1131.2	2.6	701.0	.0
1999	2.0	.0	2.0	1855.5	1138.9	2.7	714.0	.0
2000	2.0	.0	2.0	1863.4	1146.7	2.7	714.0	.0
2001	2.0	.0	2.0	1871.3	1154.6	2.7	714.0	.0
2002	2.0	.0	2.0	1879.5	1162.7	2.7	714.0	.0
2003	2.0	.0	2.0	1887.7	1171.0	2.8	714.0	.0
2004	2.0	.0	2.0	1896.1	1179.3	2.8	714.0	.0
2005	2.0	.0	2.0	1904.7	1187.8	2.8	714.0	.0
2006	2.0	.0	2.0	1913.4	1196.5	2.9	714.0	.0
2007	2.0	.0	2.0	1922.2	1205.3	2.9	714.0	.0
2008	2.0	.0	2.0	1931.2	1214.3	2.9	714.0	.0
2009	2.0	.0	2.0	1940.4	1223.4	3.0	714.0	.0
2010	2.0	.0	2.0	1949.7	1232.7	3.0	714.0	.0
2011	2.0	.0	2.0	1959.2	1242.2	3.1	714.0	.0
2012	2.0	.0	2.0	1968.9	1251.8	3.1	714.0	.0
2013	2.0	.0	2.0	1978.8	1261.6	3.1	714.0	.0
2014	2.0	.0	2.0	1988.8	1271.6	3.2	714.0	.0
2015	2.0	.0	2.0	1999.0	1281.8	3.2	714.0	.0
2016	2.0	.0	2.0	2009.4	1292.2	3.2	714.0	.0
2017	2.0	.0	2.0	2020.0	1302.7	3.3	714.0	.0
2018	2.0	.0	2.0	2030.8	1313.5	3.3	714.0	.0
2019	2.0	.0	2.0	2041.8	1324.4	3.3	714.0	.0
2020	2.0	.0	2.0	2053.0	1335.6	3.4	714.0	.0
2021	2.0	.0	2.0	2064.4	1347.0	3.4	714.0	.0
2022	2.0	.0	2.0	2076.0	1358.6	3.5	714.0	.0
2023	2.0	.0	2.0	2087.9	1370.4	3.5	714.0	.0
2024	2.0	.0	2.0	2100.0	1382.4	3.5	714.0	.0
2025	2.0	.0	2.0	2112.3	1394.7	3.6	714.0	.0
2026	2.0	.0	2.0	12799.0	1407.2	3.6	714.0	10674.1

***** ALT 1 *****

DISCOUNT RATE	ACCUM. DISCOUNTED COST	ACCUM. DISCOUNTED BENEFIT	B/C RATIO	NPV
0	19280.	78690.	4.0814	59410.
1	18748.	61264.	3.2678	42516.
2	18241.	48386.	2.6526	30145.
3	17757.	38751.	2.1822	20993.
4	17295.	31452.	1.8185	14157.
5	16859.	25854.	1.5341	9001.
6	16429.	21506.	1.3090	5077.
7	16023.	18088.	1.1289	2066.
8	15633.	15370.	.9832	-263.
9	15258.	13182.	.8639	-2076.
10	14898.	11402.	.7654	-3496.
11	14552.	9939.	.6830	-4612.
12	14219.	8725.	.6136	-5494.
13	13898.	7707.	.5546	-6191.
14	13590.	6847.	.5039	-6742.
15	13292.	6115.	.4600	-7177.
16	13005.	5486.	.4219	-7519.
17	12728.	4943.	.3884	-7785.
18	12461.	4471.	.3588	-7990.
19	12203.	4058.	.3326	-8145.
20	11954.	3696.	.3091	-8259.
21	11714.	3375.	.2881	-8338.
22	11481.	3091.	.2692	-8390.
23	11256.	2838.	.2521	-8418.
24	11038.	2611.	.2365	-8427.
25	10828.	2408.	.2224	-8420.
26	10624.	2225.	.2094	-8399.
27	10426.	2060.	.1976	-8367.
28	10235.	1910.	.1866	-8325.
29	10050.	1774.	.1766	-8275.
30	9870.	1651.	.1673	-8219.

