

## CHAPTER 18

### EVALUATION OF MASTER PLAN

#### 18.1 METHODOLOGY OF ECONOMIC AND FINANCIAL EVALUATION

##### 18.1.1 General

Economic evaluation of the proposed plans and projects was done in two stages of the planning process with different purposes; one is in the stage of the investment schedule planning to determine the relative priority among projects (Chapter 17) and the other is to evaluate economic viability of the plan in accordance with the proposed implementation schedule (this Chapter). In both cases, economic evaluation was made by comparing costs with benefits. General approach of the cost-benefit analysis is shown in Figure 8.1-1.

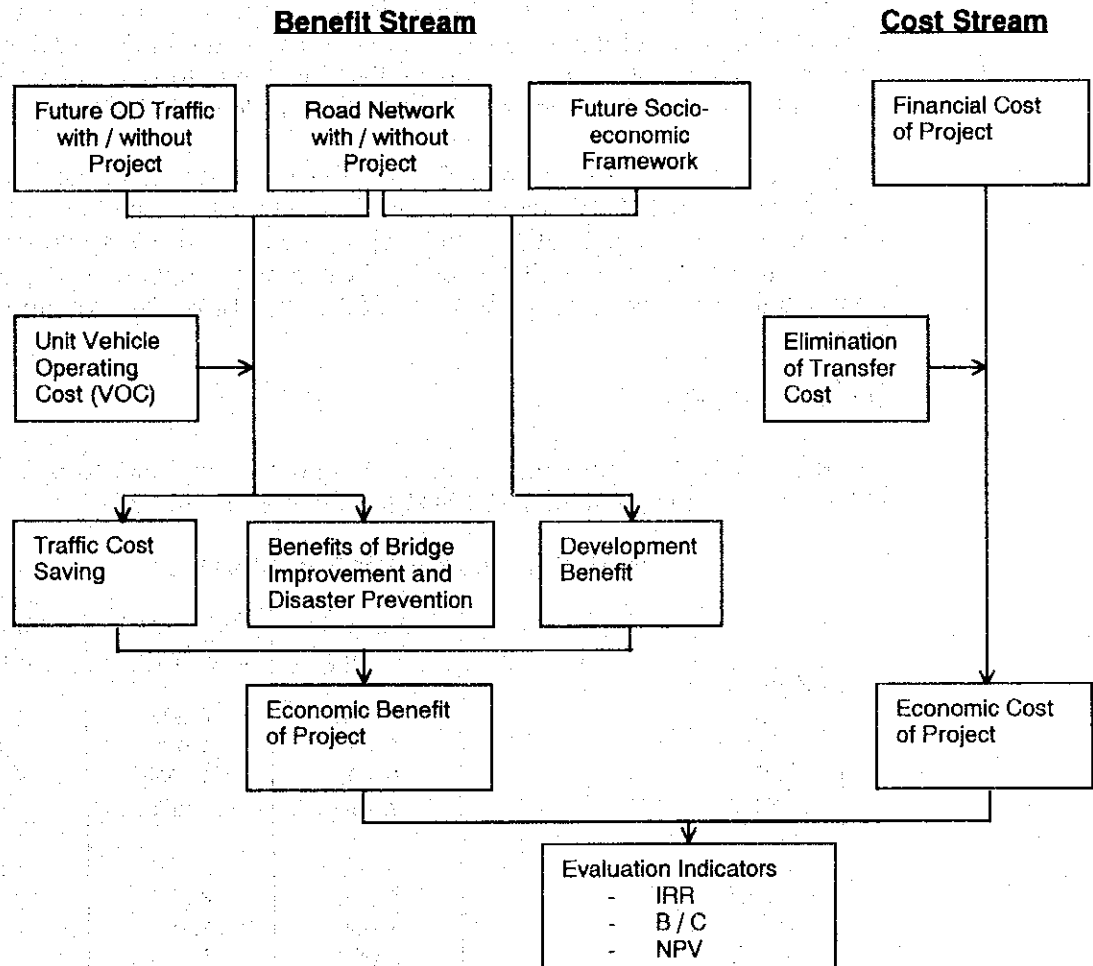


FIGURE 18.1-1 FLOW OF ECONOMIC ANALYSIS

The cost and benefit accruing from a project were measured in terms of economic price. Comparison was made between the benefit which will contribute to the national and regional economy and the cost which is the monetary expression of real consumption of goods and services needed to implement the project. For this purpose, all the transfer costs (taxes and subsidies) were deducted from the cost.

By implementing a road project, a variety of benefits is expected such as improvement of safety and comfort, promotion of inter-regional trade and regional development in the long run, as well as mitigation of traffic congestion. To define and quantify the benefit in this Study, however, a rather conservative approach was taken, limiting the benefit to three items; saving in traffic cost, regional development effect and benefits of bridge improvement and disaster prevention.

### 18.1.2 Economic Benefits

#### (1) Traffic Cost Saving

Construction of a new road will provide a shorter route to some OD trips. Improvement of a road will give a better condition to the traffic. Widening of a road will increase its capacity and enable the traffic to operate at a higher level-of-service. These effects will result in the reduction of the traffic cost.

Traffic cost is composed of running cost, fixed cost and time cost. Running cost is related to the distance traveled and composed of fuel cost, lubricant cost, time cost, maintenance and repair costs and distance-dependent depreciation cost. Fixed cost is composed of time-dependent depreciation cost, capital cost, crew cost and overhead cost. Time cost is time value of passengers.

#### Basic Traffic Cost

Basic traffic cost is the cost on the road under ideal conditions. The unit basic traffic cost is provided by DPWH as shown in Table 18.1-1.

**TABLE 18.1-1 BASIC TRAFFIC COSTS**

(Dec. 1997)

Vehicle Type	Running Cost (P/km)	Fixed Cost (P/min)	Time Cost (P/min)
<b>Financial Cost</b>			
Car	5.390	0.207	1.022
Jeepney	2.430	1.026	1.066
Bus	9.190	1.668	4.075
Truck	7.740	0.501	-
<b>Economic Cost</b>			
Car	3.340	0.140	1.236
Jeepney	1.940	0.959	2.331
Bus	7.090	1.441	7.995
Truck	6.000	0.445	-

#### Traffic Cost in Actual Condition

Actual traffic costs depend on road and traffic conditions. Table 18.1-2 shows the running cost adjustment factor for various road conditions.

