Appendix 15.1 Present Condition of the Study Area

1. Physical - Chemical Environmental Component

(1) Geography

1) Topography

The study area is located in Surabaya municipality and adjacent area. The topographic characteristics of the area in Surabaya municipality is flat condition ranging from 0 m to 20 m altitude spreading to eastern, northern and southern part of the study area. The coastal area of the area is ranging from 1 m to 3 m above the sea level.

The other part of the area has also flat condition ranging from 10 m to 20 m altitude generally be found in the western and southern part of Surabaya which is Sawahan, Karangpilang, Benowo, Lakarsantri and Tandes Districts.

2) Geology

The characteristic of soil and rock geology in the study area and surrounding area is comprising some rock formation such as Alluvium, Kabuh, Pacungan, Sonde, Madura and Lidah Formations. The Alluvium formation covers large part of the area and approximately 70 % of Kotamadya Surabaya area. The characteristic and distribution of each formation are as follows:

a. Alluvium Formation

This alluvium formation consist of pebble, gravel, clay and shell fragment. This rock distribution obtain in a large part of Surabaya area covers Northern, Southern and Eastern part of the area.

b. Kabuh Formation

The Kabuh formation has characteristics such as sand stone and gravel, dark gray color and crease grain, crisscross, conglomerate. This rock formation is distributed in some part of Rungkut District, Wonocolo District, Tenggilis Mejoyo District, Wiyung District, Karang Pilang District, Lakarsantri District, Tandes District, Sukamanunggal District, Benowo District and Dukuh Pakis District.

c. Pucangan Formation

Characteristics of the Pucangan formation are divided by two part of surface rock layer covers :

i. Upper surface layer

-Tuffaceous sand stone
-Crisscross

ii. Lower surface layer

- Tuffaceous stand stone, insertion with conglomerate and clay stone
- Mollusks fossil and plankton

This formation can be seen surrounding central, western and southern part of Surabaya which is between Kabuh formation and Lidah formation. Particularly this formation spreads to Dukuh Pakis District, Sawahan District, Sukamanunggal District, Tandes District, Benowo District, Wiyung District, Lokarsantri District, Karangpilang District and Gubung District.

d. Lidah Formation

The Lidah formation is located in some part of Wonokromo District, Sawahan District, Dukuh Pakis District, Lakarsantri District, Karang Pilang District and Gubung District.

e. Madura Formation

This formation is located in Benowo District in Surabaya and Gresik Regency. The characteristics of this rock are :

i. Upper surface layer
-Limestone
-Black or brown color

ii. Lower surface layer
-Limestone, consist of mollusks, slightly land
-Yellowish white color

f. Sonde Formation
This formation is seen in around border of Surabaya and Gresik Regency. This rock compose of tuffaceous clay, diatome and scattered of limestone.

3) Type of Soil

The type of soil in the study area composes alluvium and greenmosol. The characteristics of each soil type are as follows :

a. Alluvium

The alluvium is formed by cause of sedimentation process from river flow with long period. This soil type is appropriate for agriculture due to consist of clay sedimentation mixed with fire sand, grayish black with good permeability. The alluvium is divided by three types which is hydromorph alluvium, dark gray alluvium and gray alluvium.

b. Greemosol

The greemosol is formed from natural rock crushing. This soil includes neutral acid, brown and gray, clay texture, poor drainage and porosity and possibility of erosion occurrence. This soil is seen only western and southern Surabaya, Gresik and Sidoarjo. The soil distribution by type in Surabaya and surrounding area is shown in following table.

Table A15.1.1 Soil Type in Surabaya

Type of Soil	Area (ha)	Percentage (%)
Alluvium	26,740.57	81.93
Grey alluvium	16,498.98	50.55
Dark Gray Alluvium	4,377.44	13.41
Hydromorph	5,864.14	17.97
Dark Gray Gremosol	5,896.12	18.07

Source : Regional Planning 2005

(2) Climate

SMA (Surabaya Metropolitan Area) experiences a tropical climate with the dry season which is generally starting from May to October, and rainy season which is starting from November to April. An annual average temperature is 28.65°C, maximum monthly average temperature is 36.3°C in November and minimum monthly average temperature is 20.5°C in July.

According to the precipitation data, an annual precipitation is 1,270 mm which is about 90% concentrated in the rainy season from November to April. The maximum monthly precipitation is 261.8 mm in January and the minimum 5.6 mm in August.

The northerly monsoon, which prevails from November to February, brings heavy rain during rainy season. The southeast Trade Wind maintains slightly cooler in the dry season carrying milder air from Australian continent. Wind velocity normally ranges from 3 to 20 knots and is relatively constant throughout the year. Only once had 50 knots wind recorded and destructive winds are rare. The

northerly monsoon air stream is modified in Madura Island and the Java coast line.

Table A15.1.2 Temperature, Humidity and Precipitation

Month	Temperature (°C)		Precipitation	Humidity (%)		Air Pressure (Mbs)		Sunshine (%)	Rain Days
	Max	Min	(mm)	Max	Min	Max	Min		
January	34.6	23.7	287	97.0	56.0	1,011.6	1,007.8	62.0	29
February	34.7	24.0	274	97.0	53.0	1,011.4	1,008.0	54.0	23
March	33.2	23.4	375	95.0	58.0	1,013.3	1,007.0	42.0	27
April	33.8	24.3	128	97.0	54.0	1,012.4	1,008.9	65.0	10
May	34.3	22.1	8	89.0	42.0	1,013.6	1,009.7	89.0	4
Jun	33.3	21.4	-	89.0	45.0	1,013.8	1,009.4	92.0	1
July	32.8	20.5	-	89.0	42.0	1,014.3	1,010.9	94.0	-
August	33.0	20.7	-	89.0	37.0	1,015.2	1,011.9	98.0	-
September	34.0	23.0	-	80.0	32.0	1,015.7	1,012.8	93.0	-
October	36.2	23.2	-	83.0	27.0	1,015.5	1,011.3	85.0	-
November	36.3	25.8	18	83.0	38.0	1,013.4	1,009.5	83.0	8
December	34.8	24.4	180	93.0	52.0	1,013.3	1,009.0	60.0	22
Total	-	-	1,265	-	-	-	-	-	124
Average	34.3	23.0	105	90.0	45.0	1,013.5	1,009.7	76.0	10

Source: Perak II Meteorological Station

Table A15.1.3 Wind Velocity and Wind Direction in Perak II Station

Month	Number of Wind Direction	Average of Wind Velocity (Knot)	Maximum of Wind Direction	Max. Wind Velocity (Knot)	Time in Max (WIB)	Number of Days
January	360	5.00	340	25.00	16:45	7
February	360	5.00	330	25.00	13:50	24
March	090	5.00	030	27.00	14:56	7
April	020	5.00	090	19.00	12:57	27
May	090	5.00	070	25.00	15:34	10
Jun	160	5.00	160	24.00	12:10	22
July	130	5.00	120	25.00	11:00	24
August	130	6.00	090	28.00	13:46	11
September	130	6.00	130	25.00	14:30	21
October	090	6.00	120	26.00	13:55	23
November	090	4.00	100	25.00	10:40	6
December	360	5.00	090	23.00	13:04	3
Average	-	5.17	-	24.75	-	-

Source: Perak II Meteorological Station

(3) Hydrology and water quality

1) River System

Three river systems, Brantas river in the south, Bengawan Solo in the north and Lamong river in the west influence directly to the study area.

Brantas River

The Brantas river is the second largest river in Java Island. A total length of main stream is approximately 320 km with 12,000 km² river basin. The annual precipitation in the basin is approximately 2,000 mm which receive about 80% from the rainy season between November to April. In Mojokerto, the main stream is divided into two rivers, Surabaya river and Porong river. The Porong river was constructed as the relief of the Brantas river.

The Surabaya river receives water from Brantas river through the gedeg and wirip sluices as well as Marmojo river which is an origin of Surabaya river.

Surabaya/Wonokromo River

The Surabaya river has 604.4 km² river basin and 100 km length. The river bed slope ranges 1 to 300 in armojo basin to 1 to 4,200 near the Mas river mouth. Marmojo river floods every rainy season due to confluence water of the Kedung Sala river diverted from the Brantas river.

Surabaya river in Wonokromo divides into two rivers, Wonokromo river and Mas river. There is Gunungsari dam in upstream of diversion point which was constructed in 1981 and maintains water levels for 9 irrigations and industrial water intakes.

Bengawan Solo River

Bengawan Solo river is the largest river in Java Island. The river runs approximately 600 km with approximately 16,100 km² basin area. There is two head of the river which are from southern mountain (G. Sewu) with 6,072 km² and 3,775 km² basin areas respectively up to confluence of the two rivers in Ngawi.

From this point, the Solo river flows to northward through Kendeng ridges to Cepu and then flows to eastward in wide extending alluvial flat reaching to northern Gresik. Finally the Solo river reaches Java Sea in northern Gresik. This river meanders and has a low slope which is only about 100 m above 500 km upstream from the estuary.

The Solo river has a small a flow capacity (500m³/sec) to carry floods from the basin. The river floods every rainy season and an average of 93,600 ha involving 55,000 houses are damaged by the floods. The river dikes in the Solo lower reach were constructed in the Dutch period. The dikes are seen on he right bank from Babad to Sumbayat of 75.6 km and the left bank from Reinggel to Laren of 46.8 km.

Lamong River

The Lamong river is located in Lamongan region that the upstream reaches boundary between Gresik and Surabaya in the lower reaches. The river has 830 km² basin area and 4,500 ha irrigation area. The river basin area is low food production area in East Java due to its dependence on rainfall. Although there are 53 water reservoir for irrigation purposes. It is reported that Kebomas area in Gresik and Benowo area in Surabaya area flood every year.

2) Local River Canal System

Drainage Area

The drainage areas in Surabaya is divided into 5 basins; Wonocolo, Rungkut, Sukolila, Central Tandes, and Karang Pilang. Each area drains to Wonokromo river through Surabaya river. There are 13 major drainage rivers and 7 major irrigation canals.

Irrigation

Less than 4000 ha were irrigated in 1981 and these are 4 zone; Wonocolo-Rungkut, Sukolila, Northern of Jl. Tandes, and Rowowiyung area (Kedurus river basin). These irrigation canals will become drainage canals in accordance with urbanization.

Water Reservoir

Two water reservoirs are currently operated; Morokembangan Boezem and Jeblokan reservoirs. The Morokembangan Boezem is 83 ha and obtains water from Greges river and Jeblokan reservoir takes water from Jeblokan canal and drains to the sea through the Tambakwedi mitre gates.

Sea Dike

The sea dikes were constructed to prevent salt water intrusion from sea. Only 17 Km of sea dike is provided from northern to eastern coast of Surabaya. No sea dike has been constructed in western side of Mas River and southern part of Wonokromo river. A total 12 gates are provided in the sea dike including office.

Table A15.1.4 Drainage and Irrigation Canal Kotamadaya Surabaya

River / Canal	Length (Km)	Outlet Control
River		
1. Lamong	68.0	None
2. Surabaya	28.7	Jagir Dam
3. Wonokromo	12.3	None
4. Kedurus	10.8	Jagir Dam
5. Mas	13.9	Gubeng Dam
6. Kadangan	40.0	None
Drainage Canals		
1. Perbatasan	10.0	None
2. Wonocolo - Wonorejo	14.3	None
3. Kalidami	6.1	Tide Gate
4. TAmbakwedi	5.7	Tide Gate
5. Pegirian	8.4	Tide Gate
6. Greges	4.9	Tide Gate
7. Anak	3.9	-
8. Simo	10.6	-
9. Balong	4.6	-
10. Sememi	7.9	-
Other Canals		
1. Lesser Canal	86.0	-
2. Conduits/Ppelines	1,252.0	-

Main Irrigation Canals	Lengths (Km)
Menangal	4.8
Kebonagung	13.1
Karah	3.8
Kalibokor - Keputih	9.0
Kali Kepiting	6.4
Jeblokan	7.7
Gunungsari	21.1
Sub Total	65.9
Sub Irrigation System	Lengths (Km)
Kebonagung	17.9
Kalibokor - Keputih	5.9
Jeblokan	4.0
Rowo Wiyung Area	5.7
Others	0.4
Sub Total	33.9

(2) Water Quality

Water quality sampling survey for surface water was carried out in six locations. The locations of water quality sampling are Busem River (Jl. Gresik), Kali Asemrowo ((Jl. Dupak), Kali Jemur Sari (Jl. Jemur Sari), Sungai Surabaya (Jl. Wonokromo). The measurement parameter covers Suspended Solid (SS), pH, Dissolved Oxygen (DO), BOD and COD. The measurements result were compared with the standard No. 413/1987 from the Governor of East Java. The water quality results from 6 (six) samples are shown in the following table.

Table A15.1.5 Water Quality Sampling Results

	Location	Date	Temperature (°c)	Cl (mg/l)	pH	DO (mg/l)	BOD (mg/l)	COD (mg/l)	SS (mg/l)
Class B				600	6-8.5	4	6	6.21	1,500
W5	Surabaya River	Sep.16,96	30	70.56	6.5	3.3	6.21	14.8	230
Class C				0.003	6-9	-	-	-	2,000
W2	Asem Rowo River (Jl.Dupak)	Sep.19,96	30	-	7.8	-	213.5	403	535
W3	Jemursari River (Jl.Jemursari)	Sep.19,96	30	-	6.8	3.1	6.21	15.7	231
W4	Kebonsari River (Jl.Gayung Kebonsari)	Sep.16,96	30	-	6	2.5	9.15	8.1	
Class D				-	6-9	-	-	-	1,000-2,500
W1	Busem River (Jl.Gresik)	Sep.16,96	32	-	2	-	328.4	611.5	4,670
W6	Benowo River	Sep.17,96	32	-	7.4	2.6	10.22	22.5	1,840

Note. Class B: water treatment, Class C: Fishery and animal husbandry, Class D: Agriculture, Industry and Hydropower (East Java Government Regulation)

(3) Air Quality

The ambient air quality sampling survey for proposed 5 routes was carried out from December 5 to December 20, 1996 in corroboration with BTKL Surabaya. The results are shown in tables compared with ambient air quality standard (East Java Government Regulation No.179/1996). The parameters required to be studied in the AMDAL study of this road development are Nitrogen Oxide (NOx), Carbon Monoxide

(CO), Lead (Pb), Hydrocarbon (HC) and Suspended Particulate Matter (SPM).

Table A15.1.6 Ambient Air Quality Sampling Location

Route	District Location	Sub District	District	Sampling Date
Route - 1				
R 1 - 1	Jl.Raya Surbaya - Gresik (Segoromadu Bridge)	Romokalisari	Gresik	05 December 1996
R 1 - 2	Jl. Raya Sememi	Benowo	Surabaya	05 December 1996
R 1 - 3	Jl. Raya Made Kidul,	Lakarsantri	Surabaya	06 December 1996
R 1 - 4	Jl. Randengansari	Randengansari	Gresik	06 December 1996
R 1 - 5	Jl. Tenaru	Driyorejo	Gresik	06 December 1996
R 1 - 6	Jl. Sidoarjo - Krian	Trosobo	Sidoarjo	07 December 1996
Route - 2				
R 2 - 1	Jl. Tambak Asri - Jl Gresik	Asemrowo	Surabaya	09 December 1996
R 2 - 2	Jl. Asemrowo Bridge	Asemrowo	Surabaya	10 December 1996
R 2 - 3	Jl. Mayjen Sungkono	Sukomanunggal	Surabaya	11 December 1996
R 2 - 4	Jl. Karah Kebon Agung	Jambangan	Surabaya	12 December 1996
R 2 - 5	Jl. A. Yani	Gayungan	Surabaya	13 December 1996
Route - 3				
R 3 - 1	Jl. Panjang Jiwo	Rungkut	Surabaya	20 December 1996
R 3 - 2	Jl. Wadung Asri	Waru	Sidoarjo	20 December 1996
Route - 4				
R 4 - 1	Jl. Raya Domas	Menganti	Gresik	19 December 1996
R 4 - 2	Jl. Wonokromo	Wonokromo	Surabaya	16 December 1996
R 4 - 3	Jl. Jagir Wonokromo	Wonocolo	Surabaya	17 December 1996
Route - 5				
R 5 - 1	Jl. Raya Kedamen	Kedamen	Gresik	19 December 1996
R 5 - 2	Jl. Jemursari	Wonocolo	Surabaya	18 December 1996

Table A15.1.7 Ambient Air Quality Sampling Result of Route-1

Parameter	Unit	STD	R 1 -1		R 1 - 2	R 1 - 3	R 1 - 4	R 1 - 5		R 1 - 6	
			7.00 - 8.00	18.00 - 19.00	12.00 - 13.00	12.00 - 13.00	10.00 - 11.00	12.00 - 13.00	07.00 - 08.00	12.00 - 13.00	18.00 - 19.00
Sulfur dioxide (SO_2)	PPM	0.10	0.04800	0.05810	0.00850	0.02060	0.01380	0.02430	0.03220	0.04710	0.03040
Carbon monoxide (CO)	PPM	20.00	4.28000	6.31000	0.00000	0.00000	0.00000	0.00000	3.28000	2.16000	1.04000
Nitrogen oxide (NOx)	PPM	0.05	0.00640	0.04790	0.00270	0.00018	0.00038	0.00120	0.00930	0.00720	0.00920
Dust	mg/m^3	0.26	0.57000	0.81600	0.18200	0.15200	0.30400	0.22800	0.57000	0.65000	0.82800
Lead (Pb)	mg/m^3	0.06	0.00037	0.00043	0.00084	0.00590	0.00000	0.00000	0.00046	0.00680	0.00071
Hydrocarbon (HC)	PPM	0.02	0.22000	0.36000	0.00000	0.00000	0.00000	0.00000	0.18000	0.23000	0.40000
Temperature/ humidity	°C/%	-	31 / 66	30 / 72	31.5 / 62	26 / 84	30 / 78	28.5 / 88	29.5 / 74	32 / 68	28.5/81
Wind velocity	knot/-	-	4.0 - 5.3	0.6 - 3.8	2.2 - 6.5	0.3 - 0.9	0.3 - 1.1	0.5 - 1.3	1.2 - 3.2	0.9 - 2.5	2.8 - 6.1
Wind direction	-	-	WS	WS	ES	N	S	U	NW	NW	NW

Source: Environmental Condition Survey by JICA Study Team

Table A15.1.8 Ambient Air Quality Sampling Result of Route -2

Parameter	Unit	Std	R 2 -1			R 2 - 2			R 2 - 3		
			7. - 8.00	12. - 13.	18. - 19.	7. - 8.00	12. - 13.	18. - 19.	7. - 8.00	12. - 13.	18. - 19.
Sulfur dioxide (SO_2)	PPM	0.10	0.03580	0.04780	0.03090	0.02570	0.02440	0.01520	0.02100	0.02220	0.01580
Carbon monoxide (CO)	PPM	20.00	2.18000	1.36000	2.06000	4.33000	4.08000	5.20000	0.84000	1.32000	1.60000
Nitrogen oxide (NOx)	PPM	0.05	0.01380	0.01060	0.01440	0.05970	0.03300	0.01440	0.01410	0.02050	0.01710
Dust	mg/m^3	0.26	0.84300	0.26300	0.39000	1.49800	1.27500	0.13300	0.46300	0.70600	0.15100
Lead (Pb)	mg/m^3	0.06	0.00223	0.00199	0.00000	0.00135	0.00133	0.00083	0.00119	0.00152	0.00100
Hydrocarbon (HC)	PPM	0.02	0.00000	0.00000	0.00000	0.01850	0.63000	0.38000	0.08000	0.23000	0.40000
Temperature/ humidity	°C/%	-	32 / 77	27 / 84	26.5 / 88	30 / 68	32.5 / 64	26.5 / 84	29 / 84	31.5 / 70	25 / 90
Wind velocity	knot/-	-	0.2 - 0.6	0.5 - 1.2	0.6 - 1.2	0.7 - 1.6	0.7 - 1.8	0.3 - 1.9	0.5 - 0.7	1.9 - 3.2	0.8 - 6.8
Wind direction	-	-	W	W	WS	SE	SE	SE	W	W	W

(Continued)

Parameter	Unit	Std	R 2 -4			R 2 - 2		
			7.00 - 8.00	12.00-13.00	18.00-19.00	7.00 - 8.00	12.00-13.00	18.00-19.00
Sulfur dioxide (SO_2)	PPM	0.10	0.04590	0.03010	0.03700	0.01840	0.03450	0.02940
Carbon monoxide (CO)	PPM	20.00	0.00000	0.00000	0.00000	3.40000	3.20000	2.80000
Nitrogen oxide (NOx)	PPM	0.05	0.00930	0.00170	0.00990	0.00840	0.01780	0.01330
Dust	mg/m^3	0.26	0.26000	0.03070	0.19700	0.08700	0.18100	0.04700
Lead (Pb)	mg/m^3	0.06	0.00330	0.00160	0.00620	0.00470	0.00250	0.00480
Hydrocarbon (HC)	PPM	0.02	0.00000	0.00000	0.00000	0.68000	0.35000	0.35000
Temperature/ humidity	°C/%	-	30 / 68	30 / 68	29.5 / 68	31 / 80	32 / 68	29 / 78
Wind velocity	knot/-	-	2.6 - 3.5	1.5 - 3.3	1.8 - 4.1	3.0 - 4.5	11.0 - 15.2	0.7 - 1.1
Wind direction	-	-	NE	NE	NE	E	E	E

