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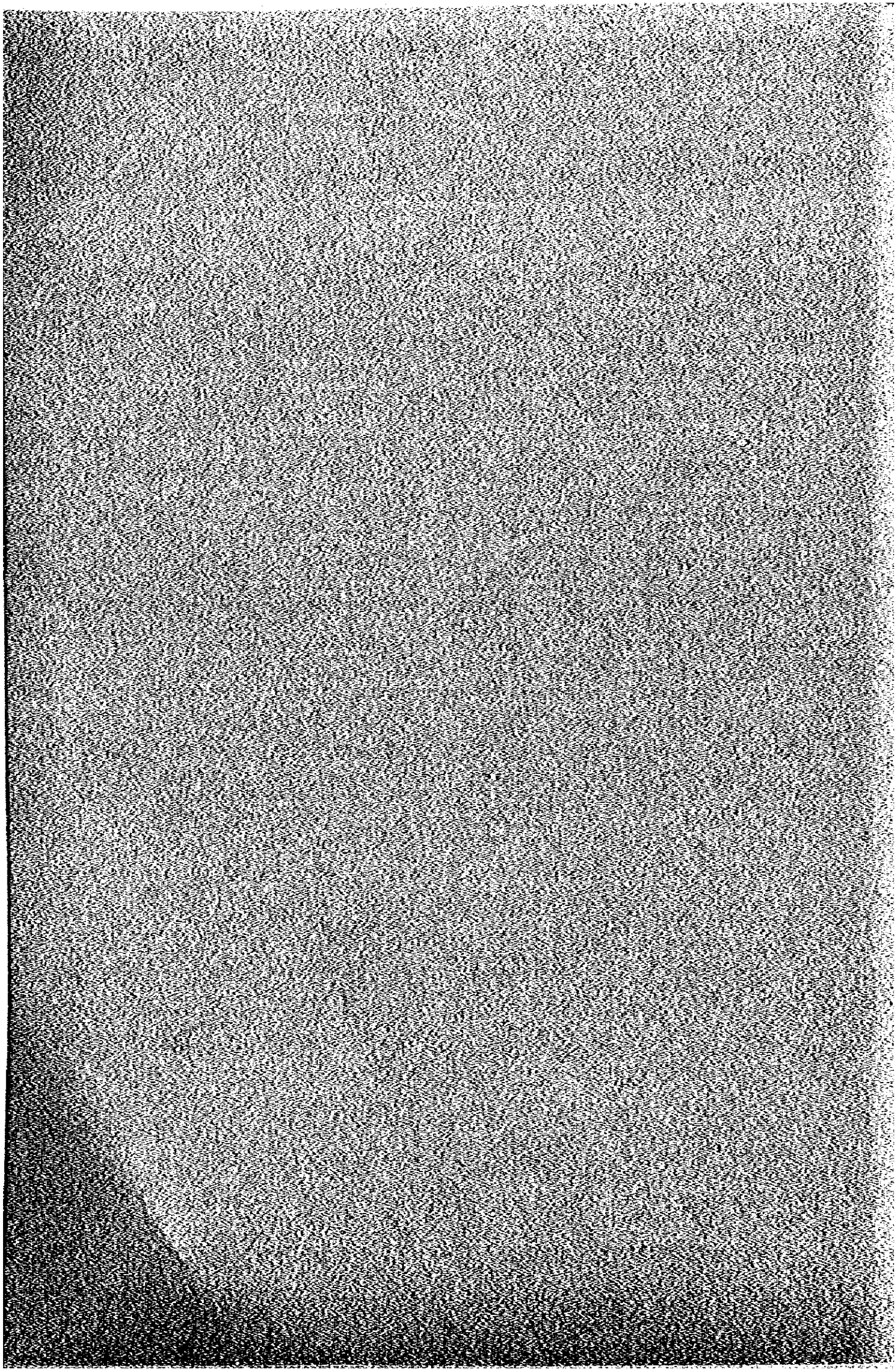

APPENDIX TABLE 11-1 UNIT COST OF MAJOR WORK ITEM

		Description	Unit	Quantity	Unit Price		
					F/C	L/C	Tax
1	101	Maintenance and Protection of Traffic and Others	L.S.		-	2.66×10^{6}	0.13×10^{6}
2	201	Removal of Concrete Pavement	SQ.M		29	29	7
3	202	Removal of Foundation or Obstruction	Cu.M		68	68	14
4	203	Borrow Excavation	Cu.M		90	90	20
5	301	Subbase	Cu.M		180	180	40
6	302	Portland Cement Concrete Pavement	Cu.M		1,560	1,080	360
7	501	Bridge Span 20m H=9m	SQ.M		4,841	3,352	1,117
8	502	Bridge Span 25m H=9m	SQ.M		5,335	3,694	1,231
9	503	Bridge Span 30 H=9m	SQ.M		5,642	3,906	1,302
10	504	Bridge Span 35 H=9m	SQ.M		6,006	4,158	1,386
11	505	Bridge (PC BOX) 35+50+35	SQ.M		8,476	5,868	1,956
12	505	Bridge (PC BOX) 40+60+40	SQ.M		9,662	6,689	2,229
13	506	Bridge (PC BOX) 45+70+45	SQ.M		10,910	7,553	2,517
14	507	Approach Bearing Unit	SQ.M		1,042	1,141	297
15	508	Underpassing Section	L.S.		248.97×10^{6}	172.36×10^{6}	57.45×10^{6}
16	509	Pedestrian Bridge	SQ.M		5,280	1,360	1,360
17	510	Retaining Wall	L.M.		5.612	5,124	1,464
18	511	Noise Barrier Wall (H=3.0M)	L.M.		1,782	459	459
19	601	R.C. pipe culvert D=60 CM	L.M.		506	462	132
20	602	R.C. pipe culvert D=100 CM	L.M.		966	882	252
21	603	Concrete U-Ditch	L.M.		184	168	48
22	701	Guard Rail	L.M.		1,320	340	340
23	702	Fence	L.M.		627	162	161
24	703	Regulatory Sign	Each		2,574	663	663
25	704	Guide Sign	Each		198.00×10^{3}	51.00×10^{3}	51.00×10^{3}
26	705	Road Marking	SQ.M		198	51	51
27	706	Illumination post	Each		27.06×10^{3}	6.97×10^{3}	6.97×10^{3}
28	707	Traffic Signal	Set		0.66×10^{6}	0.17×10^{6}	0.17×10^{6}
29	801	Toll Booth	Each		1.65×10^{6}	0.43×10^{6}	0.43×10^{6}
30	802	Toll Gate Office	Each		3.85×10^{6}	0.99×10^{6}	0.99×10^{6}
31	803	Matrix Sign	Each		1.32×10^{6}	0.34×10^{6}	0.34×10^{6}
32	804	C.C.TV Camera	Each		0.40×10^{6}	0.10×10^{6}	0.10×10^{6}
33	805	Other Equipment for Toll System	L.S.		0.66×10^{6}	0.17×10^{6}	0.17×10^{6}

APPENDIX TABLE 11-2 UNIT COST OF BRIDGES

In 1983 prices

Type of Bridge Span Length, Pier Height, Road Width	Unit Price per m^2
	Baht
Span L=20 m H=6.5 m W=12.83 m	8,370
H=9 W=12.83	9,310
H=13 W=12.83	10,710
Span L=25 m H=6.5 W=12.83 m	9,230
H=6.5 W= 9.33	9,880
H=6.5 W= 5.83	10,150
H=9 W=12.83	10,260
H=9 W= 9.33	10,980
H=9 W= 5.83	11,290
H=13 W=12.83	11,750
H=13 W= 9.33	12,930
Span L=30 H=6.5 W=12.83	9,940
H=9 W=12.83	10,850
H=13 W=12.83	12,170
H=15 W=12.83	12,470
Span L=35 H=6.5 W=12.83	10,690
H=9 W=12.83	11,550
H=13 W=12.83	12,670
H=15 W=12.83	13,030
PC BOX 35+50+35 H=9 W=12.83	16,300
35+50+35 H=16 W=12.83	17,240
40+60+40 H=9 W=12.83	18,580
40+60+40 H=16 W=12.83	20,430
45+70+45 H=9 W=12.83	20,980
45+70+45 H=16 W=12.83	23,080

APPENDIX TABLE 11-3 SUMMARY OF COST COMPONENTS

Type of Work	Foreign Currency Component	Local Currency Component	Local Tax	Total
Earthwork	45	45	10	100
Asphalt Pavement	62	26	12	100
Bridges	52	36	12	100
Culverts	46	42	12	100
Toll Facilities	66	17	17	100
Engineering	41	48	11	100

