14.7 Effects of Tollway on Industrial Development

14.7.1 Development Trend of Tollway Impact Area

Industrial and residential development are taking place in the vicinity of existing interchanges of Jakarta-Tangerang Tollway and Jakarta-Cikampek Tollway. Although recent development is concentrated in the Jakarta Metropolitan Area about 30 km in radius from the center of Jakarta, speculation in land along the tollways is extending further.

Heavy and petro-chemical industries have been developed in areas adjacent to seaports. However, as higher value goods are produced which have less significant transport cost component, industrialization will increase the need for a higher capacity and more dense transport network.

As the per capita income of Indonesia increases, the need also increases for a more efficient distribution system and correspondingly more rapid network of road transport. The facilities in this distribution system include factories, inter-city bus terminals, truck terminals, wholesale markets, warehouses, perishable food markets, and wholesalers. These facilities will generally locate near tollway interchanges and major nodes in the high capacity transport network.

Leisure and recreation development changes from the villa type development to the complex type development where, for example, various recreational facilities are properly planned at one place to collectively utilize the land more efficiently and preserve the natural environment to a maximum extent. This enables the recreational development to lie near large cities. Preference is given over all to shorter travel hours to the recreation site. The expressway/tollway development in this sense expands the opportunity of urban type recreational development. The tourism resource oriented development is also continued to develop in remote areas in response to the progress of expressway/tollway construction.

High development potentials in interchange areas will be realized with proper plans, otherwise inefficient scattered development with poor infrastructure will emerge in the areas. Actions to be taken will include but not necessarily limited to the following:

1) Preparation of a regional plan in the interchange impact area and coordination with relevant local plans

2) Preparation of budgets or funds for implementing the plan

3) Proper actions to provide regulations/decrees for land use re-zoning and land price controls

14.7.2 Conceivable Development in Impact Areas of the Proposed Interchanges

The development of interchange impact areas relys much on characteristics of the nearby cities and regions where a tollway route lies.

The West Java Structure Plan defines a hierarchy of cities, and the cities where the tollway route passes nearby are as follows:

Main development center - Cikampek and Cirebon

Sub-development center - Subang, Pamanukan, Kadipaten, Jatibarang and Sumber

Among the above cities, Cikampek and Cirebon are strategically important for the respective regional development and the development of large and medium scale industries is intended in these cities and also in Palimanan and Indramayu.

Therefore, impact areas of Cikampek, Cirebon and Palimanan interchanges will augment the industrial development potential by the construction of project tollway.

Cikampek is located in the junction of Jakarta-Cikampek Tollway, Cikampek-Cirebon Tollway and the planned Cikampek-Padalarang Tollway. Therefore, it will function as a production and distribution center including the development of industrial estates, wholesale markets, truck terminals, warehouses and resultantly residential estates for workers of these facilities. The development of urban infrastructure, therefore, is urgently required to support these development.

Cirebon is an emerging primary city in Java Island. However, the city development is somewhat stagnated in these days. Cirebon city that has a seaport is expected to grow extensively in economic activities based on the development of basic industries and the related supporting industries.

In addition, Cirebon is located in a one-day round trip distance to and from Jakarta and Semarang which are the primary cities in Java Island. Therefore, a truck terminal would be planned near Cirebon interchange to play a key role in an inter-regional cargo distribution network.

Subang city is surrounded by plantation and a beautiful natural scenery along the road to Bandung is appreciated. The existing recreational area in Ciater is famous for hot spring. The project tollway will attract more tourists particularly from Jakarta, and the development of a golf course, sports facility complex with hotel/cottage accommodations near the hot spring resources will enhance the tourism and leisure development in the south of Subang city.

Kadipaten and Palimanan are included in the Cirebon Development Region. Supporting industries related to the basic industry in Cirebon will be developed in these cities. These cities are located in the present national roads of Cirebon-Jakarta and Cirebon-Bandung and relatively densely populated. Therefore, the impact areas of Dawuan and Polimanan interchanges will have to be planned properly for the industrial and residential development.

CHAPTER 15. FINANCIAL PROJECT ANALYSIS

CHAPTER 15. FINANCIAL PROJECT ANALYSIS

15.1 General

15.1.1 Introduction

The principal objective of financial analysis is to evaluate the financial viability of the implementation of the construction and operation of the proposed Cikampek-Cirebon Tollway.

This analysis is performed based on an estimation in terms of revenue and construction cost and operation/maintenance cost. Additionally, financial conditions of the required fund are assumed.

According to the said estimations and assumptions, the profit/loss statement and the cash flow are tabulated. In the tabulation of the profit/loss statement and cash flow, first year of continuous annual surplus and continuous accumulated surplus will be examined. As an evaluation indicator of financial viability, the Financial Internal Rate of Return (FIRR) and Net Present Value (NPV) will be demonstrated, according to the conventional discounted cash flow method.

15.1.2 Assumptions

The following assumptions are made:

1) Project Life

The opening of the operation of the whole of the proposed tollway (in 4-lanes) is scheduled to be 1998. The project life is assumed to be 25 years after the inauguration of the whole operation of the proposed tollway.

2) Salvage Value

The project life of 25 years is the period for the purpose of this analysis. The facility of the tollway will continue to have value for a much longer period.

Accordingly, the salvage value (undepreciated value) is assumed as a negative cost in the final year of the project life.

3) Prices

For financial analysis, two prices are assumed as follows:

- Constant 1989 price
- Current price

In the case of constant price, the annual 3% increase of toll rate was assumed according to the targeted growth ratio of GDP per capita in Indonesia.

In the case of current price, the increase of toll rate of 40% for three years (about 12% increase per annum) is based on interview with Jasa Marga, and the annual 8% increase of cost was assumed according to statistical data of consumer prices in Indonesia.

15.2 Toll Rate and Revenue

15.2.1 Toll Rate

In the analysis of the traffic demand projection, the toll model was derived from the study result of the existing tollway tariff which was prepared for the traffic assignment. The toll rates for the revenue estimation of financial analysis are based on the said toll rate model.

As a result of calculation of traffic assignment, the toll per vehicle-kilometer and the financial benefit per vehicle-kilometer are obtained.

Table 15.2.1 shows a summary of the comparison of the toll per vehicle-kilometer and the financial benefit per vehicle-kilometer by vehicle type. The toll per vehicle-kilometer is about Rp. 80-160 for sedan and pick-up, and about Rp. 120-230 for truck and bus at 1989 prices. The ratios of toll to financial benefit in terms of per vehicle-kilometer ranges about 0.2 to 0.5.

According to discussions with Jasa Marga, it is suggested that the guideline for toll structure is recovery of about 70 percent of the benefit which the user receives ordinarily from using the tollway. Only from the viewpoint of benefit can it be said that the above result shows there is room for an increase of toll rate.

Table 15.2.1 Summary of Ratios of Toll per Vehicle-Km and Financial Benefit per Vehicle-Km

Year	Vehicle Type z	Financial Benefit per Vehicle-Km (Rp.) (1)	Toll per Vehicle-Km (Rp.) (2)	Ratio (2)/(1)
1995	Passenger Car	318	85	0.267
	Bus	283	123	0.435
	Pickup	195	88	0.453
	Truck	248	122	0.491
2005	Passenger Car	605	112	0.186
	Bus	599	164	0.273
	Pickup	386	116	0.299
	Truck	651	167	0.256
2015	Passenger Car	755	153	0.203
	Bus	903	220	0.244
	Pickup	486	158	0.324
	Truck	817	227	0.277

Note: at 1989 prices

15.2.2 Estimated Revenue

Based on the result of calculation of traffic assignment, the estimated revenues are shown in Table 15.2.2. While for the case of constant price the toll rates (at 1989 price) adopted are assumed to increase at 3 percent a year escalation rate and revised every three years. For the case of current price they are assumed to increase at about 12 percent a year escalation rate and revised every three years.

Table 15.2.2 Estimated Tollway Revenue in Planning Year

(Unit: Million Rp./year)

	1995	2005	2015
In Constant Price	29,807	162,821	428,778
In Current Price	48,929	562,068	3,112,943

15.3 Financial Internal Rate of Return

Based on the estimated construction cost and operation/maintenance cost (refer to Chapter 13), and the estimated revenue, the financial internal rate of return (FIRR) is calculated for the cases of constant price and current price. In this case, the Return on Investment (ROI) is examined, which is an indicator for evaluation of the Project, regardless of the condition of fund raising for the Project.

Additionally, the sensitivity test in the case of constant price is tried for the following two assumptions:

- No increase of toll rate (The assumption for costs is unchanged.)
- Annual 5 percent increase of toll rate (ditto)

Table 15.3.1 shows a summary of the calculation result of FIRR (ROI) and Net Present Value in a discount rate of 15 percent for each case.

Table 15.3.1 Summary of Calculation of FIRR

	FIRR (ROI) (%)	NPV (15% discount rate) (Million Rp.)
Constant Price	14.31	-28,287
Current Price	23.80	1,230,625
(Sensitivity Case of Constant Price)		
Annual increase of toll rate		
-0%	9.14	-181,895
-5%	17.68	135,151

Tables 15.3.2 and 15.3.3 show details of the calculation of FIRR (ROI) and NPV for constant price case and current price case, respectively.

The calculation results show that the implementation of the Project is financially justifiable and feasible from the viewpoint of FIRR (ROI).

Table 15.3.2 FIRR (ROI) (Constant Price)

FIRR = 14.31 (%)

N.P.V = (28,287) (Mil.Rp.)

Year	Revenue	Const. Cost	O & M Cost	Cash Flow for ROI
1990		0		0
1991		4,415		(4,415)
1992		8,830		(8,830)
1993		61,287		(61,287)
1994		97,049		(97,049)
1995		195,419		(195,419)
1996		220,981		(220,981)
1997		159,558		(159,558)
1998	42,886	0	15,795	27,091
1999	56,240	0	15,795	40,444
2000	69,593	0	15,795	53,798
2001	90,632	0	15,795	74,836
2002	105,222	0	15,795	89,427
2003	119,813	0	15,795	104,018
2004	146,877	0	15,795	131,082
2005	162,821	0	15,795	147,026
2006	179,402	0	15,795	163,607
2007	214,147	0	15,795	198,352
2008	232,265	34,470	15,795	182,000
2009	250,382	34,470	15,795	200,117
2010	293,403	0	16,690	276,713
2011	313,201	0	16,690	296,511
2012	332,999	0	16,690	316,309
2013	385,511	29,797	16,690	339,023
2014	407,144	29,797	16,690	360,657
2015	428,778	0	17,218	411,560
2016	468,538	0	17,218	451,320
2017	468,538	0	17,218	451,320
2018	468,538	0	17,218	451,320
2019	511,969	0	17,218	494,750
2020	511,969	0	17,218	494,750
2021	511,969	0	17,218	494,750
2022	559,449	0	17,218	542,231

Note: Figure in ( ) indicates a minus value.

Table 15.3.3 FIRR (ROI) (Current Price)

FIRR = 23.80 (%)

N.P.V = 1,230,625 (Mil.Rp.)

Year	Revenue	Const. Cost	O & M Cost	Cash Flow for ROI
1990		0		0
1991		5,149		(5,149)
1992		11,123		(11,123)
1993		83,381		(83,381)
1994		142,595		(142,595)
1995		310,090		(310,090)
1996		378,695		(378,695)
1997		295,310		(295,310)
1998	90,190	0	31,573	58,617
1999	118,272	0	34,099	84,173
2000	146,354	0	36,827	109,527
2001	244,211	0	39,773	204,438
2002	283,526	0	42,954	240,572
2003	322,840	0	46,391	276,449
2004	507,029	0	50,103	456,926
2005	562,068	0	54,112	507,956
2006	619,306	0	58,441	560,865
2007	947,158	0	63,116	884,042
2008	1,027,290	148,757	68,166	810,367
2009	1,107,423	160,655	73,619	873,149
2010	1,662,586	0	84,014	1,578,572
2011	1,774,772	0	90,735	1,684,037
2012	1,886,958	0	97,994	1,788,964
2013	2,798,820	188,943	105,833	2,504,044
2014	2,955,882	204,059	114,300	2,637,523
2015	3,112,943	0	127,350	2,985,593
2016	4,358,103	0	137,538	4,220,565
2017	4,358,103	0	148,541	4,209,562
2018	4,358,103	0	160,425	4,197,678
2019	6,101,331	0	173,259	5,928,072
2020	6,101,331	0	187,120	5,914,211
2021	6,101,331	0	202,089	5,899,242
2022	8,541,872	0	218,257	8,323,615

Note: Figure in ( ) indicates a minus value.

15.4 Cash Flow Analysis

15.4.1 Profit and Loss Statement

First, for the cash flow analysis of the Project, the profit and loss statement is estimated.

Assumptions are made of the items of the profit and loss statement as follows:

a) Revenue:

Refer to 15.2.

b) Operation and Maintenance Costs:

Calculation of the operation and maintenance costs is based on the estimation in 13.4. Considering the total service length and the number of lanes for each operation year of the proposed tollway, the operation and maintenance costs are estimated.

c) Property Tax

In this analysis, the property tax for the right of way related to the proposed tollway is assumed. The annual value of property tax is estimated based on the assumption that the tax ratio is one per mill (1/1000) of the procurement cost of the right of way.

d) Interest (Long-Term Loan and Short-Term Loan)

Payments of the interest for the long-term and short-term loans are assumed to be made for the remaining balance of loans. Details of loan conditions are mentioned later.

e) Depreciation

Depreciation method follows the straight line method. The life expectancy of the tollway is assumed to be 50 years.

f) Depreciation of Interest during Construction Period

The interest during construction period is assumed to be treated as a depreciable asset. The term of depreciation is assumed to be 25 years in accordance with the project life.

g) Corporate Tax

The annual value of corporate tax is assumed to be 35 percent of the profit after depreciations.

15.4.2 Cash Flow Analysis

1) Assumption of Financial Source and Use

a) Financial Source

The item of financial source is assumed as below:

- Profit after tax
- Depreciation
- Depreciation of interest during construction period
- Equity, and
- Long-term loan

In this analysis, the financial source of the interest during construction period is assumed to be from the short-term loan.

b) Financial Use

The item of financial use is assumed as below:

- Construction cost
- Interest during construction period
- Repayment of long-term loan, and
- Repayment of short-term loan

In the financial analysis, the interest during construction is assumed to be included into the total initial project cost.

c) Examination of alternatives of Financial Source

The initial project cost is assumed to be financed from equity and long-term loan. In the cash flow analysis, equity is assumed to be disbursed over the first few years prior to the long-term loan.

In this analysis, several alternatives varying the conditions of financial sources (i.e. the equity/loan (long-term loan) ratio and the interest rate of long-term loan) are assumed and examined.

2) Assumption of Equity/Loan Ratio

The following cases for the equity/loan ratio are assumed:

a) Equity 30%: Loan 70%
b) Equity 40%: Loan 60%

3) Assumption of Long-Term Loan Condition

The following conditions of long-term loan are assumed:

a) Interest rate : 10%
Grace period : 5 years and
Repayment period : 15 years

b) Interest rate : 15%
(Grace period and repayment period as a))

c) Interest rate : 20%
(Grace period and repayment period as a))

4) Assumption of Short-Term Loan

It is assumed that in the case of cash flow deficit of the total financial source against the total financial use, the deficit is financed by a short-term loan. In particular, the interest during the construction period is assumed to be financed by a short-term loan. The repayment of principal and payment of interest (20 percent per annum) is assumed to be made in the year following the borrowing.

15.4.3 Analysis Result

Table 15.4.1 shows a summary of the calculation results for each alternative case.

- Constant Price Case
  In the constant price case, the 30% : 70% equity/loan ratio case shows a severe deficit in cash flow. The deficit in cash flow requires the raising of a short-term loan, and this causes a high increase in payment of interest which then leads to the next deficit. Only the 10% interest rate case shows a sound financial condition. In the 40% : 60% equity/loan ratio case, the 20% interest case shows a deficit in cash flow. The 40% : 60% equity/loan ratio and the 15% interest rate case shows that the first year of accumulated surplus in the profit and loss statement is 2014, which is 16 years after the opening of the tollway operation.

- Current Price Case
  On the other hand, the current price case shows favorable conditions even in severe interest rate cases. This is mainly because of a high level of revenue. In the 40% : 60% equity/loan ratio and 15% interest rate case, the first year of accumulated surplus in the profit and loss statement is 2005.

As an example of the calculation results, the case of equity/loan ratio of 40%:60% and interest rate of 15% is tabulated.

Tables 15.4.2-15.4.5 show tabulations of the debt service of long-term loan, the profit and loss statement, the cash flow and financial internal rate of return (Return on Equity) for the constant price case, and Tables 15.4.6-15.4.9 for the current price case.

Table 15.4.1 Summary of Results of Financial Analysis

	Equity /Loan Ratio	Interest Rate	(No.)	FIRR (ROI) (%)	NPV (Discount Rate = 15%) (Mil.Rp.)	FIRR (ROE) (%)	NPV (Discount Rate = 15%) (Mil.Rp.)	First Year of Surplus: Annual Surplus in Profit & Loss (Year)	First Year of Surplus: Accum. Surplus in Profit & Loss (Year)	First Year of Surplus: Annual Surplus in Cash Flow (Year)	Maximum Short-term Loan Amount (Mil.Rp.)	Year of Maximum Short-term Loan (Year)	(No.)
1. (Constant Price)	30%:70%	10%	(1)	14.31	(28,287)	15.70	20,863	2004	2010	2012	393,242	2005	(1)
(1) Toll Rate: 3% up/Year		15%	(2)	14.31	(28,287)	13.58	(46,550)	2014	*)	*)	1,828,487	2014	(2)
		20%	(3)	14.31	(28,287)	11.80	(113,961)	*)	*)	*)	-	-	(3)
(2) Cost: Constant	40%:60%	10%	(4)	14.31	(28,287)	15.43	13,611	2003	2007	2009	212,461	2003	(4)
		15%	(5)	14.31	(28,287)	13.74	(42,992)	2007	2014	2016	742,333	2009	(5)
		20%	(6)	14.31	(28,287)	12.26	(99,594)	*)	*)	*)	-	-	(6)
2. (Current Price)	30%:70%	10%	(7)	23.80	1,230,625	27.06	1,335,099	2001	2004	2005	306,199	2000	(7)
(1) Toll Rate: 40% up/ 3 Year		15%	(8)	23.80	1,230,625	25.32	1,225,940	2004	2007	2007	772,357	2003	(8)
		20%	(9)	23.80	1,230,625	23.81	1,116,782	2004	2009	2010	1,434,208	2004	(9)
(2) Cost: 8% up/Year	40%:60%	10%	(10)	23.80	1,230,625	26.38	1,324,431	2001	2003	2004	198,408	2000	(10)
		15%	(11)	23.80	1,230,625	25.05	1,232,793	2002	2005	2006	465,665	2002	(11)
		20%	(12)	23.80	1,230,625	23.84	1,141,152	2004	2007	2008	889,716	2004	(12)

Note: (1) Figure in ( ) indicates a minus value.
(2) *) ..... Null first year of surplus within the project life.

Table 15.4.2 Debt Service of Long-term Loan

(Loan Ratio = 60%)
(Constant Price) (Million Rp.)

Year	Beginning Balance	Loan	Balance after Loan	Repayment	Ending Balance	Interest 15%
1989	0	0	0	0	0	0
1990	0	0	0	0	0	0
1991	0	0	0	0	0	0
1992	0	0	0	0	0	0
1993	0	0	0	0	0	0
1994	0	0	0	0	0	0
1995	0	78,569	78,569	0	78,569	11,785
1996	78,569	210,396	288,965	0	288,965	43,345
1997	288,965	159,558	448,523	0	448,523	67,279
1998	448,523	0	448,523	0	448,523	67,279
1999	448,523	0	448,523	0	448,523	67,279
2000	448,523	0	448,523	5,238	443,285	66,493
2001	443,285	0	443,285	19,265	424,020	63,603
2002	424,020	0	424,020	29,902	394,118	59,118
2003	394,118	0	394,118	29,902	364,216	54,632
2004	364,216	0	364,216	29,902	334,314	50,147
2005	334,314	0	334,314	29,902	304,412	45,662
2006	304,412	0	304,412	29,902	274,510	41,177
2007	274,510	0	274,510	29,902	244,608	36,691
2008	244,608	0	244,608	29,902	214,706	32,206
2009	214,706	0	214,706	29,902	184,804	27,721
2010	184,804	0	184,804	29,902	154,902	23,235
2011	154,902	0	154,902	29,902	125,000	18,750
2012	125,000	0	125,000	29,902	95,098	14,265
2013	95,098	0	95,098	29,902	65,196	9,779
2014	65,196	0	65,196	29,902	35,294	5,294
2015	35,294	0	35,294	24,664	10,630	1,595
2016	10,630	0	10,630	10,630	0	0
2017	0	0	0	0	0	0
2018	0	0	0	0	0	0
2019	0	0	0	0	0	0
2020	0	0	0	0	0	0
2021	0	0	0	0	0	0
2022	0	0	0	0	0	0

Table 15.4.3 Profit and Loss Statement (Constant Price)

(Ratio of Loan = 60%)
(Interest Rate = 15%)

(Million Rp.)

Year	Revenue	Operation & Maint. Cost	Property Tax	Gross Profit	Interest (Long)	Interest (Short)	Profit after Int.	Depre-ciation	Depre-ciation (Int. d. Con. P.)	Profit after Dep.	Corporate Tax	Profit after Tax	(Accum. Profit after Tax)
1990						0							
1991						0							
1992						0							
1993						0							
1994						0							
1995					0	0							
1996					0	2,357							
1997					0	11,026							
1998	42,886	15,795	16	27,075	67,279	24,482	(64,686)	13,497	4,897	(83,080)	0	(83,080)	(83,080)
1999	56,240	15,795	16	40,428	67,279	37,419	(64,270)	13,497	4,897	(82,664)	0	(82,664)	(165,744)
2000	69,593	15,795	16	53,782	66,493	50,273	(62,984)	13,497	4,897	(81,378)	0	(81,378)	(247,122)
2001	90,632	15,795	16	74,820	63,603	63,917	(52,700)	13,497	4,897	(71,094)	0	(71,094)	(318,216)
2002	105,222	15,795	16	89,411	59,118	78,310	(48,017)	13,497	4,897	(66,411)	0	(66,411)	(384,627)
2003	119,813	15,795	16	104,002	54,632	93,894	(44,524)	13,497	4,897	(62,918)	0	(62,918)	(447,545)
2004	146,877	15,795	16	131,066	50,147	108,779	(27,860)	13,497	4,897	(46,254)	0	(46,254)	(493,799)
2005	162,821	15,795	16	147,010	45,662	120,332	(18,984)	13,497	4,897	(37,378)	0	(37,378)	(531,177)
2006	179,402	15,795	16	163,591	41,177	130,109	(7,695)	13,497	4,897	(26,089)	0	(26,089)	(557,266)
2007	214,147	15,795	16	198,336	36,691	137,628	24,017	13,497	4,897	5,623	1,968	3,655	(553,611)
2008	232,265	15,795	16	216,453	32,206	139,199	45,048	13,497	4,897	26,654	9,329	17,325	(536,286)
2009	250,382	15,795	16	234,571	27,721	144,929	61,921	13,497	4,897	43,527	15,234	28,292	(507,994)
2010	293,403	16,690	16	276,697	23,235	148,467	104,995	14,876	4,897	85,222	29,828	55,394	(452,599)
2011	313,201	16,690	16	296,495	18,750	139,413	138,332	14,876	4,897	118,559	41,496	77,063	(375,536)
2012	332,999	16,690	16	316,293	14,265	126,027	176,001	14,876	4,897	156,228	54,680	101,548	(273,988)
2013	385,511	16,690	16	368,804	9,779	107,743	251,282	14,876	4,897	231,509	81,028	150,481	(123,507)
2014	407,144	16,690	16	390,438	5,294	85,632	299,512	14,876	4,897	279,739	97,909	181,830	58,323
2015	428,778	17,218	16	411,544	1,595	57,251	352,698	16,068	4,897	331,733	116,106	215,626	273,949
2016	468,538	17,218	16	451,304	0	14,866	436,438	16,068	4,897	415,473	145,415	270,057	544,007
2017	468,538	17,218	16	451,304	0	0	451,304	16,068	4,897	430,339	150,619	279,720	823,727
2018	468,538	17,218	16	451,304	0	0	451,304	16,068	4,897	430,339	150,619	279,720	1,103,447
2019	511,969	17,218	16	494,734	0	0	494,734	16,068	4,897	473,769	165,819	307,950	1,411,397
2020	511,969	17,218	16	494,734	0	0	494,734	16,068	4,897	473,769	165,819	307,950	1,719,347
2021	511,969	17,218	16	494,734	0	0	494,734	16,068	4,897	473,769	165,819	307,950	2,027,297
2022	559,449	17,218	16	542,215	0	0	542,215	16,068	4,881	521,266	182,443	338,823	2,366,120

Note: Figure in ( ) indicates a minus value.

Table 15.4.4 Cash Flow (Constant Price)

(Ratio of Loan = 60%)
(Interest Rate = 15%)

(Million Rp.)

