Technical Volume

Chapter **8**

CONSTRUCTION AND LAND COST

CHAPTER 8 CONSTRUCTION AND LAND COST

8.1 Construction Cost

Table 8-1 : Construction Quantity and Cost (Section 1)

No.	Description	Unit	Unit Price	Quantity		Cost		
				Sec. 1-A	Sec. 1-B	Sec. 1-A	Sec. 1-B	Total
1.	General					24,963,750.0	30,511,250.0	55,475,000.0
	Maintenance & Protection of Traffic	L.S.				4,992,750.0	6,102,250.0	11,095,000.0
	Mobilization / Demobilization	L.S.				14,978,250.0	18,306,750.0	33,285,000.0
	Work in or Dearing with Exist.Water	L.S.				4,992,750.0	6,102,250.0	11,095,000.0
2.	Site Clearing					261,558.0	237,150.0	498,708.0
	Clearing and Grubbing	m2	0.6	435,930.0	395,250.0	261,558.0	237,150.0	498,708.0
3.	Road Earthwork					54,135,945.5	48,358,859.5	102,494,805.0
	Common Excavation (Common Soile)	m3	6.5	397,250.0	390,250.0	2,582,125.0	2,536,625.0	5,118,750.0
	Soft Rock Excavation	m3	11.3	2,447,060.0	2,403,940.0	27,651,778.0	27,164,522.0	54,816,300.0
	Hard Rock Excavation	m3	34.3			0.0	0.0	0.0
	Borrow Material	m3	22.6	1,057,612.5	825,562.5	23,902,042.5	18,657,712.5	42,559,755.0
	Soft Ground Treatment	m2	47.3			0.0	0.0	0.0
4.	Bridge					191,866,000.0	163,581,000.0	355,447,000.0
	L<20M	m2	1,100.0	7,685.0	45,040.0	8,453,500.0	49,544,000.0	57,997,500.0
	20m<L<30m	m2	1,500.0	12,795.0	31,880.0	19,192,500.0	47,820,000.0	67,012,500.0
	30m<L	m2	2,000.0	11,050.0	21,680.0	22,100,000.0	43,360,000.0	65,460,000.0
	Continous Box Girder	m2	3,800.0	37,400.0	6,015.0	142,120,000.0	22,857,000.0	164,977,000.0
5.	Drainage					9,221,254.0	9,837,738.0	19,058,992.0
	Side Ditch	m	120.0	13,820.0	12,620.0	1,658,400.0	1,514,400.0	3,172,800.0
	R.C.Pipe Culvert	m	275.6	50.0	0.0	13,780.0	0.0	13,780.0
	R.C.Box Culvert	m	9,678.3	780.0	860.0	7,549,074.0	8,323,338.0	15,872,412.0
6.	Pavement					14,174,655.0	12,942,589.5	27,117,244.5
	Subgrade Preparetion	m2	0.6	210,755.0	192,455.0	126,453.0	115,473.0	241,926.0
	Granular Subbase	m3	26.0	63,226.5	57,736.5	1,643,889.0	1,501,149.0	3,145,038.0
	Macadam Road Base Course	m3	34.3	63,266.5	57,736.5	2,170,041.0	1,980,362.0	4,150,402.9
	Prime/Tack Cost	m2	1.3	421,510.0	384,910.0	547,963.0	500,383.0	1,048,346.0
	Asphaltic Treated Base Course	ton	84.1	56,903.9	51,962.8	4,785,618.0	4,370,071.5	9,155,689.5
	Asphaltic Concrete Surface Course	ton	101.1	48,473.7	44,264.6	4,900,691.1	4,475,151.1	9,375,842.1
	Concrete Pavement	m2	80.3	0.0	0.0	0.0	0.0	0.0
7.	Miscellaneous					3,917,044.6	4,453,524.0	8,370,568.6
	Turfing (Common Soil)	m2	4.0	72,633.4	56,697.0	290,533.6	226,788.0	517,321.6
	Turfing (Soft Rock)	m2	11.0			0.0	0.0	0.0
	Guardrail	m	50.0	4,740.0	3,700.0	237,000.0	185,000.0	422,000.0
	Delinator	unit	30.0	210.0	247.0	6,300.0	7,410.0	13,710.0
	Road Marking	m2	27.0	11,198.0	13,173.0	302,346.0	355,671.0	658,017.0
	Guide Signs	unit	2,000.0	3.0	6.0	6,000.0	12,000.0	18,000.0
	Regulatory and Warning Sign	unit	35.0	21.0	25.0	735.0	875.0	1,610.0
	ROW Fence	m	115.0	21,000.0	25,000.0	2,415,000.0	2,875,000.0	5,290,000.0
	Emergency Telphone	km	65,000.0	10.0	12.0	650,000.0	780,000.0	1,430,000.0
	ROW Pegs	unit	20.0	419.0	494.0	8,380.0	9,880.0	18,260.0
	Kilometer Post	unit	75.0	10.0	12.0	750.0	900.0	1,650.0
8.	Tunnel					136,404,840.0	231,474,880.0	367,879,720.0
	Tunnel	m	103,337.0	1,320.0	2,240.0	136,404,840.0	231,474,880.0	367,879,720.0
9.	Interchange					84,072,749.0	185,075,474.0	269,148,223.0
	Interchange	L.S.		1.0	3.0	84,072,749.0	185,075,474.0	269,148,223.0
10.	Service Facilities					1,182,905.9	752,758.3	1,935,664.2
	Service Area	unit	1,182,905.9	1.0		1,182,905.9	0.0	1,182,905.9
	Rest Area	unit	752,758.3		1.0	0.0	752,758.3	752,758.3
					Total	520,200,702.0	687,225,223.3	1,207,425,925.3

Table 8-2 : Construction Quantity and Cost (Section 2)

No.	Description	Unit	Unit Price	Quantity		Cost		
				Sec. 2-A	Sec. 2-B	Sec. 2-A	Sec. 2-B	Total
1.	General					46,131,000.0	30,754,000.0	76,885,000.0
	Maintenance & Protection of Traffic	L.S.				13,377,990.0	8,918,660.0	22,296,650.0
	Mobilization / Demobilization	L.S.				23,526,810.0	15,069,460.0	38,596,270.0
	Work in or Dearing with Exist.Water	L.S.				9,226,200.0	6,765,880.0	15,992,080.0
2.	Site Clearing					470,316.0	358,620.0	828,936.0
	Clearing and Grubbing	m2	0.6	783,860.0	597,700.0	470,316.0	358,620.0	828,936.0
3.	Road Earthwork					88,707,316.5	64,656,283.5	153,363,600.0
	Common Excavation (Common Soile)	m3	6.5	540,705.0	639,015.0	3,514,582.5	4,153,597.5	7,668,180.0
	Soft Rock Excavation	m3	11.3	3,062,400.0	3,619,200.0	34,605,120.0	40,896,960.0	75,502,080.0
	Hard Rock Excavation	m3	34.3			0.0	0.0	0.0
	Borrow Material	m3	22.6	2,238,390.0	867,510.0	50,587,614.0	19,605,726.0	70,193,340.0
	Soft Ground Treatment	m2	47.3			0.0	0.0	0.0
4.	Bridge					255,902,150.0	319,943,100.0	575,845,250.0
	L<20M	m2	1,100.0	104,636.5	5,781.0	115,100,150.0	6,359,100.0	121,459,250.0
	20m<L<30m	m2	1,500.0	55,216.0	12,090.0	82,824,000.0	18,135,000.0	100,959,000.0
	30m<L	m2	2,000.0	15,366.0	10,630.0	30,732,000.0	21,260,000.0	51,992,000.0
	Continous Box Girder	m2	3,800.0	7,170.0	72,155.0	27,246,000.0	274,189,000.0	301,435,000.0
5.	Drainage					21,811,902.0	7,038,384.0	28,850,286.0
	Side Ditch	m	120.0	25,300.0	19,940.0	3,036,000.0	2,392,800.0	5,428,800.0
	R.C.Pipe Culvert	m	275.6			0.0	0.0	0.0
	R.C.Box Culvert	m	9,678.3	1,940.0	480.0	18,775,902.0	4,645,584.0	23,421,486.0
6.	Pavement					25,556,666.4	20,142,290.5	45,698,956.9
	Subgrade Preparetion	m2	0.6	385,825.0	304,085.0	231,495.0	182,451.0	413,946.0
	Granular Subbase	m3	26.0	115,747.5	91,225.5	3,009,435.0	2,371,863.0	5,381,298.0
	Macadam Road Base Course	m3	34.3	115,747.5	91,225.5	3,970,139.3	3,129,034.7	7,099,173.9
	Prime/Tack Cost	m2	1.3	771,650.0	608,170.0	1,003,145.0	790,621.0	1,793,766.0
	Asphalt Treated Base Course	ton	84.1	104,172.8	82,103.0	8,760,932.5	6,904,862.3	15,665,794.8
	Asphalt Concrete Surface Course	ton	101.1	84,881.5	66,898.7	8,581,519.7	6,763,458.6	15,344,978.2
	Concrete Pavement	m2	80.3	0.0	0.0	0.0	0.0	0.0
7.	Miscellaneous					10,259,331.0	6,322,270.0	16,581,601.0
	Turfing (Common Soil)	m2	4.0	158,248.0	61,330.0	632,992.0	245,320.0	878,312.0
	Turfing (Soft Rock)	m2	11.0		0.0	0.0	0.0	0.0
	Guardrail	m	50.0	12,540.0	4,860.0	627,000.0	243,000.0	870,000.0
	Delinator	unit	30.0	472.0	280.0	14,160.0	8,400.0	22,560.0
	Road Marking	m2	27.0	25,172.0	14,945.0	679,644.0	403,515.0	1,083,159.0
	Guide Signs	unit	2,000.0	2.0	4.0	4,000.0	8,000.0	12,000.0
	Regulatory and Warning Sign	unit	35.0	46.0	30.0	1,610.0	1,050.0	2,660.0
	ROW Fence	m	115.0	46,000.0	30,000.0	5,290,000.0	3,450,000.0	8,740,000.0
	Emergency Telphone	km	65,000.0	46.0	30.0	2,990,000.0	1,950,000.0	4,940,000.0
	ROW Pegs	unit	20.0	910.0	593.0	18,200.0	11,860.0	30,060.0
	Kilometer Post	unit	75.0	23.0	15.0	1,725.0	1,125.0	2,850.0
8.	Tunnel					511,518,150.0	77,502,750.0	589,020,900.0
	Tunnel	m	103,337.0	4,950.0	750.0	511,518,150.0	77,502,750.0	589,020,900.0
9.	Interchange					81,143,689.0	77,727,553.0	158,871,242.0
	Interchange	unit	0.0	1.0	2.0	81,143,689.0	77,727,553.0	158,871,242.0
10.	Service Facilities					1,182,905.9	752,758.3	1,935,664.2
	Service Area	unit	1,182,905.9	1.0		1,182,905.9	0.0	1,182,905.9
	Rest Area	unit	752,758.3	0.0	1.0	0.0	752,758.3	752,758.3
					Total	1,042,683,426.8	605,198,009.3	1,647,881,436.1

Table 8-3 : Construction Quantity and Cost (Section 3)

No.	Description	Unit	Unit Price	Quantity		Cost		
				Sec. 3-A	Sec. 3-B	Sec. 3-A	Sec. 3-B	Total
1.	General					21,881,393.0	40,259,607.0	62,141,000.0
	Maintenance & Protection of Traffic	L.S.				5,689,162.2	10,467,497.8	16,156,660.0
	Mobilization / Demobilization	L.S.				11,159,510.4	20,532,399.6	31,691,910.0
	Work in or Dearing with Exist.Water	L.S.				5,032,720.4	9,259,709.6	14,292,430.0
2.	Site Clearing					255,132.0	538,992.0	794,124.0
	Clearing and Grubbing	m2	0.6	425,220.0	898,320.0	255,132.0	538,992.0	794,124.0
3.	Road Earthwork		0.0			47,743,033.8	96,806,106.3	144,549,140.0
	Common Excavation (Common Soile)	m3	6.5	104,737.5	411,862.5	680,793.8	2,677,106.3	3,357,900.0
	Soft Rock Excavation	m3	11.3	489,440.0	1,924,640.0	5,530,672.0	21,748,432.0	27,279,104.0
	Hard Rock Excavation	m3	34.3			0.0	0.0	0.0
	Borrow Material	m3	22.6	1,837,680.0	3,202,680.0	41,531,568.0	72,380,568.0	113,912,136.0
	Soft Ground Treatment	m2	47.3			0.0	0.0	0.0
4.	Bridge					218,813,800.0	247,088,600.0	465,902,400.0
	L<20M	m2	1,100.0	1,313.0	1,124.0	1,444,300.0	1,236,400.0	2,680,700.0
	20m<L<30m	m2	1,500.0	23,741.0	32,872.0	35,611,500.0	49,308,000.0	84,919,500.0
	30m<L	m2	2,000.0	34,715.0	30,235.0	69,430,000.0	60,470,000.0	129,900,000.0
	Continous Box Girder	m2	3,800.0	29,560.0	35,809.0	112,328,000.0	136,074,200.0	248,402,200.0
5.	Drainage					9,669,006.0	14,848,845.0	24,517,851.0
	Side Ditch	m	120.0	14,440.0	30,990.0	1,732,800.0	3,718,800.0	5,451,600.0
	R.C.Pipe Culvert	m	275.6	0.0	0.0	0.0	0.0	0.0
	R.C.Box Culvert	m	9,678.3	820.0	1,150.0	7,936,206.0	11,130,045.0	19,066,251.0
6.	Pavement					14,586,473.4	31,304,395.2	45,890,868.6
	Subgrade Preparetion	m2	0.6	220,210.0	472,597.5	132,126.0	283,558.5	415,684.5
	Granular Subbase	m3	26.0	66,063.0	141,779.3	1,717,638.0	3,686,261.8	5,403,899.8
	Macadam Road Base Course	m3	34.3	66,063.0	141,779.4	2,265,960.9	4,863,033.4	7,128,994.3
	Prime/Tack Cost	m2	1.3	440,420.0	945,195.0	572,546.0	1,228,753.5	1,801,299.5
	Asphalt Treated Base Course	ton	84.1	59,456.5	127,601.3	5,000,291.7	10,731,269.3	15,731,561.0
	Asphalt Concrete Surface Course	ton	101.1	48,446.2	103,971.5	4,897,910.8	10,511,518.7	15,409,429.5
	Concrete Pavement	m2	80.3		0.0	0.0	0.0	0.0
7.	Miscellaneous					4,599,903.7	9,057,867.2	13,657,770.9
	Turfing (Common Soil)	m2	4.0	180,234.0	314,109.0	720,936.0	1,256,436.0	1,977,372.0
	Turfing (Soft Rock)	m2	11.0	0.0	0.0	0.0	0.0	0.0
	Guardrail	m	50.0	11,780.0	20,530.0	589,000.0	1,026,500.0	1,615,500.0
	Delinator	unit	30.0	203.0	373.5	6,090.0	11,205.0	17,295.0
	Road Marking	m2	27.0	10,835.1	19,935.6	292,547.7	538,261.2	830,808.9
	Guide Signs	unit	2,000.0	2.0	11.0	4,000.0	22,000.0	26,000.0
	Regulatory and Warning Sign	unit	35.0	20.0	27.0	700.0	945.0	1,645.0
	ROW Fence	m	115.0	14,440.0	32,670.0	1,660,600.0	3,757,050.0	5,417,650.0
	Emergency Telphone	km	65,000.0	20.3	37.4	1,319,500.0	2,431,000.0	3,750,500.0
	ROW Pegs	unit	20.0	289.0	653.0	5,780.0	13,060.0	18,840.0
	Kilometer Post	unit	75.0	10.0	18.8	750.0	1,410.0	2,160.0
8.	Tunnel					0.0	0.0	0.0
	Tunnel	m	103,337.0		0.0	0.0	0.0	0.0
9.	Interchange					33,794,211.4	296,125,235.8	329,919,447.2
	Interchange	unit	0.0	1.0	1.0	33,794,211.4	296,125,235.8	329,919,447.2
10.	Service Facilities					752,758.3	1,182,905.9	1,935,664.2
	Service Area	unit	1,182,905.9	0.0	1.0	0.0	1,182,905.9	1,182,905.9
	Rest Area	unit	752,758.3	1.0	0.0	752,758.3	0.0	752,758.3
					Total	352,095,711.5	737,212,554.4	1,089,308,265.9

Table 8-4 : Total Construction Quantity and Cost

No.	Description	Unit	Unit Price	Quantity	Cost
1.	General				194,501,000.0
	Maintenance & Protection of Traffic	L.S.			49,548,310.0
	Mobilization / Demobilization	L.S.			103,573,180.0
	Work in or Dearing with Exist Water	L.S.			41,379,510.0
2.	Site Clearing				2,121,768.0
	Clearing and Grubbing	m2	0.6	3,536,280.0	2,121,768.0
3.	Road Earthwork				400,407,545.0
	Common Excavation (Common Soile)	m3	6.5	2,483,820.0	16,144,830.0
	Soft Rock Excavation	m3	11.3	13,946,680.0	157,597,484.0
	Hard Rock Excavation	m3	34.3	0.0	0.0
	Borrow Material	m3	22.6	10,029,435.0	226,665,231.0
	Soft Ground Treatment	m2	47.3	0.0	0.0
4.	Bridge				1,397,194,650.0
	L<20M	m2	1,100.0	165,579.5	182,137,450.0
	20m<L<30m	m2	1,500.0	168,594.0	252,891,000.0
	30m<L	m2	2,000.0	123,676.0	247,352,000.0
	Continous Box Girder	m2	3,800.0	188,109.0	714,814,200.0
5.	Drainage				72,427,129.0
	Side Ditch	m	120.0	117,110.0	14,053,200.0
	R.C.Pipe Culvert	m	275.6	50.0	13,780.0
	R.C.Box Culvert	m	9,678.3	6,030.0	58,360,149.0
6.	Pavement				118,707,070.0
	Subgrade Preparetion	m2	0.6	1,785,927.5	1,071,556.5
	Granular Subbase	m3	26.0	535,778.3	13,930,235.8
	Macadam Road Base Course	m3	34.3	535,818.4	18,378,571.1
	Prime/Tack Cost	m2	1.3	3,571,855.0	4,643,411.5
	Asphalt Treated Base Course	ton	84.1	482,200.3	40,553,045.2
	Asphalt Concrete Surface Course	ton	101.1	396,936.2	40,130,249.8
	Concrete Pavement	m2	80.3	0.0	0.0
7.	Miscellaneous				38,609,940.5
	Turfing (Common Soil)	m2	4.0	843,251.4	3,373,005.6
	Turfing (Soft Rock)	m2	11.0	0.0	0.0
	Guardrail	m	50.0	58,150.0	2,907,500.0
	Delinator	unit	30.0	1,785.5	53,565.0
	Road Marking	m2	27.0	95,258.7	2,571,984.9
	Guide Signs	unit	2,000.0	28.0	56,000.0
	Regulatory and Warning Sign	unit	35.0	169.0	5,915.0
	ROW Fence	m	115.0	169,110.0	19,447,650.0
	Emergency Telphone	km	65,000.0	155.7	10,120,500.0
	ROW Pegs	unit	20.0	3,358.0	67,160.0
	Kilometer Post	unit	75.0	88.8	6,660.0
8.	Tunnel				956,900,620.0
	Tunnel	m	103,337.0	9,260.0	956,900,620.0
9.	Interchange				757,938,912.2
	Interchange	unit	0.0	9.0	757,938,912.2
10.	Service Facilities				5,806,992.6
	Service Area	unit	1,182,905.9	3.0	3,548,717.7
	Rest Area	unit	752,758.3	3.0	2,258,274.9
				Total	3,944,615,627.3

8.2 Land Cost

Table 8-5 : Land Requirement for the KLORR

(Unit : m2)

	Section 1			Section 2			Section 3			Total
	Segment 1	Segment 2	Sub Total	Segment 1	Segment 2	Sub Total	Segment 1	Segment 2	Sub Total	
Orchard	180,000	30,000	210,000	90,000	60,000	150,000	120,000	120,000	240,000	600,000
Rubber	300,000	603,600	903,600	780,000	576,000	1,356,000	414,000	258,000	672,000	2,931,600
Oil Palm	144,000		144,000	150,000	120,000	270,000		120,000	120,000	534,000
Housing		120,000	120,000	360,000	30,000	390,000	78,000	120,000	198,000	708,000
Pond			0		90,000	90,000		60,000	60,000	150,000
Tin Mine			0			0		120,000	120,000	120,000
Total	624,000	753,600	1,377,600	1,380,000	876,000	2,256,000	612,000	798,000	1,410,000	5,043,600

Table 8-6 : Land Acquisition and Compensation Cost (Financial Cost)

(Unit : RM'000)

		Unit Price	Section 1			Section 2			Section 3			Total
		RM/m2	Segment 1	Segment 2	Sub Total	Segment 1	Segment 2	Sub Total	Segment 1	Segment 2	Sub Total	
Land Acquisition	Orchard	80	14,400	2,400	16,800	7,200	4,800	12,000	9,600	9,600	19,200	48,000
	Rubber	30	9,000	18,108	27,108	23,400	17,280	40,680	12,420	7,740	20,160	87,948
	Oil Palm	40	5,760	0	5,760	6,000	4,800	10,800	0	4,800	4,800	21,360
	Housing	400	0	48,000	48,000	144,000	12,000	156,000	31,200	48,000	79,200	283,200
	Pond	40	0	0	0	0	3,600	3,600	0	2,400	2,400	6,000
	Tin Mine	80	0	0	0	0	0	0	0	9,600	9,600	9,600
	Sub Total		29,160	68,508	97,668	180,600	42,480	223,080	53,220	82,140	135,360	456,108
Compensation			350	1,200		3,300	200		2,050	1,300		8,400
Total			29,510	69,708	99,218	183,900	42,680	226,580	55,270	83,440	138,710	464,508

Technical Volume

Chapter 9
STAGE CONSTRUCTION BY TRAFFIC OPERATION

CHAPTER 9 STAGE CONSTRUCTION BY TRAFFIC OPERATION

The KLORR is planned finally to operate with six (6) lanes - full access control.

As one of the scheduling plans of the construction, it is considered that depending upon the demand increase, the road construction would be carried out stage by stage such as

(1) 2 lane and 4 lane operation
(2) 4 lane operation

Each operation and cost estimates are discussed in this Chapter.

1. Type of Operation

1) 2 lane and 4 lane operation in stage 1

(1) Earthworks Section (4 lane operation)
- Road basement would be constructed for 6 lane operation
- Pavement work of 4 lanes will be completed in Stage 1

(2) Bridge (2 lane operation)
- One side bridge would be constructed in Stage 1
- Another side bridge would be constructed in Stage 2

(3) Tunnel (2 lane operation)
- One side tunnel would be constructed in Stage 1
- Another one would be constructed in Stage 2

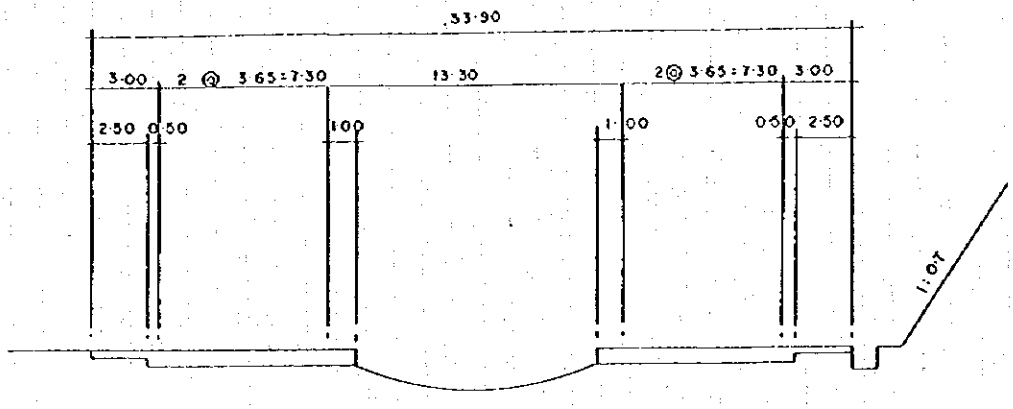
Adopting this stage plan, traffic queue would occur in the 2 lane operation section, such as the bridge or the tunnel, but the queue will be eliminated or moderated in the earthworks section by cars overtaking other cars or being overtaken themselves. However, the 2 lane operation section will have a small capacity as compared with the traffic demand. Even if the method is adopted, the next stage's construction has to be started immediately, and two step stages are needed for the final completion.

Thus, the stage construction is not recommended.

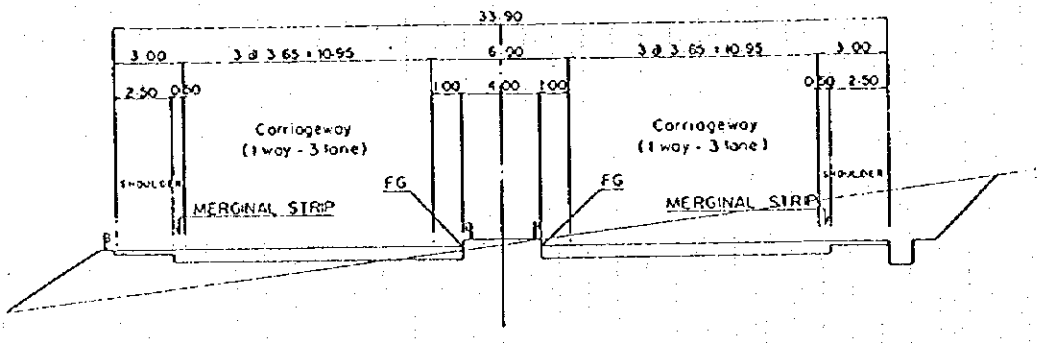
2) 4 lane operation in stage 1

(1) Earthworks Section (4 lane operation)

- Basement would be constructed for 6 lanes
- Pavement work would be made for 4 lanes in Stage 1
- Additional pavement work would be made for 6 lane operation in Stage2



Stage 1 (4 lane operation)

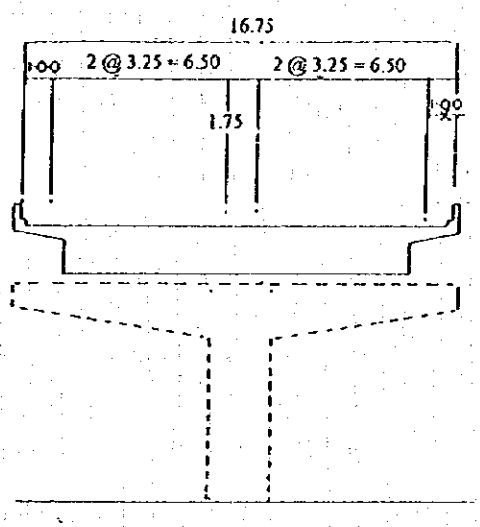


Stage 2 (6 lane operation)

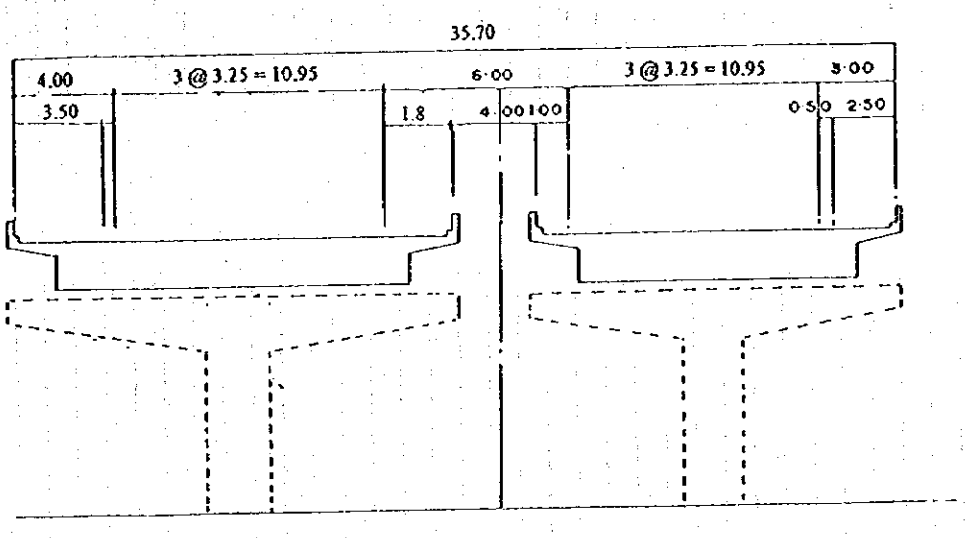
(2) Bridge Section (4 lane operation)

a) One side bridge to be used for two-directional traffic

- In Stage 1, one side bridge would be completed and two-way traffic with 4 lanes would be operated on it.
- In Stage 2, the other bridge will be built and operation of one-directional traffic will be made on each bridge, respectively.