### Traffic Cost in Actual Condition

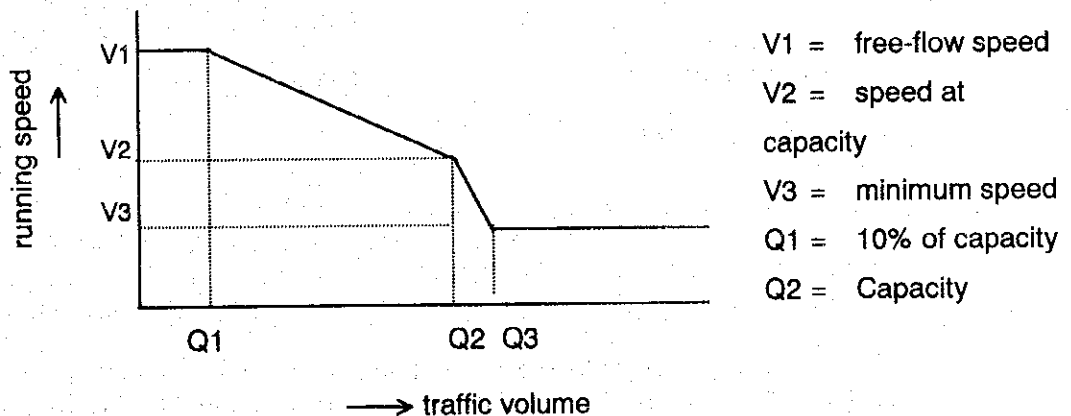
Actual traffic costs depend on road and traffic conditions. Table 18.1-2 shows the running cost adjustment factor for various road conditions. Running cost is calculated by multiplying the basic running cost by the adjustment factor.

**TABLE 18.1-2 RUNNING COST ADJUSTMENT FACTOR**

Surface Type and Condition		Car	Jeepney	Bus	Truck
Paved	Good	1.00	1.00	1.00	1.00
	Fair	1.20	1.20	1.30	1.30
	Bad	1.40	1.40	1.60	1.60
	Very Bad	1.60	1.60	1.90	1.90
Gravel	Good	1.15	1.15	1.25	1.25
	Fair	1.30	1.30	1.50	1.50
	Bad	1.60	1.60	1.90	1.90
	Very Bad	1.90	1.90	2.30	2.30
Earth	Good	1.50	1.50	1.75	1.75
	Fair	2.00	2.00	2.50	2.50
	Bad	3.00	3.00	4.00	4.00
	Very Bad	4.00	4.00	7.00	7.00
Impassable		8.00	8.00	14.00	14.00
Non-existing		16.00	16.00	28.00	28.00

SOURCE: DPWH, collaborated by the JICA Study Team

Fixed cost and time cost are calculated by travel time. Travel time is calculated based on speed-volume relationships which were assumed as shown in Figure 18.1-2.



**FIGURE 18.1-2 SPEED-VOLUME RELATIONSHIP**

Running speeds and traffic capacities in various road conditions were assumed as shown in Tables 18.1-3 and 18.1-4, respectively.

**TABLE 18.1-3 RUNNING SPEED (km/hr)**

		Free-flow Speed (%)				V2	V3
		Car	Jeepney	Bus	Truck	All Vehicles	All Vehicles
Expressway		110	90	90	90	55	15
Paved	Good	70	70	60	60	35	11
	Fair	60	60	50	50	30	10
	Bad	40	40	30	30	20	8
	Very Bad	30	30	20	20	15	7
Gravel	Good	60	60	50	50	30	10
	Fair	40	40	30	30	20	8
	Bad	30	30	20	20	15	7
	Very Bad	20	20	15	15	12.5	6
Earth	Good	40	40	30	30	20	8
	Fair	30	30	20	20	15	7
	Bad	20	20	15	15	12.5	6
	Very Bad	10	10	10	10	10	5
Impassable		4	4	4	4	4	4
Non-existing		2	2	2	2	2	2

**TABLE 18.1-4 TRAFFIC CAPACITY (vehicles/day)**

Road Category	Capacity	Note	
Narrow	1-lane road	6,000	Width $\leq$ 4.0m
Wide	1-lane road	12,000	4-m < width $\leq$ 5.0m
Narrow	2-lane road	18,000	5.0m < width $\leq$ 6.0m
Ordinary	2-lane road	20,000	6.0m width $\leq$ 6.7m
Wide	2-lane road	24,000	6.7m width
Urban	4-lane road	68,000	high roadside friction
Rural	4-lane road	76,000	low roadside friction
2-lane expressway		30,000	
4-lane expressway		88,000	

## (2) Development Benefit

Improvement and new construction of a trunk road would accelerate the economic growth of the influence area through expanding its market, changing cropping patterns, encouraging industrial investment and so on. A potential model was developed to evaluate this regional development effects.

The basic assumption to make the potential model was that the essential factors to determine the GRDP of a region would be the market size (population) and accessibility to the market (transportation cost). The data in 1997 were used in order to formulate the hypothesis that the easier to access the bigger market, the higher the GRDP of the region.

The development potential of a zone was defined as the summation of population of all zones in the Study Area discounted by the economic distance from the zone in consideration to each zone, that is:

$$pGRDP_i = \alpha \cdot POT_i + \beta$$

$$POT_i = \sum_j (P_j / D_{ij}^\gamma)$$

Where:  $pGRDP_i$  : Per Capita GRDP in zone i (1,000 peso/person)  
 $POT_i$  : Development potential of zone i  
 $P_j$  : Population of zone j (1,000 person)  
 $D_{ij}$  : Travel time from zone i to zone j (minute),  
 assuming  $D_{ii} = 10\text{min.}$   
 $\alpha, \beta, \gamma$  : Constant

By the least square method, values of the parameters are determined as follows:

$$\alpha = 0.169$$

$$\beta = 21.1$$

$$\gamma = 1.49$$

Using the potential model, development benefit (movement of GRDP) by a road project can be estimated as follows:

$$DB_i = P_i \cdot d(pGRDP_i) = \alpha \cdot P_i \cdot d(POT_i)$$

$$D(POT_i) = \sum_j P_j \left[ 1 / (D_{ij} - dD_{ij})^\gamma - 1 / D_{ij}^\gamma \right]$$

where:  $DB_i$  : Development benefit in zone i (million peso/year)  
 $P_i$  : Population of zone i (1,000 person)  
 $d(pGRDP_i)$  : Increment of per-capita GRDP of zone i (1,000 peso/person)  
 $d(POT_i)$  : Increment of development potential of zone i (1,000 peso/person)  
 $D_{ij}$  : Travel time from zone i to j in without project case (minute)  
 $dD_{ij}$  : Reduction of travel time by road project from zone i to zone j (minute)  
 $\alpha, \gamma$  : Parameters ( $\alpha = 0.169, \gamma = 1.49$ )

### (3) Benefit of Bridge Improvement and Disaster Prevention

#### Benefit of Bridge Improvement

If a bridge is kept in poor condition without being repaired or replaced, the work of becoming unserviceable will be high. A bridge improvement project will prolong the durable life of the bridge and reduce the probating of being unserviceable. When a bridge is unusable, traffic passing the bridge must take a detour route, which causes additional traffic cost. The benefit of bridge improvement was evaluated as the difference in the additional traffic cost between "without project" and "with project" cases.

### Benefit of Disaster Prevention

Disaster prevention projects would reduce the frequency of natural disaster damages and provide such benefits as savings in additional costs due to using discuss and savings in disaster restoration costs.