Source : Environmental Condition Survey by JICA Study Team

Table A15.1.9 Ambient Air Quality Sampling Result of Route-3

Parameter	Unit	Standard	R3 -1		R3 - 2	
			7.00 - 8.00	12.00 - 13.00	7.00 - 8.00	12.00 - 13.00
Sulfur dioxide (SO_2)	PPM	0.10	0.0159	0.0127	0.0180	0.0089
Carbon monoxide (CO)	PPM	20.00	0.02	0.040	0.0000	0.0000
Nitrogen oxide (NOx)	PPM	0.05	0.0093	0.0075	0.0049	0.0053
Dust	mg/m^3	0.26	2.660	1.388	0.187	0.960
Lead (Pb)	mg/m^3	0.06	0.00181	0.00165	0.0014	0.0013
Hydrocarbon (HC)	PPM	0.02	0.0000	0.0000	0.0000	0.0000
Temperature/ humidity	°C/%	-	29.5 / 68	35 / 50	29.5 / 70	35 / 54
Wind velocity	knot/-	-	1.2 - 2.3	3.5 - 9.3	4.5 - 11.4	4.2 - 9.6
Wind direction	-		NE	NE	NE	NE

Source : Environmental Condition Survey by JICA Study Team

Table A15.1.10 Ambient Air Quality Sampling Result of Route-4

Parameter	Unit	Standard	R 4 - 1	R 4 - 2			R 4 - 3		
			12. - 13.00	7.00 - 8.00	12. - 13.00	18. - 19.00	7.00 - 8.00	12.-13.	18. - 19.
Sulfur dioxide (SO_2)	PPM	0.10	0.1300	0.0184	0.0345	0.0294	0.0183	0.0298	0.0221
Carbon monoxide (CO)	PPM	20.00	0.0400	3.40	3.20	2.80	0.08	0.051	0.038
Nitrogen oxide (NOx)	PPM	0.05	0.0113	0.0084	0.0178	0.0133	0.0100	0.0060	0.0029
Dust	mg/m^3	0.26	0.169	0.087	0.181	0.047	0.190	0.187	0.094
Lead (Pb)	mg/m^3	0.06	0.00077	0.0047	0.0025	0.0048	0.00037	0.00040	0.00050
Hydrocarbon (HC)	PPM	0.02	0.0000	0.68	0.52	0.35	0.0000	0.00000	0.0000
Temperature/ humidity	°C/%		30 / 70	31 / 80	32 / 68	29 / 78	31 / 62	31 / 62	26 / 90
Wind velocity	knot/-		2.4 - 4.3	3.0 - 4.5	11.0 - 15.2	0.7 - 1.1	1.0 - 1.6	1.2 - 1.8	0.7 - 1.0
Wind direction	-		SW	E	E	E	E	E	E

Source : Environmental Condition Survey by JICA Study Team

Table A15.1.11 Ambient Air Quality Sampling Result of Route-5

Parameter	Unit	Standard	R 5 - 1		R 5 - 2		
			7.00 - 8.00	12.00 - 13.00	7.00 - 8.00	12.00 - 13.00	18.00 - 19.00
Sulfur dioxide (SO2)	PPM	0.10	0.1300	0.1420	0.0096	0.0238	0.0336
Carbon monoxide (CO)	PPM	20.00	0.00	0.000	0.15	0.22	0.34
Nitrogen oxide (NOx)	PPM	0.05	0.0113	0.0078	0.0071	0.0071	0.0105
Dust	mg/m3	0.26	0.169	0.161	0.785	0.810	1.037
Lead (Pb)	mg/m3	0.06	0.00078	0.00065	0.00092	0.00118	0.00277
Hydrocarbon (HC)	PPM	0.02	0.0000	0.0000	0.0400	0.0210	0.0160
Temperature/ humidity	°C/%	-	30 / 70	33.5 / 64	29.5 / 68	30 / 40	27 / 80
Wind velocity	knot/-	-	2.4 - 4.3	2.2 - 63	1.3 - 1.6	4.0 - 8.8	0.5 - 1.8
Wind direction	-	-	SW	W	NE	NE	NE

Source : Environmental Condition Survey by JICA Study Team

(4) Noise

The noise level measurement in the proposed routes was carried out in corroboration with BTKL Surabaya. These samples have been taken in the same location of air quality sampling. The noise level (dB(A)) was measured for one hour of three times a day such as morning period (7:00-9:00), noon period (12:00-13:00) and evening period (17:00 - 19:00). The results are summarized and shown in following table.

Table A15.1.12 Noise Sampling Results

Sampling Location	Morning 7:00 - 9:00 dB(A)	Noon 12:00 - 13:00dB(A)	Evening 17:00 - 19:00dB(A)
R 1-1	72 - 86	72 - 85	73 - 86
R 1-2	72 - 86	56 - 66	73 - 86
R 1-3	72 - 86	53 - 55	73 - 86
R 1-4	72 - 86	58 -61	73 - 86
R 1-5	72 - 86	61 - 64	73 - 86
R 1-6	75 - 86	76 - 85	76 - 85
R 2-1	69 - 75	73 - 82	74 - 85
R 2-2	71 - 76	69 - 75	72 - 76
R 2-3	72 - 75	72 - 75	72 - 75
R 2-4	66 - 70	65 - 70	68 - 73
R 2-5	72 - 82	75 - 84	74 - 81
R 3-1	68 - 76	68 - 77	-
R 3-2	65 - 72	-	-
R 4-1	-	60 - 68	-
R 4-2	69 - 73	73 - 77	71 - 74
R 4-3	70 - 75	71 -75	68 - 71
R 5-1	72 - 79	67 - 72	-
R 5-2	67 - 83	69 - 82	69 - 81

Source : Environmental Condition Survey by JICA Study Team

2. Biological Component

(1) Flora

Present condition of flora was surveyed and provided information about 4 vegetation groups, Cultivated plant, Garden, Shade tree, Wild tree, based on their use and habitat in the study location. The description of species composition, number of habitat vegetation are shown as follows:

1) Cultivated Plant

Cultivated plant habitats are dry field and rice field dependent on rain in the study area. Composition of vegetation species in dry field consist of "palawija crops" (crops planted as second crops in dry seasons), material tree and industrial tree. The material tree is planted for building material, while the industrial tree is planted for industrial raw material.

Table A15.1.13 Diversity and Abundance Species of Vegetation at Dry Field

No.	Indonesian Name	Latin Name	Abundance	Note
1.	Jati	*Tectona grandis*	4	5 - Abundant (Frequency 80 - 100 %)
2.	Ki hujan	*Samanea saman*	3	4 - Many (Frequency 60 - 79 %)
3.	Mangga	*Mangifera indica*	4	3 - Moderate (Frequency 40 - 59 %)
4.	Johar	*Cassia siamea*	3	2 - Less (Frequency 20 - 39 %)
5.	Pilang	*Acasia leucophloa*	3	1 - Wide (Frequency < 20 %)
6.	Kapok	*Ceiba petandra*	3	
7.	Bambu haur	*Bambusa vulgaris*	4	
8.	Mimba	*Azandirachta indica*	3	
9.	Kesambi	*Schleichera oleaceae*	2	
10.	Lamtoro	*Leucaena leucocephola*	2	
11.	Kawista	*Feroniella lucida*	3	
12.	Kijaran	-	2	

Source : Environmental Condition Survey by JICA Study Team

2) The Garden Vegetation

The garden vegetation distributes to residential area composing of fruits, decorated plant and shade tree. The species diversity and abundance of garden vegetation in the study area are shown in following table:

Table A15.1.14 Diversity and Abundance Species of The Garden Vegetation

No	Species	Latin Name	Abundance	Note
1	Mangga	*Mangifera indica*	5	5 - Abundant (Frequency 80 - 100 %)
2	Jambu air	*Spzygium aqueum*	4	4 - Many (Frequency 60 - 79 %)
3	Pisang	*Musa paradisiaca*	3	3 - Moderate (Frequency 40 - 59 %)
4	Sarikaya	*Annona Squamusa*	3	2 - Less (Frequency 20 - 39 %)
5	Jambu batu	*Psidiun guajava*	3	1 - Wide (Frequency < 20 %)
6	Nangka	*Artocarpus integra*	4	
7	Belimbing	*Cicca acida*	3	
8	Cereme	*Averrhoca corambola*	3	
9	Kersen	*Muntingia calaboza*	3	
10	Sawo duren	*Chrysop hyllem cainilao*	2	
11	Kawista	*Feroniella lucida*	1	
12	Kapok	*Ceiba petandra*	2	

Source : Environmental Condition Survey by JICA Study Team

3) Shade Tree

The shade tree has planted in road shoulder. Results of survey, 23 species are identified with 2500 individual trees. The dominant species is angasana (*Pterocarpus indicus*), Lamtoro gung (*Leucaena leucocephalae*), Glodogan tiang (*Polyalthia excelsa*) and Foumis tree (*Acacia auriculiformis*).

4) Wild Tree

The wild tree habitants distributes in none use land, swamp and river banks. The species diversity is also shown in the table.

(2) Fauna

The wild animal (fauna) observed in study areas is mainly birds such as Passern montanus, Pycnonotus avrigaster, Streptopelia chinensis, Sturnupostor jala, Egretta ibis invermedia. There are no important or endangered species.

3. Socioeconomic and Socio-culture Component

(1) Demography

1) Population, House Hold and Density

Number of population and density in the study area which consists of Benowo, Lakarsantri, Driyorejo and Taman District are shown in following table.

Table A15.1.15 Demographic Condition in the Subject Area

	District	Sub District	Area (Km^2)	Number Population	Population Density
Route -1	Surabaya	Benowo	41,04	35,266	859
		Lakarsantri	34,19	58,431	1,709
	Gresik	Driyorejo	51,30	50,001	975
	Sidoarjo	Taman	28,83	110,589	3,836
Route -2	Surabaya	Asem Rowo	3,31	20,126	6,080
		Suko Manunggal	9,21	75,401	8,187
		Dukuh Pakis	5,99	44,409	7,414
		Wiyung	11,52	33,332	2,893
		Jambangan	3,84	28,627	7,455
		Gayungan	6,23	35,207	5,651
Route -3	Surabaya	Rungkut	17,45	51,937	2,976
		Tenggilis Mejoyo	5,90	38,525	6,530
		Gunung Anyar	12 ,36	26,066	2,109
	Sidarjo	Waru	27 ,72	116,093	4,188
		Sedati	60,57	42 ,849	6,74
Route -4	Sidarjo	Menganti	-	47,571	-
	Surabaya	Lokarsantri	34,19	58,431	1,709
		Suko Manunggal	9,21	75,401	8,187
		Dukuh Pakis	5,99	44,409	7,414
		Wonokromo	6,90	171,843	2,905
		Wonocolo	6,12	57,311	9,365
		Tenggilis Mejoyo	5,90	38,525	6,530
		Rungkut	17,45	51,937	2,976
Route -5	Gresik	Kedamean	65,96	47,538	721
	Surabaya	Driyorejo	51,30	50,001	975
		Lakarsantri	34,19	58,431	1,709
		Wiyung	11,52	33,332	2,893
		Karang Pilang	7,73	44 ,026	5,696
		Jambangan	3,84	28,627	7,455
		Gayungan	6,23	35,207	5,651
		Wonocolo	6,12	57,311	9,365
		Tenggilis Mejoyo	5,90	38,525	6,530

Source : Surabaya in Figure 1994, Kabupaten Gresik in Figure 1994 and Kabupaten Sidoarjo in Figure 1994.

2) Education

Information of education level in the study area was obtained from interview survey and type and number of education facilities in the study area are also surveyed. Results of the survey are summarized in following tables.

Table A15.1.16 Education Level

	Education Level	No.	%
Route -1	Not school / Not graduated	3	6.0
	Elementary school	26	52.0
	Junior High School	9	18.0
	Senior High School	11	22.0
	Academy / University	1	2.0
	Total	50	100.0
Route -2	Not School / Not Graduate	4	4.4
	Elementary School	17	18.9
	Junior High School	14	15.6
	Senior High School	18	53.3
	Academy / University	7	7.8
	Total	90	100.0
Route -3	Not School / Not Graduate	4	5.6
	Elementary School	25	34.7
	Junior High School	13	18.1
	Senior High School	24	33.3
	Academy / University	7	8.3
	Total	72	100.0
Route -4	Not School / Not Graduate	10	10.2
	Elementary School	35	35.7
	Junior High School	18	18.4
	Senior High School	31	31.6
	Academy / University	7	4.1
	Total	98	100.0
Route -5	Not School / Not Graduate	6	6.7
	Elementary School	27	30.0
	Junior High School	14	15.5
	Senior High School	35	38.9
	Academy / University	8	8.9
	Total	90	100.0

Source: Surabaya in Figure 1994, Kabupaten Gresik in Figure 1994 and Kabupaten Sidoarjo in Figure 1994.

Table A15.1.17 Education Facility

	District	Elementary School	Junior High School	Senior High School
Route -1	Benowo	28	3	1
	Lakarsantri	36	10	4
	Driyorejo	33	6	3
	Taman	52	15	12
	Total			
Route -2	Asemrowo	17	4	-
	Suko Manunggal	28	12	7
	Dukuh Pakis	28	10	5
	Wiyung	17	4	3
	Jambangan	15	6	2
	Gayungan	16	9	-
	Total	179	67	29
Route -3	Rungkut	23	12	6
	Tenggilis Mejoyo	19	6	5
	Gunung Anyar	11	6	-
	Waru	44	2	8
	Sedati	21	5	4
	Total	118	39	23
Route -4	Menganti	40	5	2
	Lakarsantri	36	10	4
	Suko Manunggal	28	12	7
	Dukuh Pakis	28	10	5
	Wonokromo	80	23	10
	Wonocolo	29	11	8
	Tenggilis Mejoyo	19	6	5
	Rungkut	23	12	6
	Total	283	89	47
Route -5	Kedamean	37	3	3
	Driyorejo	33	6	3
	Lakarsantri	36	10	4
	Wiyung	17	4	3
	Karang Pilang	3	11	-
	Jambangan	29	11	8
	Gayungan	23	12	6
	Wonocolo	29	11	8
	Tenggilis Mejoyo	19	6	5
	Total	232	66	28

Source:Surabaya in Figure 1994, Kabupaten Gresik in Figure 1994 and Kabupaten Sidoarjo in Figure 1994.

3) Social Structure

Population in the study area is divided into two groups which is semi urban population and urban population. The semi urban population is population group which stay in outskirts of city or village and people behave lower education. Whereas the urban population group comprise of middle class who stay in luxurious housing complex or in commercial center with more individual life pattern and commercial characteristics.

Certain traditions particularly related to faith and religion are still seen in the part of population of the study area such as ceremonial meal, visiting in sacred places, and good relationship with older and leader or Moslem leader. This aspect is generally seen in the village area.

4) Social Group

There exist social organization or group such as PKK, Dharma Wanita, Rukun Kematian, Jimpitan, Arisan, Kerja Bhakti (Gotong Royong), Karang Taruna, Kadarkum, LKMD, Kelompok Simulasi P4, Remaja Masjid and religion groups (recitation of the Koran praying) in the study area. Activity and function of PKK and Dharma Wanita are ladies program for activities of Arisan (social gathering), Posyandu and others. Likewise with other organization or group support existence of inhabitants.

(2) Economic Activities

Economic activity in Kotamadya Surabaya, Gresik and Sidoarjo Regencies is supported by various business sector. Regarding to GRDP of Kotamadya Surabaya in 1993, the dominant sector is commerce at 22.39 %, industry and processing sector at 19.23 % and Bank and Financing sector 15.60 %. The dominant sector to contribution of GRDP in Gresik Regency in 1992 is industry and processing sector at 31.86 % , mines and excavating sector at 22.25 % and commercial sector 13.13 % . Then, in case of GRDP of Sidoarjo Regency in 1994, the dominant sector is processing industry at 51.49 %, commercial sector at 18.46 % and agriculture sector at 7.40 %.

1) Livelihood and Income

Based on interview result in the study area, livelihood aspects are responded as shown in following tables.

Table A15.1.18 Occupation

	Occupation	Number	%
Route -1	Civil / Military /Retire		16.0
	Private Employee		28.0
	Entrepreneur		14.0
	Sales / Trade		20.0
	Farmer		14.0
	Fisherman		0.0
	Labors		8.0
	Total	50	100.0
Route -2	Civil / Military / Retire	13	14.5
	Private Employee	40	44.5
	Entrepreneur	12	13.3
	Sales / Trade	21	23.3
	Farmer	0	0.0
	Fishery	0	0.0.
	Labors	4	4.4
	Total	90	100.0
Route -3	Civil / Military / Retired	0	0.0
	Private Employee	29	40.3
	Entrepreneur	38	52.8
	Sales / Trade	4	5.0
	Farmer	1	1.4
	Fishery	0	0.0.
	Labors	0	0.0
	Total	72	100.0
Route -4	Civil / Military / Retire	15	15.3
	Private Employee	29	29.6
	Entrepreneur	29	29.6
	Sales / Trade	12	12.2
	Farmer	4	4.1
	Fishery	0	0.0.
	Labors	9	9.2
	Total	98	100.0
Route -5	Civil / Military / Retire	18	20.0
	Private Employee	29	32.2
	Entrepreneur	21	23.3
	Sales / Trade	10	11.1
	Farmer	7	7.8
	Fishery	0	0.0.
	Labor	5	5.6
	Total	90	100.0

Table A15.1.19 Income level

	Income (Rp./month)	Number	%
Route -1	< 100,000	0	0.0
	100,000 - 300,000	32	64.0
	300,000 - 600,000	17	34.0
	600,000 - 1,000,000	1	2.0
	1,000,000 - 2,000,000	0	0
	> 2,000,000	0	0
	Total	50	100.0
Route -2	< 100,000	0	0.0
	100,000 - 300,000	52	57.8
	300,000 - 600,000	28	31.1
	600,000 - 1,000,000	9	10.0
	1,000,000 - 2,000,000	1	1.1
	> 2,000,000	0	0.0
	Total	90	100.0
Route -3	< 100,000	0	0.0
	100,000 - 300,000	29	40.3
	300,000 - 600,000	38	52.8
	600,000 - 1,000,000	4	5.5
	1,000,000 - 2,000,000	1	1.4
	> 2,000,000	0	0.0
	Total	72	100.0
Route -4	< 100,000	1	1.0
	100,000 - 300,000	61	62.2
	300,000 - 600,000	27	27.6
	600,000 - 1,000,000	7	7.1
	1,000,000 - 2,000,000	2	2.1
	> 2,000,000	0	0.0
	Total	98	100.0
Route -5	< 100,000	6	6.7
	100,000 - 300,000	41	45.6
	300,000 - 600,000	29	32.2
	600,000 - 1,000,000	12	13.3
	1,000,000 - 2,000,000	2	2.2
	> 2,000,000	0	0.0
	Total	90	100.0

2) Ownership Status and Land Price

Land ownership, land price and building condition in the study area were asked on the interview survey. Land ownership in this area is mainly categorized as certificate land ownership, Petok D and HGB shown in following table.

Table A15.1.20 Type of Housing and House Condition

	Type of Housing	Number	%	Housing Condition	Number	%
Route -1	Masonry	40	80.0	Good	31	62.0
	Half masonry	4	8.0	Fair	18	36.0
	Wood	5	10.0	Bad	1	2.0
	Bamboo	1	2.0			
	Total	50	100.0	Total	50	100.0
Route -2	Masonry	84	93.3	Good	68	75.6
	Half Masonry	5	5.6	Fair	22	24.4
	Wood	1	1.1	Bad	0	0.0
	Bamboo	0	0.0			
	Total	90	100.0	Total	90	100.0
Route -3	Masonry	68	94.4	Good	54	75.0
	Half Masonry	0	0.0	Fair	18	25.0
	Wood	4	5.6	Bad	0	0.0
	Bamboo	0	0.0			
	Total	72	100.0	Total	72	100.0
Route -4	Masonry	77	78.6	Good	67	68.4
	Half Masonry	15	15.3	Fair	31	31.6
	Wood	5	5.1	Bad	0	0.0
	Bamboo	1	1.0			
	Total	98	100.0	Total	98	100.0
Route -5	Masonry	78	86.7	Good	57	63.3
	Half Masonry	6	6.7	Fair	33	36.7
	Wood	5	5.5	Bad	0	0.0
	Bamboo	1	1.1			
	Total	98	100.0	Total	90	100.0

Source: Environmental Condition Survey by JICA Study Team

Table A15.1.21 Land Ownership and Land Price

	Route-1	Route-2	Route-3	Route-4	Route-5
Land Ownership	Petok D 94%	Petok D 45% HGB 24%	Petok D 67% HGB 24%	Petok D 46% HGB 31%	Petok D 48% HGB 23 %
Average Land/ building Area	372m^2/130 m^2	225 m^2/170 m^2	302 m^2/168 m^2	178 m^2/98 m^2	270 m^2/117 m^2
Market Land Price in Rp./sq.m	50,000 - 250,000	50,000 - 100,000	100,000 - 800,000	50,000- 150,000	50,000- 150,000

Source: Environmental Condition Survey by JICA Study Team Note: Petok D: Citified Own Land, HGB: Rented Land from the Government

(3) Land use

Land use pattern in the study area is classified by 8 (eight) types in accordance with National Land Agency (BPN).The type of land use is shown in following table.