Stage 1 (4 lane operation)



Stage 2 (6 lane operation)

b) Necessity of Widening the Width of Bridges

As it is impossible to use one bridge for 4 lane operation for two-directional traffic, it is necessary to expand the width of bridges for Stage 1 operation.

If the geometric design standard can be changed as a special case as shown in the table below, the minimum expansion is 1.80 meters i.e. from 14.95 meters to 16.75 meters for 4 lane operation.

Table 9-1 : Minimum Width of Roadway

	Standard (m)		Special Case (m)	
	Normal Standard	Width Needed	Special Case	Width Needed
• Lane width • Shoulder width • Median width	3.65 3.00 + 1.00	10.95 4.00	3.25 1.00 + 1.00	13.00 2.00 1.75
Total Width		14.95m		16.75m

There are problems in the Stage 1 operation in which the narrow width of the lanes will cause decrease in traffic capacity as well as increase in accident possibilities.

c) Necessity of Two Bridges to be located in interchange

There are bridges on the main road to be located from a ramp terminal to the next ramp terminal in an interchange. These bridges should be built under the original plan which is two bridge construction for each direction traffic, because the replacement of rampway is needed.

d) Final Feature

After the final stage, each bridge has a different width: one measures 16.75 meters (to be constructed in Stage 1) and the other measures 14.95 meters.

(3) Tunnel (4 lane operation)

a) One tunnel to be used for two-directional traffic

Like the bridge section, one original tunnel for three lane operation cannot accommodate four lanes' width for two-directional traffic, according to the above stated minimum standard. To expand the width by 3.80 meters is necessary to be provided for the four lanes for two-directional traffic under the special case. The width of three lanes on one direction is necessary to be 12.95 meters whilst the width of the two-directional four lanes (using one tunnel) is 16.75 meters.

Furthermore, it is technically difficult to construct the type of large size tunnel with carriageway width of 14 meters or more.

Thus, this method is not recommended.

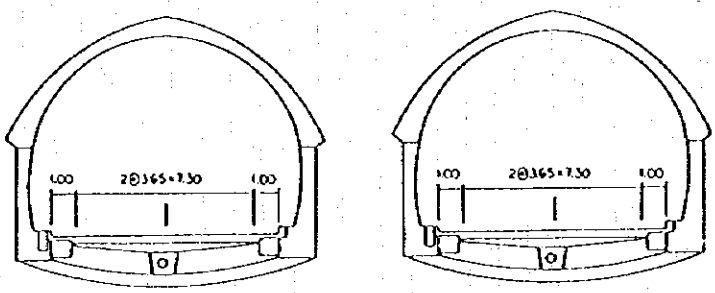
(2) Three tunnel operation (1)

- Two tunnels with 2 lanes for each directional traffic would be constructed in Stage 1. The crossing section is composed of both sides of shoulders (each of 1.00m width) and 2 lane carriageway (each of 3.65m width), and the total width is 9.30 meters.
- In Stage 2, one more tunnel of the same size would be built.

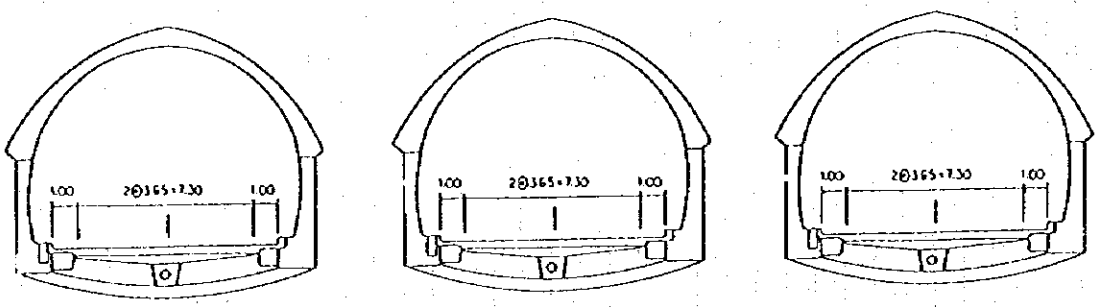
After Stage 2, one tunnel would be operated for two-directional traffic with one lane each. The other two tunnels would each accommodate one-way traffic.

In the stage 1, operation of traffic condition is good, but after Stage 2, it will be difficult to control the traffic in the center tunnel where one-way traffic must be used for one lane.

It is not preferred to have for control of traffic.



Stage 1



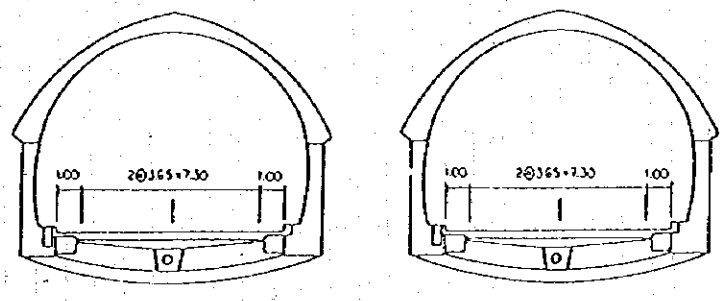
Stage 2

c) Three tunnel operation (2)

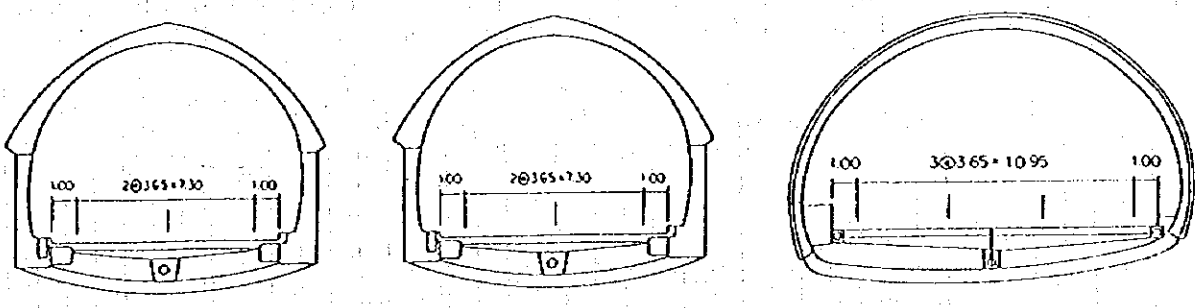
- Two tunnels with two lanes for each direction would be constructed in stage 1.
- In order to eliminate the demerits of the above mentioned method (1), the third tunnel with three lanes would be constructed in stage 2.

The stage 2 operation of the tunnels is carried out this way: Two tunnels with two lanes each are used for one-directional traffic, and the other tunnel with 3 lanes is for the other directional traffic.

This method is preferable if the stage plan of construction is adopted.



Stage 1



Stage 2

2. Estimated Cost for Stage Construction Plan

1) Alternative selection

Direct construction cost is estimated for four (4) alternatives under four lane operation in Stage 1 and six lane operation in Stage 2. These alternatives are selected under the conditions shown in Table 9-2.

Table 9-2 : Conditions of each Alternative

Stage	Type of Structure	Act 1	Act 2	Act 3	Act 4
Stage 1	Earth	4 lanes	4 lanes	4 lanes	4 lanes
	Bridge	One widened bridge	One widened bridge	One widened bridge	One widened bridge
	Tunnel	2 tunnels with 2 lanes	2 tunnels with 2 lanes	2 tunnels with 2 lanes	2 tunnels with 2 lanes
	Staging in Section	All 6 sections	All 6 sections	Except Sections 3-A and 3-B	Except Sections 3-A and 3-B
Stage 2 (additional works)	Earth	2 lanes	2 lanes	2 lanes	2 lanes
	Bridge	One standard bridge	One standard bridge	One standard bridge	One standard bridge
	Tunnel	1 tunnel with 3 lanes	1 tunnel with 2 lanes	1 tunnel with 3 lanes	1 tunnel with 2 lanes
	Staging in section	All 6 sections	All 6 sections	Except sections 3-A and 3-B	Except sections 3-A and 3-B

2) Estimated Cost

The estimated cost of each alternative is shown in Table 9-3. It is obvious that the stage construction will need a larger amount of cost than that of the original construction. The amount is 3 to 5% more.

Alternative 4 is the cheapest amongst all, but three tunnels with 2 lanes cannot be proposed. If the center tunnels are to be operated as one lane for each directional traffic, the capacity will become quite low and also occurrence of accident will be high.

Thus, Alternative 3 is preferable; the necessary costs are RM3,114.0 million in Stage 1 and RM1,185.1 million in stage 2. The total costs is RM4,299.1 million, which is RM354.5 million more or 9.0% higher than the cost of the original construction (RM 3,944.6 million).

3) Interchange

4) Consideration of traffic demand

Table 9-3 : Direct Construction Cost for Stage Construction

In case of four(4) lane operation to sex(6) lane operation

No.	Description	Staging	Sec 1-1	Sec 1-2	Sec 2-1	Sec 2-2	Sec 3-1	Sec 3-2	Total
Org.	Estimated Origenal Cost for 6 lane operation		520,247,532	687,166,286	1,042,716,944	605,162,151	352,110,046	737,218,576	3,944,621,534
Alt.1	Tunnel (2with 2lanes & 1with 3 lanes)	Stage 1	373,697,620	514,977,043	712,947,880	423,089,175	248,225,384	613,471,099	2,886,408,201
		Stage 2	207,389,487	247,691,990	478,390,821	251,599,358	142,403,951	171,836,234	1,499,311,840
		Total	581,087,107	762,669,033	1,191,338,700	674,688,533	390,629,335	785,307,333	4,385,720,041
		Ratio of Org.	1.117	1.110	1.143	1.115	1.109	1.065	1.112
Alt.2	Tunnel(3 with 3lanes)	Stage 1	373,697,620	514,977,043	712,947,880	423,089,175	248,225,384	613,471,099	2,886,408,201
		Stage 2	200,933,428	236,931,892	454,180,602	247,931,143	142,403,951	171,836,234	1,454,217,250
		Total	574,631,049	751,908,935	1,167,128,481	671,020,318	390,629,335	785,307,333	4,340,625,451
		Ratio of Org.	1.105	1.094	1.119	1.109	1.109	1.065	1.100
Alt.3	Tunnel (2with 2lanes & 1with 3 lanes) and No staging section 3	Stage 1	373,697,620	514,977,043	712,947,880	423,089,175	352,110,046	737,218,576	3,114,040,339
		Stage 2	207,389,487	247,691,990	478,390,821	251,599,358	0	0	1,185,071,656
		Total	581,087,107	762,669,033	1,191,338,700	674,688,533	352,110,046	737,218,576	4,299,111,995
		Ratio of Org.	1.117	1.110	1.143	1.115	1.000	1.000	1.090
Alt.4	Tunnel(3 with 3lanes) and No staging section 3	Stage 1	373,697,620	514,977,043	712,947,880	423,089,175	352,110,046	737,218,576	3,114,040,339
		Stage 2	200,933,428	236,931,892	454,180,602	247,931,143	0	0	1,139,977,065
		Total	574,631,049	751,908,935	1,167,128,481	671,020,318	352,110,046	737,218,576	4,254,017,405
		Ratio of Org.	1.105	1.094	1.119	1.109	1.000	1.000	1.078

Technical Volume

Chapter **10**
PROJECT EVALUATION

CHAPTER 10 PROJECT EVALUATION

1 INTRODUCTION

1.1 General

The purpose of the project evaluation in this study is two-fold; one is to evaluate the project viability from the national economic viewpoint, the other is to evaluate the financial viability from the private sector's viewpoint.

In other words, the former is to find whether or not a sufficient return to the national economy can be expected as the result of the project implementation.

The latter is to examine whether or not a sufficient profit can be brought about as a result of the investment for the project.

Project evaluation, in general, can be used for several purposes: to examine the project feasibility as stated above, to determine the optimum plan among several alternatives, to identify the project priority among several projects etc.. There is no alternative plan regarding the main features such as alignment, cross section etc., thus the objective of the project evaluation in this study is to examine the economic and financial viability of the formulated scheme.

1.2 Procedure

The evaluation procedure is shown in Figure 10A-1. Firstly, the project to be evaluated is identified. Assuming a tentative schedule, where the project is implemented within the shortest period, a preliminary economic evaluation is carried out to find the high priority section. Based on this result, alternative implementation schedules are prepared. Then a financial analysis is undertaken to find the various financial conditions to make the project feasible. Through this process, the most favorable implementation schedule is also identified. Finally, based on this schedule, the evaluation is made again from both the economic and financial viewpoints including a sensitivity analysis.

The sensitivity analysis for financial evaluation is made for the cases of different GRDP growth rate and estimation allowances for cost and benefit. On the other hand the sensitivity analysis for economic evaluation was not carried out, because of the project feature of extremely high feasibility.

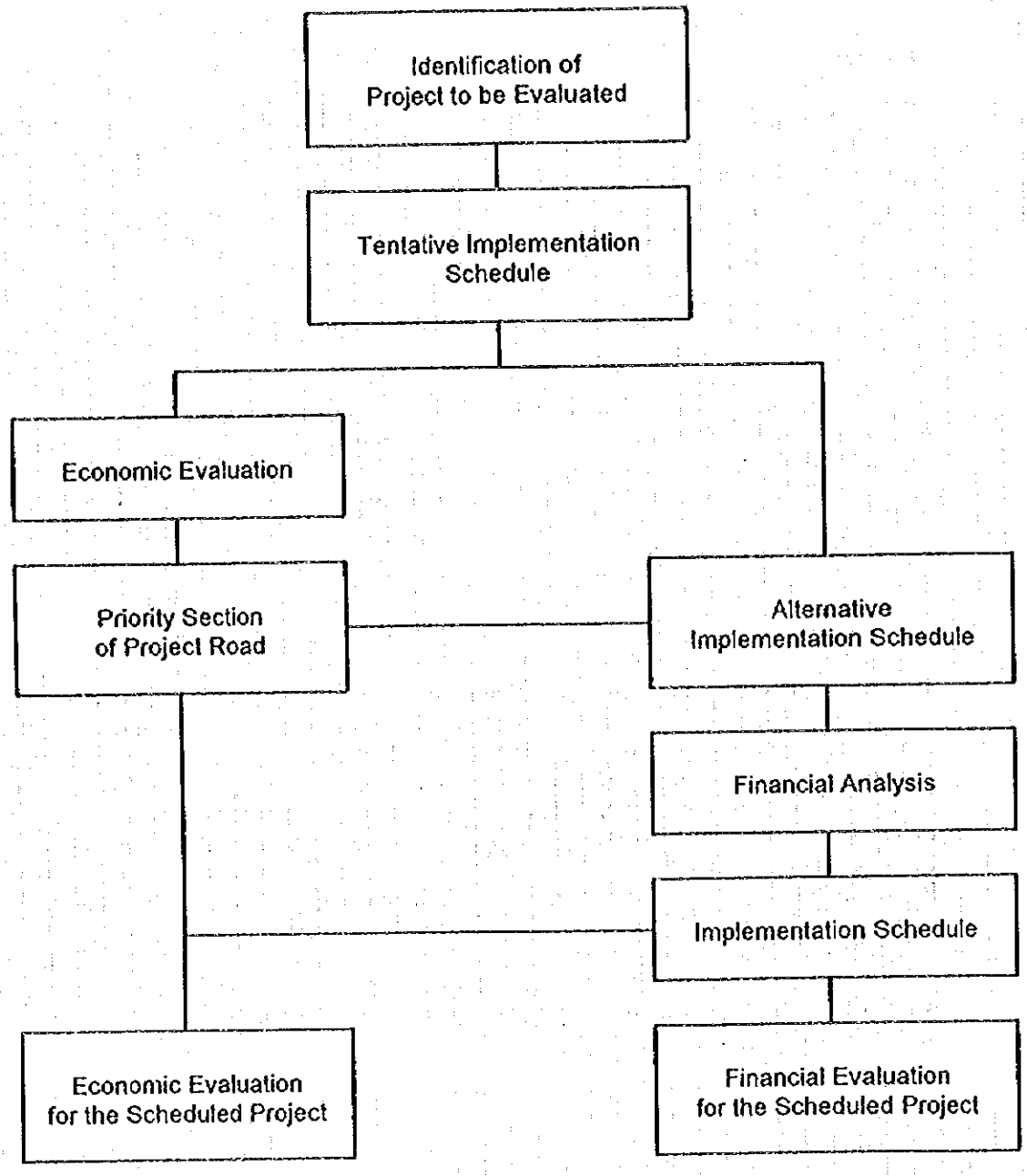


Figure 1-1 : Evaluation Procedure

2. ECONOMIC EVALUATION

2.1 Procedure

Economic evaluation generally aims to find the economic feasibility by examining whether the project will bring about sufficient contribution to the national or regional economy based on the comparison of the cost and benefit.

The general procedure of the economic evaluation is illustrated in Figure 2-1. Since the economic evaluation is made by comparing the cost and benefit, the construction cost and maintenance cost are converted to economic cost at first.

At the same time, the implementation schedules of the KLORR and the other related highway projects are determined. Based on the implementation schedules, the road network can be identified by corresponding target year such as 2000, 2010 etc..

Then the traffic assignment is made for the "with project" and "without project" cases by using the traffic demand and the network in the future target years.

The savings in vehicle-km and vehicle-hr are obtained from the traffic assignment results. Applying the unit benefit, the economic benefit of the KLOOR can be calculated.

As for the economic benefit, only the direct benefits are counted; (a) Saving in vehicle operating cost, (b) Saving in travel time, and (c) Reduction in traffic accident cost.

The evaluation is carried out by using a conventional indicators, i.e., Benefit cost Ratio, Net Present Value and Internal Rate of Return.

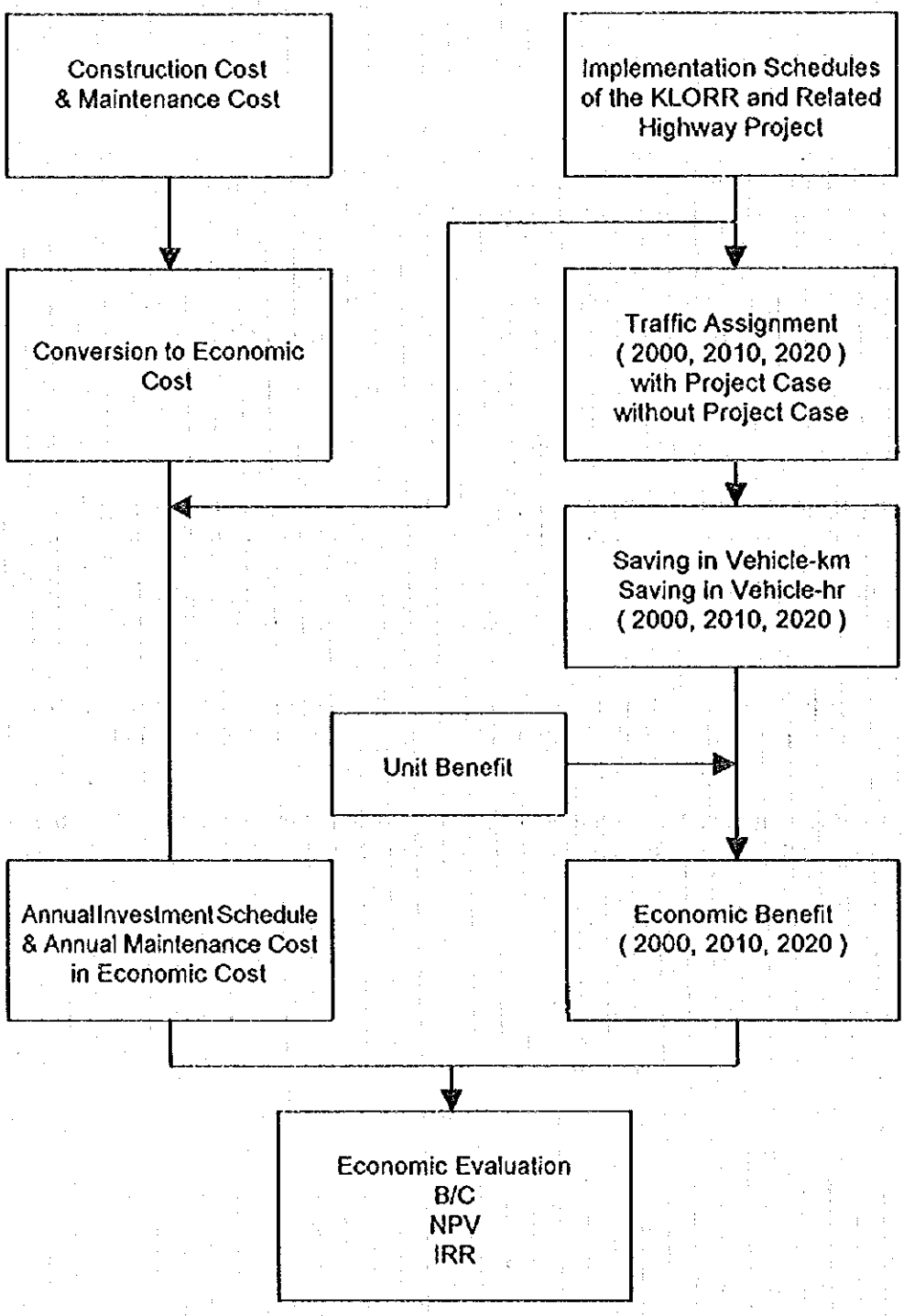


Figure 2-1 : General Procedure of Economic Evaluation

As mentioned above, the evaluation will be made three times for the following project cases.

(a) The proposed scheme as a whole based on the condition that the project is implemented during the years from 1997 to 2001 as shown below.

(b) The proposed scheme by section based on the same schedule assumed above. The section 2 is subdivided into two segments, since the section length is relatively long and requires large amount of construction cost.

Section 1: The section from the North-South Expressway at the North to the KL-Karak Highway

Section2: Segment1: The section from KL-Karak Highway to the Hull Langat Road

Segment 2: The section from the Hulu Langat Road to the Federal Road No.1 at the South

Section 3: The section from the Federal Road No.1 to N-S Central Link

(c) The proposed scheme as a whole according to the implementation schedule.

For the evaluation, the following conditions are assumed.

(a) The life of the project is assumed to be thirty(30)years

(b) The discount rate is 12 % per annum

(c) The implementation schedule is tentatively assumed as follows:

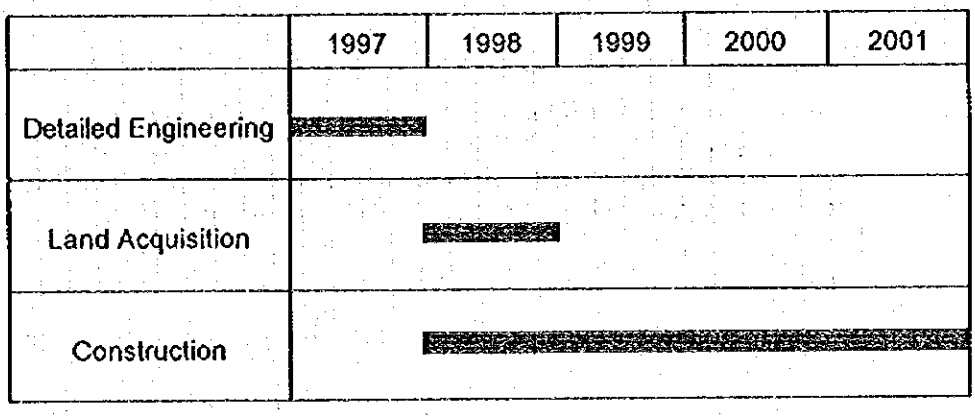


Figure 2-2 : Tentative Construction Schedule

As a result, the project road is assumed to be open to traffic in the year 2002.

2.2 Economic Cost

1) Economic Price

The economic evaluation uses the economic cost converted from the financial cost, which is calculated in market price. Market prices usually do not represent adequately scarcities of certain resources or surpluses of other resources and in addition, they are including indirect taxes or hidden subsidies which are transfer payments and not resources costs.

In order to convert from the market price to economic price or shadow price, the national parameters, i.e., a set of conversation factors have been prepared by EPU.

The national parameters cover a comprehensive range of tradeable and non-tradeable goods. Accordingly the national parameters are effectively utilized for estimating the economic cost after scrutinizing the appropriateness for their application.

(a) Skilled Labour

According to the Mid-Term Review of SMP, the unemployment rate dropped from 5.0 percent in 1990 to 3.0 percent in 1993. It is anticipated to further drop to 2.8 percent in 1995. This indicted that the Malaysian economy has reached a full employment level. This situation will be maintained as long as the recent economic growth is continued.

Hence, the market for skilled labour in Malaysia shows a scarcity, therefore the opportunity cost may be adequately reflected in the market wage. As a result, the market wage is applied as the economic price.

(b) Unskilled Labour

The conversion factor from the national parameter is 0.78, which has been estimated under relatively higher unemployment rate. Based on the current unemployment rate, 2.8%, the shadow wage rate is estimated to be 1.0, namely the market wage can be applied for unskilled labour as well.

(c) Land

The area along the Outer Ring Road is presently used as a forest agriculture and partly residential.

Land is freely traded except for the reserve land. Since the project corridor is located adjacent to the urbanized area, the market price will be applied as the economic price of land.

The reserve land, which is mainly govemment land , are not counted as the land acquisition cost in case of financial cost.

However, these costs are to be included in the economic cost by estimating the unit price from the adjacent land cost.

(d) Other Cost Items

Project cost is disaggregated into various costs of tradeable non-tradeable goods such as construction materials, equipments and labour etc. Construction materials are further broken down into detail cost items such as cement, steel, asphalt etc. As for these materials and equipment costs, the conversion factors

from the national parameters will be applied. The conversion factors for major item are as follows.

- Cement : 0.92
- Steel(Foreign) : 0.77
- Steel(Local) : 0.99
- Asphalt : 0.92
- Plywood : 1.00
- Construction Equipment(Foreign) : 1.00
- Construction Equipment(Local) : 0.94
- Diesel Fuel : 0.88

(e) Construction Cost

The construction cost is broken down into these basic cost items as listed above, the economic cost can be obtained by applying the above factors.

The economic cost by section is estimated as Table 2-1.