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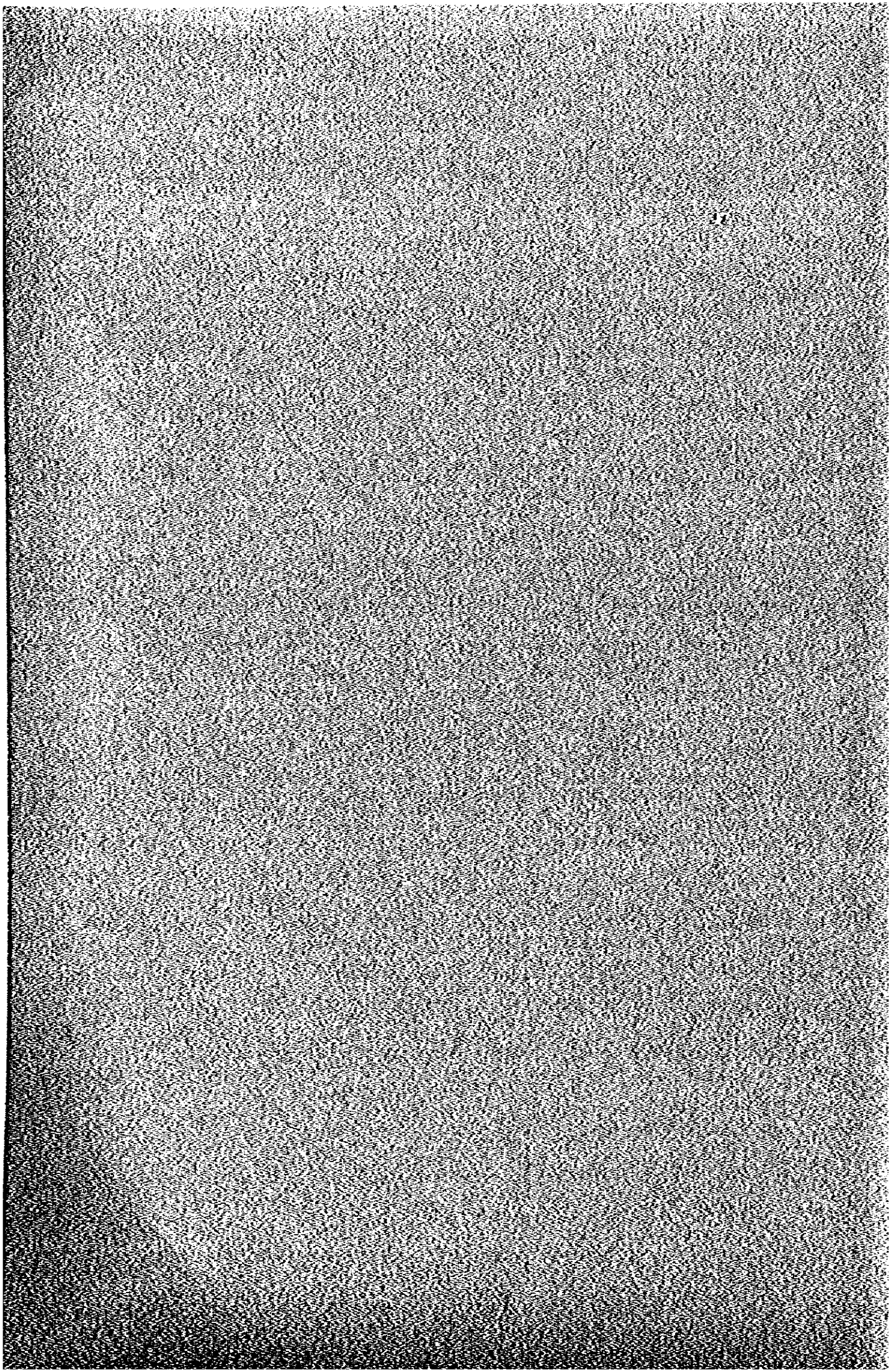

APPENDIX 12.1 VEHICLE OPERATING COST

12.1.1 General

Studies on the vehicle operating cost were conducted for representative vehicle types, each having different operating characteristics. For each vehicle type, a popular vehicle make was selected. It is determined that the make represents a typical cost performance of that vehicle type.

In some countries, the vehicle operating cost (VOC) is divided into the distance related cost (running cost) and the time related cost (fixed hourly cost). However, in Thailand all factors in the VOC are enumerated by distance related cost. Accordingly, this study follows the conventional Thai method.

Time value is determined for passengers in vehicles. No time value for cargo is estimated. Time value used in economic analysis is estimated by referring to hourly income and trip purpose of vehicle users.

Prices and tax element of VOC were studied in September 1982 for Phase I and again in May 1983 for Phase II. It was found they were virtually at the same level except the fuel price which was revised in March 1983.

The new fuel price and tax element were incorporated in the VOC estimates in the Phase II Study.

12.1.2 Representative Vehicles

Vehicles were classified into eight types. A vehicle make which represents each classified type was selected. Annual operating kilometerage and life years in use were assumed for each type. They are shown in Appendix Table 12–1.

Market prices were determined after reviewing the information given by dealers and makers[1]. Buses and trucks are generally sold from the factory as a unit of engine-chassis-cab on which bodies are fixed by purchasers. Types and cost of the body are quite different among those users. The prices of body shown in the table are considered to indicate the cost of a common and standard type.

12.1.3 Running Cost

(1) Fuel and Engine Oil

Fuel consumption rate at a normal travelling speed on flat and paved urban road is shown as follows :

Type	V=km/h	km/ℓ	ℓ/km
Motorcycle	60	30	0.034
Car	70	14	0.074
Light bus	60	13	0.078
Medium bus	60	8	0.130
Heavy bus	60	5	0.217
Light truck	70	11	0.096
Medium truck	60	7	0.152
Heavy truck	60	5	0.197

1) Reference (1), Appendix P 12–23.

APPENDIX TABLE 12-1 REPRESENTATIVE VEHICLES

	Type	Make	Horse Power and Engine CC	Life in use, Years	Annual Km.	Market Price, Baht		
						Complete	Body	Total
1	Motorcycle	Suzuki	- 100	6	13,000	22,000	-	22,000
2	Passenger Car	Toyota Corolla	75 - 1300	10	18,000	229,000	-	229,000
3	Light Bus	Datsun Pick up	90 - 1600	7	40,000	130,000	30,000	160,000
4	Medium Bus	Isuzu-Elf	100 - 3300	7	50,000	271,000	70,000	341,000
5	Heavy Bus	Hino BX 321	150 - 5900	7	60,000	417,000	533,000	950,000
6	Pickup Truck	Datsun-Pick up	80 - 1600	8	30,000	130,000	-	130,000
7	Medium Truck	Hino FE 172	168 - 6500	10	40,000	414,000	114,000	528,000
8	Heavy Truck	Hino FL 176	168 - 6500	10	50,000	624,000	129,000	753,000

When the traffic volume on road increases, the travelling speed decreases. Decreases in the travelling speed usually accompany changes in speed cycles such as stopping, slow down, acceleration, etc. The relationship between the fuel consumption rate and the travel speed is shwon in Appendix Table 12–2. The table was developed by referring to an experimental data[2] on urban roads in Japan since traffic congestion and vehicle types on roads in large urban areas in Japan are quite similar to those in other countries including Bangkok.

Engine oil consumption per 1,000 km is shown in Appendix Table 12–3. Appendix Table 12–4 presents the economic cost of fuel and engine oil per litre.

(2) Tire

The cost of set of tires and tubes per vehicle was estimated and shown in Appendix Table 12–5. Generally, commercial service vehicles in Thailand use retreading tires. Thus, one new set and one retread set were combined together to have a tire cost per 1,000 km in this study.

It was generally said that when vehicles run at a lower speed the tire wear is less, while at higher speed the tire wear becomes larger. This tendency is also shown in the report such as Jan De Wielle[3] and Robley Winfrey[4].

However, most of the studies on vehicle running cost do not explicitly explore the tire wear on congested urban roads. Bus and truck operators often say that a low travelling speed of 30–20 km/h or less on urban roads usually means frequent changes in speed with braking which increase tire friction, and that it is not likely that tires used by the vehicles running mostly in urban areas have a longer life than those in rural areas if the roads are in the same conditions.

Unfortunately, there are no experimental data which indicate how the tire wear is different on the roads under uninterrupted flow and on the roads with frequent speed changes. Accordingly, it is assumed the tire wear would be same regardless of the speed level.

12.1.4 Fixed Cost

(1) Depreciation

Vehicle costs without tires were estimated by finding the duty rates for CIF value of imported CKD and the taxes on the product. The CIF values were approximated by interviewing with persons in Customs Department. Customs duty rates and taxes on the product are shown in Appendix Table 12–6. By using these tax rates, the economic cost is tabulated as in Appendix Table 12–7.

Depreciation ratio was calculated by an interest rate of 12% and the life year of each vehicle. No salvage value at the end of service life was considered since the amount was negligibly small. Depreciation ratio (CRF) is also shown in the Appendix Table 12–8.

In order to enumerate vehicle efficiency at various travelling speeds, an index table was prepared. The table indicates if the vehicle runs at a lower speed, the efficiency decreases resulting in a higher depreciation cost. It is shown in Appendix Table 12–9.

2) See Reference (2), Appendix P 12–23.

3) and 4) See Reference (3) and (4), Appendix P 12–24.

APPENDIX TABLE 12-2 FUEL CONSUMPTION

(Liters/1,000 kms)

Speed	Motor-cycle [7]	Passenger Car [1]	Light Bus [6]	Medium Bus [3]	Heavy Bus [1]	Light Truck [5]	Medium Truck [2]	Heavy Truck [4]
5	85.0	190.6	218.2	363.8	606.0	247.8	337.2	438.4
10	78.3	174.0	200.4	333.4	555.6	226.2	312.5	406.3
15	63.4	140.8	163.6	272.7	454.5	183.0	263.2	342.2
20	54.0	120.0	138.5	230.8	384.6	156.0	227.3	295.5
25	47.3	105.0	120.0	200.0	333.3	136.5	208.3	270.8
30	42.3	94.0	105.9	176.5	294.1	122.2	185.2	240.8
35	39.5	87.7	97.3	162.2	270.3	114.0	175.4	228.0
40	37.4	83.0	90.0	150.0	250.0	107.9	163.9	213.1
45	35.7	79.4	85.7	142.9	238.1	103.2	158.7	206.3
50	35.1	78.0	81.8	136.3	227.2	101.4	153.8	200.0
55	34.2	76.0	80.0	133.4	222.3	98.8	151.5	197.0
60	33.8	75.0	78.2	130.4	217.4	97.5	151.5	197.0
65	33.8	75.0	80.4	133.4	222.3	97.5	156.3	203.2
70	33.3	74.0	83.8	139.6	232.6	96.2	161.3	209.6
75	33.8	75.0	87.8	146.3	243.9	97.5	172.4	224.1
80	34.7	77.0	96.0	160.0	263.3	100.1	192.3	250.0
85	35.6	79.0	107.1	178.5	297.5	102.7	217.0	282.1
90	36.9	82.0	115.2	192.0	320.0	106.6	237.0	308.1

Sources : 1) M.Sano "Fuel Consumption on Urban Streets" Traffic Engineering Vol. 14 No.2, 1979 in Japan.
2) Kanto Engineering Office, MOW in Japan. "Fuel Consumption of the Vehicle Running on Roads-A. Review on the Reports of Survey on Vehicle Fuel Consumption", 1979
3) The figures are estimated by 1) (Heavy Bus) x 0.6
4) The figures are estimated by 2) x 1.3
5) The figures are estimated by 1) (car) x 1.3
6) The figures are estimated by 3) x 0.6
7) The figures are estimated by 1) (car) x 0.45

Remarks : 1) and 2) The figures were slightly revised from the original data in cases for interpolation and extrapolation

APPENDIX TABLE 12-3

ENGINE OIL CONSUMPTION BY VEHICLE TYPE

(Liters/1,000 kms)

Motor-cycle	Car	Light Bus	Heavy and Medium Bus	Light Truck	Medium and Heavy Truck
0.45	1.0	1.2	2.3	1.2	2.5

Sources : ETA & AEC, the Detailed Design of Dao Khanong-Port Expressway, Phase I Study of Route Alignment, Estimation of Road User Cost, 1981. The consumption rate by a motorcycle is assumed at 0.45 of a car.