Year	(Sources) Profit after Tax	Depre-ciation	Depre-ciation (Int. d. Con. P.)	Equity (Int. d. Con. P.)	Equity	Loan (Long)	(Sources Total)	(Uses) Const. Cost	Intrest during Const. Period	(Total Project Cost)	Repay Loan (Long)	Repay Loan (Short)	(Uses Total)	(Sources Minus Uses)	Loan (Short)	Net Cash Flow	Accum-lated Net Cash Flow
1990				0	0	0	0	0	0	0	0	0	0	0	0	0	0
1991				0	4,415	0	4,415	4,415	0	4,415	0	0	4,415	0	0	0	0
1992				0	8,830	0	8,830	8,830	0	8,830	0	0	8,830	0	0	0	0
1993				0	61,287	0	61,287	61,287	0	61,287	0	0	61,287	0	0	0	0
1994				0	97,049	0	97,049	97,049	0	97,049	0	0	97,049	0	0	0	0
1995				0	116,850	78,569	195,419	195,419	11,785	207,204	0	0	207,204	(11,785)	11,785	0	0
1996				0	10,585	210,396	220,981	220,981	43,345	264,326	0	11,785	276,111	(55,130)	55,130	0	0
1997				0	0	159,558	159,558	159,558	67,279	226,837	0	55,130	281,967	(122,409)	122,409	0	0
1998	(83,080)	13,497	4,897	0	0	0	(64,686)	0	0	0	0	122,409	122,409	(187,095)	187,095	0	0
1999	(82,664)	13,497	4,897	0	0	0	(64,270)	0	0	0	0	187,095	187,095	(251,365)	251,365	0	0
2000	(81,378)	13,497	4,897	0	0	0	(62,984)	0	0	0	5,238	251,365	256,603	(319,587)	319,587	0	0
2001	(71,094)	13,497	4,897	0	0	0	(52,700)	0	0	0	19,265	319,587	338,852	(391,552)	391,552	0	0
2002	(66,411)	13,497	4,897	0	0	0	(48,017)	0	0	0	29,902	391,552	421,454	(469,471)	469,471	0	0
2003	(62,918)	13,497	4,897	0	0	0	(44,524)	0	0	0	29,902	469,471	499,373	(543,897)	543,897	0	0
2004	(46,254)	13,497	4,897	0	0	0	(27,860)	0	0	0	29,902	543,897	573,799	(601,659)	601,659	0	0
2005	(37,378)	13,497	4,897	0	0	0	(18,984)	0	0	0	29,902	601,659	631,561	(650,545)	650,545	0	0
2006	(26,089)	13,497	4,897	0	0	0	(7,695)	0	0	0	29,902	650,545	680,447	(688,142)	688,142	0	0
2007	3,655	13,497	4,897	0	0	0	22,049	0	0	0	29,902	688,142	718,044	(695,995)	695,995	0	0
2008	17,325	13,497	4,897	0	0	0	35,719	34,470	0	34,470	29,902	695,995	760,367	(724,647)	724,647	0	0
2009	28,292	13,497	4,897	0	0	0	46,686	34,470	0	34,470	29,902	724,647	789,019	(742,333)	742,333	0	0
2010	55,394	14,876	4,897	0	0	0	75,167	0	0	0	29,902	742,333	772,235	(697,067)	697,067	0	0
2011	77,063	14,876	4,897	0	0	0	96,836	0	0	0	29,902	697,067	726,969	(630,133)	630,133	0	0
2012	101,548	14,876	4,897	0	0	0	121,321	0	0	0	29,902	630,133	660,035	(538,714)	538,714	0	0
2013	150,481	14,876	4,897	0	0	0	170,254	29,797	0	29,797	29,902	538,714	598,413	(428,159)	428,159	0	0
2014	181,830	14,876	4,897	0	0	0	201,603	29,797	0	29,797	29,902	428,159	487,858	(286,255)	286,255	0	0
2015	215,626	16,068	4,897	0	0	0	236,591	0	0	0	24,664	286,255	310,919	(74,328)	74,328	0	0
2016	270,057	16,068	4,897	0	0	0	291,022	0	0	0	10,630	74,328	84,958	206,065	0	206,065	206,065
2017	279,720	16,068	4,897	0	0	0	300,685	0	0	0	0	0	0	300,685	0	300,685	506,750
2018	279,720	16,068	4,897	0	0	0	300,685	0	0	0	0	0	0	300,685	0	300,685	807,435
2019	307,950	16,068	4,897	0	0	0	328,915	0	0	0	0	0	0	328,915	0	328,915	1,136,350
2020	307,950	16,068	4,897	0	0	0	328,915	0	0	0	0	0	0	328,915	0	328,915	1,465,265
2021	307,950	16,068	4,897	0	0	0	328,915	0	0	0	0	0	0	328,915	0	328,915	1,794,180
2022	338,823	16,068	4,881	0	0	0	359,772	(390,305)	0	(390,305)	0	0	(390,305)	750,077	0	750,077	2,544,257
(Total)				0	299,016	448,523		876,072 (Exclude Salvage Value)	122,409	998,481					9,110,269		

Note: Figure in ( ) indicates a minus value.

Table 15.4.5 FIRR (ROE) (Constant Price)

(Ratio of Loan = 60%) FIRR = 13.74 (%)
(Interest Rate = 15%)
N.P.V = (42,992) (Mil.Rp.) 15%

Year	Revenue	Equity	O & M Cost	Loan Repay (Long)	Loan Interest (Long)	Cash Flow for ROE
1990		0		0		0
1991		4,415		0		(4,415)
1992		8,830		0		(8,830)
1993		61,287		0		(61,287)
1994		97,049		0		(97,049)
1995		116,850		0	11,785	(128,635)
1996		10,585		0	43,345	(53,930)
1997		0		0	67,279	(67,279)
1998	42,886	0	15,795	0	67,279	(40,188)
1999	56,240	0	15,795	0	67,279	(26,835)
2000	69,593	0	15,795	5,238	66,493	(17,933)
2001	90,632	0	15,795	19,265	63,603	(8,032)
2002	105,222	0	15,795	29,902	59,118	407
2003	119,813	0	15,795	29,902	54,632	19,484
2004	146,877	0	15,795	29,902	50,147	51,033
2005	162,821	0	15,795	29,902	45,662	71,462
2006	179,402	0	15,795	29,902	41,177	92,528
2007	214,147	0	15,795	29,902	36,691	131,759
2008	232,265	0	15,795	29,902	32,206	154,361
2009	250,382	0	15,795	29,902	27,721	176,964
2010	293,403	0	16,690	29,902	23,235	223,576
2011	313,201	0	16,690	29,902	18,750	247,859
2012	332,999	0	16,690	29,902	14,265	272,142
2013	385,511	0	16,690	29,902	9,779	329,139
2014	407,144	0	16,690	29,902	5,294	355,258
2015	428,778	0	17,218	24,664	1,595	385,301
2016	468,538	0	17,218	10,630	0	440,690
2017	468,538	0	17,218	0	0	451,320
2018	468,538	0	17,218	0	0	451,320
2019	511,969	0	17,218	0	0	494,750
2020	511,969	0	17,218	0	0	494,750
2021	511,969	0	17,218	0	0	494,750
2022	559,449	0	17,218	0	0	542,231

Note: Figure in ( ) indicates a minus value.

Table 15.4.6 Debt Service of Long-term Loan

(Loan Ratio = 60%)
(Current Price) (Million Rp.)

	Beginning Balance	Loan	Balance after Loan	Repayment	Ending Balance	Interest 15%
1989	0	0	0	0	0	0
1990	0	0	0	0	0	0
1991	0	0	0	0	0	0
1992	0	0	0	0	0	0
1993	0	0	0	0	0	0
1994	0	0	0	0	0	0
1995	0	95,199	95,199	0	95,199	14,280
1996	95,199	345,296	440,495	0	440,495	66,074
1997	440,495	295,310	735,805	0	735,805	110,371
1998	735,805	0	735,805	0	735,805	110,371
1999	735,805	0	735,805	0	735,805	110,371
2000	735,805	0	735,805	6,347	729,458	109,419
2001	729,458	0	729,458	29,366	700,092	105,014
2002	700,092	0	700,092	49,053	651,039	97,656
2003	651,039	0	651,039	49,053	601,986	90,298
2004	601,986	0	601,986	49,053	552,933	82,940
2005	552,933	0	552,933	49,053	503,880	75,582
2006	503,880	0	503,880	49,053	454,827	68,224
2007	454,827	0	454,827	49,053	405,774	60,866
2008	405,774	0	405,774	49,053	356,721	53,508
2009	356,721	0	356,721	49,053	307,668	46,151
2010	307,668	0	307,668	49,053	258,615	38,792
2011	258,615	0	258,615	49,053	209,562	31,434
2012	209,562	0	209,562	49,053	160,509	24,076
2013	160,509	0	160,509	49,053	111,456	16,719
2014	111,456	0	111,456	49,053	62,403	9,361
2015	62,403	0	62,403	42,707	19,696	2,954
2016	19,696	0	19,696	19,696	0	0
2017	0	0	0	0	0	0
2018	0	0	0	0	0	0
2019	0	0	0	0	0	0
2020	0	0	0	0	0	0
2021	0	0	0	0	0	0
2022	0	0	0	0	0	0

Table 15.4.7 Profit and Loss Statement (Current Price)

(Ratio of Loan = 60%)
(Interest Rate = 15%)

(Million Rp.)

Year	Revenue	Operation & Maint. Cost	Property Tax	Gross Profit	Interest (Long)	Interest (Short)	Profit after Int.	Depre-ciation	Depre-ciation (Int. d. Con. P.)	Profit after Dep.	Corporate Tax	Profit after Tax	(Accum. Profit after Tax)
1990						0							
1991						0							
1992						0							
1993						0							
1994						0							
1995					0	0							
1996					0	2,856							
1997					0	16,071							
1998	90,190	31,573	24	58,593	110,371	38,145	(89,923)	22,479	7,629	(120,031)	0	(120,031)	(120,031)
1999	118,272	34,099	24	84,149	110,371	56,130	(82,352)	22,479	7,629	(112,460)	0	(112,460)	(232,491)
2000	146,354	36,827	24	109,503	109,419	72,600	(72,516)	22,479	7,629	(102,624)	0	(102,624)	(335,115)
2001	244,211	39,773	24	204,414	105,014	88,373	11,027	22,479	7,629	(19,081)	0	(19,081)	(354,197)
2002	283,526	42,954	24	240,548	97,656	92,041	50,851	22,479	7,629	20,743	7,260	13,483	(340,714)
2003	322,840	46,391	24	276,425	90,298	93,133	92,994	22,479	7,629	62,886	22,010	40,876	(299,838)
2004	507,029	50,103	24	456,902	82,940	88,747	285,215	22,479	7,629	255,107	89,287	165,819	(134,018)
2005	562,068	54,112	24	507,932	75,582	59,372	372,978	22,479	7,629	342,870	120,005	222,866	88,847
2006	619,306	58,441	24	560,841	68,224	18,588	474,029	22,479	7,629	443,921	155,372	288,549	377,396
2007	947,158	63,116	24	884,018	60,866	0	823,152	22,479	7,629	793,044	277,565	515,479	892,875
2008	1,027,290	68,166	24	959,100	53,508	0	905,592	22,479	7,629	875,484	306,420	569,065	1,461,939
2009	1,107,423	73,619	24	1,033,780	46,151	0	987,629	22,479	7,629	957,521	335,132	622,388	2,084,328
2010	1,662,586	84,014	24	1,578,548	38,792	0	1,539,756	28,667	7,629	1,503,460	526,211	977,249	3,061,577
2011	1,774,772	90,735	24	1,684,013	31,434	0	1,652,579	28,667	7,629	1,616,283	565,699	1,050,584	4,112,161
2012	1,886,958	97,994	24	1,788,940	24,076	0	1,764,864	28,667	7,629	1,728,568	604,999	1,123,569	5,235,730
2013	2,798,820	105,833	24	2,692,963	16,719	0	2,676,244	28,667	7,629	2,639,948	923,982	1,715,966	6,951,697
2014	2,955,882	114,300	24	2,841,558	9,361	0	2,832,197	28,667	7,629	2,795,901	978,565	1,817,335	8,769,032
2015	3,112,943	127,350	24	2,985,569	2,954	0	2,982,615	36,527	7,629	2,938,459	1,028,461	1,909,998	10,679,030
2016	4,358,103	137,538	24	4,220,541	0	0	4,220,541	36,527	7,629	4,176,385	1,461,735	2,714,650	13,393,681
2017	4,358,103	148,541	24	4,209,538	0	0	4,209,538	36,527	7,629	4,165,382	1,457,884	2,707,498	16,101,179
2018	4,358,103	160,425	24	4,197,654	0	0	4,197,654	36,527	7,629	4,153,498	1,453,724	2,699,774	18,800,952
2019	6,101,331	173,259	24	5,928,048	0	0	5,928,048	36,527	7,629	5,883,892	2,059,362	3,824,530	22,625,482
2020	6,101,331	187,120	24	5,914,187	0	0	5,914,187	36,527	7,629	5,870,031	2,054,511	3,815,520	26,441,003
2021	6,101,331	202,089	24	5,899,218	0	0	5,899,218	36,527	7,629	5,855,062	2,049,272	3,805,791	30,246,793
2022	8,541,872	218,257	24	8,323,591	0	0	8,323,591	36,527	7,629	8,279,435	2,897,802	5,381,633	35,628,426

Note: Figure in ( ) indicates a minus value.

Table 15.4.8 Cash Flow (Current Price)

(Million Rp.)

(Ratio of Loan = 60%)
(Interest Rate = 15%)

Year	(Sources) Profit after Tax	Depre-ciation	Depre-ciation (Int. d. Con. P.)	Equity (Int. d. Con. P.)	Equity	Loan (Long)	(Sources Total)	(Uses) Const. Cost	Intrest during Const. Period	(Total Project Cost)	Repay Loan (Long)	Repay Loan (Short)	(Uses Total)	(Sources Minus Uses)	Loan (Short)	Net Cash Flow	Accum-lated Net Cash Flow
1990				0	0	0	0	0	0	0	0	0	0	0	0	0	0
1991				0	5,149	0	5,149	5,149	0	5,149	0	0	5,149	0	0	0	0
1992				0	11,123	0	11,123	11,123	0	11,123	0	0	11,123	0	0	0	0
1993				0	83,381	0	83,381	83,381	0	83,381	0	0	83,381	0	0	0	0
1994				0	142,595	0	142,595	142,595	0	142,595	0	0	142,595	0	0	0	0
1995				0	214,891	95,199	310,090	310,090	14,280	324,370	0	0	324,370	(14,280)	14,280	0	0
1996				0	33,399	345,296	378,695	378,695	66,074	444,769	0	14,280	459,049	(80,354)	80,354	0	0
1997				0	0	295,310	295,310	295,310	110,371	405,681	0	80,354	486,035	(190,725)	190,725	0	0
1998	(120,031)	22,479	7,629	0	0	0	(89,923)	0	0	0	0	190,725	190,725	(280,648)	280,648	0	0
1999	(112,460)	22,479	7,629	0	0	0	(82,352)	0	0	0	0	280,648	280,648	(363,000)	363,000	0	0
2000	(102,624)	22,479	7,629	0	0	0	(72,516)	0	0	0	6,347	363,000	369,347	(441,863)	441,863	0	0
2001	(19,081)	22,479	7,629	0	0	0	11,027	0	0	0	29,366	441,863	471,229	(460,203)	460,203	0	0
2002	13,483	22,479	7,629	0	0	0	43,591	0	0	0	49,053	460,203	509,256	(465,665)	465,665	0	0
2003	40,876	22,479	7,629	0	0	0	70,984	0	0	0	49,053	465,665	514,718	(443,734)	443,734	0	0
2004	165,819	22,479	7,629	0	0	0	195,927	0	0	0	49,053	443,734	492,787	(296,859)	296,859	0	0
2005	222,866	22,479	7,629	0	0	0	252,974	0	0	0	49,053	296,859	345,912	(92,939)	92,939	0	0
2006	288,549	22,479	7,629	0	0	0	318,657	0	0	0	49,053	92,939	141,992	176,665	0	176,665	176,665
2007	515,479	22,479	7,629	0	0	0	545,587	0	0	0	49,053	0	49,053	496,534	0	496,534	673,199
2008	569,065	22,479	7,629	0	0	0	599,173	148,757	0	148,757	49,053	0	197,810	401,363	0	401,363	1,074,561
2009	622,388	22,479	7,629	0	0	0	652,496	160,655	0	160,655	49,053	0	209,708	442,788	0	442,788	1,517,350
2010	977,249	28,667	7,629	0	0	0	1,013,545	0	0	0	49,053	0	49,053	964,492	0	964,492	2,481,842
2011	1,050,584	28,667	7,629	0	0	0	1,086,880	0	0	0	49,053	0	49,053	1,037,827	0	1,037,827	3,519,669
2012	1,123,569	28,667	7,629	0	0	0	1,159,865	0	0	0	49,053	0	49,053	1,110,812	0	1,110,812	4,630,481
2013	1,715,966	28,667	7,629	0	0	0	1,752,262	188,943	0	188,943	49,053	0	237,996	1,514,266	0	1,514,266	6,144,748
2014	1,817,335	28,667	7,629	0	0	0	1,853,631	204,059	0	204,059	49,053	0	253,112	1,600,519	0	1,600,519	7,745,267
2015	1,909,998	36,527	7,629	0	0	0	1,954,154	0	0	0	42,707	0	42,707	1,911,447	0	1,911,447	9,656,714
2016	2,714,650	36,527	7,629	0	0	0	2,758,806	0	0	0	19,696	0	19,696	2,739,110	0	2,739,110	12,395,825
2017	2,707,498	36,527	7,629	0	0	0	2,751,654	0	0	0	0	0	0	2,751,654	0	2,751,654	15,147,479
2018	2,699,774	36,527	7,629	0	0	0	2,743,930	0	0	0	0	0	0	2,743,930	0	2,743,930	17,891,408
2019	3,824,530	36,527	7,629	0	0	0	3,868,686	0	0	0	0	0	0	3,868,686	0	3,868,686	21,760,094
2020	3,815,520	36,527	7,629	0	0	0	3,859,676	0	0	0	0	0	0	3,859,676	0	3,859,676	25,619,771
2021	3,805,791	36,527	7,629	0	0	0	3,849,947	0	0	0	0	0	0	3,849,947	0	3,849,947	29,469,717
2022	5,381,633	36,527	7,629	0	0	0	5,425,789	(1,011,491)	0	(1,011,491)	0	0	(1,011,491)	6,437,280	0	6,437,280	35,906,997
(Total)				0	490,538	735,805		1,928,757 (Exclude Salvage Value)	190,725	2,119,482					3,130,270		

Note: Figure in ( ) indicates a minus value.

Table 15.4.9 FIRR (ROE) (Current Price)

(Ratio of Loan = 60%) FIRR = 25.05 (%)
(Interest Rate = 15%)
N.P.V = 1,232,793 (Mil.Rp.) 15%

Year	Revenue	Equity	O & M Cost	Loan Repay	Loan Interest	Cash Flow for ROE
1990		0		0		0
1991		5,149		0		(5,149)
1992		11,123		0		(11,123)
1993		83,381		0		(83,381)
1994		142,595		0		(142,595)
1995		214,891		0	14,280	(229,171)
1996		33,399		0	66,074	(99,473)
1997		0		0	110,371	(110,371)
1998	90,190	0	31,573	0	110,371	(51,754)
1999	118,272	0	34,099	0	110,371	(26,198)
2000	146,354	0	36,827	6,347	109,419	(6,239)
2001	244,211	0	39,773	29,366	105,014	70,058
2002	283,526	0	42,954	49,053	97,656	93,863
2003	322,840	0	46,391	49,053	90,298	137,098
2004	507,029	0	50,103	49,053	82,940	324,933
2005	562,068	0	54,112	49,053	75,582	383,321
2006	619,306	0	58,441	49,053	68,224	443,588
2007	947,158	0	63,116	49,053	60,866	774,123
2008	1,027,290	0	68,166	49,053	53,508	856,563
2009	1,107,423	0	73,619	49,053	46,151	938,600
2010	1,662,586	0	84,014	49,053	38,792	1,490,727
2011	1,774,772	0	90,735	49,053	31,434	1,603,550
2012	1,886,958	0	97,994	49,053	24,076	1,715,835
2013	2,798,820	0	105,833	49,053	16,719	2,627,215
2014	2,955,882	0	114,300	49,053	9,361	2,783,168
2015	3,112,943	0	127,350	42,707	2,954	2,939,932
2016	4,358,103	0	137,538	19,696	0	4,200,869
2017	4,358,103	0	148,541	0	0	4,209,562
2018	4,358,103	0	160,425	0	0	4,197,678
2019	6,101,331	0	173,259	0	0	5,928,072
2020	6,101,331	0	187,120	0	0	5,914,211
2021	6,101,331	0	202,089	0	0	5,899,242
2022	8,541,872	0	218,257	0	0	8,323,615

Note: Figure in ( ) indicates a minus value.

15.5 Sensitivity Analysis

Sensitivity analysis has been conducted, using some likely variables for the case of equity/loan ratio of 40% : 60% and interest rate of 15% of long-term loan both for the constant price case and the current price case.

1) Cases for Sensitivity Analysis

The following cases are assumed:

Case 1: An investment cost overrun of 10 percent
Case 2: A 10 percent decrease in revenue
Case 3: Combination of Case 1 and Case 2

2) Analysis Results

Table 15.5.1 shows the results of the sensitivity analysis.

As can be seen, a 10% decrease in revenue would have a slightly greater effect than a 10% increase in investment cost. In the current price case, even for the severe combination case of 10% overrun of investment cost and 10% decrease in revenue, the cash flow would still show a favorable condition.

Table 15.5.1 Summary of Results of Sensitivity Analysis of Financial Analysis for Case of Equity/Loan Ratio = 40%:60% and Interest Rate = 15%

			FIRR (ROI)	NPV (Discount Rate = 15%)	FIRR (ROE)	NPV (Discount Rate = 15%)	First Year of Surplus			Maximum Short-term Loan Amount	Year of Maximum Short-term Loan	
		(No.)	(%)	(Mil.Rp.)	(%)	(Mil.Rp.)	Annual Surplus in Profit & Loss (Year)	Accum. Surplus in Profit & Loss (Year)	Annual Surplus in Cash Flow (Year)	(Mil.Rp.)	(Year)	(No.)
1. (Constant Price)	(Base Case)		14.31	(28,287)	13.74	(42,992)	2007	2014	2016	742,333	2009	
(1) Toll Rate: 3% up/Year	1) Inv. Cost + 10%	(1)	13.52	(64,930)	12.76	(81,105)	2010	2018	2019	1,129,793	2010	(1)
(2) Cost: Constant	2) Revenue - 10%	(2)	13.34	(65,982)	12.54	(80,687)	2012	2020	2021	1,153,384	2011	(2)
	3) Combination of 1) and 2)	(3)	12.57	(102,624)	11.59	(118,801)	*)	*)	*)	-	-	(3)
2. (Current Price)	(Base Case)		23.80	1,230,625	25.05	1,232,793	2002	2005	2006	465,665	2002	
(1) Toll Rate: 40% up/ 3 Year	1) Inv. Cost + 10%	(4)	22.95	1,169,004	24.08	1,171,388	2003	2006	2007	599,941	2003	(4)
(2) Cost: 8% up/Year	2) Revenue - 10%	(5)	22.76	1,032,189	23.85	1,034,357	2003	2006	2007	589,702	2003	(5)
	3) Combination of 4) and 5)	(6)	21.93	970,569	22.91	972,952	2004	2007	2008	764,941	2003	(6)

Note: (1) Figure in ( ) indicates a minus value.
(2) *) ..... Null first year of surplus within the project life.

CHAPTER 16. CONCLUSION AND RECOMMENDATION

CHAPTER 16 . CONCLUSION AND RECOMMENDATION

16.1 Conclusion

It is concluded as a result of the feasibility study that the project tollway is technically, economically, and financially feasible, and the project should be implemented at the earliest opportunity.

Economic evaluation indicates a high internal rate of return of more than 30%. Further sensitivity analysis confirmed the feasibility of the project.

The financial IRR analysis resulted in a reasonably high rate of return of 14.3% at a constant 1989 price and 23.8% at a current price. FIRR calculations based on current prices is higher than the prevailing interest rate at commercial banks of around 18%.

16.2 Recommendations

16.2.1 Construction Method and Sections

It is recommended that the tollway is constructed as a 4-lane divided highway covering the whole length between Cikampek and Cirebon and widened to a 6-lane at inner lanes at the ultimate stage. (see 7.8.3)

The construction is recommended to be divided into nine (9) sections taking into consideration operations for hauling, excavation and filling, accessibility to each section, and proper work volume. (see 12.2)

16.2.2 Initial Stage Interchange Construction

Trumpet type interchanges should be constructed at Cikampek, Subang, Cikedung, Dawuan, Palimanan, Cirebon, and East Cirebon during the initial stage of construction. (see 8.2.2 and 10.3.3)

16.2.3 Urban Transport Study in Cirebon

Cirebon city has the most potential for development. Since the project tollway will have considerable impact on the city area it will cause conflicts in urban land use and will also cause changes in traffic flow. A regional transport plan therefore is recommended for the Cirebon urban area. In the course of this urban transport study, the necessity of the West Cirebon Interchange should be examined.

16.2.4 Operation and Maintenance Facilities

Since the project tollway is to be operated by an independent organization different from the Jakarta-Cikampek Tollway, a throughway toll barrier gate becomes necessary. It is recommended that this toll barrier gate be located about 12 km east of the Cikampek interchange.

Service areas are necessary at intervals of about 100 km in maximum length. In this project, one service area is recommended at initial stage in Kalijati district and another service area is recommended to construct near the Lake Sitopatok, if the tollway is extended east of Cirebon. (see 10.4.2)

16.2.5 Environmental Study

In order to minimize negative impacts on the environment, careful attention was paid for the selection of the project route. Problems that may be necessary to examine in a detailed environmental study will include the following items:

- Water pollution due to sewage from service area
- Change in the ground water level caused by large scale excavation work in the rubber plantation area around Kerta Jati
- Air pollution and noise in the densely built up areas around Cirebon city
- Effects of earth, sand, and dust caused by the construction on the residential areas and cultivated land

The detailed environmental study should be conducted in the beginning of the detailed design work. (see 10.10)

16.2.6 Land Use Plan in Interchange Area

The project tollway attracts various types of development particularly in the interchange areas. Speculation in land and conflicts in land use should be avoided by a proper land development plan and law enforcement, otherwise inefficient scattered development with poor infrastructure will take place.

