(5) Breakdown of Construction Cost (Cikunir Area)

(5-1) Aggregate plant

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	2,992	3,296	9.9	-	9.9
4-02	m^3	1,669	153,581	256.3	4.9	201.2
(2) Material						
Metal	(t)	90	5,620,000	505.8	45.0	-
(3) Placing	(t)	134	1,264,500	169.4	-	169.4
Total				941.4	49.9	380.5

(5-2) Plant Operation Cost

1st stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
Plant operation cost	m^3	0	224	0	0	0
Total				0	0	0

(5-3) Excavation (2)

1st stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-01	m^3	0	1,875	0	0	0
5-04	m^3	0	1,284	0	0	0
Total				0	0	0

(5-4) Plant Operation Cost

2nd stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
Plant operation cost	m^3	630,000	224	141.1	-	141.1
Total				141.1	-	141.1

(5-5) Excavation (2)

2nd stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-01	m^3	630,000	1,875	1,181.2	61.7	490.1
5-04	m^3	630,000	1,284	808.9	35.3	414.5
Total				1,990.1	97.0	904.6

(6) Breakdown of Construction Cost (Cikunir Area)

(6-1) Excavation (1)

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-01	m^3	1,370,000	1,875	2,568.8	133.7	1,065.9
5-02	m^3	1,370,000	853	1,168.6	50.8	597.3
Total				3,737.4	184.5	1,663.2

(6-2) Excavation (3)

1st stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-01	m^3	2,858,000	1,875	5,358.8	278.9	2,223.5
5-03	m^3	2,858,000	1,052	3,006.6	130.7	1,537.6
Total				8,365.4	409.6	3,761.1

(6-3) Excavation (3)

2nd stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-01	m^3	783,000	1,875	1,468.1	76.7	609.2
5-03	m^3	783,000	1,052	823.7	36.0	421.3
Total				2,291.8	112.7	1,030.5

(7) Breakdown of Construction Cost (Cikunir Area)

Diversion cannel

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Excavation						
1-01	m^3	147,705	1,875	276.9	14.5	114.9
5-01	m^3	147,705	2,360	348.6	15.1	178.6
(2) Embankment						
2-01	m^3	147,705	2,562	378.4	19.1	163.8
4-01	m^3	19,125	49,712	950.7	25.1	669.1
Total				1,954.6	73.8	1,126.4

(8) Breakdown of Construction Cost (Cikunir Area)

(8-1) Consolidation dams

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Dike						
1-01	m^3	34,320	1,875	64.4	3.4	26.7
2-01	m^3	34,320	2,562	88.0	4.4	38.1
4-01	m^3	6,990	49,712	347.5	9.2	244.6
5-02	m^3	34,320	853	29.3	1.3	15.0
(2) Consolidation dams						
1-02	m^3	1,560	3,296	5.1	0	5.1
4-01	m^3	5,200	49,712	258.5	6.8	181.9
Total				792.8	25.1	511.4

(8-2) Revetment works

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-01	m^3	10,817	1,875	20.3	1.1	8.4
2-01	m^3	6,490	2,562	16.6	0.8	7.2
4-01	m^3	9,615	49,712	478.0	12.6	336.4
4-02	m^3	2,975	153,581	456.9	8.7	358.6
5-02	m^3	10,817	853	9.2	0.4	4.7
Total				981.0	23.6	715.3

(9) Breakdown of Construction Cost (Cikunir Area)

Check dam

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	8,430	3,296	27.8	-	27.8
4-01	m^3	28,100	49,712	1,396.9	36.8	983.1
Total				1,424.7	36.8	1,010.9

(10) Breakdown of Construction Cost (Cisaruni Area)

(10-1) Check dams 1st stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	1,380	3,296	4.5	-	4.5
4-01	m^3	4,600	49,712	228.7	6.0	160.9
Total				233.2	6.0	165.4

(10-2) Check dams 2nd stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	12,630	3,296	41.6	-	41.6
5-02	m^3	42,100	49,712	2,092.9	55.2	1,473.0
Total				2,134.5	55.2	1,514.6

(11) Breakdown of Construction Cost (Cikupang Area)

(11-1) Check dams 1st stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	1,440	3,296	4.7	-	4.7
4-01	m^3	4,800	49,712	238.6	6.1	167.9
Total				243.3	6.1	172.6

(11-2) Check dams 2nd stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	2,130	3,296	7.0	-	7.0
4-01	m^3	7,100	49,712	353.0	9.3	248.4
Total				360.0	9.3	255.4

(12) Breakdown of Construction Cost (Cimerah Area)

(12-1) Check dams 1st stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	2,910	3,296	10.0	0	10.2
4-01	m^3	9,700	49,712	482.2	12.7	339.4
Total				492.2	12.7	349.4

(12-2) Check dams 2nd stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	23,040	3,296	75.9	0	75.9
5-02	m^3	76,800	49,712	3,817.9	100.6	2,687.0
Total				3,893.8	100.6	2,762.9

5. Breakdown of Construction Cost for Alternative-E

(1) Breakdown of Construction Cost (Crater Lake Tunnel)

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-03	m^3	1,069	36,637	39.2	1.9	17.8
1-04	m^3	3,672	38,304	140.7	6.9	63.1
1-05	m^3	228	53,419	12.2	0.4	7.7
1-06	m^3	1,141	80,883	92.3	4.1	46.2
4-02	m^3	1,260	153,581	193.5	3.7	151.9
7-01	m	665	2,217,039	1,474.3	129.6	17.6
7-02	m	665	575,789	382.9	25.9	91.8
8-01	m	90	4,366,780	393.0	35.0	0
8-02	m	90	890,379	80.1	7.1	0
15-01	hour	6,600	5,800	38.3	-	38.3
16-01	m	3,120	110,000	343.2	-	343.2
Cooling plant				601.3	53.5	0
Total				3,791.0	268.1	777.6

(2) Breakdown of Construction Cost (Ciloseh Area)

(2-1) Dike Improvement

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Excavation						
1-01	m^3	19,956	1,875	37.4	2.0	15.5
5-01	m^3	19,956	2,360	47.1	2.0	24.1
(2) Embankment						
2-01	m^3	19,956	2,562	51.1	2.6	22.1
3-01	m^3	2,646	27,974	74.0	2.7	43.5
Total				209.6	9.3	105.2

(2-2) Check Dams of Cimampang Area

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	2,640	3,296	8.7	-	8.7
4-01	m^3	8,800	49,712	437.5	11.5	308.2
Total				446.2	11.5	316.9

(2-3) Plant operation

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
Plant operation cost	m^3	394,000	224	88.3	0	88.3
Total				88.3	0	88.3

(2-4) Excavation (2)

(1st stage)

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-01	m^3	394,000	1,875	738.8	38.6	306.5
5-01	m^3	394,000	2,360	929.8	40.2	476.3
Total				1,668.6	78.8	782.8

Note: Excavation 2;

(3) Breakdown of Construction Cost (Cikunir Area)

Dike Improvement (without Ciponyo I Dalam)

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Excavation						
1-01	m^3	345,392	1,875	234.8	12.3	97.4
5-01	m^3	345,392	2,360	295.6	12.8	151.4
(2) Embankment						
2-02	m^3	345,392	3,424	1,182.6	59.7	511.9
4-01	m^3	41,263	49,712	2,051.3	54.1	1,443.7
3-01	m^3	16,139	27,974	451.5	16.6	265.3
Total				5,148.1	199.6	2,907.2

(4) Breakdown of Construction Cost (Cikunir Area)

Rising Dike (Ciponyo I Dalam)

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Excavation						
1-01	m^3	345,392	1,875	647.6	33.8	268.7
5-01	m^3	345,392	2,360	85.1	35.4	417.6
(2) Embankment						
2-02	m^3	345,392	3,424	1,182.6	59.7	511.9
4-01	m^3	41,263	49,712	2,051.3	54.1	1,443.7
3-01	m^3	16,139	27,974	451.5	16.6	265.3
Total				5,148.1	199.6	2,907.2

(5) Breakdown of Construction Cost (Cikunir Area)

(5-1) Aggregate plant

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	0	3,296	0	0	0
4-02	m^3	0	153,581	0	0	0
(2) Material						
Metal	(t)	0	5,620,000	0	0	0
(3) Placing	(t)	0	1,264,500	0	0	0
Total				0	0	0

(5-2) Plant Operation Cost

1st stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
Plant operation cost	m^3	0	224	0	0	0
Total				0	0	0

(5-3) Excavation (2)

1st stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-01	m^3	0	1,875	0	0	0
5-04	m^3	0	1,284	0	0	0
Total				0	0	0

(5-4) Plant Operation Cost

2nd stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
Plant operation cost	m^3	0	224	0	0	0
Total				0	0	0

(5-5) Excavation (2)

2nd stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-01	m^3	0	1,875	0	0	0
5-04	m^3	0	1,284	0	0	0
Total				0	0	0

(6) Breakdown of Construction Cost (Cikunir Area)

(6-1) Excavation (1)

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-01	m^3	1,370,000	1,875	2,568.8	133.7	1,065.9
5-02	m^3	1,370,000	853	1,168.6	50.8	597.3
Total				3,737.4	184.5	1,663.2

(6-2) Excavation (3)

1st stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-01	m^3	2,890,000	1,875	5,418.8	282.1	2,248.4
5-03	m^3	2,890,000	1,052	3,040.3	132.2	1,554.8
Total				8,459.1	414.3	3,803.2

(6-3) Excavation (3)

2nd stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-01	m^3	1,413,000	1,875	2,649.4	137.9	1,099.3
5-03	m^3	1,413,000	1,052	1,486.5	64.6	760.2
Total				4,135.9	202.5	1,859.5

(7) Breakdown of Construction Cost (Cikunir Area)

Diversion cannel

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Excavation						
1-01	m^3	288,720	1,875	541.4	28.2	224.6
5-01	m^3	288,720	2,360	681.4	29.6	349.1
(2) Embankment						
2-01	m^3	288,720	2,562	739.7	37.3	320.2
4-01	m^3	25,947	49,712	1,288.0	33.8	907.8
Total				3,250.5	128.9	1,801.7

(8) Breakdown of Construction Cost (Cikunir Area)

(8-1) Consolidation dams

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Dike						
1-01	m^3	34,320	1,875	64.4	3.4	26.7
2-01	m^3	34,320	2,562	88.0	4.4	38.1
4-01	m^3	6,990	49,712	347.5	9.2	244.6
5-02	m^3	34,320	853	29.3	1.3	15.0
(2) Consolidation dams						
1-02	m^3	1,560	3,296	5.1	0	5.1
4-01	m^3	5,200	49,712	258.5	6.8	181.9
Total				792.8	25.1	511.4

(8-2) Revetment works

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-01	m^3	10,817	1,875	20.3	1.1	8.4
2-01	m^3	6,490	2,562	16.6	0.8	7.2
4-01	m^3	9,615	49,712	478.0	12.6	336.4
4-02	m^3	2,975	153,581	456.9	8.7	358.6
5-02	m^3	10,817	853	9.2	0.4	4.7
Total				981.0	23.6	715.3

(9) Breakdown of Construction Cost (Cikunir Area)

Check dam

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	8,430	3,296	27.8	-	27.8
4-01	m^3	28,100	49,712	1,396.9	36.8	983.1
Total				1,424.7	36.8	1,010.9

(10) Breakdown of Construction Cost (Cisaruni Area)

(10-1) Check dams 1st stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	1,380	3,296	4.5	-	4.5
4-01	m^3	4,600	49,712	228.7	6.0	160.9
Total				233.2	6.0	165.4

(10-2) Check dams 2nd stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	12,630	3,296	41.6	-	41.6
5-02	m^3	42,100	49,712	2,092.9	55.2	1,473.0
Total				2,134.5	55.2	1,514.6

(11) Breakdown of Construction Cost (Cikupang Area)

(11-1) Check dams 1st stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	1,440	3,296	4.7	-	4.7
4-01	m^3	4,800	49,712	238.6	6.1	167.9
Total				243.3	6.1	172.6

(11-2) Check dams 2nd stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	2,130	3,296	7.0	-	7.0
4-01	m^3	7,100	49,712	353.0	9.3	248.4
Total				360.0	9.3	255.4

(12) Breakdown of Construction Cost (Cimerah Area)

(12-1) Check dams 1st stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	2,910	3,296	10.0	0	10.2
4-01	m^3	9,700	49,712	482.2	12.7	339.4
Total				492.2	12.7	349.4

(12-2) Check dams 2nd stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	23,040	3,296	75.9	0	75.9
5-02	m^3	76,800	49,712	3,817.9	100.6	2,687.0
Total				3,893.8	100.6	2,762.9

Annex-4

Breakdown of Unit Cost (Economic Cost)

Unit Cost of Construction Work (I) (Economic Cost)

Item No.	Work Description		Unit Cost			Rupiah Evaluation of Foreign (Rp)
			Total (Rp)	Foreign (¥)	Local (Rp)	
1-01	Open-cut excavation of sand with gravel by machinery Back-hoe (1.4 m^3) including loading	(m^3)	1,435			
1-02	Open-cut excavation by man-power for foundation of dam and other structure	(m^3)	1,954			
1-03	Tunnel excavation of sand with gravel by man-power	(m^3)	36,370			
1-04	Tunnel excavation of rock by man-power	(m^3)	38,037			
1-05	Shaft excavation of sand with gravel by man-power	(m^3)	53,336			
1-06	Shaft excavation of rock by man-power	(m^3)	80,645			
2-01	Embankment, Furnishing, Spreading and Compacting of main board of dike Bulldozer 16 (t)	(m^3)	2,003			
2-02	Height of Dike $\geq$5.0	(m^3)	2,675			
3-01	Gabion work, Furnishing and placing wire net mattress and filling boulders in the net mattress	(m^3)	25,386			
4-01	Furnishing and placing wet masonry for dam	(m^3)	45,190			
4-02	Furnishing and placing plain concrete	(m^3)	138,401			
5-01	Transportation of riverbed material from Sand Pocket to aggregate plant L=5.0 km	(m^3)	1,726			
5-02	Transportation of riverbed material from Sand Pocket to aggregate plant L=500 m	(m^3)	624			