Table 2-1 : Estimation of Economic Cost of Construction Cost

(RM '000)

Section		LFU	LCE	FST	FAS	LPL	LLA	FEQ	LEQ	LST	LTA	TOTAL
Section 1 Segment 1	Financial	15469	33591	108903	14798	2088	123268	121628	33381	34292	5681	520248
	Conversion	0.88	0.92	0.77	0.92	1	1	1	0.94	0.99	0	
	Economic	13613	30904	83855	13614	2088	128937	121628	31378	33949	0	481146
Section 1 Segment 2	Financial	20328	52850	159610	30464	4782	190684	197403	43396	49934	8008	794659
	Conversion	0.88	0.92	0.77	0.92	1	1	1	0.94	0.99	0	
	Economic	17889	48622	122900	28027	4782	190684	197403	40792	49435	0	737733
Section 2 Segment 1	Financial	30875	65771	237209	16186	4336	239377	266272	63675	69189	1182	104271
	Conversion	0.88	0.92	0.77	0.92	1	1	1	0.94	0.99	6	6
	Economic	27170	60509	182651	14891	4336	266272	266272	59855	68497	0	961558
Section 2 Segment 2	Financial	19007	38674	132685	14483	2492	139158	139158	40731	40972	7283	605161
	Conversion	0.88	0.92	0.77	0.92	1	1	1	0.94	0.99	0	
	Economic	16726	35580	102175	13324	2492	139158	139158	38287	40562	0	557971
Section 3 Segment 1	Financial	11307	21677	73940	6900	1362	82143	82143	26589	23287	4336	352109
	Conversion	0.88	0.92	0.77	0.92	1	1	1	0.94	0.99	0	
	Economic	9950	19943	56934	6348	1362	82143	82143	24994	23054	0	325297
Section 3 Segment 2	Financial	20461	50384	111936	48332	4171	144332	144332	50944	45730	8210	737218
	Conversion	0.88	0.92	0.77	0.92	1	1	1	0.94	0.99	0	
	Economic	18006	46353	86191	44465	4171	144332	144332	47887	45273	0	689396

Note : LFU : Diesel Fuel
LCE : Cement
FST : Steel(Foreign)
FAS : Asphalt
LPL : Plywood
LLA : Labour Cost
FEQ : Construction Equipment(Foreign)
LEQ : Construction Equipment(Local)
LST : Steel(Local)
LTA : Tax

As for the land acquisition and compensation cost, the government land is mainly consist of rubber and pond area in Table 2-2, which shows the land requirement for the ORR.

Table 2-2 : Land Requirement for ORR

(m²)

	Section 1 Segment 1	Segment2	Section 2 Segment 1	Segment 2	Section 3 Segment 1	Segment 2
Orchard	180000	30000	90000	60000	120000	120000
Rubber	300000	603600	780000	576000	414000	258000
Oil Palm	144000		150000	120000		120000
Housing		120000	360000	30000	78000	120000
Pond				90000		60000
Tin Mine						120000
Total	624000	753600	1380000	876000	612000	798000

The land price for those area in financial cost, which is shown in Table 2-3, is accounted only for the compensation cost, therefore, the land price of the adjacent area is accounted in terms of economic cost.

Table 2-3 : Land Acquisition and Compensation Cost (Financial Cost)

(RM'000)

	Unit Price RM/m2	Section 1 Segment1	Segment2	Section 2 Segment1	Segment2	Section3 Segment1	Segment2	Total
Orchard	80	14400	2400	7200	4800	9600	9600	48000
Rubber	30	9000	18108	23400	17280	12420	7740	87948
Oil Palm	40	5760	0	6000	4800	0	4800	21360
Housing	400	0	48000	144000	12000	31200	48000	283200
Pond	40	0	0	0	3600	0	2400	6000
Tin Mine	80	0	0	0	0	0	9600	9600
Sub Total		29160 Sec Total	68508 97668	180600 Sec Total	42480 223080	53220 Sec Total	82140 135360	456108
Compensation		350	1200	3300	200	2050	1300	8400
Total		29510 Sec Total	69708 99218	183900 Sec Total	42680 226580	55270 Sec Total	83440 13870	464508

As a result, the land cost in economic cost is estimated as shown in Table 2-4.

Regarding the compensation, the number of houses to be relocated are counted in each section at first, then the compensation cost is estimated by assuming the average cost of RM50,000 per house.

With regard to the other costs such as environmental protection cost, detail engineering cost, the combined conversion factor is applied to obtain the economic cost. The combined conversion factor for construction work is defined as 0.9215. As a consequence, the project cost is converted to the economic cost as shown in Table 2-5.

Table 2-4 : Land Acquisition and Compensation Cost (Economic Cost)

(RM'000)

	Unit Price RM/m2	Section 1 Segment1	Segment2	Section 2 Segment1	Segment2	Section3 Segment1	Segment2	Total
Orchard	80	14400	2400	7200	4800	9600	9600	48000
Rubber	40	12000	24144	31200	23040	16560	10320	117264
Oil Palm	40	5760	0	6000	4800	0	4800	21360
Housing	400	0	48000	144000	12000	31200	48000	283200
Pond	80	0	0	0	7200	0	4800	12000
Tin Mine	80	0	0	0	0	0	9600	9600
Sub Total		32160 Sec Total	74544 106704	188400 Sec Total	51840 240240	57360 Sec Total	87120 144480	491424
Compensation		350	1200	3300	200	2050	1300	8400
Total		32510 Sec Total	75744 108254	191700 Sec Total	52040 243740	59410 Sec Total	88420 147830	499824

Table 2-5 : Project Cost

(RM '000)

	Section 1	Section 2		Section 3	Total
	N-S Expressway - Karak Highway	Segment 1 Karak Highway- Hulu Langat Road	Segment 2 Hulu Langat - Federal Route1	Federal Route1 - N-S Central Link	
Financial Cost					
· Design	60,397	52,136	30,358	54,446	197,337
· Land Acquisition	99,218	183,900	42,680	138,710	464,508
· Construction	1,207,447	1,042,717	605,162	1,089,318	3,944,644
· Environmental Protection	12,074	10,427	6,051	10,893	39,445
Total	1,379,136	1,289,180	684,251	1,293,367	4,645,934
Economic Cost					
· Design	55,656	48,043	27,883	50,190	181,772
· Land Acquisition	108,254	191,700	52,040	147,830	499,824
· Construction	1,119,118	961,558	557,971	1,014,693	3,653,340
· Environmental Protection	11,127	9,608	5,576	10,038	36,349
Total	1,294,155	1,210,909	643,470	1,222,751	4,371,285

2) Maintenance Cost

Maintenance cost is also converted to the economic cost by employing combined conversion factor for road maintenance work. The result is shown in Table 2-6.

Table 2-6 : Maintenance Cost

	Section 1	Section 2		Section 3	Total
	N-S Expressway - Karak Highway	Segment 1 Karak Highway- Hulu Langat Road	Segment 2 Hulu Langat - Federal Route1	Federal Route1 - N-S Central Link	
Financial Cost					
Annual Maintenance (RM '000/yr)	2,342	3,370	2,133	2,955	10,800
Periodical Maintenance (RM '000/5 yr)	3,282	1,991	1,798	4,569	11,730
Economic Cost					
Annual Maintenance (RM '000/yr)	2,158	3,106	1,966	2,723	9,953
Periodical Maintenance (RM '000/5 yr)	3,025	1,835	1,657	4,293	10,810

2.3 Economic Benefit

Among the various benefits derived from the implementation of the road network plan, the following factors are counted as the economic benefits.

a. Saving in vehicle operating cost
b. Saving in travel time cost
c. Reduction of traffic accident

In addition to these direct benefits, several other direct and indirect benefits can be identified, e.g., increased comfort in vehicle operation, the promotion effect of regional development, increase in land price etc.. These benefits, however, are not counted in this study since they are difficult to be measured in monetary terms. Even though they could be quantified, the estimates are unreliable and sometimes may cause double counting of the benefits.

2.3.1 Vehicle Operating Cost

The vehicle operating cost is calculated based on the representative vehicles in Malaysia by surveying the current market prices and reviewing past studies on operating cost.

The costs are composed of distance related cost and time related cost.

In this paper, the vehicles are divided into 5 categories i.e. passenger car, van, medium lorry, heavy lony and bus. Furthermore, the vehicles are categorized into 3 types namely passenger car, lorry and bus, in order to adjust to the categories in traffic projection (Refer Appendix).

Lorry is defined as van, medium lorry and heavy lorry and the composition ratios are as the followings :

Table 2-7 : Composition Ratio of Lorry

Vehicle Type	Van	Medium Lorry	Heavy Lorry
Peninsular	37.0%	37.1%	25.9%
Sabah	66.6%	27.7%	5.6%
Sarawak	49.6%	21.9%	28.5%

Source : HPU Traffic Counting
RIS and Rcs, HNDP

In Sabah, the category of bus is assumed to consist 80% on mini-bus (Van Type) and 20% of large bus.

1) Prices of New Vehicles

The price of various representative models of the vehicles are presented in Table 2-8. The prices shown in the Table are the price on-the-road as of September 1995 which includes the government's net approved selling price plus purchases related taxes and the prices of options.

The prices of passengercar and bus are taken from the average prices of both type of vehicles respectively.

For the purpose of the Study, the sales price is applied and is calculated by subtracting the taxes and insurance from the market price.

Table 2-8 : Prices of New Vehicles in Peninsular

Type of Vehicle	On-the-Road Price ($)	Excise Duty ($)	Sales Tax ($)
Passenger Car			
1. Proton Saga Iswara 1.3S (Metallic)	38,758.21	3,474.51	2,295.76
2. Proton Saga Wira 1.5S (Metallic)	53,522.71	5,862.15	3,328.88
Van			
1. Ford Econovan Diesel ST63FM1	51,097.32	8,744.89	3,744.89
Medium Lorry			
1. Mercedez Benz 709/42 (3 ton lorry)	67,645.08	Exempted	5,060.49
Heavy Lorry			
1. Hino	115,000.00	Exempted	9,661.00
Bus			
1. Hino AK176K	105,700.00	Exempted	8,898.00
2. Mercedez Benz OF1315/51	192,482.70	Exempted	6,241.12

2) Running Cost (Distance Related Cost)

(a) Fuel and Lubricant Oil

Fuel Prices in Malaysia are set by the Petroleum Section of the Ministry of Trade and Industry. The retail prices as of September 1995 were obtained from Petronas.

The use of difficult kinds of fuel by vehicles type is assumed as follows based on the vehicle registration statistics.

i) Most of the passenger car are using regular petrol, therefore, regular petrol price is employed.
ii) For vans, medium lorry and heavy lorry, most vehicles are consuming diesel, then diesel price is applied.
iii) All buses are using 100% diesel.

The same procedure also applied to calculate the price of lubricant oil. Table 2-9 and Table 2-10 show the prices of fuel and lubricant oil in Malaysia.

(b) Tyre Cost

The Financial cost of type is obtained through market price survey in Kuala Lumpur as shown in Table 2-10. The unit type cost per km is obtained by using the current price and the average type life.

Table 2-9 : Fuel and Lubricant Price

Fuel Type	Sales Price	Duty & Sales Tax	Government Set Price Excluding Duty
Premium	1.10	0.48	0.62
Regular	1.06	0.46	0.60
Diesel	0.65	0.17	0.48
Gasoline Engine Oil	Sales Price	Duty & Sales Tax	Excluding Duty & Sales Tax
①MACH 5	6.40	0.32	6.08
②MOTOLUBXGP SAE30,40	3.81	0.19	3.62
Diesel Engine Oil	Sales Price	Duty & Sales Tax	Sales Price Excluding Duty
①MOTOLUB CS3 SAE 15W/40	5.11	0.26	4.85
②MOTOLUB CS3 SAE 10W/30	4.76	0.24	4.52
③MOTOLUB CH$3 SAE 30,40	5.65	0.28	5.37
④MOTOLUB XGD SAE 30,40	3.86	0.19	3.67

Source : Petronas

Table 2-10 : Tire Price

Vehicle Type	Size	Sales Price of Single Type	Duty Excise / Sales Tax
Passenger Car	155 Sr 13	111.21	7.06
Van	600 x 14 x 8PR	157.33	11.03
Medium Lorry	900 x 20 x 14PR	680.30	46.63
Heavy Lorry	1000 x 20 x 14PR	755.16	51.77
Bus	900 x 20 x 14PR	680.30	46.63

Source : Market Price Survey, September 1995

(c) Maintenance Cost

Maintenance cost consists of spare parts and labour cost. The spare parts cost is estimated based on the ratio of the parts to vehicle price. The unit labour cost is estimated as 7.39 based on the monthly wage, RM1300 which is obtained by a labour cost survey assuming the monthly working hour as 176hr/month.

The key factors such as "Parts Cost Ratio", "Labour Hour" required are determined with reference to the past studies.

Table 2-11 : Spare Parts Cost and Maintenance Labour Cost

	Passenger Car	Van	Medium Lorry	Heavy Lorry	Bus
Parts Cost Ratio to Vehicle Price	3 %	5 %	8.5 %	10 %	10 %
Maintenance Labour Hours/1000km	1	1.2	20	24.5	30
Financial Unit Labour Cost RM/hr	7.39	7.39	7.39	7.39	7.39

Source : 1) Axle Load Study
2) Estimated with reference to Year Book of Transport Statistic, Axle Load Study, Klang Vallay Transport Study etc.

(d) Vehicle Depreciation Cost

Vehicle depreciation cost is usually divided into the portion applied to the time related and the potation applied to the distance related cost.

The proportion between the two portions normally used by the World Bank is employed as shown in Table 2-12.

Table 2-12 : Vehicle Life and Salvage Value

Vehicle Type	Average Life	Salvage Value	Proportation
Passenger Car	10 Years	20 %	50 % : 50 %
Van	10 Years	20 %	50 % : 50 %
Lorry	10 Years	15 %	30 % : 70 %
Bus	10 Years	15 %	30 % : 70 %

Note: The figures under "Proportion" show the time related and the distance related depreciation cost respectively

Source:HNDP

(e) Unit Running Cost

The unit running cost is calculated by summing up the cost items above, using the annual mileage by vehicle type shown in Table 2-13.

Table 2-13 : Average Annual Mileage (km/yr)

Vehicle Type	Ave. Annual Mileage
Passenger Car	20,000
Van	34,000
Medium Lorry	71,000
Heavy Lorry	71,000
Bus	71,000

Source : HNPP JICA 1992 Axle Load Study

3) Fixed Cost (Time Related Cost)

(a) Depreciation Cost

The time related depreciation cost is calculated by subtraction "the distance determined portion" from the total depreciation cost.

(b) Capital Opportunity Cost (Interest Cost)

The interest rate is assumed to be 10 % per year taking into account the future economic growth rate and uncertain factor.

The capital opportunity cost is calculated from the residual value of a vehicle and this interest rate as shown in the following formula:

Depreciation + Capital Opportunity Cost
= (Vehicle Price) x CRF - (Salvage Value) x SFF

Where,

(Vehicle Price) : Sales price for financial cost
Sales price less tyres and tax for economic cost

(Salvage Value):(Vehicle Price) multiplied by the percentage assumed.

CRF: Capital Recovery Factor

$$r^n / \left(\frac{r^n - 1}{r - 1} \right)$$

SFF: Sinking Fund Factor

$$1 / \left(\frac{r^n - 1}{r - 1} \right)$$

Capital Opportunity Cost is obtained from the above value deducted by the depreciation cost.

(c) Crew Cost

The crew wage is estimated by updating the data complied in the past studies. The wages as of September 1995 are as follows.

Table 2-14 : Crew Wage

	Taxi	Lorry	Bus
Crew Wage Driver Assistant	RM1300/Month	RM80/Day RM40/Day	RM45/Day

Source : Market Price Survey

Table 2-15 : Overhead / Insurance Cost

	Van	Medium Lorry	Heavy Lorry	Bus
Overhead & Insurance RM/yr Financial Cost	5,570	13,145	18,270	18,270
Economic Cost	4,010	10,122	13,154	13,154

Source : Updated on the basis of Axle Load Study

(d) Unit Fixed Cost

The unit fixed cost is calculated by summing up the above cost items, using the annual usage hours by vehicle type shown in Table 2-16.

Table 2-16 : Average Annual Usage Hours

	hr / yr
Passenger car	1,200
Van	1,430
Medium Lorry	2,890
Heavy Lorry	2,890
Bus	2,890

Source : HNDP JICA 1992, Axle Load Study

4) Unit Vehicle Operating Cost

The unit running cost as well as unit fixed cost are shown in Table 2-17 and Table 2-18.

Table 2-17 : Unit Running Cost

(RM / km in 1995 price)

Financial Cost	Car	Van	Medium Lorry	Heavy Lorry	Bus
1. Fuel Cost	0.106	0.138	0.143	0.189	0.189
2. Lubricant Oil	0.009	0.013	0.026	0.028	0.028
3. Tyre Cost	0.009	0.014	0.086	0.157	0.086
4. Maintenance	0.081	0.083	0.223	0.331	0.425
5. Depreciation	0.098	0.083	0.053	0.089	0.121
6. Total	0.303	0.331	0.530	0.794	0.848
Economic Cost	Car	Van	Medium Lorry	Heavy Lorry	Bus
1. Fuel Cost	0.060	0.078	0.106	0.139	0.139
2. Lubricant Oil	0.009	0.013	0.024	0.026	0.026
3. Tyre Cost	0.008	0.013	0.080	0.146	0.080
4. Maintenance	0.068	0.064	0.213	0.312	0.408
5. Depreciation	0.082	0.062	0.048	0.081	0.115
6. Total	0.227	0.230	0.471	0.704	0.768

Table 2-18 : Unit Fixed Cost

(RM / hour)

Financial Cost	Car	Van	Medium Lorry	Heavy Lorry	Bus
1. Depreciation	1.658	0.832	0.597	1.015	1.316
2. Interest	2.910	2.433	1.599	2.719	3.525
3. Crew Cost	-	6.500	12.000	16.000	10.625
4. Overhead	0.887	3.779	4.549	6.322	6.322
5. Total	5.454	13.544	18.754	26.056	21.787
Economic Cost	Car	Van	Medium Lorry	Heavy Lorry	Bus
1. Depreciation	1.363	0.616	0.510	0.856	1.207
2. Interest	2.391	1.801	1.367	2.294	3.234
3. Crew Cost	-	5.590	10.320	13.760	9.138
4. Overhead	0.638	2.721	3.502	4.552	4.552
5. Total	4.392	10.728	15.700	21.462	18.129

5) Travel Time Cost

Time value is assessed in terms of hourly productivity of the vehicle passengers. The gross regional domestic products (GRDP) of Kuala Lumpur Metropolitan Region (Kuala Lumpur and Selangr) in 1995 is estimated to be RM39,870 million at 1987 price or RM69,892 million at 1995 price as shown in Chapter 3.

The number of employment in 1995 is estimated as 1,613,300, therefore, the annual value added productivity is calculated to be RM43,322 at 1995 price, which is equivalent to RM20.6 per hour by assuming the annual working time be 2100 hours.

For estimating travel time cost, the above time value is applied to production related trips only i.e. business trips, which makes up about 16% of the total.

Consequently, the time cost by vehicle type is obtained as shown in Table 2-19.

Table 2-19 : Time Cost

Vehicle Type	Average Occupancy (person/vehicle)	Time Cost (RM/hr/veh)
Car	1.7	5.4
Bus	21.5	68.5

Source : Roadside Interview in 1995

6) Accident Cost

According to the transport statistics, the total damage to properties and vehicles in 1990 is RM121,130,000 at 1990 price, which is equivalent to RM147,536,000 at 1995 price.

The statistics of casualties in 1989 and 1990 are shown as Table 2-20. The gross regional domestic products (GRDP) of KL Metropolitan Region in 1995 is RM69,892 million at 1995 price and the population in 1995 is estimated as 4,028 thousand, therefore, the per capita GRDP is calculated to be RM17,352 in 1995 price.

Assuming the average residual life be 30years, the accumulated value of the life discounted at 12 % per annum is RM156,550. Hence, the total loss due to casualties is estimated to be about RM557 million.

Table 2-20 : Statistics of Casualties

(person)

Year	Mortality	Serious Injuries	Minor Injuries	Total death due to Injuries
1989	3,099	7,932	19,015	3,773
1990	3,011	7,458	14,215	3,345

Source : Transport Statistics

The total annual vehicle - km in 1990 is estimated at 123,363 million. As a consequence, the unit accident cost is estimated as RM6.91/1,000 veh.km.

7) Benefits Estimation

Economic benefits are calculated by summing up the total savings in the vehicle operating cost, the passenger time cost and the accident cost, obtained from the differences in vehicle - km and vehicle-time between the "Without" project case and "With" project case. At present, various highway development projects are on-going in KL metropolitan region, such as the Middle Ring Road, Dedicated Highway, South Klang Valley Expressway etc. Assumes the following network conditions. The completion year of these project are assumed as follows in the traffic assignment.

Table 2-21 : Assumed Completion Year of Major Highway Projects

Highway Project	Assumed Completion Year
Middle Ring Road II	
- East Half	1997
- West Half	1999
Shah Alam Expressway	
- KL-Seremban to N-S Central Link	1997
- N-S Central Link - Jin Langat	2001
N-S Central Link	1997
KL-Karak Highway Widening	1997
Karak-Kuantan Expressway	2001
(East Coast Expressway)	
Ampang Bypass	1997
Dedicated Highway	1997
Demansara - Puchong Road	1998
South Klang Vallay Expressway	1998
(Westside of N-S Central Link)	

Table 2-22 shows the estimated benefits in 2003, 2010 and 2020. The benefits are interpolated by assuming a constant annual growth rate for the intermediate years and assumed to remain at the same level as that in 2020 for the years after 2020.

Table 2-22 : Estimated Economic Benefits

(RM Million)

		Benefit	2002	2010	2020
Whole Length of ORR		VOC Saving	334.9	1,632.8	3,256.5
		Time Saving	193.5	836.5	1,498.0
		Accident Saving	0.5	3.5	3.5
		Total	529.0	2,472.9	4,788.0
Section 1		VOC Saving	50.7	247.0	476.6
		Time Saving	19.5	127.1	209.9
		Accident Saving	0.5	0.5	0.9
		Total	70.6	374.5	687.4
Section2	Segment 1	VOC Saving	11.4	80.0	152.7
		Time Saving	1.8	31.8	70.9
		Accident Saving	0.2	0.6	0.7
		Total	13.4	112.4	224.3
	Segment 2	VOC Saving	22.8	346.9	778.0
		Time Saving	10.2	174.7	347.3
		Accident Saving	0.1	0.9	1.2
		Total	33.1	522.6	1,126.5
Section 3		VOC Saving	74.1	838.1	1,651.4
		Time Saving	33.5	417.5	738.8
		Accident Saving	0.5	2.3	2.4
		Total	108.2	1,257.9	2,392.6

2.4 Evaluation Results

2.4.1 Evaluation as a Whole

Firstly, the economic feasibility of the Outer Ring Road as a whole is evaluated based on the assumed schedule. Table 2-25 shows the benefit cost streams for the project life. The total discounted cost and benefit are RM2,677 million, RM8,176 million respectively. As a result, the evaluation indicators are estimated as shown in Table 2-23.

It is found that the Outer Ring Road project is highly economically feasible.

Table 2-23 : Evaluation Indicators for Whole Length

Benefit-cost Ratio (b/c)	3.05
Net Present Value (NPV) (RM Million)	5,498.5
Internal Rate of Return (IRR) (%)	22.7

2.4.2 Evaluation by Section

The benefit cost streams of the Outer Ring Road by section are shown in Table 2-26 ~ Table 2-29. The evaluation results by section are shown in Table 2-24, which indicates that the B/C ratios in all the sections are higher than 1.0 except for the segment 1 of the section 2. These sections are economically feasible even if they are implemented individually.

The highest B/C ratio is found in the cases of Section 3, which is the southern part of the Outer Ring Road, where impressive development projects like Putra Jaya are on going. The second highest is the segment 2 of the Section 2, the south eastern part of the Outer Ring Road. As a result, the section 3 should be given the highest priority for the implementation.

After the completion of the section 3, the section 2 segment 2 is given the higher priority than the other sections, considering that the additional implementation of section 2 segment 2 has the higher evaluation indicators than the other cases.

Table 2-24 : Economic Evaluation Indicators by Section

	B/C	NPV (RM Million)	IRR(%)
Section 1	1.62	484.1	16.2
Section 2 Segment 1	0.51	-366.7	7.2
Segment 2	4.38	1,331.5	25.4
Section 3	5.45	3,329.2	29.0
Section 3 + Section 1	3.30	3,538.5	23.0
Section 3 + Section 2 Seg.1	2.85	2,774.6	21.4
Section 3 + Section 2 Seg.2	5.16	4,775.5	28.0

2.4.3 Evaluation on Proposed Implementation Schedule

The implementation schedule is proposed in the Chapter 14. Based on the scheduled, where it is implemented from 1997 to 2005 in accordance with the priority by section, the project feasibility is re-examined.

Table 2-25 : Benefit Cost Stream for Whole Length

(RM Million)

year	Project Cost	VOC (Distance Related) Benefit	VOC (Time Related) Benefit	Passenger Time Benefit	Accident Benefit	Total Benefit	Discounted Cost	Discounted Benefit
1995	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1996	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1997	181.8	0.0	0.0	0.0	0.0	0.0	144.9	0.0
1998	499.8	0.0	0.0	0.0	0.0	0.0	355.8	0.0
1999	1,229.9	0.0	0.0	0.0	0.0	0.0	781.6	0.0
2000	1,229.9	0.0	0.0	0.0	0.0	0.0	697.9	0.0
2001	1,229.9	0.0	0.0	0.0	0.0	0.0	623.1	0.0
2002	16.3	21.8	313.1	193.5	0.5	529.0	7.4	239.3
2003	16.3	33.1	374.0	227.6	0.8	635.4	6.6	256.6
2004	16.3	50.1	446.6	267.6	1.2	765.5	5.9	276.0
2005	16.3	75.8	533.3	314.7	1.8	925.6	5.2	298.0
2006	27.7	86.8	654.4	382.7	2.1	1,125.9	8.0	323.7
2007	16.3	99.3	803.1	465.3	2.4	1,370.1	4.2	351.7
2008	16.3	113.7	985.4	565.8	2.7	1,667.6	3.7	382.2
2009	16.3	130.2	1,209.2	688.0	3.1	2,030.4	3.3	415.5
2010	16.3	149.0	1,483.8	836.5	3.5	2,472.9	3.0	451.8
2011	27.7	149.3	1,599.1	886.7	3.5	2,638.6	4.5	430.4
2012	16.3	149.5	1,723.3	939.9	3.5	2,916.2	2.4	410.2
2013	16.3	149.7	1,857.2	996.3	3.5	3,006.7	2.1	391.0
2014	16.3	149.9	2,001.4	1,056.1	3.5	3,210.9	1.9	372.8
2015	16.3	150.2	2,156.9	1,119.4	3.5	3,430.0	1.7	355.6
2016	27.7	150.4	2,324.4	1,186.6	3.5	3,664.9	2.6	339.2
2017	16.3	150.6	2,504.9	1,257.8	3.5	3,916.9	1.3	323.7
2018	16.3	150.9	2,699.5	1,333.2	3.5	4,187.1	1.2	309.0
2019	16.3	151.1	2,909.2	1,413.2	3.5	4,477.0	1.1	295.0
2020	16.3	151.3	3,135.2	1,498.0	3.5	4,788.0	1.0	281.6
2021	27.7	151.3	3,135.2	1,498.0	3.5	4,788.0	1.5	251.5
2022	16.3	151.3	3,135.2	1,498.0	3.5	4,788.0	0.8	224.5
2023	16.3	151.3	3,135.2	1,498.0	3.5	4,788.0	0.7	200.5
2024	16.3	151.3	3,135.2	1,498.0	3.5	4,788.0	0.6	179.0
2025	16.3	151.3	3,135.2	1,498.0	3.5	4,788.0	0.5	159.8
2026	27.7	151.3	3,135.2	1,498.0	3.5	4,788.0	0.8	142.7
2027	16.3	151.3	3,135.2	1,498.0	3.5	4,788.0	0.4	127.4
2028	16.3	151.3	3,135.2	1,498.0	3.5	4,788.0	0.4	113.8
2029	16.3	151.3	3,135.2	1,498.0	3.5	4,788.0	0.3	101.6
2030	16.3	151.3	3,135.2	1,498.0	3.5	4,788.0	0.3	90.7
2031	27.7	151.3	3,135.2	1,498.0	3.5	4,788.0	0.5	81.0
Total							2,677.0	8,175.5

Note : Discount Rate : 12 % p.a.