Based on the past data, approximate value if benefit was estimated as shown in Table 18.1-5.

**TABLE 18.1-5 UNIT BENEFITS**

Item	Unit Benefit (peso/veh/m/year)
Bridge improvement	
Temporary bridge replacement	57.0
Major repair of permanent bridge	50.0
Minor repair of permanent bridge	24.0
Disaster prevention	
Cut slope failure	12.0
Embankment slope failure	12.0
Debris flow	12.0
Scouring	4.0
Flooding	4.0

#### 18.1.3 Economic Cost

Project costs estimated in Chapter 15 are so-called financial costs of the projects. From the viewpoint of national or regional economy, tax is not consumption of goods and services, but only a monetary transfer. For the purpose of economic evaluation, taxes included in the financial cost such as import duty, value added tax and consumption tax were deducted from the financial cost. These taxes account for about 15% of the financial cost.

#### 18.1.4 Financial Evaluation

Financial evaluation was done for expressway projects to assess the profitability of the project. For this purpose, the financial internal rate of return (FIRR) was calculated by comparing internal and costs over the analysis period of time.

##### *Patronage and Revenue*

Traffic volume on toll facilities was estimated by the following diversion model:

$$P = \frac{K}{1 + \alpha \left( \frac{B \cdot 1}{\Delta t \cdot S} \right) \beta}$$

where: P = diversion rate  
K = maximum diversion rate

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 K = maximum diversion rate  
 R = toll (peso)  
 $\Delta t$  = travel time difference (hour) i.e. travel time using ordinary road minus travel time using toll road  
 S = increase rate of average income  
 $\alpha \beta$  = parameters ( $\alpha = 0,00005$ ,  $\beta = 2.0$ )

Maximum diversion rates (K) were assumed as 1.0 for car, 0.8 for jeepney, 0.9 for bus and 0.9 for truck, and increase rate of average income (S) was conservatively set at 1.0.

Diverted traffic volume was estimated by the iteration method shown in Figure 18.1-3.

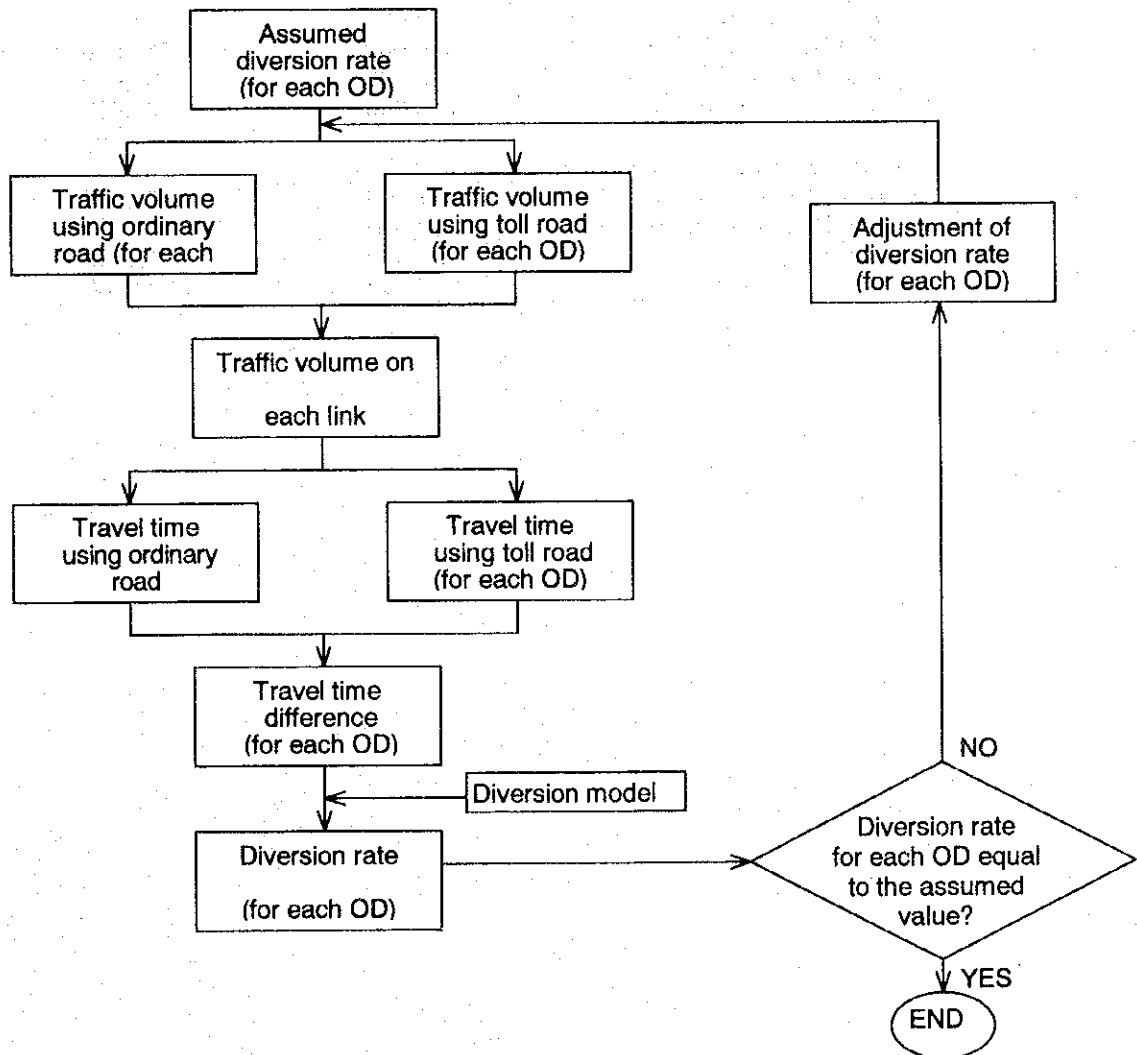


FIGURE 18.1-3 PROCEDURE FOR ESTIMATION OF DIVERTED TRAFFIC VOLUME

## Costs

The following costs were taken into account in the financial evaluation:

- Initial investment costs including detailed design cost, right-of-way acquisition cost, construction cost and construction supervision cost.
- Operation cost
- Maintenance cost

The initial investment costs are shown in Chapter 15. The operation and maintenance costs were estimated as shown in Table 18.1-6.

**TABLE 18.1-6 OPERATION AND MAINTENANCE COSTS  
FOR EXPRESSWAY PROJECTS**

	4-lane Expressway	2-lane Expressway
<b>Operation Cost (P/km/year)</b>		
Administration	38,000	27,000
Too Collection/Toll Plaza	588,000	412,000
Patrol Group	119,000	83,000
Total	745,000	522,000
<b>Maintenance Cost (P/km/year)</b>		
Administration	121,000	72,000
Routine Maintenance/Repair	206,000	124,000
Electricity	50,000	30,000
Total	377,000	226,000



## 18.2 ECONOMIC AND FINANCIAL EVALUATION

### 18.2.1 Economic Evaluation of Individual Projects

The economic evaluations of individual projects were carried out on the following assumptions:

- Implementation schedule : as shown in Chapter 17
- Benefit analysis period : 20 years, except for expressway projects and inter-island link projects in which 30 years were considered
- Discount rate : 15%
- Economic evaluation indicators : Internal rate of return  
Benefit / cost ratio  
Net present value

Base year was set at the first year in the implementation schedule (usually starting year of the detailed design) in the calculation of the net present value.