Table A15.1.22 Land Use Type

No.	Land Use Type	Description
1	Paddy field	Area of wet agriculture land or often flooding.
2	Village	Residential building group which proposed to permanent.
3	Cemetery	Cemetery area both clean seen by gravestone and no identification only known by the population.
4	Unused land	Uncultivated land
5	Dry land	Dry agriculture land which is not irrigated but planted with various plant and permanent cultivate.
6	Industry / Factory	Areal which located industry or factory building.
7	Public Services	Areal fro office, shopping center and other activities which related with services
8	Pond / Salt field	Land which is used for salt industries or pond activity.

Source : Environmental Condition Survey by JICA Study Team

The land use data is obtained from map of kali Surabaya phase II and field survey and the area of land utilization is measured by planimeter. The results are shown in following table.

Characteristics of land use in SMA is that urbanization activities has been expanded to north and south axis along the arterial road in the past reaching to Sidarjo, while urbanization trend has recently been growing to the western part reaching to Gresick by large scale of housing development.

Table A15.1.23 Land Use Classification

Land use Type	Route -1 (km^2)		Route -2 (km^2)		Route -3 (km^2)		Route -4 (km^2)		Route -5 (km^2)	
1. Paddy Field	2.00	46%	0.93	28%	0.05	3%	2.15	38%	1.87	41%
2. Residential	0.20	5%	0.78	24%	1.30	67%	1.05	19%	1.30	29%
3. non-use Land	0.50	11%	0.35	11%	0.06	3%	0.40	7%	0.25	5%
4. Public Services	0.00	0%	0.15	5%	0.15	8%	0.60	11%	0.20	4%
5. Industry	0.08	2%	0.20	6%	0.18	9%	0.09	2%	0.00	0%
6. Cemetery	0.00	0%	0.08	2%	0.12	6%	0.05	1%	0.00	0%
7. Dry Land	0.20	5%	0.28	9%	0.08	4%	0.85	15%	0.78	17%
8. Pond/Salt Field	1.30	30%	0.43	13%	0.00	0%	0.04	1%	0.00	0%
9. Rivers	0.10	2%	0.07	2%	0.00	0%	0.40	7%	0.15	3%
Total	4.38	100%	3.27	100%	1.94	100%	5.63	100%	4.55	100%

Source : Environmental Condition Survey by JICA Study Team

(4) Traffic Volume

Traffic volume in the study area was surveyed in each proposed routes as same as air quality sampling points. The traffic volume survey is carried out 24 hour period utilizing category of East Java transport mode. Results of the survey was converted to PCU number based on following coefficient

Table A15.1.24 Coefficient for PCU Conversion

Mode	Coefficient
- bicycle	0.5
- public car /motorcycle	1
- truck< 5 ton	2
- truck > 5 ton	2.5
- bus	3
- truck > 10 ton	3
- row engine vehicle	7

Table A15.1.25 Traffic Volume

Route	Location	Point	Vehicle Total (Unit)	Passenger per Car Unit	Average Daily Traffic (PCU/hr)
Route -1	Surabaya - Gresik	R1-1	29,881	47,904	1,996
	Benowo - Tandes	R1-2	11,032	19,534	814
	Malang - Made	R1-3	2,968	4,890	204
	Lakarsantri - Driyorejo	R1-4	6,414	13,268	553
	Krian - Surabaya	R1-5	40,492	68,071	2,806
Route -2	Tambak Asri - Kalianak	R2-1	8,,182	30,688	1,278
	Gerbang Tol - Dupak	R2-2	77,666	153,661	6,403
	HR.Mohamad - Mayjen Sungkono	R2-3	79,846	105,943	4,414
	Waru - Surabaya	R2-4	53,376	97,842	4,077
	A. Yani - Taman Raya	R2-5	66,175	99,039	4,127
Route -3	Rungkut-Panjang Jiwo	R3-1	80,805	108,712	4,529
	Sedati - Rungkut	R3-2	51,759	99,801	4,158
Route -4	Ringkang-Putat Lor	R4-1	9,252	18,078	753
	Darmo-Wonokromo	R4-2	177,609	215,911	8,996
	Panjang Jiwo-Jagir	R4-3	56,689	75,393	3,141
Route -5	Driyorejo-Bringkang	R5-1	8,162	16,893	704
	Jemursari-Prapen	R5-2	77,133	98,556	4,107

Source : Environmental Condition Survey by JICA Study Team

(5) Public Facilities and Utilities

1) Water Supply Network

The water supply is facilitated in the study area by Kodya Surabaya (City Water Supply: PDAM) while a small part of the area uses a well water. The housing complex surrounding the study area such as Pondok Candra Indah, Mulyosari and others is using supplied water from PDAM. However adjacent area of the housing development such as Tabakkoso village, welled water is used for bathing and washing.

2) Drainage Network

Growth of urbanization in Surabaya is very fast and causes land use changes from agriculture to other land use such as housings. This area has used existing drainage both agriculture and irrigation drainage.

3) Electricity Supply Network

Electricity network from PLN in the study area is already facilitated.

(6) Archaeological and Cultural Heritage

Each municipality or province has stipulated cultural heritage in the Structure Plan. In Surabaya municipality, there remain historical buildings which were built in colonial era and some of heroism statures or independent activity places when the people were involved during World War II. In addition natural heritage such as beach, river side and gorge are included in the structural plan. The cultural and natural heritage is shown in following table.

Table A15.1.26 List of Cultural Heritage

Category	Title	Location
History of City Development	Kalimas Harbor	North Surabaya
History of Nation Heroes	Building and Location of History Focus and History Fragment I, II & III.	Jembatan Merah ("Red Bridge") Area
Sosio - Culture of Community	Old house of worships. Old cemeteries. Old "Kampung" (Hamlet). Arabic, Chinese Ethnic Group Kampung. Fisherman Kampung. Etc.	Ampel Area. Kembang Kuning Area, Peneleh Cemetery. Kraton, Peneleh, etc. Ampel Area, etc. Kenjeran, Sukolilo.
Science	Mpu Tantular Museum Loka Jala Crana Museum DHD '45 Museum. Etc.	Wonokromo Area. Morokrembangan Area. Mayjen. Sungkono Area.
Nature Tourism.	Kenjeran Beach. Jurang Kupang. River Area. Etc.	Kenjeran Area. Benowo Area. Jl. Kayun Area.

Source: Fakta dan Analisa RTRW Surabaya 2005

(7) Public Health

1) Major Disease

Based on the major disease information in the study area which recorded by Puskesmas for all age group in Surabaya Municipality in 1994 was obtained. Three (3) main diseases type are identified such as Upper Respiratory Tract (ISPA) at 38.3 %, Muscles System at 13.5 % and Diarrhea at 8.2 %. In Sidoarjo Regency, main disease types are Upper Respiratory Tract (ISPA) at 19.21 %, other ISPA diseases at 10.73 % and Muscle System at 9.40 %. Whereas for Gresik Regency, there is no available data of main diseases.

The information of disease type that ever or often suffered by inhabitants in the study area are explained in follows table:

Table A15.1.27 Type of Suffered Diseases

	Kind of Diseases	No.	%
Route -1	Diarrhea	0	0.0
	Dysentery. Typhmus. Cholera	2	4.0
	Skin Diseases	0	0.0
	Flu and Throat Diseases	16	32.0
	Others	9	18.0
	No Diseases	23	46.0
	Total	50	100.0
Route -2	Diarrhea	0	0.0
	Dysentery. Typhus. Cholera	1	1.1
	Skin Diseases	22	24.4
	Flu and Throat Diseases	35	38.9
	Others	7	7.8
	No Diseases	25	27.8
	Total	90	100.0
Route -3	Diarrhea	0	1.4
	Dysentery. Typhus. Cholera	9	12.5
	Skin Diseases	15	20.8
	Flu and Throat Diseases	12	16.7
	Others	7	9.7
	No Diseases	28	38.9
	Total	72	100.0
Route -4	Diarrhea	1	0.1
	Dysentery. Typhus. Cholera	1	1.0
	Skin Diseases	6	6.2
	Flu and Throat Diseases	12	12.2
	Others	14	14.3
	No Diseases	64	65.3
	Total	98	100.0
Route -5	Diarrhea	5	5.5
	Dysentery. Typhus. Cholera	1	1.1
	Skin Diseases	6	6.7
	Flu and Throat Diseases	15	16.7
	Others	28	31.1
	No Diseases	35	38.9
	Total	90	100.0

Source : Environmental Condition Survey by JICA Study Team

Table A15.1.28 Water Supply Source

		Drinking Water		Washing Water	
		No.	%	No.	%
Route -1	PAM	24	48.0	7	14.0
	Rain Water	0	0.0	0	4.0
	Well	26	52.0	42	84.0
	River	0	0.0	0	0.0
	Water Spring	0	0.0	1	2.0
	Total	50	100.0	50	100.0
Route -2	PAM	78	86.7	43	47.8
	Rain Water	0	0.0	0	0.0
	Well	12	13.3	47	52.2
	River	0	0.0	0	0.0
	Water Spring	0	0.0	0	0.0
	Total	90	100.0	90	100.0
Route -3	PAM	65	90.3	7	9.7
	Rain Water	0	0.0	0	0.0
	Well	7	9.7	65	90.3
	River	0	0.0	0	0.0
	Water Spring	0	0.0	0	0.0
	Total	72	100.0	72	100.0
Route -4	PAM	65	66.3	28	28.6
	Rain Water	0	0.0	0	0.0
	Well	28	28.6	65	66.3
	River	0	0.0	0	0.0
	Water Spring	5	5.1	5	5.11
	Total	98	100.0	90	100.0
Route -5	PAM	64	71.1	24	26.7
	Rain Water	0	0.0	0	0.0
	Well	25	27.8	65	72.2
	River	0	0.0	0	0.0
	Water Spring	1	1.1	1	1.1
	Total	90	100.0	90	100.0

Source : Environmental Condition Survey by JICA Study Team

2) Sanitation and Waste Disposal Management

Present conditions of sanitation and waste disposal management are surveyed in accordance with interview survey. The results of the survey is summarized in following table.

3) Type and Number of Medical Facilities

Type and number of existing health facilities in the study area is shown in following table.

Table A15.1.29 Number of Medical Facilities

Kodya / Kabupaten	Health Facilities (unit) General Hospital	Maternity Hospital	Local Government Clinic	Mother & Child Medical Clinic	Pharmacy
Surabaya	23	28	96	103	189
Gresik	4	3	103	N/A	13
Sidoarjo	6	5	83	6	46

Source:Surabaya in Figure 1994, Kabupaten Gersik in Figure 1994 and Kabupaten Sidoarjo in Figure 1994.

Table A15.1.30 Garbage Management and Sewerage Condition

	Garbage Management	Number	%	Savage Condition	Number	%
Route -1	Burn	32	64.0	Own	50	100.0
	Garbage Can	15	30.0	Own Neighbor	0	0.0
	Land Fill	3	6.0	Public Sewerage	0	0.0
	Others	0	0.0	Others	0	0.0
	Total	50	100.0	Total	50	100.0
Route -2	Burn	1	1.1	Own	84	93.4
	Garbage / Can	87	96.7	Own Neighbor	4	4.4
	Land Fill	1	1.1	Public Sewerage	1	1.1
	Others	1	1.1	Other	1	1.1
	Total	90	100	Total	90	100
Route -3	Burn	18	25.0	Own	70	97.2
	Garbage / Can	46	63.9	Own Neighbor	0	0.0
	Land Fill	8	11.1	Public Sewerage	2	2.8
	Others	0	0.0	Other	0	0.0
	Total	72	100	Total	72	100
Route -4	Burn	22	22.4	Own	97	99.0
	Garbage / Can	73	74.5	Own Neighbor	0	0.0
	Land Fill	3	3.1	Public Sewerage	1	1.0
	Others	0	0.0	Other	0	0.0
	Total	98	100	Total	78	100
Route -5	Burn	23	25.6	Own	89	98.9
	Garbage / Can	67	74.4	Own Neighbor	0	0.0
	Land Fill	0	0.0	Public Sewerage	1	1.1
	Others	0	0.0	Other	0	0.0
	Total	90	100	Total	90	100

Source : Environmental Condition Survey by JICA Study Team

Table A15.1.31 Number of Paramedical Facilities

Kodya / Kabupaten	Number					
	Specia-list dr	General dr.	Teeth dr.	Nurse	Midwife	Others
Surabaya	N/A	98	79	144	164	616
Gresik	0	51	20	269	97	56
Sidoarjo	43	74	45	432	252	459

Source: Surabaya in Figure 1994, Kabupaten Gersik in Figure 1994 and Kabupaten Sidoarjo in Figure 1994.

(8) Community Perception

Regarding project perception, approval or disapproval to the proposed projects, reason of disapproval, compensation condition, etc., were asked to inhabitants in the study area. The results are summarized in following table.

Table A15.1.32 Distribution of Project Information and Source of Information

No.		Route-1		Route-2		Route-3		Route-4		Route-5	
		No.	%	No.	%	No.	%	No.	%	No.	%
1.	Not yet know	18	36.0	62	68.9	34	97.2	54	55.1	54	60.0
2.	Already know. form :										
	a. District / Village	23	46.0	8	8.9	7	9.7	21	21.4	17	18.9
	b. Radio / TV	1	2.0	18	20.0	2	2.8	0	0.0	0	0.0
	c. Neighbor / Friend	8	16.0	2	2.2	29	40.3	23	23.5	17	18.9
	d. News Paper	0	0.0	-	-	-	-	0	0.0	3	2.2
	Total	50	100.0	90	100.0	72	100.0	98	100.0	91	100.0

Source : Environmental Condition Survey by JICA Study Team

Table A15.1.33 Public Perception on the Project

No.	Response and Reason	Route -1		Route-2		Route-3		Route-4		Route-5	
		No.	%	No.	%	No.	%	No.	%	No.	%
1.	Not agree. because :										
	a. Father land	3	6.0	1	1.1	0	0.0	1	1.1	3	3.3
	b. Not appropriate compensation	2	4.0	1	1.1	1	1.4	1	1.1	5	5.6
	c. Lose of livelihood / activity place	2	4.0	0	0.0	3	4.2	1	1.1	0	0.0
	d. Difficult to get new place	0	0.0	0	0.0	3	4.2	8	8.3	5	5.6
2.	Agree. because :										
	a. As long as the compensation appreciate with market price	18	36	36	40.0	22	30.5	33	33.7	22	24.5
	b. To improve the area	10	20.0	0	0.0	9	12.5	9	9.3	10	11.1
	c. To support the government program and interest.	3	6.0	8	8.9	15	20.8	23	23.5	10	11.1
	d. To smooth traffic flow and to decrease traffic congestion	3	6.0	10	11.1	17	23.6	6	6.2	6	6.7
3.	No objection. because:										
	a. Public interest	1	2.0	1	1.1	0	0.0	1	1.1	2	2.2
	b. Depend on public agreement	8	16.0	5	5.6	1	1.4	6	6.2	13	14.4
	c. Government policy	0	0.0	11	12.2	0	0.0	3	3.2	10	11.1
	d. Leased (haven't the right of land)	0	0.0	4	4.4	1	1.4	5	5.2	4	4.4
	Total	50	100.0	90	100.0	72	100.0	98	100.0	90	100.0

Source : Environmental Condition Survey by JICA Study Team

Table A15.1.34 Expected Compensation

No.		Route-1		Route-2		Route-3		Route-4		Route-5	
		No.	%	No.	%	No.	%	No.	%	No.	%
1.	Money	29	58.0	83	92.2	57	79.1	66	67.4	63	70.0
2.	Land	3	6.0	0	0.0	1	1.4	7	7.1	2	2.2
3.	House	8	16.0	3	3.3	2	2.8	6	6.1	5	5.6
4.	Others	10	20.0	4	4.5	12	16.7	19	19.4	20	22.2
	Total	50	100.0	90	100.0	72	100.0	98	100.0	90	100.0

Source : Environmental Condition Survey by JICA Study Team

Table A15.1.35 Expected Relocation Area

No.	Location	Route-1		Route-2		Route-3		Route-4		Route-5	
		No.	%	No.	%	No.	%	No.	%	No.	%
1.	Same Village	38	76.0	18	20.0	43	59.7	39	39.8	43	47.8
2.	Same District	1	2.0	18	20.0	2	2.8	38	37.8	37	41.1
3.	Same Town	9	18.0	50	5.5	23	31.9	10	10.2	3	3.3
4.	Others	2	4.0	4	4.5	4	5.6	11	11.2	7	7.8
	Total	50	100.0	90	100.0	72	100.0	98	100.0	90	100.0