Supplementary Study - Case Study of Implementation Schedule

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List of Tables

1. Project Cost and Financial Constraint

The estimated project cost for the initial 4-lane tollway between Cikampek and Cirebon amounts to about 750 billion Rupiah. This is quite a large amount of investment to be made for a single project.

Given the difficult financial condition of the Indonesian Government, additional borrowing from official foreign aid programs seems to be hard to realize. Therefore, participation of the private sector in providing social infrastructure such as a tollway has been encouraged. In fact some of the tollway schemes have virtually been implemented by the private sector.

According to past experience of tollway construction in Indonesia, the longest tollway being operated at present is the Jakarta-Cikampek Tollway of about 70 Km in length, followed by Jagorawi of about 50 Km in length. The recently started tollway construction between Tangerang and Balaraja, which is an extension of the Jakarta-Tangerang Tollway and constitutes a part of the Jakarta-Merak Tollway, is to be invested in and operated by the private sector for about 13 Km length.

The implementation of 140 Km length of tollway at one time is difficult because of the scale of its physical and financial aspects. The Indonesian authority eventually advised that the initial investment should be limited to 400-500 billion Rupiah.

Even a 2-lane/2-way tollway for the total length of 140 Km requires about 580 billion Rupiah. Therefore, longitudinally staged construction should be planned to meet the requirement.

2. Partial Operation Scheme and Longitudinal Staging

A longitudinal division of the project tollway is therefore planned in order to lighten the burden of the initial investment cost and to realize partial tollway operation considering the following factors:

i) Cost Elements

- to minimize earth volume to be transported for cut and fill
- to balance the earth volumes to cut and fill
- to minimize the total length of construction roads to be either improved or built
- to not exceed an initial construction cost of 500 billion Rupiah

ii) Operational Elements

- to divide the tollway so as to attract traffic demand as much as possible
- to select the terminus of each divided segment for easy access to regional centers
- to consider a unit of operation and maintenance activities

As a result of the foregoing it is proposed to divide the total tollway length into three segments, which are:

Package A : Cikampek-Subang, which directly connects to the existing Jakarta-Cikampek Tollway and the planned Cikampek-Padalarang Tollway. Cikampek is a development center and Subang is a sub-development center in Puruwasuka Development Region. Further, a regional tollway office is proposed to be located in Subang at completion of the total length of the project tollway.

Package B : Subang-Dawuan, which reinforces a missing link in the road network in the region. Dawuan is located near Kadipaten which is a sub-development center of Cirebon Development Region, and is directly connected with the national road between Cirebon and Bandung. Further, a regional tollway office is proposed to be located in Dawuan.

Package C : Dawuan-Cirebon, which by-passes Cirebon City and a congested national road section between Cirebon and Palimanan. This segment runs parallel to the Cirebon-Kadipaten national road. Cirebon City is defined as a development center of West Java Province as well as of Cirebon Development Region.

The project study aims to examine to feasibility of the Cikampek-Cirebon Tollway and to complete the extension to Cirebon of the currently operating Jakarta-Cikampek Tollway.

Alternative longitudinal staging plans were, therefore, assembled, assuming the shortage of funds for the total project cost is only temporary at the initial stage and provided the subsequent construction could start immediately after the initial section commenced partial operation.

Basically to follow the identified project concept, partial operation of the project tollway should be scheduled so as to be a continuation of the existing Jakarta-Cikampek Tollway. In addition, from a psychological point of view a driver will favour using a tollway continuously and is less likely to select a route via discontinued tollway components. That is, a partial operation unconnected with the Jakarta-Cikampek Tollway, such as Package B, Package C or Packages B & C would not attract potential tollway users as expected.

Accordingly, the alternative longitudinal staging plans are assumed to consist of the following construction stages:

i) Package A followed by Package B and finally Package C
ii) Packages A + B followed by Package C
iii) Packages A + B + C simultaneously.

In addition to the above longitudinal construction stages, a cross sectional staging was analyzed using the estimated traffic demand to the tollway.

3. Traffic Demand for Package Combinations and Cross-section Staging

Before the total length of Cikampek-Cirebon Tollway is complete, that is during a partial operation of the tollway, the tollway impact upon the region will be smaller than that which will be brought about after completion of the total length.

Therefore, the estimations of traffic volumes on the alternative implementation plans were based on the present pattern OD matrices for the years 1995 and 2005.

The resulting traffic volumes for the respective alternative plans are shown in Table SP 3.1.

According to this traffic analysis Package A alone requires only a 2-lane/2-way tollway for about 10 years from the assumed commencement of tollway operation in 1998. The combinations of Packages A & B and A & B & C require the addition of traffic lanes from 2-lane/2-way to 4-lane/2-way in 2001. There is thus only a few years duration until the traffic demand overtakes the 2-lane/2-way road capacity at the freeway service level.

Table SP 3.1 Estimated Traffic Volumes on Package Combinations

Package Combination	Segment*	Traffic Volume (Veh./day)		No. of Lanes Required	
		Year 1995	2005	1995	2005
A (Cikampek-Subang)	b	2,034	5,986		
	c	1,826	5,677	2	2
	Average	1,930	5,832		
A & B (Cikampek-Dawuan)	b	5,863	12,730		
	c	5,666	12,436		
	d	5,376	11,676	2	4
	e	5,380	11,886		(in Year 2001)
	f	5,301	11,660		
	Average	5,517	12,078		
A & B & C (Cikampek-Cirebon)	b	6,417	13,439		
	c	6,224	13,155		
	d	6,051	12,556		
	e	6,060	12,792		
	f	5,384	12,578	2	4
	g	5,828	10,715		(in Year 2001)
	h	5,743	10,562		
	i	6,745	12,40		
	j	5,700	11,485		
	(k)**	(3,540)	(6,899)		
	Average	6,084	12,187		

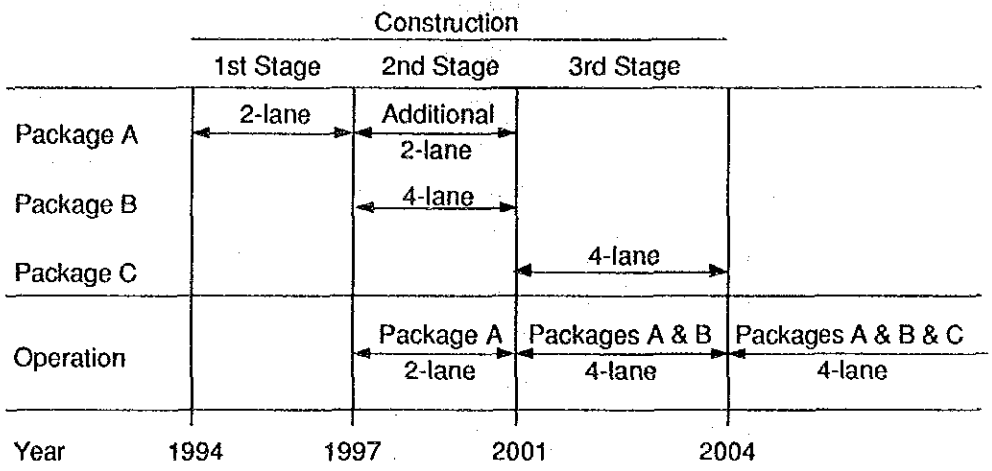
Note: * Please refer to Fig. 11.1.3 of Main Report

** (k) section is considered as an access to the throughway from the arterial road, so that traffic volume on section (k) is not included in the average volume calculation.

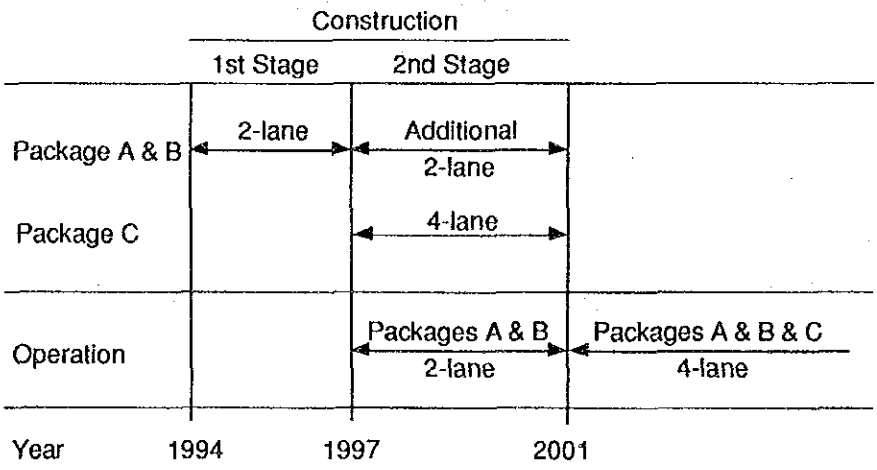
4. Alternative Implementation Plans and Project Cost

Alternative implementation plans were prepared taking into account both longitudinal and cross-sectional staging plans. They are:

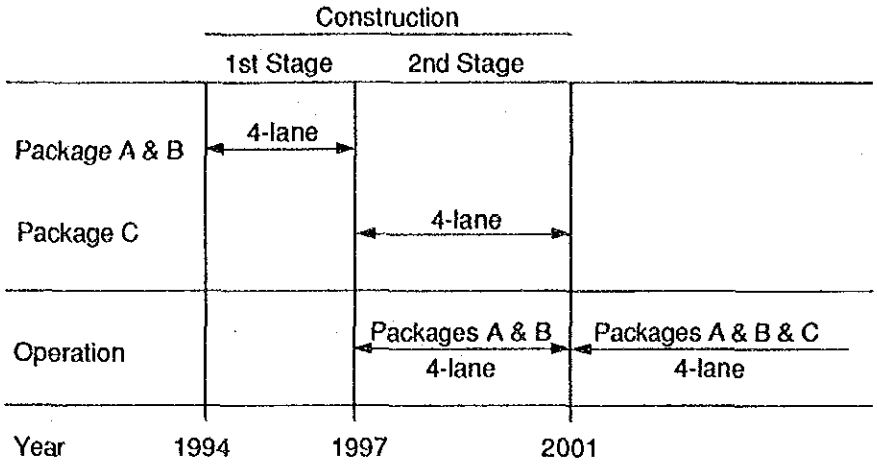
Alternative 1



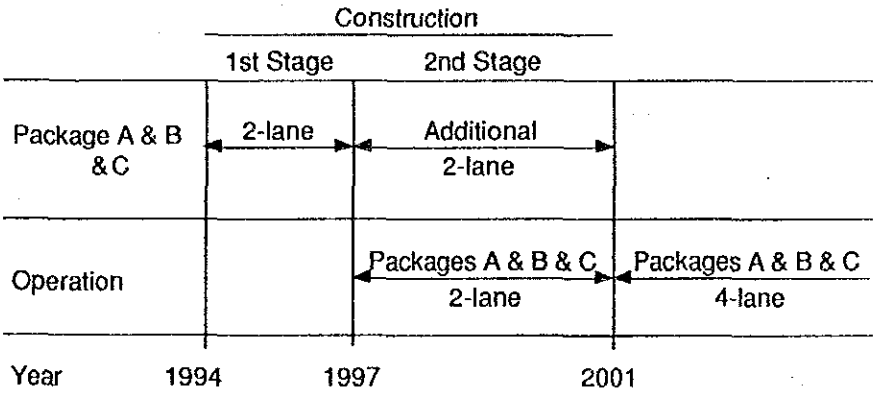
Alternative 2



Alternative 3



Alternative 4



The construction cost of each package is estimated for its initial 2-lane tollway, the remaining works for a 4-lane tollway, and for the initial 4-lane tollway as shown in Table SP 4.1. The breakdown of the project costs is presented in Tables SP 4.3 and 4.4.

Table SP 4.1 Financial Project Cost of Package Combination

(Billion Rupiah)

Package	A	B	C	A+B	A+B+C
Initial 2-lane	180	182	219	362	581
Remaining for 4-lane	55	61	81	116	197
Initial 4-lane	228	228	292	456	748

Accordingly the total project cost to complete the 4-lane tollway is summarized for the respective alternative implementation plans as shown in Table SP 4.2.

Table SP 4.2 Project Cost by Stage for Alternative Implementation Plan

(Billion Rupiah)

Implementation Plan	Stage 1	Stage 2	Stage 3	Total
Alternative 1:	180	55 + 228 = 283	292	755
Alternative 2:	362	116 + 292 = 408	-	770
Alternative 3:	456	292	-	748
Alternative 4:	581	197	-	778

The project cost required for the initial stage varies from 180 to 581 billion Rupiah and Alternative 4 exceeds 500 billion Rupiah.

Table SP 4.3 Project Cost (Initial Divided 2-Lanes)

(1000 Rp.)

ITEM	Initial 2-Lanes			
	PACKAGE A	PACKAGE B	PACKAGE C	TOTAL
1 Earth works				
Clearing and grubbing	1,612,600	1,807,850	1,837,000	5,257,450
Common excavation (E-L)	14,297,500	8,316,000	3,717,000	26,330,500
Borrow excavation (E-L)	931,000	205,200	8,618,400	9,754,600
Embankment (1km T-C) soil	9,437,500	5,437,500	7,820,000	22,695,000
Haulage A (7Km)	2,467,500	5,351,500	2,474,500	10,293,500
Haulage B (13Km)	8,092,500	0	13,780,000	21,872,500
Haulage C (20Km)	0	0	9,810,000	9,810,000
Sodding Solid	109,500	153,500	154,500	417,500
Sodding Strip	503,650	439,250	445,200	1,388,100
Sub-total	37,451,750	21,710,800	48,656,600	107,819,150
2 Flexible Pavement				
Subgrade Preparation	75,000	105,150	106,350	286,500
Aggregate Subbase	4,925,000	6,875,000	4,475,000	16,275,000
Asphalt treated base	6,260,700	8,774,000	8,884,700	23,919,400
Binder course (t=6cm)	2,749,500	3,858,700	3,910,400	10,518,600
Surface course (t=4cm)	2,134,000	2,992,000	3,025,000	8,151,000
Prime coat	349,600	490,400	496,800	1,336,800
Tackcoat	200,800	281,200	284,800	766,800
Seal coat	272,400	382,800	387,600	1,042,800
Sub-total	16,967,000	23,759,250	21,570,650	62,296,900
3 Bridges				
Short span bridges	1,172,600	765,050	5,848,700	7,786,350
Medium span bridges	10,310,300	9,132,200	7,653,800	27,096,300
Long span bridges	3,224,000	3,224,000	0	6,448,000
Sub-total	14,706,900	13,121,250	13,502,500	41,330,650
4 Grade separation structure				
Medium span bridges	7,415,100	7,661,500	14,414,400	29,491,000
I/C bridges	1,185,800	0	0	1,185,800
Over-Bridges (Pedestrian)	938,497	1,685,464	1,876,994	4,500,955
Ramp Bridges	0	677,600	2,032,800	2,710,400
Sub-total	9,539,397	10,024,564	18,324,194	37,888,155
5 Drainage				
U-ditch & Catchbasin	2,580,000	3,577,600	3,646,400	9,804,000
Concrete pipe o 100	556,405	367,908	1,028,781	1,953,094
Culvert A (3 x 3)	2,016,000	2,352,000	1,716,000	6,084,000
Culvert B (5 x 5)	702,000	520,000	2,080,000	3,302,000
Sub-total	5,854,405	6,817,508	8,471,181	21,143,094
6 Related Construction				
Road relocation	1,095,600	249,000	1,494,000	2,838,600
Road improvement (access)	0	539,500	4,357,500	4,897,000
Road improvement (const.)	2,158,000	664,000	1,660,000	4,482,000
New construction (access)	0	996,000	249,000	1,245,000
Sub-total	3,253,600	2,448,500	7,760,500	13,462,600
7 Miscellaneous				
Guard Rail (single)	448,310	478,647	1,078,640	2,005,596
Fence, Km Post, ROW Stake	1,125,000	1,560,000	1,590,000	4,275,000
Median Barrier	562,500	780,000	795,000	2,137,500
Marking	72,500	102,500	102,500	277,500
Signs and Signals	480,000	665,600	678,400	1,824,000
Sub-total	2,688,310	3,586,747	4,244,540	10,519,596
8 Interchange(exclud bridge)	7,000,000	7,000,000	7,000,000	21,000,000
9 Throughway Toll Barrier	5,700,000	0	0	5,700,000
10 Parking Area	0	8,240,000	4,120,000	12,360,000
11 Service Area	4,200,000	0	0	4,200,000
Sub-total	16,900,000	15,240,000	11,120,000	43,260,000
Direct Construction Cost	107,361,000	96,709,000	133,650,000	337,720,000
Contingency 15%	16,104,000	14,506,000	20,048,000	50,658,000
Overhead & Profit 10%	12,347,000	11,122,000	15,370,000	38,839,000
Engineering fee 7%	10,978,000	9,991,000	14,051,000	35,020,000
Vehicle & Furniture	1,042,000	1,042,000	1,042,000	3,126,000
Tax 10%	14,783,000	13,337,000	18,416,000	46,536,000
Land Acquisition & Compensation	17,364,000	35,093,000	16,780,000	69,237,000
Project Cost	179,979,000	181,800,000	219,357,000	581,136,000

Table SP 4.4 Project Cost (Remaining Works for 4-Lanes)

(1000 Rp.)

ITEM	Remaining Works for 4-Lanes			
	PACKAGE A	PACKAGE B	PACKAGE C	TOTAL
1 Earth works				
Clearing and grubbing	0	0	0	0
Common excavation (E-L)	5,544,000	3,797,500	1,389,500	10,731,000
Borrow excavation (E-L)	0	881,600	5,183,200	6,064,800
Embankment (1km T-C) soil	3,300,000	3,015,000	4,302,500	10,617,500
Haulage A (7Km)	840,000	2,005,500	1,305,500	4,151,000
Haulage B (13Km)	2,437,500	0	7,605,000	10,042,500
Haulage C (20Km)	0	0	5,280,000	5,280,000
Sodding Solid	72,500	102,000	103,500	278,000
Sodding Strip	251,650	219,800	222,600	694,050
Sub-total	12,445,650	10,021,400	25,391,800	47,858,850
2 Flexible Pavement				
Subgrade Preparation	45,600	64,050	64,950	174,600
Aggregate Subbase	2,675,000	3,775,000	3,850,000	10,300,000
Asphalt treated base	3,772,000	5,293,100	5,358,700	14,423,800
Binder course (t=6cm)	1,654,400	2,321,800	2,350,000	6,326,200
Surface course (t=4cm)	1,281,500	1,804,000	1,826,000	4,911,500
Prime coat	212,800	298,800	302,000	813,600
Tackcoat	120,800	169,600	171,600	462,000
Seal coat	112,800	159,600	162,000	434,400
Sub-total	9,874,900	13,885,950	14,085,250	37,846,100
3 Bridges				
Short span bridges	1,172,600	765,050	5,848,700	7,786,350
Medium span bridges	10,310,300	9,132,200	7,653,800	27,096,300
Long span bridges	3,224,000	3,224,000	0	6,448,000
Sub-total	14,706,900	13,121,250	13,502,500	41,330,650
4 Grade separation structure				
Medium span bridges	0	0	0	0
I/C bridges	0	0	0	0
Over-Bridges (Pedestrian)	0	0	0	0
Ramp Bridges	0	0	0	0
Sub-total	0	0	0	0
5 Drainage				
U-ditch & Catchbasin	0	0	0	0
Concrete pipe o 100	0	0	0	0
Culvert A (3 x 3)	0	0	0	0
Culvert B (5 x 5)	0	0	0	0
Sub-total	0	0	0	0
6 Related Construction				
Road relocation	0	0	0	0
Road improvement (access)	0	0	0	0
Road improvement (const.)	0	0	0	0
New construction (access)	0	0	0	0
Sub-total	0	0	0	0
7 Miscellaneous				
Guard Rail (single)	353,929	404,490	768,531	1,526,950
Fence, Km Post, ROW Stake	0	0	0	0
Median Barrier	0	0	0	0
Marking	62,500	85,000	85,000	232,500
Signs and Signals	243,200	332,800	332,800	908,800
Sub-total	659,629	822,290	1,186,331	2,668,250
8 Interchange(exclud bridge)	0	0	0	0
9 Throughway Toll Barrier	0	0	0	0
10 Parking Area	0	4,120,000	2,060,000	6,180,000
11 Service Area	0	0	0	0
Sub-total	0	4,120,000	2,060,000	6,180,000
Direct Construction Cost	37,687,000	41,971,000	56,226,000	135,884,000
Contingency 15%	5,653,000	6,296,000	8,434,000	20,383,000
Overhead & Profit 10%	4,334,000	4,827,000	6,466,000	15,627,000
Engineering fee 7%	1,907,000	2,124,000	2,845,000	6,876,000
Vehicle & Furniture	0	0	0	0
Tax 10%	4,958,000	5,522,000	7,397,000	17,877,000
Land Acquisition & Compensation	0	0	0	0
Project Cost	54,539,000	60,740,000	81,368,000	196,647,000

5. Economic Comparison of Alternative Implementation Plans

In order to evaluate the efficiency of the investment schedule IRR was applied to the alternative implementation plans.

The economic benefit was calculated by comparing "with" and "without" each package combination. The benefit is defined as consisting of savings in vehicle operating costs and travel time costs of the tollway users.

The benefit in the assumed tollway commencement year of 1998 was derived by interpolation between 1995 and 2005, and the result is presented in Table SP 5.1.

The economic investment cost for an initial 2-lane/2-way construction and the remaining cost for 4-lane/2-way, and an initial 4-lane/2-way are shown in Table SP 5.2.

Table SP 5.1 Economic Benefits of Package Combinations

(Million Rupiah)

Package		1995	2005
A	(2-lane/2-way)	1,843	16,840
A + B	(2-lane/2-way)	24,073	107,893
A + B	(4-lane/2-way)	34,390	154,133
A + B + C	(2-lane/2-way)	43,978	158,548
A + B + C	(4-lane/2-way)	62,825	226,497

The economic benefits shown above were based upon the traffic demand estimated by the present pattern model. After completion of the total 4-lane tollway it was assumed that the traffic volume could reach in several years the level of traffic volume estimated by the gravity model.

Consequently, economic cost and benefit flows were prepared for the alternative implementation plans as presented in Tables SP 5.3 through 5.6, and the economic IRRs were calculated as shown in Table SP 5.7.

Table SP 5.2 Economic Project Cost

(MILLION RP.)

INITIAL 2-LANE CONSTRUCTION

	PACKAGE A	PACKAGE B	PACKAGE C	PACKAGE A+B	PACKAGE A+B+C
DETAILED DESIGN	4985	4571	6550	9556	16106
SUPERVISION	4160	3752	5190	7912	13102
LAND ACQ.& COMP	17364	35093	16780	52457	69237
CONSTRUCTION	119828	108169	149333	227997	377330
PROJECT COST	146337	151585	177853	297922	475775

(MILLION RP.)

REMAINING WORKS FOR 4-LANE

	PACKAGE A	PACKAGE B	PACKAGE C	PACKAGE A+B	PACKAGE A+B+C
DETAILED DESIGN	0	0	0	0	0
SUPERVISION	1589	1769	2370	3358	5728
LAND ACQ.& COMP	0	0	0	0	0
CONSTRUCTION	41950	46562	62571	88512	151083
PROJECT COST	43539	48331	64941	91870	156811

(MILLION RP.)