The analysis was done for each project and by its component segments.

The evaluation results are presented in Table 18.2-1.

### 18.2.2 Economic Evaluation of Master Plan

The master plan, three six-year programs and the total program, were evaluated as a whole in the same manner as for individual projects. Program 1 (the first six-year program), Program II (the second six-year program) and Program III (the third six-year program) include the projects for which the construction starts by year 2004, 2010 and 2016, respectively.

Cost benefits flow of each program and economic evaluation indicators are shown in Table 18.2-2, which are summarized as follows:

	IRR (%)	B/C	NPV (Billion Peso)
Program I	44.2	3.66	99.141 1)
Program II	31.1	2.49	90.964 2)
Program III	24.2	1.79	62.411 3)
Total Program	41.3	2.92	150.133 1)

Base year 1) 1999, 2) 2005, 3) 2011

The economic evaluation proves a high economical viability of the plan.

TABLE 18.2-1 ECONOMIC EVALUATION INDICATORS OF INDIVIDUAL PROJECTS (1/9)

Project Number	Project Name	Project Evaluation			Evaluation by Segment			Program	
		IRR (%)	B/C	NPV (M.peso)	Segment Number	IRR (%)	B/C		NPV (M.peso)
<u>Rehabilitation/Improvement/New Construction Projects</u>									
MA 1	Marinduque Circumferential Road	21.9	1.48	236.6	MA 1-1	23.7	1.67	232.6	I
					MA 1-2	15.4	1.03	9.1	II
MR 1	Mindoro East Coast Road	35.3	3.06	2284.8	MR 1-1	103.2	8.19	288.5	II
					MR 1-2	66.2	5.68	686.0	II
					MR 1-3	77.9	7.73	1116.8	II
					MR 1-4	34.8	2.96	1098.7	I
					MR 1-5	20.0	1.39	222.1	II
MR 2	Mindoro South Coast Road	20.3	1.42	236.3	MR 2-1	20.3	1.42	231.7	II
					MR 2-2	19.6	1.31	6.1	III
MR 3	Mindoro Cross Island Road	(Deferred)			MR 3-1 (Deferred)				
					MR 3-2 (Deferred)				
					MR 3-3 (Deferred)				
MR 4	Mindoro West Coast Road	14.5	0.96	-89.8	MR 4-1 (On-going/Committed)				I
					MR 4-2	23.8	1.65	166.1	II
					MR 4-3	14.8	0.98	-11.4	II
					MR 4-4 (On-going/Committed)				I
					MR 4-5 (On-going/Committed)				I
					MR 4-6	22.6	1.57	158.7	I
					MR 4-7	9.0	0.64	-1.5	I
					MR 4-8 (On-going/Committed)				I
					MR 4-9 (On-going/Committed)				I
					MR 4-10 (On-going/Committed)				I
MR 5	Mindoro North Coast Road	24.9	1.80	509.2	MR 5-1	27.0	2.07	431.2	II
					MR 5-2	19.5	1.33	136.3	III
MR 6	Catapan - Socorro Coastal Road	35.9	2.92	1070.4	MR 6-1	34.4	2.86	891.4	III
					MR 6-2 (Deferred)				
					MR 6-3	45.8	3.29	179.0	III
MR 7	San Jose - Calintaan Inland Road	(Deferred)			MR 7-1 (Deferred)				
MR 8	Mamburao - Abra de Ilog Coastal Road	13.3	0.88	-218.0	MR 8-1	6.6	0.50	-285.6	III
					MR 8-2	15.7	1.06	87.8	III
PL 1	Palawan North Road	20.2	1.42	1020.8	PL 1-1 (On-going/Committed)				I
					PL 1-2 (On-going/Committed)				I
					PL 1-3 (On-going/Committed)				I
					PL 1-4 (On-going/Committed)				I
					PL 1-5	20.5	1.49	431.0	II
					PL 1-6	11.7	0.76	-191.9	II
PL 2	Palawan South Road	38.8	3.01	1710.1	PL 2-1	36.5	2.80	28.7	I
					PL 2-2	43.1	3.76	1099.8	I
					PL 2-3	37.9	3.07	766.3	II
					PL 2-4	20.3	1.40	118.2	II
PL 3	Palawan South Road Extension	19.2	1.30	101.2	PL 3-1	19.2	1.30	101.2	III
					PL 3-2 (Deferred)				
					PL 3-3 (Deferred)				
PL 4	Salvacion - Roxas West Coast Road	10.2	0.67	-609.3	PL 4-1	6.3	0.48	-249.6	III
					PL 4-2	11.2	0.73	-398.2	III
					PL 4-3	11.3	0.75	-77.5	III
PL 5	Quezon - Bacungan West Coast Road	(Deferred)			PL 5-1 (Deferred)				
					PL 5-2 (Deferred)				
PL 6	J.P. Rizal - Quezon West Coast Road	(Deferred)			PL 6-1 (Deferred)				
					PL 6-2 (Deferred)				
PL 7	Aboabo - Quezon Road	29.7	2.18	230.4	PL 7-1	29.7	2.18	230.4	III
PL 8	Batarasa Cross Island Road	0.5	0.28	-191.6	PL 8-1	0.5	0.28	-191.6	III
RO 1	Romblon Island Road	20.7	1.41	125.6	RO 1-1	20.7	1.41	125.6	II
RO 2	Tablas Circumferential Road	13.8	0.93	-45.0	RO 2-1	12.9	0.85	-71.6	III
					RO 2-2	8.9	0.62	-202.0	III
					RO 2-3	17.3	1.16	44.5	I
RO 3	Sibuyan Circumferential Road	3.7	0.37	-751.5	RO 3-1	1.4	0.29	-527.5	III
					RO 3-2	8.7	0.63	-105.0	III
					RO 3-3	4.2	0.41	-191.2	III
CA 1	Catanduanes Circumferential Road	16.4	1.06	56.8	CA 1-1	57.7	4.14	211.6	I
					CA 1-2	10.6	0.71	-133.5	I
					CA 1-3	6.1	0.48	-568.4	III
					CA 1-4	7.2	0.50	-271.1	III
					CA 1-5	51.8	3.69	159.2	I
PA 1	Iloilo - Roxas Road	121.7	13.74	5340.1	PA 1-1	207.1	17.40	225.7	I
					PA 1-2	116.8	13.57	1432.5	I
					PA 1-3	110.2	19.60	611.6	II
					PA 1-4	119.8	16.24	2412.0	II
					PA 1-5	92.7	6.62	503.7	I
					PA 1-6	75.8	5.25	163.0	I
					PA 1-7	85.5	10.71	400.7	II
					PA 1-8	104.4	20.79	2871.6	II
					PA 1-9	82.8	8.47	79.3	II
PA 2	Kalibo - Roxas Road	53.3	4.57	1526.6	PA 2-1	57.8	5.41	1112.6	I
					PA 2-2	41.2	2.73	100.3	I
					PA 2-3	46.4	3.69	313.8	I
PA 3	Panay East-West Link Road	48.6	3.44	1890.3	PA 3-1	29.8	2.07	66.1	II
					PA 3-2	47.1	3.95	624.7	I
					PA 3-3	40.0	3.05	534.2	I
					PA 3-4	84.7	6.52	536.0	I
					PA 3-5	44.5	3.40	152.4	II
					PA 3-6 (Deferred)				
					PA 3-7 (Deferred)				
					PA 3-8 (Deferred)				
					PA 3-9	10.6	0.71	-93.7	III