Source : Environmental Condition Survey by JICA Study Team

Appendix 16.1 Breakdown of Estimated Construction Costs

Table A 16.1.1 Route –1 : Toll Road

DESCRIPTION	Unit	Unit Price Rp	Section 1 From STA. 0 + 200 To STA. 5 + 0 L = 4.800 Quantity	Section 1 Amount Rp. x 1,000	Section 2 From STA. 5 + 0 To STA. 6 + 550 L = 1.550 Quantity	Section 2 Amount Rp. x 1,000	Section 3 From STA. 6 + 550 To STA. 10 + 295 L = 3.745 Quantity	Section 3 Amount Rp. x 1,000	Section 4 From STA. 10 + 295 To STA. 12 + 785 L = 2.490 Quantity	Section 4 Amount Rp. x 1,000	Section 5 From STA. 12 + 785 To STA. 14 + 935 L = 2.150 Quantity	Section 5 Amount Rp. x 1,000	Section 6 From STA. 14 + 935 To STA. 19 + 885 L = 4.950 Quantity	Section 6 Amount Rp. x 1,000	Section 7 From STA. 19 + 885 To STA. 20 + 500 L = 0.615 Quantity	Section 7 Amount Rp. x 1,000	Sub-Total Section 2 Section 7 L = 15.500 Quantity	Sub-Total Section 2 Section 7 L = 15.500 Amount Rp. x 1,000	Section 8 From STA. 20 + 500 To STA. 21 + 35 L = 0.535 Quantity	Section 8 Amount Rp. x 1,000	TOTAL Section 1 Section 8 L = 20.835 Quantity	TOTAL Section 1 Section 8 L = 20.835 Amount Rp. x 1,000
1. GENERAL	L.S		1	16,210,125	1	5,994,057	1	6,381,790	1	13,947,953	1	3,399,396	1	14,254,899	1	2,528,159	1	47,006,255	1	1,474,176	1	63,216,380
2. EARTHWORK																						
Clearing and Grubbing	m2	1,700	155,439	264,247	44,950	76,415	235,935	401,090	0	0	135,450	230,265	146,025	248,243	18,145	30,842	580,503	986,854	21,400	21,400	757,042	2,008,443
Common Excavation	m3	5,200	0	0	0	0	59,093	307,233	0	0	67,934	353,256	20,497	106,582	60,472	314,455	207,986	1,081,525	6,473	6,473	214,458	1,295,984
Wet Excavation	m3	5,200	0	0	0	0	59,093	307,233	0	0	67,934	353,256	20,497	106,582	60,472	314,455	207,986	1,081,525	6,473	6,473	214,458	1,295,984
Borrow Material	m3	18,600	155,439	2,891,173	44,950	836,070	59,093	1,098,948	0	0	67,934	1,263,569	20,497	381,237	60,472	1,124,780	252,936	4,704,603	6,473	6,473	414,848	8,010,624
SUB-TOTAL				3,155,420		912,485		2,114,502		0		2,200,345		842,644		1,784,552		7,854,508		40,818		11,050,746
3. BRIDGES																						
Precast Prestressed I-Girder	m2	1,235,000	22,664	27,990,040	16,037	19,805,695	22,069	27,255,215	72,210	89,179,350	9,106	11,245,910	65,903	81,390,205	9,527	11,765,228	194,852	240,641,603	6,919	8,544,965	224,435	277,176,608
Precast Reinforced-Beam	m2	988,800	7,860	7,771,968	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Castin Site Concrete Box Girder	m2	1,560,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Steel Box Girder	m2	2,450,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Piled Slab	m2	455,000	124,915	60,334,138	28,913	13,964,979	0	0	0	0	0	0	0	0	0	0	28,913	13,964,979	0	0	153,828	74,299,117
SUB-TOTAL				96,096,146		33,770,674		27,255,215		89,179,350		11,245,910		81,390,205		11,765,228		254,606,582		8,544,965		359,247,693
4. DRAINAGE																						
Pipe Culvert ø= 0.6 m	m	169,700	2,400	407,280	775	131,518	1,873	317,763	1,245	211,277	1,075	182,428	2,475	420,008	308	52,183	7,750	1,315,175	1,070	181,579	11,220	1,904,034
Pipe Culvert ø= 1.0 m	m	555,200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-Ditch	m	170,800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,070	182,756	1,070	182,756
Paved Ditch	m	71,000	9,600	681,600	3,100	220,100	7,490	531,790	4,980	353,580	4,300	305,300	9,900	702,900	1,230	87,330	31,000	2,201,000	1,070	75,970	41,670	2,958,570
Box Culvert (4.5 x 2.5 m)	m	1,422,000	0	0	51	72,735	124	175,738	0	0	71	100,991	163	232,294	0	0	409	581,648	18	25,105	427	606,753
Box Culvert (2@ 4.0x2.0 m)	m	2,626,000	0	0	51	134,320	124	324,534	0	0	71	186,315	163	428,957	0	0	409	1,074,126	18	46,362	427	1,120,488
SUB-TOTAL				1,088,880		558,673		1,349,825		564,857		774,933		1,784,148		139,513	0	5,171,949		511,772		6,772,601
5. PAVEMENT																						
Subgrade Preparation	m2	1,300	0	0	0	0	104,440	135,772	0	0	64,260	83,538	82,705	107,517	10,028	13,036	261,433	339,862	11,136	14,477	272,569	354,339
Lower Subbase	m3	38,000	0	0	0	0	31,332	1,190,616	0	0	19,278	732,564	24,812	942,857	3,008	114,314	78,430	2,980,331	3,341	126,950	81,771	3,107,281
Upper Subbase	m3	40,300	0	0	0	0	25,264	1,022,169	0	0	15,606	628,922	20,086	809,446	2,435	98,141	63,491	2,558,677	2,610	105,183	66,101	2,663,860
Asphalt Treatment Base Course	ton	74,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Binder Course	ton	77,000	0	0	0	0	20,687	1,592,867	0	0	13,591	1,046,506	17,492	1,346,892	2,121	163,303	53,890	4,149,568	2,290	176,318	56,180	4,325,886
Surface Course	ton	77,900	18,264	1,422,776	5,282	411,439	10,343	805,742	11,734	914,098	6,364	495,758	8,191	638,059	993	77,361	42,907	3,342,448	1,760	137,116	62,931	4,902,339
Asphalt Cement	ton	515,200	1,275	658,805	370	190,513	1,965	1,012,680	821	423,262	1,261	649,763	1,623	836,269	197	101,293	6,237	3,213,881	261	134,286	7,776	4,006,974
Prime/Tack Coat	kg	1,200	155,439	186,527	44,950	53,940	198,125	237,750	72,210	86,652	117,430	140,916	205,320	246,384	26,430	31,716	664,465	797,358	29,960	35,952	849,864	1,019,837
SUB-TOTAL				2,268,108		655,892		5,907,597		1,424,012		3,777,968		4,927,404		599,262		17,382,125		730,283		20,380,517
6. MISCELLANEOUS																						
Road Marking	m2	17,100	5,760	98,496	1,860	31,806	4,494	76,847	2,988	51,095	2,580	44,118	5,940	101,574	738	12,620	18,600	318,060	803	13,723	25,163	430,279
Concrete Curb	m	36,900	9,600	354,240	3,100	114,390	7,490	276,381	4,980	183,762	4,300	158,670	9,900	365,310	1,230	45,387	31,000	1,143,900	4,280	157,932	44,880	1,656,072
Guardrail	m	150,000	60	9,000	160	24,000	200	30,000	0	0	200	30,000	400	60,000	100	15,000	1,060	159,000	0	0	1,120	168,000
Street Lighting	km	468,000,000	4.8	2,246,400	2	725,400	4	1,752,660	2	1,165,320	2	1,006,200	5	2,316,600	1	287,820	16	7,254,000	1	500,760	21	10,001,160
Trees	each	1,200	240	288	78	93	187	225	125	149	108	129	248	297	31	37	775	930	214	257	1,229	1,475
Sodding	m2	3,200	31,200	99,840	10,075	32,240	24,343	77,896	16,185	51,792	13,975	44,720	32,175	102,960	3,998	12,792	100,750	322,400	4,815	15,408	136,765	437,648
Retaining Wall	m	13,418,000	60	805,080	160	2,146,880	200	2,683,600	0	0	200	2,683,600	400	5,367,200	100	1,341,800	1,060	14,223,080	0	0	1,120	15,028,160
Concrete Slop Protection	m2	66,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ROW Fence	m	43,500	9,600	417,600	3,100	134,850	7,490	325,815	4,980	216,630	4,300	187,050	9,900	430,650	1,230	53,505	31,000	1,348,500	0	0	40,600	1,766,100
Toll Gate	each	95,000,000	12	1,140,000	8	760,000	4	380,000	0	0	4	380,000	4	380,000	8	760,000	28	2,660,000	0	0	60	3,800,000
Traffic Control Signs	km	60,000,000	4.8	288,000	1.6	93,000	3.7	224,700	2	149,400	2	129,000	5	297,000	0.6	36,900	15.5	930,000	0.5	32,100	21	1,250,100
SUB-TOTAL				5,458,944		4,062,659		5,928,124		1,818,148		4,663,487		9,421,591		2,565,861		28,349,870				33,818,814
7. TOTAL				124,277,623		45,954,440		48,927,053		106,934,310		26,062,039		113,120,891		19,382,554		360,381,288		11,302,018		495,960,926
8. V.A.T (PPN 10 %)				12,427,762		4,595,444		4,892,705		10,693,431		2,606,204		11,312,089		1,938,255		36,038,129		1,130,201		49,596,093
9. GRAND TOTAL				136,705,385		50,549,884		53,819,758		117,627,741		28,668,243		124,432,980		21,320,810		396,419,417		12,432,216		545,557,019

Table A 16.1.2 Route-1 : Arterial Road

DESCRIPTION	Unit	From STA. To STA.	Section 1 0 + 200 5 + 0 L = 4.800		Section 2 5 + 0 6 + 550 L = 1.550		Section 3 6 + 550 10 + 295 L = 3.745		Section 4 10 + 295 12 + 785 L = 2.490		Section 5 12 + 785 14 + 935 L = 2.150		Section 6 14 + 935 19 + 885 L = 4.950		Section 7 19 + 885 20 + 500 L = 0.615		Sub-Total Section 1 Section 7 L = 15.500		Section 8 20 + 500 21 + 35 L = 0.535		TOTAL Section 1 Section 7 L = 15.500	
		Unit Price Rp.	Quantity	Amount Rp. x 1,000	Quantity	Amount Rp. x 1,000	Quantity	Amount Rp. x 1,000	Quantity	Amount Rp. x 1,000	Quantity	Amount Rp. x 1,000	Quantity	Amount Rp. x 1,000	Quantity	Amount Rp. x 1,000	Quantity	Amount Rp. x 1,000	Quantity	Amount Rp. x 1,000	Quantity	Amount Rp. x 1,000
1. GENERAL	L.S		1	0	1	7,094,297	1	3,581,715	1	184,589	1	1,542,795	1	6,362,035	1	0	1	18,770,431			1	18,770,431
2. EARTHWORK																						
Clearing and Grubbing	m2	1,700	0	0	59,570	101,269	149,800	254,660	0	0	86,000	146,200	0	0	0	0	295,370	502,129	0		295,370	502,129
Common Excavation	m3	5,200	0	0	0	0	67,146	349,159	0	0	39,990	207,948	0	0	0	0	107,136	557,107	0		107,136	557,107
Wast Excavation	m3	5,200	0	0	0	0	67,146	349,159	0	0	39,990	207,948	0	0	0	0	107,136	557,107	0		107,136	557,107
Borrow Material	m3	18,600	0	0	41,329	768,719	67,146	1,248,916	0	0	39,990	743,814	0	0	0	0	148,465	2,761,449	0		148,465	2,761,449
SUB-TOTAL				0		869,988		2,201,894		0		1,305,910		0		0		4,377,792				4,377,792
3. BRIDGES																						
Precast Prestressed I-Girder	m2	1,235,000	0	0	16,021	19,785,935	4,995	6,168,825	0	0	0	0	32,116	39,663,260	0	0	53,132	65,618,020	0		53,132	65,618,020
Precast Reinforced-Beam	m2	988,800	0	0	2,220	2,195,136	0	0	0	0	0	0	0	0	0	0	2,220	2,195,136	0		2,220	2,195,136
Castin Site Concrete Box Girder	m2	1,560,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0
Steel Box Girder	m2	2,450,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0
Piled Slab	m2	483,900	0	0	41,329	19,961,907	0	0	0	0	0	0	0	0	0	0	41,329	19,961,907	0		41,329	19,961,907
SUB-TOTAL				0		41,942,978		6,168,825		0		0		39,663,260		0		87,775,063				87,775,063
4. DRAINAGE																						
Pipe Culvert ø= 0.6 m	m	169,700	0	0	3,100	526,070	7,490	1,271,053	0	0	4,300	729,710	0	0	0	0	14,890	2,526,833	0		14,890	2,526,833
Pipe Culvert ø= 1.0 m	m	555,200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0
U-Ditch	m	170,800	0	0	3,100	529,480	7,490	1,279,292	0	0	4,300	734,440	0	0	0	0	14,890	2,543,212	0		14,890	2,543,212
Paved Ditch	m	71,000	0	0	3,100	220,100	7,490	531,790	0	0	4,300	305,300	0	0	0	0	14,890	1,057,190	0		14,890	1,057,190
Box Culvert (4.5 x 2.5 m)	m	1,422,000	0	0	62	88,164	150	213,016	0	0	86	122,292	0	0	0	0	298	423,472	0		298	423,472
Box Culvert (2@ 4.0x2.0 m)	m	2,626,000	0	0	62	162,812	150	393,375	0	0	86	225,836	0	0	0	0	298	782,023	0		298	782,023
SUB-TOTAL				0		1,526,626		3,686,525		0		2,117,578		0		0		7,332,729				7,332,729
5. PAVEMENT																						
Subgrade Preparation	m2	1,300	0	0	0	0	115,520	150,176	0	0	68,800	89,440	0	0	0	0	184,320	239,616	0		184,320	239,616
Lower Subbase	m3	38,000	0	0	0	0	34,656	1,316,928	0	0	20,640	784,320	0	0	0	0	55,296	2,101,248	0		55,296	2,101,248
Uper Subbase	m3	40,300	0	0	0	0	27,075	1,091,123	0	0	16,125	649,838	0	0	0	0	43,200	1,740,960	0		43,200	1,740,960
Asphalt Tretment Base Course	ton	74,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0
Binder Course	ton	77,000	0	0	0	0	23,754	1,829,043	0	0	14,147	1,089,319	0	0	0	0	37,901	2,918,362	0		37,901	2,918,362
Surface Course	ton	77,900	0	0	6,999	545,259	12,321	959,810	8,192	638,165	7,074	551,026	18,309	1,426,259	0	0	52,895	4,120,519	0		52,895	4,120,519
Asphalt Cement	ton	515,300	0	0	490	252,478	2,288	1,178,853	573	295,497	1,344	692,545	1,292	660,419	0	0	5,977	3,079,792	0		5,977	3,079,792
Prime/Tack Coat	kg	1,200	0	0	59,570	71,484	209,720	251,664	69,720	83,664	120,400	144,480	155,820	186,984	0	0	615,230	738,276	0		615,230	738,276
SUB-TOTAL				0		869,221		6,777,595		1,017,326		4,000,967		2,273,662		0		14,938,772				14,938,772
6. MISCELLANEOUS																						
Road Marking	m2	17,100	0	0	2,325	39,758	5,618	96,059	3,735	63,869	3,225	55,148	8,348	142,742	0	0	23,250	397,575	0		23,250	397,575
Concrete Curb	m	36,900	0	0	12,400	457,560	29,960	1,105,524	0	0	17,200	634,680	0	0	0	0	59,560	2,197,764	0		59,560	2,197,764
Guardrail	m	150,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0
Street Lighting	km	468,000,000	0	0	3.1	1,450,800	7.5	3,505,920	0	0	4.3	2,012,400	0	0	0	0	15	6,968,520	0		15	6,968,520
Trees	each	1,200	0	0	620	744	1,498	1,798	0	0	860	1,032	0	0	0	0	2,978	3,574	0		2,978	3,574
Sodding	m2	3,200	0	0	13,950	44,640	33,705	107,856	0	0	19,350	61,920	0	0	0	0	67,005	214,416	0		67,005	214,416
Retaining Wall	m	13,418,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0
Concrete Slop Protection	m2	66,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0
ROW Fence	m	43,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0
Toll Gate	each	95,000,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0
Traffic Control Signs	km	60,000,000	0	0	1.6	93,000	3.7	224,700	2.5	149,400	2.2	129,000	5.6	330,900	0	0	16	930,000	0		16	930,000
SUB-TOTAL				0		2,086,502		5,041,257		213,269		2,894,180		476,642		0		10,711,849				10,711,849
7. TOTAL				0		54,389,612		27,459,811		1,415,183		11,866,430		48,775,599		0		143,906,636				143,906,636
8. V.A.T (PPN 10 %)				0		5,438,961		2,745,981		141,518		1,186,643		4,877,560		0		14,390,664				14,390,664
9. GRAND TOTAL				0		59,828,574		30,205,792		1,556,702		13,053,073		53,653,159		0		158,297,299				158,297,299

Table A 16.1.3 Route-2

DESCRIPTION	Unit	From STA. / To STA.	Section 1 0 + 0 / 4 + 100 L = 4.100		Section 2 4 + 100 / 1 + 565 L = 3.588		Section 3 1 + 565 / 5 + 335 L = 3.805		Section 4 5 + 335 / 7 + 190 L = 1.818		TOTAL L = 13.310	
		Unit Price Rp.	Quantity	Amount Rp. x 1,000	Quantity	Amount Rp. x 1,000	Quantity	Amount Rp. x 1,000	Quantity	Amount Rp. x 1,000	Quantity	Amount Rp. x 1,000
1. GENERAL	L.S		1	6,420,593	1	3,529,001	1	3,498,257	1	2,070,668	1	15,518,518
2. EARTHWORK												
Clearing and Grabbing	m2	1,700	82,000	139,400	81,250	138,125	152,200	258,740	72,700	123,590	388,150	659,855
Common Excavation	m3	5,200	19,068	99,154	36,609	190,367	88,074	457,985	37,836	196,747	181,587	944,252
Wast Excavation	m3	5,200	19,068	99,154	36,609	190,367	88,074	457,985	37,836	196,747	181,587	944,252
Borrow Material	m3	18,600	19,578	364,151	36,609	680,927	88,074	1,638,176	37,836	703,750	182,097	3,387,004
SUB-TOTAL				701,858		1,199,786		2,812,886		1,220,834		5,935,364
3. BRIDGES												
Precast Prestressed I-Girder	m2	1,235,000	12,735	15,727,725	5,694	7,031,473	2,389	2,949,798	3,200	3,952,000	24,017	29,660,995
Precast Reinforced-Beam	m2	988,800	1,280	1,265,664	0	0	0	0	0	0	1,280	1,265,664
Castin Site Concrete Box Girder	m2	1,560,000	0	0	0	0	0	0	0	0	0	0
Steel Box Girder	m2	2,450,000	0	0	0	0	0	0	0	0	0	0
Piled Slab	m2	483,000	29,506	14,251,398	0	0	0	0	0	0	29,506	14,251,398
SUB-TOTAL				31,244,787		7,031,473		2,949,798		3,952,000		45,178,057
4. DRAINAGE												
Pipe Culvert ø= 0.6 m	m	169,700	2,050	347,885	3,358	569,768	2,783	472,190	1,818	308,430	10,008	1,698,273
Pipe Culvert ø= 1.0 m	m	555,200	0	0	0	0	0	0	0	0	0	0
U-Ditch	m	170,800	8,200	1,400,560	10,940	1,868,552	11,130	1,901,004	7,270	1,241,716	37,540	6,411,832
Paved Ditch	m	71,000	0	0	0	0	0	0	0	0	0	0
Box Culvert (4.5 x 2.5 m)	m	1,422,000	0	0	0	0	0	0	0	0	0	0
Box Culvert (2@ 4.0x2.0 m)	m	2,626,000	0	0	0	0	0	0	0	0	0	0
SUB-TOTAL				1,748,445		2,438,320		2,373,194		1,550,146		8,110,105
5. PAVEMENT												
Subgrade Preparation	m2	1,300	27,013	35,117	60,151	78,197	113,762	147,891	48,872	63,533	249,798	324,737
Lower Subbase	m3	38,000	8,104	307,948	19,752	750,567	38,532	1,464,230	16,553	629,024	82,941	3,151,769
Uper Subbase	m3	40,300	6,753	272,156	15,749	634,677	30,275	1,220,100	13,006	524,147	65,784	2,651,080
Asphalt Tretmant Base Coarse	ton	74,500	0	0	0	0	0	0	0	0	0	0
Binder Course	ton	77,000	5,975	460,047	12,911	994,139	24,147	1,859,316	10,373	798,749	53,406	4,112,252
Surface Course	ton	77,900	7,708	600,453	8,882	691,926	12,532	976,215	5,980	465,809	35,101	2,734,403
Asphalt Cement	ton	515,300	1,465	754,667	1,453	748,706	2,379	1,226,120	1,136	585,442	6,433	3,314,935
Prime/Tack Coat	kg	1,200	91,024	109,229	145,614	174,737	209,293	251,152	95,032	114,038	540,963	649,156
SUB-TOTAL				2,539,618		4,072,949		7,145,023		3,180,742		16,938,333
6. MISCELLANEOUS												
Road Marking	m2	17,100	3,690	63,099	4,590	78,489	6,849	117,118	3,272	55,943	18,401	314,649
Concrete Curb	m	36,900	8,200	302,580	16,250	599,625	30,440	1,123,236	14,540	536,526	69,430	2,561,967
Guardrail	m	150,000	0	0	0	0	0	0	0	0	0	0
Street Lighting	km	468,000,000	4.1	1,918,800	5.1	2,386,800	7.6	3,561,480	3.6	1,701,180	20.4	9,568,260
Trees	each	1,200	205	246	558	669	1,142	1,370	545	654	2,449	2,939
Sodding	m2	3,200	4,100	13,120	14,175	45,360	30,440	97,408	14,540	46,528	63,255	202,416
Retaining Wall	m	13,418,000	300	4,025,400	400	5,367,200	200	2,683,600	100	1,341,800	1,000	13,418,000
Concrete Slop Protection	m2	66,500	0	0	0	0	0	0	0	0	0	0
ROW Fence	m	43,500	0	0	0	0	0	0	0	0	0	0
Toll Gate	each	95,000,000	0	0	0	0	0	0	0	0	0	0
Traffic Control Signs	km	60,000,000	4.1	246,000	5.1	306,000	7.6	456,600	3.6	218,100	20.4	1,226,700
SUB-TOTAL				6,569,245		8,784,143		8,040,812		3,900,731		27,294,931
7. TOTAL				49,224,545		27,055,671		26,819,970		15,875,121		118,975,307
8. V.A.T (PPN 10 %)				4,922,455		2,705,567		2,681,997		1,587,512		11,897,531
9. GRAND TOTAL				54,147,000		29,761,238		29,501,967		17,462,633		130,872,838

Table A 16.1.4 Route-3

DESCRIPTION	Unit	From STA. To STA.	Section 1 0 + 0 3 + 835 L = 3.835		Section 2 3 + 835 8 + 220 L = 4.385		TOTAL 0 + 0 8 + 220 L = 8.220	
		Unit Price Rp.	Quantity	Amount Rp. x 1,000	Quantity	Amount Rp. x 1,000	Quantity	Amount Rp. x 1,000
1. GENERAL	L.S		1	1,292,011	1	1,125,490	1	2,417,501
2. EARTHWORK								
Clearing and Grabbing	m2	1,700	47,938	81,494	54,813	93,181	102,750	174,675
Common Excavation	m3	5,200	20,709	107,687	23,679	123,131	44,388	230,818
West Excavation	m3	5,200	20,709	107,687	23,679	123,131	44,388	230,818
Borrow Material	m3	18,600	20,709	385,187	23,679	440,429	44,388	825,617
SUB-TOTAL				682,055		779,872		1,461,927
3. BRIDGES								
Precast Prestressed I-Girder	m2	1,235,000	2,240	2,766,400	525	648,375	2,765	3,414,775
Precast Reinforced-Beam	m2	988,800	323	318,888	540	533,952	862	852,840
Castin Site Concrete Box Girder	m2	1,560,000	0	0	0	0	0	0
Steel Box Girder	m2	2,450,000	0	0	0	0	0	0
Piled Slab	m2	483,000	0	0	0	0	0	0
SUB-TOTAL				3,085,288		1,182,327		4,267,615
4. DRAINAGE								
Pipe Culvert ø= 0.6 m	m	169,700	0	0	0	0	0	0
Pipe Culvert ø= 1.0 m	m	555,200	0	0	0	0	0	0
U-Ditch	m	170,800	7,670	1,310,036	8,770	1,497,916	16,440	2,807,952
Paved Ditch	m	71,000	0	0	0	0	0	0
Box Culvert (4.5 x 2.5 m)	m	1,422,000	0	0	0	0	0	0
Box Culvert (2@ 4.0x2.0 m)	m	2,626,000	0	0	0	0	0	0
SUB-TOTAL				1,310,036		1,497,916		2,807,952
5. PAVEMENT								
Sabgrade Preparation	m2	1,300	42,185	54,841	48,235	62,706	90,420	117,546
Lower Subbase	m3	38,000	8,437	320,606	9,647	366,586	18,084	687,192
Uper Subbase	m3	40,300	7,670	309,101	8,770	353,431	16,440	662,532
Asphalt Tretmant Base Coarse	ton	74,500	0	0	0	0	0	0
Binder Course	ton	77,000	8,111	624,549	9,274	714,119	17,385	1,338,668
Surface Course	ton	77,900	4,056	315,924	4,637	361,233	8,693	677,157
Asphalt Cement	ton	515,300	771	397,063	881	454,008	1,652	851,071
Prime/Tack Coat	kg	1,200	103,545	124,254	118,395	142,074	221,940	266,328
SUB-TOTAL				2,146,338		2,454,157		4,600,495
6. MISCELLANEOUS								
Road Marking	m2	17,100	3,452	59,021	3,947	67,485	7,398	126,506
Concrete Curb	m	36,900	15,340	566,046	17,540	647,226	32,880	1,213,272
Guardrail	m	150,000	0	0	0	0	0	0
Street Lighting	km	468,000,000	3.8	1,794,780	4.4	2,052,180	8	3,846,960
Trees	each	1,200	575	690	658	789	1,233	1,480
Sodding	m2	3,200	15,340	49,088	17,540	56,128	32,880	105,216
Retaining Wall	m	13,418,000	0	0	0	0	0	0
Concrete Slop Protection	m2	66,500	0	0	0	0	0	0
ROW Fence	m	43,500	0	0	0	0	0	0
Toll Gate	each	95,000,000	0	0	0	0	0	0
Traffic Control Signs	km	60,000,000	3.8	230,100	4.4	263,100	8	493,200
SUB-TOTAL				2,699,725		3,086,908		5,786,633
7. TOTAL				11,215,452		10,126,670		21,342,123
8. V.A.T (PPN 10 %)				1,121,545		1,012,667		2,134,212
9. GRAND TOTAL				12,336,998		11,139,337		23,476,335