APPENDIX TABLE 12-4 FUEL AND OIL PRICE

(Baht/Liters)

Item		Market Prices	Excise Tax	Municipality Tax	Economic Cost
Gasoline Regular	1)	11.10	3.75	0.04	7.31
Gasoline Super	2)	12.60	4.26	0.04	8.30
Diesel	3)	6.99	0.93	0.01	6.05
Engine Oil	4)	31.50	1.58	0.02	29.90
Engine Oil	5)	25.80	1.29	0.01	24.50

Sources : National Energy Administration, May 1983

Notes : In this study, it was assumed

1) Regular gasoline is used by motorcycles, light trucks and light buses;
2) Super gasoline by passenger cars ;
3) Diesel fuel by medium and large sized trucks and buses;
4) Engine oil is for car and light trucks; and
5) Engine oil for others.

APPENDIX TABLE 12-5 TIRES AND TUBES BY VEHICLE TYPE : LIFE KM AND COST

Vehicle and No. of tires	Tire Size	Life Km per set	Market Price per set, Baht	Net price per set, Baht	Perceived Cost per set per Baht per Km	Perceived Cost per set per Baht per Km	Economic cost Baht per 1,000 Km per set
1. Motorcycle 2	2.75-18-4	30,000	600	540	0.020	0.020	18.0
2. Passenger Car 4	165 SR 13	60,000	3,200	2,880	0.050	0.050	22.0
3. Light Bus 4	6.50-16-8	45,000	3,800	3,520	0.084	0.073	65.7
	retreading	25,000	1,300	1,170	0.053		
4. Medium Bus 6	7.00-16-12	50,000	8,000	7,200	0.160	0.152	133.0
	retreading	25,000	3,400	3,100	0.135		
5. Heavy Bus 6	8.25-20-12	50,000	15,000	13,500	0.300	0.272	245.0
	retreading	25,000	5,400	4,860	0.246		
6. Light Truck 4	6.00-16-8	45,000	3,200	2,880	0.071	0.071	64.0
7. Medium Truck 6	8.25-20-12	45,000	14,000	12,600	0.311	0.277	249.0
	retreading	25,000	4,800	4,320	0.172		
8. Heavy Truck 10	9.00-20-12	50,000	30,000	27,000	0.600	0.475	428.0
	retreading	30,000	8,000	7,200	0.257		

APPENDIX TABLE 12-6 DUTIES AND TAXES

Vehicles	Duties on CIF[1] Percentage	Business and Local[1] Taxes on CIF Percentage
A. Duties and Taxes on Import		
Motorcycles	60	2.93
Cars	80	3.30
Light trucks	40	2.55
Buses & trucks	30	2.35
B. Sales Tax on Completed Product[2]		
Motorcycles	12	
Cars	30	
Others	7	

Sources : 1) Customs Department, Customs Tariff of Thailand, September 1981 and March 1983.

2) Revenue Department, September 1982

APPENDIX TABLE 12--7 BREAKDOWN OF COSTS OF VEHICLES BY TYPE

(In Baht)

Vehicles	Market Price	Tire Price	Market Price w/o Tires	Sales Taxes[1] and Customs/Duties	Taxes & Duties in Total	Economic Cost w/o Tires
Motorcycle	22,000 (CKD,CIF	600	21,400 7,700	2,290 ,4,850)	7,140	14,260
Car	229,000 (CKD,CIF	3,200	225,800 55,000	52,110 45,810)	97,920	127,880
Light Bus	169,000 (CKD,CIF	3,800	156,200 55,000	10,220 23,600)	33,620	122,580
Medium Bus	341,000 (CKD,CIF	9,000	332,000 103,100	21,710 33,350)	55,060	276,940
Heavy Bus	950,000 (CKD,CIF	15,000	935,000 199,000	61,150 65,500)	125,550	809,450
Light Truck	130,000 (CKD,CIF	3,200	126,800 55,000	8,290 23,400)	31,690	95,110
Medium Truck	528,000 (CKD,CIF	14,000	514,000 169,100	33,620 54,700)	83,320	425,680
Heavy Truck	753,000 (CKD,CIF	30,000	723,000 199,000	47,280 65,400)	111,680	611,320

Note : 1) It is assumed that sales tax rate is applied to factory prices resulting in market prices.

(2) Wages

Wages in the total of regular salary, overtime payment, revenue-incentive payment, etc. are shown in Appendix Table 12--10. The annual wage payment per vehicle is related to annual kilometerage.

Changes in wage rate caused by different travelling speeds were determined by referring to Appendix Table 12--9.

(3) Maintenance Cost

Maintenance cost was divided into the cost of labor and that of spare part. They are shown in Appendix Tables 12--11 and 12--12.

(4) Overhead Cost

Overhead cost was estimated for medium and large sized commercial vehicles (trucks and buses). Appendix Table 12--13 presents the cost for each vehicle type per 1,000 km. Changes in the cost at various travel speeds were estimated by using the figures in Appendix Table 12--9.

(5) Total Vehicle Operating Cost by Travelling Speed

Total vehicle operating cost for each vehicle type at various travelling speeds is shown in Appendix Tables 12--14 to 12--21. The cost is shown in economic cost of Baht per 1,000 km. Table 12--2 is the summary table of VOC at basic running conditions, i.e., the normal running on level and paved urban roads.

APPENDIX TABLE 12-8

DEPRECIATION RATE OF VEHICLES BY TYPE

(Depreciation % per '000 km)

Vehicles	Years in use	Annual Km	CRF[1)]	CRF/'000 km
Motorcycle	6	13,000	0.2432	0.0187
Car	10	18,000	0.1770	0.0098
Light Bus	7	40,000	0.2191	0.0055
Medium Bus	7	50,000	0.2191	0.0044
Heavy Bus	7	60,000	0.2191	0.0037
Light Truck	8	30,000	0.2013	0.0067
Medium Truck	10	40,000	0.1770	0.0044
Heavy Truck	10	50,000	0.1770	0.0035

Note : 1) CRF : Capital Recovery Factor,

$$CRF = \frac{(1 + i)^n \times i}{(1 + i)^n - 1}$$ where i = 12% and n = Years

No salvage value is counted since the figure is negligibly small.

APPENDIX TABLE 12-9

VEHICLE EFFICIENCY RATIO BY TRAVEL SPEED

Km/H	Motor-cycle	Car	Light Bus	Medium Bus	Heavy Bus	Light Truck	Medium Truck	Heavy Truck
5	0.691	0.657	0.755	0.577	0.739	0.554	0.697	0.748
10	0.719	0.683	0.777	0.615	0.746	0.588	0.729	0.771
15	0.747	0.709	0.799	0.653	0.753	0.622	0.761	0.794
20	0.775	0.735	0.821	0.691	0.760	0.656	0.793	0.817
25	0.803	0.761	0.843	0.729	0.767	0.690	0.825	0.840
30	0.831	0.787	0.865	0.767	0.774	0.724	0.857	0.863
35	0.860	0.814	0.888	0.806	0.808	0.758	0.888	0.885
40	0.888	0.840	0.910	0.845	0.842	0.793	0.911	0.908
45	0.916	0.867	0.933	0.884	0.882	0.828	0.933	0.931
50	0.944	0.894	0.955	0.922	0.921	0.863	0.955	0.954
55	0.972	0.921	0.978	0.961	0.961	0.897	0.977	0.977
60	* 1.000	0.947	* 1.000	* 1.000	* 1.000	0.931	* 1.000	* 1.000
65	1.028	0.974	1.011	1.039	1.040	0.966	1.023	1.023
70	1.056	* 1.000	1.022	1.078	1.079	* 1.000	1.045	1.072
75	1.084	1.027	1.033	1.117	1.119	1.034	1.067	1.122
80	1.112	1.053	1.044	1.156	1.158	1.068	1.089	1.172
85	1.140	1.079	1.055	1.195	1.197	1.102	1.111	1.221
90	1.168	1.105	1.066	1.234	1.236	1.136	1.133	1.271

Sources : Basic figures of relative ratio are from ETA-AEC, 1981. They are interpolated and extrapolated to cover the range of travel speeds as shown above. Then relative ratios are recalculated by setting the annual kilometerage at normal speed at 1.000.

Notes : * A unit ratio at the normal travelling speed.