Table 2-26 : Benefit Cost Stream for Section 1

(RM Million)

year	Project Cost	VOC (Distance Related) Benefit	VOC (Time Related) Benefit	Passenger Time Benefit	Accident Benefit	Total Benefit	Discounted Cost	Discounted Benefit
1995	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1996	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1997	55.7	0.0	0.0	0.0	0.0	0.0	44.4	0.0
1998	108.3	0.0	0.0	0.0	0.0	0.0	77.1	0.0
1999	373.0	0.0	0.0	0.0	0.0	0.0	237.1	0.0
2000	373.1	0.0	0.0	0.0	0.0	0.0	211.7	0.0
2001	373.0	0.0	0.0	0.0	0.0	0.0	189.0	0.0
2002	4.2	19.1	31.6	19.5	0.5	70.6	1.9	31.9
2003	4.2	24.8	42.7	26.0	0.6	94.1	1.7	38.0
2004	4.2	32.3	57.7	34.6	0.8	125.4	1.5	45.2
2005	4.2	42.0	78.0	46.1	1.0	167.2	1.3	53.8
2006	7.2	37.9	107.5	62.3	0.9	208.6	2.1	60.0
2007	4.2	37.6	131.6	73.2	0.9	243.3	1.1	62.5
2008	4.2	37.3	155.7	74.1	0.9	278.0	1.0	63.7
2009	4.2	37.0	179.8	95.0	0.9	312.7	0.9	64.0
2010	4.2	21.6	225.4	127.1	0.5	374.5	0.8	68.4
2011	7.2	23.1	246.8	135.4	0.5	405.8	1.2	66.2
2012	4.2	24.7	268.2	143.6	0.6	437.1	0.6	63.7
2013	4.2	26.3	289.6	151.9	0.6	468.4	0.5	60.9
2014	4.2	27.8	311.0	160.2	0.6	499.7	0.5	58.0
2015	4.2	29.4	332.4	168.5	0.7	530.9	0.4	55.0
2016	7.2	31.0	353.8	176.8	0.7	562.2	0.7	52.0
2017	4.2	32.5	375.1	185.1	0.8	593.5	0.3	49.0
2018	4.2	34.1	396.5	193.3	0.8	624.8	0.3	46.1
2019	4.2	35.7	417.9	201.6	0.8	656.1	0.3	43.2
2020	4.2	37.3	439.3	209.9	0.9	687.4	0.2	40.4
2021	7.2	37.3	439.3	209.9	0.9	687.4	0.4	36.1
2022	4.2	37.3	439.3	209.9	0.9	687.4	0.2	32.2
2023	4.2	37.3	439.3	209.9	0.9	687.4	0.2	28.8
2024	4.2	37.3	439.3	209.9	0.9	687.4	0.2	25.7
2025	4.2	37.3	439.3	209.9	0.9	687.4	0.1	22.9
2026	7.2	37.3	439.3	209.9	0.9	687.4	0.2	20.5
2027	4.2	37.3	439.3	209.9	0.9	687.4	0.1	18.3
2028	4.2	37.3	439.3	209.9	0.9	687.4	0.1	16.3
2029	4.2	37.3	439.3	209.9	0.9	687.4	0.1	14.6
2030	4.2	37.3	439.3	209.9	0.9	687.4	0.1	13.0
2031	7.2	37.3	439.3	209.9	0.9	687.4	0.1	11.6
Total							778.2	1,262.3

Table 2-27 : Benefit Cost Stream for Section 2 Segment 1

(RM Million)

year	Project Cost	VOC (Distance Related) Benefit	VOC (Time Related) Benefit	Passenger Time Benefit	Accident Benefit	Total Benefit	Discounted Cost	Discounted Benefit
1995	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1996	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1997	48.0	0.0	0.0	0.0	0.0	0.0	38.3	0.0
1998	191.7	0.0	0.0	0.0	0.0	0.0	136.4	0.0
1999	323.7	0.0	0.0	0.0	0.0	0.0	205.7	0.0
2000	323.7	0.0	0.0	0.0	0.0	0.0	183.7	0.0
2001	323.7	0.0	0.0	0.0	0.0	0.0	164.0	0.0
2002	4.5	8.5	2.9	1.8	0.2	13.4	2.0	6.1
2003	4.5	13.0	4.1	2.5	0.3	19.9	1.8	8.0
2004	4.5	19.9	5.7	3.4	0.5	29.6	1.6	10.7
2005	4.5	30.5	8.1	4.8	0.7	44.0	1.4	14.2
2006	6.3	29.1	17.7	10.2	0.7	57.7	1.8	16.6
2007	4.5	27.8	27.4	15.6	0.7	71.4	1.2	18.3
2008	4.5	26.4	37.0	21.0	0.6	85.1	1.0	19.5
2009	4.5	25.1	46.7	26.4	0.6	98.7	0.9	20.2
2010	4.5	23.7	56.3	31.8	0.6	112.4	0.8	20.5
2011	6.3	21.8	65.5	35.7	0.5	123.5	1.0	20.1
2012	4.5	19.9	74.7	39.6	0.5	134.7	0.7	19.6
2013	4.5	17.9	83.9	43.5	0.4	145.8	0.6	19.0
2014	4.5	16.0	93.1	47.4	0.4	156.9	0.5	18.2
2015	4.5	14.1	102.3	51.3	0.3	168.1	0.5	17.4
2016	6.3	12.1	111.5	55.2	0.3	179.2	0.6	16.6
2017	4.5	10.2	120.7	59.1	0.2	190.3	0.4	15.7
2018	4.5	8.3	129.9	63.1	0.2	201.4	0.3	14.9
2019	4.5	6.3	139.1	67.0	0.1	212.6	0.3	14.0
2020	4.5	4.4	148.3	70.9	0.1	223.7	0.3	13.2
2021	6.3	4.4	148.3	70.9	0.1	223.7	0.3	11.7
2022	4.5	4.4	148.3	70.9	0.1	223.7	0.2	10.5
2023	4.5	4.4	148.3	70.9	0.1	223.7	0.2	9.4
2024	4.5	4.4	148.3	70.9	0.1	223.7	0.2	8.4
2025	4.5	4.4	148.3	70.9	0.1	223.7	0.1	7.5
2026	6.3	4.4	148.3	70.9	0.1	223.7	0.2	6.7
2027	4.5	4.4	148.3	70.9	0.1	223.7	0.1	6.0
2028	4.5	4.4	148.3	70.9	0.1	223.7	0.1	5.3
2029	4.5	4.4	148.3	70.9	0.1	223.7	0.1	4.7
2030	4.5	4.4	148.3	70.9	0.1	223.7	0.1	4.2
2031	6.3	4.4	148.3	70.9	0.1	223.7	0.1	3.8
Total							747.7	381.0

Table 2-28 : Benefit Cost Stream for Section 2 Segment 2

(RM Million)

year	Project Cost	VOC (Distance Related) Benefit	VOC (Time Related) Benefit	Passenger Time Benefit	Accident Benefit	Total Benefit	Discounted Cost	Discounted Benefit
1995	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1996	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1997	27.9	0.0	0.0	0.0	0.0	0.0	22.2	0.0
1998	52.0	0.0	0.0	0.0	0.0	0.0	37.0	0.0
1999	187.8	0.0	0.0	0.0	0.0	0.0	119.4	0.0
2000	187.8	0.0	0.0	0.0	0.0	0.0	106.6	0.0
2001	187.8	0.0	0.0	0.0	0.0	0.0	95.2	0.0
2002	2.8	-3.7	16.5	10.2	-0.1	22.9	1.3	10.3
2003	2.8	5.0	27.5	16.7	0.1	49.3	1.1	19.9
2004	2.8	13.6	45.9	27.5	0.3	87.3	1.0	31.5
2005	2.8	22.3	76.5	45.1	0.5	144.4	0.9	46.5
2006	4.5	25.2	123.2	71.0	0.6	220.1	1.3	63.3
2007	2.8	27.2	166.5	91.2	0.6	285.5	0.7	73.3
2008	2.8	29.1	209.9	111.3	0.7	351.0	0.7	80.4
2009	2.8	31.0	253.3	131.5	0.7	416.5	0.6	85.2
2010	2.8	37.0	309.9	174.7	0.9	522.6	0.5	95.5
2011	4.5	38.4	351.6	192.0	0.9	582.9	0.7	95.1
2012	2.8	39.8	393.3	209.2	0.9	643.3	0.4	93.7
2013	2.8	41.2	435.0	226.5	1.0	703.7	0.4	91.5
2014	2.8	42.7	476.7	243.8	1.0	764.1	0.3	88.7
2015	2.8	44.1	518.4	261.0	1.0	824.5	0.3	85.5
2016	4.5	45.5	560.1	278.3	1.1	884.9	0.4	81.9
2017	2.8	46.9	601.8	295.5	1.1	945.3	0.2	78.1
2018	2.8	48.3	643.5	312.8	1.1	1,005.7	0.2	74.2
2019	2.8	49.7	685.2	330.1	1.1	1,066.0	0.2	70.2
2020	2.8	51.1	726.9	347.3	1.2	1,126.4	0.2	66.3
2021	4.5	51.1	726.9	347.3	1.2	1,126.4	0.2	59.2
2022	2.8	51.1	726.9	347.3	1.2	1,126.4	0.1	52.8
2023	2.8	51.1	726.9	347.3	1.2	1,126.4	0.1	47.2
2024	2.8	51.1	726.9	347.3	1.2	1,126.4	0.1	42.1
2025	2.8	51.1	726.9	347.3	1.2	1,126.4	0.1	37.6
2026	4.5	51.1	726.9	347.3	1.2	1,126.4	0.1	33.6
2027	2.8	51.1	726.9	347.3	1.2	1,126.4	0.1	30.0
2028	2.8	51.1	726.9	347.3	1.2	1,126.4	0.1	26.8
2029	2.8	51.1	726.9	347.3	1.2	1,126.4	0.1	23.9
2030	2.8	51.1	726.9	347.3	1.2	1,126.4	0.1	21.3
2031	4.5	51.1	726.9	347.3	1.2	1,126.4	0.1	19.0
Total							393.1	1,724.5

Table 2-29 : Benefit Cost Stream for Section 3

(RM Million)

year	Project Cost	VOC (Distance Related) Benefit	VOC (Time Related) Benefit	Passenger Time Benefit	Accident Benefit	Total Benefit	Discounted Cost	Discounted Benefit
1995	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1996	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1997	50.2	0.0	0.0	0.0	0.0	0.0	40.0	0.0
1998	147.8	0.0	0.0	0.0	0.0	0.0	105.2	0.0
1999	338.2	0.0	0.0	0.0	0.0	0.0	215.0	0.0
2000	338.2	0.0	0.0	0.0	0.0	0.0	191.9	0.0
2001	338.2	0.0	0.0	0.0	0.0	0.0	171.4	0.0
2002	5.4	19.9	54.2	33.5	0.5	108.2	2.4	48.9
2003	5.4	30.0	89.9	54.7	0.7	175.4	2.2	70.8
2004	5.4	45.1	149.1	89.3	1.1	284.6	1.9	102.6
2005	5.4	67.9	247.2	145.8	1.6	462.5	1.7	148.9
2006	9.7	73.8	333.8	185.4	1.7	594.6	2.8	170.9
2007	5.4	79.7	420.4	224.9	1.7	726.7	1.4	186.5
2008	5.4	85.6	507.0	264.4	1.8	858.8	1.2	196.8
2009	5.4	91.5	593.6	304.0	1.8	990.9	1.1	202.8
2010	5.4	97.5	740.6	417.5	2.3	1,257.9	1.0	229.8
2011	9.7	98.2	821.1	449.6	2.3	1,371.3	1.6	223.7
2012	5.4	100.7	907.7	489.2	2.4	1,500.0	0.8	218.5
2013	5.4	103.2	994.3	528.7	2.4	1,628.7	0.7	211.8
2014	5.4	105.7	1,080.9	568.2	2.5	1,757.3	0.6	204.0
2015	5.4	108.2	1,167.5	607.8	2.5	1,886.0	0.6	195.5
2016	9.7	110.7	1,254.1	647.3	2.6	2,014.7	0.9	186.5
2017	5.4	113.2	1,340.8	686.8	2.6	2,143,4	0.4	177.1
2018	5.4	115.6	1,427.4	726.3	2.7	2,272.0	0.4	167.6
2019	5.4	118.1	1,514.0	765.9	2.7	2,400.7	0.4	158.2
2020	5.4	105.2	1,546.2	738.8	2.4	2,392.6	0.3	140.7
2021	9.7	105.2	1,546.2	738.8	2.4	2,392.6	0.5	125.7
2022	5.4	105.2	1,546.2	738.8	2.4	2,392.6	0.3	112.2
2023	5.4	105.2	1,546.2	738.8	2.4	2,392.6	0.2	100.2
2024	5.4	105.2	1,546.2	738.8	2.4	2,392.6	0.2	89.4
2025	5.4	105.2	1,546.2	738.8	2.4	2,392.6	0.2	79.9
2026	9.7	105.2	1,546.2	738.8	2.4	2,392.6	0.3	71.3
2027	5.4	105.2	1,546.2	738.8	2.4	2,392.6	0.1	63.7
2028	5.4	105.2	1,546.2	738.8	2.4	2,392.6	0.1	56.8
2029	5.4	105.2	1,546.2	738.8	2.4	2,392.6	0.1	50.8
2030	5.4	105.2	1,546.2	738.8	2.4	2,392.6	0.1	45.3
2031	9.7	105.2	1,546.2	738.8	2.4	2,392.6	0.2	40.5
Total							748.3	4,077.5

The results of the benefits cost analysis tabulated in Table 2-30 show that the Outer Ring Road as a whole is highly economically feasible. Those figures, the internal rate of return of 25.4%, the net present value amounting RM5,700 million, assure the appropriateness of the schedule as well as the economic soundness of the project.

Table 2-30 : Evaluation Indicators for the Whole Length Based on Proposed Schedule

Benefit-cost Ratio (B/C)	3.49
Net Present Value (NPV)(RM Million)	5,700.0
Internal Rate of Return (IRR)(%)	25.4

3. FINANCIAL ANALYSIS

3.1 General

3.1.1 Objectives

The Outer Ring Road project is likely to be implemented as a privatized project and operated as a toll road. The purpose of financial analysis is two-fold; one is to find the financial viability under the given implementation schedule, while the other is to find the conditions required for the privatization.

These are achieved by examining the following issues under the condition that the Outer Ring Road is operated as a toll road.

(a) Whether the project cost and operation / maintenance cost can be reimbursed by the levied toll or not under the given conditions regarding various influencing factors such as toll level, loan, equity share, traffic volume, phasing plan etc.?.

The project should be attractive as a business venture, therefore, the revenue should be sufficient not only to cover all the investment but also to produce enough profit within a reasonably short period.

(b) On the contrary, what kind of conditions will be required for making the project financially viable?.

In case of privatization scheme, the questioned condition might be toll level, concession period or procurement of other income resources such as development profit of land in the project corridor, additional toll revenue by packaging other highway.

3.1.2 Project to be Evaluated

As the total length of the Outer Ring Road is about 89 km passing through the mountainous area, there may be some difficulties to implement the whole stretch at once.

Accordingly, the whole length has been divided into three sections, Section 1 ~ Section 3, denoted clockwise from the North end to the South end.

The each section is further subdivided into two segments as shown in Figure 3-1, thus, the whole length consists of 6 segments in total. The project cost by segment is summarized in Table 3-1. The operation and maintenance costs are shown in Table 3-2.

Table 3-1 : Project Cost

(in 1995 prices) (RM million)

	Construction Cost	Engineering Cost	Land Acquisition	Environmental Protection	Total
Section 1					
Segment 1	520.2	26.0	29.5	5.2	580.9
Segment 2	687.2	34.4	69.7	6.9	798.2
Total	1,207.4	60.4	99.2	12.1	1,379.1
Section 2					
Segment 1	1,042.7	52.1	183.9	10.4	1,289.1
Segment 2	605.2	30.3	42.7	6.1	684.3
Total	1,647.9	82.4	226.6	16.5	1,973.4
Section 3					
Segment 1	352.1	17.6	55.3	3.5	428.5
Segment 2	737.2	36.9	83.4	7.4	864.9
Total	1,089.3	54.5	138.7	10.9	1,293.4
Grand Total	3,944.6	197.3	464.5	39.5	4,645.9

Table 3-2 : Operation and Maintenance Cost

(in 1995 prices) (RM million)

	Operation Cost	Maintenance Cost	
		Annual Cost	Periodical Overlay (every 5 years)
Section 1			
Segment 1	1,037	1,076	1,694
Segment 2	1,215	1,266	1,588
Total	2,252	2,342	3,282
Section 2			
Segment 1	1,538	3,370	1,798
Segment 2	973	2,133	1,991
Total	2,511	5,503	3,789
Section 3			
Segment 1	1,064	1,064	3,372
Segment 2	1,942	1,909	1,287
Total	3,006	2,955	4,659
Grand Total	7,769	10,800	11,730

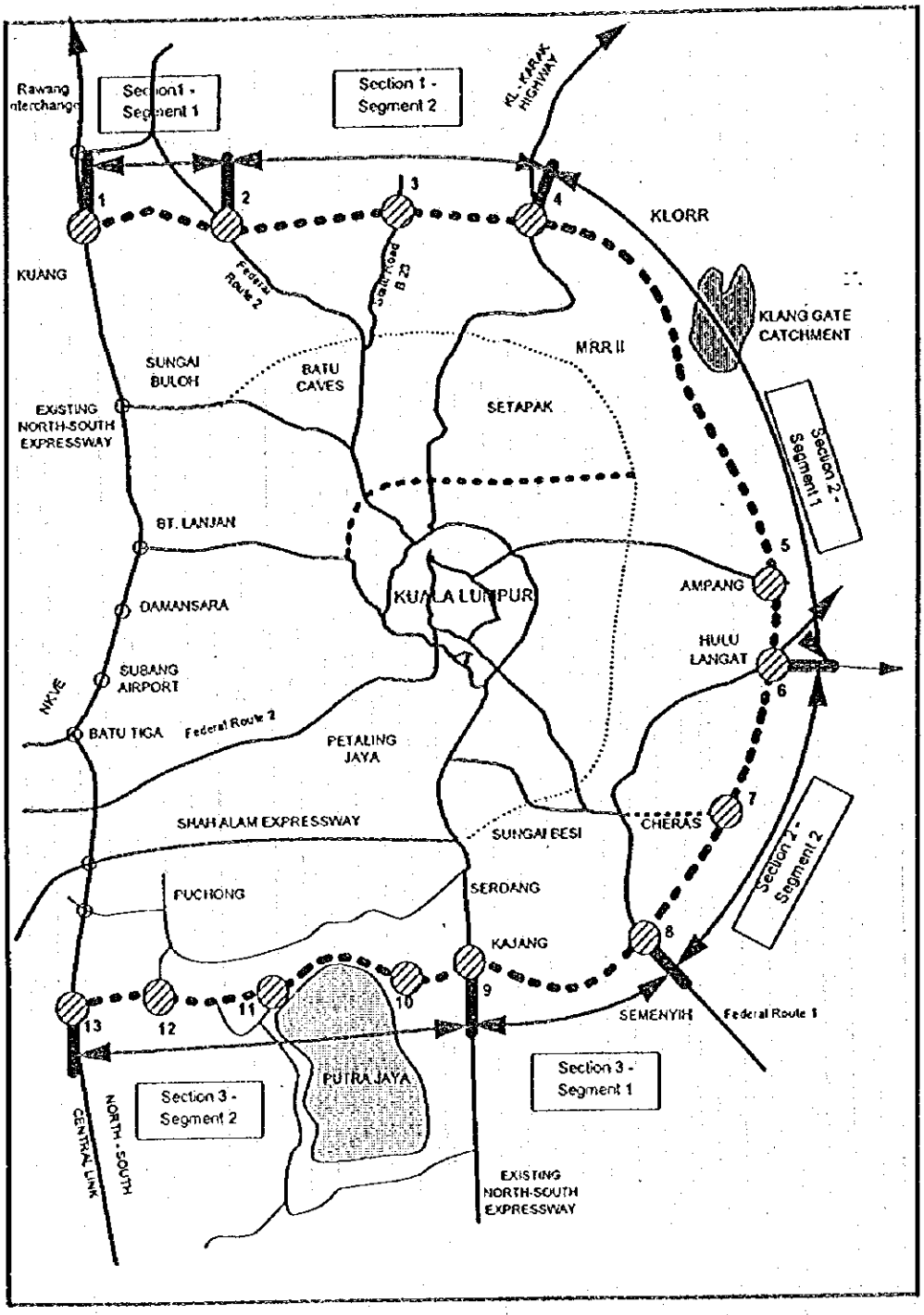


Figure 3-1 : Segments of ORR

3.2 Procedure

The study procedure of financial analysis is shown in Figure 3-2. Based on the results of the economic evaluation, the priority sections of the KLORR are identified. Hence, the implementation schedule can be determined so as to carry out the whole length within the shortest period.

This implementation schedule is denoted as the base case. As the toll system of the KLORR, a closed system was selected as described in Chapter 8 of the Main Volume. Accordingly, the toll rates for the North-South Expressway, where a closed system is applied, will be the guideline for the KLORR.

Applying the toll rates for the N-S Expressway to the KLORR as the base case, the traffic demands for the target years 2000, 2005, 2010 and 2020, are assigned to the future road network including the highway development projects. Then, the toll revenue can be estimated by using the estimated traffic volume and toll rates on the KLORR.

On the other hand, the investment schedule and annual operation / maintenance cost are clarified from the construction schedule and operation / maintenance schedule. The financial sources for the investment are either the capital and paid up equity or loans from banks.

By assuming the equity loan ratio and the loan conditions such as interest rate, repayment period etc., the loan repayment schedule is established.

For the financial analysis, the concession period and other conditions like inflation rate, interest rate for short term loan, payment condition for land acquisition cost etc., should be determined beforehand.

Based on the above conditions, the financial analysis is carried out. If the result indicates that the project is financially feasible, the study can proceed to the next step, the preparation stage for the privatization. Unfortunately, if the project is not feasible, the study should be repeated by changing the basic conditions, i.e., implementation schedule, equity loan ratio, concession period etc..

Finally the conditions that make the project viable are summarized. If such satisfactory conditions could not be found, the project is concluded to be financially unfeasible.

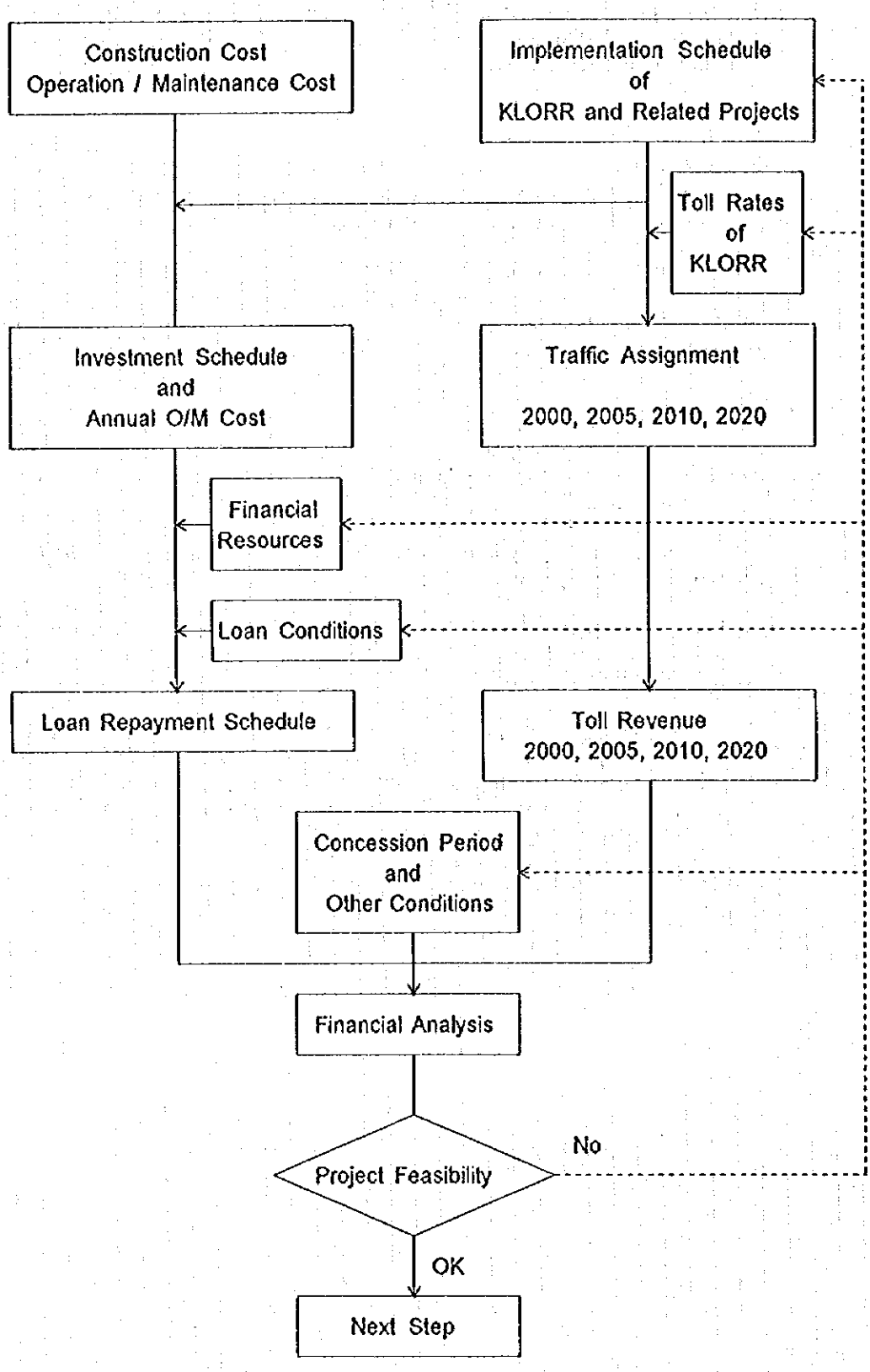


Figure 3-2 : General Procedure of Financial Analysis

3.3 Implementation Schedule

Based on the economic evaluation, the highest priority is given to the Section 3, followed by the Segment 2 of Section 2.Taking into account the development schedule of the related projects such as two ambitious projects of Putra Jaya, KLIA at the south, as well as the highway projects like Middle Ring Road II, KL-Karak Highway and East Cost Expressway etc., the implementation schedule of the Outer Ring Road is set up as shown in Figure 3-3as the base case.

Out of the whole project, the Segment 2 of Section 3 might be included in the South Klang Valley Expressway (SKVE) project, which is on going as an another privatization project, hence, the case excluding this section is also additionally examined.

The schedule intends to construct starting from the Segments 2 and 1 of the Section 3, then the Segment 2 of Section 2 and proceeding to Section 1 skipping the Segment 1 of Section 2 in the mountainous area, which will be implemented at last. Taking into account that the project scheme involves the construction of tunnels and bridges, the construction period of each segment may requires two or three years, thus the period for the whole length becomes eight years, completing by the year 2005.

Thus, the completed section will be open to traffic one after another, the first one, the segment 2 of Section 3 in the year 2000, and the last one, the Segment 1 of Section 2 in the year 2006.