Unit Cost of Construction Work (I) (Economic Cost)

Item No.	Work Description		Unit Cost			Rupiah Evaluation of Foreign (Rp)
			Total (Rp)	Foreign (¥)	Local (Rp)	
5-03	Transportation of riverbed material from Sand Pocket to aggregate plant L=1.0 km	(m^3)	732			
5-04	Transportation of riverbed material from Sand Pocket to aggregate plant L=2.0 km	(m^3)	958			
6-01	Aggregate plant equipment	(m^3)	1,665			
7-01	Corrugated pipe 2,000 mm Furnishing and placing Corrugated pipe	(m)	2,216,571			
7-02	Corrugated pipe 4,000 mm Furnishing and placing Corrugated pipe	(m)	4,366,780			
8-01	H-Beem 2,000 mm Furnishing and placing H-Beem	(m)	575,460			
8-02	H-Beem 4,000 mm Furnishing and placing H-Beem	(m)	890,379			
9-01	Transportation of aggregate by train	(m^3)	5,875			
10-01	Loading (unloading)	(m^3)	1,022			

Breakdown of Unit Cost

1. Excavation by Machine (1-01)

- Sand with gravel, Production: 84 m^3/hr

- Back hoe 1.4 m^3

- Allotment: 1/84 = 0.0119

Work Item	Allotment	Unit	Unit Cost (Rp)	Total	Amount Foreign	Local (Rp)
Depreciation cost	0.0119	hr/m^3	43,505	518		
Owner ship cost	0.0119		0	0		
Fuel oil cost	0.0119		6,456	77		
Operator & labour	0.0119		1,752	21		
Repair & maintenance	0.0119		43,505	518		
Sub Total (Rp/m^3)				1,134		
Total (Sub Total x 1.265)				1,435		

Breakdown of Equipment Cost

Equipment Back hoe 1.4 m^3

a	Economic life		5 year
b	Operation time per year		2,000 hour/year
c	Basic price		483,392,000 Rp
d	Tire cost		- Rp
e	Residual value, 0.1 x (c-d)		48,339,200 Rp
f	Depreciation cost, $\frac{c-d-e}{ab}$		43,505 Rp
g	Ownership cost, $\frac{0.2 \times (a+1) \times c}{2ab}$		29,004 Rp/hr
h	Operation cost, i+j+k+l		7,670 Rp/hr
i	Fuel 0.129 l/hr	209 ps x 200 Rp/l	5,380 Rp/hr
j	Lubricant, i x 20%		1,076 Rp/hr
k	Tire cost		- Rp/hr
l	Operator		2,038 Rp/hr
	Operator	0.143 x 7,000	Rp/hr
	Assistant operator	0.143 x 1/2 x 4,500	Rp/hr
	Foreman	0.143 x 1/5 x 5,000	Rp/hr
	Common labour	0.143 x 2 x 2,000	Rp/hr
m	Repair and maintenance cost, $\frac{(c-d) \times n}{ab}$		43,505 Rp/hr
n	Ratio of repair and maintenance cost		90%
o	Direct cost, f+g+h+m		123,684 Rp/hr
p	Indirect cost, 15% of direct cost		18,553 Rp/hr
q	Equipment cost, o+p		142,237 Rp/hr

Production/hour

$$Q = \frac{3,600 \times q \times E}{cm}$$

$q = 1.37\ m^3$, $E = 0.6$, $cm = 35$ sec (swing angle = 180°)

$$Q = \frac{3,600 \times 1.37 \times 0.6}{35} = 84\ m^3/hr$$

2. Excvation by Manpower (1-02)

Excavation depth H $\leq$ 1 m

Transportation Distance L $\leq$ 30 m

	Work Item	Allotment	Unit	Unit Cost (Rp)	Total	Amount Foreign	Local (Rp)
Common soil	Excavation						
	Common labour	0.75	man.day	1,000	750		
	Foreman	0.025	man.day	5,000	125		
	Transportation						
	Common labour	0.33	man.day	1,000	330		
	Foreman	0.01	man.day	5,000	50		
	Total (Rp/m^3)	x 1.265			1,255 1,588		
Hard soil	Excavation						
	Common labour	1	man.day	1,000	1,000		
	Foreman	0.033	man.day	5,000	165		
	Transportation						
	Common labour	0.33	man.day	1,000	330		
	Foreman	0.01	man.day	5,000	50		
	Total (Rp/m^3)	x 1.265			1,545 1,954		

3. Excavation of Crater Lake Tunnel (1-03 - 1-06)

3.1 Drainage Tunnel

3.1.1 Condition

1) Dimension Diameter: 2.0 m
Length : 665 m

2) Soil condition a: Soil with gravel
b: Rock

3) Lining
- Shorting: H-sections will be used and it is erected at intervals of 1.0 m.
- Lining material:
Prefabricated corrugated steel pipe will be used as it has features of;
. Light weight
. Simple execution
. Easy transportation
Divided units of pipe are assembled to complete tunnel section at the place.

4) Tunnel section
Circular section will be applied.

5) Excavation
- Labour formation
The work will be executed with following formation.

	Labour	Man	Work
Inside the Tunnel	Skilled tunnel labour	2	Excavation
	Tunnel labour	2	Excavation, Loading, Transport
	Tunnel foreman	1	Planning, Safety Control
Outside the Tunnel	Skilled labour	1	Operation of machines
	Common labour	1	Miscellaneous works

- Working hour per 1 day

Work	Working hour
Preparation, go in and out of tunnel	30 min
Rest in tunnel	30 min
Excavation and lining	420 min

- Cycle time (min/1 cycle time)

Work	Sand with gravel	Rock
Transportation of excavated soil	t_2=205	t_2=228
Placing of rail and ventilation pipe	15	15
Check, survey	3	3
Excavation work	t_3=196	t_3=196
Total (min/1 cycle)	T=419	T=442

- Time for transportation of excavated soil per 1 cycle (t_2)

Description	Unit	Sand with Gravel	Rock
Carrying volume per 1 cycle	m^3	7.13	7.13
Carrying volume per 3 trollies	m^3	1.2	1.08
Loading unloading time per 1 trip	min	30	30
No. of trip (n)	trip	7.13/1.2=5.94	7.13/1.08=6.60
t_2=n x (t + 30)	min	205	228

t : Trip time t=150/66.7 x 2 = 4.5 min

Average transport distance L = 150 m

Trip speed V = 4 Km/hr = 66.7 m/min

- Time for excavation work per 1 cycle

$$t_3 = A \times P \times \frac{60}{q \times N} - (t + 3)$$

A: Excavation area 7.13 m^3

P: Spacing of shoring 1 m

q: Performance of 1 hammer 0.7 m^3/hr

N: No. of hammer N=3

$$t_3 = 7.13 \times 1 \times \frac{60}{0.7 \times 3} - (4.5 + 3) = 196 \text{ min}$$

- Machines to be employed

Machine	No.
Pick hammer 8 kg	3
Air compressor 3.5 m /min	1
Trolly 0.5 m	3
Fan 1.5 Kw	1
Diesel generator 30 kvA	1

- Operating time of machines

Operating time of machines per 1 day operation is settled 7 hours.

- Labour cost

The unit cost of labours exclusively employed in tunnel work are estimated in reference of the standard in Japan.
The unit costs are listed in the table below.

Labour	Unit	Amount
Skilled tunnel labour	Rp/man.day	7,000
Tunnel labour	"	5,000
Skilled labour	"	3,500
Tunnel foremen	"	7,000

3.1.2 Unit Cost of Tunnel Excavation (1-03)

- Sand with gravel

T=419 min

Work Item	Allotment	Unit	Unit Cost (Rp)	Total	Amount foreign	Local (Rp)
Skilled tunnel labour	3.0 1)	man.day	7,000	21,000		
Tunnel labour	3.0 1)	"	5,000	15,000		
Tunnel foreman	1.5 1)	"	7,000	10,500		
Skilled labour	1.5 1)	"	3,500	5,250		
Common labour	1.5 1)	"	1,000	1,500		
Compressor (3.5 m^3/min)	4.43 2)	hr	5,566	24,657		
Pick hammer 8 kg	1.5 3)	day	2,506	3,759		
Fan 1.5 Kw	0.9 4)	day	23,632	21,269		
Trolly 0.5 m^3	3.0 4)	day	13,664	40,992		
Diesel generator 30 kvA	0.9	day	47,824	43,042		
Temporary facilities	1.0	meter	18,028	18,028		
Total (Rp/1 cycle 1 meter)				204,997		
x 1.265				259,321		
m/m^3 (7.13) m^3				36,370		

- Rock (1-04)

T=442 min

Work item	Allotment	Unit	Unit cost (Rp)	Total	Amount foreign	Local (Rp)
Skilled tunnel labour	3.156	man.day	7,000	22,092		
Tunnel labour	3.156	"	5,000	15,780		
Tunnel foreman	1.579	"	7,000	11,053		
Skilled labour	1.579	"	3,500	5,526		
Common labour	1.579	"	1,000	1,579		
Compressor (3.5 m^3/min)	4.321	hr	5,566	24,657		
Pick hammer 8 kg	1.5	day	2,506	2,405		
Fan 1.5 Kw	0.95	day	23,632	22,450		
Trolly 0.5 m^3	3.0	day	13,664	25,825		
Diesel generator 30 kvA	0.95	day	47,824	45,443		
Temporary facilities	1.0	meter	18,028	18,028		
Total (Rp/1 cycle 1 meter)				160,603		
Rp/m^3 (7.13 m^3/m)						
x 1.265				38,037		

Note: 1) Labour formation x $\frac{T}{420}$ 2) $(64 + t_3)/60$

3) $2 \times t_3/420$ 4) No x T/420

3.1.3 Equipment Cost

Equipment	Compressor	3.5 m^3/min	33 PS
Basic Price		: 1,620 kY	
Economic life		: 5 year	
Operation time/year		: 2000 hour/year	
Repair & maintenance cost ratio		: 90%	

	Amount (Y/hr)		
	Total	Foreign	Local
Depreciation	146	146	-
Ownership	97	-	97
Fuel, oil	98	49	49
Repair & maintenance	146	88	58
Miscellaneous	10	0	10
Total Y/hr	497	283	214
Rp/hr	5,566	3,170	2,396

1$ = 1,630 Rp = 145Y, 11.2 Rp = 1 Y

3.1.4 Unit Cost of Lining (7-01)

- Corrugated pipe 2,000 mm
- 1 cycle (1 meter) 155 mm

Work Item	Allot-ment	Unit	Unit Cost (Rp)	Total	Amount Foreign	Local (Rp)
Corrugated pipe 2,000 mm	1.0	meter	1,332,800	1,332,800		
R-ring H-100 @ 1.5 m	1.0	"	374,800	374,800		
Skilled tunnel labour	0.74	man.day	7,000	5,180		
Tunnel labour	0.74	"	5,000	3,700		
Tunnel foreman	0.37	"	7,000	2,590		
Skilled labour	0.37	"	3,500	1,295		
Common labour	0.37	"	1,000	370		
Fan 1.5 Kw	0.37	day	23,632	8,744		
Trolly 0.5 m^3	0.37	day	13,632	5,056		
Generator 30 kvA	0.37	day	47,824	17,695		
Total Rp/1 meter				1,752,230		
x 1.265				2,216,571		
					¥194,880	

Note: $\frac{\text{Erection time}}{\text{1 day work}} = \frac{155 \text{ min}}{420 \text{ min}} = 0.37$ day/m

3.1.5 Shoring H-beam for Corrugated Pipe 2,000 mm (8-01)

- H-1.25 x 1.25 x 6.5 x 9
- Spacing 1 m

Work Item	Allot-ment	Unit	Unit Cost (Rp)	Total	Amount Foreign	Local (Rp)
H-beam H-125x125x6.5x9-3.207	152.6	kg	2,133	325,496		
Wood	0.26	m^3	75,000	19,500		
Skilled tunnel labour	0.52	man.day	7,000	3,640		
Tunnel labour	0.52	"	5,000	2,600		
Tunnel foreman	0.26	"	7,000	1,820		
Skilled labour	0.26	"	3,500	910		
Common labour	0.26	"	1,000	260		
Fan 1.5 Kw	0.26	day	23,632	6,144		
Trolly 0.5 m^3	0.52	day	13,664	7,105		
Generator 30 kvA	0.26	day	47,824	12,434		
Fabrication of steel	100	kg	750	75,000		
Sub Total Rp/1 meter				454,909		
Total x 1.265				575,460		

Note: $\frac{\text{Erection time for shoring}}{\text{1 day work}} = \frac{110 \text{ min}}{420 \text{ min}} = 0.26 \text{ day}$

H-125 x 125 x 6.5 x 9 - 3.207 m x 2

3.207 x 23.8 kg/m

= 76.3 kg

66,000¥/t x 250% x 1.15 = ¥189,750 x 11.24Rp/¥ = 2,132,790 Rp/t

≒ 2,133 Rp/kg

3.2 Shaft

3.2.1 Condition

1) Dimension Diameter: 4.0 m
   Depth : 90 m
2) Soil condition a: Sand with gravel
   b: Rock
3) Excavation

- Labour formation

Labour	Man	Work
Skilled tunnel labour	4	Excavation, installation of lining material
Skilled labour	1	Winch operating
Common labour	1	Work outside of pit
Foreman	1	Instruction

- Excavation progress per 1 day
  Sand with gravel: 0.50 m/day
  Rock : 0.35 m/day
- Equipment for excavation

Use	Name	Specifications	No.
Excavation of excavated Soil Hanging of lining material	Scaffolding	With 10 Kw motor, 1 ton winch	1
Ventilation	Fan	ϕ 200 mm, 0.75 Kw	1
Transportation of evacuated soil	Belt conveyor	7 m length with 1 Kw motor	1
Drainage	Submersible pump	ϕ 50 mm, 3.7 Kw	1
Excavation			
for sand with gravel	Pick hammer	8 kg	4
for rock	Pick hammer	8 kg	1
	Hand hammer	15 kg	3
	Air compressor	10 m^3/min	1
Power source	Diesel Generator	30 kvA	1

- Disposal of excavated soil
- Excavated soil is planned to be put at about 5 m distance from the side wall of the shaft.