Table 16.1.5 Route–4

DESCRIPTION	Unit	From STA. / To STA.	Section 1 0 + 600 – 7 + 225 L = 7.825		Section 2 7 + 225 – 12 + 0 L = 4.775		Section 3 12 + 0 – 18 + 500 L = 6.500		Section 4 18 + 500 – 19 + 100 L = 0.600		Section 5 19 + 100 – 27 + 0 L = 7.900		TOTAL 0 + 600 – 27 + 0 L = 27.600	
		Unit Price Rp.	Quantity	Amount Rp. x 1,000	Quantity	Amount Rp. x 1,000	Quantity	Amount	Quantity	Amount	Quantity	Amount Rp. x 1,000	Quantity	Amount Rp. x 1,000
1. GENERAL	LS		1	3,962,541	1	2,164,627	1	259,769	1	332,627	1	8,046,264	1	14,765,828
2. EARTHWORK														
Clearing and Grabbing	m2	1,700	313,000	532,100	0	0	0	0	27,000	45,900	92,500	157,250	432,500	735,250
Common Excavation	m3	5,200	159,630	830,076	0	0	0	0	16,200	84,240	45,960	238,992	221,790	1,153,308
West Excavation	m3	5,200	159,630	830,076	0	0	0	0	16,200	84,240	45,960	238,992	221,790	1,153,308
Borrow Material	m3	18,600	159,630	2,969,118	0	0	0	0	16,200	301,320	45,960	854,856	221,790	4,125,294
SUB–TOTAL				5,161,370		0		0		515,700		1,490,090		7,167,160
3. BRIDGES														
Precast Prestressed I–Girder	m2	1,235,000	0	0	0	0	0	0	0	0	19,191	23,700,885	19,191	23,700,885
Precast Reinforced–Beam	m2	988,800	0	0	0	0	0	0	0	0	0	0	0	0
Castin Site Concrete Box Girder	m2	1,560,000	0	0	0	0	0	0	0	0	3,825	5,967,000	3,825	5,967,000
Steel Box Girder	m2	2,450,000	0	0	0	0	0	0	0	0	1,725	4,226,250	1,725	4,226,250
Piled Slab	m2	483,000	0	0	0	0	0	0	0	0	0	0	0	0
SUB–TOTAL				0		0		0		0		33,894,135		33,894,135
4. DRAINAGE														
Pipe Culvert ø= 0.6 m	m	169,700	7,825	1,327,903	4,775	810,318	0	0	0	0	7,900	1,340,630	20,500	3,478,850
Pipe Culvert ø= 1.0 m	m	555,200	548	304,111	334	185,576	0	0	63	34,978	553	307,026	1,498	831,690
U–Ditch	m	170,800	15,650	2,673,020	9,550	1,631,140	0	0	3,600	614,880	15,800	2,698,640	44,600	7,617,680
Paved Ditch	m	71,000	0	0	0	0	0	0	0	0	0	0	0	0
Box Culvert (4.5 x 2.5 m)	m	1,422,000	313	445,086	0	0	0	0	0	0	0	0	313	445,086
Box Culvert (2@ 4.0x2.0 m)	m	2,626,000	313	821,938	0	0	0	0	0	0	0	0	313	821,938
SUB–TOTAL				5,572,057		2,627,033		0		649,858		4,346,296		13,195,244
5. PAVEMENT														
Sabgrade Preparation	m2	1,300	266,050	345,865	162,350	211,055	0	0	18,000	23,400	110,800	144,040	557,200	724,360
Lower Subbase	m3	38,000	56,340	2,140,920	34,380	1,306,440	0	0	3,600	136,800	21,630	821,940	115,950	4,406,100
Uper Subbase	m3	40,300	53,210	2,144,363	32,470	1,308,541	0	0	3,600	145,080	21,365	861,010	110,645	4,458,994
Asphalt Tretmant Base Course	ton	74,500	0	0	0	0	0	0	0	0	0	0	0	0
Binder Course	ton	77,000	57,005	4,389,395	34,786	2,678,512	0	0	4,230	325,710	23,547	1,813,119	119,568	9,206,736
Surface Course	ton	77,900	28,503	2,220,350	29,231	2,277,100	11,838	922,190	5,523	430,203	11,774	917,156	86,868	6,766,998
Asphalt Cement	ton	515,300	5,415	2,790,600	4,133	2,129,903	829	427,013	640	329,985	2,237	1,152,708	13,255	6,830,210
Prime/Tack Coat	kg	1,200	485,150	582,180	396,800	476,160	100,750	120,900	65,000	78,000	200,400	240,480	1,248,100	1,497,720
SUB–TOTAL				14,613,673		10,387,711		1,470,103		1,469,178		5,950,452		33,891,117
6. MISCELLANEOUS														
Road Marking	m2	17,100	10,564	180,640	10,346	176,921	3,900	66,690	3,780	64,638	8,303	141,973	36,893	630,862
Concrete Curb	m	36,900	46,950	1,732,455	28,650	1,057,185	0	0	0	0	36,900	1,361,610	112,500	4,151,250
Guardrail	m	150,000	0	0	0	0	0	0	0	0	480	72,000	480	72,000
Street Lighting	km	468,000,000	7.8	3,662,100	4.8	2,234,700	0	0	0	0	7.9	3,697,200	20.5	9,594,000
Trees	each	1,200	1,565	1,878	955	1,146	0	0	0	0	1,318	1,581	3,838	4,605
Sodding	m2	3,200	46,950	150,240	28,650	91,680	0	0	0	0	36,900	118,080	112,500	360,000
Retaining Wall	m	13,418,000	0	0	0	0	0	0	0	0	480	6,440,640	480	6,440,640
Concrete Slop Protection	m2	66,500	0	0	0	0	0	0	0	0	0	0	0	0
ROW Fence	m	43,500	0	0	0	0	0	0	0	0	0	0	0	0
Toll Gate	each	95,000,000	0	0	0	0	0	0	0	0	0	0	0	0
Traffic Control Signs	km	60,000,000	7.8	469,500	8.0	481,500	3.3	195,000	2.8	168,000	7.9	474,000	29.8	1,788,000
SUB–TOTAL				6,196,813		4,043,132		261,690		232,638		12,307,084		23,041,357
7. TOTAL				35,506,454		19,222,503		1,991,562		3,200,001		66,034,321		125,954,841
8. V.A.T (PPN 10 %)				3,550,645		1,922,250		199,156		320,000		6,603,432		12,595,484
9. GRAND TOTAL				39,057,100		21,144,753		2,190,718		3,520,001		72,637,753		138,550,325

Table A 16.1.6 Route–5

DESCRIPTION	Unit	From STA. 0 + 300 To STA. 7 + 170 L = 6.870			Section 2: 7 + 170 – 16 + 170 L = 9.000		Section 3: 16 + 155 – 19 + 500 L = 3.345		Section 4: 19 + 500 – 22 + 880 L = 3.380		TOTAL 0 + 300 – 22 + 880 L = 22.595	
		Unit Price Rp.	Quantity	Amount Rp. x 1,000	Quantity	Amount Rp. x 1,000	Quantity	Amount	Quantity	Amount	Quantity	Amount Rp. x 1,000
1. GENERAL	L.S		1	3,224,632	1	4,217,367	1	9,127,732	1	212,159	1	16,781,890
2. EARTHWORK												
Clearing and Grabbing	m2	1,700	240,450	408,765	314,475	534,608	117,075	199,028	0	0	672,000	1,142,400
Common Excavation	m3	5,200	144,270	750,204	188,685	981,162	70,245	365,274	0	0	403,200	2,096,640
West Excavation	m3	5,200	144,270	750,204	188,685	981,162	70,245	365,274	0	0	403,200	2,096,640
Borrow Material	m3	18,600	144,270	2,683,422	188,685	3,509,541	70,245	1,306,557	0	0	403,200	7,499,520
SUB–TOTAL				4,592,595		6,006,473		2,236,133		0		12,835,200
3. BRIDGES												
Precast Prestressed I–Girder	m2	1,235,000	0	0	0	0	21,680	26,774,800	0	0	21,680	26,774,800
Precast Reinforced–Beam	m2	988,800	0	0	0	0	0	0	0	0	0	0
Castin Site Concrete Box Girder	m2	1,560,000	0	0	0	0	0	0	0	0	0	0
Steel Box Girder	m2	2,450,000	0	0	0	0	5,760	14,112,000	0	0	5,760	14,112,000
Piled Slab	m2	483,000	0	0	0	0	0	0	0	0	0	0
SUB–TOTAL				0		0		40,886,800		0		40,886,800
4. DRAINAGE												
Pipe Culvert ø= 0.6 m	m	169,700	0	0	0	0	0	0	0	0	0	0
Pipe Culvert ø= 1.0 m	m	555,200	481	266,996	629	349,193	234	130,000	0	0	1,344	746,189
U–Ditch	m	170,800	13,740	2,346,792	17,970	3,069,276	6,690	1,142,652	0	0	38,400	6,558,720
Paved Ditch	m	71,000	0	0	0	0	0	0	0	0	0	0
Box Culvert (4.5 x 2.5 m)	m	1,422,000	240	341,920	314	447,183	117	166,481	0	0	672	955,584
Box Culvert (2@ 4.0x2.0 m)	m	2,626,000	240	631,422	314	825,811	117	307,439	0	0	672	1,764,672
SUB–TOTAL				3,587,129		4,691,464		1,746,572		0		10,025,165
5. PAVEMENT												
Sabgrade Preparation	m2	1,300	199,230	258,999	260,565	338,735	97,005	126,107	0	0	556,800	723,840
Lower Subbase	m3	38,000	72,135	2,741,130	94,343	3,585,015	35,123	1,334,655	0	0	201,600	7,660,800
Uper Subbase	m3	40,300	46,373	1,868,812	60,649	2,444,145	22,579	909,924	0	0	129,600	5,222,880
Asphalt Tretmant Base Coarse	ton	74,500	0	0	0	0	0	0	0	0	0	0
Binder Course	ton	77,000	16,488	1,269,576	21,564	1,660,428	8,028	618,156	0	0	46,080	3,548,160
Surface Course	ton	77,900	8,244	642,208	10,782	839,918	4,014	312,691	1,200	93,480	24,240	1,888,296
Asphalt Cement	ton	515,300	1,401	722,183	1,833	944,514	682	351,630	60	30,918	3,977	2,049,245
Prime/Tack Coat	kg	1,200	329,760	395,712	431,280	517,536	160,560	192,672	24,000	28,800	945,600	1,134,720
SUB–TOTAL				7,898,619		10,330,290		3,845,834		153,198		22,227,941
6. MISCELLANEOUS												
Road Marking	m2	17,100	7,214	123,351	9,434	161,326	3,512	60,059	1,050	17,955	21,210	362,691
Concrete Curb	m	36,900	41,220	1,521,018	53,910	1,989,279	20,070	740,583	6,000	221,400	121,200	4,472,280
Guardrail	m	150,000	0	0	0	0	700	105,000	0	0	700	105,000
Street Lighting	km	468,000,000	14	6,430,320	18	8,409,960	7	3,130,920	2	936,000	40	18,907,200
Trees	each	1,200	1,374	1,649	1,797	2,156	669	803	200	240	4,040	4,848
Sodding	m2	3,200	54,960	175,872	71,880	230,016	26,760	85,632	8,000	25,600	161,600	517,120
Retaining Wall	m	13,418,000	0	0	0	0	700	9,392,600	0	0	700	9,392,600
Concrete Slop Protection	m2	66,500	0	0	0	0	0	0	0	0	0	0
ROW Fence	m	43,500	0	0	0	0	0	0	0	0	0	0
Toll Gate	each	95,000,000	0	0	0	0	0	0	0	0	0	0
Traffic Control Signs	km	60,000,000	6.9	412,200	9.0	539,100	3.3	200,700	1.0	60,000	20.2	1,212,000
SUB–TOTAL				8,664,410		11,331,837		13,716,297		1,261,195		34,973,739
7. TOTAL				27,967,384		22,502,348		71,559,367		1,626,552		123,655,652
8. V.A.T (PPN 10 %)				2,796,738		2,250,235		7,155,937		162,655		12,365,565
9. GRAND TOTAL				30,764,123		24,752,583		78,715,304		1,789,207		136,021,217

Appendix 16.2 Breakdown of Land Acquisition and Compensation Costs

Table A 16.2.1 Route-1 : Toll Road

Description	Section 1 0 + 200 5 + 0 L = 4.8 km			Section 2 5 + 0 6 + 550 L = 1.6 km			Section 3 6 + 550 10 + 295 L = 3.7 km			Section 4 10 + 295 12 + 785 L = 2.5 km			Section 5 12 + 785 14 + 935 L = 2.2 km			Section 6 14 + 935 19 + 885 L = 5.0 km			Section 7 19 + 885 20 + 500 L = 0.6 km			Section 8 20 + 500 21 + 35 L = 0.5 km			TOTAL L = 20.8 km	
	Unit Price Rp	Area m2	Amount Rp.x1,000	Unit Price Rp	Area m2	Amount Rp.x1,000	Unit Price Rp	Area m2	Amount Rp.x1,000	Unit Price Rp	Area m2	Amount Rp.x1,000	Unit Price Rp	Area m2	Amount Rp.x1,000	Unit Price Rp	Area m2	Amount Rp.x1,000	Unit Price Rp	Area m2	Amount Rp.x1,000	Unit Price Rp	Area m2	Amount Rp.x1,000	Area m2	Amount Rp.x1,000
Commercial Area	175,000	0	0	175,000	0	0	175,000	0	0	175,000	0	0	0	0	0	0	0	0	150,000	0	0	150,000	0	0	0	0
Housing Area	175,000	0	0	175,000	4,410	771,750	175,000	53,965	9,426,275	175,000	0	0	45,000	3,780	170,100	45,000	36,225	1,630,125	100,000	1,890	189,000	100,000	20,000	2,000,000	120,170	14,187,350
Industrial Area	160,000	0	0	160,000	0	0	160,000	0	0	160,000	0	0	45,000	0	0	45,000	0	0	100,000	0	0	100,000	0	0	0	0
Rice Field Area	85,000	0	0	85,000	0	0	85,000	176,085	14,967,225	85,000	0	0	17,500	131,670	2,304,225	17,500	111,195	1,945,913	30,000	28,350	850,500	30,000	17,655	529,650	464,955	20,597,513
Field Area	77,500	9,240	716,100	77,500	35,200	2,728,000	77,500	0	0	77,500	0	0	17,500	0	0	17,500	0	0	0	0	0	0	0	0	44,520	3,450,300
Salt Farm Area	77,500	49,335	3,823,463	77,500	0	0	77,500	0	0	77,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	49,335	3,823,463
Fish Pond Area	80,000	17,325	1,386,000	80,000	57,960	4,636,800	80,000	0	0	80,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	75,285	6,022,800
Forest Area	0	0	0	0	0	0	0	0	0	0	0	0	10,000	0	0	10,000	22,365	223,650	0	0	0	0	0	0	22,365	223,650
Road/Rover	0	212,500	0	0	0	0	0	0	0	0	82,170	0	0	0	0	0	142,065	0	0	6,615	0	0	0	0	443,350	0
Total of Toll Road		288,400	5,925,563		97,650	8,142,750		229,950	24,393,500		82,170	0		135,450	2,474,325		311,850	3,799,688		36,855	1,039,500		37,655	2,529,650	1,219,980	48,305,075

Table A 16.2.2 Route-1 : Arterial Road

Description	Section 1 0 + 200 5 + 0 L = 0.0 km			Section 2 5 + 0 6 + 550 L = 1.6 km			Section 3 6 + 550 10 + 295 L = 3.7 km			Section 4 10 + 295 12 + 785 L = 2.5 km			Section 5 12 + 785 14 + 935 L = 2.2 km			Section 6 14 + 935 19 + 885 L = 5.0 km			Section 7 19 + 885 20 + 500 L = 0.6 km			Section 8 20 + 500 21 + 35 L = 0.0 km			TOTAL L = 15.5 km	
	Unit Price Rp	Area m2	Amount Rp.x1,000	Unit Price Rp	Area m2	Amount Rp.x1,000	Unit Price Rp	Area m2	Amount Rp.x1,000	Unit Price Rp	Area m2	Amount Rp.x1,000	Unit Price Rp	Area m2	Amount Rp.x1,000	Unit Price Rp	Area m2	Amount Rp.x1,000	Unit Price Rp	Area m2	Amount Rp.x1,000	Unit Price Rp	Area m2	Amount Rp.x1,000	Area m2	Amount Rp.x1,000
Commercial Area	175,000	0	0	175,000	0	0	175,000	11,000	1,925,000	175,000	0	0	0	0	0	0	0	0	150,000	0	0	150,000	0	0	11,000	1,925,000
Housing Area	175,000	0	0	175,000	2,800	490,000	175,000	23,200	4,060,000	175,000	0	0	45,000	0	0	45,000	23,000	1,035,000	100,000	1,200	120,000	100,000	0	0	50,200	5,705,000
Industrial Area	160,000	0	0	160,000	0	0	160,000	0	0	160,000	0	0	450,000	0	0	450,000	0	0	100,000	0	0	100,000	0	0	0	0
Rice Field Area	85,000	0	0	85,000	22,400	1,904,000	85,000	103,600	8,806,000	85,000	0	0	17,500	0	0	17,500	70,600	1,235,500	30,000	4,200	126,000	30,000	0	0	200,800	12,071,500
Field Area	77,500	0	0	77,500	0	0	77,500	0	0	77,500	0	0	17,500	0	0	17,500	0	0	0	0	0	0	0	0	0	0
Salt Farm Area	77,500	0	0	77,500	36,800	2,852,000	77,500	0	0	77,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36,800	2,852,000
Fish Pond Area	80,000	0	0	80,000	0	0	80,000	0	0	80,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Forest Area	0	0	0	0	0	0	0	0	0	0	0	0	10,000	0	0	10,000	13,800	138,000	10,000	2,400	24,000	0	0	0	16,200	162,000
Road/Rover	0	0	0	0	0	0	0	0	0	0	54,780	0	0	54,780	0	0	90,200	0	0	4,200	0	0	0	0	203,960	0
Total of Arterial		0	0		62,000	5,246,000		137,800	14,791,000		54,780	0		54,780	0		197,600	2,408,500		12,000	270,000		0	0	518,960	22,715,500

Table A 16.2.3 Route–2

Description	Section 1 0 + 0 4 + 100 L = 4.100			Section 2 4 + 100 1 + 565 L = 3.588			Section 3 1 + 565 5 + 335 L = 3.805			Section 4 5 + 335 7 + 190 L = 1.818			TOTAL L= 13.311	
	Unit Price Rp.	Area m2	Amount Rp.x1,000	Unit Price Rp.	Area m2	Amount Rp.x1,000	Unit Price Rp.	Area m2	Amount Rp.x1,000	Unit Price Rp.	Area m2	Amount Rp.x1,000	Area m2	Amount Rp.x1,000
Commercial Area	175,000	0	0	175,000	0	0	175,000	0	0	175,000	0	0	0	0
Housing Area	175,000	2,000	350,000	175,000	41,900	7,332,500	175,000	10,300	1,802,500	175,000	14,200	2,485,000	68,400	11,970,000
Industrial Area	160,000	17,000	2,720,000	160,000	0	0	160,000	0	0	160,000	0	0	17,000	2,720,000
Rice Field Area	85,000	24,150	2,052,750	85,000	0	0	85,000	56,700	4,819,500	85,000	83,200	7,072,000	164,050	13,944,250
Fieled Area	77,000	0	0	77,000	0	0	77,000	40,700	3,133,900	77,000	0	0	40,700	3,133,900
Salt Farm Area	77,000	0	0	77,000	0	0	77,000	0	0	77,000	0	0	0	0
Fish Pond Area	80,000	37,400	2,992,000	0	0	0	0	0	0	0	0	0	37,400	2,992,000
Foret Area	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Road/River	0	18,000	0	0	65,975	0	0	44,500	0	0	1,300	0	129,775	0
Total of Route–2		98,550	8,114,750		107,875	7,332,500		152,200	9,755,900		98,700	9,557,000	457,325	34,760,150