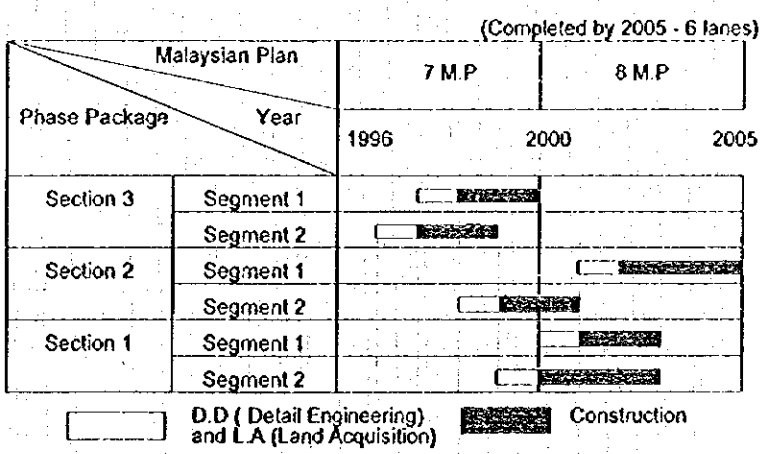


Figure 3-3 : Implementation Schedule for Base Case

3.4 Toll Revenue

1) Toll Level

As elaborated in Chapter 6, the Outer Ring Road would be utilized a part of the nation-wide expressway, the North - South Expressway, therefore, the same toll system, a closed system should be adopted for the project road as well.

The toll charge presently applied for the North - South Expressway is as shown in Table 3-3.

Table 3-3 : Current Toll Charge for North - South Expressway

(sen/km)

Class	Description	Toll Charge
1	Passenger cars	7.5
2	Two axles and six wheels excluding bus	12.5
3	Three or more axles	17.5
4	Taxi	3.75
5	Bus	6.25

According to the concession agreement between the government and PLUS, the toll charge is calculated at 7.5 sen per km until the end of 1995 and 10 sen per km from the January of 1996.

From 1996 to 2018 when the agreement ends, the rate is to be increased by six percent per annum or higher should the consumer price index become higher.

As of the end of January, 1996, however, the rate is still remaining at 7.5 sen per km, taking into account the current circumstances that the toll has been raised only three years ago from 5 sen per km and that the inflation rate during the period has not been so high. Thus, the toll raise may be either postponed or carried out by reducing the increase rate.

However, according the concession agreement for North - South Central Link, which is also considered as a part of North - South Expressway, the same toll rate and same toll charge escalation have been agreed.

Hence, the toll rate for the Outer Ring Road is assumed to be set as shown in Table 3-4 as the base case, the growth rate of which is following the case of the North - South Expressway and North - South Central Link.

Table 3-4 : Toll Rate of Project Road

Year	Toll for Passenger Car[1)]	Weighted Average[2)]
2000	12.6 M¢/km	14.5 M¢/km
2009	21.3 M¢/km	24.8 M¢/km
2018	36.0 M¢/km	41.9 M¢/km
2027	60.8 M¢/km	70.8 M¢/km

Note : 1) Base Case : Following the concession agreement for North - South Expressway the toll rate in 2000 is obtained from the following formula.
10.0M¢/km in 1996 x 1.06^4 = 12.6 M¢/km

2) Weighted Average : The following vehicle composition is applied to calculate the weighted average.
Car : 74%
Lorry : 23%

Bus : 3%
For the lorries and buses, the same growth rate is applied to the current rates.

2) Traffic Volume

The traffic volume on the project road is obtained from the traffic assignment for the respective cases, the method of which is explained in Chapter 4.

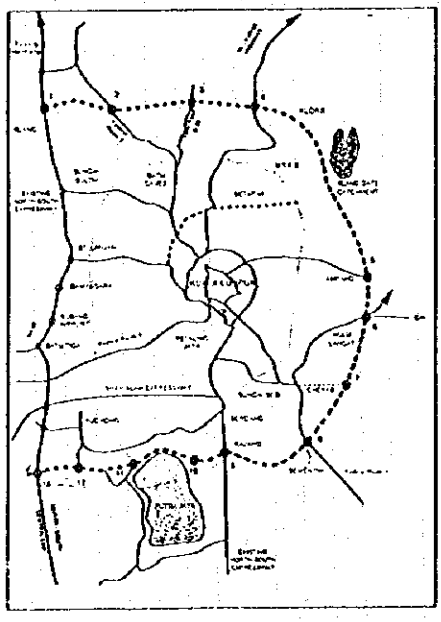
The traffic volume for the base case based on the implementation schedule is summarized as shown in Table 3-5.

Table 3-5 : Traffic Volume on Outer Ring Road

(veh/day)

Section	Year						
	2000	2001	2002	2004	2006	2010	2020
IC 13 ~ IC 12	10,900	21,100	29,100	46,300	56,900	69,000	84,700
IC 12 ~ IC 11	10,900	21,100	29,100	46,300	56,900	69,000	84,700
IC 11 ~ IC 10	10,900	20,800	29,200	46,400	57,100	70,000	80,800
IC 10 ~ IC 9	11,400	20,000	28,900	45,300	58,500	76,100	93,500
IC 9 ~ IC 8	-	22,800	51,900	51,900	67,100	79,000	92,300
IC 8 ~ IC 7	-	-	47,200	60,800	72,600	86,000	100,900
IC 7 ~ IC 6	-	-	51,000	60,800	81,000	93,300	119,000
IC 6 ~ IC 5	-	-	-	-	76,000	81,000	90,000
IC 5 ~ IC 4	-	-	-	-	12,500	22,000	50,600
IC 4 ~ IC 3	-	-	-	19,000	29,500	46,000	71,100
IC 3 ~ IC 2	-	-	-	36,500	44,300	56,700	80,900
IC 2 ~ IC 1	-	-	-	17,800	24,700	41,800	66,600

Note : Refer to the illustration below for IC No.



If the average volume in 2020 is less than the capacity, the traffic demand for the years after the 2020 is assumed to grow up to the capacity by applying the growth rate of the period from 2010 to 2020, and then remain at the constant till the end of the concession period.

3) Revenue

The total vehicle-km on the Outer Ring Road is calculated by using the future traffic volume and the corresponding length by section.

Then, the toll revenue is estimated from the total vehicle-km multiplied by the toll rate shown in Table 3-4.

The toll revenues in the target years resulted as shown in Table 3-6.

Table 3-6 : Toll Revenue

Year	Annual Revenue (RM Million)
2000	9.9
2005	157.9
2010	458.3
2020	1,048.3

The toll revenue in 2000 is extremely low compared to the other target years. This is because of the short length open to traffic and the lower toll rate than the later stage.

3.5 Basic Conditions for Financial Analysis

1) Implementation / Operation Body

There are three alternative cases as an implementation and operating body for the Project Road, namely:-

- Government or Related Agency
- Private Sector
- Third Sector

The project road is most probably implemented and operated by a private sector considering the recent government policy. However, there may be some possibilities that some portion of the project cost, or some section or entire project could be borne by the government, which will be clarified through the financial analysis.

As the private sector's implementation requires the most severe test in financial analysis, the government contribution is assumed to be minimum in this study.

Nevertheless, because of its characteristics as a social infrastructure for public use, the Government in general has to have a right of overseeing the due performance of the implementation / operating body in any case.

The Government also has to retain the prerogative over the issue of toll charges and control over traffic surveillance.

2) Concession Period

Under its privatization policy, the government has granted to private companies the right and authority to collect toll from the users of the corresponding projects for a concession period. The concession period varies from 9 years to 30 years depending on the terms of the agreement.

The concession period is significantly sensitive for the financial viability. The project requires a huge amount of project cost and rather long period for its construction, therefore it is tentatively assumed to be as follows in this Study.

a. 30 years including construction period
b. 35 years including construction period
c. 40 years including construction period
d. 45 years including construction period

3) Equity Share and Dividend

Because of the large amount of investment, the equity share (equity to loan allocation ratio) is supposed to be comparatively low if exclusively prepared by the private sector. Hence, the equity loan allocation plan is assumed as follows :

Table 3-7 : Equity Loan Allocation

	Equity	Loan
Equity Loan Ratio	20%	80%

As for the dividend, the higher the dividend rate and the earlier the start of payment, the easier the equity can be prepared.

Dividend should be paid in accordance with the profitability of the business entity, however, if the first year of the surplus is in the far future, investors may

not be interested in this project. Accordingly the dividend payment is assumed to be started in the fifth year from the opening to traffic irrespective of the financial situation of the corresponding years.

The dividend rate is assumed as 8% per year, which is higher than the interest rate of the long term fixed deposit.

4) Long Term Loan Condition

The shortage of the initial investment of the project will be covered by a commercial loan and a government support loan, being assumed as the following table.

Table 3-8 : Long Term Loan Conditions

Loan Conditions	Loan Type	
	Commercial Loan	Government Loan
Annual Interest Rate	11%	6%
Draw down	Pro-rate to the Costs during construction period	-
Maximum Lending Period	15 years	15 years
Grace Period	5 years	5 years
Repayment	Uniform Amount including interest portion	Uniform Amount including interest portion

Assuming that the maximum amount of the government support loan would be as much as the equity, the long term loan allocation ratio is given as follows.

Table 3-9 : Financing Plan

Financial Resources	Share
Equity	20%
Commercial Loan	60%
Government Loan	20%
Total	100%

5) Short Term Loan

As the project requires large amount of long-term loans for the initial investment, once the repayment is started, the implementing / operating business entity will often encounter a shortage of cash in hand.

This shortage has to be offset by the short-term loan financed by an ordinary commercial bank, otherwise, the entity cannot continue its operation.

The lending period of short-term loan is assumed to be one year and the interest rate is 9% per year.

6) Land Acquisition

The land acquisition and compensation cost will be paid by the government at the initial stage. However, all the costs are assumed to be reimbursed to the government by the concession company after the repayment of long-term loan.

It is also assumed that the reimbursement is made during three years.

7) Inflation Rate

According to the Annual Report, 1994 issued by the Bank Negara Malaysia, the consumer price in Malaysia during the years from 1989 to 1994 is fairly stable with an average annual growth rate of 3.7% as shown in Table 3-10.

The average growth in consumer price of the industrialized countries is also very stable, only 3.2% per annum during the recent seven years.

Table 3-10 : Growth in Consumer Prices

Year	Growth Rate to the Previous Year
1989	2.8
1990	3.1
1991	4.4
1992	4.7
1993	3.6
1994	3.7
Average Growth Rate	3.7%

Hence, taking some allowance into account, the inflation rate for the financial analysis is assumed to be 4% per annum for both the foreign and local portion of the construction and operation / maintenance costs.

8) Tax

The total tax is set at 30% of the net profit before tax, taking into account the corporate income tax.

3.6 Evaluation Indices

The financial viability of the project is evaluated from the following viewpoints :-

* Project as a whole and
* Investor

As to the evaluation indices from the viewpoint of the project as a whole, Financial Internal Rate of Return (FIRR), Financial Net Present Value (FNPV), Financial Cost Benefit Ratio (B/C) are used. On the other had, Return on Equity (ROE) is used as the evaluation index from the viewpoint of the investors.

FIRR shows the marginal interest rate with which the investment cost balances with the accumulated net profit.

Therefore, if the FIRR exceeds the interest rate of long term loan, the project is judged to be financially viable. In this Study, 11% is adopted as the interest rate to be compared with the calculated FIRR.

Likewise, ROE indicates the rate of return on the paid-up equity.

The Financial Internal Rate of Return (FIRR) is determined as the discount rate that equalizes the present value of the stream of the financial costs and benefits over the concession period. The FIRR can be express as the following formula :-

$$\sum_{t=1}^{T} \frac{I_t}{(1+\gamma)^t} = \sum_{t=1}^{T} \frac{B_t - C_t}{(1+\gamma)^t}$$

Where:-

γ - FIRR
I_t - Investment costs in year t
B_t - Revenue in year t
C_t - Operating expenses in year t

The Financial Net Present Value (FNPV) and Financial Cost Benefit Ratio (B/C) are expressed by the following formula:-

$$FNPV = \sum_{t=1}^{T} \frac{B_t}{(1+\gamma)^t} - \sum_{t=1}^{T} \frac{I_t - C_t}{(1+\gamma)^t}$$

$$B/C = \sum_{t=1}^{T} \frac{B_t}{(1+\gamma)^t} \Big/ \sum_{t=1}^{T} \frac{I_t - C_t}{(1+\gamma)^t}$$

Where :-

γ - Discount rate

The Return on Equity (ROE) can be expressed as the following formula :-

$$\sum_{t=1}^{T} \frac{E_t}{(1+\gamma)^t} = \sum_{t=1}^{T} \frac{B_t - C_t^1 - C_t^2 - C_t^3}{(1+\gamma)^t}$$

Where:-

γ - ROE
E_{t_1} - Paid-up Equity in year t
C_{t_1} - Operating expenses in year t
C_{t_2} - Repayment of principal portion of debt borrowed in year t
C_t^3 - Repayment of interest portion of the debt borrowed in year t
B_t - Revenue in year t

3.7 Results of Analysis

1) Evaluation for Base Case

Table 3-11 shows the evaluation indicators for the base case by alternative concession period. Other conditions applicable to all the cases are exactly those as denoted in the previous section, namely;

- Equity share to the initial investment is 20%.
- The percent share of the government support loan and commercial loan is 20%, 60% respectively.
- Toll rate in 2000 is 12.6 sen/km which will be raised every 10 years with the rate of 6% p.a.

From the results, the following findings are pointed out.

(1) The FIRR is lower than 11% in any case, even for the 45 years concession period, therefore the financial return of project is not sufficient under the given conditions.

(2) As for the case "excluding Section 3 Segment 2", it is found that the FIRR is further lower and less profitable compared to the "Whole Project" case.

(3) As shown in Table 3-12, under the condition of uniform repayment, the first year of the operation surplus will be 12th year after the opening, which is not attractive for private sector.

Moreover, the short term loan expands to huge amount till the 17th year. The actual repayment condition may not be uniform but such schedule that the repayment increases year by year toward the end of the repayment period so as to minimize the short term loan.

However, the above table suggests that the operation without considerable amount of short term loan may not be easy for the base case.

(4) If the concession period is further extended to more than 50 years, FIRR may reach at 11%, however, the Debt Service Coverage Ratio is too low, which indicates that the operating body may suffer from the inadequate cash flow for considerably long period.

Table 3-11 : Financial Evaluation Indicators for Base Case

Case	Financial Evaluation Indicators	Concession Period (yrs)			
		30	35	40	45
Whole Project	Financial Internal Rate of Return (FIRR)	6.89%	8.57%	9.64%	10.38%
	B / C Ratio	0.61	0.70	0.81	0.89
	Net Present Value (NPV) (RM'million)	-1,268.0	-941.0	-637.0	-347.0
	Return on Equity (ROE)	4.89%	7.82%	9.46%	10.50%
	Debt Service Coverage Ratio (DSCR) [1]	0.87	0.87	0.87	0.87
Excluding Section 3 Segment 2	Financial Internal Rate of Return (FIRR)	5.89%	7.56%	8.85%	9.76%
	B / C Ratio	0.52	0.61	0.70	0.79
	Net Present Value (NPV) (RM'million)	-1,454.0	-1,165.0	-885.0	-614.0
	Return on Equity (ROE)	3.67%	6.41%	8.41%	9.67%
	Debt Service Coverage Ratio (DSCR) [1]	0.71	0.71	0.71	0.71

Note 1) DSCR is defined as follows :- DSCR = (Bt - Ct) / (Lt + It)
Bt : Revenue in year t

Ct : Operating Cost in year t
Lt : Repayment of principal portion of loans
It : Repayment of interest portion of loans

The more detailed results on the cash flow for the base case are shown in the Appendix.

Table 3-12 : Financial Situation of the Base Case During the Concession Period

	Equity Share	
	20%	30%
First Year of Operation Surplus	12th	12th
Maximum Short-Term Loan in Single Year (RM'million) (Year)	550.0 (9th)	474.4 (9th)
Maximum Accumulated Short-Term Loan (RM'million) (Year)	5,257.3 (17th)	4,551.1 (17th)
Clearing up Year of Loan	26th	25th

2) Alternative Cases

Since the base case is not financially desirable, some alternative conditions are assumed by either reducing the construction cost and debt service or increasing the revenue. The alternative conditions are as follows:-

(a) Staging of Construction

This alternative aims to reduce the financial cost at the initial stage by employing a temporary scheme of the ORR such as a four lane road operation at the first stage.

(b) Reduction of Implementation Length

The implementation length for privatization is reduced to some portion only and the rest may be carried out by the government.

(c) Application of Higher Toll Rate

By increasing the toll rate, the improvement of the financial situation will be examined.

3) Stage Construction

Two types of stage construction are examined in this study; one is the staging of section, the other is the staging of road width.

(a) Staging of Section

Staging of section is to postpone the construction of relatively less profitable sections. In the case of the project, those to be postponed are the Section 1 and the Segment 1 of Section 2.

The staging plan is assumed as shown in Figure 3-3. The completion of the project is postponed from the year 2005 in the base case to the year 2010.

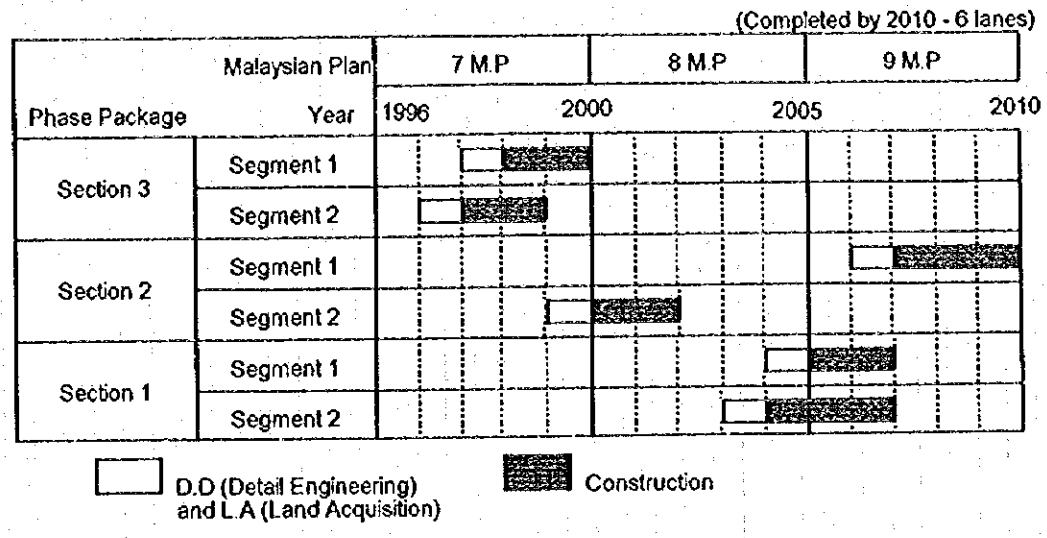


Figure 3-4 : Staging Plan of Section

Except for the implementation schedule, all the other conditions are assumed to be same as the basic case. The financial evaluation indicators are shown in Table 3-13.

Table 3-13 : Evaluation Indicators for Staging of Section

	Concession Period (yrs)		
	35	40	45
Financial Internal Rate of Return (FIRR)	8.96%	10.12%	10.91%
B / C Ratio	0.78	0.88	0.98
Net Present Value (NPV) (RM'million)	-626.0	-330.0	-47.0
Return on Equity (ROE)	8.38%	10.22%	11.35%
Debt Service Coverage Ratio (DSCR)	1.34	1.34	1.34

In case of the staging plan of section as well, the FIRR does not exceed 11% in any cases of concession period, although the financial returns are somewhat improved compared to the base case, particularly for the DSCR.

As a result, the staging plan of section based on the above schedule will not bring about sufficient profit.

(b) Staging of Road Width

Staging of road width is to open to traffic as temporarily a 4-lane road. By the early 2000's, a sufficient traffic demand for 6 lanes can be expected for the Section 3 and Segment 2 of Section 2, therefore, those sections should be constructed with the final scheme. On the other hand, the traffic volumes on Section 1 and Segment 1 of Section 2 will be not so high, therefore, only these sections are planned with stage construction, namely constructed as a 4 lanes road by the year 2005 and widened to 6 lanes by the year 2015. (Refer to Figure 3-5).

The construction schedule by section is basically following the base case.

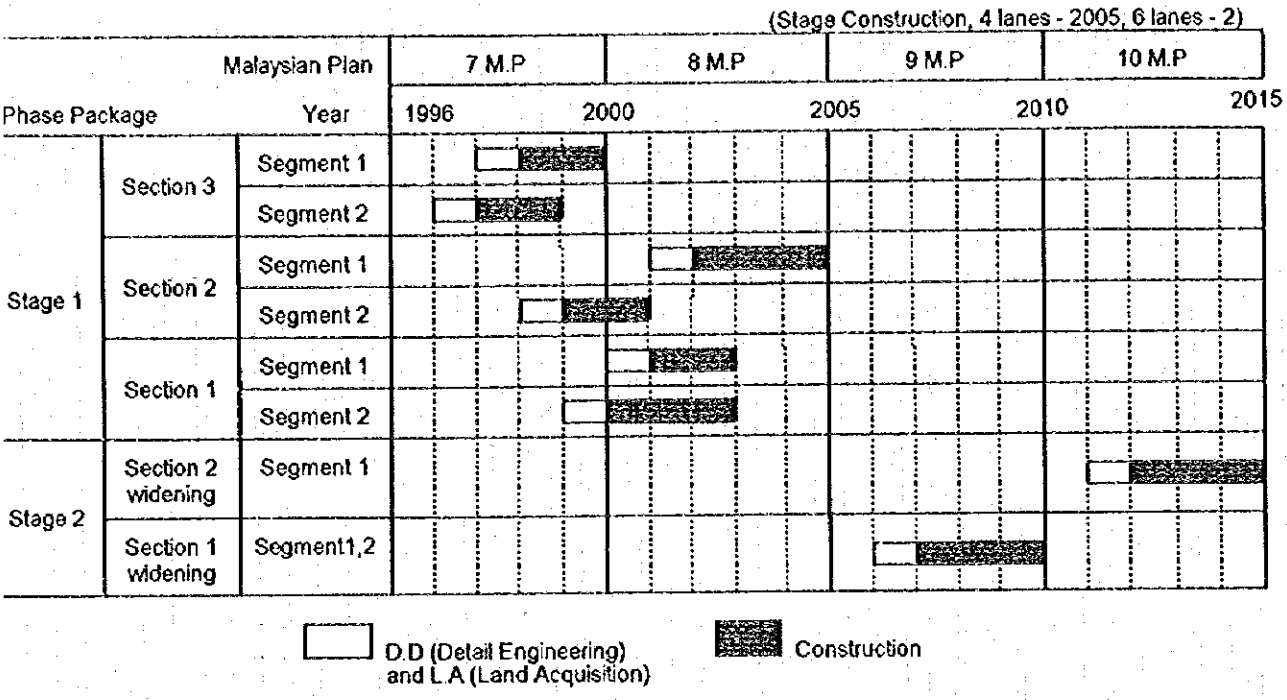


Figure 3-5 : Staging Plan of Road Width

The construction cost of the staging sections are shown in Table 3-14.

Table 3-14 : Construction Cost for the Staging Sections

(RM million)

	Stage Construction		Total	Original Construction Cost
	Stage 1	Stage 2		
Section 1				
Segment 1	373.7	207.4	581.1	520.2
Segment 2	515.0	247.7	762.7	687.2
Total	888.7	455.1	1,343.8	1,207.4
Section				
Segment 1	712.9	478.4	1,191.3	1,042.7

The results of the analysis are shown in Table 3-15. It is found that the improvement of the profitability by the staging of the road width is not significant. The FIRR is still less than 11% even for the 45 years concession period. This is partly because the construction cost will increase about 10% to 15% due to the stage construction, and partly because of the adverse impacts on the traffic demand.

Table 3-15 : Financial Evaluation Indicators for Staging of Road Width

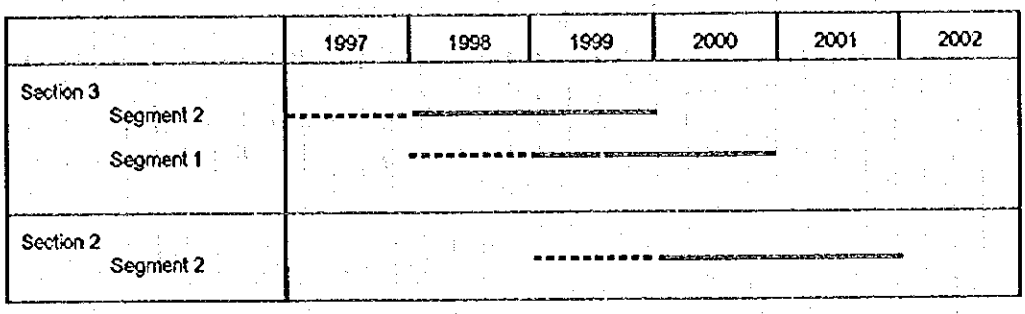
	Concession Period (yrs)		
	35	40	45
Financial Internal Rate of Return (FIRR)	8.54%	9.67%	10.47%
B / C Ratio	0.73	0.83	0.91
Net Present Value (NPV) (RM'million)	-834.0	-547.0	-271.0
Return on Equity (ROE)	7.63%	9.50%	10.65%
Debt Service Coverage Ratio (DSCR)	1.96	1.96	1.96

4) Reduction of Implementation Length

For improving the profitability, the project length is reduced to the Section 3 and the Segment 2 of Section 2 only, namely the portion from the N-S Central Link to the Hulu Langat road.

The implementation schedule is assumed as same as the base case as shown in Table 3-16.

Table 3-16 : Implementation Schedule for Reduced Length Case



Note : ---------- : Detail Engineering / Land Acquisition
▬▬▬▬▬ : Construction

Assuming that all the other conditions including toll rates are same as the base case, the financial evaluation indicators are calculated as shown in Table 3-17.

Table 3-17 : Evaluation Indicators for Reduced Length

	Concession Period (yrs)		
	35	40	45
Financial Internal Rate of Return (FIRR)	10.27%	11.15%	11.79%
B / C Ratio	0.90	1.02	1.14
Net Present Value (NPV) (RM'million)	-162.0	34.0	229.0
Return on Equity (ROE)	10.4%	11.6%	12.4%
Debt Service Coverage Ratio (DSCR)	0.87	0.87	0.87

By reducing the implementation length, the indicators can be significantly improved; if the concession period is 40 years or over, the FIRR becomes higher than 11%, ROE also shows sufficiently high values, therefore, the project brings about a high return in the given period.

However, the DSCR is fairly low, only 0.87, which indicates that a large amount of short term loan will be required in the repayment period of long term loan, even if the repayment schedule is changed to a favorable conditions, e.g. from the uniform one to the unequal repayment.

Accordingly in order to improve the above situation, either the equity injection or government soft loan should be increased more, for example 25% of the construction cost.

5) Application of Higher Toll Rate

If a higher toll is applied, the traffic demand on the project road will decrease, because some traffic would divert to other routes which might be more economical. But some traffic will still remain on the project road, because of less travel time required. In the assignment model of EMME2, the traffic demand is assigned to the network so as to minimize the travel time, where the toll is also converted to time, taking into account the time value, RM9.5/hr per vehicle in average in 1995 price.

The time value is calculated from the labour productivity, therefore, will increase in future in accordance with the GDP growth.

As a result, the profitability depends on how much the traffic volume would decrease, how much the revenue would decrease or increase if a higher toll is applied.

The results of the analysis are shown in Table 3-18 and Figure 3-6. The following points are noted from the results.

(1) The higher the toll, the higher profitability is attained when the toll level is less than five times the Base Case. This is because the decrease in the traffic volume on the ORR due to the higher toll application is not so large, since the traffic volume on the MRR II will be sufficiently heavy by the early 2000's.

The traffic demand on the ORR under the toll condition of 1.5 times the Base Case is shown in Table 3-19.