3.2.2 Unit Cost of Shaft Excavation (1-05)

- Sand with gravel

Work Item	Allotment	Unit	Unit Cost (Rp)	Total	Amount Foreign	Local (Rp)
Skilled tunnel labour	4	man.day	7,000	28,000		
Skilled labour	1	"	3,500	3,500		
Common labour	1	"	1,000	1,000		
Foreman	1	"	5,000	5,000		
Pick hammer 8 kg	4	Unit	2,506	10,024		
Compressor 10 m^3/min	1	"	104,818	104,818		
Diesel generator 30 kvA	1	"	47,824	47,824		
Temporary facilities	1	day	119,982	119,982		
Total Rp/day				320,148		
Unit cost for 1 meter excavation (0.5 m/day)				640,296		
Unit cost for 1 m^3 excavation (15.21 m^3/m)				42,097		
			x 1.265	53,336		

- Rock (1-06)

Work Item	Allotment	Unit	Unit Cost (Rp)	Total	Amount Foreign	Local (Rp)
Skilled tunnel labour	4	man.day	7,000	28,000		
Skilled labour	1	"	3,500	3,500		
Common labour	1	"	1,000	1,000		
Foreman	1	"	5,000	5,000		
Hand hammer 15 kg	3	Unit	10,661	31,983		
Pick hammer 8 kg	1	"	2,506	2,506		
Compressor 10 m^3/min	1	"	104,818	104,818		
Diesel generator 30 kvA	1	"	47,824	47,824		
Temporary facilities	1	day	114,749	114,749		
Total Rp/day				339,380		
Unit cost for 1 meter excavation (0.35 m/day) Rp/m				969,657		
Unit cost for 1 m^3 excavation (15.21 m^3/m)				63,751		
Rp/m^3			x 1.265	80,645		

3.2.3 Equipment Cost of 1 Day Operation

- Excavation machines

Equipment	Pick Hammer 8 kg			Hand Hammer 15 kg		
Basic price	¥33,000			¥140,000		
Economic life	2 years			2 years		
Operation time	800 hrs			800 hrs		
Repair & Maintenance Cost ratio	35%			35%		
	Amount (¥/hr)			Amount (¥/hr)		
	Total	Foreign	Local	Total	Foreign	Local
Depreciation	19	19	-	79	79	-
Ownership	6	-	6	26	-	26
Repair & Maintenance	7	4	3	31	19	12
Total (¥/hr)	32	23	9	136	98	38
(Rp/day)	2,506	1,806	700	10,061	7,686	2,975

Equipment	Air Compressor 10.5 m^3/min			Diesel Generator 30 kvA		
Basic price	¥4,144 k			¥2,321 k		
Economic life	5 years			5 years		
Operation	2,000 hrs			2,000 hrs		
R & M cost ratio	90 %			65 %		
	Amount (¥/hr)			Amount (¥/hr)		
	Total	Foreign	Local	Total	Foreign	Local
Depreciation	370	370	-	209	209	-
Ownership	249	-	249	139	-	139
Fuel	263	132	131	84	42	42
Oil	53	27	26	17	9	8
R & M	370	222	148	151	91	60
Miscellaneous	32	-	32	10	-	10
Total (¥/hr)	1337	751	586	610	351	259
(Rp/day)	104,818	58,877	45,941	47,824	27,517	20,307

Operating time of machine = 7 hours/day

Equipment Cost for a day operation

Equipment		Trolly (0.5 m^3)	Fan (1.5 kw)
a) Intial Cost (¥)		460,000	1,390,000
b) Economic life (year)		5	6
c) Operation days (day/year)		140	170
d) Depreciation Ration (%)		90	90
e) Repair & Maintenance Ratio (%)		70	35
f) Yearly Management Cost Ratio (%)		5	5
g) Depreciation Cost (¥/day)	$\frac{a \times d}{b \times c}$	593	1,226
h) Repair & Maintenance Cist (¥/day)	$\frac{a \times c}{b \times c}$	462	476
i) Yearly Management Cost (¥/day)	$\frac{a \times f}{c}$	165	408
j) Hire Cost (¥/day)	g+h+i	1,220	2,110
(Rp/day)		13,664	23,632

3.2.4 Unit Cost of Lining (7-02)

- Coruggated pipe 4,000 mm

Work Item	Allotment	Unit	Unit Cost (Rp)	Total	Amount Foreign	Local (Rp)
Liner plate ϕ 4,000 mm, t=3.2 mm	1	meter	3,452,000	3,452,000		
Total Rp/1 meter				3,452,000		
x 1.265				4,366,780		

3.2.5 Unit Cost of Reinforcing H-beam (8-02)

- H 125 x 125 x 6.5 x 9
- 311 kg/1 ring @ 1.0 m

Work Item	Allotment	Unit	Unit Cost	Total	Amount Foreign	Local (Rp)
Skilled tunnel labour	0.4	man.day	3,500	1,400		
Skilled labour	0.1	"	3,000	300		
Common labour	0.1	"	1,000	100		
Foreman	0.1	"	2,500	250		
H-beam H-125 x 125 x 6.5 x 9	329	kg	2,133	701,757		
Total Rp/1 ring				703,857		
Unit cost for 1 meter excavation (Rp/m) (1.0 m/1 ring)				890,379		

ϕ 4,000 mm t=3.2

¥161,000 + 106,000 = ¥267,000/m x 1.15 = ¥307,050/m

= 3,451,242

= 3,452,000

H-125 x 125 x 6.5 x 9 - 13.82 m x 23.8 kg/m = 328.9 kg

4. Embankment by machine

- Bulldozer 16 ton
- Production: Excavation 71 m^3/hr
  Spreading & compaction 38 m^3/hr

4.1 Height of Dike <5.0 m (2-01)

Work Item	Allotment	Unit	Unit Cost (Rp)	Total	Amount Foreign	Local (Rp)
Depreciation cost	0.0404	hr/m^3	16,410	663		
Ownership cost	0.0404		0	0		
Fuel oil cost	0.0404		4,320	175		
Operator & labour	0.0404		2,038	82		
Repair & Maintenance	0.0404		16,410	663		
Total (Rp/m^3)				1,583		
x 1.265				2,003		

Production/hour

Excavation $Q = \frac{60 \times q \times E}{Cm}$, Cm = 0.038L + 0.2 (min), L=20 m, Cm=0.96 min

$$Q = \frac{60 \times 1.75 \times 0.65}{0.96} = 71 \text{ m}^3/\text{hr}$$

Spreading $Q_1 = 10E(11D+8) = 10 \times 0.6 \times (11 \times 0.3+8) = 68 \text{ m}^3/\text{hr}$

E : Work efficiency 0.6

D : Height after compaction 0.3 m

Compaction $Q = \frac{V W D E}{N} = \frac{3,500 \times 0.7 \times 0.3 \times 0.6}{5} = 88 \text{ m}^3/\text{hr}$

V=3,500 m/hr, W=0.7 m, D=0.3 m, E=0.6, N=5

Spreading and compaction

$$Q = \frac{Q_1 \times Q_2}{Q_1 + Q_2} = \frac{68 \times 88}{68 + 88} = 38 \text{ m}^3/\text{hr}$$

Allotment $\frac{1}{38} + \frac{1}{71} = 0.0404$

4.2 Height of dike ≧5.0 m (2-02)

- Bulldozer 16 ton
- Production : Excavation 71 m^3/hr
  Spreading & compaction 25 m^3/hr

Work Item	Allotment	Unit	Unit Cost (Rp)	Total	Amount Foreign	Local (Rp)
Depreciation cost	0.054	hr/m^3	16,410	886		
Ownership cost	0.054		0	0		
Fuel oil cost	0.054		4,320	233		
Operator & labour	0.054		2,038	110		
Repair & Maintenance	0.054		16,410	886		
Total (Rp/m^3)				2,115		
x 1.265				2,675		

Production/hour

Excavation $Q = \frac{60 \times q \times E}{Cm}$ Cm = 0.038L + 0.2 (min), L=20 m, Cm=0.96 min

$$Q = \frac{60 \times 1.75 \times 0.65}{0.96} = 71 \text{ m}^3/\text{hr}$$

Spreading $Q_1 = 10E\,(10D+8) = 10 \times 0.6 \times (11 \times 0.15+8) = 58 \text{ m}^3/\text{hr}$

E : Work efficiency 0.6

D : Height after compaction 0.15 m

Compaction $Q = \frac{V\,W\,D\,E}{N} = \frac{3{,}500 \times 0.7 \times 0.15 \times 0.6}{5} = 44 \text{ m}^3/\text{hr}$

V=3,500 m/hr, W=0.7 m, D=0.15 m, E=0.6, N=5

Spreading and compaction

$$Q = \frac{Q_1 \times Q_2}{Q_1 + Q_2} = \frac{58 \times 44}{58 + 44} = 25 \text{ m}^3/\text{hr}$$

Allotment

$$A = \frac{1}{25} + \frac{1}{71} = 0.054$$

Breakdown of Equipment Cost

Equipment Bulldozer 16 ton

a	Economic life	5	year
b	Operation time/year	2,000	hour/year
c	Basic price	182,336,000	Rp
d	Tire cost	-	Rp
e	Residual value, 0.1 x (c-d)	18,233,600	Rp
f	Depreciation cost, $\frac{c-d-e}{ab}$	16,410	Rp
g	Ownership cost, $\frac{0.2 \times (a+1) \times c}{2ab}$	10,960	Rp/hr
h	Operation cost, i+j+k+l	5,534	Rp/hr
i	Fuel 18.3 l/hr 150 ps x 200 Rp/l	3,600	Rp/hr
j	Lubricant, i x 20%	720	Rp/hr
k	Tire cost		Rp/hr
l	Operator	2,038	Rp/hr
	Operator	7,000	Rp/hr
	Assistant operator	4,500	Rp/hr
	Foreman	5,000	Rp/hr
	Common labour	2,000	Rp/hr
m	Repair and maintenance cost, $\frac{(c-d) \times n}{ab}$	16,410	Rp/hr
n	Ratio of repair and maintenance cost	90	%
o	Direct cost, f+g+h+m	49,314	Rp/hr
p	Indirect cost, 15% of direct cost	7,397	Rp/hr
q	Equipment cost, o+p	56,711	Rp/hr

5. Gabion Work (3-01)

- 1 m^3 gabion mattres
- 4 mm wire for frame 20%
- 3 mm wire for net 80%

Work Item	Allotment	Unit	Unit Cost (Rp)	Total	Amount Foreign	Local (Rp)
Plait						
Wire	9.6	kg	950	9,120		
Gabion net maker	0.68	man.day	3,000	2,040		
Common labour	0.546	"	1,000	546		
Foreman	0.0267	"	5,000	134		
Stone filling						
Stone	1	m^3	5,000	5,000		
Common labour	1.5	man.day	1,000	1,500		
Foreman	0.025	"	5,000	125		
Transportation of stone L≤75 m	1	LS	818	818		
Filter	1	LS	785	785		
Total (Rp/m^3)				20,068		
x 1.265				25,386		

6. Stone Masonry (4-01)

- 1 m^3 stone masonry, C:S=1:4

Work Item	Allotment	Unit	Unit Cost (Rp)	Total	Amount Foreign	Local (Rp)
Stone	1.2	m^3	5,000	6,000		
Cement	4.07	bag	4,400	17,908		
Sand	0.522	m^3	5,000	2,610		
Mason	1.2	man.day	3,500	4,200		
Chief mason	0.12	"	4,000	480		
Common labour	3.6	"	1,000	3,600		
Foreman	0.18	"	5,000	900		
Total (Rp/m^3)				35,698		
x 1.265				45,190		

7. Plain Concrete (4-02)

- 1 m^3 Plain concrete, C:S:G=1:2:3

Work Item	Allotment	Unit	Unit Cost (Rp)	Total	Amount Foreign	Local (Rp)
1) Concrete material						
Gravel	0.82	m^3	8,000	6,560		
Sand	0.54	"	5,000	2,700		
Cement	6.8	bag	4,400	29,920		
Sub Total (Rp/m^3)				39,180		
2) Labour for mixing and placing						
Common labour	6	man.day	1,000	6,000		
Foreman	0.3	"	5,000	1,500		
Mason	1	"	3,500	3,500		
Chief mason	0.1	"	4,000	400		
Sub Total (Rp/m^3)				6,600		
3) Form work material						
Wood	0.4	m^3	75,000	30,000		
Nail	4	kg	1,000	4,000		
Sub Total (Rp/m^3)				34,000		
4) Labour for form making and removal						
Chief carpenter	0.5	man.day	3,500	1,750		
Foreman	0.1	"	5,000	500		
Carpenter	5	"	3,500	17,500		
Common labour	2	"	1,000	2,000		
Common labour (removal)	4	"	1,000	4,000		
Sub Total (Rp/m^3)				31,750		
5) Equipment						
Mixer (250 lt)		LS	1,885	1,885		
Vibrator		LS	458	458		
Belt conveyor		LS	6,172	6,172		
Sub Total (Rp/m^3)				8,515		
6) Fuel, Oil		LS		1,363		
Total (Rp/m^3)				109,408		
x 1.265				138,401		

8. Transportation of Riverbed Material

Long distance 5 km (5-01)

$Q=12.0\ m^3/hr$

Work Item	Allotment	Unit	Unit Cost (Rp)	Total	Amount Foreign	Local (Rp)
Dump truck 11 ton, production 9.4 m^3/ hr=0.106 hr/m^3						
Depreciation cost	0.083	hr/m^3	5,944	493		
Ownership cost	0.083		0	0		
Fuel, oil	0.083		2,904	241		
Tire cost	0.083		1,100	91		
Driver	0.083		571	47		
Repair & Maintenance	0.083		5,944	493		
Indirect cost	-					
Total (Rp/m^3)				1,365		
x 1.265				1,726		