Table A 16.2.4 Route–3

Description	Section 1 0 + 0 3 + 500 L = 3.500			Section 2 3 + 500 8 + 220 L = 4.7			TOTAL L= 8.2	
	Unit Price Rp.	Area m2	Amount Rp.x1,000	Unit Price Rp.	Area m2	Amount Rp.x1,000	Area m2	Amount Rp.x1,000
Commercial Area	250,000	20,775	5,193,750	300,000	12,900	3,870,000	33,675	9,063,750
Housing Area	250,000	11,025	2,756,250	200,000	39,525	7,905,000	50,550	10,661,250
Industrial Area	250,000	13,950	3,487,500	200,000	6,975	1,395,000	20,925	4,882,500
Rice Field Area	175,000	11,775	2,060,625	140,000	6,375	892,500	18,150	2,953,125
Field Area	165,000	0	0		0	0	0	0
Salt Farm Area	0	0	0		0	0	0	0
Fish Pond	0	0	0		0	0	0	0
Forest Area	0	0	0		0	0	0	0
Road/river	0	38,350	0		43,850	0	82,200	0
Total		95,875	13,498,125		109,625	14,062,500	205,500	27,560,625

Table A 16.2.5 Route–4

Description	Section 1			Section 2			Section 3			Section 4			Section 5			TOTAL	
	0 ~ 600			7 + 225			12 + 0			18 + 500			19 + 100				
	7 + 225			12 + 0			18 + 500			19 + 100			27 + 0				
	L = 7.8			L = 4.8			L = 6.5			L = 0.6			L = 7.9			L= 27.6	
	Unit Price Rp.	Area m2	Amount Rp.x1,000	Unit Price Rp.	Area m2	Amount Rp.x1,000	Unit Price Rp.	Area m2	Amount Rp.x1,000	Unit Price Rp.	Area m2	Amount Rp.x1,000	Unit Price Rp.	Area m2	Amount Rp.x1,000	Area m2	Amount Rp.x1,000
Commercial Area	0	0	0	180,000	0	0	180,000	0	0	180,000	7,000	1,260,000	180,000	32,500	5,850,000	39,500	7,110,000
Housing Area	45,000	0	0	170,000	0	0	170,000	0	0	170,000	32,850	5,584,500	170,000	58,075	9,872,750	90,925	15,457,250
Industrial Area	450,000	0	0	155,000	0	0	155,000	0	0	155,000	0	0	155,000	6,450	999,750	6,450	999,750
Rice Field Area	17,500	121,800	2,131,500	75,000	0	0	75,000	0	0	75,000	0	0	75,000	74,200	5,565,000	196,000	7,696,500
Field Area	17,500	170,800	2,989,000	72,500	0	0	72,500	0	0	72,500	0	0	72,500	0	0	170,800	2,989,000
Salt Farm Area	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fish Pond	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Forest Area	12,000	20,400	244,800	0	0	0	0	0	0	0	0	0	0	0	0	20,400	244,800
Road/River	0	0	0	0	191,000	0	0	217,300	0	0	58,150	0	0	73,925	0	540,375	0
Total of Route–4		313,000	5,365,300		191,000	0		217,300	0		98,000	6,844,500		245,150	22,287,500	1,064,450	34,497,300

Table A 16.2.6 Route–5

Description	Section 1			Section 2			Section 3			Section 4			TOTAL	
	0 + 300			7 + 170			16 + 155			19 + 500				
	7 + 170			16 + 155			19 + 500			22 + 880				
	L = 6.9 km			L = 9.0 km			L = 3.3 km			L = 3.4 km			L= 22.6 km	
	Unit Price Rp.	Area m2	Amount Rp.x1,000	Unit Price Rp.	Area m2	Amount Rp.x1,000	Unit Price Rp.	Area m2	Amount Rp.x1,000	Unit Price Rp.	Area m2	Amount Rp.x1,000	Area m2	Amount Rp.x1,000
Commercial Area	–	0	0	200,000	0	0	200,000	0	0	200,000	0	0	0	0
Housing Area	45,000	0	0	170,000	19,775	3,361,750	170,000	89,150	15,155,500	170,000	0	0	108,925	18,517,250
Industrial Area	450,000	0	0	165,000	0	0	165,000	71,575	11,809,875	165,000	0	0	71,575	11,809,875
Rice Field Area	17,500	142,800	2,499,000	55,000	159,250	8,758,750	55,000	30,850	1,696,750	55,000	0	0	332,900	12,954,500
Field Area	17,500	97,650	1,708,875	25,000	82,950	2,073,750	25,000	0	0	25,000	0	0	180,600	3,782,625
Salt Farm Area	–	0	0	0	0	0	0	0	0	0	0	0	0	0
Fish Pond	–	0	0	0	0	0	0	0	0	0	0	0	0	0
Forest Area	–	0	0	0	0	0	0	0	0	0	0	0	0	0
Road/River	0	0	0	0	0	0	0	10,500	0	0	118,300	0	128,800	0
Total		240,450	4,207,875		261,975	14,194,250		202,075	28,662,125		118,300	0	822,800	47,064,250

Appendix 17.1 Equations for Vehicle Operating Costs

A) Equations of Fuel Consumption

Sedan/Van	Y =	0.03719	S*S	-	4.19966	S	+	175.9911
Mini/Medium Bus	Y =	0.06846	S*S	-	8.02987	S	+	340.6040
Large Bus	Y =	0.12292	S*S	-	13.68742	S	+	541.0279
Small/Medium Truck (2-axles)	Y =	0.06427	S*S	-	7.06130	S	+	318.3326
Large Truck (3-axles)	Y =	0.11462	S*S	-	12.85594	S	+	503.7179

where: Y = Fuel consumption (liter/1,000 Km)
S = Running speed (Km per hour)
Note) Sedan/Van includes Sedan/Van(Private)/Pick-up.

B) Equations of Engine Oil Consumption

Sedan/Van	Y =	0.00025	S*S	-	0.02664	S	+	1.44171
Mini/Medium Bus	Y =	0.00057	S*S	-	0.06130	S	+	3.31753
Large Bus	Y =	0.00130	S*S	-	0.12968	S	+	7.06239
Small/Medium Truck (2-axles)	Y =	0.00048	S*S	-	0.05608	S	+	3.07383
Large Truck (3-axles)	Y =	0.00100	S*S	-	0.11715	S	+	6.40962

where: Y = Engine oil consumption (liter/1,000 Km)

C) Equations of Tyre Wear

Sedan/Van	Y = (0.0008848 S - 0.0045333)
Bus	Y = (0.0012356 S - 0.0064667)
Truck	Y = (0.0011553 S - 0.0059333)

where: Y = Total tyre wear of vehicle equated as wear of one tyre per 1,000km

D) Equations of Maintenance Cost

(1) Maintenance Cost on Parts

Sedan/Van	Y = (0.0000064 S + 0.0005567)
Bus	Y = (0.0000332 S + 0.0020891)
Truck	Y = (0.0000191 S + 0.0015400)

where: Y = Maintenance parts equated as the depreciable value of the vehicle per 1,000Km

(2) Maintenance Hour of Labour

Sedan/Van	Y = (0.00362 S + 0.36267)
Bus	Y = (0.02311 S + 1.97733)
Truck	Y = (0.01511 S + 1.21200)

where: Y = Hours of maintenance labour per 1,000 Km

E) Equations of Depreciation

Sedan/Van	Y = 1/(2.500 S + 125)
Bus	Y = 1/(8.756 S + 350)
Truck	Y = 1/(6.129 S + 245)

where: Y = Depreciation per 1,000 Km, equated as the depreciable value of the vehicle

F) Equations of Interest

Sedan/Van	Y = (0.15 x 1000)/(500 S)
Bus	Y = (0.15 x 1000)/(2571 S)
Truck	Y = (0.15 x 1000)/(1714 S)

where: Y = Interest per 1,000 Km, equated as one half the value of the vehicles
(interest rate = 15% per annum)

G) Equations of Insurance

Sedan/Van	Y = (0.035 x 1000 x 0.5)/(500 S)
Bus	Y = (0.040 x 1000 x 0.5)/(2500 S)
Truck	Y = (0.060 x 1000 x 0.5)/(1750 S)

where: Y = Insurance cost per 1,000 Km, equated as one half the value of the vehicle

H) Equations of Travelling Hours for Wages

Bus	Y = 1000/S
Truck	Y = 1000/S

where: Y = Travelling time per 1,000 Km

Average Crew Size per Vehicle:

Minibus (Public)	=	Driver :	1.0 ,	Conductor	:	0.5
Large Bus	=	Driver :	1.0 ,	Conductor	:	1.0
Small/Medium Truck (2-axles)	=	Driver :	1.0 ,	Assistant	:	1.0
Large Truck (3-axles)	=	Driver :	1.0 ,	Assistant	:	2.0

I) Overhead

Bus	= 10% of subtotal of A) to H) above
Truck	= 10% of subtotal of A) to H) above

Assumption on "Equations for Vehicle Operating Costs"

Parameters	Psg. Car/Van	Bus	Truck
Average Year-Round Speed (Km/hour)	50	40	40
Average Annual Distance Trvelled (Km)	25,000	100,000	70,000
Average Service Life (years)	10	7	7
Life Time Distance Travelled (Km)	250,000	700,000	490,000

Appendix 17.2 Project Economic Analysis

Table A17.2.1 Economic Cash Flow for Route-1

EIRR = 26.66%
NPV = 595,023 (Million Rp.)
B/C = 2.27
(Discount Rate = 15.00%)

(Million Rp.)

	Year	Benefits			Costs			Net
		VOC Saving	Time Saving	Total	Investment Cost	O/M Costs	Total Costs	Cash Flow
	1998				21,116		21,116	-21,116
	1999				39,062		39,062	-39,062
	2000				39,062		39,062	-39,062
	2001				251,041		251,041	-251,041
	2002				251,041		251,041	-251,041
	2003				254,543		254,543	-254,543
1	2004	123,844	137,940	261,783		4,647	4,647	257,136
2	2005	132,170	148,701	280,871		4,647	4,647	276,224
3	2006	140,496	159,463	299,959		4,647	4,647	295,312
4	2007	148,822	170,224	319,047		4,647	4,647	314,399
5	2008	157,149	180,986	338,135		4,647	4,647	333,487
6	2009	165,475	191,747	357,222		4,647	4,647	352,575
7	2010	173,801	202,509	376,310		4,647	4,647	371,663
8	2011	182,128	213,271	395,398		4,647	4,647	390,751
9	2012	190,454	224,032	414,486		4,647	4,647	409,839
10	2013	198,780	234,794	433,574	(19,476)	4,647	24,123	409,450
11	2014	207,107	245,555	452,662		4,647	4,647	448,014
12	2015	215,433	256,317	471,749		4,647	4,647	467,102
13	2016	223,759	267,078	490,837		4,647	4,647	486,190
14	2017	232,085	277,840	509,925		4,647	4,647	505,278
15	2018	240,412	288,601	529,013		4,647	4,647	524,365
16	2019	244,575	293,982	538,557		4,647	4,647	533,909
17	2020	248,738	299,363	548,101		4,647	4,647	543,453
18	2021	252,901	304,743	557,645		4,647	4,647	552,997
19	2022	257,064	310,124	567,188		4,647	4,647	562,541
20	2023	261,227	315,505	576,732	(19,476)	4,647	24,123	552,609
21	2024	265,391	320,886	586,276		4,647	4,647	581,629
22	2025	269,554	326,267	595,820		4,647	4,647	591,173
23	2026	273,717	331,647	605,364		4,647	4,647	600,717
24	2027	277,880	337,028	614,908		4,647	4,647	610,261
25	2028	282,043	342,409	624,452		4,647	4,647	619,805
26	2029	286,206	347,790	633,996		4,647	4,647	629,348
27	2030	290,369	353,170	643,540		4,647	4,647	638,892
28	2031	294,533	358,551	653,084		4,647	4,647	648,436
29	2032	298,696	363,932	662,628		4,647	4,647	657,980
30	2033	302,859	369,313	672,172	(19,476)	4,647	24,123	648,048
	Total	6,837,667	8,173,766	15,011,433	855,864	139,420	1,053,712	13,957,720

Table A17.2.2 Economic Cash Flow for Route-2

EIRR = 26.53%
NPV = 134,108 (Million Rp.)
B/C = 2.31
(Discount Rate = 15.00%)

(Million Rp.)

	Year	Benefits			Costs			Net
		VOC Saving	Time Saving	Total	Investment Cost	O/M Costs	Total Costs	Cash Flow
	1998				3,926		3,926	-3,926
	1999				19,118		19,118	-19,118
	2000				19,118		19,118	-19,118
	2001				46,678		46,678	-46,678
	2002				46,678		46,678	-46,678
	2003				47,291		47,291	-47,291
1	2004	19,126	42,568	61,694		273	273	61,421
2	2005	21,076	44,274	65,350		273	273	65,076
3	2006	23,026	45,979	69,005		273	273	68,732
4	2007	24,977	47,684	72,660		273	273	72,387
5	2008	26,927	49,389	76,315		273	273	76,042
6	2009	28,877	51,094	79,971		273	273	79,697
7	2010	30,827	52,799	83,626		273	273	83,353
8	2011	32,777	54,504	87,281		273	273	87,008
9	2012	34,728	56,209	90,937		273	273	90,663
10	2013	36,678	57,914	94,592	(5,040)	273	5,313	89,278
11	2014	38,628	59,619	98,247		273	273	97,974
12	2015	40,578	61,324	101,902		273	273	101,629
13	2016	42,528	63,029	105,557		273	273	105,284
14	2017	44,478	64,734	109,213		273	273	108,939
15	2018	46,429	66,439	112,868		273	273	112,595
16	2019	47,404	67,292	114,696		273	273	114,422
17	2020	48,379	68,144	116,523		273	273	116,250
18	2021	49,354	68,997	118,351		273	273	118,078
19	2022	50,329	69,850	120,179		273	273	119,905
20	2023	51,304	70,702	122,006	(5,040)	273	5,313	116,693
21	2024	52,279	71,555	123,834		273	273	123,560
22	2025	53,254	72,407	125,661		273	273	125,388
23	2026	54,229	73,260	127,489		273	273	127,216
24	2027	55,204	74,112	129,317		273	273	129,043
25	2028	56,180	74,965	131,144		273	273	130,871
26	2029	57,155	75,817	132,972		273	273	132,699
27	2030	58,130	76,670	134,799		273	273	134,526
28	2031	59,105	77,522	136,627		273	273	136,354
29	2032	60,080	78,375	138,455		273	273	138,181
30	2033	61,055	79,227	140,282	(5,040)	273	5,313	134,969
	Total	1,305,100	1,916,453	3,221,552	182,809	8,198	206,127	3,015,425

Table A17.2.3 Economic Cash Flow for Route-3

EIRR = 23.93%
NPV = 37,473 (Million Rp.)
B/C = 2.06
(Discount Rate = 15.00%)

(Million Rp.)

	Year	Benefits			Costs			Net Cash Flow
		VOC Saving	Time Saving	Total	Investment Cost	O/M Costs	Total Costs	
	1998				704		704	-704
	1999				15,159		15,159	-15,159
	2000				15,159		15,159	-15,159
	2001				8,373		8,373	-8,373
	2002				8,373		8,373	-8,373
	2003				8,713		8,713	-8,713
1	2004	9,545	10,331	19,877		166	166	19,710
2	2005	9,928	10,930	20,858		166	166	20,692
3	2006	10,311	11,529	21,840		166	166	21,674
4	2007	10,694	12,128	22,822		166	166	22,656
5	2008	11,077	12,726	23,804		166	166	23,637
6	2009	11,460	13,325	24,786		166	166	24,619
7	2010	11,843	13,924	25,767		166	166	25,601
8	2011	12,226	14,523	26,749		166	166	26,583
9	2012	12,609	15,122	27,731		166	166	27,565
10	2013	12,992	15,721	28,713	(1,198)	166	1,365	27,348
11	2014	13,375	16,319	29,695		166	166	29,528
12	2015	13,758	16,918	30,676		166	166	30,510
13	2016	14,141	17,517	31,658		166	166	31,492
14	2017	14,524	18,116	32,640		166	166	32,474
15	2018	14,907	18,715	33,622		166	166	33,455
16	2019	15,099	19,014	34,113		166	166	33,946
17	2020	15,290	19,313	34,604		166	166	34,437
18	2021	15,482	19,613	35,094		166	166	34,928
19	2022	15,673	19,912	35,585		166	166	35,419
20	2023	15,865	20,212	36,076	(1,198)	166	1,365	34,712
21	2024	16,056	20,511	36,567		166	166	36,401
22	2025	16,248	20,810	37,058		166	166	36,892
23	2026	16,439	21,110	37,549		166	166	37,382
24	2027	16,631	21,409	38,040		166	166	37,873
25	2028	16,822	21,709	38,531		166	166	38,364
26	2029	17,014	22,008	39,022		166	166	38,855
27	2030	17,205	22,308	39,513		166	166	39,346
28	2031	17,397	22,607	40,003		166	166	39,837
29	2032	17,588	22,906	40,494		166	166	40,328
30	2033	17,780	23,206	40,985	(1,198)	166	1,365	39,621
	Total	429,980	534,491	964,471	56,481	4,993	65,068	899,403

Table A17.2.4 Economic Cash Flow for Route-4

EIRR = 30.99%
NPV = 185,550 (Million Rp.)
B/C = 2.71
(Discount Rate = 15.00%)

(Million Rp.)

	Year	Benefits			Costs			Net
		VOC Saving	Time Saving	Total	Investment Cost	O/M Costs	Total Costs	Cash Flow
	1998				4,157		4,157	-4,157
	1999				18,974		18,974	-18,974
	2000				18,974		18,974	-18,974
	2001				49,416		49,416	-49,416
	2002				49,416		49,416	-49,416
	2003				50,560		50,560	-50,560
1	2004	33,758	58,509	92,267		542	542	91,725
2	2005	35,087	59,093	94,180		542	542	93,638
3	2006	36,415	59,678	96,093		542	542	95,550
4	2007	37,743	60,262	98,005		542	542	97,463
5	2008	39,071	60,847	99,918		542	542	99,376
6	2009	40,399	61,431	101,831		542	542	101,288
7	2010	41,728	62,016	103,743		542	542	103,201
8	2011	43,056	62,600	105,656		542	542	105,114
9	2012	44,384	63,185	107,569		542	542	107,026
10	2013	45,712	63,769	109,481	(12,538)	542	13,081	96,401
11	2014	47,040	64,354	111,394		542	542	110,852
12	2015	48,368	64,938	113,307		542	542	112,764
13	2016	49,697	65,523	115,219		542	542	114,677
14	2017	51,025	66,107	117,132		542	542	116,590
15	2018	52,353	66,692	119,045		542	542	118,502
16	2019	53,017	66,984	120,001		542	542	119,459
17	2020	53,681	67,276	120,958		542	542	120,415
18	2021	54,345	67,569	121,914		542	542	121,371
19	2022	55,009	67,861	122,870		542	542	122,328
20	2023	55,673	68,153	123,826	(12,538)	542	13,081	110,746
21	2024	56,337	68,445	124,783		542	542	124,240
22	2025	57,002	68,738	125,739		542	542	125,197
23	2026	57,666	69,030	126,695		542	542	126,153
24	2027	58,330	69,322	127,652		542	542	127,109
25	2028	58,994	69,614	128,608		542	542	128,066
26	2029	59,658	69,907	129,565		542	542	129,022
27	2030	60,322	70,199	130,521		542	542	129,978
28	2031	60,986	70,491	131,477		542	542	130,935
29	2032	61,650	70,783	132,433		542	542	131,891
30	2033	62,314	71,076	133,390	(12,538)	542	13,081	120,309
	Total	1,510,819	1,974,453	3,485,272	191,495	16,272	245,382	3,239,890

Table A17.2.5 Economic Cash Flow for Route-5

EIRR = 29.48%
NPV = 194,659 (Million Rp.)
B/C = 2.69
(Discount Rate = 15.00%)

(Million Rp.)

	Year	Benefits			Costs			Net Cash Flow
		VOC Saving	Time Saving	Total	Investment Cost	O/M Costs	Total Costs	
	1998				4,081		4,081	-4,081
	1999				25,885		25,885	-25,885
	2000				25,885		25,885	-25,885
	2001				48,514		48,514	-48,514
	2002				48,514		48,514	-48,514
	2003				49,450		49,450	-49,450
1	2004	43,559	44,683	88,242		464	464	87,778
2	2005	45,948	45,835	91,784		464	464	91,319
3	2006	48,338	46,988	95,325		464	464	94,861
4	2007	50,727	48,140	98,867		464	464	98,402
5	2008	53,116	49,292	102,408		464	464	101,944
6	2009	55,506	50,444	105,949		464	464	105,485
7	2010	57,895	51,596	109,491		464	464	109,026
8	2011	60,284	52,748	113,032		464	464	112,568
9	2012	62,674	53,900	116,574		464	464	116,109
10	2013	65,063	55,052	120,115	(3,343)	464	3,807	116,308
11	2014	67,452	56,204	123,656		464	464	123,192
12	2015	69,842	57,356	127,198		464	464	126,734
13	2016	72,231	58,509	130,739		464	464	130,275
14	2017	74,620	59,661	134,281		464	464	133,816
15	2018	77,009	60,813	137,822		464	464	137,358
16	2019	78,204	61,389	139,593		464	464	139,128
17	2020	79,399	61,965	141,364		464	464	140,899
18	2021	80,593	62,541	143,134		464	464	142,670
19	2022	81,788	63,117	144,905		464	464	144,441
20	2023	82,983	63,693	146,676	(3,343)	464	3,807	142,869
21	2024	84,177	64,269	148,446		464	464	147,982
22	2025	85,372	64,845	150,217		464	464	149,753
23	2026	86,567	65,421	151,988		464	464	151,523
24	2027	87,761	65,997	153,759		464	464	153,294
25	2028	88,956	66,573	155,529		464	464	155,065
26	2029	90,151	67,149	157,300		464	464	156,836
27	2030	91,345	67,725	159,071		464	464	158,606
28	2031	92,540	68,301	160,841		464	464	160,377
29	2032	93,735	68,877	162,612		464	464	162,148
30	2033	94,929	69,453	164,383	(3,343)	464	3,807	160,576
	Total	2,202,763	1,772,536	3,975,299	202,329	13,930	226,287	3,749,012

Appendix 17.3 Economic Sensitivity Analysis for Delay of Implementation (Change of NPV (Net Present Value))

(Unit: Million Rp.)