TABLE 18.2-1 ECONOMIC EVALUATION INDICATORS OF INDIVIDUAL PROJECTS (2/9)

Project Number	Project Name	Project Evaluation			Evaluation by Segment			Program		
		IRR (%)	B/C	NPV (M. peso)	Segment Number	IRR (%)	B/C		NPV (M. peso)	
PA 4	Roxas - Estancia Road	60.0	4.13	628.6	PA 4-1	80.4	5.98	414.8	III	
					PA 4-2	40.3	2.82	213.8	III	
					PA 4-3	(No Work)				
					PA 4-4	(No Work)				
PA 5	Panay East Coast Road	115.0	5.88	1282.1	PA 5-1	117.1	11.43	987.4	I	
					PA 5-2	35.0	2.34	55.6	III	
					PA 5-3	39.2	3.04	269.7	III	
					PA 5-4	23.9	1.66	112.7	III	
					PA 5-5	43.1	3.44	342.5	II	
					PA 5-6	94.6	12.12	499.9	II	
PA 6	Iloilo - Cabatuan - Lumbinao Road	84.2	10.69	1810.3	PA 6-2	89.1	17.53	581.6	II	
					PA 6-3	71.9	7.83	728.8	II	
PA 7	Calinog - Jamindan - Altavas Road	32.5	2.36	820.0	PA 7-1	41.3	3.38	306.9	II	
					PA 7-2	48.8	4.14	236.7	II	
					PA 7-3	23.7	1.62	187.1	II	
					PA 7-4	27.0	1.91	89.3	II	
PA 8	Iloilo - Antique Road	50.0	4.54	2106.6	PA 8-1	143.3	15.86	633.1	II	
					PA 8-2	64.1	7.41	695.3	II	
					PA 8-3	44.5	3.57	479.4	II	
					PA 8-4	39.5	3.11	230.9	II	
					PA 8-5	51.9	3.76	214.3	II	
					PA 8-6	35.3	2.66	177.5	II	
PA 9	Antique Coastal Road	25.7	1.94	1009.1	PA 9-1	(On-going/Committed)			I	
					PA 9-2	(On-going/Committed)			I	
					PA 9-3	(On-going/Committed)			I	
					PA 9-4	(On-going/Committed)			I	
					PA 9-5	(On-going/Committed)			I	
PA 10	Nabas - Kalibo Road	45.5	3.68	858.1	PA 9-6	30.8	2.27	351.7	II	
					PA 9-7	114.3	9.31	122.0	II	
					PA 10-1	39.6	3.10	396.7	II	
PA 11	Nabas - Caticlan - Pandal Road	20.6	1.39	286.2	PA 10-2	53.4	4.53	461.4	II	
					PA 11-1	20.9	1.38	36.9	III	
PA 12	Aklan Penetration Road	19.2	1.29	190.4	PA 11-2	29.0	2.07	232.1	III	
					PA 11-3	6.3	0.50	-74.5	III	
					PA 11-4	19.9	1.35	96.5	III	
					PA 12-1	21.7	1.49	95.2	III	
PA 13	Iloilo - Leon - Miagao Road	25.5	1.68	426.3	PA 12-2	21.0	1.45	99.9	III	
					PA 12-3	14.7	0.96	-6.3	III	
					PA 13-1	66.1	4.69	357.7	III	
PA 14	Barotac - San Rafael - Dumarao Road	25.1	1.89	351.1	PA 13-2	71.6	5.77	182.9	III	
					PA 13-3	11.3	0.77	-114.3	III	
					PA 14-1	(On-going/Committed)			I	
PA 15	Tapaz - Cuartero - Pontevedra Road	30.3	2.42	637.7	PA 14-2	39.4	3.12	63.8	II	
					PA 14-3	34.5	2.64	523.0	II	
PA 16	Leon - Sibalom Cross Mountain Road	(Deferred)			PA 15-1	31.1	2.44	310.3	II	
					PA 15-2	29.6	2.40	327.4	II	
					PA 16-1	(Deferred)				
PA 17	Tiotas - Dao - Asuloman Road	13.5	0.90	-64.4	PA 16-2	(Deferred)				
					PA 16-3	(Deferred)				
GU 1	Guimaras Circumferential Road	14.6	0.98	-15.0	PA 17-1	3.9	0.40	-110.8	III	
					PA 17-2	15.9	1.07	32.0	III	
					GU 1-1	30.7	2.23	153.8	II	
					GU 1-2	3.9	0.41	-198.7	III	
GU 2	Guimaras Cross Island Road	14.2	0.94	-11.9	GU 1-3	5.4	0.51	-61.2	III	
					GU 1-4	13.6	0.90	-35.2	III	
NE 1	Bacolod - San Carlos Coastal Road	50.9	3.85	372.2	GU 2-1	14.2	0.94	-11.9	I	
					NE 1-1	(No Work)				
					NE 1-2	89.8	5.30	90.7	I	
					NE 1-3	(No Work)				
NE 2	Bacolod - Kabankalan Road	157.9	18.45	563.4	NE 1-4	44.7	3.57	372.3	II	
					NE 2-1	(No Work)				
					NE 2-2	(No Work)				
					NE 2-3	(No Work)				
					NE 2-4	157.9	19.19	550.0	I	
NE 3	Kabankalan - Bais Road	106.6	8.29	236.5	NE 2-5	(No Work)				
					NE 3-1	(No Work)				
					NE 3-2	(No Work)				
NE 4	Bais - Dumaguete Road	161.6	13.24	788.8	NE 3-3	106.6	8.29	236.5	II	
					NE 4-1	145.0	11.64	512.2	II	
					NE 4-2	235.2	20.64	114.8	II	
NE 5	Bacolod - D.S. Benedicto - San Carlos Road	34.3	2.53	784.3	NE 4-3	190.9	16.49	161.8	II	
					NE 5-1	106.4	7.85	107.6	III	
					NE 5-2	33.5	2.48	309.8	I	
NE 6	Hinigaran - Guihulngan Road	26.6	1.89	636.4	NE 5-3	34.8	2.50	448.0	I	
					NE 6-1	58.9	4.19	251.4	II	
					NE 6-2	14.6	0.98	-6.9	II	
NE 7	Tanjay - Sta. Catalina Road	26.3	2.00	496.0	NE 6-3	27.9	2.07	392.0	II	
					NE 7-1	26.3	2.00	496.0	I	
NE 8	Kabankalan - Basay Road	40.6	2.70	1445.1	NE 8-1	(On-going/Committed)			I	
					NE 8-2	(On-going/Committed)			I	
NE 9	Basay - Dumaguete Road	40.4	2.69	338.9	NE 8-3	22.8	1.69	340.7	I	
					NE 9-1	37.7	2.85	171.1	II	
					NE 9-2	20.0	1.37	37.9	II	
					NE 9-3	104.3	8.36	161.9	II	
					NE 9-4	27.1	1.89	73.1	II	