Production/hour

$$Q = \frac{60 \times q \times E}{cm} \qquad q=6.1\ m^3,\ E=0.9$$

$$Cm = \frac{n \times Cms}{60 \times Es} + \frac{l}{v_1} + \frac{l}{v_2} + t_1 + t_2$$

$\frac{n \times Cms}{60 \times Es} \doteqdot 5$ min., $l=5$ Km, $v_1 = 30$ Km/hr $= 500$ m/min

$v_2 = 40$ Km/hr $= 666$ m/min, $t_1 = 3$ min, $t_2 = 2$ min

$$Cm = 5 + \frac{5000}{666} + \frac{5000}{500} + 3 + 2 = 27.5 \text{ min}$$

$$Q = \frac{60 \times 6.1 \times 0.9}{27.5} = 12.0\ m^3/hr$$

Near distance 1,000 m (5-02)

Work Item	Allotment	Unit	Unit Cost (Rp)	Total	Amount Foreign	Local (Rp)
Dump truck 11 ton, production 7.0 m^3/ hr=0.106 hr/m^3						
Depreciation cost	0.03	hr/m^3	5,944	178		
Ownership cost	0.03		6,036	0		
Fuel, oil	0.03		2,904	87		
Tire cost	0.03		1,100	33		
Driver	0.03		571	17		
Repair & Maintenance	0.03		5,944	178		
Indirect cost	-				-	
Total (Rp/m^3)				493		
x 1.265				624		

Production/hour

$$Q = \frac{60 \times q \times E}{Cm} \qquad q=6.1\ m^3,\ E=0.9$$

$$Cm = \frac{n \times Cms}{60 \times Es} + \frac{1}{v_1} + \frac{1}{v_2} + t_1 + t_2$$

$\frac{n \times Cms}{60 \times Es} \doteq 5$ min., $l=0.5$ Km, $v_1 = 30$ Km/hr $= 500$ m/min

$v_2 = 40$ Km/hr $= 666$ m/min, $t_1 = 3$ min, $t_2 = 2$ min

$$Cm = 5 + \frac{500}{666} + \frac{500}{500} + 3 + 2 = 11.8 \text{ min}$$

$$Q = \frac{60 \times 6.1 \times 0.9}{11.8} = 28.0\ m^3/hr$$

Near distance 1,000 m (5-03)

Work Item	Allotment	Unit	Unit Cost (Rp)	Total	Amount Foreign	Local (Rp)
Dump truck 11 ton, production 7.0 m^3/ hr=0.106 hr/m^3						
Depreciation cost	0.037	hr/m^3	5,944	219		
Ownership cost	0.037		0	0		
Fuel, oil	0.037		2,904	107		
Tire cost	0.037		1,100	40		
Driver	0.037		571	21		
Repair & Maintenance	0.037		5,944	219		
Indirect cost	-					
Total (Rp/m^3)				579		
x 1.265				732		

Production/hour

$$Q = \frac{60 \times q \times E}{cm} \qquad q=6.1\ m^3,\ E=0.9$$

$$Cm = \frac{n \times Cms}{60 \times Es} + \frac{1}{v_1} + \frac{1}{v_2} + t_1 + t_2$$

$\frac{n \times Cms}{60 \times Es} \doteqdot 5$ min., l=1.0 Km, v_1 = 30 Km/hr = 500 m/min

v_2 = 40 Km/hr = 666 m/min, t_1 = 3 min, t_2 = 2 min

$$Cm = 5 + \frac{1000}{666} + \frac{1000}{500} + 2 + 2 = 12.5 \text{ min}$$

$$Q = \frac{60 \times 6.1 \times 0.9}{12.5} = 26.4\ m^3/hr$$

Near distance 2000 m (5-04)

Work Item	Allotment	Unit	Unit Cost (Rp)	Total	Amount Foreign	Local (Rp)
Dump truck 11 ton, production 7.0 m^3/ hr=0.106 hr/m^3						
Depreciation cost	0.045	hr/m^3	5,944	268		
Ownership cost	0.045		6,036	0		
Fuel, oil	0.045		2,904	131		
Tire cost	0.045		1,100	50		
Driver	0.045		571	26		
Repair & Maintenance	0.045		5,944	268		
Indirect cost	-			-		
Total (Rp/m^3)				757		
x 1.265				958		

Production/hour

$$Q = \frac{60 \times q \times E}{cm} \qquad q=6.1\ m^3,\ E=0.9$$

$$Cm = \frac{n \times Cms}{60 \times Es} + \frac{1}{v_1} + \frac{1}{v_2} + t_1 + t_2$$

$\frac{n \times Cms}{60 \times Es} \doteqdot 5$ min., l=0.5 Km, v_1 = 30 Km/hr = 500 m/min

v_2 = 40 Km/hr = 666 m/min, t_1 = 3 min, t_2 = 2 min

$$Cm = 5 + \frac{2000}{666} + \frac{2000}{500} + 1 + 2 = 15.0 \text{ min}$$

$$Q = \frac{60 \times 6.1 \times 0.9}{15.0} = 22.0\ m^3/hr$$

Breakdown of Equipment Cost

Equipment	Dump truck 11 ton	
a	Economic life	8 year
b	Operation time per year	2,000 hour/year
c	Basic price	107,314,000 Rp
d	Tire cost	1,650,000 Rp
e	Residual value, 0.1 x (c-d)	10,566,400 Rp
f	Depreciation cost, $\frac{c-d-e}{ab}$	5,944 Rp
g	Ownership cost, $\frac{0.2 \times (a+1) \times c}{2ab}$	6,036 Rp/hr
h	Operation cost, i+j+k+l	4,575 Rp/hr
i	Fuel 0.039 l/hr x 310 ps x 200 Rp/l	2,420 Rp/hr
j	Lubricant, i x 20%	484 Rp/hr
k	Tire cost	1,100 Rp/hr
l	Operator	1,001 Rp/hr
	Operator	0.143 x 7,000 Rp/hr
	Assistant operator	4,500 Rp/hr
	Foreman	5,000 Rp/hr
	Common labour	2,000 Rp/hr
m	Repair and maintenance cost, $\frac{(c-d) \times n}{ab}$	5,944 Rp/hr
n	Ratio of repair and maintenance cost	90 %
o	Direct cost, f+g+h+m	22,499 Rp/hr
p	Indirect cost, 15% of direct cost	3,375 Rp/hr
q	Equipment cost, o+p	25,874 Rp/hr

9. Loading

77 m^3/h

Work Item	Allotment	Unit	Unit Cost (Rp)	Total	Amount Foreign	Local (Rp)
Depreciation cost	0.013	hr/m^3	21,173	275	275	-
Ownership cost	0.013		12,704	165	-	165
Fuel, oil cost	0.013		6,625	86	43	43
Operator & labour	0.013		572	7	-	7
Repair & Maintenance	0.013		21,173	275	165	110
				808	483	325
Total (Rp/m^3)				1,022	-	-

Breakdown of Equipment Cost

Equipment	Tractor Shovel	1.8	m^3
a	Economic life	5	year
b	Operation time per year	2,000	hour/year
c	Basic price	211,728,000	Rp
d	Tire cost		Rp
e	Residual value, 0.1 x (c-d)	21,172,800	Rp
f	Depreciation cost, $\frac{c-d-e}{ab}$	21,173	Rp
g	Ownership cost, $\frac{0.2 \times (a+1) \times c}{2ab}$	12,704	Rp/hr
h	Operation cost, i+j+k+l	7,839	Rp/hr
i	Fuel 0.129 l/hr x 214 ps x 200 Rp/l	5,521	Rp/hr
j	Lubricant, i x 20%	1,104	Rp/hr
k	Tire cost	-	Rp/hr
l	Operator		Rp/hr
	Operator	0.143 x 4,000	Rp/hr
	Assistant operator		Rp/hr
	Foreman		Rp/hr
	Common labour		Rp/hr
m	Repair and maintenance cost, $\frac{(c-d) \times n}{ab}$	21,173	Rp/hr
n	Ratio of repair and maintenance cost	90	%
o	Direct cost, f+g+h+m	22,499	Rp/hr
p	Indirect cost, 15% of direct cost	3,375	Rp/hr
q	Equipment cost, o+p	25,874	Rp/hr

Annex-5

Breakdown of Construction Cost (Economic Cost)

Alternative - A Cikunir Area

B Cikunir Area

C Cikunir Area

D Cikunir Area

E Cikunir Area

Economic Cost of Construction

		A	B	C	D	E
1-01	Crater Lake	3,674.4	3,674.4	3,674.4	3,674.4	3,674.4
2-01	Improvement dike	170.2	170.2	170.2	170.2	170.2
2-02	Check dam	402.9	402.9	402.9	402.9	402.9
2-03	Excavation	1,245.4	1,245.4	1,245.4	1,245.4	1,245.4
2-04	Aggregate plant	656.0	656.0	656.0	656.0	656.0
3-01	Improvement	1,335.7	1,335.7	1,335.7	1,335.7	1,335.7
3-02	Check dam	1,286.3	1,286.3	1,286.3	1,286.3	1,286.3
3-03	Excavation (1)	2,820.9	2,820.9	2,820.9	2,820.9	2,820.9
3-04	Excavation (3) 1st	-	973.0	4,782.5	6,193.3	6,262.7
3-04'	Excavation (3) 2nd	-	1,625.3	0	1,696.8	3,062.0
3-05	Excavation (2) 1st	3,460.3	2,287.7	1,347.3	-	-
3-05'	Excavation (2) 2nd	7,339.3	5,384.3	3,816.8	1,507.6	-
3-06	Aggregate plant	2,073.8	1,659.0	1,214.9	912.0	-
3-07	Operation 1st	2,407.6	1,671.0	1,031.4	-	-
3-07'	Operation 2nd	5,106.6	3,933.0	2,922.0	1,258.7	
3-08	Rising dike	1,399.4	1,708.6	1,935.5	2,477.5	4,290.0
3-09	Diversion cannel	-	1,114.7	1,263.8	1,627.1	2,633.4
3-10	Consolidation dam	693.2	693.2	693.2	693.2	693.2
3-11	Revetment works	881.4	881.4	881.4	881.4	881.4
4-01	Check dam	210.6	210.6	210.6	210.6	210.6
4-01'	Check dam	1,927.2	1,927.2	1,927.2	1,927.2	1,927.2
4-02	Check dam	219.7	219.7	219.7	219.7	219.7
4-.2'	Check dam	325.0	325.0	325.0	325.0	325.0
4-03	Check dam	444.0	444.0	444.0	444.0	444.0
4-03'	Check dam	3,515.6	3,515.6	3,515.6	3,515.6	3,515.6

Note) Excavation (1) for riverbed

Excavation (2) for aggregate

Excavation (3)

2nd stage

1. Breakdown of Construction Cost for Alternative-A

(1) Breakdown of Construction Cost (Crater Lake Tunnel)

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-03	m^3	1,069	36,370	38.9		
1-04	m^3	3,672	38,037	139.7		
1-05	m^3	228	53,336	12.2		
1-06	m^3	1,141	80,645	92.0		
4-02	m^3	1,260	138,401	174.4		
7-01	m	665	2,216,571	1,474.0		
7-02	m	665	575,460	382.7		
8-01	m	90	4,366,780	393.0		
8-02	m	90	890,379	80.1		
15-01	hour	6,600	4,350	28.7		
16-01	m	3,120	82,500	257.4		
Cooling plant				601.3		
Total				3,674.4		

(2) Breakdown of Construction Cost (Ciloseh Area)

(2-1) Dike Improvement

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Excavation						
1-01	m^3	19,956	1,435	28.6		
5-01	m^3	19,956	1,726	34.4		
(2) Embankment						
2-01	m^3	19,956	2,003	40.0		
3-01	m^3	2,646	25,386	67.2		
Total				170.2		

(2-2) Check Dams of Cimampang Area

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	2,640	1,954	5.2		
4-01	m^3	8,800	45,190	397.7		
Total				402.9		

(2-3) Plant operation

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
Plant operation cost	m^3	394,000	1,665	656.0		
Total				656.0		

(2-4) Excavation (2)

(1st stage)

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-01	m^3	394,000	1,435	565.4		
5-01	m^3	394,000	1,726	680.0		
Total				1,245.4		

Note: Excavation 2;

(3) Breakdown of Construction Cost (Cikunir Area)

Dike Improvement (without Ciponyo I Dalam)

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Excavation						
1-01	m^3	125,238	1,435	179.7		
5-01	m^3	125,238	1,726	216.2		
(2) Embankment						
2-01	m^3	125,238	2,003	250.9		
3-01	m^3	27,136	25,386	688.9		
Total				1,335.7		

(4) Breakdown of Construction Cost (Cikunir Area)

Rising Dike (Ciponyo I Dalam)

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Excavation						
1-01	m^3	40,306	1,435	57.8		
5-01	m^3	40,306	1,726	69.6		
(2) Embankment						
2-01	m^3	40,306	2,003	80.7		
4-01	m^3	24,994	45,190	1,129.5		
3-01	m^3	2,436	25,386	61.8		
Total				1,399.4		

(5) Breakdown of Construction Cost (Cikunir Area)

(5-1) Aggregate plant

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	6,648	1,954	13.0		
4-02	m^3	3,708	138,401	513.2		
(2) Material						
Metal	(t)	200	5,620,000	1,124.0	100.0	-
(3) Placing	(t)	335	1,264,500	423.6	-	423.6
Total				2,073.8		

(5-2) Plant Operation Cost

1st stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
Plant operation cost	m^3	1,446,000	1,665	2,407.6		
Total				2,407.6		

(5-3) Excavation (2)

1st stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-01	m^3	1,446,000	1,435	2,075.0		
5-04	m^3	1,446,000	958	1,385.3		
Total				3.460.3		

(5-4) Plant Operation Cost

2nd stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
Plant operation cost	m^3	3,067,000	1,665	5,106.6		
Total				5,106.6		

(5-5) Excavation (2)

2nd stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-01	m^3	3,067,000	1,435	4,401.1		
5-04	m^3	3,067,000	958	2,938.2		
Total				7,339.3		

(6) Breakdown of Construction Cost (Cikunir Area)

(6-1) Excavation (1)