It is found that the reduction in the traffic volume compared to the Base Case is about 18%, 11% and 5% for the years 2005, 2010 and 2020 respectively.

(2) If the toll level is 1.5 times the base case or more, that is 18.9 sen/km or more, the FIRR exceeds 11% in any case of concession period.

Simultaneously the ROE becomes higher than 11.0%, DSCR also shows higher than 1.0. Accordingly it can be said that the project is financially feasible to be privatized, under the higher toll application.

(3) Although the project is financially feasible under the toll of 1.5 times or more, FIRR should be preferably about 12% since various uncertain factors are anticipated for the project.

Therefore, if the toll level of 18.9 sen/km is applied, 40 years including construction period will be required for the concession period.

Table 3-18 : Indicators for Higher Toll Application

Toll Case		Concession Period (yrs)			
		30	35	40	45
1.5 x (Base Case)	FIRR	9.59	11.10	12.05	12.69
	B / C	0.84	1.02	1.18	1.32
	NPV (RM million)	-513.0	55.0	575.0	1,063.0
	ROE	9.27	11.70	12.93	13.71
	DSCR	1.19	1.19	1.19	1.19
2.0 x (Base Case)	FIRR	11.37	12.85	13.70	14.22
	B / C	1.04	1.29	1.51	1.72
	NPV (RM million)	136.0	944.0	1,678.0	2,364.0
	ROE	12.19	14.29	15.34	15.91
	DSCR	1.44	1.44	1.44	1.44
3.0 x (Base Case)	FIRR	13.63	14.95	15.73	16.17
	B / C	1.36	1.72	2.06	2.38
	NPV (RM million)	1,175.0	2,350.0	3,475.0	4,526.0
	ROE	15.92	17.59	18.42	18.84
	DSCR	1.19	1.85	1.85	1.85

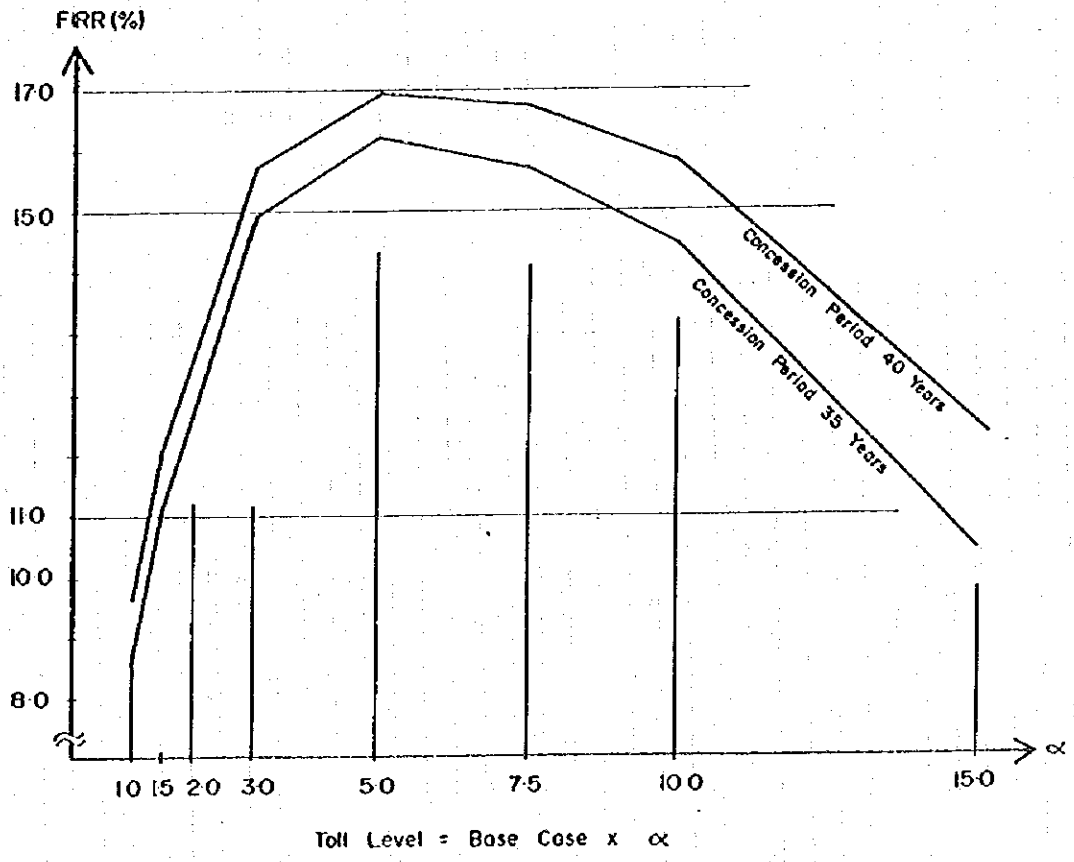


Figure 3-6 : FIRR for Higher Toll Application

Table 3-19 : Traffic Volume on ORR for the Toll Application of 1.5 times Base Case

(veh/day)

Section	2006	2010	2020
IC 13 - IC 12	45,100	66,800	82,500
IC 12 - IC 11	45,100	66,800	82,500
IC 11 - IC 10	46,000	67,800	78,300
IC 10 - IC 9	49,200	73,700	90,800
IC 9 - IC 8	63,800	76,000	89,800
IC 8 - IC 7	70,100	82,800	98,400
IC 7 - IC 6	76,900	89,500	116,500
IC 6 - IC 5	69,200	74,600	87,800
IC 5 - IC 4	2,500	12,200	41,200
IC 4 - IC 3	17,400	33,400	66,800
IC 3 - IC 2	38,400	49,300	78,900
IC 2 - IC 1	15,800	34,300	64,700

Note : Refer to the illustration below Table 3-3 for IC No.

(4) As shown in Figure 3-6, the FIRR turns to decrease from the toll level of about 5.0 times the Base Case, i.e., 63.0 ¢/km, because of the decrease in traffic volume due to the toll raise gradually becomes longer and larger and when the toll is excessively high, the reduction in traffic volume will be more sensitive to the revenue than the increase in toll charge.

Accordingly, about 63 ¢/km can be theoretically regarded as the optimum toll level for the concession company since it realizes the highest profitability.

For the users of the ORR, however, the optimum toll level would be zero, i.e. toll free.

As a consequence, the optimum toll in more practical sense, will be the equilibrium point between the concession company and the users, that is the minimum toll level with which the concession company can be satisfied for the privatization.

Hence, the above mentioned toll level, 18.9 ¢/km in 2000 is deemed as the optimum one.

Table 3-20-(a)

(1)FINANCIAL STATEMENTS

Equity : Government support Loan : Commercial Loan = 20:20:60
Toll Rate in 2000 : 12.6 sen / km
Concession Period : 40 years

(a) PROFIT LOSS STATEMENT

CASE - 006(Plan 1) Toll Rate 12.6 (RM '000)

No. of Year	Year	1. OPERATING REVENUE			2. OPERATING EXPENSE			3.	4. OTHER EXPENSES						5. NET PROFIT	6. INCOME	7.NET PROFIT	8. DIVIDENDS	9. RETAINED
									(1) Finacial Cost				Sales						
		Toll Revenue	Interest 8.0%	Total	Operating Cost	Maintenance Cost	Total	OPERATING PROFIT	Interest for Long Term	Interest for Soft Loan	Int. for Short 9.0%	Total	Tax (2)	Total (3)	BEFORE TAX	TAX 30.0%	AFTER TAX		EARNINGS
		(1)	(2)	(3)	(1)	(2)	(3)												
1	1997	0		0	0	0	0	0	0	0		0		0	0	0	0	0	0
2	1998	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0
3	1999	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0
4	2000	9,675	0	9,675	2,289	2,323	4,612	5,263	79,920	14,238	0	94,158		94,158	-88,895	0	-88,895	0	-88,895
5	2001	30,150	0	30,150	2,381	3,740	6,121	24,029	128,908	22,694	8,001	159,603		159,603	-135,574	0	-135,574	0	-135,574
6	2002	90,830	0	90,830	3,721	6,697	10,418	80,412	180,066	31,509	12,202	223,777		223,777	-143,365	0	-143,365	0	-143,365
7	2003	105,150	0	105,150	3,870	6,965	10,835	94,315	186,634	32,337	13,176	232,147		232,147	-137,832	0	-137,832	0	-137,832
8	2004	141,478	0	141,478	7,162	15,376	22,538	118,940	308,829	54,439	14,629	377,897		377,897	-258,957	0	-258,957	0	-258,957
9	2005	157,864	0	157,864	7,449	12,905	20,354	137,510	307,659	53,714	28,863	390,236		390,236	-252,726	0	-252,726	18,522	-271,248
10	2006	210,113	0	210,113	10,048	19,396	29,444	180,669	366,059	64,085	33,543	463,687		463,687	-283,018	0	-283,018	29,120	-312,138
11	2007	224,574	0	224,574	10,449	17,293	27,742	196,832	361,030	62,631	41,218	464,879		464,879	-268,047	0	-268,047	39,992	-308,039
12	2008	239,036	0	239,036	10,867	23,450	34,317	204,719	336,458	58,490	45,413	440,361		440,361	-235,642	0	-235,642	39,992	-275,634
13	2009	454,546	0	454,546	11,301	24,543	35,844	418,702	316,141	54,395	49,511	420,047		420,047	-1,345	0	-1,345	70,008	-71,353
14	2010	480,477	0	480,477	11,753	25,356	37,109	443,368	285,636	48,742	35,799	370,177		370,177	73,191	21,957	51,234	70,008	-18,774
15	2011	497,476	0	497,476	12,223	23,599	35,822	461,654	254,424	42,698	36,292	333,414		333,414	128,240	38,472	89,768	86,316	3,452
16	2012	514,475	0	514,475	12,712	21,040	33,752	480,723	218,372	36,092	37,644	292,108		292,108	188,615	56,585	132,030	86,316	45,714
17	2013	531,475	0	531,475	13,222	28,531	41,753	489,722	175,889	28,717	36,844	241,450		241,450	248,272	74,482	173,790	86,316	87,474
18	2014	548,474	0	548,474	13,750	29,862	43,612	504,862	138,636	22,305	32,225	193,166		193,166	311,696	93,509	218,187	86,316	131,871
19	2015	565,473	0	565,473	14,299	30,852	45,151	520,322	104,898	16,616	24,269	145,783		145,783	374,539	112,362	262,177	86,316	175,861
20	2016	582,472	0	582,472	14,871	28,712	43,583	538,889	74,872	11,665	16,165	102,702		102,702	436,187	130,856	305,331	86,316	219,015
21	2017	599,471	0	599,471	15,464	25,598	41,062	558,409	41,095	6,352	7,537	54,984		54,984	503,425	151,028	352,397	86,316	266,081
22	2018	616,470	0	616,470	16,083	34,710	50,793	565,677	20,616	3,137	0	23,753		23,753	541,924	162,577	379,347	86,316	293,031
23	2019	1,145,118	0	1,145,118	16725	36,328	53,053	1,092,065	5,246	799	0	6,045		6,045	1,086,020	325,806	760,214	86,316	673,898
24	2020	1,175,847	0	1,175,847	17,394	37,531	54,925	1,120,922	0	0	0	0		0	1,120,922	336,277	784,645	86,316	698,329
25	2021	1,207,401	0	1,207,401	18,089	34,928	53,017	1,154,384	0	0	0	0		0	1,154,384	346,315	808,069	86,316	721,753
26	2022	1,239,802	0	1,239,802	18,812	31,141	49,953	1,189,849	0	0	0	0		0	1,189,849	356,955	832,894	86,316	746,578
27	2023	1,273,072	0	1,273,072	19,564	42,229	61,793	1,211,279	0	0	0	0		0	1,211,279	363,384	847,895	86,316	761,579
28	2024	1,307,235	0	1,307,235	20,346	44,198	64,544	1,242,691	0	0	0	0		0	1,242,691	372,807	869,884	86,316	783,568
29	2025	1,338,090	0	1,338,090	21,158	45,660	66,818	1,271,272	0	0	0	0		0	1,271,272	381,382	889,890	86,316	803,574
30	2026	1,338,090	0	1,338,090	22,004	42,495	64,499	1,273,591	0	0	0	0		0	1,273,591	382,077	891,514	86,316	805,198
31	2027	1,338,090	38,854	1,376,944	22,886	37,888	60,774	1,316,170	0	0	0	0		0	1,316,170	394,851	921,319	86,316	835,00
32	2028	1,338,090	105,654	1,443,744	23,802	51,378	75,180	1,368,564	0	0	0	0		0	1,368,564	410,569	957,995	86,316	871,679
33	2029	2,391,480	175,388	2,566,868	24,754	53,775	78,529	2,488,339	0	0	0	0		0	2,488,339	746,502	1,741,837	86,316	1,655,521
34	2030	2,391,480	307,830	2,699,310	25,745	55,556	81,301	2,618,009	0	0	0	0		0	2,618,009	785,403	1,832,606	86,316	1,746,290
35	2031	2,391,480	447,533	2,839,013	26,775	51,705	78,480	2,760,533	0	0	0	0		0	2,760,533	828,160	1,932,373	86,316	1,846,057
36	2032	2,391,480	595,218	2,986,698	27,845	46,100	73,945	2,912,753	0	0	0	0		0	2,912,753	873,826	2,038,927	86,316	1,952,611
37	2033	2,391,480	751,427	3,142,907	28,959	62,512	91,471	3,051,436	0	0	0	0		0	3,051,436	915,431	2,136,005	86,316	2,049,689
38	2034	2,391,480	915,402	3,306,882	30,117	65,428	95,545	3,211,337	0	0	0	0		0	3,211,337	963,401	2,247,936	86,316	2,161,620
39	2035	2,391,480	1,088,332	3,479,812	31,322	67,595	98,917	3,380,895	0	0	0	0		0	3,380,895	1,014,269	2,366,626	86,316	2,280,310
40	2036	2,391,480	1,270,756	3,662,236	32,575	62,910	95,485	3,566,751	0	0	0	0		0	3,566,751	1,070,025	2,496,726	86,316	2,410,410
41	2037	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
42	2038	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43	2039	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44	2040	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45	2041	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total		38,432,554	5,696,394	44,128,948	622,786	1,250,305	1,873,091	42,255,857	3,891,388	665,655	473,331	5,030,374	0	5,030,374	37,225,483	11,709,268	25,516,215	2,511,858	23,004,357

Table 3-20-(b)

(b) CASH FLOW STATEMENT

CASE - 006(Plan 1) Toll Rate 12.6

(RM '000)

No. of Month	Year	1. SOURCE OF FUNDS						2. APPLICATION OF FUNDS								3. CASH SURPLUS (SINGLE YR)	4. CASH SURPLUS (ACCUML.)
		Net Profit Before Tax (1)	Long Term Loan (2)	Soft Loan (3)	Short Term Loan (4)	Paid Up Equity (5)	Total (6)	Capital Expenditure (1)	Repayment Long Loan (2)	Repayment Soft Loan (3)	Repayment Short Loan (4)	Repayment Land cost (5)	Income Tax (6)	Dividends (7)	Total (8)		
1	1997	0	35,699	11,900	0	11,900	59,499	59,499	0	0	0		0	0	59,499	0	0
2	1998	0	251,272	83,757	0	83,757	418,786	418,786	0	0	0		0	0	418,786	0	0
3	1999	0	407,578	135,859	0	135,859	679,296	679,296	0	0	0		0	0	679,296	0	0
4	2000	-88,895	397,426	132,475	88,895	132,475	662,376	662,376	0	0	0		0	0	662,376	0	0
5	2001	-135,574	407,699	135,900	135,574	135,900	679,499	679,499	0	0	0		0	0	679,499	0	0
6	2002	-143,365	431,669	143,890	146,403	143,890	722,487	719,449	2,135	903	0		0	0	722,487	0	0
7	2003	-137,832	693,946	231,315	162,539	231,315	1,181,283	1,156,576	17,396	7,311	0		0	0	1,181,283	0	0
8	2004	-258,957	299,778	99,926	320,698	99,926	561,371	499,630	43,683	18,058	0		0	0	561,371	0	0
9	2005	-252,726	311,769	103,923	372,695	103,923	639,584	519,615	72,255	29,192	0		0	18,522	639,584	0	0
10	2006	-283,018	0	0	457,976	0	174,958	0	104,584	41,254	0		0	29,120	174,958	0	0
11	2007	-268,047	0	0	504,587	0	236,540	0	141,903	54,645	0		0	39,992	236,540	0	0
12	2008	-235,642	0	0	550,118	0	314,476	0	199,011	75,473	0		0	39,992	314,476	0	0
13	2009	-1,345	0	0	397,766	0	396,421	0	238,830	87,583	0		0	70,008	396,421	0	0
14	2010	73,191	0	0	403,241	0	476,432	0	283,745	100,722	0		21,957	70,008	476,432	0	0
15	2011	128,240	0	0	418,271	0	546,511	0	314,957	106,766	0		38,472	86,316	546,511	0	0
16	2012	188,615	0	0	409,382	0	597,997	0	343,541	111,555	0		56,585	86,316	597,997	0	0
17	2013	248,272	0	0	358,058	0	606,330	0	338,664	106,868	0		74,482	86,316	606,330	0	0
18	2014	311,696	0	0	269,661	0	581,357	0	306,710	94,822	0		93,509	86,316	581,357	0	0
19	2015	374,539	0	0	179,615	0	554,154	0	272,964	82,512	0		112,362	86,316	554,154	0	0
20	2016	436,187	0	0	83,745	0	519,932	0	233,762	68,998	0		130,856	86,316	519,932	0	0
21	2017	503,425	0	0	0	0	503,425	0	186,178	53,588	26,315		151,028	86,316	503,425	0	0
22	2018	541,924	0	0	0	0	541,924	0	88,825	25,375	178,831		162,577	86,316	541,924	0	0
23	2019	1,086,020	0	0	0	0	1,086,020	0	47,693	13,324	612,881		325,806	86,316	1,086,020	0	0
24	2020	1,120,922	0	0	0	0	1,120,922	0	0	0	579,419	118,910	336,277	86,316	1,120,922	0	0
25	2021	1,154,384	0	0	0	0	1,154,384	0	0	0	534,173	187,580	346,315	86,316	1,154,384	0	0
26	2022	1,189,849	0	0	0	0	1,189,849	0	0	0	659,360	87,218	356,955	86,316	1,189,849	0	0
27	2023	1,211,279	0	0	0	0	1,211,279	0	0	0	761,579		363,384	86,316	1,211,279	0	0
28	2024	1,242,691	0	0	0	0	1,242,691	0	0	0	783,568		372,807	86,316	1,242,691	0	0
29	2025	1,271,272	0	0	0	0	1,271,272	0	0	0	803,574		381,382	86,316	1,271,272	0	0
30	2026	1,273,591	0	0	0	0	1,273,591	0	0	0	319,524		382,077	86,316	787,917	485,674	485,674
31	2027	1,316,170	0	0	0	0	1,316,170	0	0	0	0		394,851	86,316	481,167	835,003	1,320,677
32	2028	1,368,564	0	0	0	0	1,368,564	0	0	0	0		410,569	86,316	496,885	871,679	2,192,356
33	2029	2,488,339	0	0	0	0	2,488,339	0	0	0	0		746,502	86,316	832,818	1,655,521	3,847,877
34	2030	2,618,009	0	0	0	0	2,618,009	0	0	0	0		785,403	86,316	871,719	1,746,290	5,594,167
35	2031	2,760,533	0	0	0	0	2,760,533	0	0	0	0		828,160	86,316	914,476	1,846,057	7,440,224
36	2032	2,912,753	0	0	0	0	2,912,753	0	0	0	0		873,826	86,316	960,142	1,952,611	9,392,835
37	2033	3,051,436	0	0	0	0	3,051,436	0	0	0	0		915,431	86,316	1,001,747	2,049,689	11,442,524
38	2034	3,211,337	0	0	0	0	3,211,337	0	0	0	0		963,401	86,316	1,049,717	2,161,620	13,604,144
39	2035	3,380,895	0	0	0	0	3,380,895	0	0	0	0		1,014,269	86,316	1,100,585	2,280,310	15,884,454
40	2036	3,566,751	0	0	0	0	3,566,751	0	0	0	0		1,070,025	86,316	1,156,341	2,410,410	18,294,864
41	2037	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0
42	2038	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0
43	2039	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0
44	2040	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0
45	2041	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0
Total		37,225,483	3,236,836	1,078,945	5,259,224	1,078,945	47,879,433	5,394,726	3,236,836	1,078,949	5,259,224	393,708	11,709,268	2,511,858	29,584,569	18,294,864	89,499,796

Table 3-20-(c)

(c) BALANCE SHEET

CASE - 006(Plan 1) Toll Rate 12.6

(RM '000)

No. of Month	Year	1. ASSETS						2. LIABILITIES				3. NET WORTH			4. TOTAL LIABILITIES & WORTH
		Current Assets (Cash) (1)	(2) Fixed Assets				Total (3)	Outstand. Long Loan (1)	Outstand. Soft Loan (2)	Outstand. Short Loan (3)	total (4)	Paid-Up Equity (1)	Retained Earnings (2)	Total (3)	
			Land	Design	Others	Total									
1	1997	0	0	59,499	0	59,499	59,499	35,699	11,900	0	47,599	11,900	0	11,900	59,499
2	1998	0	0	59,499	418,787	478,286	478,286	286,971	95,657	0	382,628	95,657	0	95,657	478,285
3	1999	0	0	95,256	1,062,326	1,157,582	1,157,582	694,549	231,516	0	926,065	231,516	0	231,516	1,157,581
4	2000	0	0	169,441	1,650,517	1,819,958	1,819,958	1,091,975	363,991	88,895	1,544,861	363,991	-88,895	275,096	1,819,957
5	2001	0	0	169,441	2,330,015	2,499,456	2,499,456	1,499,674	499,891	224,469	2,224,034	499,891	-224,469	275,422	2,499,456
6	2002	0	0	238,731	2,980,173	3,218,904	3,218,904	1,929,208	642,878	370,872	2,942,958	643,781	-367,834	275,947	3,218,905
7	2003	0	0	238,731	4,136,750	4,375,481	4,375,481	2,605,758	866,882	533,411	4,006,051	875,096	-505,666	369,430	4,375,481
8	2004	0	0	238,731	4,636,380	4,875,111	4,875,111	2,861,853	948,750	854,109	4,664,712	975,022	-764,623	210,399	4,875,111
9	2005	0	0	238,731	5,155,995	5,394,726	5,394,726	3,101,367	1,023,481	1,226,804	5,351,652	1,078,945	-1,035,871	43,074	5,394,726
10	2006	0	0	238,731	5,155,995	5,394,726	5,394,726	2,996,783	982,227	1,684,780	5,663,790	1,078,945	-1,348,009	-269,064	5,394,726
11	2007	0	0	238,731	5,155,995	5,394,726	5,394,726	2,854,880	927,582	2,189,367	5,971,829	1,078,945	-1,656,048	-577,103	5,394,726
12	2008	0	0	238,731	5,155,995	5,394,726	5,394,726	2,655,869	852,109	2,739,485	6,247,463	1,078,945	-1,931,682	-852,737	5,394,726
13	2009	0	0	238,731	5,155,995	5,394,726	5,394,726	2,417,039	764,526	3,137,251	6,318,816	1,078,945	-2,003,035	-924,090	5,394,726
14	2010	0	0	238,731	5,155,995	5,394,726	5,394,726	2,133,294	663,804	3,540,492	6,337,590	1,078,945	-2,021,809	-942,864	5,394,726
15	2011	0	0	238,731	5,155,995	5,394,726	5,394,726	1,818,337	557,038	3,958,763	6,334,138	1,078,945	-2,018,357	-939,412	5,394,726
16	2012	0	0	238,731	5,155,995	5,394,726	5,394,726	1,474,796	445,483	4,368,145	6,288,424	1,078,945	-1,972,643	-893,698	5,394,726
17	2013	0	0	238,731	5,155,995	5,394,726	5,394,726	1,136,132	338,615	4,726,203	6,200,950	1,078,945	-1,885,169	-806,224	5,394,726
18	2014	0	0	238,731	5,155,995	5,394,726	5,394,726	829,422	243,793	4,995,864	6,069,079	1,078,945	-1,753,298	-674,353	5,394,726
19	2015	0	0	238,731	5,155,995	5,394,726	5,394,726	556,458	161,281	5,175,479	5,893,218	1,078,945	-1,577,437	-498,492	5,394,726
20	2016	0	0	238,731	5,155,995	5,394,726	5,394,726	322,696	92,283	5,259,224	5,674,203	1,078,945	-1,358,422	-279,477	5,394,726
21	2017	0	0	238,731	5,155,995	5,394,726	5,394,726	136,518	38,695	5,232,909	5,408,122	1,078,945	-1,092,341	-13,396	5,394,726
22	2018	0	0	238,731	5,155,995	5,394,726	5,394,726	47,693	13,320	5,054,078	5,115,091	1,078,945	-799,310	279,635	5,394,726
23	2019	0	0	238,731	5,155,995	5,394,726	5,394,726	0	0	4,441,197	4,441,197	1,078,945	-125,412	953,533	5,394,730
24	2020	0	118,910	238,731	5,155,995	5,513,636	5,513,636	0	0	3,861,778	3,861,778	1,078,945	572,917	1,651,862	5,513,640
25	2021	0	306,490	238,731	5,155,995	5,701,216	5,701,216	0	0	3,327,605	3,327,605	1,078,945	1,294,670	2,373,615	5,701,220
26	2022	0	393,708	238,731	5,155,995	5,788,434	5,788,434	0	0	2,668,245	2,668,245	1,078,945	2,041,248	3,120,193	5,788,438
27	2023	0	393,708	238,731	5,155,995	5,788,434	5,788,434	0	0	1,906,666	1,906,666	1,078,945	2,802,827	3,881,772	5,788,438
28	2024	0	393,708	238,731	5,155,995	5,788,434	5,788,434	0	0	1,123,098	1,123,098	1,078,945	3,586,395	4,665,340	5,788,438
29	2025	0	393,708	238,731	5,155,995	5,788,434	5,788,434	0	0	319,524	319,524	1,078,945	4,389,969	5,468,914	5,788,438
30	2026	485,674	393,708	238,731	5,155,995	5,788,434	6,274,108	0	0	0	0	1,078,945	5,195,167	6,274,112	6,274,112
31	2027	1,320,677	393,708	238,731	5,155,995	5,788,434	7,109,111	0	0	0	0	1,078,945	6,030,170	7,109,115	7,109,115
32	2028	2,192,356	393,708	238,731	5,155,995	5,788,434	7,980,790	0	0	0	0	1,078,945	6,901,849	7,980,794	7,980,794
33	2029	3,847,877	393,708	238,731	5,155,995	5,788,434	9,636,311	0	0	0	0	1,078,945	8,557,370	9,636,315	9,636,315
34	2030	5,594,167	393,708	238,731	5,155,995	5,788,434	11,382,601	0	0	0	0	1,078,945	10,303,660	11,382,605	11,382,605
35	2031	7,440,224	393,708	238,731	5,155,995	5,788,434	13,228,658	0	0	0	0	1,078,945	12,149,717	13,228,662	13,228,662
36	2032	9,392,835	393,708	238,731	5,155,995	5,788,434	15,181,269	0	0	0	0	1,078,945	14,102,328	15,181,273	15,181,273
37	2033	11,442,524	393,708	238,731	5,155,995	5,788,434	17,230,958	0	0	0	0	1,078,945	16,152,017	17,230,962	17,230,962
38	2034	13,604,144	393,708	238,731	5,155,995	5,788,434	19,392,578	0	0	0	0	1,078,945	18,313,637	19,392,582	19,392,582
39	2035	15,884,454	393,708	238,731	5,155,995	5,788,434	21,672,888	0	0	0	0	1,078,945	20,593,947	21,672,892	21,672,892
40	2036	18,294,864	393,708	238,731	5,155,995	5,788,434	24,083,298	0	0	0	0	1,078,945	23,004,357	24,083,302	24,083,302
41	2037	0	0	0	0	0	0	0	0	0	0	0	0	0	0
42	2038	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43	2039	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44	2040	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45	2041	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 3-21-(a)