INTERNAL RATE OF RETURN 7.89 PER CENT

***** ALT 2 *****

YEAR	COST			BENEFIT				
	TOTAL	CONSTRUCTION	MAINTENANCE	TOTAL	DIRECT	INDIRECT	IRRIG.	SALVAGE V.
1987	4835.0	4835.0	.0	.0	.0	.0	.0	.0
1988	5918.0	5918.0	.0	.0	.0	.0	.0	.0
1989	5498.0	5498.0	.0	53.0	52.8	.1	.0	.0
1990	5499.0	5499.0	.0	148.0	147.7	.3	.0	.0
1991	1965.0	1965.0	.0	855.4	853.5	1.9	.0	.0
1992	2.0	.0	2.0	2035.7	1438.5	3.2	594.0	.0
1993	2.0	.0	2.0	2039.1	1424.8	3.2	611.0	.0
1994	2.0	.0	2.0	2066.4	1434.2	3.3	629.0	.0
1995	2.0	.0	2.0	2093.0	1443.7	3.3	646.0	.0
1996	2.0	.0	2.0	2121.7	1453.3	3.3	665.0	.0
1997	2.0	.0	2.0	2149.5	1463.2	3.4	683.0	.0
1998	2.0	.0	2.0	2177.6	1473.1	3.4	701.0	.0
1999	2.0	.0	2.0	2200.7	1483.3	3.5	714.0	.0
2000	2.0	.0	2.0	2211.1	1493.6	3.5	714.0	.0
2001	2.0	.0	2.0	2221.6	1504.1	3.5	714.0	.0
2002	2.0	.0	2.0	2232.3	1514.8	3.6	714.0	.0
2003	2.0	.0	2.0	2243.2	1525.6	3.6	714.0	.0
2004	2.0	.0	2.0	2254.3	1536.6	3.7	714.0	.0
2005	2.0	.0	2.0	2265.6	1547.9	3.7	714.0	.0
2006	2.0	.0	2.0	2277.0	1559.3	3.8	714.0	.0
2007	2.0	.0	2.0	2288.7	1570.9	3.8	714.0	.0
2008	2.0	.0	2.0	2300.6	1582.7	3.8	714.0	.0
2009	2.0	.0	2.0	2312.6	1594.7	3.9	714.0	.0
2010	2.0	.0	2.0	2324.9	1607.0	3.9	714.0	.0
2011	2.0	.0	2.0	2337.4	1619.4	4.0	714.0	.0
2012	2.0	.0	2.0	2350.2	1632.1	4.0	714.0	.0
2013	2.0	.0	2.0	2363.1	1645.0	4.1	714.0	.0
2014	2.0	.0	2.0	2376.3	1658.2	4.1	714.0	.0
2015	2.0	.0	2.0	2389.7	1671.6	4.2	714.0	.0
2016	2.0	.0	2.0	2403.4	1685.2	4.2	714.0	.0
2017	2.0	.0	2.0	2417.3	1699.1	4.3	714.0	.0
2018	2.0	.0	2.0	2431.5	1713.2	4.3	714.0	.0
2019	2.0	.0	2.0	2446.0	1727.6	4.4	714.0	.0
2020	2.0	.0	2.0	2460.7	1742.3	4.4	714.0	.0
2021	2.0	.0	2.0	2475.7	1757.2	4.5	714.0	.0
2022	2.0	.0	2.0	2491.0	1772.5	4.5	714.0	.0
2023	2.0	.0	2.0	2506.6	1788.0	4.6	714.0	.0
2024	2.0	.0	2.0	2522.4	1803.8	4.6	714.0	.0
2025	2.0	.0	2.0	2538.6	1819.9	4.7	714.0	.0
2026	2.0	.0	2.0	15700.6	1836.4	4.7	714.0	13145.4