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-01	m^3	1,370,000	1,435	1,966.0		
5-02	m^3	1,370,000	624	854.9		
Total				2,820.9		

(6-2) Excavation (3)

1st stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-01	m^3	0	1,435	0		
5-03	m^3	0	732	0		
Total				0		

(6-3) Excavation (3)

2nd stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-01	m^3	0	1,435	0		
5-03	m^3	0	732	0		
Total				0		

(7) Breakdown of Construction Cost (Cikunir Area)

Diversion cannel

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Excavation						
1-01	m^3	0	1,435	0		
5-01	m^3	0	1,726	0		
(2) Embankment						
2-01	m^3	0	2,003	0		
4-01	m^3	0	45,190	0		
Total				0		

(8) Breakdown of Construction Cost (Cikunir Area)

(8-1) Consolidation dams

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Dike						
1-01	m^3	34,320	1,435	49.2		
2-01	m^3	34,320	2,003	68.7		
4-01	m^3	6,990	45,190	315.9		
5-02	m^3	34,320	624	21.4		
(2) Consolidation dams						
1-02	m^3	1,560	1,954	3.0		
4-01	m^3	5,200	45,190	235.0		
Total				693.2		

(8-2) Revetment works

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-01	m^3	10,817	1,435	15.5		
2-01	m^3	6,490	2,003	13.0		
4-01	m^3	9,615	45,190	434.5		
4-02	m^3	2,975	138,401	411.7		
5-02	m^3	10,817	624	6.7		
Total				881.4		

(9) Breakdown of Construction Cost (Cikunir Area)

Check dam

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	8,430	1,954	16.5		
4-01	m^3	28,100	45,190	1,269.8		
Total				1,286.8		

(10) Breakdown of Construction Cost (Cisaruni Area)

(10-1) Check dams 1st stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	1,380	1,954	2.7		
4-01	m^3	4,600	45,190	207.9		
Total				210.6		

(10-2) Check dams 2nd stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	12,630	1,954	24.7		
5-02	m^3	42,100	45,190	1,902.5		
Total				1,927.2		

(11) Breakdown of Construction Cost (Cikupang Area)

(11-1) Check dams 1st stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	1,440	1,954	2.8		
4-01	m^3	4,800	45,190	216.9		
Total				219.7		

(11-2) Check dams 2nd stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	2,130	1,954	4.2		
4-01	m^3	7,100	45,190	320.8		
Total				325.0		

(12) Breakdown of Construction Cost (Cimerah Area)

(12-1) Check dams 1st stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	2,910	1,954	5.7		
4-01	m^3	9,700	45,190	438.3		
Total				444.0		

(12-2) Check dams 2nd stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	23,040	1,954	45.0		
5-02	m^3	76,800	45,190	3,470.6		
Total				3,515.6		

2. Breakdown of Construction Cost for Alternative-B

(1) Breakdown of Construction Cost (Crater Lake Tunnel)

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-03	m^3	1,069	36,370	38.9		
1-04	m^3	3,672	38,037	139.7		
1-05	m^3	228	53,336	12.2		
1-06	m^3	1,141	80,645	92.0		
4-02	m^3	1,260	138,401	174.4		
7-01	m	665	2,216,571	1,474.0		
7-02	m	665	575,460	382.7		
8-01	m	90	4,366,780	393.0		
8-02	m	90	890,379	80.1		
15-01	hour	6,600	4,350	28.7		
16-01	m	3,120	82,500	257.4		
Cooling plant				601.3		
Total				3,674.4		

(2) Breakdown of Construction Cost (Ciloseh Area)

(2-1) Dike Improvement

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Excavation						
1-01	m^3	19,956	1,435	28.6		
5-01	m^3	19,956	1,726	34.4		
(2) Embankment						
2-01	m^3	19,956	2,003	40.0		
3-01	m^3	2,646	25,386	67.2		
Total				170.2		

(2-2) Check Dams of Cimampang Area

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	2,640	1,954	5.2		
4-01	m^3	8,800	45,190	397.7		
Total				402.9		

(2-3) Plant operation

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
Plant operation cost	m^3	394,000	1,665	656.0		
Total				656.0		

(2-4) Excavation (2)

(1st stage)

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-01	m^3	394,000	1,435	565.4		
5-01	m^3	394,000	1,726	680.0		
Total				1,245.4		

Note: Excavation 2;

(3) Breakdown of Construction Cost (Cikunir Area)

Dike Improvement (without Ciponyo I Dalam)

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Excavation						
1-01	m^3	125,238	1,435	179.7		
5-01	m^3	125,238	1,726	216.2		
(2) Embankment						
2-01	m^3	125,238	2,003	250.9		
3-01	m^3	27,136	25,386	688.9		
Total				1,335.7		

(4) Breakdown of Construction Cost (Cikunir Area)

Rising Dike (Ciponyo I Dalam)

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Excavation						
1-01	m^3	40,306	1,435	57.8		
5-01	m^3	40,306	1,726	69.6		
(2) Embankment						
2-01	m^3	40,306	2,003	80.7		
4-01	m^3	24,994	45,190	1,129.5		
3-01	m^3	2,436	25,386	61.8		
Total				1,399.4		

(5) Breakdown of Construction Cost (Cikunir Area)

(5-1) Aggregate plant

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	5,318	1,954	10.4		
4-02	m^3	2,966	138,401	410.5		
(2) Material						
Metal	(t)	160	5,620,000	899.2		
(3) Placing	(t)	268	1,264,500	338.9		
Total				1,659.0		

(5-2) Plant Operation Cost

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
Plant operation cost	m^3	956,000	1,748	1,671.1		
Total				1,671.1		

(5-3) Excavation (2)

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-01	m^3	956,000	1,435	1,371.9		
5-04	m^3	956,000	958	915.8		
Total				2,287.7		

(5-4) Plant Operation Cost

2nd stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
Plant operation cost	m^3	2,250,000	1,748	3,933.0		
Total				3,933.0		

(5-5) Excavation (2)

2nd stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-01	m^3	2,250,000	1,435	3,228.8		
5-04	m^3	2,250,000	958	2,155.5		
Total				5,384.3		

(6) Breakdown of Construction Cost (Cikunir Area)

(6-1) Excavation (1)

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-01	m^3	1,370,000	1,435	1,966.0		
5-02	m^3	1,370,000	624	854.9		
Total				2,820.9		

(6-2) Excavation (3)

1st stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-01	m^3	449,000	1,435	644.3		
5-03	m^3	449,000	732	328.7		
Total				973.0		

(6-3) Excavation (3)

2nd stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-01	m^3	750,000	1,435	1,076.3		
5-03	m^3	750,000	732	549.0		
Total				1,625.3		

(7) Breakdown of Construction Cost (Cikunir Area)

Diversion cannel

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Excavation						
1-01	m^3	85,500	1,435	122.7		
5-01	m^3	85,500	1,726	147.6		
(2) Embankment						
2-01	m^3	85,500	2,003	171.3		
4-01	m^3	14,895	45,190	673.1		
Total				1,114.7		

(8) Breakdown of Construction Cost (Cikunir Area)

(8-1) Consolidation dams

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Dike						
1-01	m^3	34,320	1,435	49.2		
2-01	m^3	34,320	2,003	68.7		
4-01	m^3	6,990	45,190	315.9		
5-02	m^3	34,320	624	21.4		
(2) Consolidation dams						
1-02	m^3	1,560	1,954	3.0		
4-01	m^3	5,200	45,190	235.0		
Total				693.2		

(8-2) Revetment works

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-01	m^3	10,817	1,435	15.5		
2-01	m^3	6,490	2,003	13.0		
4-01	m^3	9,615	45,190	434.5		
4-02	m^3	2,975	138,401	411.7		
5-02	m^3	10,817	624	6.7		
Total				881.4		

(9) Breakdown of Construction Cost (Cikunir Area)

Check dam

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	8,430	1,954	16.5		
4-01	m^3	28,100	45,190	1,269.8		
Total				1,286.8		

(10) Breakdown of Construction Cost (Cisaruni Area)

(10-1) Check dams 1st stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	1,380	1,954	2.7		
4-01	m^3	4,600	45,190	207.9		
Total				210.6		

(10-2) Check dams 2nd stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	12,630	1,954	24.7		
5-02	m^3	42,100	45,190	1,902.5		
Total				1,927.2		

(11) Breakdown of Construction Cost (Cikupang Area)

(11-1) Check dams 1st stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	1,440	1,954	2.8		
4-01	m^3	4,800	45,190	216.9		
Total				219.7		

(11-2) Check dams 2nd stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	2,130	1,954	4.2		
4-01	m^3	7,100	45,190	320.8		
Total				325.0		

(12) Breakdown of Construction Cost (Cimerah Area)

(12-1) Check dams 1st stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	2,910	1,954	5.7		
4-01	m^3	9,700	45,190	438.3		
Total				444.0		

(12-2) Check dams 2nd stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	23,040	1,954	45.0		
5-02	m^3	76,800	45,190	3,470.6		
Total				3,515.6		

3. Breakdown of Construction Cost for Alternative-C

(1) Breakdown of Construction Cost (Crater Lake Tunnel)

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-03	m^3	1,069	36,370	38.9		
1-04	m^3	3,672	38,037	139.7		
1-05	m^3	228	53,336	12.2		
1-06	m^3	1,141	80,645	92.0		
4-02	m^3	1,260	138,401	174.4		
7-01	m	665	2,216,571	1,474.0		
7-02	m	665	575,460	382.7		
8-01	m	90	4,366,780	393.0		
8-02	m	90	890,379	80.1		
15-01	hour	6,600	4,350	28.7		
16-01	m	3,120	82,500	257.4		
Cooling plant				601.3		
Total				3,674.4		

(2) Breakdown of Construction Cost (Ciloseh Area)

(2-1) Dike Improvement

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Excavation						
1-01	m^3	19,956	1,435	28.6		
5-01	m^3	19,956	1,726	34.4		
(2) Embankment						
2-01	m^3	19,956	2,003	40.0		
3-01	m^3	2,646	25,386	67.2		
Total				170.2		

(2-2) Check Dams of Cimampang Area

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	2,640	1,954	5.2		
4-01	m^3	8,800	45,190	397.7		
Total				402.9		

(2-3) Plant operation

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
Plant operation cost	m^3	394,000	1,665	656.0		
Total				656.0		

(2-4) Excavation (2)

(1st stage)

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-01	m^3	394,000	1,435	565.4		
5-01	m^3	394,000	1,726	680.0		
Total				1,245.4		

Note: Excavation 2;

(3) Breakdown of Construction Cost (Cikunir Area)

Dike Improvement (without Ciponyo I Dalam)

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Excavation						
1-01	m^3	125,238	1,435	179.7		
5-01	m^3	125,238	1,726	216.2		
(2) Embankment						
2-01	m^3	125,238	2,003	250.9		
3-01	m^3	27,136	25,386	688.9		
Total				1,335.7		

(4) Breakdown of Construction Cost (Cikunir Area)

Rising Dike (Ciponyo I Dalam)

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Excavation						
1-01	m^3	84,342	1,435	121.0		
5-01	m^3	84,342	1,726	145.6		
(2) Embankment						
2-01	m^3	84,342	2,003	168.9		
4-01	m^3	29,258	45,190	1,322.2		
3-01	m^3	7,004	25,386	177.8		
Total				1,935.5		

(5) Breakdown of Construction Cost (Cikunir Area)

(5-1) Aggregate plant

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	3,989	1,954	13.1		
4-02	m^3	2,225	138,401	341.7		
(2) Material						
Metal	(t)	115	5,620,000	646.3		
(3) Placing	(t)	200	1,264,500	252.9		
Total				1,214.9		

(5-2) Plant Operation Cost

1st stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
Plant operation cost	m^3	563,000	1,832	1,031.4		
Total				1,031.4		

(5-3) Excavation (2)

1st stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-01	m^3	563,000	1,435	807.9		
5-04	m^3	563,000	958	539.4		
Total				1,347.3		

(5-4) Plant Operation Cost

2nd stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
Plant operation cost	m^3	1,595,000	1,832	2,922.0		
Total				2,922.0		

(5-5) Excavation (2)

2nd stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-01	m^3	1,595,000	1,435	2,288.8		
5-04	m^3	1,595,000	958	1,528.0		
Total				3,816.8		

(6) Breakdown of Construction Cost (Cikunir Area)

(6-1) Excavation (1)

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-01	m^3	1,370,000	1,435	1,966.0		
5-02	m^3	1,370,000	624	854.9		
Total				2,820.9		

(6-2) Excavation (3)

1st stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-01	m^3	2,207,000	1,435	3,167.0		
5-03	m^3	2,207,000	732	1,615.5		
Total				4,782.5		

(6-3) Excavation (3)

2nd stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-01	m^3	0	1,435	0		
5-03	m^3	0	732	0		
Total				0		

(7) Breakdown of Construction Cost (Cikunir Area)

Diversion cannel

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Excavation						
1-01	m^3	103,020	1,435	147.8		
5-01	m^3	103,020	1,726	177.8		
(2) Embankment						
2-01	m^3	103,020	2,003	206.3		
4-01	m^3	16,196	45,190	731.9		
Total				1,263.8		

(8) Breakdown of Construction Cost (Cikunir Area)

(8-1) Consolidation dams

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Dike						
1-01	m^3	34,320	1,435	49.2		
2-01	m^3	34,320	2,003	68.7		
4-01	m^3	6,990	45,190	315.9		
5-02	m^3	34,320	624	21.4		
(2) Consolidation dams						
1-02	m^3	1,560	1,954	3.0		
4-01	m^3	5,200	45,190	235.0		
Total				693.2		

(8-2) Revetment works

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-01	m^3	10,817	1,435	15.5		
2-01	m^3	6,490	2,003	13.0		
4-01	m^3	9,615	45,190	434.5		
4-02	m^3	2,975	138,401	411.7		
5-02	m^3	10,817	624	6.7		
Total				881.4		

(9) Breakdown of Construction Cost (Cikunir Area)

Check dam

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	8,430	1,954	16.5		
4-01	m^3	28,100	45,190	1,269.8		
Total				1,286.8		