INITIAL 4-LANE CONSTRUCTION

	PACKAGE A	PACKAGE B	PACKAGE C	PACKAGE A+B	PACKAGE A+B+C
DETAILED DESIGN	5185	4756	6775	9941	16716
SUPERVISION	5185	4756	6775	9941	16716
LAND ACQ.& COMP	17364	35093	16780	52457	69237
CONSTRUCTION	156773	144025	205009	300798	505807
PROJECT COST	184507	188630	235339	373137	608476

Table SP 5.3 Economic Cost and Benefit Flows for Alternative Implementation Plan

Alternative (1)

1st Stage:	Package A	2-Lane
2nd Stage:	Packages A+B	4-Lane
3rd Stage:	Packages A+B+C	4-Lane
4th Stage:	-	-

YEAR	COST FLOW (MIL.RP.) ENGINEERING SERVICES	LAND ACQ./ COMPENSATION	CONSTRUCTION COSTS	OPERATION/ MAINTENANCE	ANNUAL COSTS	ANNUAL BENEFIT FLOW (MIL.RP)	ANNUAL NET INCREASE OF BENEFIT (MIL.RP)
1989							
1990							
1991	3,222				3,222		-3,222
1992	6,442				6,442		-6,442
1993	6,442	52,457			58,899		-58,899
1994	1,664	16,780	35,948		54,392		-54,392
1995	1,664		47,931		49,595		-49,595
1996	832		35,945		36,777		-36,777
1997	1,903		28,805	2,996	33,704	4,843	-28,861
1998	1,587		55,793	2,996	60,376	6,342	-54,034
1999	1,587		59,988	2,996	64,571	7,842	-56,729
2000	1,268		41,390	2,996	45,654	9,342	-36,312
2001	2,710		61,503	8,941	73,154	106,236	33,082
2002	2,710		82,004	8,941	93,655	118,210	24,555
2003	1,355		61,503	8,941	71,799	130,184	58,385
2004				14,216	14,216	210,130	195,914
2005				14,216	14,216	356,701	342,485
2006				14,216	14,216	503,272	489,056
2007				14,216	14,216	649,843	635,627
2008	1,708		25,940	14,216	41,864	796,414	754,550
2009	1,708		25,940	14,216	41,864	942,985	901,121
2010				15,099	15,099	1,089,556	1,074,457
2011				15,099	15,099	1,236,127	1,221,028
2012				15,099	15,099	1,335,549	1,320,450
2013	1,476		22,076	15,099	38,651	1,434,970	1,396,319
2014	1,476		22,076	15,099	38,651	1,534,392	1,495,741
2015				15,464	15,464	1,633,813	1,618,349
2016				15,464	15,464	1,633,813	1,618,349
2017				15,464	15,464	1,633,813	1,618,349
2018				15,464	15,464	1,633,813	1,618,349
2019				15,464	15,464	1,633,813	1,618,349
2020				15,464	15,464	1,633,813	1,618,349
2021				15,464	15,464	1,633,813	1,618,349
2022				15,464	15,464	1,633,813	1,618,349
TOTAL	39,754	69,237	606,842	323,310	1,039,143	23,543,442	22,504,299

ECONOMIC IRR= 28.0%

Table SP 5.4 Economic Cost and Benefit Flows for Alternative Implementation Plan

Alternative (2)

1st Stage: Packages A+B 2-Lane
2nd Stage: Packages A+B+C 4-Lane
3rd Stage: - -
4th Stage: - -

YEAR	COST FLOW (MIL.RP.) ENGINEERING SERVICES	LAND ACQ./ COMPENSATION	CONSTRUCTION COSTS	OPERATION/ MAINTENANCE	ANNUAL COSTS	ANNUAL BENEFIT FLOW (MIL.RP)	ANNUAL NET INCREASE OF BENEFIT (MIL.RP)
1989							
1990							
1991	3,222				3,222		-3,222
1992	6,442				6,442		-6,442
1993	6,442	52,457			58,899		-58,899
1994	3,166	16,780	45,599		65,545		-65,545
1995	1,582		68,399		69,981		-69,981
1996	1,582		68,399		69,981		-69,981
1997	1,582		45,599		47,181		-47,181
1998	4,054		88,057	7,151	99,262	49,219	-50,043
1999	3,382		117,409	7,151	127,942	57,601	-70,341
2000	2,027		88,057	7,151	97,235	65,983	-31,252
2001				14,216	14,216	161,028	146,812
2002				14,216	14,216	272,004	257,788
2003				14,216	14,216	382,981	368,765
2004				14,216	14,216	493,957	479,741
2005				14,216	14,216	604,934	590,718
2006				14,216	14,216	715,910	701,694
2007				14,216	14,216	826,887	812,671
2008	1,708		25,940	14,216	41,864	937,863	895,999
2009	1,708		25,940	14,216	41,864	1,037,285	995,421
2010				15,099	15,099	1,136,706	1,121,607
2011				15,099	15,099	1,236,127	1,221,028
2012				15,099	15,099	1,335,549	1,320,450
2013	1,476		22,076	15,099	38,651	1,434,970	1,396,319
2014	1,476		22,076	15,099	38,651	1,534,392	1,495,741
2015				15,464	15,464	1,633,813	1,618,349
2016				15,464	15,464	1,633,813	1,618,349
2017				15,464	15,464	1,633,813	1,618,349
2018				15,464	15,464	1,633,813	1,618,349
2019				15,464	15,464	1,633,813	1,618,349
2020				15,464	15,464	1,633,813	1,618,349
2021				15,464	15,464	1,633,813	1,618,349
2022				15,464	15,464	1,633,813	1,618,349
TOTAL	39,849	69,237	617,551	348,604	1,075,241	25,353,900	24,278,659

ECONOMIC IRR= 30.7%

Table SP 5.5 Economic Cost and Benefit Flows for Alternative Implementation Plan

Alternative (3)

1st Stage: Packages A+B 4-Lane
2nd Stage: Packages A+B+C 4-Lane
3rd Stage: - -
4th Stage: - -

YEAR	COST FLOW (MIL.RP.) ENGINEERING SERVICES	LAND ACQ./ COMPENSATION	CONSTRUCTION COSTS	OPERATION/ MAINTENANCE	ANNUAL COSTS	ANNUAL BENEFIT FLOW (MIL.RP)	ANNUAL NET INCREASE OF BENEFIT (MIL.RP)
1989							
1990							
1991	3,343				3,343		-3,343
1992	6,687				6,687		-6,687
1993	6,687	52,457			59,144		-59,144
1994	3,977	16,780	60,160		80,917		-80,917
1995	1,988		90,239		92,227		-92,227
1996	1,988		90,239		92,227		-92,227
1997	1,988		60,160		62,148		-62,148
1998	2,710		61,503	8,941	73,154	70,313	-2,841
1999	2,710		82,003	8,941	93,654	82,287	-11,367
2000	1,355		61,503	8,941	71,799	94,262	22,463
2001				14,216	14,216	161,028	146,812
2002				14,216	14,216	272,004	257,788
2003				14,216	14,216	382,981	368,765
2004				14,216	14,216	493,957	479,741
2005				14,216	14,216	604,934	590,718
2006				14,216	14,216	715,910	701,694
2007				14,216	14,216	826,887	812,671
2008	1,708		25,940	14,216	41,864	937,863	895,999
2009	1,708		25,940	14,216	41,864	1,037,285	995,421
2010				15,099	15,099	1,136,706	1,121,607
2011				15,099	15,099	1,236,127	1,221,028
2012				15,099	15,099	1,335,549	1,320,450
2013	1,476		22,076	15,099	38,651	1,434,970	1,396,319
2014	1,476		22,076	15,099	38,651	1,534,392	1,495,741
2015				15,464	15,464	1,633,813	1,618,349
2016				15,464	15,464	1,633,813	1,618,349
2017				15,464	15,464	1,633,813	1,618,349
2018				15,464	15,464	1,633,813	1,618,349
2019				15,464	15,464	1,633,813	1,618,349
2020				15,464	15,464	1,633,813	1,618,349
2021				15,464	15,464	1,633,813	1,618,349
2022				15,464	15,464	1,633,813	1,618,349
TOTAL	39,801	69,237	601,839	353,974	1,064,851	25,427,959	24,363,108

ECONOMIC IRR= 30.4%

Table SP 5.6 Economic Cost and Benefit Flows for Alternative Implementation Plan

Alternative (4)

1st Stage: Packages A+B+C 2-Lane
2nd Stage: Packages A+B+C 4-Lane
3rd Stage: - -
4th Stage: - -

YEAR	COST FLOW (MIL.RP.) ENGINEERING SERVICES	LAND ACQ./ COMPENSATION	CONSTRUCTION COSTS	OPERATION/ MAINTENANCE	ANNUAL COSTS	ANNUAL BENEFIT FLOW (MIL.RP)	ANNUAL NET INCREASE OF BENEFIT (MIL.RP)
1989							
1990							
1991	3,222				3,222		-3,222
1992	6,442				6,442		-6,442
1993	6,442	52,457			58,899		-58,899
1994	3,166	16,780	45,599		65,545		-65,545
1995	3,658		113,199		116,857		-116,857
1996	3,658		128,133		131,791		-131,791
1997	2,620		90,399		93,019		-93,019
1998	2,291		45,325	11,370	58,986	78,349	19,363
1999	2,291		60,433	11,370	74,094	89,806	15,712
2000	1,146		45,325	11,370	57,841	101,263	43,422
2001				14,216	14,216	112,720	98,504
2002				14,216	14,216	230,598	216,382
2003				14,216	14,216	348,475	334,259
2004				14,216	14,216	466,353	452,137
2005				14,216	14,216	584,230	570,014
2006				14,216	14,216	702,108	687,892
2007				14,216	14,216	819,985	805,769
2008	1,708		25,940	14,216	41,864	937,863	895,999
2009	1,708		25,940	14,216	41,864	1,037,285	995,421
2010				15,099	15,099	1,136,706	1,121,607
2011				15,099	15,099	1,236,127	1,221,028
2012				15,099	15,099	1,335,549	1,320,450
2013	1,476		22,076	15,099	38,651	1,434,970	1,396,319
2014	1,476		22,076	15,099	38,651	1,534,392	1,495,741
2015				15,464	15,464	1,633,813	1,618,349
2016				15,464	15,464	1,633,813	1,618,349
2017				15,464	15,464	1,633,813	1,618,349
2018				15,464	15,464	1,633,813	1,618,349
2019				15,464	15,464	1,633,813	1,618,349
2020				15,464	15,464	1,633,813	1,618,349
2021				15,464	15,464	1,633,813	1,618,349
2022				15,464	15,464	1,633,813	1,618,349
TOTAL	41,304	69,237	624,445	361,261	1,096,247	25,257,283	24,161,036

ECONOMIC IRR= 29.1%

Table SP 5.7 Economic IRR of Alternative Implementation Plans

	IRR (%)
Alternative 1	28.0
Alternative 2	30.7
Alternative 3	30.4
Alternative 4	29.1

Alternative 1 shows the lowest IRR of 28.0% because the efficiency of the initial investment of Package A with a 2-lane road is quite small. In other words, the partial operation of Package A could not attract as much traffic as the other Package combinations.

The remaining three alternatives produced similar results of IRR ranging from 29.1% to 30.7%.

Comparing Alternatives 2 and 3, Alternative 2 requires less initial investment and produces a little bit higher rate of return than Alternative 3. However, as the IRRs are very close to each other, a 4-lane partial operation at the initial stage (Alternative 3) is more desirable than a 2-lane partial operation (Alternative 2) from such viewpoints as:

- it is complex and difficult to carry out the engineering design to accord with each construction stage,
- a few years after completion of the 2-lane/2-way tollway, a widening to 4-lane/2-way is required,
- traffic safety and service levels are relatively low, and
- a traffic accident easily influences upon the total traffic flow.

This may be similar Alternative 4 but it should be noted that Alternative 4 intends to realize not partial but full operation between Cikampek and Cirebon at the initial stage.

In consequence, Alternatives 3 and 4 are selected for further comparative study from the financial viability point of view.

6. Financial Comparison of Alternative Implementation Plans

A financial comparison for Alternative 3 and 4, which were selected in the economic analysis, is carried out. The traffic demand for the revenue estimation and the construction costs are based on the study results previously mentioned in Sections 3 and 4. The assumptions and methodology for estimation of profit and loss and cash flow are similar to those in the Main Report (refer to Chapter 15).

Summaries of the financial analysis results of Alternatives 3 and 4 are shown in Tables SP 6.1 and 6.2, respectively. It is generally observed that Alternative 3 has a slight advantage over Alternative 4.

The comparison between Alternatives 3 and 4 is summarized in Table SP 6.3.

Table SP 6.3 Value of FIRR (ROI)

(1)	Constant Price	
	Alternative 3	14.01%
	Alternative 4	13.89%
(2)	Current Price	
	Alternative 3	23.52%
	Alternative 4	23.38%

Details of the financial calculations for Alternatives 3 and 4 at current price are shown in Tables SP 6.4 - 6.7 and Tables SP 6.8 - 6.11, respectively. The fund raising condition is assumed to be 40% : 60% equity loan ratio and 15% interest rate.

Table SP 6.1 Summary of Results of Financial Analysis

(for Alternative 3)

	Equity /Loan Ratio	Interest Rate		FIRR (ROI)	NPV (Discount Rate = 15%)	FIRR (ROE)	NPV (Discount Rate = 15%)	First Year of Surplus			Maximum Short-term Loan Amount	Year of Maximum Short-term Loan	
			(No.)	(%)	(Mil.Rp.)	(%)	(Mil.Rp.)	Annual Surplus in Profit & Loss (Year)	Accum. Surplus in Profit & Loss (Year)	Annual Surplus in Cash Flow (Year)	(Mil.Rp.)	(Year)	(No.)
1. (Constant Price)	30%:70%	10%	(1)	14.01	(37,284)	15.24	6,590	2007	2013	2015	587,800	2009	(1)
(1) Toll Rate: 3% up/Year		15%	(2)	14.01	(37,284)	13.27	(52,158)	2022	*)	*)	2,495,070	2021	(2)
		20%	(3)	14.01	(37,284)	11.59	(110,906)	*)	*)	*)	-	-	(3)
(2) Cost: Constant	40%:60%	10%	(4)	14.01	(37,284)	15.01	195	2005	2010	2011	333,630	2005	(4)
		15%	(5)	14.01	(37,284)	13.44	(49,151)	2010	2017	2018	994,930	2009	(5)
		20%	(6)	14.01	(37,284)	12.04	(98,493)	*)	*)	*)	-	-	(6)
2. (Current Price)	30%:70%	10%	(7)	23.52	1,134,757	26.48	1,234,426	2004	2006	2007	491,195	2003	(7)
(1) Toll Rate: 40% up/ 3 Year		15%	(8)	23.52	1,134,757	24.91	1,133,155	2005	2008	2009	1,053,660	2004	(8)
		20%	(9)	23.52	1,134,757	23.51	1,031,883	2007	2010	2011	1,924,063	2006	(9)
(2) Cost: 8% up/Year	40%:60%	10%	(10)	23.52	1,134,757	25.88	1,224,557	2003	2005	2005	302,396	2002	(10)
		15%	(11)	23.52	1,134,757	24.67	1,139,497	2004	2007	2008	732,141	2003	(11)
		20%	(12)	23.52	1,134,757	23.55	1,054,438	2005	2009	2010	1,247,493	2005	(12)

Note: (1) Figure in ( ) indicates a minus value.
(2) *) ..... Null first year of surplus within the project life.

Table SP 6.2 Summary of Results of Financial Analysis

(for Alternative 4)

	Equity /Loan Ratio	Interest Rate	(No.)	FIRR (ROI) (%)	NPV (Discount Rate = 15%) (Mil.Rp.)	FIRR (ROE) (%)	NPV (Discount Rate = 15%) (Mil.Rp.)	First Year of Surplus: Annual Surplus in Profit & Loss (Year)	First Year of Surplus: Accum. Surplus in Profit & Loss (Year)	First Year of Surplus: Annual Surplus in Cash Flow (Year)	Maximum Short-term Loan Amount (Mil.Rp.)	Year of Maximum Short-term Loan (Year)	(No.)
1. (Constant Price)	30%:70%	10%	(1)	13.89	(43,387)	15.14	3,972	2007	2013	2015	604,102	2009	(1)
(1) Toll Rate: 3% up/Year		15%	(2)	13.89	(43,387)	13.07	(59,658)	*)	*)	*)	-	-	(2)
		20%	(3)	13.89	(43,387)	11.32	(123,289)	*)	*)	*)	-	-	(3)
(2) Cost: Constant	40%:60%	10%	(4)	13.89	(43,387)	14.89	(3,351)	2005	2009	2011	323,008	2005	(4)
		15%	(5)	13.89	(43,387)	13.24	(56,892)	2010	2018	2019	1,062,789	2010	(5)
		20%	(6)	13.89	(43,387)	11.78	(110,433)	*)	*)	*)	-	-	(6)
2. (Current Price)	30%:70%	10%	(7)	23.38	1,141,577	26.50	1,245,661	2003	2006	2006	447,791	2003	(7)
(1) Toll Rate: 40% up/ 3 Year		15%	(8)	23.38	1,141,577	24.81	1,137,260	2004	2008	2009	1,055,500	2004	(8)
		20%	(9)	23.38	1,141,577	23.33	1,028,853	2007	2011	2011	1,983,515	2006	(9)
(2) Cost: 8% up/Year	40%:60%	10%	(10)	23.38	1,141,577	25.86	1,235,093	2003	2004	2005	259,930	2002	(10)
		15%	(11)	23.38	1,141,577	24.55	1,143,932	2004	2007	2007	717,786	2003	(11)
		20%	(12)	23.38	1,141,577	23.37	1,052,770	2005	2009	2010	1,264,718	2004	(12)

Note: (1) Figure in ( ) indicates a minus value.
(2) *) ..... Null first year of surplus within the project life.

Table SP 6.4 Profit and Loss Statement (Current Price)

(for Alternative 3)

(Million Rp.)

(Ratio of Loan = 60%)
(Interest Rate = 15%)

Year	Revenue	Operation & Maint. Cost	Property Tax	Gross Profit	Interest (Long)	Interest (Short)	Profit after Int.	Depre-ciation	Depre-ciation (Int. d. Con. P.)	Profit after Dep.	Corporate Tax	Profit after Tax	(Accum. Profit after Tax)
1990						0							
1991						0							
1992						0							
1993						0							
1994						0							
1995					0	0							
1996					0	2,856							
1997					0	11,632							
1998	61,933	19,858	24	42,051	66,072	24,846	(48,867)	13,170	4,969	(67,006)	0	(67,006)	(67,006)
1999	67,446	21,447	24	45,975	66,072	34,620	(54,717)	13,170	4,969	(72,856)	0	(72,856)	(139,862)
2000	72,959	23,162	24	49,773	65,120	50,986	(66,333)	13,170	4,969	(84,472)	0	(84,472)	(224,334)
2001	109,861	39,773	24	70,064	117,155	76,514	(123,605)	24,837	8,252	(156,694)	0	(156,694)	(381,028)
2002	169,041	42,954	24	126,063	112,750	105,135	(91,822)	24,837	8,252	(124,911)	0	(124,911)	(505,939)
2003	228,222	46,391	24	181,807	108,345	129,373	(55,911)	24,837	8,252	(89,000)	0	(89,000)	(594,940)
2004	402,367	50,103	24	352,240	102,132	146,428	103,680	24,837	8,252	70,591	24,707	45,884	(549,055)
2005	485,221	54,112	24	431,085	94,064	138,917	198,104	24,837	8,252	165,015	57,755	107,259	(441,796)
2006	568,074	58,441	24	509,609	85,995	121,605	302,009	24,837	8,252	268,920	94,122	174,798	(266,998)
2007	911,296	63,116	24	848,156	77,926	90,786	679,444	24,837	8,252	646,355	226,224	420,131	153,133
2008	1,027,290	68,166	24	959,100	69,857	10,901	878,342	24,837	8,252	845,253	295,839	549,415	702,548
2009	1,107,423	73,619	24	1,033,780	61,789	0	971,991	24,837	8,252	938,902	328,616	610,286	1,312,834
2010	1,662,586	84,014	24	1,578,548	53,720	0	1,524,828	31,025	8,252	1,485,551	519,943	965,608	2,278,442
2011	1,774,772	90,735	24	1,684,013	45,651	0	1,638,362	31,025	8,252	1,599,085	559,680	1,039,405	3,317,848
2012	1,886,958	97,994	24	1,788,940	37,582	0	1,751,358	31,025	8,252	1,712,081	599,228	1,112,853	4,430,700
2013	2,798,820	105,833	24	2,692,963	29,514	0	2,663,449	31,025	8,252	2,624,172	918,460	1,705,712	6,136,412
2014	2,955,882	114,300	24	2,841,558	21,445	0	2,820,113	31,025	8,252	2,780,836	973,292	1,807,543	7,943,955
2015	3,112,943	127,350	24	2,985,569	14,328	0	2,971,241	38,885	8,252	2,924,104	1,023,436	1,900,667	9,844,623
2016	4,358,103	137,538	24	4,220,541	9,183	0	4,211,358	38,885	8,252	4,164,221	1,457,477	2,706,744	12,551,366
2017	4,358,103	148,541	24	4,209,538	5,519	0	4,204,019	38,885	8,252	4,156,882	1,454,909	2,701,973	15,253,340
2018	4,358,103	160,425	24	4,197,654	1,855	0	4,195,799	38,885	8,252	4,148,662	1,452,032	2,696,630	17,949,970
2019	6,101,331	173,259	24	5,928,048	0	0	5,928,048	38,885	8,252	5,880,911	2,058,319	3,822,592	21,772,562
2020	6,101,331	187,120	24	5,914,187	0	0	5,914,187	38,885	8,252	5,867,050	2,053,468	3,813,583	25,586,145
2021	6,101,331	202,089	24	5,899,218	0	0	5,899,218	38,885	8,252	5,852,081	2,048,228	3,803,853	29,389,998
2022	8,541,872	218,257	24	8,323,591	0	0	8,323,591	38,885	8,259	8,276,447	2,896,757	5,379,691	34,769,689

Note: Figure in ( ) indicates a minus value.

Table SP 6.5 Cash Flow (Current Price)

(for Alternative 3)

(Million Rp.)

Year	(Sources) Profit after Tax	Depre-ciation	Depre-ciation (Int. d. Con. P.)	(Ratio of Loan = 60%) (Interest Rate = 15%) Equity (Int. d. Con. P.)	Equity	Loan (Long)	(Sources Total)	(Uses) Const. Cost	Intrest during Const. Period	(Total Project Cost)	Repay Loan (Long)	Repay Loan (Short)	(Uses Total)	(Sources Minus Uses)	Loan (Short)	Net Cash Flow	Accum-lated Net Cash Flow
1990				0	0	0	0	0	0	0	0	0	0	0	0	0	0
1991				0	5,149	0	5,149	5,149	0	5,149	0	0	5,149	0	0	0	0
1992				0	11,123	0	11,123	11,123	0	11,123	0	0	11,123	0	0	0	0
1993				0	83,381	0	83,381	83,381	0	83,381	0	0	83,381	0	0	0	0
1994				0	142,595	0	142,595	142,595	0	142,595	0	0	142,595	0	0	0	0
1995				0	87,525	95,199	182,724	182,724	14,280	197,004	0	0	197,004	(14,280)	14,280	0	0
1996				0	0	197,337	197,337	197,337	43,880	241,217	0	14,280	255,497	(58,160)	58,160	0	0
1997				0	0	147,944	147,944	147,944	66,072	214,016	0	58,160	272,176	(124,232)	124,232	0	0
1998	(67,006)	13,170	4,969	0	160,443	0	111,576	160,443	0	160,443	0	124,232	284,675	(173,099)	173,099	0	0
1999	(72,856)	13,170	4,969	0	47,704	180,758	173,745	228,462	27,114	255,576	0	173,099	428,675	(254,930)	254,930	0	0
2000	(84,472)	13,170	4,969	0	0	185,640	119,307	185,640	54,960	240,600	6,347	254,930	501,877	(382,570)	382,570	0	0
2001	(156,694)	24,837	8,252	0	0	0	(123,605)	0	0	0	19,502	382,570	402,072	(525,677)	525,677	0	0
2002	(124,911)	24,837	8,252	0	0	0	(91,822)	0	0	0	29,365	525,677	555,042	(646,864)	646,864	0	0
2003	(89,000)	24,837	8,252	0	0	0	(55,911)	0	0	0	29,365	646,864	676,229	(732,141)	732,141	0	0
2004	45,884	24,837	8,252	0	0	0	78,973	0	0	0	41,416	732,141	773,557	(694,583)	694,583	0	0
2005	107,259	24,837	8,252	0	0	0	140,348	0	0	0	53,792	694,583	748,375	(608,027)	608,027	0	0
2006	174,798	24,837	8,252	0	0	0	207,887	0	0	0	53,792	608,027	661,819	(453,932)	453,932	0	0
2007	420,131	24,837	8,252	0	0	0	453,220	0	0	0	53,792	453,932	507,724	(54,504)	54,504	0	0
2008	549,415	24,837	8,252	0	0	0	582,504	148,757	0	148,757	53,792	54,504	257,053	325,451	0	325,451	325,451
2009	610,286	24,837	8,252	0	0	0	643,375	160,655	0	160,655	53,792	0	214,447	428,928	0	428,928	754,379
2010	965,608	31,025	8,252	0	0	0	1,004,885	0	0	0	53,792	0	53,792	951,093	0	951,093	1,705,472
2011	1,039,405	31,025	8,252	0	0	0	1,078,682	0	0	0	53,792	0	53,792	1,024,890	0	1,024,890	2,730,363
2012	1,112,853	31,025	8,252	0	0	0	1,152,130	0	0	0	53,792	0	53,792	1,098,338	0	1,098,338	3,828,700
2013	1,705,712	31,025	8,252	0	0	0	1,744,989	188,942	0	188,942	53,792	0	242,734	1,502,255	0	1,502,255	5,330,955
2014	1,807,543	31,025	8,252	0	0	0	1,846,820	204,057	0	204,057	53,792	0	257,849	1,588,971	0	1,588,971	6,919,926
2015	1,900,667	38,885	8,252	0	0	0	1,947,804	0	0	0	47,446	0	47,446	1,900,358	0	1,900,358	8,820,285
2016	2,706,744	38,885	8,252	0	0	0	2,753,881	0	0	0	34,294	0	34,294	2,719,587	0	2,719,587	11,539,871
2017	2,701,973	38,885	8,252	0	0	0	2,749,110	0	0	0	24,427	0	24,427	2,724,683	0	2,724,683	14,264,555
2018	2,696,630	38,885	8,252	0	0	0	2,743,767	0	0	0	24,427	0	24,427	2,719,340	0	2,719,340	16,983,895
2019	3,822,592	38,885	8,252	0	0	0	3,869,729	0	0	0	12,369	0	12,369	3,857,360	0	3,857,360	20,841,255
2020	3,813,583	38,885	8,252	0	0	0	3,860,720	0	0	0	0	0	0	3,860,720	0	3,860,720	24,701,975
2021	3,803,853	38,885	8,252	0	0	0	3,850,990	0	0	0	0	0	0	3,850,990	0	3,850,990	28,552,965
2022	5,379,691	38,885	8,259	0	0	0	5,426,835	(1,098,369)	0	(1,098,369)	0	0	(1,098,369)	6,525,204	0	6,525,204	35,078,169
(Total)				0	537,920	806,878		2,047,209 (Exclude Salvage Value)	206,306	2,253,515					4,723,000		

Note: Figure in ( ) indicates a minus value.