(1)FINANCIAL STATEMENTS

Equity : Government support Loan : Commercial Loan = 20:20:60
Toll Rate in 2000 : 12.6 sen / km * 1.5
Concession Period : 40 years

(a) PROFIT LOSS STATEMENT

CASE - 007(Plan 1) Toll Rate 12.6 * 1.5 (RM '000)

No. of Year	Year	1. OPERATING REVENUE			2. OPERATING EXPENSE			3. OPERATING PROFIT	4. OTHER EXPENSES						5. NET PROFIT BEFORE TAX	6. INCOME TAX	7. NET PROFIT AFTER TAX	8. DIVIDENDS	9. RETAINED EARNINGS
		Toll Revenue (1)	Interest 6.0% (2)	Total (3)	Operating Cost (1)	Maintenance Cost (2)	Total (3)		(1) Finacial Cost: Interest for Long Term	Interest for Soft Loan	Int. for Short 9.0%	Total	Sales Tax (2)	Total (3)		30.0%			
1	1997	0		0	0	0	0	0	0	0		0		0	0	0	0	0	0
2	1998	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0
3	1999	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0
4	2000	13,148	0	13,148	2,289	2,323	4,612	8,536	79,920	14,238	0	94,158		94,158	-85,622	0	-85,622	0	-85,622
5	2001	33,402	0	33,402	2,361	3,740	6,121	27,281	128,908	22,694	7,706	159,308		159,308	-132,027	0	-132,027	0	-132,027
6	2002	115,813	0	115,813	3,721	6,697	10,418	105,395	180,066	31,509	11,882	223,457		223,457	-118,062	0	-118,062	0	-118,062
7	2003	134,424	0	134,424	3,870	6,965	10,835	123,589	186,634	32,337	10,899	229,870		229,870	-106,281	0	-106,281	0	-106,281
8	2004	175,444	0	175,444	7,162	15,376	22,538	152,906	308,829	54,439	11,789	375,057		375,057	-222,151	0	-222,151	0	-222,151
9	2005	195,278	0	195,278	7,449	12,905	20,354	174,924	307,659	53,714	25,550	386,923		386,923	-211,999	0	-211,999	18,522	-230,521
10	2006	260,241	0	260,241	10,048	19,396	29,444	230,797	366,059	64,065	29,877	460,021		460,021	-229,224	0	-229,224	29,120	-258,344
11	2007	285,126	0	285,126	10,449	17,293	27,742	257,384	361,030	62,631	36,376	460,037		460,037	-202,653	0	-202,653	39,992	-242,645
12	2008	309,851	0	309,851	10,867	23,450	34,317	275,534	336,458	58,490	39,527	434,475		434,475	-158,941	0	-158,941	39,992	-198,933
13	2009	600,073	0	600,073	11,301	24,543	35,844	564,229	316,141	54,395	42,608	413,144		413,144	151,085	45,326	105,759	70,008	35,751
14	2010	644,552	0	644,552	11,753	25,356	37,109	607,443	285,636	46,742	26,160	360,538		360,538	246,905	74,072	172,833	70,008	102,825
15	2011	672,709	0	672,709	12,223	23,599	35,822	636,887	254,424	42,698	25,348	322,470		322,470	314,417	94,325	220,092	86,316	133,776
16	2012	700,866	0	700,866	12,712	21,040	33,752	667,114	218,372	36,092	25,915	280,379		280,379	386,735	116,021	270,714	86,316	184,398
17	2013	729,023	0	729,023	13,222	28,531	41,753	687,270	175,889	28,717	24,363	228,969		228,969	458,301	137,490	320,811	86,316	234,495
18	2014	757,181	0	757,181	13,750	29,862	43,612	713,569	138,636	22,305	18,993	179,934		179,934	533,635	160,091	373,544	86,316	287,228
19	2015	785,338	0	785,338	14,299	30,852	45,151	740,187	104,898	16,616	10,267	131,801		131,801	608,386	182,516	425,870	86,316	339,554
20	2016	813,495	0	813,495	14,871	28,712	43,583	769,912	74,872	11,665	1,433	87,970		87,970	681,942	204,583	477,359	86,316	391,043
21	2017	841,652	0	841,652	15,464	25,598	41,062	800,590	41,095	6,352	0	47,447		47,447	753,143	225,943	527,200	86,316	440,884
22	2018	869,810	0	869,810	16,083	34,710	50,793	819,017	20,616	3,137	0	23,753		23,753	795,264	238,579	556,685	86,316	470,369
23	2019	1,611,736	0	1,611,736	16,725	36,328	53,053	1,558,683	5,246	799	0	6,045		6,045	1,552,638	465,791	1,086,847	86,316	1,000,531
24	2020	1,662,274	0	1,662,274	17,394	37,531	54,925	1,607,349	0	0	0	0		0	1,607,349	482,205	1,125,144	86,316	1,038,828
25	2021	1,714,398	0	1,714,398	18,089	34,928	53,017	1,661,381	0	0	0	0		0	1,661,381	498,414	1,162,967	86,316	1,076,651
26	2022	1,768,156	0	1,768,156	18,812	31,141	49,953	1,718,203	0	0	0	0		0	1,718,203	515,461	1,202,742	86,316	1,116,426
27	2023	1,823,599	43,894	1,867,493	19,564	42,229	61,793	1,805,700	0	0	0	0		0	1,805,700	541,710	1,263,990	86,316	1,177,674
28	2024	1,880,781	138,108	2,018,889	20,346	44,198	64,544	1,954,345	0	0	0	0		0	1,954,345	586,304	1,368,041	86,316	1,281,725
29	2025	1,939,756	240,646	2,180,402	21,158	45,660	66,818	2,113,584	0	0	0	0		0	2,113,584	634,075	1,479,509	86,316	1,393,193
30	2026	1,992,900	352,102	2,345,002	22,004	42,495	64,499	2,280,503	0	0	0	0		0	2,280,503	684,151	1,596,352	86,316	1,510,036
31	2027	1,992,900	472,905	2,465,805	22,886	37,888	60,774	2,405,031	0	0	0	0		0	2,405,031	721,509	1,683,522	86,316	1,597,206
32	2028	1,992,900	600,681	2,593,581	23,802	51,378	75,180	2,518,401	0	0	0	0		0	2,518,401	755,520	1,762,881	86,316	1,676,565
33	2029	3,556,750	754,806	4,293,556	24,754	53,775	78,529	4,215,027	0	0	0	0		0	4,215,027	1,264,508	2,950,519	86,316	2,864,203
34	2030	3,558,750	963,943	4,522,693	25,745	55,556	81,301	4,441,392	0	0	0	0		0	4,441,392	1,332,418	3,108,974	86,316	3,022,658
35	2031	3,558,750	1,206,755	4,764,505	26,775	51,705	78,480	4,686,025	0	0	0	0		0	4,686,025	1,405,808	3,280,217	86,316	3,193,901
36	2032	3,558,750	1,461,267	5,020,017	27,845	46,100	73,945	4,946,072	0	0	0	0		0	4,946,072	1,483,822	3,462,250	86,316	3,375,934
37	2033	3,558,750	1,731,342	5,290,092	28,959	62,512	91,471	5,198,621	0	0	0	0		0	5,198,621	1,559,586	3,639,035	86,316	3,552,719
38	2034	3,558,750	2,015,560	5,574,310	30,117	65,428	95,545	5,478,765	0	0	0	0		0	5,478,765	1,643,630	3,835,135	86,316	3,748,819
39	2035	3,558,750	2,315,465	5,874,215	31,322	67,595	98,917	5,775,298	0	0	0	0		0	5,775,298	1,732,589	4,042,709	86,316	3,956,393
40	2036	3,558,750	2,631,976	6,190,726	32,575	62,910	95,485	6,095,241	0	0	0	0		0	6,095,241	1,828,572	4,266,669	86,316	4,180,353
41	2037	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
42	2038	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43	2039	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44	2040	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45	2041	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total		55,786,826	14,908,450	70,695,276	622,786	1,250,305	1,873,091	68,822,185	3,891,388	665,656	348,713	4,905,756	0	4,905,756	63,916,429	19,615,019	44,301,410	2,511,858	41,789,552

Table 3-21-(b)

(D) CASH FLOW STATEMENT

CASE - 007(Plan 1) Toll Rate 12.6 * 1.5

(RM '000)

No. of Month	Year	1. SOURCE OF FUNDS						2. APPLICATION OF FUNDS								3. CASH SURPLUS (SINGLE YR)	4. CASH SURPLUS (ACCUML.)
		Net Profit Before Tax (1)	Long Term Loan (2)	Soft Loan (3)	Short Term Loan (4)	Paid Up Equity (5)	Total (6)	Capital Expenditure (1)	Repayment Long Loan (2)	Repayment Soft Loan (3)	Repayment Short Loan (4)	Repayment Land cost (5)	Income Tax (6)	Dividends (7)	Total (8)		
1	1997	0	35,699	11,900	0	11,900	59,499	59,499	0	0	0		0	0	59,499	0	0
2	1998	0	251,272	83,757	0	83,757	418,786	418,786	0	0	0		0	0	418,786	0	0
3	1999	0	407,578	135,859	0	135,859	679,296	679,296	0	0	0		0	0	679,296	0	0
4	2000	-85,622	397,426	132,475	85,622	132,475	662,376	662,376	0	0	0		0	0	662,376	0	0
5	2001	-132,027	407,699	135,900	132,027	135,900	679,499	679,499	0	0	0		0	0	679,499	0	0
6	2002	-118,062	431,669	143,890	121,100	143,890	722,487	719,449	2,135	903	0		0	0	722,487	0	0
7	2003	-106,281	693,946	231,315	130,988	231,315	1,181,283	1,156,576	17,396	7,311	0		0	0	1,181,283	0	0
8	2004	-222,151	299,778	99,926	283,892	99,926	561,371	499,630	43,683	18,058	0		0	0	561,371	0	0
9	2005	-211,999	311,769	103,923	331,968	103,923	639,584	519,615	72,255	29,192	0		0	18,522	639,584	0	0
10	2006	-229,224	0	0	404,182	0	174,958	0	104,584	41,254	0		0	29,120	174,958	0	0
11	2007	-202,653	0	0	439,193	0	236,540	0	141,903	54,645	0		0	39,992	236,540	0	0
12	2008	-158,941	0	0	473,417	0	314,476	0	199,011	75,473	0		0	39,992	314,476	0	0
13	2009	151,085	0	0	290,662	0	441,747	0	238,830	87,583	0		45,326	70,008	441,747	0	0
14	2010	246,905	0	0	281,642	0	528,547	0	283,745	100,722	0		74,072	70,008	528,547	0	0
15	2011	314,417	0	0	287,947	0	602,364	0	314,957	106,766	0		94,325	86,316	602,364	0	0
16	2012	386,735	0	0	270,698	0	657,433	0	343,541	111,555	0		116,021	86,316	657,433	0	0
17	2013	458,301	0	0	211,037	0	669,338	0	338,664	106,868	0		137,490	86,316	669,338	0	0
18	2014	533,635	0	0	114,304	0	647,939	0	306,710	94,822	0		160,091	86,316	647,939	0	0
19	2015	608,386	0	0	15,922	0	624,308	0	272,964	82,512	0		182,516	86,316	624,308	0	0
20	2016	681,942	0	0	0	0	681,942	0	233,762	68,998	88,283		204,583	86,316	681,942	0	0
21	2017	753,143	0	0	0	0	753,143	0	186,178	53,588	201,118		225,943	86,316	753,143	0	0
22	2018	795,264	0	0	0	0	795,264	0	88,625	25,375	356,169		238,579	86,316	795,264	0	0
23	2019	1,552,638	0	0	0	0	1,552,638	0	47,693	13,324	939,514		465,791	86,316	1,552,638	0	0
24	2020	1,607,349	0	0	0	0	1,607,349	0	0	0	919,918	118,910	482,205	86,316	1,607,349	0	0
25	2021	1,661,381	0	0	0	0	1,661,381	0	0	0	889,071	187,580	498,414	86,316	1,661,381	0	0
26	2022	1,718,203	0	0	0	0	1,718,203	0	0	0	480,528	87,216	515,461	86,316	1,169,523	548,680	548,680
27	2023	1,805,700	0	0	0	0	1,805,700	0	0	0	0		541,710	86,316	628,026	1,177,674	1,726,354
28	2024	1,954,345	0	0	0	0	1,954,345	0	0	0	0		586,304	86,316	672,620	1,281,725	3,008,079
29	2025	2,113,584	0	0	0	0	2,113,584	0	0	0	0		634,075	86,316	720,391	1,393,193	4,401,272
30	2026	2,280,503	0	0	0	0	2,280,503	0	0	0	0		684,151	86,316	770,467	1,510,036	5,911,308
31	2027	2,405,031	0	0	0	0	2,405,031	0	0	0	0		721,509	86,316	807,825	1,597,206	7,508,514
32	2028	2,518,401	0	0	0	0	2,518,401	0	0	0	0		755,520	86,316	841,836	1,676,565	9,185,079
33	2029	4,215,027	0	0	0	0	4,215,027	0	0	0	0		1,264,508	86,316	1,350,824	2,864,203	12,049,282
34	2030	4,441,392	0	0	0	0	4,441,392	0	0	0	0		1,332,418	86,316	1,418,734	3,022,658	15,071,940
35	2031	4,686,025	0	0	0	0	4,686,025	0	0	0	0		1,405,808	86,316	1,492,124	3,193,901	18,265,841
36	2032	4,946,072	0	0	0	0	4,946,072	0	0	0	0		1,483,822	86,316	1,570,138	3,375,934	21,641,775
37	2033	5,198,621	0	0	0	0	5,198,621	0	0	0	0		1,559,586	86,316	1,645,902	3,552,719	25,194,494
38	2034	5,478,765	0	0	0	0	5,478,765	0	0	0	0		1,643,630	86,316	1,729,946	3,748,819	28,943,313
39	2035	5,775,298	0	0	0	0	5,775,298	0	0	0	0		1,732,589	86,316	1,818,905	3,956,393	32,899,706
40	2036	6,095,241	0	0	0	0	6,095,241	0	0	0	0		1,828,572	86,316	1,914,888	4,180,353	37,080,059
41	2037	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0
42	2038	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0
43	2039	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0
44	2040	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0
45	2041	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0
Total		63,916,429	3,236,836	1,078,945	3,874,601	1,078,945	73,185,756	5,394,726	3,236,836	1,078,949	3,874,601	393,708	19,615,019	2,511,858	36,105,697	37,080,059	223,435,696

Table 3-21-(c)

(c) BALANCE SHEET

CASE - 007(Plan 1) Toll Rate 12.6 * 1.5

(RM '000)

No. of Month	Year	1. ASSETS						2. LIABILITIES				3. NET WORTH			4. TOTAL LIABILITIES & WORTH
		Current Assets (Cash) (1)	(2) Fixed Assets				Total (3)	Outstand. Long Loan (1)	Outstand. Soft Loan (2)	Outstand. Short Loan (3)	total (4)	Paid-Up Equity (1)	Retained Earnings (2)	Total (3)	
			Land	Design	Others	Total									
1	1997	0	0	59,499	0	59,499	59,499	35,699	11,900	0	47,599	11,900	0	11,900	59,499
2	1998	0	0	59,499	418,787	478,286	478,286	286,971	95,657	0	382,628	95,657	0	95,657	478,285
3	1999	0	0	95,256	1,062,326	1,157,582	1,157,582	694,549	231,516	0	926,065	231,516	0	231,516	1,157,581
4	2000	0	0	169,441	1,650,517	1,819,958	1,819,958	1,091,975	363,991	85,622	1,541,588	363,991	-85,622	278,369	1,819,957
5	2001	0	0	169,441	2,330,015	2,499,456	2,499,456	1,499,674	499,891	217,649	2,217,214	499,891	-217,649	282,242	2,499,456
6	2002	0	0	238,731	2,980,173	3,218,904	3,218,904	1,929,208	642,878	338,749	2,910,835	643,781	-335,711	308,070	3,218,905
7	2003	0	0	238,731	4,136,750	4,375,481	4,375,481	2,605,758	866,882	469,737	3,942,377	875,096	-441,992	433,104	4,375,481
8	2004	0	0	238,731	4,636,380	4,875,111	4,875,111	2,861,853	946,750	753,629	4,564,232	975,022	-664,143	310,879	4,875,111
9	2005	0	0	238,731	5,155,995	5,394,726	5,394,726	3,101,367	1,023,481	1,085,597	5,210,445	1,078,945	-894,664	184,281	5,394,726
10	2006	0	0	238,731	5,155,995	5,394,726	5,394,726	2,996,783	982,227	1,489,779	5,468,789	1,078,945	-1,153,008	-74,063	5,394,726
11	2007	0	0	238,731	5,155,995	5,394,726	5,394,726	2,854,880	927,582	1,928,972	5,711,434	1,078,945	-1,395,653	-316,708	5,394,726
12	2008	0	0	238,731	5,155,995	5,394,726	5,394,726	2,655,869	852,109	2,402,389	5,910,367	1,078,945	-1,594,586	-515,641	5,394,726
13	2009	0	0	238,731	5,155,995	5,394,726	5,394,726	2,417,039	764,526	2,693,051	5,874,616	1,078,946	-1,558,835	-479,890	5,394,726
14	2010	0	0	238,731	5,155,995	5,394,726	5,394,726	2,133,294	663,804	2,974,693	5,771,791	1,078,945	-1,456,010	-377,065	5,394,726
15	2011	0	0	238,731	5,155,995	5,394,726	5,394,726	1,818,337	557,038	3,262,640	5,638,015	1,078,945	-1,322,234	-243,289	5,394,726
16	2012	0	0	238,731	5,155,995	5,394,726	5,394,726	1,474,796	445,483	3,533,338	5,453,617	1,078,945	-1,137,836	-58,891	5,394,726
17	2013	0	0	238,731	5,155,995	5,394,726	5,394,726	1,136,132	336,615	3,744,375	5,219,122	1,078,945	-903,341	175,604	5,394,726
18	2014	0	0	238,731	5,155,995	5,394,726	5,394,726	829,422	243,793	3,858,679	4,931,894	1,078,945	-616,113	462,832	5,394,726
19	2015	0	0	238,731	5,155,995	5,394,726	5,394,726	556,458	161,281	3,874,601	4,592,340	1,078,945	-276,559	802,386	5,394,726
20	2016	0	0	238,731	5,155,995	5,394,726	5,394,726	322,696	92,283	3,786,318	4,201,297	1,078,945	114,484	1,193,429	5,394,726
21	2017	0	0	238,731	5,155,995	5,394,726	5,394,726	136,518	38,695	3,585,200	3,760,413	1,078,945	555,368	1,634,313	5,394,726
22	2018	0	0	238,731	5,155,995	5,394,726	5,394,726	47,693	13,320	3,229,031	3,290,044	1,078,945	1,025,737	2,104,682	5,394,726
23	2019	0	0	238,731	5,155,995	5,394,726	5,394,726	0	0	2,289,517	2,289,517	1,078,945	2,026,268	3,105,213	5,394,730
24	2020	0	118,910	238,731	5,155,995	5,513,636	5,513,636	0	0	1,369,599	1,369,599	1,078,945	3,065,096	4,144,041	5,513,640
25	2021	0	306,490	238,731	5,155,995	5,701,216	5,701,216	0	0	480,528	480,528	1,078,945	4,141,747	5,220,692	5,701,220
26	2022	548,680	393,708	238,731	5,155,995	5,788,434	6,337,114	0	0	0	0	1,078,945	5,258,173	6,337,118	6,337,118
27	2023	1,726,354	393,708	238,731	5,155,995	5,788,434	7,514,788	0	0	0	0	1,078,946	6,435,847	7,514,792	7,514,792
28	2024	3,008,079	393,708	238,731	5,155,995	5,788,434	8,796,513	0	0	0	0	1,078,945	7,717,572	8,796,517	8,796,517
29	2025	4,401,272	393,708	238,731	5,155,995	5,788,434	10,189,706	0	0	0	0	1,078,945	9,110,765	10,189,710	10,189,710
30	2026	5,911,308	393,708	238,731	5,155,995	5,788,434	11,699,742	0	0	0	0	1,078,945	10,620,801	11,699,746	11,699,746
31	2027	7,508,514	393,708	238,731	5,155,995	5,788,434	13,296,948	0	0	0	0	1,078,945	12,218,007	13,296,952	13,296,952
32	2028	9,165,079	393,708	238,731	5,155,995	5,788,434	14,973,513	0	0	0	0	1,078,945	13,894,572	14,973,517	14,973,517
33	2029	12,049,282	393,708	238,731	5,155,995	5,788,434	17,837,716	0	0	0	0	1,078,945	16,758,775	17,837,720	17,837,720
34	2030	15,071,940	393,708	238,731	5,155,995	5,788,434	20,860,374	0	0	0	0	1,078,945	19,781,433	20,860,378	20,860,378
35	2031	18,265,841	393,708	238,731	5,155,995	5,788,434	24,054,275	0	0	0	0	1,078,945	22,975,334	24,054,279	24,054,279
36	2032	21,641,775	393,708	238,731	5,155,995	5,788,434	27,430,209	0	0	0	0	1,078,945	26,351,268	27,430,213	27,430,213
37	2033	25,194,494	393,708	238,731	5,155,995	5,788,434	30,982,928	0	0	0	0	1,078,945	29,903,987	30,982,932	30,982,932
38	2034	28,943,313	393,708	238,731	5,155,995	5,788,434	34,731,747	0	0	0	0	1,078,945	33,652,806	34,731,751	34,731,751
39	2035	32,899,706	393,708	238,731	5,155,995	5,788,434	38,688,140	0	0	0	0	1,078,945	37,609,199	38,688,144	38,688,144
40	2036	37,080,059	393,708	238,731	5,155,995	5,788,434	42,868,493	0	0	0	0	1,078,945	41,789,552	42,868,497	42,868,497
41	2037	0	0	0	0	0	0	0	0	0	0	0	0	0	0
42	2038	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43	2039	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44	2040	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45	2041	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 3-22-(a)

(1)FINANCIAL STATEMENTS

Equity : Government support Loan : Commercial Loan = 20:20:60
Toll Rate in 2000 : 12.6 sen / km * 2.0
Concession Period : 40 years

(a) PROFIT LOSS STATEMENT

(RM '000)

CASE - 008(Plan 1) Toll Rate 12.6 * 2.0

No. of Year	Year	1. OPERATING REVENUE			2. OPERATING EXPENSE			3. OPERATING PROFIT	4. OTHER EXPENSES						5. NET PROFI BEFORE TA	6. INCOME TAX	.NET PROFI AFTER TAX	8. DIVIDENDS	9. RETAINED EARNINGS
		Toll Revenue (1)	Interest 8.0% (2)	Total (3)	Operating Cost (1)	Maintenance Cost (2)	Total (3)		(1) Finacial Cost: Interest for Long Term	Interet for Soft Loan	Int. for Short 9.0%	Total	Sales Tax (2)	Total (3)		30.0%			
1	1997	0		0	0	0	0	0	0	0		0		0	0	0	0	0	0
2	1998	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0
3	1999	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0
4	2000	14,100	0	14,100	2,289	2,323	4,612	-9,488	79,920	14,238	0	94,158		94,158	-84,670	0	-84,670	0	-84,670
5	2001	32,379	0	32,379	2,381	3,740	6,121	26,258	128,908	22,694	7,620	159,222		159,222	-132,964	0	-132,964	0	-132,964
6	2002	135,872	0	135,872	3,721	6,697	10,418	125,454	180,066	31,509	11,967	223,542		223,542	-98,088	0	-98,088	0	-98,088
7	2003	160,594	0	160,594	3,870	6,965	10,835	149,759	186,634	32,337	9,101	228,072		228,072	-78,313	0	-78,313	0	-78,313
8	2004	200,275	0	200,275	7,162	15,376	22,538	177,737	308,829	54,439	9,272	372,540		372,540	-194,803	0	-194,803	0	-194,803
9	2005	223,418	0	223,418	7,449	12,905	20,354	203,064	307,659	53,714	23,089	384,462		384,462	-181,398	0	-181,398	18,522	-199,920
10	2006	304,809	0	304,809	10,048	19,396	29,444	275,365	366,059	64,085	27,123	457,267		457,267	-181,902	0	-181,902	29,120	-211,022
11	2007	333,401	0	333,401	10,449	17,293	27,742	305,659	361,030	62,631	32,117	455,778		455,778	-150,119	0	-150,119	39,992	-190,111
12	2008	361,993	0	361,993	10,867	23,450	34,317	327,676	336,458	58,490	34,799	429,747		429,747	-102,071	0	-102,071	39,992	-142,063
13	2009	700,360	0	700,360	11,301	24,543	35,844	664,516	316,141	54,395	37,489	408,025		408,025	256,491	76,947	179,544	70,008	109,536
14	2010	751,628	0	751,628	11,753	25,356	37,109	714,519	285,636	48,742	19,519	353,897		353,897	360,622	108,187	252,435	70,008	182,427
15	2011	793,084	0	793,084	12,223	23,599	35,822	757,262	254,424	42,698	18,184	315,306		315,306	441,956	132,587	309,369	86,316	223,053
16	2012	834,539	0	834,539	12,712	21,040	33,752	800,787	218,372	36,092	17,880	272,344		272,344	528,443	158,533	369,910	86,316	283,594
17	2013	875,995	0	875,995	13,222	28,531	41,753	834,242	175,869	28,717	15,435	220,041		220,041	614,201	184,260	429,941	86,316	343,625
18	2014	917,451	0	917,451	13,750	29,862	43,612	873,839	138,636	22,305	9,172	170,113		170,113	703,726	211,118	492,608	86,316	406,292
19	2015	958,907	0	958,907	14,299	30,852	45,151	913,756	104,898	16,616	0	121,514		121,514	792,242	237,673	554,569	86,316	468,253
20	2016	1,000,362	0	1,000,362	14,871	28,712	43,583	956,779	74,872	11,665	0	86,537		86,537	870,242	261,073	609,169	86,316	522,853
21	2017	1,041,818	0	1,041,818	15,464	25,598	41,062	1,000,756	41,095	6,352	0	47,447		47,447	953,309	285,993	667,316	86,316	581,000
22	2018	1,083,274	0	1,083,274	16,083	34,710	50,793	1,032,481	20,616	3,137	0	23,753		23,753	1,008,728	302,618	706,110	86,316	619,794
23	2019	2,011,536	0	2,011,536	16,725	36,328	53,053	1,958,483	5,246	799	0	6,045		6,045	1,952,438	585,731	1,366,707	86,316	1,280,391
24	2020	2,085,678	0	2,085,678	17,394	37,531	54,925	2,030,753	0	0	0	0		0	2,030,753	609,226	1,421,527	86,316	1,335,211
25	2021	2,162,552	47,150	2,209,702	18,089	34,928	53,017	2,156,685	0	0	0	0		0	2,156,685	647,006	1,509,679	86,316	1,423,363
26	2022	2,242,261	146,013	2,388,274	18,812	31,141	49,953	2,338,321	0	0	0	0		0	2,338,321	701,496	1,636,825	86,316	1,550,509
27	2023	2,324,907	263,076	2,587,983	19,564	42,229	61,793	2,526,190	0	0	0	0		0	2,526,190	757,857	1,768,333	86,316	1,682,017
28	2024	2,410,599	397,638	2,808,237	20,346	44,198	64,544	2,743,693	0	0	0	0		0	2,743,693	823,108	1,920,585	86,316	1,834,269
29	2025	2,499,450	544,379	3,043,829	21,158	45,660	66,818	2,977,011	0	0	0	0		0	2,977,011	893,103	2,083,908	86,316	1,997,592
30	2026	2,591,576	704,187	3,295,763	22,004	42,495	64,499	3,231,264	0	0	0	0		0	3,231,264	969,379	2,261,885	86,316	2,175,569
31	2027	2,647,710	878,232	3,525,942	22,886	37,888	60,774	3,465,168	0	0	0	0		0	3,465,168	1,039,550	2,425,618	86,316	2,339,302
32	2028	2,647,710	1,065,376	3,713,086	23,802	51,378	75,180	3,637,906	0	0	0	0		0	3,637,906	1,091,372	2,546,534	86,316	2,460,218
33	2029	4,754,490	1,262,194	6,016,684	24,754	53,775	78,529	5,938,155	0	0	0	0		0	5,938,155	1,781,447	4,156,708	86,316	4,070,392
34	2030	4,754,490	1,587,825	6,342,315	25,745	55,556	81,301	6,261,014	0	0	0	0		0	6,261,014	1,878,304	4,382,710	86,316	4,296,394
35	2031	4,754,490	1,931,537	6,686,027	26,775	51,705	78,480	6,607,547	0	0	0	0		0	6,607,547	1,982,264	4,625,283	86,316	4,538,967
36	2032	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0
37	2033	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0
38	2034	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0
39	2035	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0
40	2036	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0
41	2037	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
42	2038	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43	2039	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44	2040	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45	2041	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total		48,611,708	8,827,607	57,439,315	471,968	945,760	1,417,728	56,021,587	3,891,388	665,655	272,767	4,829,810	0	4,829,810	51,191,777	15,718,832	35,472,945	2,080,278	33,392,667