APPENDIX TABLE 12-10 WAGES AND WAGE RATE

Vehicles	Item	Monthly Income per person[1] (Baht)	Annual Income per person (Baht)	Economic Wage cost/vehicle[2] (Baht)	Normal Speed K/H	Annual Running Km	Economic Wage cost/1,000 km (Baht)
Light Bus	Driver	2,500	30,000	27,000	60	40,000	675.0
Medium Bus	Driver	3,000	36,000	48,600	60	50,000	972.0
	Conductor	1,500	18,000				
Heavy Bus	Driver	5,000	60,000	91,800	60	60,000	1,530.0
	Conductors	3,500	42,000				
Light Truck	Driver	2,500	30,000	27,000	70	30,000	450.0[3]
Medium Truck	Driver	5,000	60,000	54,000	60	40,000	1,350.0
Heavy Truck	Driver	5,000	60,000	86,400	60	50,000	1,728.0
	Helpers	3,000	36,000				

Notes : 1) Determined after interviewing ETA, BMTA,etc. The income covers regular, overtime and revenue-incentive payments

2) Assumed at 0.9 of the annual income.

3) It is assumed that a half of light trucks are driven by owners : $900 \times \frac{1}{2} = 450.0$

APPENDIX TABLE 12-11 VEHICLE MAINTENANCE : LABOUR

(Labor Hours per 1,000 km)

Speed	Motor-cycle[2]	Passenger Car	Light Bus	Medium Bus	Heavy Bus	Light Truck	Medium Truck	Heavy Truck
5	0.44	1.10	1.35	3.76	6.00	1.35	3.76	6.00
10	0.44	1.10	1.35	3.76	6.00	1.35	3.76	6.00
15	0.44	1.10	1.35	3.76	6.00	1.35	3.76	6.00
20	0.44	1.10	1.35	3.76	6.00	1.35	3.76	6.00
25[1]	0.44	1.10	1.40	3.88	6.20	1.40	3.88	6.20
30[1]	0.48	1.20	1.45	4.00	6.40	1.45	4.00	6.40
35	0.50	1.25	1.55	4.30	6.88	1.55	4.30	6.88
40[1]	0.50	1.25	1.55	4.30	6.88	1.55	4.30	6.88
45	0.54	1.35	1.65	4.70	7.60	1.65	4.70	7.60
50[1]	0.54	1.35	1.65	4.70	7.60	1.65	4.70	7.60
55	0.58	1.44	1.75	5.20	8.35	1.75	5.20	8.35
60[1]	0.58	1.58	1.75	5.20	8.35	1.75	5.20	8.35
65	0.63	1.58	1.88	5.75	9.22	1.88	5.75	9.22
70[1]	0.63	1.58	1.88	5.75	9.22	1.88	5.75	9.22
75	0.66	1.65	2.00	6.35	10.20	2.00	6.35	10.20
80[1]	0.66	1.65	2.00	6.35	10.20	2.00	6.35	10.20
85	0.67	1.72	2.12	6.95	11.18	2.12	6.75	11.18
90	0.67	1.72	2.12	6.95	11.18	2.12	6.75	11.18

Sources : 1) ETA and AEC 1981, op.cit.
2) Estimated at 0.4 of passenger cars

Remarks : Figures in higher and lower speeds are extrapolated

APPENDIX TABLE 12-12

VEHICLE MAINTENANCE : SPARE PART

(Percent of Economic Vehicle Cost/1,000 km)

Speed	Motor cycle[2]	Passenger Car	Light Bus	Medium Bus	Heavy Bus	Light Truck	Medium Truck	Heavy Truck
5	0.02	0.04	0.05	0.13	0.13	0.06	0.13	0.13
10	0.02	0.04	0.05	0.13	0.13	0.06	0.13	0.14
15	0.02	0.04	0.05	0.13	0.13	0.06	0.13	0.14
20	0.02	0.05	0.06	0.14	0.14	0.06	0.14	0.15
25[1]	0.02	0.05	0.06	0.14	0.14	0.06	0.14	0.15
30[1]	0.02	0.06	0.07	0.14	0.15	0.07	0.15	0.16
35	0.02	0.06	0.07	0.15	0.15	0.07	0.15	0.16
40[1]	0.02	0.06	0.07	0.15	0.16	0.07	0.15	0.17
45	0.02	0.06	0.07	0.15	0.16	0.07	0.18	0.18
50[1]	0.02	0.06	0.07	0.15	0.17	0.07	0.18	0.18
55	0.02	0.06	0.08	0.15	0.17	0.08	0.19	0.19
60[1]	0.03	0.07	0.08	0.19	0.17	0.08	0.19	0.19
65	0.03	0.07	0.08	0.20	0.17	0.08	0.20	0.20
70[1]	0.03	0.07	0.08	0.20	0.17	0.08	0.20	0.20
75	0.03	0.07	0.09	0.21	0.21	0.09	0.21	0.23
80[1]	0.03	0.08	0.09	0.21	0.21	0.09	0.21	0.23
85	0.03	0.08	0.09	0.21	0.21	0.09	0.21	0.25
90	0.03	0.08	0.09	0.21	0.21	0.09	0.21	0.25

Sources : 1) ETA and AEC 1981, op.cit.

2) Estimated at 0.4 of passenger cars

Remarks : Figures in higher and lower speeds are extrapolated

APPENDIX TABLE 12-13

OVERHEAD COST FOR VEHICLE OPERATION

Item	Economic Vehicle Cost	Overhead[1] per cent	Rate per 1000 Km	Overhead Cost Baht/1,000 km
Medium Bus	276,940	3.5	1/50 = 0.020	193.86
Heavy Bus	809,450	7.0	1/60 = 0.017	963.25
Medium Truck	425,680	3.5	1/40 = 0.025	372.47
Heavy Truck	611,320	7.0	1/50 = 0.020	855.84

Note : 1) The percent is applied to the economic vehicle cost

Sources : ETA - AEC 1981, op.cit.

APPENDIX TABLE 12-14

VEHICLE OPERATING COST : MOTORCYCLE (ECONOMIC)

Speed	Fuel		Oil		Tire		Depreciation		Wage		Maintenance parts		Maintenance labor		Overhead		Total Baht/ 1,000 km
	Rate	Cost	Rate	Cost	Rate	Cost	Rate	Cost	Rate	Cost	Rate	Cost	Rate	Cost	Rate	Cost	
5	85.0	621.35	0.45	11.03	0.03	18.00	0.027	385.02	-	-	0.02	7.70	0.44	16.24	-	-	1059.34
10	78.3	572.37	0.45	11.03	0.03	18.00	0.026	370.76	-	-	0.02	7.42	0.44	16.24	-	-	995.82
15	63.4	463.45	0.45	11.03	0.03	18.00	0.025	356.50	-	-	0.02	7.13	0.44	16.24	-	-	872.35
20	54.0	394.74	0.45	11.03	0.03	18.00	0.024	342.24	-	-	0.02	6.84	0.44	16.24	-	-	789.09
25	47.3	345.76	0.45	11.03	0.03	18.00	0.023	327.98	-	-	0.02	6.55	0.44	16.24	-	-	725.56
30	42.3	309.21	0.45	11.03	0.03	18.00	0.023	327.98	-	-	0.02	6.55	0.48	17.22	-	-	689.99
35	39.5	288.75	0.45	11.03	0.03	18.00	0.022	313.72	-	-	0.02	6.27	0.50	18.46	-	-	656.23
40	37.4	273.39	0.45	11.03	0.03	18.00	0.021	299.46	-	-	0.02	5.99	0.50	18.46	-	-	626.33
45	35.7	260.97	0.45	11.03	0.03	18.00	0.020	285.20	-	-	0.02	5.70	0.54	19.94	-	-	600.84
50	35.1	256.58	0.45	11.03	0.03	18.00	0.020	285.20	-	-	0.02	5.70	0.54	19.94	-	-	596.45
55	34.2	250.00	0.45	11.03	0.03	18.00	0.019	270.94	-	-	0.02	5.41	0.58	21.41	-	-	576.79
60	33.8	247.08	0.45	11.03	0.03	18.00	0.019	70.94	-	-	0.02	5.41	0.58	21.41	-	-	573.87
65	33.8	247.08	0.45	11.03	0.03	18.00	0.018	256.68	-	-	0.03	7.70	0.63	23.26	-	-	563.75
70	33.3	243.42	0.45	11.03	0.03	18.00	0.018	256.68	-	-	0.03	7.70	0.63	23.26	-	-	560.09
75	33.4	244.15	0.45	11.03	0.03	18.00	0.017	242.42	-	-	0.03	7.27	0.66	24.37	-	-	547.24
80	34.65	253.29	0.45	11.03	0.03	18.00	0.017	242.42	-	-	0.03	7.27	0.66	24.37	-	-	556.38
85	35.55	259.87	0.45	11.03	0.03	18.00	0.016	238.16	-	-	0.03	6.84	0.67	24.74	-	-	558.64
90	36.9	269.74	0.45	11.03	0.03	18.00	0.016	230.16	-	-	0.03	6.84	0.67	24.74	-	-	560.51

APPENDIX TABLE 12-15

VEHICLE OPERATING COST : PASSENGER CAR (ECONOMIC)