Table SP 6.6 FIRR (ROI) (Current Price) (for Alternative 3)

FIRR = 23.52 (%)

N.P.V = 1,134,757 (Rp.Mil.) 15%

Year	Revenue	Const. Cost	O & M Cost	Cash Flow for ROI
1990		0		0
1991		5,149		(5,149)
1992		11,123		(11,123)
1993		83,381		(83,381)
1994		142,595		(142,595)
1995		182,724		(182,724)
1996		197,337		(197,337)
1997		147,944		(147,944)
1998	61,933	160,443	19,858	(118,368)
1999	67,446	228,462	21,447	(182,463)
2000	72,959	185,640	23,162	(135,843)
2001	109,861	0	39,773	70,088
2002	169,041	0	42,954	126,087
2003	228,222	0	46,391	181,831
2004	402,367	0	50,103	352,264
2005	485,221	0	54,112	431,109
2006	568,074	0	58,441	509,633
2007	911,296	0	63,116	848,180
2008	1,027,290	148,757	68,166	810,367
2009	1,107,423	160,655	73,619	873,149
2010	1,662,586	0	84,014	1,578,572
2011	1,774,772	0	90,735	1,684,037
2012	1,886,958	0	97,994	1,788,964
2013	2,798,820	188,942	105,833	2,504,045
2014	2,955,882	204,057	114,300	2,637,525
2015	3,112,943	0	127,350	2,985,593
2016	4,358,103	0	137,538	4,220,565
2017	4,358,103	0	148,541	4,209,562
2018	4,358,103	0	160,425	4,197,678
2019	6,101,331	0	173,259	5,928,072
2020	6,101,331	0	187,120	5,914,211
2021	6,101,331	0	202,089	5,899,242
2022	8,541,872	0	218,257	8,323,615

Note: Figure in ( ) indicates a minus value.

Table SP 6.7 FIRR (ROE) (Current Price) (for Alternative 3)

(Ratio of Loan = 60%) FIRR = 24.67 (%)

(Interest Rate = 15%)

N.P.V = 1,139,497 (Rp.Mil.) 15%

Year	Revenue	Equity	O & M Cost	Loan Repay	Loan Interest	Cash Flow for ROE
1990		0		0		0
1991		5,149		0		(5,149)
1992		11,123		0		(11,123)
1993		83,381		0		(83,381)
1994		142,595		0		(142,595)
1995		87,525		0	14,280	(101,805)
1996		0		0	43,880	(43,880)
1997		0		0	66,072	(66,072)
1998	61,933	160,443	19,858	0	66,072	(184,440)
1999	67,446	47,704	21,447	0	93,186	(94,891)
2000	72,959	0	23,162	6,347	120,080	(76,630)
2001	109,861	0	39,773	19,502	117,155	(66,569)
2002	169,041	0	42,954	29,365	112,750	(16,028)
2003	228,222	0	46,391	29,365	108,345	44,121
2004	402,367	0	50,103	41,416	102,132	208,716
2005	485,221	0	54,112	53,792	94,064	283,253
2006	568,074	0	58,441	53,792	85,995	369,846
2007	911,296	0	63,116	53,792	77,926	716,462
2008	1,027,290	0	68,166	53,792	69,857	835,475
2009	1,107,423	0	73,619	53,792	61,789	918,223
2010	1,662,586	0	84,014	53,792	53,720	1,471,060
2011	1,774,772	0	90,735	53,792	45,651	1,584,594
2012	1,886,958	0	97,994	53,792	37,582	1,697,590
2013	2,798,820	0	105,833	53,792	29,514	2,609,681
2014	2,955,882	0	114,300	53,792	21,445	2,766,345
2015	3,112,943	0	127,350	47,446	14,328	2,923,819
2016	4,358,103	0	137,538	34,294	9,183	4,177,088
2017	4,358,103	0	148,541	24,427	5,519	4,179,616
2018	4,358,103	0	160,425	24,427	1,855	4,171,396
2019	6,101,331	0	173,259	12,369	0	5,915,703
2020	6,101,331	0	187,120	0	0	5,914,211
2021	6,101,331	0	202,089	0	0	5,899,242
2022	8,541,872	0	218,257	0	0	8,323,615

Note: Figure in ( ) indicates a minus value.

Table SP 6.8 Profit and Loss Statement (Current Price)

(for Alternative 4)

(Million Rp.)

(Ratio of Loan = 60%)
(Interest Rate = 15%)

Year	Revenue	Operation & Maint. Cost	Property Tax	Gross Profit	Interest (Long)	Interest (Short)	Profit after Int.	Depre-ciation	Depre-ciation (Int. d. Con. P.)	Profit after Dep.	Corporate Tax	Profit after Tax	(Accum. Profit after Tax)
1990						0							
1991						0							
1992						0							
1993						0							
1994						0							
1995					0	0							
1996					0	2,491							
1997					0	12,881							
1998	81,171	25,315	24	55,832	85,256	29,932	(59,356)	16,898	5,987	(82,241)	0	(82,241)	(82,241)
1999	87,677	27,341	24	60,312	85,255	41,804	(66,747)	16,898	5,987	(89,632)	0	(89,632)	(171,873)
2000	94,183	29,528	24	64,631	84,426	58,682	(78,477)	16,898	5,987	(101,362)	0	(101,362)	(273,235)
2001	140,966	39,773	24	101,169	119,237	83,139	(101,207)	25,403	8,223	(134,833)	0	(134,833)	(408,068)
2002	195,703	42,954	24	152,725	113,553	107,998	(68,826)	25,403	8,223	(102,452)	0	(102,452)	(510,520)
2003	250,438	46,391	24	204,023	107,869	129,341	(33,187)	25,403	8,223	(66,813)	0	(66,813)	(577,334)
2004	427,252	50,103	24	377,125	101,009	143,557	132,559	25,403	8,223	98,933	34,627	64,307	(513,027)
2005	503,882	54,112	24	449,746	92,774	133,117	223,855	25,403	8,223	190,229	66,580	123,649	(389,378)
2006	580,518	58,441	24	522,053	84,538	112,643	324,872	25,403	8,223	291,246	101,936	189,310	(200,069)
2007	920,004	63,116	24	856,864	76,303	79,036	701,525	25,403	8,223	667,899	233,765	434,134	234,066
2008	1,027,290	68,166	24	959,100	68,068	0	891,032	25,403	8,223	857,406	300,092	557,314	791,380
2009	1,107,423	73,619	24	1,033,780	59,833	0	973,947	25,403	8,223	940,321	329,112	611,208	1,402,589
2010	1,662,586	84,014	24	1,578,548	51,598	0	1,526,950	31,591	8,223	1,487,136	520,498	966,639	2,369,227
2011	1,774,772	90,735	24	1,684,013	43,362	0	1,640,651	31,591	8,223	1,600,837	560,293	1,040,544	3,409,771
2012	1,886,958	97,994	24	1,788,940	35,127	0	1,753,813	31,591	8,223	1,713,999	599,900	1,114,099	4,523,871
2013	2,798,820	105,833	24	2,692,963	26,892	0	2,666,071	31,591	8,223	2,626,257	919,190	1,707,067	6,230,938
2014	2,955,882	114,300	24	2,841,558	18,656	0	2,822,902	31,591	8,223	2,783,088	974,081	1,809,007	8,039,945
2015	3,112,943	127,350	24	2,985,569	11,251	0	2,974,318	39,451	8,223	2,926,644	1,024,325	1,902,318	9,942,263
2016	4,358,103	137,538	24	4,220,541	6,479	0	4,214,062	39,451	8,223	4,166,388	1,458,236	2,708,152	12,650,415
2017	4,358,103	148,541	24	4,209,538	3,928	0	4,205,610	39,451	8,223	4,157,936	1,455,278	2,702,658	15,353,074
2018	4,358,103	160,425	24	4,197,654	1,376	0	4,196,278	39,451	8,223	4,148,604	1,452,011	2,696,593	18,049,666
2019	6,101,331	173,259	24	5,928,048	0	0	5,928,048	39,451	8,223	5,880,374	2,058,131	3,822,243	21,871,910
2020	6,101,331	187,120	24	5,914,187	0	0	5,914,187	39,451	8,223	5,866,513	2,053,280	3,813,234	25,685,143
2021	6,101,331	202,089	24	5,899,218	0	0	5,899,218	39,451	8,223	5,851,544	2,048,041	3,803,504	29,488,647
2022	8,541,872	218,257	24	8,323,591	0	0	8,323,591	39,451	8,210	8,275,930	2,896,576	5,379,355	34,868,002

Note: Figure in ( ) indicates a minus value.

Table SP 6.9 Cash Flow (Current Price)

(for Alternative 4)

(Million Rp.)

Year	(Sources) Profit after Tax	Depre-ciation	Depre-ciation (Int. d. Con. P.)	Equity (Int. d. Con. P.)	Equity	Loan (Long)	(Sources Total)	(Uses) Const. Cost	Intrest during Const. Period	(Total Project Cost)	Repay Loan (Long)	Repay Loan (Short)	(Uses Total)	(Sources Minus Uses)	Loan (Short)	Net Cash Flow	Accum-lated Net Cash Flow
			(Ratio of Loan = 60%) (Interest Rate = 15%)														
1990				0	0	0	0	0	0	0	0	0	0	0	0	0	0
1991				0	5,150	0	5,150	5,150	0	5,150	0	0	5,150	0	0	0	0
1992				0	11,123	0	11,123	11,123	0	11,123	0	0	11,123	0	0	0	0
1993				0	83,382	0	83,382	83,382	0	83,382	0	0	83,382	0	0	0	0
1994				0	111,020	0	111,020	111,020	0	111,020	0	0	111,020	0	0	0	0
1995				0	148,512	83,027	231,539	231,539	12,454	243,993	0	0	243,993	(12,454)	12,454	0	0
1996				0	19,726	263,314	283,040	283,040	51,952	334,992	0	12,454	347,446	(64,406)	64,406	0	0
1997				0	0	222,028	222,028	222,028	85,256	307,284	0	64,406	371,690	(149,662)	149,662	0	0
1998	(82,241)	16,898	5,987	0	117,923	0	58,567	117,923	0	117,923	0	149,662	267,585	(209,018)	209,018	0	0
1999	(89,632)	16,898	5,987	0	52,187	117,621	103,061	169,808	17,643	187,451	0	209,018	396,469	(293,408)	293,408	0	0
2000	(101,362)	16,898	5,987	0	0	137,544	59,067	137,544	38,274	175,818	5,535	293,408	474,761	(415,694)	415,694	0	0
2001	(134,833)	25,403	8,223	0	0	0	(101,207)	0	0	0	23,089	415,694	438,783	(539,990)	539,990	0	0
2002	(102,452)	25,403	8,223	0	0	0	(68,826)	0	0	0	37,891	539,990	577,881	(646,707)	646,707	0	0
2003	(66,813)	25,403	8,223	0	0	0	(33,187)	0	0	0	37,891	646,707	684,598	(717,786)	717,786	0	0
2004	64,307	25,403	8,223	0	0	0	97,933	0	0	0	45,733	717,786	763,519	(665,586)	665,586	0	0
2005	123,649	25,403	8,223	0	0	0	157,275	0	0	0	54,902	665,586	720,488	(563,213)	563,213	0	0
2006	189,310	25,403	8,223	0	0	0	222,936	0	0	0	54,902	563,213	618,115	(395,180)	395,180	0	0
2007	434,134	25,403	8,223	0	0	0	467,760	0	0	0	54,902	395,180	450,082	17,679	0	17,679	17,679
2008	557,314	25,403	8,223	0	0	0	590,940	148,757	0	148,757	54,902	0	203,659	387,281	0	387,281	404,960
2009	611,208	25,403	8,223	0	0	0	644,834	160,655	0	160,655	54,902	0	215,557	429,277	0	429,277	834,238
2010	966,639	31,591	8,223	0	0	0	1,006,453	0	0	0	54,902	0	54,902	951,551	0	951,551	1,785,788
2011	1,040,544	31,591	8,223	0	0	0	1,080,358	0	0	0	54,902	0	54,902	1,025,456	0	1,025,456	2,811,244
2012	1,114,099	31,591	8,223	0	0	0	1,153,913	0	0	0	54,902	0	54,902	1,099,011	0	1,099,011	3,910,256
2013	1,707,067	31,591	8,223	0	0	0	1,746,881	188,942	0	188,942	54,902	0	243,844	1,503,037	0	1,503,037	5,413,293
2014	1,809,007	31,591	8,223	0	0	0	1,848,821	204,057	0	204,057	54,902	0	258,959	1,589,862	0	1,589,862	7,003,155
2015	1,902,318	39,451	8,223	0	0	0	1,949,992	0	0	0	49,367	0	49,367	1,900,625	0	1,900,625	8,903,780
2016	2,708,152	39,451	8,223	0	0	0	2,755,826	0	0	0	31,813	0	31,813	2,724,013	0	2,724,013	11,627,793
2017	2,702,658	39,451	8,223	0	0	0	2,750,332	0	0	0	17,011	0	17,011	2,733,321	0	2,733,321	14,361,115
2018	2,696,593	39,451	8,223	0	0	0	2,744,267	0	0	0	17,011	0	17,011	2,727,256	0	2,727,256	17,088,370
2019	3,822,243	39,451	8,223	0	0	0	3,869,917	0	0	0	9,173	0	9,173	3,860,744	0	3,860,744	20,949,115
2020	3,813,234	39,451	8,223	0	0	0	3,860,908	0	0	0	0	0	0	3,860,908	0	3,860,908	24,810,022
2021	3,803,504	39,451	8,223	0	0	0	3,851,178	0	0	0	0	0	0	3,851,178	0	3,851,178	28,661,200
2022	5,379,355	39,451	8,210	0	0	0	5,427,016	(1,101,345)	0	(1,101,345)	0	0	(1,101,345)	6,528,361	0	6,528,361	35,189,561
(Total)				0	549,023	823,534		2,074,968 (Exclude Selvage Value)	205,579	2,280,547					4,673,104		

Note: Figure in ( ) indicates a minus value.

Table SP 6.10 FIRR (ROI) (Current Price) (for Alternative 4)

Table 6.10 FIRR (ROI) (Current Price) (For Alternative 4)

FIRR = 23.38 (%)

N.P.V = 1,141,577 (Mil.Rp.) 15%

Year	Revenue	Const. Cost	O & M Cost	Cash Flow for ROI
1990		0		0
1991		5,150		(5,150)
1992		11,123		(11,123)
1993		83,382		(83,382)
1994		111,020		(111,020)
1995		231,539		(231,539)
1996		283,040		(283,040)
1997		222,028		(222,028)
1998	81,171	117,923	25,315	(62,067)
1999	87,677	169,808	27,341	(109,472)
2000	94,183	137,544	29,528	(72,889)
2001	140,966	0	39,773	101,193
2002	195,703	0	42,954	152,749
2003	250,438	0	46,391	204,047
2004	427,252	0	50,103	377,149
2005	503,882	0	54,112	449,770
2006	580,518	0	58,441	522,077
2007	920,004	0	63,116	856,888
2008	1,027,290	148,757	68,166	810,367
2009	1,107,423	160,655	73,619	873,149
2010	1,662,586	0	84,014	1,578,572
2011	1,774,772	0	90,735	1,684,037
2012	1,886,958	0	97,994	1,788,964
2013	2,798,820	188,942	105,833	2,504,045
2014	2,955,882	204,057	114,300	2,637,525
2015	3,112,943	0	127,350	2,985,593
2016	4,358,103	0	137,538	4,220,565
2017	4,358,103	0	148,541	4,209,562
2018	4,358,103	0	160,425	4,197,678
2019	6,101,331	0	173,259	5,928,072
2020	6,101,331	0	187,120	5,914,211
2021	6,101,331	0	202,089	5,899,242
2022	8,541,872	0	218,257	8,323,615

Note: Figure in ( ) indicates a minus value.

Table SP 6.11 FIRR (ROE) (Current Price) (for Alternative 4)

Table 6.11 FIRR (ROE) (Current Price) (For Alternative 4)

(Ratio of Loan = 60%) FIRR = 24.55 (%)

(Interest Rate = 15%)

N.P.V = 1,143,932 (Mil.Rp.) 15%

Year	Revenue	Equity	O & M Cost	Loan Repay	Loan Interest	Cash Flow for ROE
1990		0		0		0
1991		5,150		0		(5,150)
1992		11,123		0		(11,123)
1993		83,382		0		(83,382)
1994		111,020		0		(111,020)
1995		148,512		0	12,454	(160,966)
1996		19,726		0	51,952	(71,678)
1997		0		0	85,256	(85,256)
1998	81,171	117,923	25,315	0	85,256	(147,323)
1999	87,677	52,187	27,341	0	102,898	(94,749)
2000	94,183	0	29,528	5,535	122,700	(63,580)
2001	140,966	0	39,773	23,089	119,237	(41,133)
2002	195,703	0	42,954	37,891	113,553	1,305
2003	250,438	0	46,391	37,891	107,869	58,287
2004	427,252	0	50,103	45,733	101,009	230,407
2005	503,882	0	54,112	54,902	92,774	302,094
2006	580,518	0	58,441	54,902	84,538	382,637
2007	920,004	0	63,116	54,902	76,303	725,683
2008	1,027,290	0	68,166	54,902	68,068	836,154
2009	1,107,423	0	73,619	54,902	59,833	919,069
2010	1,662,586	0	84,014	54,902	51,598	1,472,072
2011	1,774,772	0	90,735	54,902	43,362	1,585,773
2012	1,886,958	0	97,994	54,902	35,127	1,698,935
2013	2,798,820	0	105,833	54,902	26,892	2,611,193
2014	2,955,882	0	114,300	54,902	18,656	2,768,024
2015	3,112,943	0	127,350	49,367	11,251	2,924,975
2016	4,358,103	0	137,538	31,813	6,479	4,182,273
2017	4,358,103	0	148,541	17,011	3,928	4,188,623
2018	4,358,103	0	160,425	17,011	1,376	4,179,291
2019	6,101,331	0	173,259	9,173	0	5,918,899
2020	6,101,331	0	187,120	0	0	5,914,211
2021	6,101,331	0	202,089	0	0	5,899,242
2022	8,541,872	0	218,257	0	0	8,323,615

Note: Figure in ( ) indicates a minus value.

7. Conclusion and Recommendation

The comparative study between the alternative implementation plans favours Alternative 3 from both economic and financial points of view.

As far as the initial investment cost is concerned, Alternative 4 requires about 581 billion Rupiah which is 27% higher than Alternative 3 at 456 billion Rupiah. If the fund procurement faces a difficult situation, the smaller amount of the initial investment can be acceptable.

However, the following elements should be considered in finalizing the implementation plan study:

- Additional lane works for Alternative 4 take place only a few years after the start of its partial operation as a 2-lane/2-way tollway.

- The initial construction cost for the 2-lane/2-way tollway from Cikampek to Cirebon is about 78% of that for a 4-lane/2-way tollway.

- Temporary operation of a 2-lane/2-way tollway eventually requires complex engineering design and construction work.

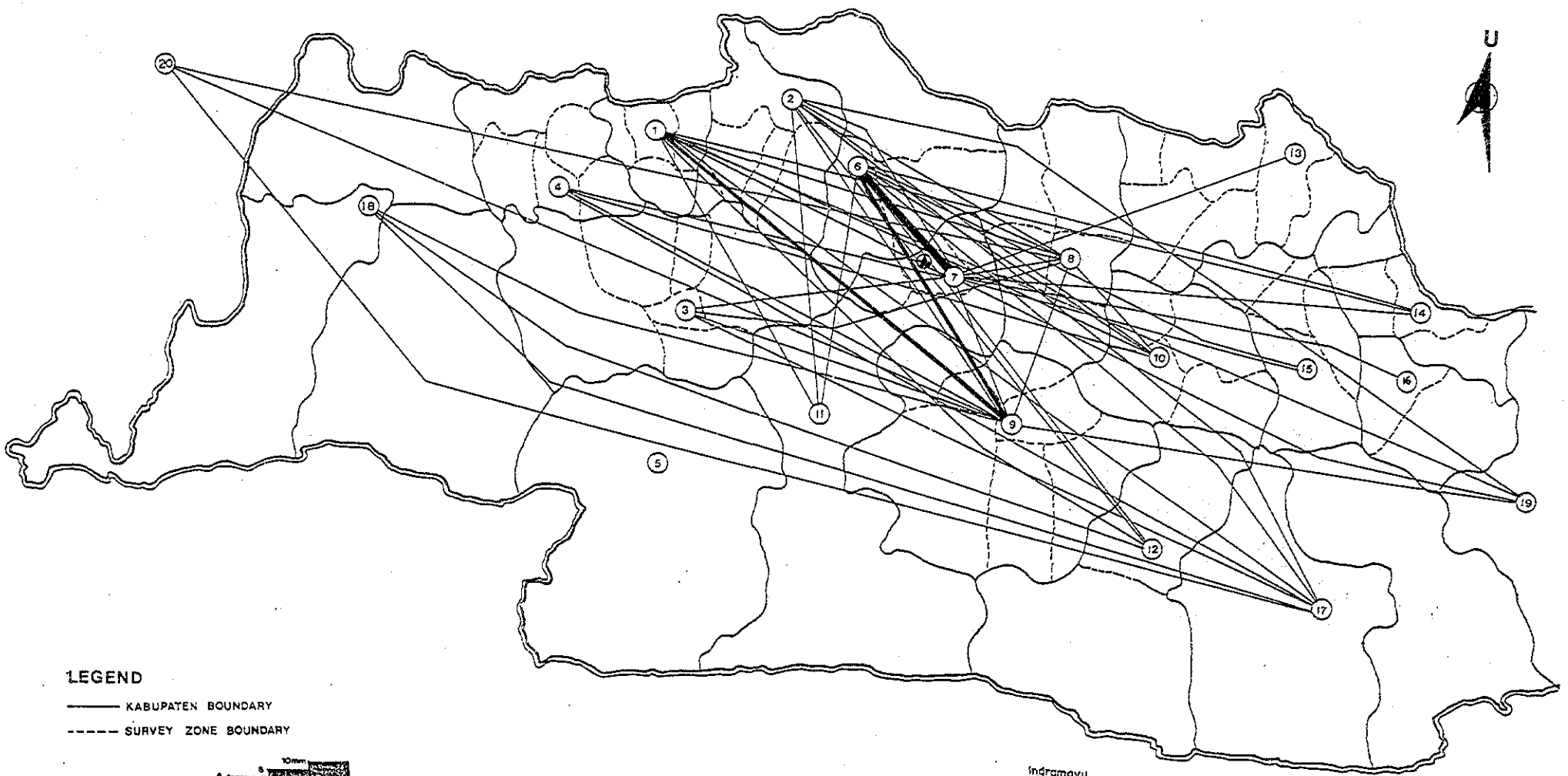
- A 2-lane/2-way tollway is not favorable for tollway users from such viewpoints as traffic safety, service level and maintenance work.

  In fact the existing 2-lane/2-way section of Jakarta-Cikampek Tollway has been socially criticized and 4-lane widening work is now underway.

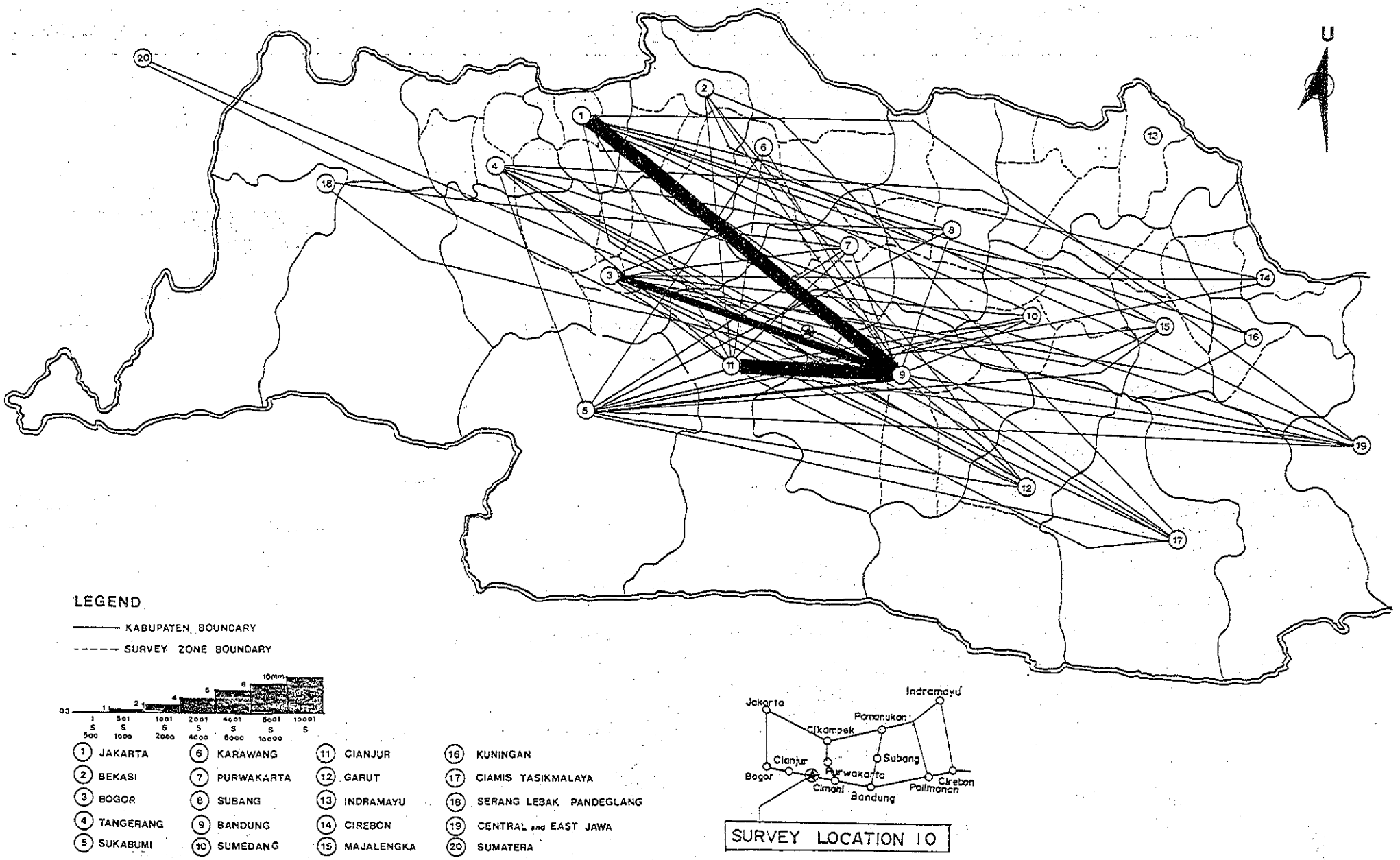
- Alternative 3 may cause traffic congestion before Package C completes on the existing Kadipaten-Cirebon national road section.