***** ALT 2 *****

DISCOUT RATE	ACCUM. DISCOUNTED COST	ACCUM. DISCOUNTED BENEFIT	B/C RATIO	NPV
0	23785.	95083.	3.9976	71298.
1	23135.	74095.	3.2027	50960.
2	22515.	58590.	2.6023	36076.
3	21922.	46994.	2.1437	25072.
4	21355.	39211.	1.7894	16857.
5	20811.	31475.	1.5124	10664.
6	20290.	26243.	1.2934	5953.
7	19790.	22130.	1.1182	2339.
8	19310.	18856.	.9765	-454.
9	18849.	16220.	.8605	-2629.
10	18405.	14074.	.7647	-4331.
11	17978.	12308.	.6846	-5671.
12	17567.	10840.	.6170	-6727.
13	17171.	9608.	.5596	-7563.
14	16790.	8566.	.5102	-8224.
15	16422.	7677.	.4675	-8745.
16	16067.	6912.	.4302	-9155.
17	15725.	6251.	.3975	-9474.
18	15394.	5674.	.3686	-9720.
19	15075.	5170.	.3429	-9905.
20	14766.	4725.	.3200	-10041.
21	14468.	4331.	.2994	-10137.
22	14180.	3981.	.2808	-10198.
23	13901.	3669.	.2639	-10232.
24	13631.	3388.	.2486	-10242.
25	13369.	3137.	.2346	-10233.
26	13116.	2909.	.2218	-10207.
27	12871.	2703.	.2100	-10168.
28	12634.	2516.	.1992	-10117.
29	12403.	2346.	.1892	-10057.
30	12180.	2191.	.1799	-9989.

INTERNAL RATE OF RETURN 7.84 PER CENT

***** ALT 3 *****

YEAR	COST			BENEFIT				
	TOTAL	CONSTRUCTION	MAINTENANCE	TOTAL	DIRECT	INDIRECT	IRRIG.	SALVAGE V.
1987	5372.0	5372.0	.0	.0	.0	.0	.0	.0
1988	5372.0	5372.0	.0	.0	.0	.0	.0	.0
1989	5372.0	5372.0	.0	.0	.0	.0	.0	.0
1990	4348.0	4312.0	36.0	794.8	793.0	1.8	.0	.0
1991	2001.0	1965.0	36.0	1001.0	998.8	2.2	.0	.0
1992	38.0	.0	38.0	2042.8	1445.6	3.2	594.0	.0
1993	38.0	.0	38.0	2046.1	1431.8	3.2	611.0	.0
1994	38.0	.0	38.0	2073.5	1441.2	3.3	629.0	.0
1995	38.0	.0	38.0	2100.1	1450.8	3.3	646.0	.0
1996	38.0	.0	38.0	2128.9	1460.5	3.4	665.0	.0
1997	38.0	.0	38.0	2156.8	1470.4	3.4	683.0	.0
1998	38.0	.0	38.0	2184.8	1480.4	3.4	701.0	.0
1999	38.0	.0	38.0	2208.1	1490.6	3.5	714.0	.0
2000	38.0	.0	38.0	2218.5	1501.0	3.5	714.0	.0
2001	38.0	.0	38.0	2229.1	1511.5	3.6	714.0	.0
2002	38.0	.0	38.0	2239.8	1522.2	3.6	714.0	.0
2003	38.0	.0	38.0	2250.8	1533.1	3.6	714.0	.0
2004	38.0	.0	38.0	2261.9	1544.2	3.7	714.0	.0
2005	38.0	.0	38.0	2273.2	1555.5	3.7	714.0	.0
2006	38.0	.0	38.0	2284.7	1567.0	3.8	714.0	.0
2007	38.0	.0	38.0	2296.5	1578.6	3.8	714.0	.0
2008	38.0	.0	38.0	2308.4	1590.5	3.9	714.0	.0
2009	38.0	.0	38.0	2320.5	1602.6	3.9	714.0	.0
2010	38.0	.0	38.0	2332.9	1614.9	4.0	714.0	.0
2011	38.0	.0	38.0	2345.4	1627.4	4.0	714.0	.0
2012	38.0	.0	38.0	2358.2	1640.2	4.0	714.0	.0
2013	38.0	.0	38.0	2371.3	1653.2	4.1	714.0	.0
2014	38.0	.0	38.0	2384.5	1666.4	4.1	714.0	.0
2015	38.0	.0	38.0	2398.0	1679.8	4.2	714.0	.0
2016	38.0	.0	38.0	2411.8	1693.5	4.2	714.0	.0
2017	38.0	.0	38.0	2425.8	1707.5	4.3	714.0	.0
2018	38.0	.0	38.0	2440.0	1721.7	4.3	714.0	.0
2019	38.0	.0	38.0	2454.6	1736.2	4.4	714.0	.0
2020	38.0	.0	38.0	2469.4	1750.9	4.4	714.0	.0
2021	38.0	.0	38.0	2484.4	1765.9	4.5	714.0	.0
2022	38.0	.0	38.0	2499.8	1781.3	4.5	714.0	.0
2023	38.0	.0	38.0	2515.4	1796.9	4.6	714.0	.0
2024	38.0	.0	38.0	2531.4	1812.8	4.7	714.0	.0
2025	38.0	.0	38.0	2547.7	1829.0	4.7	714.0	.0
2026	38.0	.0	38.0	14065.9	1845.5	4.8	714.0	11501.7