Speed	Fuel		Oil		Tire		Depreciation		Wage		Maintenance parts		Maintenance labor		Overhead		Total Baht/ 1,000 km
	Rate	Cost	Rate	Cost	Rate	Cost	Rate	Cost	Rate	Cost	Rate	Cost	Rate	Cost	Rate	Cost	
5	190.6	1581.98	1.00	29.90	0.025	72.00	0.015	1,918.20	-	-	0.04	76.73	1.10	40.61	-	-	3719.42
10	174.0	1444.20	1.00	29.90	0.025	72.00	0.014	1,790.32	-	-	0.04	71.61	1.10	40.61	-	-	3448.64
15	140.8	1168.64	1.00	29.90	0.025	72.00	0.014	1,790.32	-	-	0.04	71.61	1.10	40.61	-	-	3173.08
20	120.0	996.00	1.00	29.90	0.025	72.00	0.013	1,662.44	-	-	0.05	83.12	1.10	40.61	-	-	2884.07
25	105.0	871.50	1.00	29.90	0.025	72.00	0.013	1,662.44	-	-	0.05	83.12	1.10	40.61	-	-	2759.57
30	94.0	780.20	1.00	29.90	0.025	72.00	0.012	1,534.56	-	-	0.06	92.03	1.20	44.30	-	-	2552.99
35	87.7	727.91	1.00	29.90	0.025	72.00	0.012	1,534.56	-	-	0.06	92.03	1.25	46.15	-	-	2502.55
40	83.0	688.90	1.00	29.90	0.025	72.00	0.012	1,534.56	-	-	0.06	92.03	1.25	46.15	-	-	2463.54
45	79.4	659.02	1.00	29.90	0.025	72.00	0.011	1,406.68	-	-	0.06	84.40	1.35	49.84	-	-	2301.84
50	78.0	647.40	1.00	29.90	0.025	72.00	0.011	1,406.68	-	-	0.06	84.40	1.35	49.84	-	-	2290.22
55	76.0	630.80	1.00	29.90	0.025	72.00	0.011	1,406.68	-	-	0.06	84.40	1.44	53.16	-	-	2276.94
60	75.0	622.50	1.00	29.90	0.025	72.00	0.011	1,406.68	-	-	0.07	89.52	1.58	58.33	-	-	2278.93
65	75.0	622.50	1.00	29.90	0.025	72.00	0.010	1,278.80	-	-	0.07	89.52	1.58	58.33	-	-	2151.05
70	74.0	614.20	1.00	29.90	0.025	72.00	0.010	1,278.80	-	-	0.07	89.52	1.58	58.33	-	-	2142.75
75	75.0	622.50	1.00	29.90	0.025	72.00	0.009	1,278.80	-	-	0.07	89.52	1.65	60.92	-	-	2153.64
80	77.0	639.10	1.00	29.90	0.025	72.00	0.009	1,150.92	-	-	0.08	92.07	1.65	60.92	-	-	2044.91
85	79.0	655.70	1.00	29.90	0.025	72.00	0.009	1,150.92	-	-	0.08	92.70	1.72	63.50	-	-	2064.72
90	82.0	680.60	1.00	29.90	0.025	72.00	0.009	1,150.92	-	-	0.08	92.70	1.72	63.50	-	-	2089.62

APPENDIX TABLE 12-16

VEHICLE OPERATING COST : LIGHT BUS (ECONOMIC)

Speed	Fuel		Oil		Tire		Depreciation		Wage		Maintenance parts		Maintenance labor		Overhead		Total Baht/ 1,000 km
	Rate	Cost	Rate	Cost	Rate	Cost	Rate	Cost	Rate	Cost	Rate	Cost	Rate	Cost	Rate	Cost	
5	218.8	1599.43	1.2	35.88	0.014	65.70	0.0089	1,096.96	1.325	894.38	0.05	54.55	1.35	49.84	1.325	121.47	3912.21
10	200.4	1464.92	1.2	35.88	0.014	65.70	0.0086	1,054.19	1.287	868.73	0.05	52.71	1.35	49.84	1.287	138.04	3730.01
15	163.6	1195.91	1.2	35.88	0.014	65.70	0.0084	1,029.67	1.252	845.10	0.05	51.45	.135	49.84	1.252	134.29	3407.84
20	138.5	1012.44	1.2	35.88	0.014	65.70	0.0082	1,005.16	1.218	822.15	0.06	60.31	1.35	49.84	1.218	130.64	3182.12
25	120.0	877.20	1.2	35.88	0.014	65.70	0.0079	968.38	1.186	800.55	0.06	58.10	1.40	51.69	1.186	127.21	2984.71
30	105.9	774.13	1.2	35.88	0.014	65.70	0.0077	943.87	1.156	780.30	0.07	66.70	1.45	53.53	1.156	123.99	2844.10
35	97.3	711.26	1.2	35.88	0.014	65.70	0.0075	919.35	1.126	760.50	0.07	64.35	1.55	57.23	1.126	120.77	2735.04
40	90.0	657.90	1.2	35.88	0.014	65.70	0.0074	907.09	1.099	741.83	0.07	63.50	1.55	57.23	1.099	117.88	2647.01
45	85.7	626.47	1.2	35.88	0.014	65.70	0.0072	882.98	1.072	723.60	0.07	61.78	1.65	60.92	1.072	114.98	2572.31
50	81.8	597.96	1.2	35.88	0.014	65.70	0.0070	858.06	1.047	706.73	0.07	60.06	1.65	60.92	1.047	112.30	2497.61
55	80.0	584.80	1.2	35.88	0.014	65.70	0.0069	845.80	1.022	689.85	0.08	67.66	1.75	64.61	1.022	109.62	2463.92
60	78.2	571.64	1.2	35.88	0.014	65.70	0.0067	821.29	1.000	675.00	0.08	65.70	1.75	64.61	1.000	107.26	2407.08
65	80.4	587.72	1.2	35.88	0.014	65.70	0.0066	809.03	0.989	667.56	0.08	64.72	1.88	69.41	0.989	106.08	2406.10
70	83.4	609.65	1.2	35.88	0.014	65.70	0.0066	809.03	0.978	660.15	0.08	64.72	1.88	69.41	0.978	104.90	2419.44
75	87.8	641.82	1.2	35.88	0.014	65.70	0.0065	796.77	0.968	653.40	0.09	71.71	2.00	73.84	0.968	103.83	2442.95
80	96.0	701.76	1.2	35.88	0.014	65.70	0.0064	784.51	0.958	646.65	0.09	70.61	2.00	73.84	0.958	102.76	2481.71
85	107.1	782.90	1.2	35.88	0.014	65.70	0.0064	784.51	0.948	639.90	0.09	70.61	2.12	78.27	0.948	101.68	2559.45
90	115.2	842.11	1.2	35.88	0.014	65.70	0.0063	772.25	0.938	633.15	0.09	69.77	2.12	78.27	0.938	106.61	2603.74

APPENDIX TABLE 12-17

VEHICLE OPERATING COST : MEDIUM BUS

(ECONOMIC)

Speed	Fuel		Oil		Tire		Depreciation		Wage		Maintenance parts		Maintenance labor		Overhead		Total Baht/ 1,000 km
	Rate	Cost	Rate	Cost	Rate	Cost	Rate	Cost	Rate	Cost	Rate	Cost	Rate	Cost	Rate	Cost	
5	363.8	2200.99	2.3	56.35	0.013	137.0	0.008	2,215.52	1.733	1,684.48	0.13	288.02	3.76	138.82	1.733	335.96	7057.14
10	333.4	2017.07	2.3	56.35	0.013	137.0	0.007	1,938.58	1.626	1,580.47	0.13	252.02	3.76	138.82	1.626	315.22	6435.53
15	272.7	1649.84	2.3	56.35	0.013	137.0	0.007	1,938.58	1.531	1,488.13	0.13	252.02	3.76	138.82	1.531	296.80	5957.54
20	230.8	1396.34	2.3	56.35	0.013	137.0	0.006	1,661.64	1.447	1,406.48	0.14	232.63	3.76	138.82	1.447	280.51	5309.77
25	200.0	1210.00	2.3	56.35	0.013	137.0	0.006	1,661.64	1.218	1,183.90	0.14	232.63	3.88	143.25	1.218	236.12	4860.89
30	176.5	1067.83	2.3	56.35	0.013	137.0	0.006	1,661.64	1.186	1,152.79	0.14	232.63	4.00	147.68	1.186	229.92	4685.84
35	162.2	981.31	2.3	56.35	0.013	137.0	0.006	1,384.70	1.126	1,094.47	0.15	207.71	4.30	158.76	1.126	218.29	4238.59
40	150.0	907.50	2.3	56.35	0.013	137.0	0.005	1,384.70	1.099	1,068.23	0.15	207.71	4.30	158.76	1.099	213.05	4133.30
45	142.9	864.55	2.3	56.35	0.013	137.0	0.005	1,384.70	1.072	1,041.98	0.15	207.71	4.70	173.52	1.072	207.82	4073.63
50	136.3	824.62	2.3	56.35	0.013	137.0	0.005	1,384.70	1.047	1,017.68	0.15	207.71	4.70	173.52	1.047	202.97	4004.55
55	133.4	807.07	2.3	56.35	0.013	137.0	0.005	1,384.70	1.022	993.38	0.15	207.71	5.20	191.98	1.022	198.12	3976.31
60	130.4	788.92	2.3	56.35	0.013	137.0	0.005	1,107.76	1.000	972.00	0.19	210.47	5.20	191.98	1.000	193.86	3658.34
65	133.4	807.07	2.3	56.35	0.013	137.0	0.004	1,107.76	0.989	961.31	0.20	221.55	5.75	191.98	0.989	191.73	3674.75
70	139.6	844.58	2.3	56.35	0.013	137.0	0.004	1,107.76	0.978	950.62	0.20	221.55	5.75	212.29	0.978	189.60	3719.75
75	146.3	885.12	2.3	56.35	0.013	137.0	0.004	1,107.76	0.968	940.90	0.21	232.63	6.35	234.44	0.968	187.66	3781.86
80	160.0	968.00	2.3	56.35	0.013	137.0	0.004	1,107.76	0.958	931.18	0.21	232.63	6.35	234.44	0.958	185.72	3853.08
85	178.5	1079.93	2.3	56.35	0.013	137.0	0.004	1,107.76	0.948	921.46	0.21	232.63	6.95	256.59	0.948	183.78	3975.50
90	192.0	1161.60	2.3	56.35	0.013	137.0	0.004	1,107.76	0.948	921.46	0.21	232.63	6.95	256.59	0.948	183.78	4057.17

APPENDIX TABLE 12-18

VEHICLE OPERATING COST : HEAVY BUS (ECONOMIC)