TABLE 18.2-1 ECONOMIC EVALUATION INDICATORS OF INDIVIDUAL PROJECTS (3/9)

Project Number	Project Name	Project Evaluation			Evaluation by Segment				Program
		IRR (%)	B/C	NPV (M. peso)	Segment Number	IRR (%)	B/C	NPV (M. peso)	
NE 10	San Carlos - Bais Road	54.9	3.91	439.0	NE 10-1	33.2	2.22	86.8	III
					NE 10-2	(No Work)			
					NE 10-3	(No Work)			
					NE 10-4	57.2	4.13	150.1	II
					NE 10-5	70.4	5.14	405.4	III
NE 11	San Enrique - La Casterillana - Vallehermoso Rd	86.7	4.55	1220.1	NE 11-1	114.3	9.12	289.2	I
					NE 11-2	201.2	9.01	706.3	I
					NE 11-3	30.6	2.02	224.6	I
					NE 11-4	(No Work)			
NE 12	Talisay - Concepcion - La Carlota Road	37.1	2.77	652.5	NE 12-1	13.4	0.89	-22.8	II
					NE 12-2	56.1	4.64	538.8	II
					NE 12-3	106.5	8.63	136.5	II
NE 13	Cadiz Access Road	55.7	4.03	40.4	NE 13-1	65.7	4.03	40.4	III
NE 14	Escalante Access Road	(No Work)			NE 14-1	(No Work)			
NE 15	Sagay - Balea Road	(Deferred)			NE 15-1	(Deferred)			
NE 16	Dancalan - Sipalay Road	13.3	0.87	-100.7	NE 16-1	13.3	0.87	-100.7	III
NE 17	Mabinay - Bayawan Road	10.2	0.67	-224.2	NE 17-1	10.2	0.67	-224.2	III
CE 1	Cebu North Road	65.3	5.05	601.3	CE 1-1	(No Work)			
					CE 1-2	(No Work)			
					CE 1-3	63.8	4.75	63.4	I
					CE 1-4	90.8	6.83	403.9	II
					CE 1-5	61.1	4.37	43.0	II
					CE 1-6	51.6	4.15	371.2	II
					CE 1-7	(No Work)			
					CE 1-8	(No Work)			
CE 2	Cebu South Road	(On-going/Committed)			CE 2-1	(No Work)			
					CE 2-2	(On-going/Committed)			I
					CE 2-3	(On-going/Committed)			I
					CE 2-4	(On-going/Committed)			I
					CE 2-5	(On-going/Committed)			I
					CE 2-6	(On-going/Committed)			I
CE 3	Naga - Toledo Road	43.6	3.77	535.1	CE 3-1	44.9	3.91	410.5	I
					CE 3-2	40.0	3.38	124.6	I
CE 4	Catmon - Tuburan Road	12.0	0.80	-113.2	CE 4-1	12.0	0.80	-113.2	II
CE 5	Cebu Transcentral Road	(On-going/Committed)			CE 5-1	(On-going/Committed)			I
CE 6	Carcar - Barili - Dumanjug Road	(On-going/Committed)			CE 6-1	(On-going/Committed)			I
					CE 6-2	(No Work)			
CE 7	Bogo - Daan Bantayan Road	40.7	3.14	349.0	CE 7-1	40.7	3.14	349.0	II
CE 8	Cebu North West Coastal Road	36.8	2.39	748.9	CE 8-1	13.4	0.89	-47.6	II
					CE 8-2	36.0	2.68	471.4	II
					CE 8-3	(No Work)			
					CE 8-4	42.3	3.45	565.7	I
CE 9	Cebu South West Coastal Road	30.0	2.21	894.2	CE 9-1	63.3	5.55	621.0	III
					CE 9-2	20.8	1.46	273.2	III
CE 10	Dalaguete - Badian Road	(Deferred)			CE 10-1	(Deferred)			
CE 11	Sogod - Borbon - Bogo Road	14.9	0.99	-1.4	CE 11-1	14.9	0.99	-1.4	III
BO 1	Bohol Circumferential Road (A)	29.3	2.17	1064.2	BO 1-1	104.6	7.27	562.5	I
					BO 1-2	37.5	2.85	361.9	I
					BO 1-3	32.0	2.24	188.8	I
					BO 1-4	(On-going/Committed)			I
					BO 1-5	(On-going/Committed)			I
BO 2	Loay Interior Road	35.7	2.60	751.9	BO 2-1	68.0	4.90	275.1	II
					BO 2-2	44.6	3.60	279.0	II
					BO 2-3	38.1	2.89	43.4	II
					BO 2-4	22.6	1.57	154.4	II
BO 3	Bohol Circumferential Road (B)	28.6	2.02	708.0	BO 3-1	57.0	3.77	241.7	I
					BO 3-2	49.0	3.74	300.0	I
					BO 3-3	(On-going/Committed)			I
					BO 3-4	(On-going/Committed)			I
BO 4	Clarín - Carmen Road	31.5	2.30	338.6	BO 4-1	31.5	2.30	338.6	II
BO 5	Carmen - Jagna Road	16.1	1.08	41.7	BO 5-1	16.1	1.08	41.7	III
BO 6	Cortes - Baliuán - Sevilla Road	20.5	1.39	117.1	BO 6-1	20.5	1.39	117.1	III
BO 7	Panglao Island Road	27.3	1.81	26.8	BO 7-1	27.3	1.81	26.8	III
BO 8	Talibon Access Road	32.2	2.18	8.4	BO 8-1	32.2	2.18	8.4	III
SI 1	Siquijor Circumferential Road	12.5	0.85	-28.5	SI 1-1	19.9	1.32	6.7	III
					SI 1-2	13.8	0.92	-7.3	II
					SI 1-3	9.7	0.68	-39.1	III
LE 1	Pan Philippine Highway (Visayas)	36.9	2.59	872.9	LE 1-1	(On-going/Committed)			I
					LE 1-2	60.9	4.69	118.1	I
					LE 1-3	(No Work)			
					LE 1-4	155.2	10.28	298.0	I
					LE 1-5	99.8	7.70	516.4	I
					LE 1-6	(No Work)			
					LE 1-7	42.0	3.02	99.7	I
					LE 1-8	44.1	3.56	264.1	I
					LE 1-9	16.7	1.11	16.5	I
					LE 1-10	17.6	1.16	13.3	I
					LE 1-11	16.5	1.10	24.8	I
					LE 1-12	9.5	0.67	23.1	I
LE 2	Tacloban - Ormoc - Isabel Road	89.5	7.32	3108.4	LE 2-1	93.8	7.05	253.6	II
					LE 2-2	107.0	11.88	1727.8	II
					LE 2-3	83.9	8.40	926.5	III
					LE 2-4	49.2	4.07	495.5	III
					LE 2-5	24.2	1.69	68.5	III
LE 3	Leyte Northern Coast Road	39.8	3.26	1146.8	LE 3-1	39.8	3.26	1146.8	II
LE 4	Mahaplag - Baybay Road	37.7	2.89	272.5	LE 4-1	37.7	2.89	272.5	III
LE 5	Leyte - Biliran Road	(No Work)			LE 5-1	(No Work)			