(1) Route-1	Base Case	Case of One Year Delay of Implementation	Case of Three Year Delay of Implementation
Discounted Benefit	1,062,910 (a)	964,496 (d) (a) - (d) = (98,414)	787,412 (g) (a) - (g) = (275,498)
Discounted Cost	467,887 (b)	406,722 (e) (b) - (e) = (61,165)	307,491 (h) (b) - (h) = (160,396)
Discounted Net (Net Present Value)	595,023 (c)	557,774 (f) (c) - (f) = (37,249)	479,921 (i) (c) - (i) = (115,102)

(1) Route-2	Base Case	Case of One Year Delay of Implementation	Case of Three Year Delay of Implementation
Discounted Benefit	236,369 (a)	213,176 (d) (a) - (d) = (23,193)	172,198 (g) (a) - (g) = (64,171)
Discounted Cost	102,261 (b)	88,893 (e) (b) - (e) = (13,368)	67,213 (h) (b) - (h) = (35,048)
Discounted Net (Net Present Value)	134,108 (c)	124,283 (f) (c) - (f) = (9,825)	104,985 (i) (c) - (i) = (29,123)

(1) Route-3	Base Case	Case of One Year Delay of Implementation	Case of Three Year Delay of Implementation
Discounted Benefit	72,872 (a)	65,400 (d) (a) - (d) = (7,472)	52,373 (g) (a) - (g) = (20,499)
Discounted Cost	35,399 (b)	30,774 (e) (b) - (e) = (4,625)	23,268 (h) (b) - (h) = (12,131)
Discounted Net (Net Present Value)	37,473 (c)	34,626 (f) (c) - (f) = (2,847)	29,105 (i) (c) - (i) = (8,368)

(1) Route-4	Base Case	Case of One Year Delay of Implementation	Case of Three Year Delay of Implementation
Discounted Benefit	293,960 (a)	259,273 (d) (a) - (d) = (34,687)	201,170 (g) (a) - (g) = (92,790)
Discounted Cost	108,410 (b)	94,195 (e) (b) - (e) = (14,215)	71,219 (h) (b) - (h) = (37,191)
Discounted Net (Net Present Value)	185,550 (c)	165,078 (f) (c) - (f) = (20,472)	129,951 (i) (c) - (i) = (55,599)

(1) Route-5	Base Case	Case of One Year Delay of Implementation	Case of Three Year Delay of Implementation
Discounted Benefit	309,822 (a)	276,649 (d) (a) - (d) = (33,173)	219,547 (g) (a) - (g) = (90,275)
Discounted Cost	115,163 (b)	100,120 (e) (b) - (e) = (15,043)	75,701 (h) (b) - (h) = (39,462)
Discounted Net (Net Present Value)	194,659 (c)	176,528 (f) (c) - (f) = (18,131)	143,847 (i) (c) - (i) = (50,812)

Appendix 18.1 Profit and Loss

("Cost Base Case" and Equity/Loan Ratio : 40%/60%) (Million Rp.)

Year	1 1998	2 1999	3 2000	4 2001	5 2002	6 2003	7 2004	8 2005	9 2006	10 2007	11 2008	12 2009
I. REVENUE												
1 Toll Revenue												
(a) Toll Revenue (Gross)							98,707	101,670	121,895	125,552	152,495	157,733
(b) Revenue Sharing to JASA MARGA							0	0	0	0	0	0
(c) Net Toll Revenue ((a) - (b))							98,707	101,670	121,895	125,552	152,495	157,733
2 Other Income							2,000	2,000	2,000	2,000	2,000	2,000
3 Buy Out Revenue							0	0	0	0	0	0
(REVENUE Total) <1>							100,707	103,670	123,895	127,552	154,495	159,733
II. EXPENDITURE												
1 Operational <2>							9,299	9,857	10,448	11,075	11,740	12,444
(a) O/M Costs							(6,980)	(7,399)	(7,843)	(8,313)	(8,812)	(9,341)
(b) Overhead Cost							(1,396)	(1,480)	(1,569)	(1,663)	(1,762)	(1,868)
(c) Property Tax							(923)	(979)	(1,037)	(1,100)	(1,166)	(1,235)
(Gross Profit : <1> - <2>)							91,408	93,813	113,446	116,477	142,755	147,289
2 Depreciation <3>							60,836	60,836	60,836	60,836	60,836	47,592
(a) (Construction)							(43,968)	(43,968)	(43,968)	(43,968)	(43,968)	(43,968)
(b) (Toll equipement)							(944)	(944)	(944)	(944)	(944)	(0)
(c) (Overlay)							(0)	(0)	(0)	(0)	(0)	(0)
(d) (Land)							(12,299)	(12,299)	(12,299)	(12,299)	(12,299)	(0)
(e) (Interest During Construction)							(3,624)	(3,624)	(3,624)	(3,624)	(3,624)	(3,624)
(Operating Profit : <1> - <2> - <3>)							30,573	32,977	52,611	55,642	81,920	99,696
3 Interest for Long-term Loan							74,369	74,369	74,369	70,650	63,213	55,776
4 Interest for Short-term Loan							0	1,552	2,933	664	9,864	13,666
5 Foreign Currency Loss							24,799	24,799	24,799	23,559	21,079	18,599
(EXPENDITURE Total)							169,302	171,411	173,384	166,783	166,732	148,078
III. Profit Before Tax							-68,594	-67,742	-49,489	-39,231	-12,237	11,655
IV. Corporate Tax							0	0	0	0	0	0
V. Profit After Tax							-68,594	-67,742	-49,489	-39,231	-12,237	11,655
VI. Accumulated Profit After Tax							-68,594	-136,336	-185,825	-225,056	-237,293	-225,638

Appendix 18.1 Profit and Loss (Continued-1)

("Cost Base Case" and Equity/Loan Ratio : 40%/60%)

(Million Rp.)

Year	13 2010	14 2011	15 2012	16 2013	17 2014	18 2015	19 2016	20 2017	21 2018	22 2019	23 2020	24 2021
I. REVENUE												
1 Toll Revenue												
(a) Toll Revenue (Gross)	190,570	196,691	237,998	245,178	295,815	304,220	365,433	375,269	450,815	464,341	559,113	575,886
(b) Revenue Sharing to JASA MARGA	0	0	0	0	14,791	15,211	18,272	18,763	22,541	46,434	55,911	57,589
(c) Net Toll Revenue ((a) - (b))	190,570	196,691	237,998	245,178	281,024	289,009	347,161	356,505	428,274	417,907	503,202	518,298
2 Other Income	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
3 Buy Out Revenue	0	0	0	0	0	0	0	0	0	0	0	0
(REVENUE Total) <1>	192,570	198,691	239,998	247,178	283,024	291,009	349,161	358,505	430,274	419,907	505,202	520,298
II. EXPENDITURE												
1 Operational <2>	13,191	13,982	14,821	15,711	16,653	17,652	18,712	19,834	21,024	22,286	23,623	25,040
(a) O/M Costs	(9,901)	(10,495)	(11,125)	(11,792)	(12,500)	(13,250)	(14,045)	(14,888)	(15,781)	(16,728)	(17,731)	(18,795)
(b) Overhead Cost	(1,980)	(2,099)	(2,225)	(2,358)	(2,500)	(2,650)	(2,809)	(2,978)	(3,156)	(3,346)	(3,546)	(3,759)
(c) Property Tax	(1,310)	(1,388)	(1,471)	(1,560)	(1,653)	(1,753)	(1,858)	(1,969)	(2,087)	(2,213)	(2,345)	(2,486)
(Gross Profit : <1> - <2>)	179,379	184,708	225,176	231,467	266,371	273,357	330,450	338,671	409,250	397,621	481,579	495,257
2 Depreciation <3>	47,592	47,592	47,592	54,290	54,290	54,290	54,290	54,290	47,592	47,592	47,592	47,592
(a) (Construction)	(43,968)	(43,968)	(43,968)	(43,968)	(43,968)	(43,968)	(43,968)	(43,968)	(43,968)	(43,968)	(43,968)	(43,968)
(b) (Toll equipement)	(0)	(0)	(0)	(1,691)	(1,691)	(1,691)	(1,691)	(1,591)	(0)	(0)	(0)	(0)
(c) (Overlay)	(0)	(0)	(0)	(5,007)	(5,007)	(5,007)	(5,007)	(5,007)	(0)	(0)	(0)	(0)
(d) (Land)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
(e) (Interest During Construction)	(3,624)	(3,624)	(3,624)	(3,624)	(3,624)	(3,624)	(3,624)	(3,624)	(3,624)	(3,624)	(3,624)	(3,624)
(Operating Profit : <1> - <2> - <3>)	131,787	137,116	177,584	177,177	212,082	219,067	276,160	284,381	361,657	350,029	433,986	447,665
3 Interest for Long-term Loan	48,340	40,903	33,466	26,029	18,592	11,155	3,718	0	0	0	0	0
4 Interest for Short-term Loan	15,338	8,943	399	0	0	0	0	0	0	0	0	0
5 Foreign Currency Loss	16,119	13,639	11,159	8,679	6,200	3,720	1,240	0	0	0	0	0
(EXPENDITURE Total)	140,580	125,060	107,438	104,709	95,735	86,817	77,960	74,124	68,617	69,878	71,215	72,633
III. Profit Before Tax	51,990	73,631	132,559	142,469	187,290	204,192	271,202	284,381	361,657	350,029	433,986	447,665
IV. Corporate Tax	0	10,896	39,768	42,741	56,187	61,258	81,361	85,314	108,497	105,009	130,196	134,300
V. Profit After Tax	51,990	62,735	92,792	99,728	131,103	142,935	189,841	199,067	253,160	245,020	303,791	313,366
VI. Accumulated Profit After Tax	-173,648	-110,913	-18,121	81,607	212,710	355,644	545,486	744,552	997,712	1,242,733	1,546,523	1,859,889

Appendix 18.1 Profit and Loss (Continued-2)

("Cost Base Case" and Equity/Loan Ratio : 40%/60%)

(Million Rp.)

Year	25 2022	26 2023	27 2024	28 2025	29 2026	30 2027	31 2028	32 2029	33 2030	34 2031	35 2032	36 2033	
I. REVENUE													
1 Toll Revenue													
(a) Toll Revenue (Gross)	694,348	715,180	860,859	886,679	1,035,953	1,035,953	1,211,032	1,211,032	1,415,858	1,415,858	1,654,912	1,654,912	18,811,957
(b) Revenue Sharing to JASA MARGA	69,435	71,518	129,129	133,002	155,393	155,393	181,655	242,206	283,172	283,172	330,982	330,982	2,615,550
(c) Net Toll Revenue ((a) - (b))	624,913	643,662	731,730	753,677	880,560	880,560	1,029,377	968,826	1,132,687	1,132,687	1,323,930	1,323,930	16,196,407
2 Other Income	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	60,000
3 Buy Out Revenue	0	0	0	0	0	0	0	0	0	0	0	0	0
(REVENUE Total) <1>	626,913	645,662	733,730	755,677	882,560	882,560	1,031,377	970,826	1,134,687	1,134,687	1,325,930	1,325,930	
II. EXPENDITURE													
1 Operational <2>	26,543	28,135	29,823	31,613	33,509	35,520	37,651	39,910	42,305	44,843	47,534	50,386	735,166
(a) O/M Costs	(19,923)	(21,118)	(22,385)	(23,728)	(25,152)	(26,661)	(28,261)	(29,957)	(31,754)	(33,659)	(35,679)	(37,820)	
(b) Overhead Cost	(3,985)	(4,224)	(4,477)	(4,746)	(5,030)	(5,332)	(5,652)	(5,991)	(6,351)	(6,732)	(7,136)	(7,564)	
(c) Property Tax	(2,635)	(2,793)	(2,961)	(3,139)	(3,327)	(3,527)	(3,738)	(3,962)	(4,200)	(4,452)	(4,719)	(5,002)	
(Gross Profit : <1> - <2>)	600,370	617,527	703,907	724,064	849,050	847,040	993,726	930,915	1,092,382	1,089,843	1,278,396	1,275,544	
2 Depreciation <3>	47,592	59,586	15,618	15,618	15,618	15,618	3,624	3,624	3,624	3,624	3,624	3,624	1,147,764
(a) (Construction)	(43,968)	(43,968)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	
(b) (Toll equipement)	(0)	(3,028)	(3,028)	(3,028)	(3,028)	(3,028)	(0)	(0)	(0)	(0)	(0)	(0)	
(c) (Overlay)	(0)	(8,966)	(8,966)	(8,966)	(8,966)	(8,966)	(0)	(0)	(0)	(0)	(0)	(0)	
(d) (Land)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	
(e) (Interest During Construction)	(3,624)	(3,624)	(3,624)	(3,624)	(3,624)	(3,624)	(3,624)	(3,624)	(3,624)	(3,624)	(3,624)	(3,624)	
(Operating Profit : <1> - <2> - <3>)	552,778	557,940	688,288	708,446	833,432	831,421	990,102	927,291	1,088,757	1,086,219	1,274,772	1,271,920	
3 Interest for Long-term Loan	0	0	0	0	0	0	0	0	0	0	0	0	594,949
4 Interest for Short-term Loan	0	0	0	0	0	0	0	0	0	0	0	0	53,360
5 Foreign Currency Loss	0	0	0	0	0	0	0	0	0	0	0	0	198,388
(EXPENDITURE Total)	74,135	87,722	45,442	47,231	49,128	51,139	41,276	43,535	45,929	48,468	51,158	54,010	
III. Profit Before Tax	552,778	557,940	688,288	708,446	833,432	831,421	990,102	927,291	1,088,757	1,086,219	1,274,772	1,271,920	
IV. Corporate Tax	165,833	167,382	206,487	212,534	250,030	249,426	297,030	278,187	326,627	325,866	382,431	381,576	4,098,935
V. Profit After Tax	386,945	390,558	481,802	495,912	583,402	581,995	693,071	649,104	762,130	760,353	892,340	890,344	
VI. Accumulated Profit After Tax	2,246,833	2,637,392	3,119,193	3,615,106	4,198,508	4,780,503	5,473,574	6,122,678	6,884,808	7,645,161	8,537,501	9,427,845	

Appendix 18.2 Cash Flow

("Cost Base Case" and Equity/Loan Ratio : 40%/60%)

(Million Rp.)

Year	1 1998	2 1999	3 2000	4 2001	5 2002	6 2003	7 2004	8 2005	9 2006	10 2007	11 2008	12 2009
I. CASH-IN												
1 Financial												
- Equity	19,083	29,852	31,643	108,088	189,563	0						
- Loan	0	0	0	179,968	125,363	370,747						
2 Operational												
- Toll Revenue (Gross)	0	0	0	0	0	0	98,707	101,670	121,895	125,552	152,495	157,733
- Other Incomes	0	0	0	0	0	0	2,000	2,000	2,000	2,000	2,000	2,000
(CASH-IN TOTAL)	19,083	29,852	31,643	288,056	314,926	370,747	100,707	103,670	123,895	127,552	154,495	159,733
II. CASH-OUT												
1 Financial												
- Initial Investment	19,083	29,852	31,643	270,221	286,435	308,339						
- Interest During Construction	0	0	0	17,835	28,491	62,408						
- Loan Principal Repayment	0	0	0	0	0	0	0	0	0	67,608	67,608	67,608
- Loan Interest Payment	0	0	0	0	0	0	74,369	74,369	74,369	70,650	63,213	55,776
- Foreign Currency Loss	0	0	0	0	0	0	24,799	24,799	24,799	23,559	21,079	18,599
- Additional Investment	0	0	0	0	0	0	0	0	0	0	0	0
- (Toll Equiment)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
- (Overlay)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
- Repayment of Short-term Loan	0	0	0	0	0	0	0	7,759	14,665	3,319	49,322	68,331
- Payment of Interest of Short-term Loan	0	0	0	0	0	0	0	1,552	2,933	664	9,864	13,666
2 Operational												
- O/M Costs							6,980	7,399	7,843	8,313	8,812	9,341
- Overhead Cost							1,396	1,480	1,569	1,663	1,762	1,868
- Revenue Sharing to JASA MARGA							0	0	0	0	0	0
- Property Tax							923	979	1,037	1,100	1,166	1,235
- Corporate Tax							0	0	0	0	0	0
(CASH-OUT TOTAL)	19,083	29,852	31,643	288,056	314,926	370,747	108,466	118,335	127,213	176,875	222,826	236,425
III. (CASH-IN) minus (CASH-OUT)	0	0	0	0	0	0	-7,759	-14,665	-3,319	-49,322	-68,331	-76,692
IV. Short-term Loan	0	0	0	0	0	0	7,759	14,665	3,319	49,322	68,331	76,692
V. Net Cash Flow	0	0	0	0	0	0	0	0	0	0	0	0
VI. Accumulated Cash Flow	0	0	0	0	0	0	0	0	0	0	0	0

Appendix 18.2 Cash Flow (Continued-1)

("Cost Base Case" and Equity/Loan Ratio : 40%/60%) (Million Rp.)

Year	13 2010	14 2011	15 2012	16 2013	17 2014	18 2015	19 2016	20 2017	21 2018	22 2019	23 2020	24 2021
I. CASH-IN												
1 Financial												
- Equity												
- Loan												
2 Operational												
- Toll Revenue (Gross)	190,570	196,691	237,998	245,178	295,815	304,220	365,433	375,269	450,815	464,341	559,113	575,886
- Other Incomes	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
(CASH-IN TOTAL)	192,570	198,691	239,998	247,178	297,815	306,220	367,433	377,269	452,815	466,341	561,113	577,886
II. CASH-OUT												
1 Financial												
- Initial Investment												
- Interest During Construction												
- Loan Principal Repayment	67,608	67,608	67,608	67,608	67,608	67,608	67,608	0	0	0	0	0
- Loan Interest Payment	48,340	40,903	33,466	26,029	18,592	11,155	3,718	0	0	0	0	0
- Foreign Currency Loss	16,119	13,639	11,159	8,679	6,200	3,720	1,240	0	0	0	0	0
- Additional Investment	0	0	0	33,487	0	0	0	0	0	0	0	0
- (Toll Equiment)	(0)	(0)	(0)	(8,454)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
- (Overlay)	(0)	(0)	(0)	(25,033)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
- Repayment of Short-term Loan	76,692	44,717	1,997	0	0	0	0	0	0	0	0	0
- Payment of Interest of Short-term Loan	15,338	8,943	399	0	0	0	0	0	0	0	0	0
2 Operational												
- O/M Costs	9,901	10,495	11,125	11,792	12,500	13,250	14,045	14,888	15,781	16,728	17,731	18,795
- Overhead Cost	1,980	2,099	2,225	2,358	2,500	2,650	2,809	2,978	3,156	3,346	3,546	3,759
- Revenue Sharing to JASA MARGA	0	0	0	0	14,791	15,211	18,272	18,763	22,541	46,434	55,911	57,589
- Property Tax	1,310	1,388	1,471	1,560	1,653	1,753	1,858	1,969	2,087	2,213	2,345	2,486
- Corporate Tax	0	10,896	39,768	42,741	56,187	61,258	81,361	85,314	108,497	105,009	130,196	134,300
(CASH-OUT TOTAL)	237,287	200,688	169,219	194,254	180,030	176,604	190,910	123,912	152,062	173,728	209,730	216,928
III. (CASH-IN) minus (CASH-OUT)	-44,717	-1,997	70,779	52,923	117,785	129,616	176,523	253,357	300,752	292,612	351,383	360,958
IV. Short-term Loan	44,717	1,997	0	0	0	0	0	0	0	0	0	0
V. Net Cash Flow	0	0	70,779	52,923	117,785	129,616	176,523	253,357	300,752	292,612	351,383	360,958
VI. Accumulated Cash Flow	0	0	70,779	123,702	241,487	371,103	547,626	800,983	1,101,735	1,394,348	1,745,731	2,106,688

Appendix 18.2 Cash Flow (Continued-2)

("Cost Base Case" and Equity/Loan Ratio : 40%/60%)

(Million Rp.)