Consequently, it is concluded and recommended that the initial construction should be the Package A & B combination with a 4-lane/2-way tollway immediately, followed by the extension to Cirebon by Package C with a 4-lane/2-way tollway. In addition, a proper countermeasure should be taken to ease the increasing traffic congestion particularly at the existing Palimanan intersection.

APPENDIX



Feasibility Study on Cikampek - Cirebon Tollway Project	Fig. AP 4.2.1 Distribution Pattern of Traffic Interviewed at Survey Location Point 09 (Cikampek-Purwakarta)



AP4-2

Feasibility Study on Cikampek - Cirebon Tollway Project

Fig. AP 4.2.2 Distribution Pattern of Traffic Interviewed at Survey Location Point 10 (Cianjur-Padalarang)

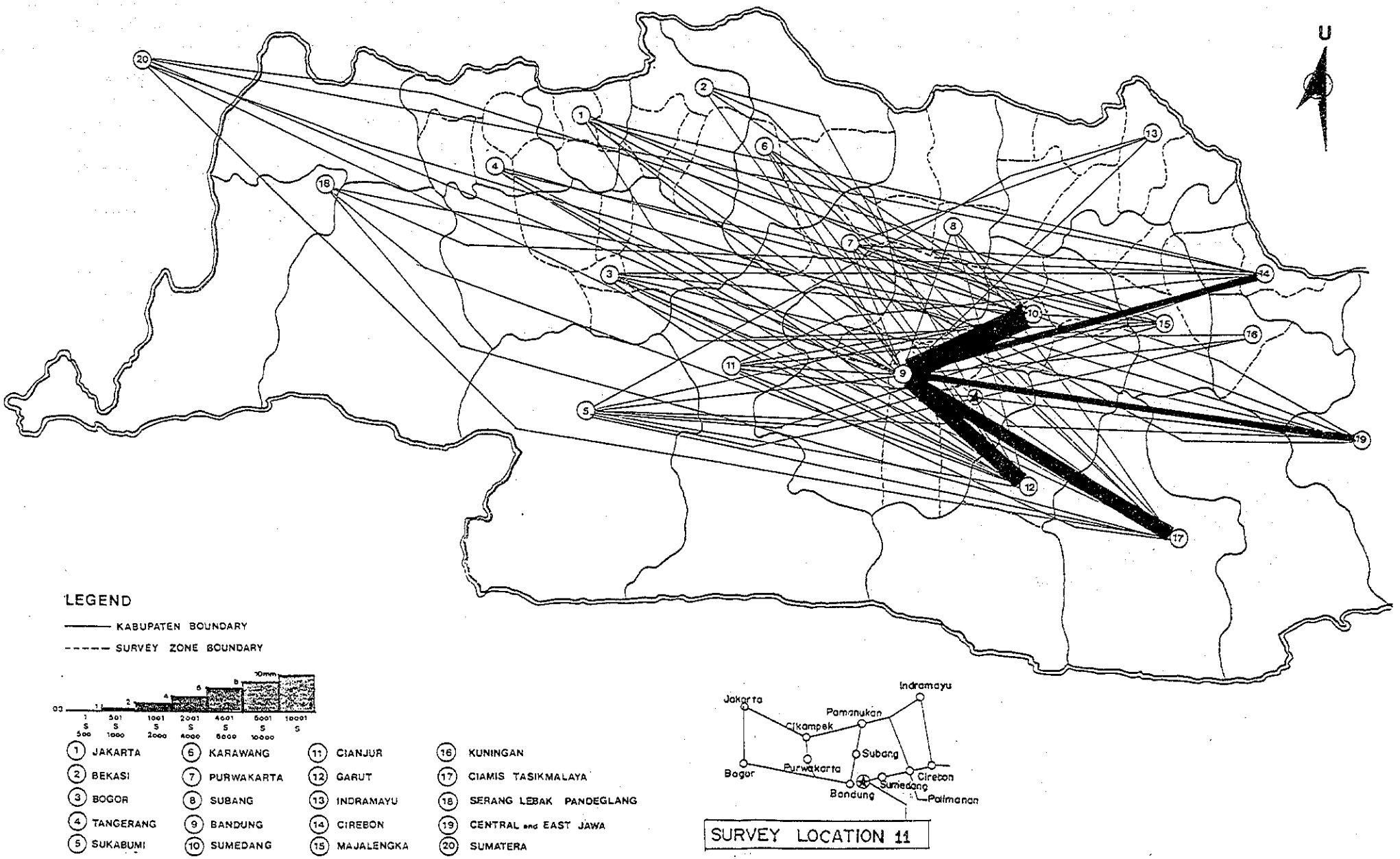
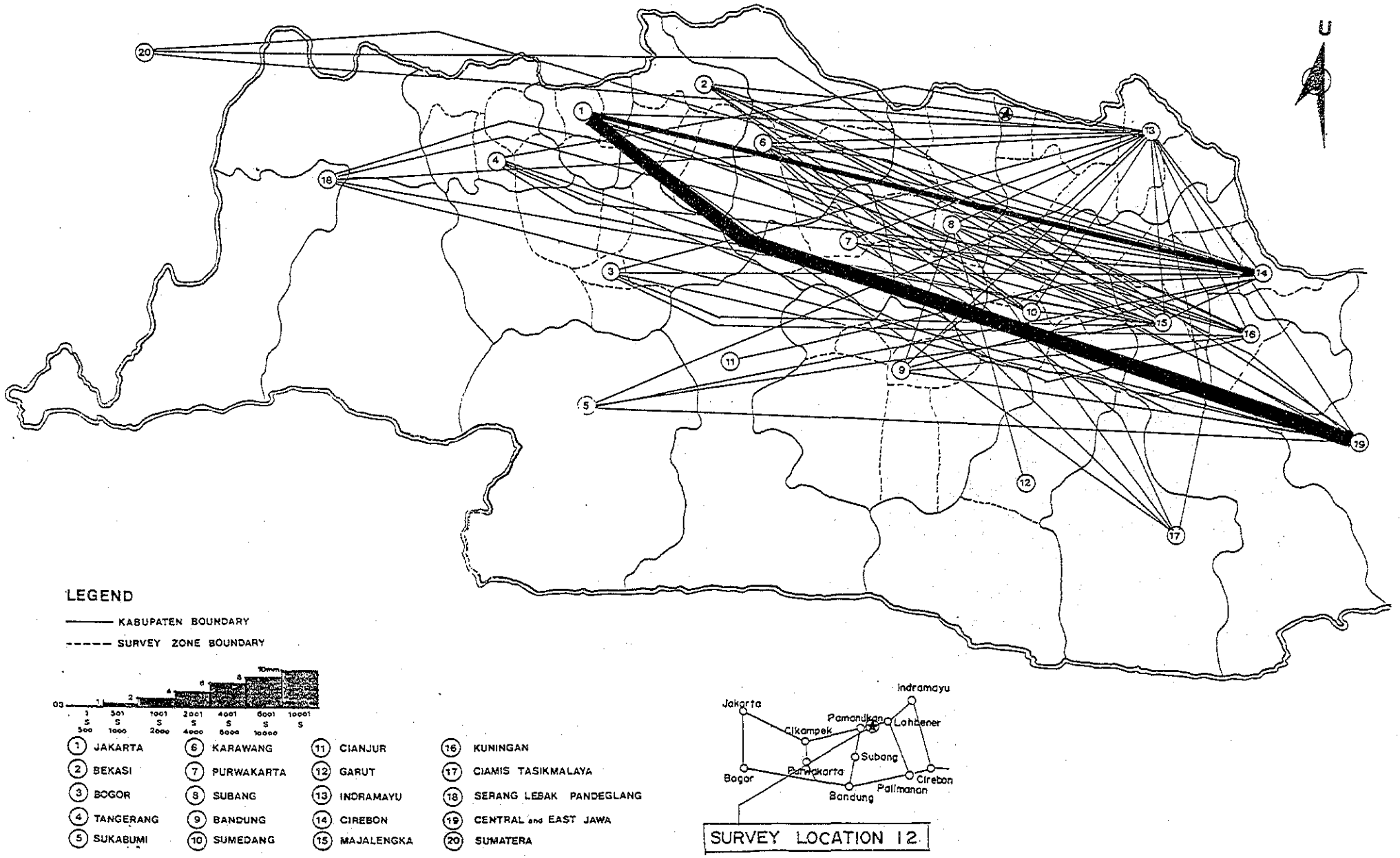


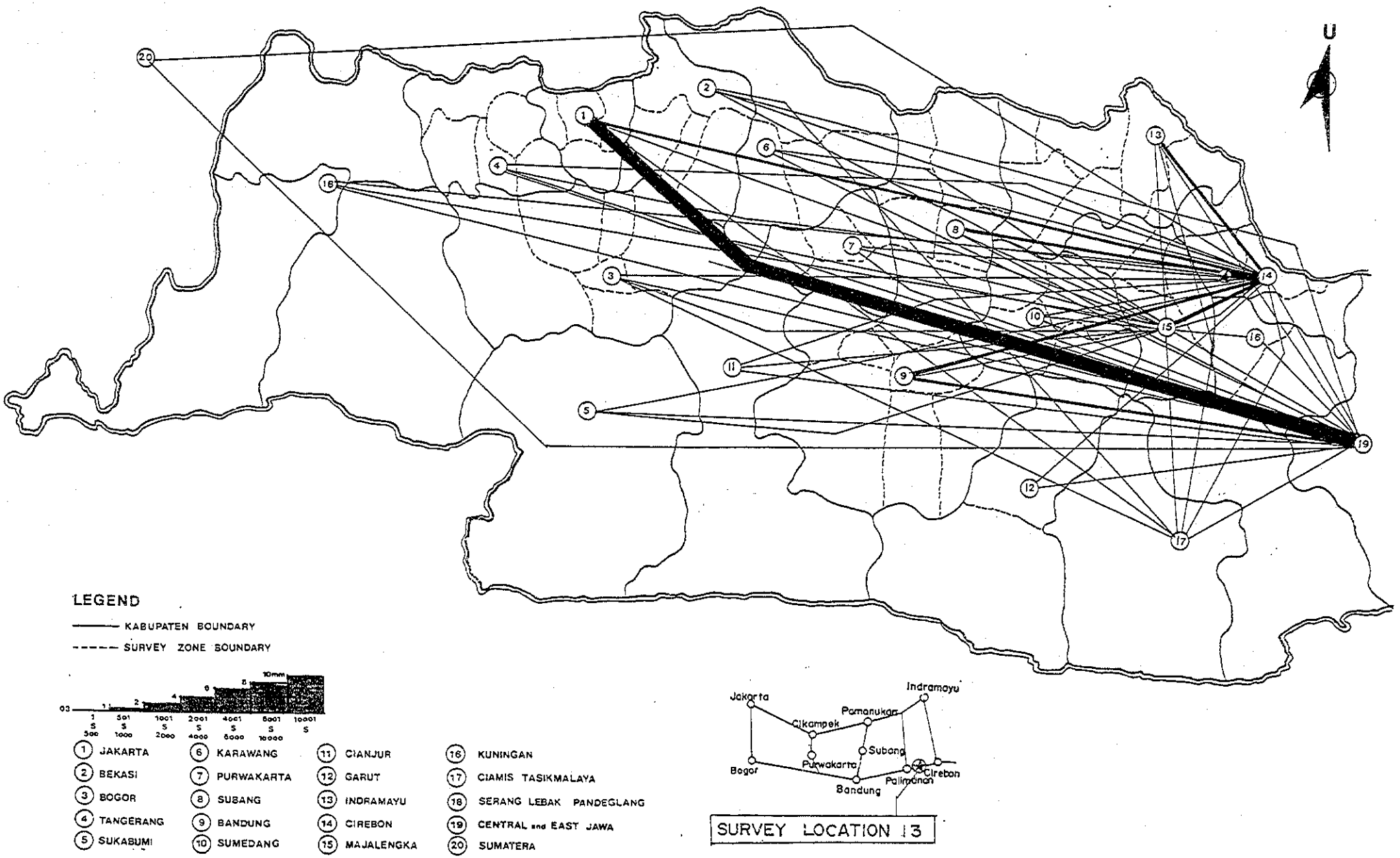
Fig. AP 4.2.3 Distribution Pattern of Traffic Interviewed at Survey Location Point 11 (Bandung-Cileunyi)

Feasibility Study on Cikampek - Cirebon Tollway Project



AP4-4

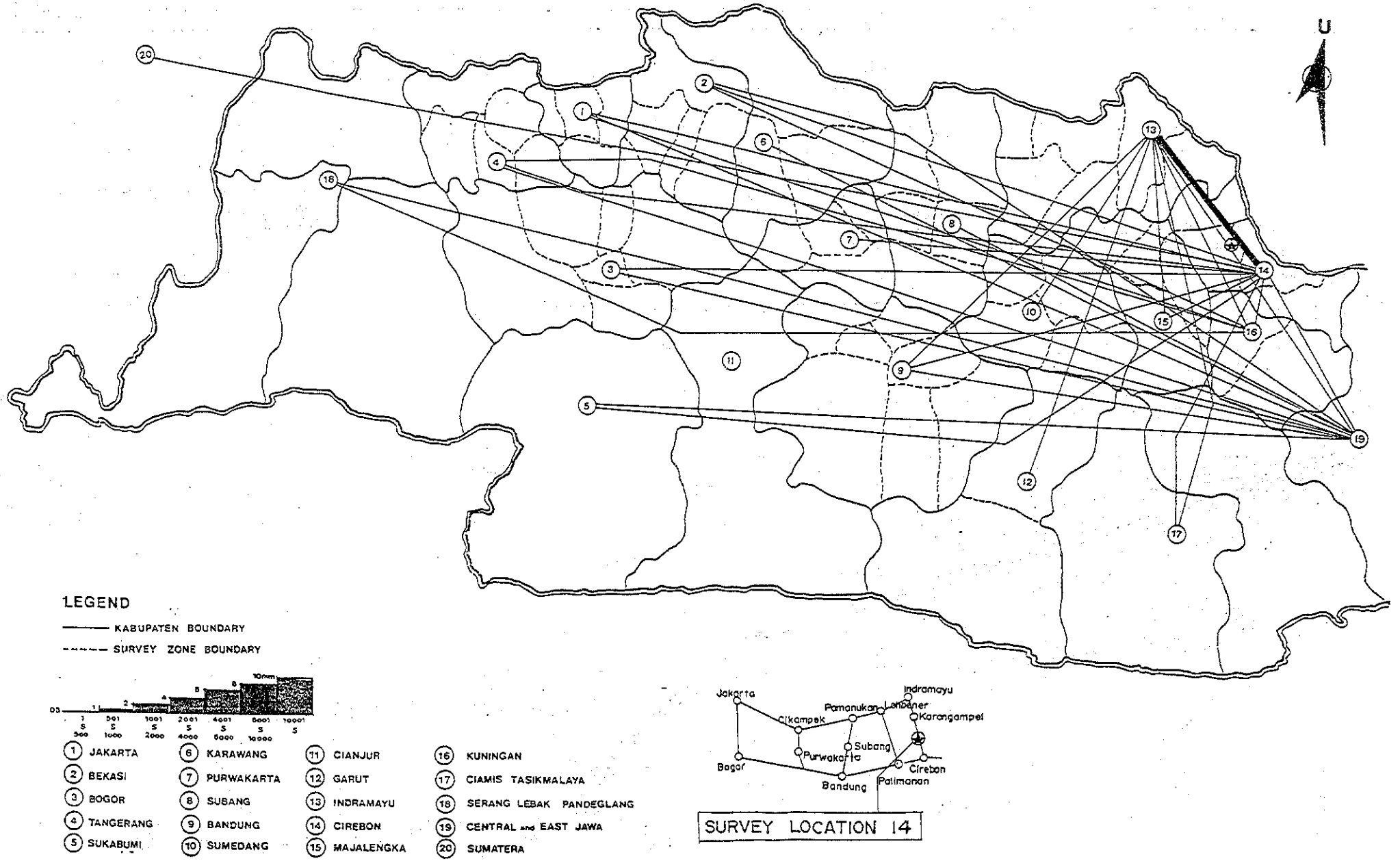
Feasibility Study on Cikampek - Cirebon Tollway Project	Fig. AP 4.2.4 Distribution Pattern of Traffic Interviewed at Survey Location Point 12 (Pamanukan-Lohbener)



AP4-5

Feasibility Study on Cikampek - Cirebon Tollway Project

Fig. AP 4.2.5 Distribution Pattern of Traffic Interviewed at Survey Location Point 13 (Palimanan-Cirebon)



Feasibility Study on Cikampek - Cirebon Tollway Project

Fig. AP 4.2.6 Distribution Pattern of Traffic Interviewed at Survey Location Point 14 (Karangampel-Cirebon)

Table AP 6.3.1 O-D Matrix, All Vehicles in 1995

FILE :ALL95.CAL

55 X 55 ZONE ALL VEHICLES ORIGIN - DESTINATION MATRIX (1995 ESTIMATE DATA) < B1 route > 1/3

ZONE No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	0	23619	52171	47081	2710	3661	2612	12	484	133	7	168	21	115	6	9	580	5205	148	84
2		0	1762	3219	19	4157	1100	13	216	43	0	39	15	48	0	0	95	768	7	0
3			0	4597	5880	706	592	0	51	15	0	36	3	26	10	4	384	3183	115	57
4				0	27	186	76	0	40	3	7	0	0	0	0	4	97	531	24	0
5					0	16	68	0	20	23	0	0	0	2	0	0	169	1040	19	8
6						0	0	28	440	85	0	226	64	324	50	3	39	297	1	3
7							0	75	801	119	0	65	53	106	18	11	68	296	5	0
8								0	0	0	0	1	0	0	0	0	0	0	0	0
9									0	0	2	544	231	809	106	6	250	1753	82	223
10										0	1	77	36	122	8	0	37	237	16	32
11											0	0	0	0	0	0	4	0	3	0
12												0	0	0	0	4	88	323	78	52
13													0	0	0	0	238	244	331	69
14														0	0	4	87	437	45	64
15															0	0	47	90	55	10
16																0	0	0	0	18
17																	0	0	0	185
18																		0	0	5364
19																			0	51
20																				0
21																				
22																				
23																				
24																				
25																				
26																				
27																				
28																				
29																				
30																				
31																				
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41																				
42																				
43																				
44																				
45																				
46																				
47																				
48																				
49																				
50																				
51																				
52																				
53																				
54																				
55																				
TOTAL																				

ORIGIN - DESTINATION MATRIX (1995 ESTIMATE DATA) < B1 route > 2/3

ALL VEHICLES

ZONE No.	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
1	116	12	1981	281	9	90	362	12	76	28	80	1138	68	2	22	3	51	269	904	4335
2	5	0	17	28	0	46	422	14	81	0	53	194	9	0	5	6	17	47	62	188
3	95	0	2022	43	0	14	36	7	1	4	51	207	18	0	14	0	27	19	185	1667
4	20	0	13	38	0	1	11	0	3	9	9	35	6	0	2	0	8	7	59	2339
5	9	0	830	29	0	2	3	0	0	0	0	145	5	0	3	0	7	6	48	401
6	3	0	0	16	0	40	35	1	2	1	8	38	1	0	2	7	10	6	28	68
7	17	0	0	20	0	10	32	2	1	0	6	20	3	0	7	2	4	26	10	12
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	67	0	18	23	1	0	11	0	0	1	9	18	3	0	1	0	0	0	0	20
10	25	0	7	4	0	0	4	0	0	0	0	5	0	0	3	0	5	0	7	3
11	0	0	0	0	0	3	18	0	3	1	2	12	0	0	4	1	6	1	4	0
12	0	0	0	1	0	49	119	0	24	4	30	436	1	0	5	2	17	9	8	0
13	0	0	0	0	0	0	1	0	1	0	0	3	0	0	0	0	0	0	0	0
14	8	0	2	17	0	17	45	0	12	0	25	46	1	0	3	0	3	2	8	0
15	0	0	5	0	0	2	2	0	1	0	0	0	0	0	0	0	0	0	0	0
16	21	0	55	35	0	0	6	0	0	0	0	0	0	0	0	0	10	0	21	1
17	218	14	648	851	0	19	106	0	39	0	19	109	6	0	91	45	196	43	513	9
18	6763	249	2159	6243	0	97	774	0	257	55	180	2609	73	13	579	296	1559	393	4024	229
19	84	11	178	385	0	4	33	0	0	6	0	27	0	0	28	21	69	18	184	7
20	0	0	20	742	0	16	85	0	29	0	0	100	4	0	76	34	160	20	298	0
21	0	0	23	88	0	5	87	0	24	0	0	206	22	0	299	149	708	27	75	10
22		0	26	18	0	0	0	0	0	0	0	50	0	0	46	21	145	3	4	0
23			0	24	0	0	0	0	0	0	0	34	0	3	12	0	3	0	58	80
24				0	0	0	0	0	0	0	0	104	0	0	37	11	100	368	2602	14
25					0	202	333	0	49	10	46	186	1	0	0	0	16	12	0	0
26						0	0	0	0	28	64	264	10	0	18	5	34	10	0	5
27							0	0	0	182	479	2255	665	0	98	50	245	128	18	3
28								0	0	0	0	39	3	0	0	0	0	1	0	0
29									0	64	217	1022	175	0	39	19	68	46	13	1
30										0	0	0	0	0	0	0	0	306	73	3
31											0	1928	31	0	0	0	0	1012	250	3
32												0	0	24	403	40	430	2701	705	144
33													0	0	12	0	13	996	244	0
34														0	0	0	0	0	0	0
35															0	0	0	386	247	0
36																0	0	186	136	0
37																	0	874	571	1
38																		0	425	4
39																			0	12
40																				0
41																				
42																				
43																				
44																				
45																				
46																				
47																				
48																				
49																				
50																				
51																				
52																				
53																				
54																				
55																				
TOTAL																				

ORIGIN - DESTINATION MATRIX (1995 ESTIMATE DATA) < B1 route > 3/3

ALL VEHICLES

ZONE No.	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	TRIP END
1	760	342	241	199	735	527	233	16	58	82	1029	118	182	1553	0	154740
2	69	26	14	9	54	17	5	0	3	11	172	25	25	76	1	36821
3	126	55	15	15	78	53	46	0	9	13	157	23	10	59	0	74661
4	28	12	5	0	34	15	11	0	2	2	83	10	5	47	0	58706
5	7	6	6	4	1	5	1	0	0	0	4	0	0	2	0	11525
6	18	5	4	2	13	2	5	0	3	2	5	1	0	6	0	10618
7	14	1	12	1	2	2	1	0	1	0	45	1	0	2	0	6319
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	129
9	5	2	0	1	6	0	0	0	0	2	8	0	0	5	0	6259
10	0	0	0	0	0	0	3	0	0	0	0	3	0	0	0	1056
11	1	0	0	0	1	0	0	0	0	0	4	0	0	0	0	85
12	13	0	0	3	2	2	0	0	0	1	3	2	2	6	0	2440
13	0	0	0	0	0	0	0	0	1	0	0	0	0	3	0	1314
14	40	0	0	5	2	1	2	0	0	0	2	0	2	0	0	2432
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	410
16	4	0	0	0	3	0	0	0	0	0	3	0	0	2	0	224
17	74	44	4	10	20	10	0	0	0	7	30	3	7	4	0	5507
18	857	445	113	155	328	376	119	40	66	60	459	95	47	86	4	49570
19	22	14	12	0	10	17	0	0	0	0	1	0	0	2	0	2113
20	68	13	6	1	6	2	0	0	0	0	11	1	0	4	0	7916
21	15	0	2	0	0	0	0	1	0	0	5	0	0	0	0	9197
22	0	0	0	0	0	0	2	0	0	0	3	0	1	0	0	605
23	0	11	0	0	3	4	3	0	0	0	15	0	0	27	0	8281
24	42	37	27	34	11	40	0	0	0	3	21	1	0	8	0	12349
25	21	3	1	1	1	3	0	0	0	0	1	0	3	0	0	899
26	6	0	0	3	3	0	0	1	0	0	0	0	0	1	0	1069
27	88	17	7	2	54	10	13	0	0	4	9	0	2	4	0	6858
28	5	0	0	0	0	1	0	0	0	0	0	0	0	0	0	85
29	33	4	1	0	6	1	1	0	0	6	2	3	0	2	0	2326
30	122	4	0	0	3	0	0	0	0	0	3	0	0	4	0	911
31	393	15	6	6	26	11	21	0	0	0	26	6	1	5	0	5021
32	1136	64	52	28	200	78	58	3	14	17	116	13	31	35	0	17522
33	386	3	0	0	3	0	0	0	0	0	4	0	0	19	0	2785
34	8	0	0	0	1	0	0	0	0	0	0	0	0	0	0	51
35	33	0	0	0	7	0	1	0	0	0	4	0	0	0	0	2487
36	9	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1045
37	61	3	0	0	17	2	4	3	0	0	7	3	0	2	0	5459
38	89	10	0	0	2	0	3	0	0	0	0	0	1	0	0	8456
39	352	791	227	79	86	69	17	0	2	10	44	5	13	18	0	13509
40	9	3	0	5	5	37	6	1	1	0	22	0	2	75	0	9725
41	0	4127	865	440	5802	695	754	18	62	95	664	52	31	46	0	18565
42		0	4338	693	1142	603	211	8	33	58	210	41	16	9	0	13421
43			0	5867	5055	1568	469	10	96	59	228	48	22	9	0	19389
44				0	2024	8264	386	50	196	140	736	77	130	25	0	19591
45					0	9412	10486	73	198	146	1155	75	64	48	0	37403
46						0	4361	320	3379	665	2332	170	184	55	0	33293
47							0	1066	450	128	1666	65	41	24	0	20662
48								0	658	321	8423	93	102	0	0	11207
49									0	4567	5441	220	143	1	0	15604
50										0	14097	2614	317	3	0	23430
51											0	20961	12672	26	0	70909
52												0	1490	4	0	26223
53													0	8	0	15554
54														0	0	2315
55															0	5
TOTAL																869056