TABLE 18.2-1 ECONOMIC EVALUATION INDICATORS OF INDIVIDUAL PROJECTS (4/9)

Project Number	Project Name	Project Evaluation			Evaluation by Segment				Program
		IRR (%)	B/C	NPV (M.peso)	Segment Number	IRR (%)	B/C	NPV (M.peso)	
LE 6	Billiran Circumferential Road	11.5	0.76	-246.2	LE 6-1 (No Work)				
					LE 6-2	9.4	0.62	-249.3	III
					LE 6-3	14.1	0.94	-29.4	III
LE 7	North-West Leyte Road	22.5	1.51	307.4	LE 7-1	17.4	1.17	22.2	II
					LE 7-2	13.5	0.89	-24.6	II
					LE 7-3	26.7	1.93	190.0	II
					LE 7-4 (On-going/Committed)				I
LE 8	West Leyte Road	33.1	2.53	1187.9	LE 8-1 (No Work)				
					LE 8-2	60.6	4.32	127.8	III
					LE 8-3	38.0	2.60	62.3	III
					LE 8-4 (On-going/Committed)				I
					LE 8-5 (No Work)				
					LE 8-6 (No Work)				
					LE 8-7 (No Work)				
					LE 8-8 (No Work)				
					LE 8-9 (On-going/Committed)				I
					LE 8-10 (No Work)				
LE 9	Bato - Sogod Road	(On-going/Committed)			LE 9-1 (On-going/Committed)				I
					LE 9-2 (On-going/Committed)				I
LE 10	North-East Leyte Inland Road	120.6	7.63	2398.4	LE 10-1	127.1	24.90	2188.0	II
					LE 10-2	28.3	2.00	196.3	II
					LE 10-3	22.9	1.65	226.9	II
LE 11	Calubian - Jubay - San Isidro Road	8.1	0.55	-418.3	LE 11-1	8.1	0.55	-418.3	III
LE 12	Durag - Albuera Road	49.6	3.46	223.6	LE 12-1	49.6	3.46	223.6	III
					LE 12-2 (Deferred)				
					LE 12-3 (Deferred)				
					LE 12-4 (Deferred)				
LE 13	Southern Leyte Pacific Coast Road	19.7	1.35	400.5	LE 13-1	24.2	1.75	430.0	I
					LE 13-2	4.2	0.37	-193.9	II
					LE 13-3	22.3	1.65	164.3	II
MS 1	Masbate - Cataingan Road	44.8	3.10	83.9	MS 1-1	44.8	3.10	83.9	II
					MS 1-2 (No Work)				
MS 2	Masbate - Milagros Road	24.4	1.60	35.0	MS 2-1	24.4	1.60	35.0	III
					MS 2-2 (No Work)				
MS 3	Milagros - Bafud Road	9.9	0.69	-137.7	MS 3-1	12.9	0.86	-29.5	III
					MS 3-2	7.2	0.55	-143.0	III
MS 4	Tolda - Aroroy - Lagta Road	13.0	0.85	-112.3	MS 4-1	10.4	0.69	-104.7	II
					MS 4-2	15.4	1.03	20.4	III
					MS 4-3	12.5	0.77	-41.9	II
MS 5	Cataingan - Placer Road	(On-going/Committed)			MS 5-1 (On-going/Committed)				I
					MS 5-2 (On-going/Committed)				I
MS 6	Cataingan - Esperanza Road	15.2	1.01	5.6	MS 6-1	15.2	1.01	5.6	III
MS 7	Masbate South Coast Road	9.3	0.62	-438.5	MS 7-1	8.3	0.56	-287.5	III
					MS 7-2	11.4	0.77	-52.7	III
					MS 7-3	10.0	0.68	-111.2	III
SA 1	Pan Philippine Highway (Visayas)	45.0	3.88	4411.7	SA 1-1	36.2	2.48	257.9	I
					SA 1-2	40.5	2.75	211.0	I
					SA 1-3	30.8	2.21	519.9	I
					SA 1-4	50.3	4.73	1332.8	I
					SA 1-5	45.1	4.07	1641.2	I
					SA 1-6	67.7	5.96	954.7	I
					SA 1-7 (On-going/Committed)				I
					SA 1-8 (On-going/Committed)				I
SA 2	North Samar Coastal Road	23.2	1.87	301.6	SA 2-1	39.5	3.14	208.9	III
					SA 2-2	33.8	2.58	465.1	III
					SA 2-3	54.0	4.13	33.7	III
					SA 2-4	19.2	1.37	81.2	I
SA 3	Catarman - Calbayog Road	24.3	1.79	554.7	SA 3-1	26.0	1.95	472.7	II
					SA 3-2	20.0	1.40	82.0	II
SA 4	Wright - Taft Road	17.8	1.17	55.1	SA 4-1	18.8	1.23	12.9	III
					SA 4-2	16.6	1.09	6.3	III
					SA 4-3	17.9	1.18	36.0	III
SA 5	South Samar Coastal Road	(On-going/Committed)			SA 5-1 (On-going/Committed)				I
					SA 5-2 (On-going/Committed)				I
					SA 5-3 (On-going/Committed)				I
SA 6	Samar Pacific Coast Road	20.3	1.37	459.5	SA 6-1	15.7	1.06	51.7	II
					SA 6-2	14.5	0.95	-7.5	II
					SA 6-3	27.1	1.99	267.2	III
					SA 6-4	15.3	1.02	15.0	III
					SA 6-5	32.1	2.40	391.9	III
					SA 6-6 (On-going/Committed)				I
					SA 6-7	20.7	1.39	113.5	III
					SA 6-8	14.0	0.93	-24.5	III
SA 7	Buenavista - Guluan Road	15.6	1.04	5.9	SA 7-1	15.6	1.04	5.9	III
SA 8	Samar Central Road	12.1	0.83	-114.2	SA 8-1	30.3	2.22	223.8	III
					SA 8-2 (Deferred)				
					SA 8-3 (Deferred)				
					SA 8-4	2.4	0.31	-388.7	III
SA 9	Basesy - Borongan Road	14.5	0.96	-54.9	SA 9-1	11.3	0.75	-39.9	III
					SA 9-2	16.8	1.13	64.7	III
					SA 9-3	14.2	0.94	-41.3	III
					SA 9-4	10.2	0.70	-46.6	III
CM 1	Camiguin Circumferential Road	24.6	1.61	118.5	CM 1-1	26.7	1.84	93.3	I
					CM 1-2	19.3	1.30	67.1	II