***** ALT 3 *****

DISCOUNT RATE	ACCUM. DISCOUNTED COST	ACCUM. DISCOUNTED BENEFIT	B/C RATIO	NPV
0	23795.	94457.	3.9696	70662.
1	22944.	73920.	3.2217	50975.
2	22182.	58703.	2.6464	36521.
3	21489.	47286.	2.2005	25797.
4	20852.	38613.	1.8517	17761.
5	20262.	31940.	1.5764	11678.
6	19710.	26743.	1.3568	7032.
7	19192.	22644.	1.1798	3451.
8	18703.	19372.	1.0358	669.
9	18240.	16731.	.9173	-1509.
10	17799.	14574.	.8188	-3225.
11	17379.	12795.	.7362	-4584.
12	16978.	11312.	.6663	-5665.
13	16593.	10065.	.6066	-6528.
14	16225.	9007.	.5551	-7218.
15	15871.	8102.	.5105	-7769.
16	15531.	7322.	.4714	-8209.
17	15204.	6646.	.4371	-8559.
18	14889.	6055.	.4067	-8835.
19	14586.	5536.	.3795	-9050.
20	14293.	5078.	.3553	-9215.
21	14011.	4672.	.3334	-9339.
22	13738.	4309.	.3137	-9428.
23	13474.	3985.	.2958	-9489.
24	13219.	3694.	.2794	-9525.
25	12973.	3431.	.2645	-9541.
26	12734.	3194.	.2508	-9540.
27	12503.	2978.	.2382	-9525.
28	12279.	2782.	.2266	-9497.
29	12062.	2603.	.2158	-9459.
30	11852.	2439.	.2058	-9412.