Year	25 2022	26 2023	27 2024	28 2025	29 2026	30 2027	31 2028	32 2029	33 2030	34 2031	35 2032	36 2033	
I. CASH-IN													
1 Financial													
- Equity													378,229
- Loan													676,078
2 Operational													
- Toll Revenue (Gross)	694,348	715,180	860,859	886,679	1,035,953	1,035,953	1,211,032	1,211,032	1,415,858	1,415,858	1,654,912	1,654,912	18,811,957
- Other Incomes	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	60,000
(CASH-IN TOTAL)	696,348	717,180	862,859	888,679	1,037,953	1,037,953	1,213,032	1,213,032	1,417,858	1,417,858	1,656,912	1,656,912	
II. CASH-OUT													
1 Financial													
- Initial Investment													945,573
- Interest During Construction													108,734
- Loan Principal Repayment	0	0	0	0	0	0	0	0	0	0	0	0	676,078
- Loan Interest Payment	0	0	0	0	0	0	0	0	0	0	0	0	594,949
- Foreign Currency Loss	0	0	0	0	0	0	0	0	0	0	0	0	198,388
- Additional Investment	0	59,970	0	0	0	0	0	0	0	0	0	107,397	200,854
- (Toll Equiment)	(0)	(15,140)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(27,114)	
- (Overlay)	(0)	(44,830)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(80,283)	
- Repayment of Short-term Loan	0	0	0	0	0	0	0	0	0	0	0	0	266,802
- Payment of Interest of Short-term Loan	0	0	0	0	0	0	0	0	0	0	0	0	
2 Operational													
- O/M Costs	19,923	21,118	22,385	23,728	25,152	26,661	28,261	29,957	31,754	33,659	35,679	37,820	551,814
- Overhead Cost	3,985	4,224	4,477	4,746	5,030	5,332	5,652	5,991	6,351	6,732	7,136	7,564	110,363
- Revenue Sharing to JASA MARGA	69,435	71,518	129,129	133,002	155,393	155,393	181,655	242,206	283,172	283,172	330,982	330,982	2,615,550
- Property Tax	2,635	2,793	2,961	3,139	3,327	3,527	3,738	3,962	4,200	4,452	4,719	5,002	72,989
- Corporate Tax	165,833	167,382	206,487	212,534	250,030	249,426	297,030	278,187	326,627	325,866	382,431	381,576	4,098,935
(CASH-OUT TOTAL)	261,811	327,005	365,439	377,148	438,932	440,339	516,337	560,304	652,104	653,881	760,948	870,341	
III. (CASH-IN) minus (CASH-OUT)	434,537	390,174	497,420	511,531	599,021	597,613	696,696	652,728	765,755	763,978	895,965	786,571	
IV. Short-term Loan	0	0	0	0	0	0	0	0	0	0	0	0	266,802
V. Net Cash Flow	434,537	390,174	497,420	511,531	599,021	597,613	696,696	652,728	765,755	763,978	895,965	786,571	
VI. Accumulated Cash Flow	2,541,225	2,931,400	3,428,820	3,940,351	4,539,372	5,136,985	5,833,681	6,486,409	7,252,163	8,016,141	8,912,106	9,698,677	

Appendix 18.3 FIRR (ROI and ROE)

("Cost Base Case" and Equity/Loan Ratio : 40%/60%)

(Million Rp.)

I. ROI :													
FIRR =	16.9%		1	2	3	4	5	6	7	8	9	10	11	12
NPV =	118,010	(15.0%)	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Investment			19,083	29,852	31,643	270,221	286,435	308,339	0	0	0	0	0	0
Operational Expenditure			0	0	0	0	0	0	9,299	9,857	10,448	11,075	11,740	12,444
Total Revenue			0	0	0	0	0	0	100,707	103,670	123,895	127,552	154,495	159,733
Net Cash Flow for FIRR (ROI)			-19,083	-29,852	-31,643	-270,221	-286,435	-308,339	91,408	93,813	113,446	116,477	142,755	147,289

(Note) 1) FIRR: Financial Internal Rate of Return
2) ROI: Return on Investment
3) NPV: Net Present Value at 15% Discount Rate
4) "Investment" includes "Initial" and "Additional" Investments
5) "Operational Expenditure" includes "O/M Costs", "Overhead Cost" and "Property Tax".
6) "Total Revenue" includes "Toll Revenue excluding Revenue Sharing", "Other Income" and "Buy Out Revenue".

(Million Rp.)

II. ROE :													
FIRR =	16.7%		1	2	3	4	5	6	7	8	9	10	11	12
NPV =	65,591	(15.0%)	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Equity			19,083	29,852	31,643	108,088	189,563	0						
Operational Expenditure			0	0	0	0	0	0	9,299	9,857	10,448	11,075	11,740	12,444
Repayment of Long-term Loan			0	0	0	0	0	0	0	0	0	67,608	67,608	67,608
Payment of Interest of Long-term Loan			0	0	0	0	0	0	74,369	74,369	74,369	70,650	63,213	55,776
Corporate Tax			0	0	0	0	0	0	0	0	0	0	0	0
Total Revenue			0	0	0	0	0	0	100,707	103,670	123,895	127,552	154,495	159,733
Net Cash Flow for FIRR (ROE)			-19,083	-29,852	-31,643	-108,088	-189,563	0	17,040	19,444	39,078	-21,781	11,934	23,904

(Note) 1) FIRR: Financial Internal Rate of Return
2) ROI: Return on Investment
3) NPV: Net Present Value at 15% Discount Rate
4) "Operational Expenditure" includes "O/M Costs", "Overhead Cost" and "Property Tax".
5) "Total Revenue" includes "Toll Revenue excluding Revenue Sharing", "Other Income" and "Buy Out Revenue".

Appendix 18.3 FIRR (ROI and ROE) (Continued-1)

("Cost Base Case" and Equity/Loan Ratio : 40%/60%)

(Million Rp.)

I. ROI :													
FIRR =	16.9%		13	14	15	16	17	18	19	20	21	22	23	24
NPV =	118,010	(15.0%)	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Investment			0	0	0	33,487	0	0	0	0	0	0	0	0
Operational Expenditure			13,191	13,982	14,821	15,711	16,653	17,652	18,712	19,834	21,024	22,286	23,623	25,040
Total Revenue			192,570	198,691	239,998	247,178	283,024	291,009	349,161	358,505	430,274	419,907	505,202	520,298
Net Cash Flow for FIRR (ROI)			179,379	184,708	225,176	197,980	266,371	273,357	330,450	338,671	409,250	397,621	481,579	495,257

(Note) 1) FIRR: Financial Internal Rate of Return
2) ROI: Return on Investment
3) NPV: Net Present Value at 15% Discount Rate
4) "Investment" includes "Initial" and "Additional" Investments
5) "Operational Expenditure" includes "O/M Costs", "Overhead Cost" and "Property Tax".
6) "Total Revenue" includes "Toll Revenue excluding Revenue Sharing", "Other Income" and "Buy Out Revenue".

(Million Rp.)

II. ROE :													
FIRR =	16.7%		13	14	15	16	17	18	19	20	21	22	23	24
NPV =	65,591	(15.0%)	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Equity														
Operational Expenditure			13,191	13,982	14,821	15,711	16,653	17,652	18,712	19,834	21,024	22,286	23,623	25,040
Repayment of Long-term Loan			67,608	67,608	67,608	67,608	67,608	67,608	67,608	0	0	0	0	0
Payment of Interest of Long-term Loan			48,340	40,903	33,466	26,029	18,592	11,155	3,718	0	0	0	0	0
Corporate Tax			0	10,896	39,768	42,741	56,187	61,258	81,361	85,314	108,497	105,009	130,196	134,300
Total Revenue			192,570	198,691	239,998	247,178	283,024	291,009	349,161	358,505	430,274	419,907	505,202	520,298
Net Cash Flow for FIRR (ROE)			63,432	65,302	84,335	95,090	123,984	133,336	177,763	253,357	300,752	292,612	351,383	360,958

(Note) 1) FIRR: Financial Internal Rate of Return
2) ROI: Return on Investment
3) NPV: Net Present Value at 15% Discount Rate
4) "Operational Expenditure" includes "O/M Costs", "Overhead Cost" and "Property Tax".
5) "Total Revenue" includes "Toll Revenue excluding Revenue Sharing", "Other Income" and "Buy Out Revenue".

Appendix 18.3 FIRR (ROI and ROE) (Continued-2)

("Cost Base Case" and Equity/Loan Ratio : 40%/60%)

(Million Rp.)

I. ROI :													
FIRR =	16.9%		25	26	27	28	29	30	31	32	33	34	35	36
NPV =	118,010	(15.0%)	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Investment			0	59,970	0	0	0	0	0	0	0	0	0	107,397
Operational Expenditure			26,543	28,135	29,823	31,613	33,509	35,520	37,651	39,910	42,305	44,843	47,534	50,386
Total Revenue			626,913	645,662	733,730	755,677	882,560	882,560	1,031,377	970,826	1,134,687	1,134,687	1,325,930	1,325,930
Net Cash Flow for FIRR (ROI)			600,370	557,557	703,907	724,064	849,050	847,040	993,726	930,915	1,092,382	1,089,843	1,278,396	1,168,147

(Note) 1) FIRR: Financial Internal Rate of Return
2) ROI: Return on Investment
3) NPV: Net Present Value at 15% Discount Rate
4) "Investment" includes "Initial" and "Additional" Investments
5) "Operational Expenditure" includes "O/M Costs", "Overhead Cost" and "Property Tax".
6) "Total Revenue" includes "Toll Revenue excluding Revenue Sharing", "Other Income" and "Buy Out Revenue".

(Million Rp.)

II. ROE :													
FIRR =	16.7%		25	26	27	28	29	30	31	32	33	34	35	36
NPV =	65,591	(15.0%)	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Equity														
Operational Expenditure			26,543	28,135	29,823	31,613	33,509	35,520	37,651	39,910	42,305	44,843	47,534	50,386
Repayment of Long-term Loan			0	0	0	0	0	0	0	0	0	0	0	0
Payment of Interest of Long-term Loan			0	0	0	0	0	0	0	0	0	0	0	0
Corporate Tax			165,833	167,382	206,487	212,534	250,030	249,426	297,030	278,187	326,627	325,866	382,431	381,576
Total Revenue			626,913	645,662	733,730	755,677	882,560	882,560	1,031,377	970,826	1,134,687	1,134,687	1,325,930	1,325,930
Net Cash Flow for FIRR (ROE)			434,537	450,144	497,420	511,531	599,021	597,613	696,696	652,728	765,755	763,978	895,965	893,968

(Note) 1) FIRR: Financial Internal Rate of Return
2) ROI: Return on Investment
3) NPV: Net Present Value at 15% Discount Rate
4) "Operational Expenditure" includes "O/M Costs", "Overhead Cost" and "Property Tax".
5) "Total Revenue" includes "Toll Revenue excluding Revenue Sharing", "Other Income" and "Buy Out Revenue".

Appendix 18.4 Privately-funded Infrastructure Business in Asia and Hedge Against Risks

1. Privately-Funded Infrastructure Business Schemes

1) Variety of Privately-funded Infrastructure Businesses

There is a great variety of privately-funded infrastructure businesses, such as BOT (Build-Operate-Transfer), BOO (Build-Own-Operate), BTO (Build-Transfer-Operate), BOOT (Build-Own-Operate-Transfer), RTO (Rehabilitate-Transfer-Operate) and ROM (Rehabilitate-Operate-Maintain). The variety is especially large in the Philippines, where the government was forced to introduce IPPs (Independent Power Producers) in order to solve power shortages in the latter half of the 1980s. Basically, however, these businesses are classified into two major categories: BOTs in which terms of operation are set and BOOs in which terms of operation are not set.

Because BTOs and RTOs are transferred to host governments without delay after the expiration of the term of operation, they are preferred to lenders since the credit worthiness is enhanced. In particular, foreign governments and international agencies find it easier to use public funds, to extend loans to BTOs and RTOs' businesses other than types of infrastructure businesses. The use of private funds is designed to improve domestic public finance and to curb the increase in official foreign debts. Therefore, the BTOs and RTOs schemes are applied to least developed countries where the risks involved in privately-funded infrastructure businesses are great or countries which have enough room in their quotas for official foreign debts. However, as these schemes transfer risks involved from lenders or borrowers to host governments, governments are averse to using them.

The Philippines has begun to use the ROMs scheme recently in order to rehabilitate power stations belonging to NPC, which is the state-run electric power company, in addition to increasing capacity by introducing IPPs to solve power shortages. Indonesia is also expected to adopt ROM sooner or later, as BOO's capacity is expected to reach approximately 40% of the total capacity by 2003, and there are those who argue for attaching importance on the rehabilitation of PLN's power stations.

2) Buyout Clause for BOT

Because they are going concerns, in principle BOOs are not allowed to buyout during the term of operation. During the term of operation, they can buyout only when there is default due to the responsibility of the government. Because Indonesia and Pakistan use the BOO scheme, there is no buyout clause in principle. In Thailand, the BOOs scheme has been adopted, because of buyout of an expressway BOTs project (the case of Kumagai Gumi) immediately after the completion of the construction, which put investors in a very difficult position. In the BOOs scheme, the operator is assured of profits without the risks of the change of ownership. In practice however, as there are set periods of operation under the BOOs scheme as well, buyout is possible after the expiration of the term of operation, if payments are made. According to the IPP model form, EGAT, which is the state-run electric power company in Thailand, can sell in even before the commencement of operation, if it pays the expenses borne by IPPs for the construction of the power station. This has become a very difficult problem. Because IPPs would suffer losses if promising project are subject to buyout immediately after the completion of construction, European and American IPPs are studying various countermeasures such as demanding penalties in addition to the cost of construction and compensation for future losses.

On the other hand, buyout during the term of operation is possible for BOTs. In the case of the BOT of Pagbilao Power Station in the Philippines, buyout is authorized only after 20 years of the 25-year operation period have elapsed, almost purchasing company has been limited.

A BOT Expressway project in Thailand was to build and operate a 20-km expressway with six lanes (sometimes four lanes) at a cost of 100 billion yen which would be connected to an existing expressway in Bangkok and was called the second Bangkok Expressway. The paid in-capital of BECL, the principle operator, was 20 billion yen (the equity capital-to-debt ratio of 1:4). Investors included Kumagai Gumi, which was the majority investors, the Asian Development Bank, and companies and banks in Thailand. BECL signed a 30-year operation contract with ETA, which is the Thai expressway public corporation, and obtained the right to operate the expressway. Seventy-one percent of the loans were made in the baht by a bank syndicate in Thailand, while the remaining 29% were made in foreign currency (4% by the Asian Development Bank and 25% by a syndicate of foreign banks).

The dispute started because after the completion of the expressway and immediately before the commencement of operation (which would have lasted for 30 years), Kumagai Gumi had to buyout the project to ETA in 1994 because of the opposition from the new regime in

Thailand. The new regime claimed that the BOT did not have the authority to raise the toll in stages, and broke the agreement with the previous regime. During the dispute that followed, the totally unjustified government's claim that a private enterprise did not even have, the right to collect tolls prevailed. Kumagai Gumi had been unilaterally responsible for meeting very severe control on the construction work. Just when it thought it could begin to recover its investment, the chance to do so was taken away from it. It was decided that ETA would buy the expressway and the dispute was settled. Kumagai Gumi clamed that the Thai authorities were violating the expressway operation agreement and that the firm was in a position to demand compensation for future losses, but it had to accept compensation for only actual losses (including repayment of loans before the term of payment and refund of investment).

2. BOTs/BOOs and Guarantee by the Government

1) Guarantee of Obligation

Originally, the BOTs and BOOs scheme were devised as a means of not increasing official foreign debts of the host government. In recent years, therefore, except for Pakistan, host governments seldom guarantee private foreign obligations of BOTs or BOOs operators. In the Philippines and Vietnam, the host governments merely make performance guarantee (e.g., (1) performance guarantee that the host government will shoulder payments when the local power purchasing companies or fuel supplies fail to perform their obligations, (2) performance guarantee for conversion into foreign exchanges or overseas loans or pays dividends on equity capital raised overseas) and do not extend guarantee of payment obligation of private debt by itself.

In Indonesia. the Finance Minister has issued letters of support to a few IPPs like Paiton 1 project and Tanjun Jati B project. However, as the letters do not mention any legal responsibility of the government of Indonesia with regard to guarantee of obligation for BOOs' debt by itself, they do not constitute guarantee of obligation in any sense. It is stated that the Ministry of Finance will make PLN perform its obligations to make payment when it purchases power from IPPs, but since it is not stated that the government will perform obligations on behalf on PLN, it is interpreted that they do not constitute performance guarantee in a strict sense.

However, under the U.S. and British commercial codes, which attach importance to the Estoppel pricple (the theory that when what is represented and what is reality cannot be distinguished, what is represented has the legal force in order to protect the parties to a deal), the Paiton I operator has received BBB credit rating, the same as the government bond of Indonesia, from Standard & Poors, which is a U.S. bond rating organization, because of what the letters of support represented, making it possible for the concern to issue bonds in the U.S. 144A market in 1996. The U.S. 144A bonds are those that stand midway between publicly-placed bonds and privately-placed bonds and could be purchased only by institutional investors. However, they can counter market. S & P's rating report (1996) says, PLN's power purchase contract obligations benefit from a letter of support issued by the Government of the Republic of Indonesia.

Because U.S. institutional investors are not satisfied with the due diligence by investment banks that issue 144A bonds, they have been averse to shouldering the risks involved with the construction of power stations. Therefore, 144A bonds have been used only as a means of refinancing after the completion of the power stations. On the other hand, IPPs often shied away from private bank loans because the longest loan they could take out was about 15 years and spread was large due to the risks involved in construction work. Paiton is a good example of an operator being able to issue bonds because U.S. investors were willing to shoulder the risks involved in construction work and firm was able to obtain a fairly high rating of BBB applied effectively by the letter of support.

The problem associated with the issue of 144A bonds is that it could lead to repayment before the term of payment of other funds, particularly official foreign debts. More problematic is the fact that investors buy 144A bonds not only when the rating is high, but also when they assume that the project is safe because public fund are used in it. However, such cases Enron in India (in which U.S. Ex-Im Bank participated), the Kumagai Gumi in Thailand (ADB participation), and Pagbilao project in the Philippines (Export-Import Bank of Japan) indicate that when risks become realty, the participation of public organizations does not help solved the problem. Unfortunately, parties to the dispute are finding out that public agencies are silent lenders and silent investors.

In China, the Commercial Bank Code and an interpretation of commercial codes by the People's Supreme Court stipulate that the central government does not guarantee obligations of state-run enterprises and private companies. Even if a local government

issues a letter of support concerning guarantee of obligation, it has no legal effect, and even third parties in good faith are not protected.

2) Performance Guarantee

Questions arise concerning performance guarantee of power purchasing agreement in the case of denationalization. For example, in Thailand state-run electric power company, EGAT, is scheduled to be listed on the stock exchange. IPPs are studying whether in such case, whether or not the government can extend performance guarantee for power purchasing agreement by EGAT, which is to be denationalized, in order to protect BOT and BOO operators. This is because the government of Thailand does not wish to continue to extend performance guarantee to BOTs and BOOs that the denationalized company will performance its obligation to purchase power.

In the past, the Minister of Finance, representing the government, has issued letters of support to IPPs extending performance guarantee (not guarantee of obligation) that power purchase agreement would be honored. However, in that country, NPC is to be split and denationalized in a year's time at the earliest. In preparation for these steps, discussion are now under way to transfer to IPPs the risks, including performance guarantee, which at present are shouldered by NPC or the government. These risks involve those associated with fuel purchases, conversion into foreign exchange, inflation, remittance of foreign exchanges, land acquisition, and the reduction in foreign debts (both ODA and private-sector). The government of the Philippines wishes to put NPC and IPPs on an equal footing in terms of conditions for competition. These moves need to be watched carefully.

3) Budgetary Measures

Commitments to budgetary measures are confusing in India. Guarantee letters issued by the central government to IPPs are not real guarantee for payment obligations that guarantee that the central government will directly repay in foreign exchanges foreign loans taken out by IPPs in the event of default. These letters merely guarantee that in the event that state power authorities cannot pay for power purchased from IPPs in the domestic currency, the central government will make budgetary measures to give subsidies to the state power authorities in order to enable smooth payments. The subsidies are given by the central government by allocating budget to the state government for the following year specifically

earmarked for payment to a particular BOT. In principle, when the central government makes guarantee of foreign obligations, this is done in the name of the President of India and not under the name of the central government.

In the case of a thermal power station BOT in Dapoli, Maharashtra (the so called Enron project), a new state government abolished the contract signed by the previous government, and wrote a new agreement in 1996 that was less favorable to the IPPs than the original agreement (profitability and the ratio of foreign capital participation were lowered). At that time, disputes arose over the effectiveness of the previous government's guarantee of IPP's private foreign debts (total of 650 million dollars, consisting of 100 million dollars from the U.S. Ex-im bank, 300 million dollars from the U.S. OPIC (Overseas Private Investment Corporation), 100 million dollars from the development Bank India, 150 million dollars in syndicate loans from commercial banks lead managed by Bank America and ABN-AMRO Bank). At the time of the original agreement, the central government had issued a guarantee letter stating that it would guarantee payment on behalf of the local government, if the letter is unable to repay foreign debts incurred by BOT operation. When the new government canceled the IPPs agreement and new negotiations were in progress, the lending parties vigorously demanded repayment, but it turned out that what the central government had done was no more than guaranteeing the above mentioned budgetary measures.

As seen in these cases, it has become increasingly difficult to obtain the guarantee of the host government to hedge various risks in BOTs/BOOs operations. Therefore, it is important for the operating entity to study how to crease a security package designed to hedge risks.