(10) Breakdown of Construction Cost (Cisaruni Area)

(10-1) Check dams 1st stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	1,380	1,954	2.7		
4-01	m^3	4,600	45,190	207.9		
Total				210.6		

(10-2) Check dams 2nd stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	12,630	1,954	24.7		
5-02	m^3	42,100	45,190	1,902.5		
Total				1,927.2		

(11) Breakdown of Construction Cost (Cikupang Area)

(11-1) Check dams 1st stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	1,440	1,954	2.8		
4-01	m^3	4,800	45,190	216.9		
Total				219.7		

(11-2) Check dams 2nd stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	2,130	1,954	4.2		
4-01	m^3	7,100	45,190	320.8		
Total				325.0		

(12) Breakdown of Construction Cost (Cimerah Area)

(12-1) Check dams 1st stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	2,910	1,954	5.7		
4-01	m^3	9,700	45,190	438.3		
Total				444.0		

(12-2) Check dams 2nd stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	23,040	1,954	45.0		
5-02	m^3	76,800	45,190	3,470.6		
Total				3,515.6		

4. Breakdown of Construction Cost for Alternative-D

(1) Breakdown of Construction Cost (Crater Lake Tunnel)

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-03	m^3	1,069	36,370	38.9		
1-04	m^3	3,672	38,037	139.7		
1-05	m^3	228	53,336	12.2		
1-06	m^3	1,141	80,645	92.0		
4-02	m^3	1,260	138,401	174.4		
7-01	m	665	2,216,571	1,474.0		
7-02	m	665	575,460	382.7		
8-01	m	90	4,366,780	393.0		
8-02	m	90	890,379	80.1		
15-01	hour	6,600	4,350	28.7		
16-01	m	3,120	82,500	257.4		
Cooling plant				601.3		
Total				3,674.4		

(2) Breakdown of Construction Cost (Ciloseh Area)

(2-1) Dike Improvement

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Excavation						
1-01	m^3	19,956	1,435	28.6		
5-01	m^3	19,956	1,726	34.4		
(2) Embankment						
2-01	m^3	19,956	2,003	40.0		
3-01	m^3	2,646	25,386	67.2		
Total				170.2		

(2-2) Check Dams of Cimampang Area

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	2,640	1,954	5.2		
4-01	m^3	8,800	45,190	397.7		
Total				402.9		

(2-3) Plant operation

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
Plant operation cost	m^3	394,000	1,665	656.0		
Total				656.0		

(2-4) Excavation (2)

(1st stage)

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-01	m^3	394,000	1,435	565.4		
5-01	m^3	394,000	1,726	680.0		
Total				1,245.4		

Note: Excavation 2;

(3) Breakdown of Construction Cost (Cikunir Area)

Dike Improvement (without Ciponyo I Dalam)

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Excavation						
1-01	m^3	125,238	1,435	179.7		
5-01	m^3	125,238	1,726	216.2		
(2) Embankment						
2-01	m^3	125,238	2,003	250.9		
3-01	m^3	27,136	25,386	688.9		
Total				1,335.7		

(4) Breakdown of Construction Cost (Cikunir Area)

Rising Dike (Ciponyo I Dalam)

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Excavation						
1-01	m^3	130,872	1,435	187.8		
5-01	m^3	130,872	1,726	225.9		
(2) Embankment						
2-02	m^3	130,872	2,675	350.1		
4-01	m^3	32,277	45,190	1,458.6		
3-01	m^3	10,049	25,386	255.1		
Total				2,477.5		

(5) Breakdown of Construction Cost (Cikunir Area)

(5-1) Aggregate plant

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	2,992	1,954	5.8		
4-02	m^3	1,669	138,401	231.0		
(2) Material						
Metal	(t)	90	5,620,000	505.8		
(3) Placing	(t)	134	1,264,500	169.4		
Total				912.0		

(5-2) Plant Operation Cost

1st stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
Plant operation cost	m^3	0	1,998	0		
Total				0		

(5-3) Excavation (2)

1st stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-01	m^3	0	1,435	0		
5-04	m^3	0	958	0		
Total				0		

(5-4) Plant Operation Cost

2nd stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
Plant operation cost	m^3	630,000	1,998	1,258.7		
Total				1,258.7		

(5-5) Excavation (2)

2nd stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-01	m^3	630,000	1,435	404.1		
5-04	m^3	630,000	958	603.5		
Total				1,507.6		

(6) Breakdown of Construction Cost (Cikunir Area)

(6-1) Excavation (1)

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-01	m^3	1,370,000	1,435	1,966.0		
5-02	m^3	1,370,000	624	854.9		
Total				2,820.9		

(6-2) Excavation (3)

1st stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-01	m^3	2,858,000	1,435	4,101.2		
5-03	m^3	2,858,000	732	2,092.1		
Total				6,193.3		

(6-3) Excavation (3)

2nd stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-01	m^3	783,000	1,435	1,123.6		
5-03	m^3	783,000	732	573.2		
Total				1,696.8		

(7) Breakdown of Construction Cost (Cikunir Area)

Diversion cannel

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Excavation						
1-01	m^3	147,705	1,435	212.0		
5-01	m^3	147,705	1,726	254.9		
(2) Embankment						
2-01	m^3	147,705	2,003	295.9		
4-01	m^3	19,125	45,190	864.3		
Total				1,627.1		

(8) Breakdown of Construction Cost (Cikunir Area)

(8-1) Consolidation dams

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Dike						
1-01	m^3	34,320	1,435	49.2		
2-01	m^3	34,320	2,003	68.7		
4-01	m^3	6,990	45,190	315.9		
5-02	m^3	34,320	624	21.4		
(2) Consolidation dams						
1-02	m^3	1,560	1,954	3.0		
4-01	m^3	5,200	45,190	235.0		
Total				693.2		

(8-2) Revetment works

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-01	m^3	10,817	1,435	15.5		
2-01	m^3	6,490	2,003	13.0		
4-01	m^3	9,615	45,190	434.5		
4-02	m^3	2,975	138,401	411.7		
5-02	m^3	10,817	624	6.7		
Total				881.4		

(9) Breakdown of Construction Cost (Cikunir Area)

Check dam

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	8,430	1,954	16.5		
4-01	m^3	28,100	45,190	1,269.8		
Total				1,286.8		

(10) Breakdown of Construction Cost (Cisaruni Area)

(10-1) Check dams 1st stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	1,380	1,954	2.7		
4-01	m^3	4,600	45,190	207.9		
Total				210.6		

(10-2) Check dams 2nd stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	12,630	1,954	24.7		
5-02	m^3	42,100	45,190	1,902.5		
Tocal				1,927.2		

(11) Breakdown of Construction Cost (Cikupang Area)

(11-1) Check dams 1st stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	1,440	1,954	2.8		
4-01	m^3	4,800	45,190	216.9		
Total				219.7		

(11-2) Check dams 2nd stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	2,130	1,954	4.2		
4-01	m^3	7,100	45,190	320.8		
Total				325.0		

(12) Breakdown of Construction Cost (Cimerah Area)

(12-1) Check dams 1st stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	2,910	1,954	5.7		
4-01	m^3	9,700	45,190	438.3		
Total				444.0		

(12-2) Check dams 2nd stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	23,040	1,954	45.0		
5-02	m^3	76,800	45,190	3,470.6		
Total				3,515.6		

5. Breakdown of Construction Cost for Alternative-E

(1) Breakdown of Construction Cost (Crater Lake Tunnel)

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-03	m^3	1,069	36,370	38.9		
1-04	m^3	3,672	38,037	139.7		
1-05	m^3	228	53,336	12.2		
1-06	m^3	1,141	80,645	92.0		
4-02	m^3	1,260	138,401	174.4		
7-01	m	665	2,216,571	1,474.0		
7-02	m	665	575,460	382.7		
8-01	m	90	4,366,780	393.0		
8-02	m	90	890,379	80.1		
15-01	hour	6,600	4,350	28.7		
16-01	m	3,120	82,500	257.4		
Cooling plant				601.3		
Total				3,674.4		

(2) Breakdown of Construction Cost (Ciloseh Area)

(2-1) Dike Improvement

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Excavation						
1-01	m^3	19,956	1,435	28.6		
5-01	m^3	19,956	1,726	34.4		
(2) Embankment						
2-01	m^3	19,956	2,003	40.0		
3-01	m^3	2,646	25,386	67.2		
Total				170.2		

(2-2) Check Dams of Cimampang Area

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	2,640	1,954	5.2		
4-01	m^3	8,800	45,190	397.7		
Total				402.9		

(2-3) Plant operation

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
Plant operation cost	m^3	394,000	1,665	656.0		
Total				656.0		

(2-4) Excavation (2)

(1st stage)

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-01	m^3	394,000	1,435	565.4		
5-01	m^3	394,000	1,726	680.0		
Total				1,245.4		

Note: Excavation 2;

(3) Breakdown of Construction Cost (Cikunir Area)

Dike Improvement (without Ciponyo I Dalam)

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Excavation						
1-01	m^3	125,238	1,435	179.7		
5-01	m^3	125,238	1,726	216.2		
(2) Embankment						
2-01	m^3	125,238	2,003	250.9		
3-01	m^3	27,136	25,386	688.9		
Total				1,335.7		

(4) Breakdown of Construction Cost (Cikunir Area)

Rising Dike (Ciponyo I Dalam)

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Excavation						
1-01	m^3	345,392	1,435	495.6		
5-01	m^3	345,392	1,726	596.1		
(2) Embankment						
2-02	m^3	345,392	2,675	923.9		
4-01	m^3	41,263	45,190	1,864.7		
3-01	m^3	16,139	25,386	409.7		
Total				4,290.0		

(5) Breakdown of Construction Cost (Cikunir Area)

(5-1) Aggregate plant

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	0	1,954	0		
4-02	m^3	0	138,401	0		
(2) Material						
Metal	(t)	0	5,620,000	0		
(3) Placing	(t)	0	1,264,5000	0		
Total				0		

(5-2) Plant Operation Cost

1st stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
Plant operation cost	m^3	0	1,998	0		
Total				0		

(5-3) Excavation (2)

1st stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-01	m^3	0	1,435	0		
5-04	m^3	0	958	0		
Total				0		

(5-4) Plant Operation Cost

2nd stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
Plant operation cost	m^3	0	299.8	0		
Total				0		

(5-5) Excavation (2)

2nd stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-01	m^3	0	1,435	0		
5-04	m^3	0	958	0		
Total				0		

(6) Breakdown of Construction Cost (Cikunir Area)

(6-1) Excavation (1)

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-01	m^3	1,370,000	1,435	1,966.0		
5-02	m^3	1,370,000	624	854.9		
Total				2,820.9		

(6-2) Excavation (3)

1st stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-01	m^3	2,890,000	1,435	4,147.2		
5-03	m^3	2,890,000	732	2,115.5		
Total				6,262.7		

(6-3) Excavation (3)

2nd stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-01	m^3	1,413,000	1,435	2,027.7		
5-03	m^3	1,413,000	732	1,034.3		
Total				3,062.0		

(7) Breakdown of Construction Cost (Cikunir Area)

Diversion cannel

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Excavation						
1-01	m^3	288,720	1,435	414.3		
5-01	m^3	288,720	1,726	498.3		
(2) Embankment						
2-01	m^3	288,720	2,003	578.3		
4-01	m^3	25,947	45,190	1,172.5		
Total				2,663.4		

(8) Breakdown of Construction Cost (Cikunir Area)

(8-1) Consolidation dams

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Dike						
1-01	m^3	34,320	1,435	49.2		
2-01	m^3	34,320	2,003	68.7		
4-01	m^3	6,990	45,190	315.9		
5-02	m^3	34,320	624	21.4		
(2) Consolidation dams						
1-02	m^3	1,560	1,954	3.0		
4-01	m^3	5,200	45,190	235.0		
Total				693.2		

(8-2) Revetment works

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-01	m^3	10,817	1,435	15.5		
2-01	m^3	6,490	2,003	13.0		
4-01	m^3	9,615	45,190	434.5		
4-02	m^3	2,975	138,401	411.7		
5-02	m^3	10,817	624	6.7		
Total				881.4		

(9) Breakdown of Construction Cost (Cikunir Area)

Check dam

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	8,430	1,954	16.5		
4-01	m^3	28,100	45,190	1,269.8		
Total				1,286.8		

(10) Breakdown of Construction Cost (Cisaruni Area)

(10-1) Check dams 1st stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	1,380	1,954	2.7		
4-01	m^3	4,600	45,190	207.9		
Total				210.6		

(10-2) Check dams 2nd stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	12,630	1,954	24.7		
5-02	m^3	42,100	45,190	1,902.5		
Total				1,927.2		

(11) Breakdown of Construction Cost (Cikupang Area)

(11-1) Check dams 1st stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	1,440	1,954	2.8		
4-01	m^3	4,800	45,190	216.9		
Total				219.7		

(11-2) Check dams 2nd stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	2,130	1,954	4.2		
4-01	m^3	7,100	45,190	320.8		
Total				325.0		

(12) Breakdown of Construction Cost (Cimerah Area)

(12-1) Check dams 1st stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	2,910	1,954	5.7		
4-01	m^3	9,700	45,190	438.3		
Total				444.0		

(12-2) Check dams 2nd stage

Item	Unit	Quantity	Unit Price (Rp)	Amount (Rpx10^6)	Foreign (¥x10^6)	Local (Rpx10^6)
1. Civil Work						
(1) Main Work						
1-02	m^3	23,040	1,954	45.0		
5-02	m^3	76,800	45,190	3,470.6		
Total				3,515.6		

Annex-6

(x 10^6 Rp)