Table AP 6.3.2 O-D Matrix, All Vehicles in 2005

FILE :ALL05.CAL

ORIGIN - DESTINATION MATRIX (2005 ESTIMATE DATA) < B1 route > 1/3

55 X 55 ZONE ALL VEHICLES

ZONE No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	0	44670	40504	80213	3970	5354	2986	65	1532	429	18	1202	525	730	175	52	1241	5765	664	919
2		0	8458	6808	890	4039	1174	34	743	109	0	179	171	312	0	0	447	1570	204	0
3			0	28746	11627	3601	1892	0	1492	189	0	350	48	453	71	51	2299	8602	1179	2114
4				0	2467	2628	964	0	1020	53	12	0	0	0	0	8	817	3391	323	0
5					0	63	125	0	138	54	0	0	0	20	0	0	235	976	100	71
6						0	0	23	508	82	0	198	111	285	46	4	177	492	2	9
7							0	61	718	104	0	53	39	83	16	9	48	220	8	0
8								0	0	0	0	1	0	0	0	0	0	0	0	0
9									0	0	2	450	179	657	93	13	239	1320	68	177
10										0	1	66	27	102	8	0	29	171	11	24
11											0	0	0	0	0	0	7	0	3	0
12												0	0	0	0	3	65	263	55	43
13													0	0	0	0	193	176	268	59
14														0	0	3	70	385	32	57
15															0	0	35	72	41	9
16																0	0	0	0	11
17																	0	0	0	145
18																		0	0	11040
19																			0	58
20																				0
21																				
22																				
23																				
24																				
25																				
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54																				
55																				
TOTAL																				

ORIGIN - DESTINATION MATRIX (2005 ESTIMATE DATA) < B1 route > 2/3

ALL VEHICLES

ZONE No.	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
1	1346	106	2231	2068	374	205	1348	23	601	142	892	2244	734	7	443	64	952	1545	2330	5672
2	194	0	86	523	0	82	518	8	181	0	326	625	198	0	84	38	166	399	644	840
3	1899	0	5691	3366	0	211	1532	31	210	110	1169	2663	679	0	149	0	719	452	3527	4925
4	710	0	750	1088	0	50	306	0	111	105	138	1476	137	0	79	0	159	169	1214	6499
5	61	0	1130	251	0	12	21	0	0	0	0	124	24	0	16	0	33	14	255	396
6	67	0	0	132	0	37	133	2	41	12	63	129	41	0	29	10	68	51	129	108
7	17	0	0	18	0	9	29	2	2	0	6	198	4	0	6	3	4	22	10	176
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	74	0	45	58	1	0	30	0	0	1	17	27	9	0	5	0	0	0	0	16
10	26	0	8	4	0	0	4	0	0	0	0	5	0	0	3	0	5	0	8	3
11	0	0	0	0	0	5	23	0	2	1	5	16	0	0	3	1	5	4	3	0
12	0	0	0	4	0	41	101	0	23	4	22	317	2	0	5	1	16	13	6	0
13	0	0	0	0	0	0	4	0	1	0	0	4	0	0	0	0	0	0	0	0
14	12	0	2	15	0	14	44	0	11	0	20	37	1	0	5	0	4	7	7	0
15	0	0	4	0	0	2	2	0	1	0	0	0	0	0	0	0	0	0	0	0
16	16	0	52	38	0	0	4	0	0	0	0	0	0	0	0	0	6	0	12	1
17	179	13	512	603	0	15	81	0	30	0	19	72	10	0	69	34	145	36	375	18
18	7390	393	2103	8164	0	189	1456	0	591	193	1061	2408	735	25	777	220	1587	1502	4889	689
19	74	12	130	295	0	4	25	0	0	5	0	21	0	0	21	14	49	16	135	7
20	0	0	22	646	0	15	75	0	30	0	0	123	11	0	62	28	126	70	272	0
21	0	0	39	325	0	19	142	0	53	0	0	202	60	0	275	137	654	39	144	10
22		0	19	9	0	0	0	0	0	0	0	35	0	0	33	14	158	3	4	0
23			0	56	0	0	0	0	0	0	0	41	0	3	10	0	8	0	75	79
24				0	0	0	0	0	0	0	28	296	0	0	110	29	212	553	3283	66
25					0	167	308	0	59	15	55	142	1	0	0	0	37	28	0	0
26						0	0	0	0	25	56	216	9	0	17	5	29	11	0	5
27							0	0	0	223	520	1832	553	0	121	53	242	231	114	18
28								0	0	0	0	30	3	0	0	0	0	1	0	0
29									0	63	195	822	149	0	36	17	64	57	12	2
30										0	0	0	0	0	0	0	0	240	57	2
31											0	2019	160	0	0	0	0	776	187	4
32												0	0	19	567	506	1249	5118	1009	125
33													0	0	17	0	39	723	176	0
34														0	0	0	0	0	0	0
35															0	0	0	323	210	0
36																0	0	158	115	0
37																	0	732	479	1
38																		0	356	18
39																			0	49
40																				0
41																				
42																				
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55																				
TOTAL																				

ORIGIN - DESTINATION MATRIX (2005 ESTIMATE DATA) < B1 route > 3/3

ALL VEHICLES

ZONE No.	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	TRIP END
1	1506	593	340	360	1294	877	390	23	90	129	2187	173	264	3004	0	225571
2	106	52	21	25	78	26	12	0	1	17	272	41	33	143	2	75549
3	200	117	14	27	109	76	63	0	16	25	299	35	12	92	0	140094
4	56	20	7	0	47	28	19	0	3	3	187	17	9	43	0	140880
5	6	12	8	3	2	9	1	0	0	0	4	0	0	2	0	23120
6	40	9	8	6	25	4	9	0	5	5	10	2	0	13	0	18810
7	149	19	90	9	29	9	8	0	8	0	447	7	0	14	0	9795
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	184
9	4	1	0	1	8	0	0	0	0	1	11	0	0	11	0	9669
10	0	0	0	0	0	0	4	0	0	0	0	3	0	0	0	1532
11	1	0	0	0	1	0	0	0	0	0	3	0	0	0	0	116
12	17	0	0	5	3	3	0	0	0	2	4	3	4	3	0	3527
13	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	1807
14	37	0	0	4	5	1	1	0	0	0	1	0	1	0	0	3418
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	575
16	5	0	0	0	3	0	0	0	0	0	3	0	0	2	0	296
17	99	62	4	13	23	16	0	0	0	11	50	6	9	9	0	8560
18	1097	506	102	175	309	320	124	26	55	40	441	74	32	75	5	72196
19	39	16	17	0	12	37	0	0	0	0	4	0	0	4	0	3953
20	130	22	7	3	9	6	0	0	0	0	36	2	0	10	0	16441
21	19	0	7	0	0	0	0	1	0	0	6	0	0	0	0	14197
22	0	0	0	0	0	0	1	0	0	0	3	0	1	0	0	804
23	0	9	0	0	3	3	5	0	0	0	16	0	0	25	0	13157
24	69	52	48	58	19	63	0	0	0	6	33	1	0	21	0	22610
25	25	4	2	1	2	3	0	0	0	0	3	0	3	0	0	1230
26	6	0	0	2	14	0	0	1	0	0	0	0	0	1	0	1474
27	153	23	11	4	66	7	9	0	0	8	12	0	4	7	0	10397
28	6	0	0	0	0	1	0	0	0	0	0	0	0	0	0	107
29	49	7	1	0	11	2	4	0	0	9	3	4	0	4	0	3458
30	157	4	0	0	3	0	0	0	0	0	4	0	0	6	0	1372
31	630	21	6	8	34	16	28	0	0	0	51	7	2	8	0	8549
32	1445	67	54	33	257	94	70	3	16	19	193	17	37	47	0	27069
33	427	4	0	0	4	0	0	0	0	0	6	0	0	8	0	4924
34	11	0	0	0	3	0	0	0	0	0	0	0	0	0	0	68
35	40	0	0	0	15	0	1	0	0	0	7	0	0	0	0	3538
36	8	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1457
37	80	4	0	0	19	2	8	3	0	0	9	4	0	2	0	8079
38	80	11	0	0	3	0	3	0	0	0	0	0	1	0	0	13765
39	619	1309	324	144	131	108	24	0	4	16	105	8	17	38	0	22933
40	14	4	0	7	10	67	10	5	4	0	45	0	4	93	0	19992
41	0	8680	1616	997	12842	1353	1542	30	121	182	1902	96	50	110	0	36851
42		0	6944	1359	2185	1032	372	12	56	102	496	66	24	17	0	24295
43			0	10139	8500	2338	739	14	142	90	488	67	28	17	0	32193
44				0	4151	14905	733	80	350	253	1935	136	217	57	0	36200
45					0	16711	19468	112	355	257	2926	129	103	98	0	70388
46						0	7228	456	5390	1054	5163	249	271	95	0	58023
47							0	1544	752	203	3906	98	62	44	0	37485
48								0	954	438	16278	121	132	0	0	20233
49									0	7180	11918	329	201	2	0	27953
50										0	30502	3891	446	5	0	44894
51											0	43020	24209	73	0	147271
52												0	1999	6	0	50611
53													0	12	0	28187
54														0	0	4222
55															0	7
TOTAL																1554086

Table AP 6.3.3 O-D Matrix, All Vehicles in 2015

FILE :ALL15.CAL

ORIGIN - DESTINATION MATRIX (2015 ESTIMATE DATA) < B1 route > 1/3

55 X 55 ZONE ALL VEHICLES

ZONE No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	0	62589	43428	1.2e5	4285	6429	3236	91	1939	755	32	2282	857	1096	310	78	1467	5865	953	1278
2		0	19528	22636	1917	9880	3215	92	1921	362	0	474	491	969	0	0	1064	3257	572	0
3			0	68586	18428	6482	3331	0	2858	454	0	873	114	1043	178	112	4048	12573	2575	4503
4				0	6931	8307	3006	0	3484	165	22	0	0	0	0	23	2528	9200	1202	0
5					0	98	205	0	219	91	0	0	0	38	0	0	351	1124	186	127
6						0	0	40	790	138	0	328	257	332	92	7	346	719	4	22
7							0	61	718	104	0	67	49	83	16	9	48	220	15	0
8								0	0	0	0	1	0	0	0	0	0	0	0	0
9									0	0	2	450	207	657	96	30	364	1401	101	178
10										0	1	66	27	102	9	0	34	171	11	25
11											0	0	0	0	0	0	11	0	5	0
12												0	0	0	0	4	65	275	56	45
13													0	0	0	0	193	176	268	59
14														0	0	4	71	400	32	60
15															0	0	35	72	41	9
16																0	0	0	0	11
17																	0	0	0	189
18																		0	0	18677
19																			0	135
20																				0
21																				
22																				
23																				
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55																				
TOTAL																				

ORIGIN - DESTINATION MATRIX (2015 ESTIMATE DATA) < B1 route > 2/3

ALL VEHICLES

ZONE No.	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
1	1824	180	2556	2912	770	275	1903	30	987	178	1228	2223	1136	10	612	98	1376	2618	2890	7585
2	496	0	261	1500	0	216	1476	12	600	0	947	1262	606	0	204	110	425	1477	1646	2272
3	3714	0	11380	7159	0	441	3470	60	453	235	2522	3950	1604	0	294	0	1564	1139	6609	10463
4	2583	0	2795	4391	0	148	923	0	361	367	444	3826	468	0	236	0	501	637	4311	23865
5	100	0	1811	470	0	19	37	0	0	0	0	151	42	0	24	0	65	34	433	487
6	147	0	0	300	0	56	281	4	99	22	140	218	97	0	59	22	156	136	244	205
7	20	0	0	27	0	9	31	2	3	0	10	352	10	0	6	3	7	26	14	449
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	116	0	80	118	2	0	58	0	0	2	35	31	17	0	10	0	0	0	0	17
10	26	0	8	4	0	0	4	0	0	0	0	6	0	0	3	0	5	0	9	3
11	0	0	0	0	0	6	28	0	2	1	7	17	0	0	4	2	7	6	3	0
12	0	0	0	6	0	42	118	0	39	4	22	317	5	0	12	2	25	36	9	0
13	0	0	0	0	0	0	6	0	2	0	0	6	0	0	0	0	0	0	0	0
14	17	0	2	25	0	14	48	0	12	0	27	41	1	0	12	0	8	21	7	0
15	0	0	4	0	0	2	2	0	1	0	0	0	0	0	0	0	0	0	0	0
16	16	0	52	50	0	0	4	0	0	0	0	0	0	0	0	0	6	0	12	1
17	205	19	512	603	0	15	86	0	35	0	25	78	22	0	69	34	145	55	388	25
18	11486	628	2585	13777	0	295	2601	0	1153	303	1745	2892	1359	43	1287	362	2701	3060	7204	1187
19	91	13	130	295	0	4	30	0	0	5	0	25	0	0	21	14	50	26	137	10
20	0	0	62	1596	0	18	142	0	93	0	0	188	34	0	108	36	190	258	500	0
21	0	0	74	745	0	35	273	0	137	0	0	298	151	0	300	137	701	133	284	11
22		0	19	10	0	0	0	0	0	0	0	35	0	0	33	14	201	4	5	0
23			0	119	0	0	0	0	0	0	0	52	0	3	11	0	16	0	115	85
24				0	0	0	0	0	0	0	122	641	0	0	325	97	643	1226	8516	214
25					0	167	367	0	85	20	64	139	1	0	0	0	57	48	0	0
26						0	0	0	0	25	58	216	9	0	17	5	30	11	0	5
27							0	0	0	331	771	1829	579	0	203	94	392	575	228	35
28								0	0	0	0	30	3	0	0	0	0	1	0	0
29									0	98	207	822	170	0	38	19	74	157	23	4
30										0	0	0	0	0	0	0	0	240	57	2
31											0	3085	430	0	0	0	0	1102	196	10
32												0	0	24	813	834	2013	9645	1504	250
33													0	0	47	0	107	739	177	0
34														0	0	0	0	0	0	0
35															0	0	0	325	210	0
36																0	0	158	115	0
37																	0	741	490	2
38																		0	1152	70
39																			0	168
40																				0
41																				
42																				
43																				
44																				
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55																				
TOTAL																				

ORIGIN - DESTINATION MATRIX (2015 ESTIMATE DATA) < B1 route > 3/3

ALL VEHICLES

ZONE No.	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	TRIP END
1	2129	761	389	488	1713	1060	510	27	111	160	3225	203	316	4800	0	308531
2	209	94	35	47	143	43	23	0	2	28	556	67	55	297	3	144079
3	365	203	22	51	189	127	110	0	26	42	586	53	16	188	0	246149
4	120	39	13	0	94	52	37	0	6	6	420	30	15	90	0	297146
5	7	21	12	3	3	14	2	0	0	0	7	0	0	2	0	37744
6	77	15	14	11	47	8	16	0	8	8	20	4	0	31	0	36716
7	248	29	125	15	48	12	12	0	11	0	783	9	0	28	0	16672
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	285
9	6	2	0	1	11	0	0	0	0	2	19	0	0	20	0	15962
10	0	0	0	0	0	0	6	0	0	0	0	5	0	0	0	2594
11	1	0	0	0	1	0	0	0	0	0	5	0	0	0	0	163
12	27	0	0	8	5	4	0	0	0	3	7	4	6	5	0	5692
13	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	2714
14	57	0	0	6	6	1	1	0	0	0	2	0	1	0	0	5196
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	867
16	7	0	0	0	4	0	0	0	0	0	5	0	0	3	0	438
17	158	95	5	21	35	23	0	0	0	16	88	9	13	17	0	13610
18	1833	767	130	287	486	434	183	32	77	57	807	99	42	150	9	114191
19	76	26	28	0	21	67	0	0	0	0	8	0	0	9	0	7242
20	230	35	10	4	16	9	0	0	0	0	69	3	0	20	0	28939
21	33	0	12	0	0	0	0	2	0	0	11	0	0	0	0	24178
22	0	0	0	0	0	0	1	0	0	0	5	0	1	0	0	1168
23	0	13	0	0	3	6	7	0	0	0	27	0	0	25	0	22813
24	146	99	83	120	37	112	0	0	0	11	74	2	0	47	0	46622
25	38	6	2	1	3	3	0	0	0	0	4	0	4	0	0	1781
26	9	0	0	3	19	0	0	1	0	0	0	0	0	2	0	2172
27	258	37	15	7	106	9	13	0	0	9	22	0	4	14	0	17419
28	9	0	0	0	0	1	0	0	0	0	0	0	0	0	0	152
29	85	12	2	0	19	3	7	0	0	13	7	7	0	7	0	5836
30	250	6	0	0	4	0	0	0	0	0	7	0	0	9	0	2166
31	1084	33	9	14	58	24	46	0	0	0	91	10	3	18	0	14587
32	2226	89	69	46	378	126	98	4	22	28	322	22	50	85	0	41378
33	662	6	0	0	6	0	0	0	0	0	10	0	0	8	0	8506
34	17	0	0	0	5	0	0	0	0	0	0	0	0	0	0	102
35	60	0	0	0	21	0	2	0	0	0	12	0	0	0	0	5378
36	8	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2166
37	129	6	0	0	29	3	10	3	0	0	15	4	0	4	0	12901
38	156	20	0	0	6	0	6	0	0	0	0	0	2	0	0	26046
39	1215	2367	524	285	248	179	42	0	7	26	223	13	28	95	0	42908
40	31	9	0	18	22	156	23	13	9	0	98	0	6	218	0	48028
41	0	16368	2722	2010	24871	2313	2911	51	217	321	4126	163	87	253	0	68379
42		0	10695	2513	3882	1643	636	18	93	170	983	102	37	35	0	41967
43			0	16772	13479	3270	1135	21	210	130	870	94	39	32	0	50968
44				0	7891	25002	1353	133	616	440	4117	234	372	127	0	63016
45					0	27089	34389	181	609	427	5961	207	169	209	0	123150
46						0	11417	661	8191	1587	9340	359	396	189	0	93933
47							0	2420	1241	322	7718	152	96	96	0	65041
48								0	1453	652	29536	177	190	0	0	35575
49									0	11233	22156	496	302	5	0	47102
50										0	56267	5849	662	12	0	78481
51											0	76788	43159	177	0	268733
52												0	2868	13	0	88046
53													0	22	0	48961
54														0	0	7363
55															0	12
TOTAL																2691964

Table AP 7.5.1 Analysis of Highway Capacity

Undivided 2 Lanes

(between CIKAMPEK - DAWUAN)

Description		Service Level A	Service Level B	Service Level C	Service Level D	Service Level E
Design speed (Km/h)		100	100	100	100	100
Grade (%)		2	2	2	2	2
Width of Lane (m)		3.60	3.60	3.60	3.60	3.60
Lateral Clearance	Outer (m)	3.00	3.00	3.00	3.00	3.00
	Inner (m)	0.00	0.00	0.00	0.00	0.00
Heavy Vehicle	Rate of Pt (%)	30	30	30	30	30
	Rate of Pr (%)	0	0	0	0	0
	Rate of Pb (%)	8	8	8	8	8
Pass.Car Equivalent	Et	2.00	2.20	2.20	2.00	2.00
	Er	2.20	2.50	2.50	1.60	1.60
	Eb	1.80	2.00	2.00	1.60	1.60
Coefficient	Width of Lane (ft)	1.00	1.00	1.00	1.00	1.00
	Lateral Clearance(fw)	1.00	1.00	1.00	1.00	1.00
	Heavy Vehicle (fhv)	0.73	0.69	0.69	0.74	0.74
Basic Capacity (pcu/h/2-lane)		2,800	2,800	2,800	2,800	2,800
Possible Capacity (veh/h/2-lane)		2,053	1,944	1,944	2,077	2,077
Percent No Passing Zones (%)		0	0	0	0	0
Coeffcient of Service Level		0.15	0.27	0.43	0.64	1.00
Design Capacity (veh/h/lane)		308	525	836	1,329	2,077
Peak Factor K (%)		7.5	7.5	7.5	7.5	7.5
Rate of Direction D (%)		60	60	60	60	60
Peak-Hour Factor (PHF)		0.91	0.92	0.94	0.95	1.00
Daily Traffic Capacity(veh/d/2-lane)		3,512	6,054	9,851	15,828	26,034

Table AP 7.5.2 Analysis of Highway Capacity

Undivided 2 Lanes

(between DAWUAN - EAST CIREBON)

Description		Service Level A	Service Level B	Service Level C	Service Level D	Service Level E
Design speed (Km/h)		100	100	100	100	100
Grade (%)		2	2	2	2	2
Width of Lane (m)		3.60	3.60	3.60	3.60	3.60
Lateral Clearance	Outer (m)	3.00	3.00	3.00	3.00	3.00
	Inner (m)	0.00	0.00	0.00	0.00	0.00
Heavy Vehicle	Rate of Pt (%)	28	28	28	28	28
	Rate of Pr (%)	0	0	0	0	0
	Rate of Pb (%)	7	7	7	7	7
Pass.Car Equivalent	Et	2.00	2.20	2.20	2.00	2.00
	Er	2.20	2.50	2.50	1.60	1.60
	Eb	1.80	2.00	2.00	1.60	1.60
Coefficient	Width of Lane (ft)	1.00	1.00	1.00	1.00	1.00
	Lateral Clearance(fw)	1.00	1.00	1.00	1.00	1.00
	Heavy Vehicle (fhv)	0.75	0.71	0.71	0.76	0.76
Basic Capacity (pcu/h/2-lane)		2,800	2,800	2,800	2,800	2,800
Possible Capacity (veh/h/2-lane)		2,096	1,991	1,991	2,118	2,118
Percent No Passing Zones (%)		0	0	0	0	0
Coeffcient of Service Level		0.15	0.27	0.43	0.64	1.00
Design Capacity (veh/h/lane)		314	538	856	1,356	2,118
Peak Factor K (%)		8.0	8.0	8.0	8.0	8.0
Rate of Direction D (%)		65	65	65	65	65
Peak-Hour Factor (PHF)		0.91	0.92	0.94	0.95	1.00
Daily Traffic Capacity(veh/d/2-lane)		3,361	5,812	9,458	15,131	24,887

Table AP 7.5.3 Analysis of Highway Capacity

Divided 2 Lanes

(between CIKAMPEK - DAWUAN)

Description		Service Level A	Service Level B	Service Level C	Service Level D	Service Level E
Design speed (Km/h)		100	100	100	100	100
Grade (%)		2	2	2	2	2
Width of Lane (m)		3.60	3.60	3.60	3.60	3.60
Lateral Clearance	Outer (m)	3.00	3.00	3.00	3.00	3.00
	Inner (m)	0.25	0.25	0.25	0.25	0.25
Heavy Vehicle	Rate of Pt (%)	30	30	30	30	30
	Rate of Pr (%)	0	0	0	0	0
	Rate of Pb (%)	8	8	8	8	8
Pass.Car Equivalent	Et	2.00	2.20	2.20	2.00	2.00
	Er	2.20	2.50	2.50	1.60	1.60
	Eb	1.80	2.00	2.00	1.60	1.60
Coefficient	Width of Lane (ft)	1.00	1.00	1.00	1.00	1.00
	Lateral Clearance(fw)	1.00	1.00	1.00	1.00	1.00
	Heavy Vehicle (fhv)	0.73	0.69	0.69	0.74	0.74
Basic Capacity (pcu/h/2-lane)		4,000	4,000	4,000	4,000	4,000
Possible Capacity (veh/h/2-lane)		2,933	2,778	2,778	2,967	2,967
Percent No Passing Zones (%)		80	80	80	80	80
Coeffcient of Service Level		0.05	0.17	0.33	0.58	1.00
Design Capacity (veh/h/lane)		147	472	917	1,721	2,967
Peak Factor K (%)		7.5	7.5	7.5	7.5	7.5
Rate of Direction D (%)		60	60	60	60	60
Peak-Hour Factor (PHF)		0.91	0.92	0.94	0.95	1.00
Daily Traffic Capacity(veh/d/2-lane)		1,483	4,827	9,574	18,167	32,971

Table AP 7.5.4 Analysis of Highway Capacity

Divided 2 Lanes

(between DAWUAN - EAST CIREBON)

Description		Service Level A	Service Level B	Service Level C	Service Level D	Service Level E
Design speed (Km/h)		100	100	100	100	100
Grade (%)		2	2	2	2	2
Width of Lane (m)		3.60	3.60	3.60	3.60	3.60
Lateral Clearance	Outer (m)	3.00	3.00	3.00	3.00	3.00
	Inner (m)	0.25	0.25	0.25	0.25	0.25
Heavy Vehicle	Rate of Pt (%)	28	28	28	28	28
	Rate of Pr (%)	0	0	0	0	0
	Rate of Pb (%)	7	7	7	7	7
Pass.Car Equivalent	Et	2.00	2.20	2.20	2.00	2.00
	Er	2.20	2.50	2.50	1.60	1.60
	Eb	1.80	2.00	2.00	1.60	1.60
Coefficient	Width of Lane (ft)	1.00	1.00	1.00	1.00	1.00
	Lateral Clearance(fw)	1.00	1.00	1.00	1.00	1.00
	Heavy Vehicle (fhv)	0.75	0.71	0.71	0.76	0.76
Basic Capacity (pcu/h/2-lane)		4,000	4,000	4,000	4,000	4,000
Possible Capacity (veh/h/2-lane)		2,994	2,845	2,845	3,026	3,026
Percent No Passing Zones (%)		80	80	80	80	80
Coeffcient of Service Level		0.05	0.17	0.33	0.58	1.00
Design Capacity (veh/h/lane)		150	484	939	1,755	3,026
Peak Factor K (%)		8.0	8.0	8.0	8.0	8.0
Rate of Direction D (%)		65	65	65	65	65
Peak-Hour Factor (PHF)		0.91	0.92	0.94	0.95	1.00
Daily Traffic Capacity(veh/d/2-lane)		1,310	4,278	8,486	16,030	29,093