Speed	Fuel		Oil		Tire		Depreciation		Wage		Maintenance parts		Maintenance labor		Overhead		Total Baht/ 1,000 km
	Rate	Cost	Rate	Cost	Rate	Cost	Rate	Cost	Rate	Cost	Rate	Cost	Rate	Cost	Rate	Cost	
5	606.0	3666.30	2.3	56.35	0.013	245.0	0.0049	3966.31	1.353	2070.09	0.13	515.62	6.00	221.52	1.353	1303.28	12044.47
10	555.6	3361.38	2.3	56.35	0.013	245.0	0.0048	3885.36	1.340	2050.20	0.13	515.62	6.00	221.52	1.340	1290.76	11626.19
15	454.5	2749.73	2.3	56.35	0.013	245.0	0.0047	3804.42	1.328	2031.84	0.13	515.62	6.00	221.52	1.328	1279.20	10903.68
20	384.6	2326.83	2.3	56.35	0.013	245.0	0.0045	3642.53	1.316	2013.48	0.14	517.39	6.00	221.52	1.316	1267.64	10290.74
25	333.3	2016.47	2.3	56.35	0.013	245.0	0.0044	3561.58	1.304	1995.12	0.14	517.39	6.20	228.90	1.304	1256.08	9876.89
30	294.1	1779.31	2.3	56.35	0.013	245.0	0.0043	3480.64	1.292	1976.76	0.15	522.10	6.40	236.29	1.292	1244.52	9540.97
35	270.3	1635.32	2.3	56.35	0.013	245.0	0.0042	3399.69	1.238	1894.14	0.15	522.10	6.88	254.01	1.238	1192.50	9199.11
40	250.0	1512.50	2.3	56.35	0.013	245.0	0.0041	3318.75	1.188	1817.64	0.16	531.00	6.88	254.01	1.188	1144.34	8879.59
45	238.1	1440.51	2.3	56.35	0.013	245.0	0.0040	3237.80	1.134	1735.02	0.16	531.00	7.60	280.59	1.134	1092.32	8618.59
50	227.2	1374.56	2.3	56.35	0.013	245.0	0.0039	3156.86	1.086	1661.58	0.17	550.43	7.60	280.59	1.086	1046.90	8372.27
55	222.3	1344.91	2.3	56.35	0.013	245.0	0.0038	3075.91	1.041	1592.73	0.17	550.43	8.35	308.28	1.041	1002.74	8176.35
60	217.4	1315.27	2.3	56.35	0.013	245.0	0.0037	2994.97	1.000	1530.00	0.17	550.43	8.35	308.28	1.000	963.25	7963.05
65	213.9	1294.10	2.3	56.35	0.013	245.0	0.0036	2914.02	0.962	1471.86	0.17	550.43	9.22	340.40	0.962	926.65	7798.81
70	232.6	1407.23	2.3	56.35	0.013	245.0	0.0035	2733.08	0.927	1418.31	0.17	550.43	9.22	340.40	0.927	892.93	7643.73
75	243.6	1473.78	2.3	56.35	0.013	245.0	0.0033	2671.19	0.894	1367.82	0.21	560.95	10.20	376.58	0.894	861.15	7612.82
80	263.3	1592.97	2.3	56.35	0.013	245.0	0.0032	2590.24	0.864	1321.92	0.21	560.95	10.20	376.58	0.864	832.25	7576.26
85	297.5	1799.88	2.3	56.35	0.013	245.0	0.0030	2428.35	0.835	1277.55	0.21	560.95	11.18	412.77	0.835	804.31	7585.16
90	320.0	1936.00	2.3	56.35	0.013	245.0	0.0029	2347.41	0.809	1237.77	0.21	560.95	11.18	412.77	0.809	779.27	7572.52

APPENDIX TABLE 12-19

VEHICLE OPERATING COST : LIGHT TRUCK

(ECONOMIC)

Speed	Fuel		Oil		Tire		Depreciation		Wage		Maintenance parts		Maintenance labor		Overhead		Total Baht/ 1,000 km
	Rate	Cost	Rate	Cost	Rate	Cost	Rate	Cost	Rate	Cost	Rate	Cost	Rate	Cost	Rate	Cost	
5	247.8	1811.40	1.2	35.88	0.022	64.0	0.012	1141.32	1.805	812.27	0.06	68.48	1.35	49.84	-	-	3983.19
10	226.2	1653.52	1.2	35.88	0.022	64.0	0.011	1046.21	1.701	765.31	0.06	62.77	1.35	49.84	-	-	3677.53
15	183.0	1337.73	1.2	35.88	0.022	64.0	0.010	951.10	1.608	723.47	0.06	57.07	1.35	49.84	-	-	3219.09
20	156.0	1140.36	1.2	35.88	0.022	64.0	0.010	951.10	1.524	685.98	0.06	57.07	1.35	49.84	-	-	2984.23
25	136.5	997.82	1.2	35.88	0.022	64.0	0.010	951.10	1.449	652.17	0.06	57.07	1.40	51.69	-	-	2809.73
30	122.2	893.28	1.2	35.88	0.022	64.0	0.009	855.99	1.381	621.55	0.07	59.92	1.45	53.53	-	-	2584.15
35	114.0	833.34	1.2	35.88	0.022	64.0	0.009	855.99	1.319	593.67	0.07	59.92	1.55	57.23	-	-	2500.03
40	107.9	788.75	1.2	35.88	0.022	64.0	0.008	760.88	1.261	567.46	0.07	53.26	1.55	57.23	-	-	2327.46
45	103.2	754.39	1.2	35.88	0.022	64.0	0.008	760.88	1.208	543.48	0.07	53.26	1.65	60.92	-	-	2272.81
50	101.4	741.23	1.2	35.88	0.022	64.0	0.008	760.88	1.159	522.60	0.07	53.26	1.65	60.92	-	-	2238.77
55	98.8	722.23	1.2	35.88	0.022	64.0	0.008	760.88	1.115	501.67	0.08	60.87	1.75	64.61	-	-	2210.14
60	97.5	712.73	1.2	35.88	0.022	64.0	0.007	665.77	1.074	483.35	0.08	53.26	1.75	64.61	-	-	2079.60
65	97.5	712.73	1.2	35.88	0.022	64.0	0.007	665.77	1.035	465.84	0.08	53.26	1.88	69.41	-	-	2066.89
70	96.2	703.22	1.2	35.88	0.022	64.0	0.007	665.77	1.000	450.00	0.08	53.26	1.88	69.41	-	-	2041.54
75	97.5	712.73	1.2	35.88	0.022	64.0	0.006	570.66	0.967	435.20	0.09	51.36	2.00	73.84	-	-	1943.67
80	100.1	731.73	1.2	35.88	0.022	64.0	0.006	570.66	0.936	421.35	0.09	51.36	2.00	73.84	-	-	1948.82
85	102.7	750.74	1.2	35.88	0.022	64.0	0.006	570.66	0.907	408.35	0.09	51.36	2.12	78.27	-	-	1959.26
90	106.6	779.25	1.2	35.88	0.022	64.0	0.006	570.66	0.880	396.13	0.09	51.36	2.12	78.27	-	-	1975.55

APPENDIX TABLE 12-20

VEHICLE OPERATING COST : MEDIUM TRUCK (ECONOMIC)

Speed	Fuel		Oil		Tire		Depreciation		Wage		Maintenance parts		Maintenance labor		Overhead		Total Baht/ 1,000 km
	Rate	Cost	Rate	Cost	Rate	Cost	Rate	Cost	Rate	Cost	Rate	Cost	Rate	Cost	Rate	Cost	
5	337.2	2040.06	2.5	61.25	0.014	249.00	0.0063	2681.78	1.435	1937.25	0.13	348.63	3.76	138.82	1.435	534.49	7991.28
10	312.5	1890.63	2.5	61.25	0.014	249.00	0.0060	2554.08	1.372	1852.20	0.13	332.03	3.76	138.82	1.372	511.03	7589.04
15	263.2	1592.36	2.5	61.25	0.014	249.00	0.0058	2468.94	1.314	1773.90	0.13	320.96	3.76	138.82	1.314	489.43	7094.66
20	227.3	1375.17	2.5	61.25	0.014	249.00	0.0055	2341.24	1.261	1702.35	0.14	327.77	3.76	138.82	1.261	469.68	6715.28
25	208.3	1260.22	2.5	61.25	0.014	249.00	0.0053	2256.10	1.212	1636.20	0.14	315.85	3.88	143.25	1.212	451.43	6373.30
30	185.2	1120.46	2.5	61.25	0.014	249.00	0.0051	2170.97	1.167	1575.45	0.15	325.65	4.00	147.68	1.167	434.67	6085.13
35	175.4	1061.17	2.5	61.25	0.014	249.00	0.0051	2170.97	1.126	1520.10	0.15	325.65	4.30	158.76	1.126	419.40	5966.30
40	163.9	991.60	2.5	61.25	0.014	249.00	0.0048	2043.26	1.098	1482.30	0.15	306.49	4.30	158.76	1.098	408.97	5701.63
45	158.7	960.14	2.5	61.25	0.014	249.00	0.0047	2000.70	1.072	1447.20	0.18	360.13	4.70	173.52	1.072	399.29	5651.23
50	153.8	930.49	2.5	61.25	0.014	249.00	0.0046	1958.13	1.047	1413.45	0.18	352.46	4.70	173.52	1.047	389.98	5528.28
55	151.5	916.58	2.5	61.25	0.014	249.00	0.0045	1915.56	1.024	1382.40	0.19	363.96	5.20	191.98	1.024	381.41	5462.14
60	151.5	916.58	2.5	61.25	0.014	249.00	0.0044	1872.99	1.000	1350.00	0.19	355.87	5.20	191.98	1.000	372.47	5370.14
65	156.3	945.62	2.5	61.25	0.014	249.00	0.0043	1830.42	0.978	1320.30	0.20	366.08	5.75	212.29	0.978	364.28	5349.24
70	161.3	975.87	2.5	61.25	0.014	249.00	0.0042	1787.86	0.957	1291.95	0.20	357.57	5.75	212.29	0.957	356.45	5292.24
75	172.4	1043.02	2.5	61.25	0.014	249.00	0.0041	1745.29	0.937	1264.95	0.21	366.51	6.35	234.44	0.937	349.00	5313.46
80	192.3	1163.42	2.5	61.25	0.014	249.00	0.0041	1745.29	0.918	1239.30	0.21	366.51	6.35	234.44	0.918	341.93	5401.14
85	217.0	1312.85	2.5	61.25	0.014	249.00	0.0040	1702.72	0.900	1215.00	0.21	357.57	6.75	249.21	0.900	335.22	5482.82
90	237.0	1433.85	2.5	61.25	0.014	249.00	0.0039	1660.15	0.883	1192.05	0.21	348.63	6.75	249.21	0.883	328.89	5523.03