Table 3-22-(b)

(b) CASH FLOW STATEMENT

CASE - 008(Plan 1) Toll Rate 12.6 * 2.0

(RM '000)

No. of Month	Year	1. SOURCE OF FUNDS						2. APPLICATION OF FUNDS								3. CASH SURPLUS (SINGLE YR)	4. CASH SURPLUS (ACCUML.)
		Net Profit Before Tax (1)	Long Term Loan (2)	Soft Loan (3)	Short Term Loan (4)	Paid Up Equity (5)	Total (6)	Capital Expenditure (1)	Repayment Long Loan (2)	Repayment Soft Loan (3)	Repayment Short Loan (4)	Repayment Land cost (5)	Income Tax (6)	Dividends (7)	Total (8)		
1	1,997	0	35,699	11,900	0	11,900	59,499	59,499	0	0	0		0	0	59,499	0	0
2	1,998	0	251,272	83,757	0	83,757	418,786	418,786	0	0	0		0	0	418,786	0	0
3	1,999	0	407,578	135,859	0	135,859	679,296	679,296	0	0	0		0	0	679,296	0	0
4	2,000	-84,670	397,426	132,475	84,670	132,475	662,376	662,376	0	0	0		0	0	662,376	0	0
5	2,001	-132,964	407,699	135,900	132,964	135,900	679,499	679,499	0	0	0		0	0	679,499	0	0
6	2,002	-98,088	431,669	143,890	101,126	143,890	722,487	719,449	2,135	903	0		0	0	722,487	0	0
7	2,003	-78,313	693,945	231,315	103,020	231,315	1,181,283	1,156,576	17,396	7,311	0		0	0	1,181,283	0	0
8	2,004	-194,803	299,778	99,926	256,544	99,926	561,371	499,630	43,683	18,058	0		0	0	561,371	0	0
9	2,005	-181,398	311,769	103,923	301,367	103,923	639,584	519,615	72,255	29,192	0		0	18,522	639,584	0	0
10	2,006	-181,902	0	0	356,860	0	174,958	0	104,584	41,254	0		0	29,120	174,958	0	0
11	2,007	-150,119	0	0	386,659	0	236,540	0	141,903	54,645	0		0	39,992	236,540	0	0
12	2,008	-102,071	0	0	415,547	0	314,476	0	199,011	75,473	0		0	39,992	314,476	0	0
13	2,009	256,491	0	0	216,877	0	473,368	0	238,830	87,583	0		76,947	70,008	473,368	0	0
14	2,010	360,622	0	0	202,040	0	562,662	0	283,745	100,722	0		108,187	70,008	562,662	0	0
15	2,011	441,956	0	0	198,670	0	640,626	0	314,957	106,766	0		132,587	86,316	640,626	0	0
16	2,012	528,443	0	0	171,502	0	699,945	0	343,541	111,555	0		158,533	86,316	699,945	0	0
17	2,013	614,201	0	0	101,907	0	716,108	0	338,564	106,868	0		184,260	86,316	716,108	0	0
18	2,014	703,726	0	0	0	0	703,726	0	306,710	94,822	4,760		211,118	86,316	703,726	0	0
19	2,015	792,242	0	0	0	0	792,242	0	272,964	82,512	112,777		237,673	86,316	792,242	0	0
20	2,016	870,242	0	0	0	0	870,242	0	233,762	68,998	220,093		261,073	86,316	870,242	0	0
21	2,017	953,309	0	0	0	0	953,309	0	186,178	53,568	341,234		285,993	86,316	953,309	0	0
22	2,018	1,008,728	0	0	0	0	1,008,728	0	88,825	25,375	505,594		302,618	86,316	1,008,728	0	0
23	2,019	1,952,438	0	0	0	0	1,952,438	0	47,693	13,324	1,219,374		585,731	86,316	1,952,438	0	0
24	2,020	2,030,753	0	0	0	0	2,030,753	0	0	0	626,921	118,910	609,226	86,316	1,441,373	589,380	589,380
25	2,021	2,156,685	0	0	0	0	2,156,685	0	0	0	0	187,580	647,006	86,316	920,902	1,235,783	1,825,163
26	2,022	2,338,321	0	0	0	0	2,338,321	0	0	0	0	87,218	701,496	86,316	875,030	1,463,291	3,288,454
27	2,023	2,526,190	0	0	0	0	2,526,190	0	0	0	0		757,857	86,316	844,173	1,682,017	4,970,471
28	2,024	2,743,693	0	0	0	0	2,743,693	0	0	0	0		823,108	86,316	909,424	1,834,269	6,804,740
29	2,025	2,977,011	0	0	0	0	2,977,011	0	0	0	0		893,103	86,316	979,419	1,997,592	8,802,332
30	2,026	3,231,264	0	0	0	0	3,231,264	0	0	0	0		969,379	86,316	1,055,695	2,175,569	10,977,901
31	2,027	3,465,168	0	0	0	0	3,465,168	0	0	0	0		1,039,550	86,316	1,125,866	2,339,302	13,317,203
32	2,028	3,637,906	0	0	0	0	3,637,906	0	0	0	0		1,091,372	86,316	1,177,688	2,460,218	15,777,421
33	2,029	5,938,155	0	0	0	0	5,938,155	0	0	0	0		1,781,447	86,316	1,867,763	4,070,392	19,847,813
34	2,030	6,261,014	0	0	0	0	6,261,014	0	0	0	0		1,878,304	86,316	1,964,620	4,296,394	24,144,207
35	2,031	6,607,547	0	0	0	0	6,607,547	0	0	0	0		1,982,264	86,316	2,068,580	4,538,967	28,683,174
36	2,032	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0
37	2,033	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0
38	2,034	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0
39	2,035	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0
40	2,036	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0
41	2,037	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0
42	2,038	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0
43	2,039	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0
44	2,040	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0
45	2,041	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0
Total		51,191,777	3,236,836	1,078,945	3,030,753	1,078,945	59,617,256	5,394,726	3,236,836	1,078,949	3,030,753	393,708	15,718,832	2,080,278	30,934,082	28,683,174	139,028,259

Table 3-22-(c)

(c) BALANCE SHEET

CASE - 008(Plan 1) Toll Rate 12.6 * 2.0

(RM '000)

No. of Month	Year	1. ASSETS						2. LIABILITIES				3. NET WORTH			4. TOTAL LIABILITIES & WORTH
		Current Assets (Cash) (1)	(2) Fixed Assets				Total (3)	Outstand. Long Loan (1)	Outstand. Soft Loan (2)	Outstand. Short Loan (3)	total (4)	Paid-Up Equity (1)	Retained Earnings (2)	Total (3)	
			Land	Design	Others	Total									
1	1,997	0	0	59,499	0	59,499	59,499	35,699	11,900	0	47,599	11,900	0	11,900	59,499
2	1,998	0	0	59,499	418,787	478,286	478,286	286,971	95,657	0	382,628	95,657	0	95,657	478,285
3	1,999	0	0	95,256	1,062,326	1,157,582	1,157,582	694,549	231,516	0	926,065	231,516	0	231,516	1,157,581
4	2,000	0	0	169,441	1,650,517	1,819,958	1,819,958	1,091,975	363,991	84,670	1,540,636	363,991	-84,670	279,321	1,819,957
5	2,001	0	0	169,441	2,330,015	2,499,456	2,499,456	1,499,674	499,891	217,634	2,217,199	499,891	-217,634	282,257	2,499,456
6	2,002	0	0	238,731	2,980,173	3,218,904	3,218,904	1,929,208	642,878	318,760	2,890,846	643,781	-315,722	328,059	3,218,905
7	2,003	0	0	238,731	4,136,750	4,375,481	4,375,481	2,605,758	866,882	421,780	3,894,420	875,096	-394,035	481,061	4,375,481
8	2,004	0	0	238,731	4,636,380	4,875,111	4,875,111	2,861,853	948,750	678,324	4,488,927	975,022	-588,838	386,184	4,875,111
9	2,005	0	0	238,731	5,155,995	5,394,726	5,394,726	3,101,367	1,023,481	979,691	5,104,539	1,078,945	-788,758	290,187	5,394,726
10	2,006	0	0	238,731	5,155,995	5,394,726	5,394,726	2,996,783	982,227	1,336,551	5,315,561	1,078,945	-999,780	79,165	5,394,726
11	2,007	0	0	238,731	5,155,995	5,394,726	5,394,726	2,854,880	927,582	1,723,210	5,505,672	1,078,945	-1,189,891	-110,946	5,394,726
12	2,008	0	0	238,731	5,155,995	5,394,726	5,394,726	2,655,869	852,109	2,139,757	5,647,735	1,078,945	-1,331,954	-253,009	5,394,726
13	2,009	0	0	238,731	5,155,995	5,394,726	5,394,726	2,417,039	764,526	2,356,634	5,538,199	1,078,945	-1,222,418	-143,473	5,394,726
14	2,010	0	0	238,731	5,155,995	5,394,726	5,394,726	2,133,294	663,804	2,558,674	5,355,772	1,078,945	-1,039,991	38,954	5,394,726
15	2,011	0	0	238,731	5,155,995	5,394,726	5,394,726	1,818,337	557,038	2,757,344	5,132,719	1,078,945	-816,938	262,007	5,394,726
16	2,012	0	0	238,731	5,155,995	5,394,726	5,394,726	1,474,796	445,483	2,928,846	4,849,125	1,078,945	-533,344	545,601	5,394,726
17	2,013	0	0	238,731	5,155,995	5,394,726	5,394,726	1,136,132	338,615	3,030,753	4,505,500	1,078,945	-189,719	889,226	5,394,726
18	2,014	0	0	238,731	5,155,995	5,394,726	5,394,726	829,422	243,793	3,025,993	4,099,208	1,078,945	216,573	1,295,518	5,394,726
19	2,015	0	0	238,731	5,155,995	5,394,726	5,394,726	556,458	161,281	2,913,216	3,630,955	1,078,945	684,826	1,763,771	5,394,726
20	2,016	0	0	238,731	5,155,995	5,394,726	5,394,726	322,696	92,283	2,693,123	3,108,102	1,078,945	1,207,679	2,286,624	5,394,726
21	2,017	0	0	238,731	5,155,995	5,394,726	5,394,726	136,518	38,695	2,351,889	2,527,102	1,078,945	1,788,679	2,867,624	5,394,726
22	2,018	0	0	238,731	5,155,995	5,394,726	5,394,726	47,693	13,320	1,846,295	1,907,308	1,078,945	2,408,473	3,487,418	5,394,726
23	2,019	0	0	238,731	5,155,995	5,394,726	5,394,726	0	0	626,921	626,921	1,078,945	3,688,864	4,767,809	5,394,730
24	2,020	589,380	118,910	238,731	5,155,995	5,513,636	6,103,016	0	0	0	0	1,078,945	5,024,075	6,103,020	6,103,020
25	2,021	1,825,163	306,490	238,731	5,155,995	5,701,216	7,526,379	0	0	0	0	1,078,945	6,447,438	7,526,383	7,526,383
26	2,022	3,288,454	393,708	238,731	5,155,995	5,788,434	9,076,888	0	0	0	0	1,078,945	7,997,947	9,076,892	9,076,892
27	2,023	4,970,471	393,708	238,731	5,155,995	5,788,434	10,758,905	0	0	0	0	1,078,945	9,679,964	10,758,909	10,758,909
28	2,024	6,804,740	393,708	238,731	5,155,995	5,788,434	12,593,174	0	0	0	0	1,078,945	11,514,233	12,593,178	12,593,178
29	2,025	8,802,332	393,708	238,731	5,155,995	5,788,434	14,590,766	0	0	0	0	1,078,945	13,511,825	14,590,770	14,590,770
30	2,026	10,977,901	393,708	238,731	5,155,995	5,788,434	16,766,335	0	0	0	0	1,078,945	15,687,394	16,766,339	16,766,339
31	2,027	13,317,203	393,708	238,731	5,155,995	5,788,434	19,105,637	0	0	0	0	1,078,945	18,026,696	19,105,641	19,105,641
32	2,028	15,777,421	393,708	238,731	5,155,995	5,788,434	21,565,855	0	0	0	0	1,078,945	20,486,914	21,565,859	21,565,859
33	2,029	19,847,813	393,708	238,731	5,155,995	5,788,434	25,636,247	0	0	0	0	1,078,945	24,557,306	25,636,251	25,636,251
34	2,030	24,144,207	393,708	238,731	5,155,995	5,788,434	29,932,641	0	0	0	0	1,078,945	28,853,700	29,932,645	29,932,645
35	2,031	28,683,174	393,708	238,731	5,155,995	5,788,434	34,471,608	0	0	0	0	1,078,945	33,392,667	34,471,612	34,471,612
36	2,032	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37	2,033	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38	2,034	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39	2,035	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40	2,036	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41	2,037	0	0	0	0	0	0	0	0	0	0	0	0	0	0
42	2,038	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43	2,039	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44	2,040	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45	2,041	0	0	0	0	0	0	0	0	0	0	0	0	0	0

3.8 Summary of Financial Analysis

As a result of the financial analysis, the cases where high profitability, higher than 11 % of FIRR, can be expected are summarized as follows:

Table 3-23 : Case with Higher Profitability

Case	Conditions	
	Toll Rate	Concession Period
1) Reduction of Implementation Length (Section 3 + Segment 2 of Section 2)	M¢12.6	40 years or more
2) Higher Toll Application (1)	M¢18.9	35 years or more
3) Higher Toll Application (2)	M¢25.2	30 years

As for the first one, the half of the project can be realized by privatization, but the another half will not be implemented for long period, say two decades at least, since the government budget is not sufficient to carry out.

This situation will not be consistent with the government perspectives of the KL metropolitan region.

In the second and the third cases, a higher toll rate should be applied on the ORR. The second case, where the toll rate is 1.5 times the base case, requires more than 35 years for the concession period. In the third case, the consession period is 30 years only, however, the toll rate should be raised to the double of the base case. A higher toll application may be justified by the following reasons.

a) Benefit Principle

Based on the benefit principle, the beneficiaries should pay for the project cost. The ORR is designed so as to have the capability to offer a congestion free travel above design speed of 100 km/hr. with controlled access, which provides the users operational freedom.

At the same time, it is designed to minimize the adverse impacts on road-side environment, protecting from disasters as well as public nuisance by employing many tunnels and viaducts.

The road users are the primary beneficiaries of the project, therefore, should pay for the cost in terms of toll charge.

b) Toll Rate on Other Highways

As mentioned above, the toll rate for the North-South Expressway is calculated on the basis of the agreement, where the toll rate be M¢12.6 in 2000.

In case of other highways, a higher toll rate can be found according to the concession agreement. In case of the Shah Alam Highway, the toll rate for the section from KL-Seremban Expressway to the N-S Central Link will be RM3.20 in the year 2001, which is equivalent to M¢16.8/km.

In case of the Dedicated Highway, the toll rate is calculated to be about M¢21.0/km.

c) Benefit from ORR

The financial benefit of the users of the ORR can be estimated as follows:

The Table 3-23 shows the total vehicle-km and vehicle-time of only the ORR users when the ORR is implemented according to the schedule. If the ORR is not constructed, those users have to use other congested roads instead of the ORR.

The total vehicle-km and vehicle-time of the ORR users in case of without ORR is also estimated and shown in the Table 3-24.

Accordingly the difference is deemed as the benefit received by the ORR users.

Table 3-24 : Total Vehicle-km and Vehicle-time of ORR Users

		With ORR	Without ORR	Difference
2000	Total Veh-km Total Veh-hr	562,344 8,818	569,685 14,278	7,341 5,420
2005	Total Veh-km Total Veh-hr	9,380,451 197,249	9,654,242 327,976	273,791 130,727

Note: The figures are expressed as the total of the ORR portion and the other roads portion used by the ORR users.

The financial benefit is obtained from the above difference multiplied by the unit running cost and fixed cost as explained in the section for vehicle cost.

Excluding the time benefit and accident benefit, since they might differ by individuals, the benefit received by the ORR users are estimated as shown in Table 3-25.

Table 3-25 : Benefit Received by ORR users

(unit : RM)

	2000	2005
Running Cost Saving Fixed Cost Saving Total	2,041 46,124 48,165	76,114 1,112,487 1,188,601
Total veh-km on ORR by ORR users Benefit per vehicle per km	186,592 0.258	3,696,767 0.322

The average benefit received by the ORR users is estimated at M¢25.8/km for the year 2000 and M¢32.2/km for the year 2005 in 1995 prices.

If the time benefit of the passengers and the accident benefit are also included, the benefit becomes about 70% higher than the above figures.

For the reference perpose, the time benefit and the accident benefit are estimated as shown in Table 3-26.

Table 3-26 : Time Benefit and Accident Benefit for ORR Users

(unit : RM)

	2000	2005
Travel Time Cost Saveing Accident Cost Saving	32,791 51	790,898 1,892
Total	32,842	792,790
Benefit per vehicle per km for ORR user	0.176	0.214

As a consequence, the financial analysis suggests that the project can be privatized under the following conditions:

1) Higher Toll Application

A higher toll rate, M¢18.9/km should be applied in 2000 for realizing stable operation.

As for concession period, at least 35 years are required taking into account the long construction period. In practical sense longer concession period, say 40 years will be required in order to make the project sufficiently attractive to the private sector.

In addition, the government support is also required in terms of soft loan and land acquisition.

2) Other Alternatives

In case that a higher toll application is difficult due to various social circumstances, other income source should be pursued.

The application of land development profit can be one of the alternatives. Prior to the financial analysis, detailed development scheme based on the region-wide development guideline should be prepared.

3.9 Sensitivity Analysis

The sensitivity analysis is made for the following factors.

a. Higher growth rate of GRDP in Selangor
b. Changes in the estimated project cost
c. Changes in the estimated traffic volume

(1) Higher growth rate of GRDP in Selangor

The traffic forecast in this study has been made on the basis that the average annual growth rate of GRDP in Selangor is 7.0% for the period from 1995 to 2020. However the target growth rate for the Selangor state is 7.8% per annum as commented in the third Steering Committee Meeting. Hence, the influence of the higher growth rate in Selangor to the project is examined as a sensitivity analysis. As a result of traffic demand analysis the influence of the higher economic growth on the traffic demand is found to be about 3% increase in 2010 and about 12% increase in 2020. (See Appendix for more detail).

Table 3-23 shows the FIRR changes due to the difference in GRDP growth rate in Selangor.

Table 3-27 : FIRR Changes Due to Difference in GRDP Growth

	Concession Period (years)	Original Case (GRDP Growth 7.0%)	GRDP Growth 7.8% Case
Base Case	35	8.57%	9.39%
	40	9.64%	10.40%
	45	10.38%	11.07%
Toll Rate 1.5 times Base Case	35	11.10%	12.12%
	40	12.05%	12.97%
	45	12.65%	13.55%

In general, compared to the original case, the FIRR is pushed up by applying the higher GRDP growth rate.

In case of Base Case, where the toll rate is 12.6 ¢/km in 2000, the FIRR increases as much as about 0.7% to 0.8% point higher than the original case. However the FIRR is at most 11.07% even for the 45 years concession period under the conditions of Base Case, which may not be so attractive for private sectors.

In case of higher toll rate, i.e. 1.5 times Base Case in 2000, the FIRR increases as much as 0.9% to 1.0% point higher than the original case by applying the 7.8% growth rate.

In this case, the FIRR exceeds 12% in any case of concession period in the table.

Hence, it suggest that the following options may be possible for the privatization if the higher economic growth rate is promising.

a. Application of the toll rate of 1.5 times Base Case, i.e. 18.9 ¢/km for 35 years concession
b. Application of lower toll rate, i.e. about 16 ¢/km for 40 years concession.

(2) Changes in estimated project cost

The project cost has uncertain factors such as ;

- Structure Length
- Construction quantity
- Escalation of unit construction cost

The ORR particularly passes through a mountainous area, which may involve more uncertain factors.

Hence the following cases are examined in the sensitivity analysis.

a. 20% increase of Project Cost
b. 20% decrease of the Project Cost

Table 3-24 and Figure 3-6 show the FIRR changes due to the changes in the estimated cost for the alternative toll level cases.

Table 3-28 : Changes in FIRR due to Project Cost Changes

Alternative Toll Level	Project Cost		
	-20%	Original	+20%
Base Case	11.5%	9.64%	8.50%
1.5x Base Case	13.72%	12.05%	10.80%
2.0x Base Case	15.37%	13.70%	12.39%

Note : 1) Toll level in the Base Case is 12.6 sen/km in 2000
2) Concession Period is assumed to be 40 years.
3) Other conditions are unchanged from the basic assumptions.

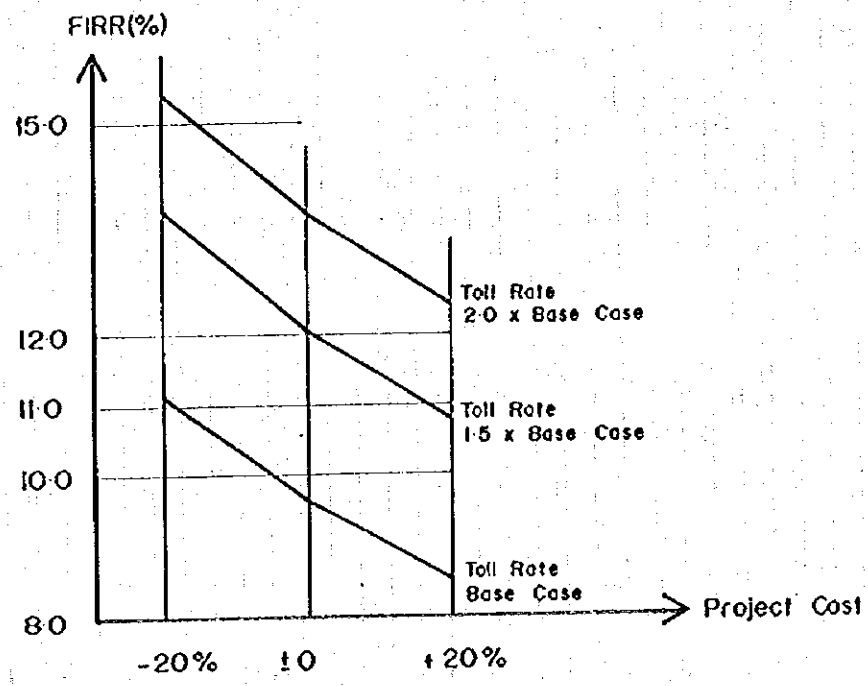


Figure 3-7 : FIRR Changes Due to Project Cost Change

In any case, 20% increase of the project cost reduces the FIRR by as much as about 1.2% point, whereas 20% decrease of the project cost will push up the FIRR by about 1.6% point.

In case of 20% increase of the project cost, the conditions for privatization will become more severe ; even for the case of 1.5 times higher toll than the Base Case, the project is not so profitable. Accordingly the toll level should be further raised to 2.0 times the Base Case in order to privatize the project, since the application of longer concession period may be difficult.

In case the project cost is decreased as much as 20%, the FIRR for the Base Case also exceeds 11.0%, therefore the toll rate of about 15 ¢/km may bring about sufficient revenue to privatize.

(3) Changes in estimated traffic volume

The traffic demand on the project road also contains various uncertain factors such as ;

- population growth and its distribution
- economic growth rate
- modal choice of residents
- impacts of toll levy
- availability of alternative route etc.

In order to examine the influence of the traffic volume changes the sensitivity test is made for the following cases.

a. 20% increase of the traffic volume
b. 20% decrease of the traffic volume

Table 3-25 shows the FIRR changes due to the changes in traffic volume on the project road for the alternative toll level cases.

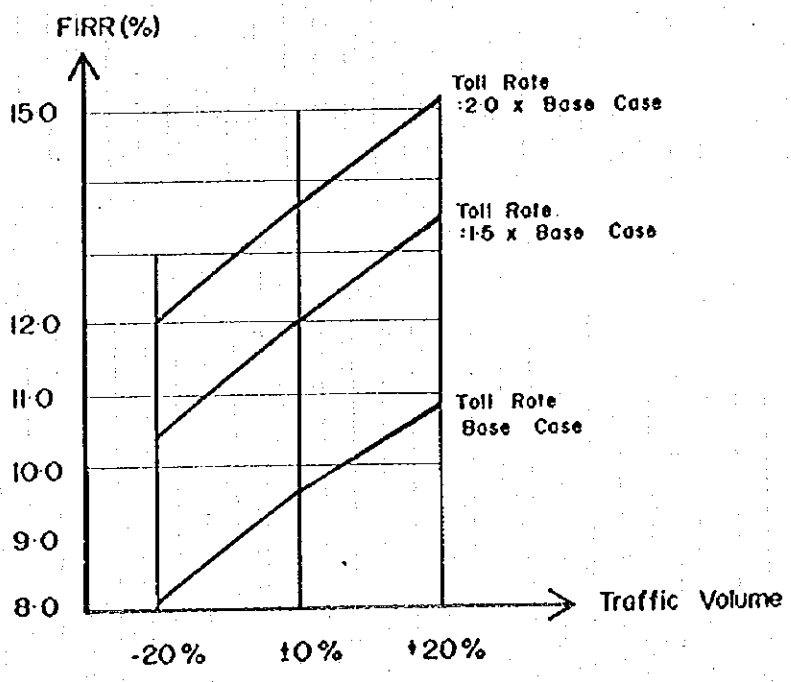


Figure 3-8 : FIRR Changes Due to Traffic Volume Change

Table 3-29 : Changes in FIRR due to Traffic Volume Changes

Alternative Toll Level	Traffic Volume		
	-20%	Original	+20%
Base Case	8.10%	9.64%	10.90%
1.5x Base Case	10.43%	12.05%	13.51%
2.0x Base Case	12.04%	13.70%	15.17%

Note : Refer to the notes under the Table 3-24.

Generally, the FIRR changes are proportional to the changes in the traffic volume for all the cases. The 20% increase of traffic volume will raise the FIRR about 1.5% point, on the other hand the 20% reduction of traffic volume will reduce the FIRR about 1.6% point.

In case of the 20% decrease, the toll level should be 2.0 times Base Case if is privatized.

On the contrary, the 20% increase of traffic volume will enable the privatization under the lower toll rate the original case, i.e. the toll at around 15 ¢/km.