Table AP 7.5.5 Analysis of Highway Capacity

Divided 3 Lanes

(between CIKAMPEK - DAWUAN)

Description		Service Level A	Service Level B	Service Level C	Service Level D	Service Level E
Design speed (Km/h)		100	100	100	100	100
Grade (%)		2	2	2	2	2
Width of Lane (m)		3.60	3.60	3.60	3.60	3.60
Lateral Clearance	Outer (m)	3.00	3.00	3.00	3.00	3.00
	Inner (m)	0.25	0.25	0.25	0.25	0.25
Heavy Vehicle	Rate of Pt (%)	30	30	30	30	30
	Rate of Pr (%)	0	0	0	0	0
	Rate of Pb (%)	8	8	8	8	8
Pass.Car Equivalent	Et	2.00	2.20	2.20	2.00	2.00
	Er	2.20	2.50	2.50	1.60	1.60
	Eb	1.80	2.00	2.00	1.60	1.60
Coefficient	Width of Lane (ft)	1.00	1.00	1.00	1.00	1.00
	Lateral Clearance(fw)	1.00	1.00	1.00	1.00	1.00
	Heavy Vehicle (fhv)	0.73	0.69	0.69	0.74	0.74
Basic Capacity (pcu/h/2-lane)		4,000	4,000	4,000	4,000	4,000
Possible Capacity (veh/h/2-lane)		2,933	2,778	2,778	2,967	2,967
Percent No Passing Zones (%)		50	50	50	50	50
Coeffcient of Service Level		0.09	0.21	0.36	0.60	1.00
Design Capacity (veh/h/lane)		264	583	1,000	1,780	2,967
Peak Factor K (%)		7.5	7.5	7.5	7.5	7.5
Rate of Direction D (%)		60	60	60	60	60
Peak-Hour Factor (PHF)		0.91	0.92	0.94	0.95	1.00
Daily Traffic Capacity(veh/d/2-lane)		2,669	5,963	10,444	18,793	32,971

Table AP 7.5.6 Analysis of Highway Capacity

Divided 3 Lanes

(between DAWUAN - EAST CIREBON)

Description		Service Level A	Service Level B	Service Level C	Service Level D	Service Level E
Design speed	(Km/h)	100	100	100	100	100
Grade	(%)	2	2	2	2	2
Width of Lane	(m)	3.60	3.60	3.60	3.60	3.60
Lateral Clearance	Outer (m)	3.00	3.00	3.00	3.00	3.00
	Inner (m)	0.25	0.25	0.25	0.25	0.25
Heavy Vehicle	Rate of Pt (%)	28	28	28	28	28
	Rate of Pr (%)	0	0	0	0	0
	Rate of Pb (%)	7	7	7	7	7
Pass.Car Equivalent	Et	2.00	2.20	2.20	2.00	2.00
	Er	2.20	2.50	2.50	1.60	1.60
	Eb	1.80	2.00	2.00	1.60	1.60
Coefficient	Width of Lane (ft)	1.00	1.00	1.00	1.00	1.00
	Lateral Clearance(fw)	1.00	1.00	1.00	1.00	1.00
	Heavy Vehicle (fhv)	0.75	0.71	0.71	0.76	0.76
Basic Capacity (pcu/h/2-lane)		4,000	4,000	4,000	4,000	4,000
Possible Capacity (veh/h/2-lane)		2,994	2,845	2,845	3,026	3,026
Percent No Passing Zones (%)		50	50	50	50	50
Coeffcient of Service Level		0.09	0.21	0.36	0.60	1.00
Design Capacity (veh/h/lane)		269	597	1,024	1,815	3,026
Peak Factor K (%)		8.0	8.0	8.0	8.0	8.0
Rate of Direction D (%)		65	65	65	65	65
Peak-Hour Factor (PHF)		0.91	0.92	0.94	0.95	1.00
Daily Traffic Capacity(veh/d/2-lane)		2,358	5,285	9,257	16,583	29,093

Table AP 7.5.7 Analysis of Highway Capacity

Multilane Highway

(between CIKAMPEK-DAWUAN)

Description		Service Level A	Service Level B	Service Level C	Service Level D	Service Level E
Design speed	(Km)	120	120	120	120	120
Type of Terrain	(L,R,M)	L	L	L	L	L
Highway Classification	Divided/Undivided	D	D	D	D	D
	Rural/Suburban	R/S	R/S	R/S	R/S	R/S
Width of Lane	(m)	3.60	3.60	3.60	3.60	3.60
Lateral Clearance	Outer(m)	3.00	3.00	3.00	3.00	3.00
	Inner(m)	1.50	1.50	1.50	1.50	1.50
Heavy Vehicle	Rate of Pt (%)	30	30	30	30	30
	Rate of Pr (%)	0	0	0	0	0
	Rate of Pb (%)	8	8	8	8	8
Pass.Car Equivalent	Et	1.7	1.7	1.7	1.7	1.7
	Er	1.6	1.6	1.6	1.6	1.6
	Eb	1.5	1.5	1.5	1.5	1.5
Coefficient	Lateral Clearance	1.00	1.00	1.00	1.00	1.00
	Heavy Vehicle	0.80	0.80	0.80	0.80	0.80
	Driver Population	1.00	1.00	1.00	1.00	1.00
Basic Capacity	(pcu/h/lane)	2,000	2,000	2,000	2,000	2,000
Possible Capacity	(veh/h/lane)	1,600	1,600	1,600	1,600	1,600
Coeffcient of Service Level		0.36	0.54	0.71	0.87	1.00
Design Capacity	(veh/h/lane)	576	864	1,136	1,392	1,600
Peak factor	K (%)	7.5	7.5	7.5	7.5	7.5
Rate of Direction	D (%)	60	60	60	60	60
Peak-Hour Factor	(PHF)	0.91	0.92	0.94	0.95	1.00
Daily traffic Capacity (veh/4-lane)		23,296	35,328	47,460	58,773	71,111
Daily traffic Capacity (veh/6-lane)		34,944	52,992	71,189	88,160	106,667

Table AP 7.5.8 Analysis of Highway Capacity

Multilane Highway

(between DAWUAN-EAST CIREBON)

Description		Service Level A	Service Level B	Service Level C	Service Level D	Service Level E
Design speed	(Km)	120	120	120	120	120
Type of Terrain	(L,R,M)	L	L	L	L	L
Highway Classification	Divided/Undivided	D	D	D	D	D
	Rural/Suburban	R/S	R/S	R/S	R/S	R/S
Width of Lane	(m)	3.60	3.60	3.60	3.60	3.60
Lateral Clearance	Outer(m)	3.00	3.00	3.00	3.00	3.00
	Inner(m)	1.50	1.50	1.50	1.50	1.50
Heavy Vehicle	Rate of Pt (%)	28	28	28	28	28
	Rate of Pr (%)	0	0	0	0	0
	Rate of Pb (%)	7	7	7	7	7
Pass.Car Equivalent	Et	1.7	1.7	1.7	1.7	1.7
	Er	1.6	1.6	1.6	1.6	1.6
	Eb	1.5	1.5	1.5	1.5	1.5
Coefficient	Lateral Clearance	1.00	1.00	1.00	1.00	1.00
	Heavy Vehicle	0.81	0.81	0.81	0.81	0.81
	Driver Population	1.00	1.00	1.00	1.00	1.00
Basic Capacity	(pcu/h/lane)	2,000	2,000	2,000	2,000	2,000
Possible Capacity	(veh/h/lane)	1,625	1,625	1,625	1,625	1,625
Coeffcient of Service Level		0.36	0.54	0.71	0.87	1.00
Design Capacity	(veh/h/lane)	585	877	1,154	1,413	1,625
Peak factor	K (%)	8.0	8.0	8.0	8.0	8.0
Rate of Direction	D (%)	65	65	65	65	65
Peak-Hour Factor	(PHF)	0.91	0.92	0.94	0.95	1.00
Daily traffic Capacity (veh/4-lane)		20,471	31,044	41,705	51,647	62,488
Daily traffic Capacity (veh/6-lane)		30,707	46,566	62,557	77,470	93,732

Table AP 10.6.1 (1) Bridge List (Throughway Bridge)

Package	Section	STA.	Length(m)	Span	Crossing
A	1	92 + 900	25	1 @ 25	Interchange Rump
		93 + 70	17	1 @ 17	Railway
		95 + 800	100	4 @ 25	River (S.Ciherang)
		100 + 30	75	3 @ 25	River
		101 + 730	75	3 @ 25	River (S.Cilamaya)
		107 + 840	40	2 @ 20	River (S.Cijengkol)
		108 + 395	75	3 @ 25	River (S.Cibuang)
		Sub-total	407		
	2	110 + 550	125	5 @ 25	River (S.Cibuang)
		120 + 560	125	5 @ 25	River (S.Cibodas)
		122 + 790	125	5 @ 25	River (S.Cibodas)
		123 + 460	295	25+[50+70+50]+4@25	River (S.Ciasem)
		123 + 830	20	1 @ 20	Irrigation Canal
		124 + 720	30	2 @ 15	Irrigation Canal and Desa Road
		129 + 340	25	1 @ 25	Interchange Rump
		Sub-total	745		
B	3	134 + 425	75	3 @ 25	River
		138 + 720	100	4 @ 25	River (S.Cilamatan)
		142 + 120	125	5 @ 25	River (S.Cipunegara)
		146 + 195	75	3 @ 25	River (S.Cikandung)
		Sub-total	375		
	4	161 + 170	225	9 @ 25	River (S.Cipanas)
		Sub-total	225		
	5	174 + 680	60	3 @ 20	River (S.Cipelang)
		176 + 845	50	2 @ 25	River (S.Cisusu)
		178 + 120	50	2 @ 25	Irrigation & Provincial Road
		178 + 380	10	1 @ 10	Light Railway (Jalan Lori)
		178 + 590	25	1 @ 25	Irrigation Canal
		180 + 550	170	[50+70+50]	River (S.Cimanuku)
		181 + 510	50	2 @ 25	River (S.Cisambeng)
		Sub-total	415		
C	6	182 + 945	20	1 @ 20	Irrigation Canal
		184 + 400	25	1 @ 25	Irrigation Canal (Saruran)
		184 + 515	25	1 @ 25	Irrigation Canal
		186 + 285	10	1 @ 10	Light Railway (Jalan Lori)
		186 + 600	20	1 @ 20	Irrigation Canal
		187 + 50	20	1 @ 20	Irrigation Canal
		187 + 750	75	3 @ 25	River (S.Cisanggom)
		Sub-total	195		
	7	191 + 40	50	2 @ 25	River (S.Cikeruh)
		193 + 500	25	1 @ 25	River
		194 + 70	20	1 @ 20	Irrigation Canal
		195 + 925	20	1 @ 20	Irrigation Canal
		196 + 730	20	1 @ 20	Irrigation Canal
		197 + 620	25	1 @ 25	Irrigation Canal
		201 + 30	100	4 @ 25	River (S.Ciwaringin)
		201 + 330	20	1 @ 20	Irrigation Canal
		202 + 85	20	1 @ 20	Irrigation Canal
		Sub-total	300		

Table AP 10.6.1 (2)

Package	Section	STA.	Length(m)	Span	Crossing
C	8	210 + 690	25	1 @ 25	Irrigation Canal
		212 + 630	20	1 @ 20	River (S. Soko)
		213 + 480	20	1 @ 20	Irrigation Canal
		213 + 740	40	2 @ 20	River
		216 + 810	25	2 @ 20	River (S. Cipager)
		218 + 450	25	1 @ 25	River
		219 + 155	20	1 @ 20	Irrigation Canal
		220 + 820	20	1 @ 20	Irrigation Canal
		221 + 400	25	1 @ 25	River
		221 + 905	65	20+25+20	River (S. Kasunean)
		Sub-total	285		
	9	223 + 280	25	1 @ 25	River (S. Sungslok)
		225 + 305	75	3 @ 25	River (S. Lunyu)
		227 + 400	20	1 @ 20	Irrigation Canal
		228 + 110	20	1 @ 20	River (S. Ciwoni)
		228 + 210	25	1 @ 25	River (S. Ciwoni)
		228 + 595	20	1 @ 20	Irrigation Canal
		229 + 225	25	1 @ 25	River (K. Penganten)
		230 + 305	20	1 @ 20	Irrigation Canal
		230 + 380	20	1 @ 20	Irrigation Canal
		230 + 430	25	1 @ 25	Irrigation Canal (Saluran)
		231 + 290	25	1 @ 25	Railway
		231 + 375	20	1 @ 20	Irrigation Canal (Saluran)
		232 + 335	20	1 @ 20	Irrigation Canal
		232 + 545	25	1 @ 25	River (K. Kanci)
		233 + 590	20	1 @ 20	Irrigation Canal
		234 + 435	20	1 @ 20	Irrigation Canal
		Sub-total	405		
Total			3,352		

Table AP 10.6.2 (1) Bridge List (Overpass Bridge)

Package	Section	NO	STA.	Angle(deg.)	Length(m)	Road Class
A	1	1	93 + 765	90	64	Provincial Road [080]
		2	94 + 635	65	71	Desa Road
		3	95 + 445	72	67	Desa Road
		4	97 + 610	90	64	Desa Road
		5	98 + 480	60	74	Desa Road
		6	99 + 305	90	64	Desa Road
		7	100 + 690	90	64	Desa Road
		8	101 + 260	90	64	Desa Road
		9	103 + 300	65	71	Desa Road
		10	104 + 750	70	68	Kabupaten Road [05]
		11	105 + 955	80	65	Desa Road
		12	106 + 540	82	65	Desa Road
		13	107 + 560	88	64	Kabupaten Road [97]
		14	108 + 60	90	64	Desa Road
			Sub-total		928	
	2	15	109 + 980	90	64	Desa Road
		16	111 + 0	90	64	Desa Road
		17	113 + 575	80	65	Kabupaten Road [94]
		18	114 + 750	90	64	Desa Road
		19	116 + 10	90	64	Desa Road
		20	116 + 875	76	66	Kabupaten Road [07]
		21	117 + 870	90	64	Desa Road
		22	118 + 360	70	68	Desa Road
		23	119 + 35	75	66	Kabupaten Road [89]
		24	121 + 30	90	64	Desa Road
		25	123 + 815	85	64	Desa Road
		26	126 + 35	75	66	Desa Road
		27	127 + 305	75	66	Desa Road
		28	128 + 240	80	65	Kabupaten Road [107]
		29	129 + 955	70	68	Kabupaten Road [076]
			Sub-total		979	
B	3	30	131 + 310	75	66	Kabupaten Road [118]
		31	134 + 800	90	64	Desa Road
		32	135 + 995	75	66	Kabupaten Road [128]
		33	138 + 325	90	64	Desa Road
		34	139 + 820	75	66	Kabupaten Road [111]
		35	140 + 570	90	64	Desa Road
		36	142 + 600	80	65	Kabupaten Road [52]
		37	142 + 895	90	64	Desa Road
		38	144 + 350	85	64	Desa Road
		39	147 + 720	60	74	Desa Road
		40	148 + 630	90	64	Desa Road
			Sub-total		722	
	4	41	149 + 570	80	65	Kabupaten Road [6]
		42	150 + 750	70	68	Desa Road
		43	152 + 260	80	65	Desa Road
		44	152 + 795	80	65	Desa Road
		45	153 + 800	80	65	Desa Road
		46	155 + 345	80	65	Desa Road
		47	156 + 595	90	64	Desa Road
		48	157 + 580	90	64	Desa Road
		49	158 + 145	70	68	Desa Road
		50	159 + 870	75	66	Kabupaten Road [15]
		51	160 + 740	75	66	Desa Road
			Sub-total		722	

Table AP 10.6.2 (2)

Package	Section	NO	STA.	Angle(deg.)	Length(m)	Road Class
B	5	52	162 + 665	90	64	Desa Road
		53	164 + 70	90	64	Desa Road
		54	164 + 750	90	64	Desa Road
		55	165 + 830	60	74	Desa Road
		56	166 + 350	90	64	Desa Road
		57	167 + 500	90	64	Desa Road
		58	167 + 940	85	64	Desa Road
		59	169 + 420	75	66	Desa Road
		60	170 + 830	65	71	Desa Road
		61	173 + 415	80	65	Desa Road
		62	175 + 865	85	64	Desa Road
		63	174 + 430	90	64	Desa Road
		64	177 + 675	80	65	Desa Road
		65	179 + 465	70	68	Desa Road
			Sub-total		921	
C	6	66	182 + 900	85	64	Kabupaten Road [20]
		67	183 + 470	90	64	Desa Road
		68	187 + 265	80	65	Kabupaten Road [21]
		69	188 + 250	85	64	Desa Road
		70	189 + 65	75	66	Desa Road
		71	190 + 670	60	74	Desa Road
		72	191 + 760	90	64	Desa Road
		73	192 + 690	80	65	Desa Road
			Sub-total		527	
	7	74	194 + 650	80	65	Desa Road
		75	195 + 260	85	64	Kabupaten Road [16]
		76	195 + 900	85	64	Desa Road
		77	199 + 390	80	65	Desa Road
		78	199 + 860	90	64	Kabupaten Road [31]
		79	200 + 510	80	65	Desa Road
		80	201 + 315	90	64	Desa Road
		81	201 + 920	65	71	Kabupaten Road [28]
		82	203 + 660	70	68	Desa Road
		83	205 + 580	70	68	Desa Road
		84	206 + 220	90	64	Desa Road
		85	207 + 120	70	68	Provincial Road [025]
		86	208 + 0	85	64	Desa Road
			Sub-total		855	
	8	87	208 + 645	85	64	Desa Road
		88	209 + 190	80	65	Kabupaten Road [30]
		89	209 + 830	85	64	Desa Road
		90	210 + 500	90	64	Desa Road
		91	210 + 980	65	71	Desa Road
		92	211 + 670	85	64	Desa Road
		93	212 + 290	90	64	Desa Road
		94	212 + 890	75	66	Desa Road
		95	213 + 645	60	74	National Road [024]
		96	214 + 110	83	64	Desa Road
		97	214 + 370	60	74	Desa Road
		98	214 + 740	60	74	Desa Road
		99	215 + 760	90	64	Desa Road
		100	216 + 130	75	66	Kabupaten Road [18]
		101	216 + 550	60	74	Desa Road
		102	217 + 285	60	74	Desa Road
		103	218 + 270	60	74	Desa Road
		104	218 + 685	75	66	Desa Road
		105	219 + 120	65	71	Desa Road
		106	219 + 840	90	64	Desa Road
		107	220 + 155	90	64	Desa Road
		108	220 + 800	85	64	Kabupaten Road [14]
		109	221 + 580	70	68	Kabupaten Road [37]
		110	221 + 930	85	64	Desa Road
			Sub-total		1,622	

Table AP 10.6.2 (3)

Package	Section	NO	STA.	Angle(deg.)	Length(m)	Road Class
C	9	111	222 + 380	85	64	Provintial Road [067]
		112	223 + 650	65	71	Desa Road
		113	223 + 870	75	66	Desa Road
		114	224 + 230	85	64	Desa Road
		115	224 + 485	70	68	Desa Road
		116	224 + 880	60	74	Desa Road
		117	225 + 200	85	64	Desa Road
		118	225 + 470	90	64	Desa Road
		119	228 + 550	90	64	Desa Road
		120	229 + 820	80	65	Desa Road
		121	231 + 915	85	64	Desa Road
		122	232 + 900	75	66	Desa Road
		123	234 + 150	90	64	Desa Road
			Sub-total		859	
Total					8,135	

Table AP 14.3.1 Specification of Representative Vehicles

Specifications	Honda Civc Grand 1500	Toyota Kijang Minibus	Toyota Kijang Pick-Up	Toyota Corolla 1300	Mitsubishi Colt Diesel 104	Mitsubishi Fuso 516H	Mercedes Benz 0508I	Mercedes Benz OH306S
1) Length (m)	4.230	4.290	4.140	4.195	4.650	7.510	6.415	10.048
2) Width (m)	1.690	1.620	1.620	1.655	1.695	2.380	2.111	2.379
3) Height (m)	1.360	1.775	1.765	1.385	2.005	2.690	2.550	-
4) Number of wheels	4	4	4	4	4	6	6	6
5) Weight (kg)	935	1,165	990	925	1,560	3,620	6,500	11,000
6) Capacity (persons)	5	8/10	3	5	3	3	26+1	53+1
7) Tire size	185x14	550x13	550x13	185x13	750x15	900x20	750x16	900x20
8) Engine capacity (cc)	1,493	1,486	1,486	1,295	3,298	6,919	3,782	5,958
9) Number of cylinders	4	4	4	4	4	6	4	6
10) Gross horse power	90 HP	63 HP	63 HP	72 HP	100 PS	170 PS	85 HP	170 HP
11) Fuel type	Gasoline	Gasoline	Gasoline	Gasoline	Diesel	Diesel	Diesel	Diesel

Table AP 14.3.2 Tax Component of Market Sales Prices of Vehicles

TAX STRUCTURE FOR SEDANS AND COMMERCIAL VEHICLES

Taxes on Sedans		Costs	Taxes
(1)	CIF Price of CKD Parts	A	
(2)	Import Duty (1) x 100 %	A	A
(3)	Assembly and Other Costs	.7A	
(4)	PPN Import (1+2+3) x 30 %	.81A	.81A
(5)	VAT (1+2+3) X 10 %	.27A	.27A
(6)	Dealer/Dist price (sum 1-5)	3.78A	
(7)	Dealer Commission (6 x 10 %)	.378A	
(8)	Sales price (6 + 7)	4.158A	
(9)	Registration fee (8 x 10 %)	.4158A	.4158A
(10)	Total price (8 + 9)	4.5738A	2.4958A

Tax ratio is 2.4958/4.5738 = 55 %

Taxes on Commercial Vehicles		Costs	Taxes
(1)	CIF Price of CKD Parts	A	
(2)	Import Duty	0	0
(3)	Assembly and Other Costs	4.5A	
(4)	PPN Import (1+2+3) X 10%	.55A	.55A
(5)	VAT (1+3) X 10 %	.55A	.55A
(6)	Dealer/Dist price (sum 1-5)	6.6A	
(7)	Dealer Commission (6 x 10 %)	.66A	
(8)	Sales price (6 + 7)	7.26A	
(9)	Registration fee (8 x 10 %)	.726A	.726A
(10)	Total price (8 + 9)	7.986A	1.826A

Tax ratio is 1.826/7.986 = 23 %

Table AP 14.3.3 Equation of Vehicle Operating Costs

A) EQUATIONS OF FUEL CONSUMPTION

Sedan/Van	y = 0.03719 S*S - 4.19966 S + 175.9911
Medium Bus	y = 0.06846 S*S - 8.02987 S + 340.604
Large Bus	y = 0.12292 S*S - 13.68742 S + 541.0279
Small Truck	y = 0.06427 S*S - 7.06130 S + 318.3326
Large Truck	y = 0.11462 S*S - 12.85594 S + 503.7179

where: y = fuel consumption (liter/1,000 km)
s = running speed (kph)

B) EQUATIONS OF ENGINE OIL CONSUMPTION

Sedan/Van	y = 0.00025 S*S - 0.02664 S + 1.44171
Medium Bus	y = 0.00057 S*S - 0.06130 S + 3.31753
Large Bus	y = 0.00030 S*S - 0.12968 S + 7.06239
Small Truck	y = 0.00048 S*S - 0.05608 S + 3.07383
Large Truck	y = 0.00100 S*S - 0.11715 S + 6.40962

where: y = enigine oil consumption (liter/1,000 km)

C) EQUATIONS OF TIRE 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 tire wear of vehicle equated as wear of one tire per 1,000 kilometers

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 1,000 kilometers

2) Maintenance hours of labor

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 labor per 1,000 kilometers

E) EQUATIONS OF DEPRECIATION

Sedan/Van	y = 1/(2.5 S + 125)
Bus	y = 1/(8.756 S + 350)
Truck	y = 1/(6.129 S + 245)

where: y = depreciation per 1,000 kilometers, equated as the depreciable value of the vehicle

F) EQUATIONS OF INTEREST

Sedan/Van	y = (0.12 x 1000)/(500 S)
Bus	y = (0.12 x 1000)/(2,500 S)
Truck	y = (0.12 x 1000)/(1,750 S)

where: y = interest per 1,000 kilometers, equated as one half the value of the vehicle: interest = 12% per year

G) EQUATIONS OF INSURANCE

Sedan/Van	y = (0.035 x 1000 x 0.5)/(500 S)
Bus	y = (0.04 x 1000 x 0.5)/(2,500 S)
Truck	y = (0.06 x 1000 x 0.5)/(1,750 S)

where: y = insurance cost per 1,000 kilometers, equated as one half the value of the vehicle

Table continued
EQUATIONS FOR VEHICLE OPERATING COSTS

H) EQUATIONS OF TRAVELLING HOURS FOR WAGES

Bus	y = 1,000/S
Truck	y = 1,000/S

where: y = travelling time per 1,000 kilometers

Average crew size per vehicle:

Medium Bus	Driver: 1	Conductor: 1.7
Large Bus	Driver: 1	Conductor: 2
Small Truck	Driver: 1	Assistant: 1
Large Truck	Driver: 1	Assistant: 2

Overhead:

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

Assumptions

Parameters	Sedan/Van	Bus	Truck
Average Year-Round Speed (km/hr)	50	40	40
Average Annual Distance Travelled (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

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