APPENDIX TABLE 12-21

VEHICLE OPERATING COST : HEAVY TRUCK (ECONOMIC)

Speed	Fuel		Oil		Tire		Depreciation		Wage		Maintenance parts		Maintenance labor		Overhead		Total Baht/ 1,000 km
	Rate	Cost	Rate	Cost	Rate	Cost	Rate	Cost	Rate	Cost	Rate	Cost	Rate	Cost	Rate	Cost	
5	438.4	2652.32	2.5	61.25	0.013	428.0	0.0047	2873.20	1.337	2310.34	0.13	373.63	6.00	221.52	1.337	1144.26	10064.52
10	406.3	2458.12	2.5	61.25	0.013	428.0	0.0045	2750.94	1.297	2241.22	0.14	377.76	6.00	221.52	1.297	1110.02	9648.83
15	342.2	2070.31	2.5	61.25	0.013	428.0	0.0044	2689.81	1.259	2175.55	0.14	381.88	6.00	221.52	1.259	1077.50	9105.82
20	295.5	1787.78	2.5	61.25	0.013	428.0	0.0043	2628.68	1.224	2115.08	0.15	386.01	6.00	221.52	1.224	1047.55	8675.87
25	270.8	1638.34	2.5	61.25	0.013	428.0	0.0042	2567.54	1.190	2056.32	0.15	390.13	6.20	228.90	1.190	1018.45	8388.93
30	240.8	1456.84	2.5	61.25	0.013	428.0	0.0041	2506.41	1.151	1988.93	0.16	394.26	6.40	236.29	1.151	985.07	8057.05
35	228.0	1379.40	2.5	61.25	0.013	428.0	0.0040	2445.28	1.130	1952.64	0.16	398.38	6.88	254.01	1.130	967.10	7886.06
40	213.0	1288.65	2.5	61.25	0.013	428.0	0.0039	2384.15	1.101	1902.53	0.17	402.51	6.88	254.01	1.101	942.28	7663.38
45	206.3	1248.12	2.5	61.25	0.013	428.0	0.0038	2323.02	1.074	1855.87	0.18	406.52	7.60	280.59	1.074	919.17	7522.54
50	200.0	1210.00	2.5	61.25	0.013	428.0	0.0037	2261.88	1.048	1810.94	0.18	407.14	7.60	280.59	1.048	896.92	7356.72
55	197.0	1191.85	2.5	61.25	0.013	428.0	0.0036	2200.75	1.024	1769.47	0.19	418.14	8.35	308.28	1.024	876.38	7254.12
60	197.0	1191.85	2.5	61.25	0.013	428.0	0.0035	2139.62	1.000	1728.00	0.19	420.89	8.35	308.28	1.000	855.84	7133.73
65	202.2	1229.36	2.5	61.25	0.013	428.0	0.0034	2078.49	0.978	1689.98	0.20	420.89	9.22	340.40	0.978	837.01	7085.38
70	209.6	1268.08	2.5	61.25	0.013	428.0	0.0033	2017.36	0.932	1610.50	0.21	423.64	9.22	340.40	0.932	797.64	6946.87
75	224.1	1355.81	2.5	61.25	0.013	428.0	0.0031	1895.09	0.891	1539.65	0.23	426.40	10.20	376.58	0.891	762.55	6845.33
80	250.0	1512.50	2.5	61.25	0.013	428.0	0.0030	1833.96	0.853	1473.98	0.23	427.31	10.20	376.58	0.853	730.03	6843.01
85	282.1	1706.71	2.5	61.25	0.013	428.0	0.0029	1772.83	0.819	1415.23	0.25	444.98	11.18	412.77	0.819	700.93	6942.70
90	308.1	1864.01	2.5	61.25	0.013	428.0	0.0028	1771.70	0.787	1359.94	0.25	445.00	11.18	412.77	0.787	673.55	7016.22

12.1.5 Passenger Time Value

The Study Team conducted a home interviewing survey in July 1982 as discussed in Chapter 4. It is found that the average income per family and the average number of income earners per family are as follows :

	Month (Baht)	Year (Baht)	Earners (Persons)
Car owning	14,138	169,700	3.0
Motorcycle owning	6,331	76,000	3.1
None	5,583	67,000	2.8

The survey also indicated a trip purpose distribution in percent as shown in Appendix Table 4–14. These data are not the same as used in the previous study[5]. However, the findings by the study team will be used to determine the time value of passengers and vehicles, being shown in Appendix Tables 12–22 and 12–23.

It is generally said that income statement by people tends to be lower than the actual income, particularly for higher income classes. Also, there were many families (approximately 33% of the recovered sheets) who refused to answer the question on income, which might result in larger deviation. At the moment there is no reliable data to revise the result of the survey. The result is used without revision in estimating a time value.

APPENDIX TABLE 12–22 TIME VALUE ESTIMATE

In 1982

Item	With car	With Motorcycle	None
A. Persons			
Income/family/year	169,700	76,000	67,000
Income earners/family	3.00	3.10	2.80
Work hours/year	2,000	2,600	2,600
a) Income/work hour	28.28	9.43	9.20
b) Unpaid time, 25% of a)	7.07	2.36	2.30
c) Student Time, 33% of b)	2.33	0.78	0.76
d) To work and on business	34%	34%	24%
e) Others	52%	52%	55%
f) School	14%	14%	21%
Total d) – f)	100	100	100
a) x d)	9.62	3.21	2.21
b) x e)	3.68	1.22	1.27
c) x f)	0.32	0.10	0.16
Weighted total/person	13.62	4.53	3.64
B. Vehicles			
Average occupants	1.63	1.24	47.00
Time value/vehicle/hour	22.20	5.62	171.08

5) Reference (5), Appendix P 12–24.

APPENDIX TABLE 12-23 TIME VALUE IN 1982 AND 2000

Item	Cars[1]	Motorcycle	None
1982			
Time value/person/hour	13.62	4.53	3.64
Time value/vehicle/hour	22.20	5.62	171.08
1982–2000			
Ratio of increase/person	1.554	1.554	1.554
2000			
Time value/person/hour	21.17	7.04	5.66
Average occupancy ratio	x 1.60	x 1.2	x 40
Time value/vehicle/hour	33.87	8.44	226.40

Notes : 1) Including those having both cars and motorcycles

2) Average per capita GNP is assumed to grow at 2.48% p.a. from 1982 to 2000, referring to Chapter 5.

3) Average occupancy ratio is assumed to decrease slightly from the 1982 level for cars and motorcycles.

Reference to Appendix 12.1

(1) – Trip Petch Isuzu Sales Co., Ltd.
1705 Lad Yao, Phahol Yothin Road, Bangkaen, Bangkok

– Toyota Metropolitan Co., Ltd.
1194 Phahol Yothin Road, Bangkaen, Bangkok

– Siam Motors Co., Ltd.
865 Rama I Road, Bangkok

– Thai Hino Motor Sales Ltd.
45/13 Wiphawaderungsit Road, Lak Si, Bangkok

– Bangkok Metropolitan Transport Authority
888 Phetchaburi Road, Bangkok

– Express Transportation Organization
Sri Ayutthaya Road, Phaya Thai, Bangkok 10400

– Tire and motorcycle dealers in Bangkok

(2) M. Sano "Fuel Consumption on Urban Streets" Traffic Engineering Volume 14 No. 2, 1979 (Japan) and

Kanto Engineering Office, MOW "Fuel Consumption of Running Vehicles on Roads – A Review on the Reports of Survey on Fuel Consumption" 1979 (Japan)

(3) Jan De Weille, Quantification of Road User Savings (1970)
World Bank Staff Occasional Paper No. 2

(4) Robley Winfrey, Economic Analysis for Highways
(International Textbook Co., 1969 USA)

(5) ETA and AEC, The Detailed Design of Dao Kanong – Port Expressway, Phase I – Study of Route Alignment, Report on Estimation of Road Users (November 1981)

APPENDIX TABLE 12-24 TRAFFIC COST AND SAVINGS, 2000

(In thousand Baht)

Cost	Items	Without	M/S	TOR	SES/P	SES
Traffic Cost on the Network[1)]	VOC	141,367 (68)	136,233 (71)	138,175 (69)	138,424 (0.70)	138,433 (0.70)
	PTC	68,005 (32)	56,552 (29)	61,055 (31)	60,624 (0.30)	60,681 (0.30)
	TOTAL	209,372 (1.00)	192,785 (1.00)	199,231 (1.00)	199,115 (1.00)	199,115 (1.00)
Savings of Traffic Cost[2)]	VOC	- -	5,134 (31)	3,192 (31)	2,943 (29)	2,934 (29)
	PTC	- -	11,453 (69)	6,950 (69)	7,381 (71)	7,324 (71)
	TOTAL	- -	16,587 (1.00)	10,142 (1.00)	10,324 (1.00)	10,258 (1.00)

Remarks : The figures in ( ) indicate the percent share.

Notes : 1) Traffic cost for ADT.

2) Savings are the balance between an alternative and the "without".