		1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	Total
Cikunir area	A	2,066.9	6,430.7	6,286.3	4,520.4	4,507.7	4,709.0	3,390.6	3,390.6	3,390.7	3,390.7	42,083.5
	B	2,057.1	7,803.1	6,786.1	4,334.0	2,723.2	4,147.8	2,989.0	2,989.0	2,988.8	2,988.5	39,806.6
	C	2,345.5	8,335.1	7,815.6	5,398.9	4,082.2	2,514.9	1,801.3	1,801.3	1,801.3	1,801.0	37,697.0
	D	2,304.8	9,766.9	9,117.6	4,682.5	3,687.0	1,670.4	1,197.8	1,197.8	1,197.8	1,198.0	36,020.6
	E	2,566.0	10,212.4	10,212.1	5,364.7	5,363.9	886.7	886.7	886.7	886.7	886.5	38,152.4
Ciloseh area		523.3	-	-	252.4	2,845.2	-	-	-	-	-	3,620.9
Cisaruni area		44.6	263.9	-	-	-	536.8	536.8	536.8	537.0	536.9	2,992.8
Cikupang area		46.5	-	275.2	-	-	-	-	-	226.2	226.3	774.2
Cimerah area		73.3	-	-	278.0	278.1	979.3	979.3	979.3	979.4	979.7	5,526.4
Crater lake		466.3	1,228.1	1,228.1	1,228.1	1,228.3	-	-	-	-	-	5,378.9

(2) 1st stage (Cikunir Area) (Area II) ** A **

(x 10^6 Rp)

	1st	2nd	3rd	4th	5th	Grand Total
1. Civil works						
1.1 Equipment (operating cost)	-	-	802.5	802.5	802.6	2,407.6
1.2 Plant	-	2,073.8	-	-	-	2,073.8
1.3 Embankment	-	658.8	658.8	658.8	658.9	2,635.3
1.4 Excavation 1	-	1,410.5	1,410.4	-	-	2,820.9
1.5 Excavation 2	-	-	1,153.4	1,153.4	1,153.5	3,460.3
1.6 Check dam (check)	-	321.6	321.6	321.6	321.5	1,286.3
1.7 Revetment works	-	393.7	393.7	393.7	393.5	1,574.6
1.8 Preparatory	-	340.0	331.8	233.1	233.1	1,138.0
Sub Total	-	5,198.4	5,072.2	3,563.1	3,563.1	17,396.8
2. Land acquisition	-	108.1	108.9	78.4	65.8	361.2
3. Government administration	-	259.9	253.6	178.2	178.1	869.8
Sub Total	-	5,566.4	5,434.7	3,819.7	3,807.0	18,627.8
4. Engineering services	1,879.0	313.1	313.1	313.1	313.1	3,131.4
5. Contingency	187.9	551.2	538.5	387.6	387.6	2,052.8
Total	2,066.9	6,430.7	6,286.3	4,520.4	4,507.7	23,812.0

Note: Excavation 1 stocking sediment

: Excavation 2 for aggregate

: Maintenance 65.0 x 10^6 Rp/year

(3) 2nd stage (Cikunir Area) (Area II) ** A **

(x 10^6 Rp)

	6th	7th	8th	9th	10th	Grand Total
1. Civil works						
1.1 Excavation 2	1,467.9	1,467.9	1,467.9	1,467.8	1,467.8	7,339.3
1.2 Plant	1,021.3	1,021.3	1,021.3	1,021.3	1,021.4	5,106.6
1.3 Preparatory	174.2	174.2	174.2	174.3	174.3	871.2
Sub Total	2,663.4	2,663.4	2,663.4	2,663.4	2,663.5	13,317.1
2. Land acquisition	64.0	64.0	64.0	64.0	64.0	320.0
3. Government administration	133.1	133.2	133.2	133.2	133.2	665.9
Sub Total	2,860.5	2,860.6	2,860.6	2,860.6	2,860.7	14,303.0
4. Engineering services	1,438.3	239.7	239.7	239.7	239.7	2,397.1
5. Contingency	410.2	290.3	290.3	290.3	290.3	1,571.4
Total	4,709.0	3,390.6	3,390.6	3,390.6	3,390.7	18,271.5

Note: Excavation volume 3,067 x 10^3 m^3

: Excavation 2: for aggregate

(2) 1st stage (Cikunir Area) (Area II) ** B **

(x 10^6 Rp)

	1st	2nd	3rd	4th	5th	Grand Total
1. Civil works						
1.1 Dike improvement	-	333.9	333.9	333.9	334.0	1,335.7
1.2 Rising Dike	-	536.3	536.3	536.2	-	1,608.8
1.3 Aggregate plant	-	1,659.0	-	-	-	1,659.0
1.4 Operation cost	-	-	557.0	557.0	557.0	1,671.0
1.5 Excavation 1	-	1,410.5	1,410.4	-	-	2,820.9
1.6 Excavation 2	-	762.6	762.6	762.5	-	2,287.7
1.7 Excavation 3	-	274.9	274.9	274.9	275.0	824.8
1.8 Dimension cannel	-	557.3	557.4	-	-	1,114.7
1.9 Check dam (check)	-	321.6	321.6	321.6	321.5	1,286.3
1.10 Revetment	-	393.7	393.7	393.7	393.5	1,574.6
1.11 Preparatory	-	418.2	360.3	222.6	131.7	1,132.8
Sub Total	-	6,393.1	5,508.1	3,402.4	2,012.7	17,316.3
2. Land acquisition	-	108.1	108.9	78.4	65.8	361.2
3. Government administration	-	319.7	275.4	170.1	100.6	865.8
Sub Total	-	6,820.9	5,892.4	3,650.9	2,179.1	18,543.3
4. Engineering services	1,870.1	311.7	311.7	311.7	311.7	3,116.9
5. Contingency	187.0	670.5	582.0	371.4	232.4	2,043.3
Total	2,057.1	7,803.1	6,786.1	4,334.0	2,723.2	23,703.5

Note: Excavation 1: stocking sediment
Excavation 2: for aggregate
Excavation 3:

(3) 2nd stage (Cikunir Area) (Area II) ** B **

(x 10^6 Rp)

	6th	7th	8th	9th	10th	Grand Total
1. Civil works						
1.1 Operation cost	786.6	786.6	786.6	786.6	786.6	3,933.0
1.2 Excavation 2	1,076.9	1,076.9	1,076.9	1,076.9	1,076.7	5,384.3
1.3 Excavation 3	325.1	325.1	325.1	325.0	325.0	1,625.3
1.4 Preparatory	153.2	153.2	153.2	153.2	153.2	766.0
Sub Total	2,341.8	2,341.8	2,341.8	2,341.7	2,341.5	11,708.6
2. Land acquisition	64.0	64.0	64.0	64.0	64.0	320.0
3. Government administration	117.1	117.1	117.1	117.1	117.0	585.4
Sub Total	2,522.9	2,522.9	2,522.9	2,522.8	2,522.5	12,614.0
4. Engineering services	1,264.3	210.8	210.8	210.8	210.8	2,107.5
5. Contingency	360.6	255.3	255.3	255.2	255.2	1,381.6
Total	4,147.8	2,989.0	2,989.0	2,988.8	2,988.5	16,103.1

Note: Excavation 2: for aggregate

: Excavation 3:

(2) 1st stage (Cikunir Area) (Area II) ** C **

(x 10^6 Rp)

	1st	2nd	3rd	4th	5th	Grand Total
1. Civil works						
1.1 Dike improvement	-	333.9	333.9	333.9	334.0	1,335.7
1.2 Rasing dike	-	648.5	648.5	648.6	-	1,945.6
1.3 Aggregate plant	-	1,214.9	-	-	-	1,214.9
1.4 Operation cost	-	-	343.8	343.8	343.8	1,031.4
1.5 Excavation 1	-	1,410.5	1,410.4	-	-	2,820.9
1.6 Excavation 2	-	-	449.1	449.1	449.1	1,347.3
1.7 Excavation 3	-	1,158.0	1,158.0	1,158.0	1,157.8	4,631.8
1.8 Diversion cannel	-	421.3	421.3	421.2	-	1,263.8
1.9 Check dam (check)	-	321.6	321.6	321.6	321.5	1,286.3
1.10 Revetment	-	393.7	393.7	393.7	393.5	1,574.6
1.11 Preparatory	-	413.2	383.6	284.9	210.0	1,291.7
Sub Total	-	6,315.6	5,863.9	4,354.8	3,209.7	19,744.0
2. Land acquisition	-	681.2	681.2	-	-	1,362.4
3. Government administration	-	315.8	293.2	217.7	160.5	987.2
Sub Total	-	7,312.6	6,838.3	4,572.5	3,370.2	22,093.6
4. Engineering services	2,132.3	355.4	355.4	355.4	355.4	3,553.9
5. Contingency	213.2	667.1	621.9	471.0	356.6	2,329.8
Total	2,345.5	8,335.1	7,815.6	5,398.9	4,082.2	27,977.3

Note: Excavation 1 stocking sediment

: Excavation 2 for aggregate

: Excavation 3

(3) 2nd stage (Cikunir Area) (Area II) ** C **

(x 10^6 Rp)

	6th	7th	8th	9th	10th	Grand Total
1. Civil works						
1.1 Operation cost	584.4	584.4	584.4	548.4	548.4	2,922.0
1.2 Excavation 2	763.4	763.4	763.4	763.4	763.2	3,816.8
1.3 Preparatory	94.3	94.3	94.4	94.4	94.3	471.7
Sub Total	1,442.1	1,442.1	1,442.2	1,442.2	1,441.9	7,210.5
2. Land acquisition	-	-	-	-	-	0
3. Government administration	72.1	72.1	72.1	72.1	72.1	360.5
Sub Total	1,514.2	1,514.2	1,514.3	1,514.3	1,514.0	7,571.0
4. Engineering services	778.7	129.8	129.8	129.8	129.8	1,297.9
5. Contingency	222.0	157.2	157.2	157.2	157.2	850.8
Total	2,514.9	1,801.2	1,801.3	1,801.3	1,801.0	9,719.7

Note: Excavation 2 for aggregate.

(2) 1st stage (Cikunir Area) (Area II) ** D **

(x 10^6 Rp)

	1st	2nd	3rd	4th	5th	Grand Total
1. Civil works						
1.1 Dike improvement	-	333.9	333.9	333.9	334.0	1,335.7
1.2 Rising dike	-	808.9	808.9	808.9	-	2,426.7
1.3 Plant	-	912.0	-	-	-	912.0
1.4 Excavation 1	-	1,410.5	1,410.4	-	-	2,820.9
1.5 Excavation 3	-	1,539.0	1,539.0	1,539.0	1,539.0	6,156.0
1.6 Diversion cannel	-	809.9	809.9	-	-	1,619.8
1.7 Check dam (check)	-	321.6	321.6	321.6	321.5	1,286.3
1.8 Revetment	-	393.7	393.7	393.7	393.5	1,574.6
1.9 Preparatory	-	349.3	429.1	273.7	217.1	1,269.2
Sub Total	-	6,878.8	6,046.5	3,670.8	2,805.8	19,401.2
2. Land acquisition	-	1,703.0	1,703.0	-	-	3,406.0
3. Government administration	-	267.0	328.0	209.2	165.9	970.1
Sub Total	-	8,848.8	8,077.5	3,880.0	2,971.0	23,777.3
4. Engineering services	2,095.3	349.2	349.2	349.2	349.3	3,492.2
5. Contingency	209.5	568.9	690.9	453.3	366.7	2,289.3
Total	2,304.8	9,766.9	9,117.6	4,682.5	3,687.0	29,558.8

Note: Excavation 1 stocking sediment

: Excavation 2 for aggregate

: Excavation 3

(3) 2nd stage (Cikunir Area) (Area II) ** D **

(x 10^6 Rp)

	6th	7th	8th	9th	10th	Grand Total
1. Civil works						
1.1 Operation cost	251.7	251.7	251.7	251.7	251.9	1,258.7
1.2 Excavation 2	301.5	301.5	301.5	301.5	301.6	1,507.6
1.3 Excavation 3	339.4	339.4	339.4	339.4	339.2	1,696.8
1.4 Preparatory	62.5	62.5	62.5	62.5	62.5	312.6
Sub Total	955.1	955.1	955.1	955.1	955.2	4,775.6
2. Land acquisition	-	-	-	-	-	0
3. Government administration	47.8	47.8	47.8	47.8	47.8	239.0
Sub Total	1,002.9	1,002.9	1,002.9	1,002.9	1,003.0	5,014.6
4. Engineering services	515.6	86.0	86.0	86.0	86.0	859.6
5. Contingency	151.9	108.9	108.9	108.9	109.0	587.6
Total	1,670.4	1,197.8	1,197.8	1,197.8	1,198.0	6,461.8

(2) 1st stage (Cikunir Area) (Area II) ** E **

(x 10^6 Rp)

	1st	2nd	3rd	4th	5th	Grand Total
1. Civil works						
1.1 Dike improvement	-	333.9	333.9	333.9	334.0	1,335.7
1.2 Rising dike	-	1,014.5	1,014.5	1,014.5	1,014.4	4,057.9
1.3 Excavation 1	-	1,410.5	1,410.4	-	-	2,820.9
1.4 Excavation 3	-	1,567.3	1,567.3	1,567.3	1,567.2	6,269.1
1.5 Diversion cannel	-	1,420.8	1,420.7	-	-	2,841.5
1.6 Check dam (Check)	-	321.6	321.6	321.6	321.5	1,286.3
1.7 Revetment	-	393.7	393.7	393.7	393.5	1,574.6
1.8 Preparatory	-	452.4	452.3	254.2	254.1	1,413.0
Sub Total	-	6,914.7	6,914.4	3,885.2	3,884.7	21,599.0
2. Land acquisition	-	1,634.8	1,634.8	408.7	408.7	4,087.0
3. Government administration	-	345.7	345.7	194.3	194.2	1,079.9
Sub Total	-	8,895.2	8,894.9	4,488.2	4,487.6	26,765.9
4. Engineering services	2,332.7	388.8	388.8	388.8	388.7	3,887.8
5. Contingency	233.3	928.4	928.4	487.7	487.6	3,065.4
Total	2,566.0	10,212.4	10,212.1	5,364.7	5,363.9	33,719.1

Note: Excavation 1 stocking sediment

: Excavation 2 for aggregate

(3) 2nd stage (Cikunir Area) (Area II) ** E **

(x 10^6 Rp)