INTERNAL RATE OF RETURN 8.31 PER CENT

***** ALT 4 *****

YEAR	COST			BENEFIT				
	TOTAL	CONSTRUCTION	MAINTENANCE	TOTAL	DIRECT	INDIRECT	IRRIG.	SALVAGE V.
1987	5896.0	5896.0	.0	.0	.0	.0	.0	.0
1988	7146.0	7146.0	.0	.0	.0	.0	.0	.0
1989	6726.0	6726.0	.0	53.0	52.8	.1	.0	.0
1990	5535.0	5499.0	36.0	969.9	966.8	2.1	.0	.0
1991	2001.0	1965.0	36.0	1125.4	1122.9	2.5	.0	.0
1992	38.0	.0	38.0	2049.3	1452.1	3.2	594.0	.0
1993	38.0	.0	38.0	2052.6	1438.3	3.3	611.0	.0
1994	38.0	.0	38.0	2080.0	1447.7	3.3	629.0	.0
1995	38.0	.0	38.0	2106.7	1457.3	3.3	646.0	.0
1996	38.0	.0	38.0	2135.5	1467.1	3.4	665.0	.0
1997	38.0	.0	38.0	2163.4	1477.0	3.4	683.0	.0
1998	38.0	.0	38.0	2191.5	1487.1	3.5	701.0	.0
1999	38.0	.0	38.0	2214.8	1497.3	3.5	714.0	.0
2000	38.0	.0	38.0	2225.3	1507.7	3.5	714.0	.0
2001	38.0	.0	38.0	2235.9	1518.3	3.6	714.0	.0
2002	38.0	.0	38.0	2246.7	1529.1	3.6	714.0	.0
2003	38.0	.0	38.0	2257.7	1540.1	3.7	714.0	.0
2004	38.0	.0	38.0	2268.9	1551.2	3.7	714.0	.0
2005	38.0	.0	38.0	2280.3	1562.5	3.7	714.0	.0
2006	38.0	.0	38.0	2291.9	1574.1	3.8	714.0	.0
2007	38.0	.0	38.0	2303.6	1585.8	3.8	714.0	.0
2008	38.0	.0	38.0	2315.6	1597.7	3.9	714.0	.0
2009	38.0	.0	38.0	2327.8	1609.9	3.9	714.0	.0
2010	38.0	.0	38.0	2340.2	1622.3	4.0	714.0	.0
2011	38.0	.0	38.0	2352.8	1634.8	4.0	714.0	.0
2012	38.0	.0	38.0	2365.7	1647.6	4.1	714.0	.0
2013	38.0	.0	38.0	2378.8	1660.7	4.1	714.0	.0
2014	38.0	.0	38.0	2392.1	1674.0	4.2	714.0	.0
2015	38.0	.0	38.0	2405.7	1687.5	4.2	714.0	.0
2016	38.0	.0	38.0	2419.5	1701.2	4.3	714.0	.0
2017	38.0	.0	38.0	2433.6	1715.2	4.3	714.0	.0
2018	38.0	.0	38.0	2447.9	1729.5	4.4	714.0	.0
2019	38.0	.0	38.0	2462.5	1744.1	4.4	714.0	.0
2020	38.0	.0	38.0	2477.3	1758.9	4.5	714.0	.0
2021	38.0	.0	38.0	2492.5	1774.0	4.5	714.0	.0
2022	38.0	.0	38.0	2507.9	1789.4	4.6	714.0	.0
2023	38.0	.0	38.0	2523.6	1805.0	4.6	714.0	.0
2024	38.0	.0	38.0	2539.7	1821.0	4.7	714.0	.0
2025	38.0	.0	38.0	2556.0	1837.3	4.7	714.0	.0
2026	38.0	.0	38.0	16725.2	1853.9	4.8	714.0	14152.5

***** ALT 4 *****

DISCOUNT RATE	ACCUM. DISCOUNTED COST	ACCUM. DISCOUNTED BENEFIT	B/C RATIO	NPV
0	28634.	97716.	3.4126	69032.
1	27657.	76241.	2.7567	48534.
2	26773.	60390.	2.2556	33617.
3	25963.	48542.	1.8696	22578.
4	25214.	39572.	1.5694	14353.
5	24516.	32694.	1.3336	8178.
6	23861.	27352.	1.1463	3491.
7	23242.	23150.	.9960	-93.
8	22657.	19804.	.8741	-2853.
9	22100.	17108.	.7741	-4992.
10	21570.	14910.	.6913	-6660.
11	21063.	13099.	.6219	-7964.
12	20578.	11591.	.5633	-8986.
13	20113.	10324.	.5133	-9789.
14	19666.	9249.	.4703	-10417.
15	19237.	8330.	.4330	-10907.
16	18825.	7539.	.4005	-11236.
17	18427.	6851.	.3713	-11576.
18	18044.	6251.	.3464	-11793.
19	17674.	5724.	.3238	-11951.
20	17318.	5253.	.3036	-12060.
21	16973.	4844.	.2854	-12129.
22	16641.	4475.	.2689	-12165.
23	16319.	4145.	.2540	-12174.
24	16008.	3848.	.2404	-12160.
25	15707.	3579.	.2279	-12127.
26	15415.	3337.	.2165	-12078.
27	15133.	3116.	.2059	-12016.
28	14859.	2915.	.1962	-11944.
29	14594.	2732.	.1872	-11862.
30	14336.	2564.	.1788	-11772.

INTERNAL RATE OF RETURN 6.97 PER CENT

JICA