APPENDIX TABLE 12-25 COST BENEFIT STREAMS: PHASE I STUDY

Year	T O R Plan		Master Plan		Year	S E S		SES/R	
	Cost	Benefit	Cost	Benefit		Cost	Benefit	Cost	Benefit
1.	3839.1	0.0	4339.4	0.0	1.	2284.2	0.0	1937.9	0.0
2.	6388.5	0.0	7232.3	0.0	2.	3807.0	0.0	3229.8	0.0
3.	8943.9	0.0	10125.1	0.0	3.	5329.7	0.0	4521.6	0.0
4.	6378.5	0.0	7232.3	0.0	4.	3757.1	0.0	3229.7	0.0
5.	124.3	1617.0	115.1	919.8	5.	59.3	1029.3	51.2	865.1
6.	124.3	1756.6	115.1	1110.6	6.	59.3	1171.7	51.2	1001.6
7.	124.3	1908.2	115.1	1340.9	7.	59.3	1332.3	51.2	1159.6
8.	124.3	2072.9	115.1	1618.9	8.	59.3	1516.4	51.2	1342.6
9.	124.3	2251.9	115.1	1954.7	9.	59.3	1730.1	51.2	1554.5
10.	124.3	2446.3	115.1	2360.0	10.	59.3	1971.0	51.2	1799.9
11.	500.1	3657.5	463.2	2849.5	11.	238.5	2244.8	206.0	2083.9
12.	124.3	2887.0	115.1	3440.4	12.	59.3	2555.0	51.2	2412.8
13.	124.3	3136.2	115.1	4153.8	13.	59.3	2909.1	51.2	2798.6
14.	124.3	3407.0	115.1	5015.3	14.	59.3	3310.6	51.2	3234.4
15.	124.3	3701.1	115.1	6055.4	15.	59.3	3766.8	51.2	3744.9
16.	124.3	3905.6	115.1	6391.6	16.	59.3	3974.9	51.2	3951.9
17.	124.3	4121.3	115.1	6746.5	17.	59.3	4193.9	51.2	4170.3
18.	500.1	4349.0	463.2	7121.1	18.	238.5	4423.8	206.0	4400.8
19.	124.3	4589.2	115.1	7516.5	19.	59.3	4668.4	51.2	4644.0
20.	124.3	4842.7	115.1	7933.9	20.	59.3	4927.5	51.2	4900.7
21.	124.3	5110.2	115.1	8374.4	21.	59.3	5201.3	51.2	5171.6
22.	124.3	5392.5	115.1	8839.4	22.	59.3	5489.9	51.2	5457.4
23.	124.3	5690.4	115.1	9330.3	23.	59.3	5792.6	51.2	5759.0
24.	124.3	6004.7	115.1	9848.4	24.	59.3	6113.8	51.2	6077.3
25.	500.1	6336.4	463.2	10395.2	25.	238.5	6449.6	206.0	6413.1
26.	124.3	6511.5	115.1	10682.5	26.	59.3	6627.7	51.2	6590.3
27.	124.3	6691.4	115.1	10977.7	27.	59.3	6810.6	51.2	6772.4
28.	124.3	6876.3	115.1	11281.0	28.	59.3	6999.0	51.2	6959.5
29.	124.3	7066.4	115.1	11592.7	29.	59.3	7192.3	51.2	7151.8
30.	124.3	7261.6	115.1	11913.1	30.	59.3	7391.0	51.2	7349.5
	29903.2	112590.7	32965.9	169763.3		17257.4	109795.0	14714.6	107762.4
12.00 %	23106.3	16911.3	24848.8	21365.5	12.00 %	13035.2	15112.8	11095.4	14427.1
	-5195.0 PW		-3483.3 PW			2077.5 PW		3331.7 PW	
	0.765 B/C		0.860 B/C			1.159 B/C		1.300 B/C	

APPENDIX TABLE 12 - 26 ECONOMIC COST BENEFIT STREAMS : PHASE II STUDY

(In million Baht of 1983 prices)

No.	Year	R - 1 Cost	R - 1 Benefit	ST - 2 Cost	ST - 2 Benefit	R - 2 Cost	R - 2 Benefit	R - 4 Cost	R - 4 Benefit
1	85	89.59	-	89.59	-	89.59	-	89.59	-
2	86	983.31	-	983.31	-	983.31	-	983.31	-
3	87	2204.79	-	2204.79	-	2204.79	-	2204.79	-
4	88	903.68	-	910.15	-	906.83	-	900.36	-
5	89	2132.63	-	2144.64	-	2138.48	-	2126.47	-
6	90	2171.98	389.67	2178.09	398.36	2175.64	342.52	33.05	337.55
7	91	1304.80	467.86	1310.54	475.03	1308.09	416.98	53.51	410.77
8	92	962.48	555.97	968.59	565.90	922.55	503.85	53.51	496.40
9	93	2207.90	1059.96	2305.68	1078.03	2061.95	969.62	53.51	957.58
10	94	1969.84	1240.64	2463.13	1254.69	2306.58	1140.26	53.51	1128.22
11	95	569.85	1437.37	887.35	1455.44	883.38	1332.98	53.51	1318.93
12	96	140.35	3011.25	165.47	3047.75	155.37	2806.85	130.38	2781.30
13	97	146.36	3452.90	172.56	3489.40	162.02	3237.55	135.97	3208.35
14	98	282.99	3938.35	333.64	3978.50	313.27	3704.75	262.90	3679.20
15	99	160.50	4482.20	189.23	4518.70	177.67	4230.35	149.10	4197.50
16	00	167.54	5077.15	197.53	5120.95	185.47	4810.70	155.64	4777.85
17	01	175.92	5412.95	207.41	5460.40	194.74	5135.55	163.43	5099.05
18	02	432.02	5767.00	509.35	5814.45	478.25	5475.00	401.35	5438.50
19	03	192.13	6139.30	226.52	6190.40	212.69	5832.70	178.49	5796.20
20	04	200.31	6544.45	236.16	6595.55	221.74	6223.25	186.09	6183.10
21	05	209.27	6967.85	246.73	7018.95	231.66	6632.05	194.41	6588.25
22	06	219.74	7409.50	259.07	7464.25	243.25	7059.10	204.14	7015.30
23	07	229.61	7891.30	270.71	7953.35	254.18	7526.30	213.31	7482.50
24	08	239.98	8395.00	282.94	8460.70	265.66	8011.75	222.94	7964.30
25	09	499.23	8931.55	588.59	8993.60	552.65	8526.40	463.78	8475.30
26	10	262.30	9493.65	309.25	9566.65	290.37	9077.55	243.68	9022.80
27	11	275.46	10088.60	324.77	10161.60	304.93	9650.60	255.90	9595.85
28	12	275.46	10088.60	324.77	10491.85	304.93	9650.60	255.90	9595.85
29	13	275.46	10088.60	324.77	10832.84	304.93	9650.60	255.90	9595.85
30	14	275.46	10088.60	324.77	11184.90	304.93	9650.60	255.90	9595.85
Total		20160.9	138384.3	21940.1	141572.2	21139.9	131598.5	19397.6	130742.4
B(i=12%)		-	15454.7	-	15684.0	-	14587.0	-	13906.0
C(i=12%)		9360.5	-	9795.0	-	9571.5	-	9149.0	-
B/C ratio		1.65		1.60		1.52		1.51	

APPENDIX TABLE 12 - 26 ECONOMIC COST BENEFIT STREAMS : PHASE II STUDY

(In million Baht of 1983 prices)

Year	FES & SES		BUS (R-1) Passing through		BUS (R-1) Bus bay use	
	Cost	Benefit	Cost	Benefit	Cost	Benefit
75	7.52	-	-	-	-	-
76	9.32	-	-	-	-	-
77	21.29	-	-	-	-	-
78	226.66	-	-	-	-	-
79	429.98	-	-	-	-	-
80	680.47	-	-	-	-	-
81	679.79	-	-	-	-	-
82	800.79	239.08	-	-	-	-
83	1175.16	478.15	-	-	-	-
84	1447.66	503.70	-	-	-	-
85	2235.26	529.25	89.59	-	89.59	-
86	2899.68	558.45	983.31	-	983.31	-
87	2757.00	594.95	2204.79	-	2204.79	-
88	1299.07	1573.15	903.68	-	903.68	-
89	2258.92	1660.75	2132.63	-	2140.13	-
90	2303.71	2138.02	2171.98	393.38	2171.98	397.32
91	1441.81	2343.96	1304.80	472.17	1304.80	476.74
92	1106.74	2563.47	962.48	560.97	969.98	566.27
93	2358.47	3213.46	2207.90	1069.35	2207.90	1079.31
94	2126.96	3547.44	1969.84	1251.54	2016.64	1263.09
95	1149.34	3912.07	569.85	1450.02	569.85	1463.42
96	256.51	5661.15	140.35	3037.94	140.35	3066.23
97	289.75	6292.60	146.36	3483.87	146.36	3516.71
98	418.90	6978.80	282.99	3974.30	282.99	4012.39
99	316.52	7741.65	160.50	4523.91	160.50	4568.13
00	330.32	8570.20	167.54	5125.55	167.54	5176.82
01	345.81	9011.85	175.92	5464.48	175.92	5519.10
02	1025.92	9475.40	432.02	5821.85	432.02	5879.99
03	378.36	9953.55	192.13	6197.69	192.13	6259.58
04	394.78	10475.50	200.31	6606.60	200.31	6672.49
05	412.39	11019.35	209.27	7034.01	209.27	7104.14
06	431.94	11581.45	219.74	7479.94	219.74	7554.59
07	452.42	12187.35	229.61	7966.27	229.61	8045.75
08	472.81	12691.05	239.98	8474.80	239.98	8559.42
09	1158.08	13227.60	499.23	9016.50	499.23	9106.57
10	516.68	13789.70	262.30	9584.08	262.30	9679.95
11	541.52	14384.65	275.46	10184.87	275.46	10286.92
12	541.52	14384.65	275.46	10184.87	275.46	10286.92
13	541.52	14384.65	275.46	10184.87	275.46	10286.92
14	541.52	14384.65	275.46	10184.87	275.46	10286.92
Total	36613.39	230051.7	20160.9	140706.5	20222.7	142103.4
B(i=12%)	-	11055.68	-	15642.9	-	15796.3
C(i=12%)	7389.9	-	9360.5	-	9385.5	-
B/C ratio	1.49		1.67		1.68	

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