	6th	7th	8th	9th	10th	Grand Total
1. Civil works						
1.1 Maintenance	612.4	612.4	612.4	612.4	612.4	3,062.0
1.2 Preparatory	42.9	42.9	42.9	42.9	42.9	214.5
Sub Total	655.3	655.3	655.3	655.3	655.3	3,276.5
2. Land acquisition	-	-	-	-	-	0
3. Government administration	32.8	32.8	32.8	32.8	32.8	164.0
Sub Total	688.1	688.1	688.1	688.1	688.1	3,440.5
4. Engineering services	118.0	118.0	118.0	118.0	117.8	589.8
5. Contingency	80.6	80.6	80.6	80.6	80.6	403.0
Total	886.7	886.7	886.7	886.7	886.5	4,433.3

Note: Excavation volume 3,067 x 10^3 m^3
: Aggregate plant 3,067 x 10^3 m^3

(1) 1st stage (Ciloseh Area) (Area I)

(x 10^6 Rp)

		1st	2nd	3rd	4th	5th	Grand Total
1.	Civil works						
1.1	Embankment	-	-	-	-	169.2	169.2
1.2	Excavation 1	-	-	-	-	1,245.4	1,245.4
1.3	Check dams	-	-	-	201.5	201.5	403.0
1.4	Operation plant	-	-	-	-	656.0	656.0
1.5	Preparatory	-	-	-	14.1	159.1	173.2
2.	Land acquisition	-	-	-	4.4	49.3	53.7
3.	Government administration	-	-	-	10.8	121.6	132.4
	Sub Total	-	-	-	230.8	2,602.1	2,832.9
4.	Engineering services	475.7	-	-	-	-	475.7
5.	Contingency	47.6	-	-	21.6	243.1	312.3
	Total	523.3	-	-	252.4	2,845.2	3,620.9

Note: Excavation volume 394 x 10^3 m^3

: Aggregate plant heire cost

: Maintenance 28.6 x 10^6 Rp/year

(2) 1st stage (Cisaruni Area) (Area III)

(x 10^6 Rp)

		1st	2nd	3rd	4th	5th	Grand Total
1.	Civil works						
1.1	Check dams	-	210.6	-	-	-	210.6
1.2	Preparatory	-	14.7	-	-	-	14.7
2.	Land acquisition	-	4.8	-	-	-	4.8
3.	Government administration	-	11.3	-	-	-	11.3
	Sub Total	-	241.4	-	-	-	241.4
4.	Engineering services	40.5	-	-	-	-	40.5
5.	Contingency	4.1	22.5	-	-	-	26.6
	Total	44.6	263.9	-	-	-	308.5

Note: Maintenance 10.5 x 10^6 Rp/year

(3) 2nd stage (Cisaruni Area) (Area II)

(x 10^6 Rp)

		6th	7th	8th	9th	10th	Grand Total
1.	Civil works						
1.1	Check dams	385.4	385.4	385.4	385.5	385.5	1,927.2
1.2	Preparatory	27.0	27.0	27.0	26.9	26.9	134.9
2.	Land acquisition	8.2	8.2	8.2	8.3	8.3	41.2
3.	Government administration	20.6	20.6	20.6	20.6	20.6	103.0
	Sub Total	441.2	441.2	441.2	441.4	441.3	2,206.3
4.	Engineering services	49.4	49.4	49.4	49.4	49.4	247.0
5.	Contingency	46.2	46.2	46.2	46.2	46.2	231.0
	Total	536.8	536.8	536.8	537.0	536.9	2,684.3

(4) 1st stage (Cikupang Area) (Area IV)

(x 10^6 Rp)

		1st	2nd	3rd	4th	5th	Grand Total
1.	Civil works						
1.1	Check dams	-	-	219.7	-	-	219.7
1.2	Preparatory	-	-	15.4	-	-	15.4
2.	Land acquisition	-	-	4.8	-	-	4.8
3.	Government administration	-	-	11.8	-	-	11.8
	Sub Total			251.7			251.7
4.	Engineering services	42.3	-	-	-	-	42.3
5.	Contingency	4.2	-	23.5	-	-	27.7
	Total	44.5	-	275.2	-	-	321.7

Note: Maintenance 10.5 x 10^6 Rp/year

(5) 2nd stage (Cisaruni Area) (Area IV)

(x 10^6 Rp)

		6th	7th	8th	9th	10th	Grand Total
1.	Civil works						
1.1	Check dams	-	-	-	162.5	162.5	325.0
1.2	Preparatory	-	-	-	11.4	11.4	22.8
2.	Land acquisition	-	-	-	3.3	3.4	6.7
3.	Government administration	-	-	-	8.7	8.7	17.4
	Sub Total	-	-	-	185.9	186.0	371.9
4.	Engineering services	-	-	-	20.8	20.8	41.6
5.	Contingency	-	-	-	19.5	19.5	39.0
	Total	-	-	-	226.2	226.3	452.5

(6) 1st stage (Cimerah Area) (Area V)

(x 10^6 Rp)

		1st	2nd	3rd	4th	5th	Grand Total
1.	Civil works						
1.1	Check dams	-	-	-	222.0	222.0	444.0
1.2	Preparatory	-	-	-	15.5	15.6	31.1
2.	Land acquisition	-	-	-	4.8	4.8	9.6
3.	Government administration	-	-	-	11.9	11.9	23.8
	Sub Total	-	-	-	254.2	254.3	508.5
4.	Engineering services	66.6	-	-	-	-	66.6
5.	Contingency	6.7	-	-	23.8	23.8	54.3
	Total	73.3	-	-	278.0	278.1	629.4

Note: Maintenance 11.1 x 10^6 Rp/year

(7) 2nd stage (Cisaruni Area) (Area V)

(x 10^6 Rp)

		6th	7th	8th	9th	10th	Grand Total
1.	Civil works						
1.1	check dams	703.1	703.1	703.1	703.1	703.2	3,515.6
1.2	Preparatory	49.2	49.2	49.2	49.2	49.3	246.1
2.	Land acquisition	15.1	15.1	15.1	15.2	15.2	75.7
3.	Government administration	37.6	37.6	37.6	37.6	37.6	188.0
	Sub Total	805.0	805.0	805.0	805.1	805.3	4,025.4
4.	Engineering services	90.1	90.1	90.1	90.1	90.1	450.5
5.	Contingency	84.2	84.2	84.2	84.2	84.3	421.1
	Total	979.3	979.3	979.3	979.4	979.7	4,897.0

(8) 1st stage (Cimerah Area) (Area VI)

(x 10^6 Rp)

		1st	2nd	3rd	4th	5th	Grand Total
1.	Civil works						
1.1	Check dams	-	918.6	918.6	918.6	918.6	3,674.4
1.2	Preparatory	-	64.3	64.3	64.3	64.3	257.2
2.	Land acquisition	-	20.1	20.1	20.1	20.2	80.5
3.	Government administration	-	49.1	49.1	49.1	49.1	196.4
	Sub Total		1,052.1	1,052.1	1,052.1	1,052.2	4,208.5
4.	Engineering services	423.9	70.7	70.7	70.7	70.7	706.7
5.	Contingency	42.4	105.3	105.3	105.3	105.4	463.7
	Total	466.3	1,228.1	1,228.1	1,228.1	1,228.3	5,378.9

Note: Maintenance 45.90 x 10^6 Rp/year

THE REPUBLIC OF INDONESIA

THE FEASIBILITY STUDY OF THE DISASTER PREVENTION PROJECT IN THE SOUTHEASTERN SLOPE OF MT. GALUNGGUNG

S U P P O R T I N G R E P O R T (V)

PROJECT EVALUATION

DECEMBER 1988

JAPAN INTERNATIONAL COOPERATION AGENCY

Supporting Report (V) (Project Evaluation)

Contents

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Table List

Figure List

1. Introduction

The Disaster Prevention Project in the southeastern slope of Mt. Galunggung has been planned for the purpose of the sediment control and the countermeasure of the crater lake on five (5) rivers in S. Ciloseh, S. Cikunir, S. Cikupang and S. Cimerah.

In this supporting report, the project was evaluated economically on the basis of its economic cost and the annual economic benefit with project.

The economic value of the project was evaluated by estimating the internal economic rate of return (IRR) and the order of priority of the project was assessed not only by IRR but also from the viewpoint of the new present value (NPV).

The annual economic benefit of the project was made equal to the annual mean damage mitigation amount expected with project. The annual mean damage mitigation amount is the difference between the annual mean damage amount without project and the one with project.

The expected effects of the annual mean damage mitigation amount with project are valued by three items of the flooding in the possible disaster area, the mitigation of the direct and indirect damage caused by the sedimentation and the water conservation in the water supply district of the irrigation channel Cikunten I (referred to below as the "Irrigation Area").

The damage amount was estimated in consideration of the possible disaster area's flooding area, inundation depth and deposited sediment thickness which were consequently derived from the flooding analysis on the sediment runoff characteristics and the flood runoff characteristics of each catchment.

The direct damage was made to be the damage amount of general assets, agricultural products and public facilities. The indirect damage was to be the economic aid for the people in the damage area. The damage amount at the irrigation area was to be the decreased amount of the rice crop.

The estimation of the economic cost is described in the Supporting Report IV.

2. FLOODING ANALYSIS

2.1 Method of Flooding Analysis

The obtained effects by executing the disaster prevention projects are the decrease of the damage by flooding and the damage by sediment flooding. The damage by flooding and the sediment runoff is estimated based on the flooding analysis. Namely, the flooding area, the inundation depth and the deposited sediment thickness presumed in the flooding analysis is used for estimating the economic benefit with project.

Therefore, the flooding analysis will be practiced in two (2) cases, one is with project and the other is without project.

The sediment volume and the flood discharge being studied in this flooding analysis are the design excess sediment volume and the probable peak discharge of each river in the disaster prevention plan examined in this study. However, the sediment volume and the flood discharge studied in the flooding analysis of the countermeasure of crater lake will be estimated in this flooding analysis.

In this study, the damage without project are the damage by flood and the damage by sediment deposit which occur by the excess sediment volume depositing in the river channels and the flooding district.

On the other hand, the damage with project is only the damage by flooding in principle. But, in S. Ciloseh Area, the excavated sediment volume during 10 years of the project executing period is 20% of the design excess sediment volume. So, in S. Ciloseh, the damage by the excess sediment volume over the design excavated sediment volume with project will be estimated.

The flow chart of the flooding analysis is as shown in Fig. - 2.1.

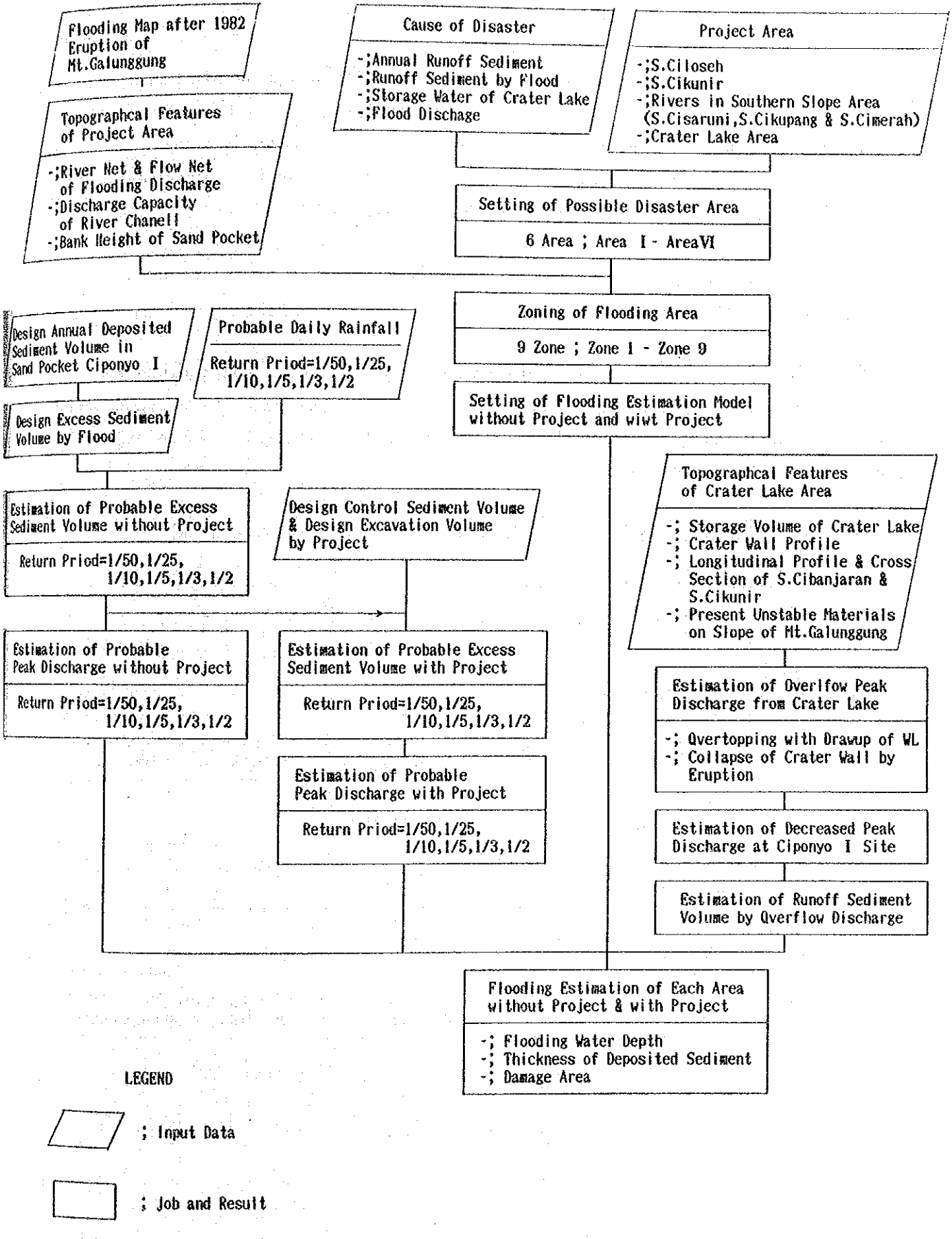

Fig.- 2.1 Flow Chart of Flooding Analysis