TABLE 18.2-1 ECONOMIC EVALUATION INDICATORS OF INDIVIDUAL PROJECTS (5/9)

Project Number	Project Name	Project Evaluation			Evaluation by Segment				Program	
		IRR (%)	B/C	NPV (M peso)	Segment Number	IRR (%)	B/C	NPV (M peso)		
MI 1	Pan Philippine Highway (Mindanao)	(D/D Completed)				MI 1-1	(D/D Completed)			I
						MI 1-2	(D/D Completed)			I
						MI 1-3	(D/D Completed)			I
						MI 1-4	(D/D Completed)			I
						MI 1-5	(D/D Completed)			I
						MI 1-6	(D/D Completed)			I
						MI 1-7	(D/D Completed)			I
						MI 1-8	(On-going/Committed)			I
						MI 1-9	(On-going/Committed)			I
						MI 1-10	(On-going/Committed)			I
						MI 1-11	(D/D Completed)			I
						MI 1-12	(D/D Completed)			I
						MI 1-13	(On-going/Committed)			I
						MI 1-14	(D/D Completed)			I
						MI 1-15	(D/D Completed)			I
						MI 1-16	(On-going/Committed)			I
						MI 1-17	(D/D Completed)			I
						MI 1-18	(D/D Completed)			I
						MI 1-19	(D/D Completed)			I
						MI 1-20	(D/D Completed)			I
						MI 2	Davao - Digos - Gen. Santos Road	(On-going/Committed)		
MI 2-1	(No Work)			I						
MI 2-2	(No Work)			I						
MI 2-3	(On-going/Committed)			I						
MI 2-4	(On-going/Committed)			I						
MI 2-5	(On-going/Committed)			I						
MI 2-6	(On-going/Committed)			I						
MI 2-7	(On-going/Committed)			I						
MI 3	Sayre Highway	70.3	10.39	3633.4		MI 2-8	(On-going/Committed)			I
						MI 3-1	(No Work)			I
						MI 3-2	69.8	9.66	446.2	I
						MI 3-3	69.4	9.52	2182.3	I
						MI 3-4	105.5	11.69	530.9	II
						MI 3-5	111.3	14.72	1063.3	II
						MI 3-6	105.0	13.89	1688.7	III
MI 4	Davao - Bukidnon Road	(On-going/Committed)				MI 4-1	(On-going/Committed)			I
						MI 4-2	(On-going/Committed)			I
						MI 4-3	(On-going/Committed)			I
MI 5	Gen. Santos - Colabato Road	64.4	5.48	1957.2		MI 5-1	(No Work)			I
						MI 5-2	(No Work)			I
						MI 5-3	(No Work)			I
						MI 5-4	(No Work)			I
						MI 5-5	(No Work)			I
						MI 5-6	(No Work)			I
						MI 5-7	50.0	4.10	379.7	II
MI 6	Colabato - Pagadian - Zamboanga Road	40.4	3.87	12453.9		MI 5-8	51.1	4.13	202.6	II
						MI 5-9	55.3	4.71	679.8	II
						MI 5-10	67.7	6.36	792.6	I
						MI 5-11	72.9	7.11	275.1	I
						MI 6-1	69.3	6.90	960.1	I
						MI 6-2	34.5	2.86	97.3	I
						MI 6-3	25.8	1.72	97.0	I
						MI 6-4	26.0	1.72	100.0	I
						MI 6-5	(On-going/Committed)			I
						MI 6-6	(On-going/Committed)			I
						MI 6-7	(On-going/Committed)			I
MI 7	Butuan - Cagayan de Oro - Iligan - Tubod Road	90.4	10.20	2691.2		MI 6-8	(On-going/Committed)			I
						MI 6-9	(On-going/Committed)			I
						MI 6-10	(On-going/Committed)			I
						MI 6-11	(On-going/Committed)			I
						MI 6-12	(On-going/Committed)			I
						MI 6-13	(On-going/Committed)			I
						MI 6-14	(On-going/Committed)			I
						MI 6-15	(On-going/Committed)			I
						MI 6-16	(On-going/Committed)			I
						MI 6-17	(On-going/Committed)			I
						MI 6-18	(On-going/Committed)			I
						MI 6-19	65.0	8.48	664.3	I
						MI 6-20	21.4	1.42	92.4	II
						MI 7-1	280.0	23.61	586.2	I
						MI 7-2	(No Work)			I
						MI 7-3	(No Work)			I
						MI 7-4	(No Work)			I
						MI 7-5	(No Work)			I
MI 7-6	(No Work)			I						
MI 7-7	(No Work)			I						
MI 7-8	59.7	4.20	149.1	I						
MI 7-9	83.9	6.99	171.1	I						
MI 7-10	(No Work)			I						
MI 7-11	(No Work)			I						
MI 7-12	(No Work)			I						
MI 7-13	100.2	11.00	214.7	I						
MI 7-14	(No Work)			I						
MI 7-15	66.7	8.18	145.8	II						
MI 7-16	71.7	5.98	160.7	II						
MI 7-17	54.3	5.46	136.5	II						
MI 7-18	172.0	19.47	3626.5	III						

TABLE 18.2-1 ECONOMIC EVALUATION INDICATORS OF INDIVIDUAL PROJECTS (6/9)

Project Number	Project Name	Project Evaluation			Evaluation by Segment				Program
		IRR (%)	B/C	NPV (M peso)	Segment Number	IRR (%)	B/C	NPV (M peso)	
MI 8	Dapitan-Oroquieta-Tangub-Tubod-S N Dimapero Rd	35.5	3.17	1529.0	MI 8-1 (No Work)				
					MI 8-2 (No Work)				
					MI 8-3 (No Work)				
					MI 8-4 (No Work)				
					MI 8-5	34.1	2.99	1244.9	I
MI 9	Dapitan - Dipolog - Liloy - Ipil Road	42.0	2.93	445.0	MI 8-6	72.1	5.11	380.9	III
					MI 8-7	58.7	4.38	289.0	II
					MI 9-1 (No Work)				
					MI 9-2 (No Work)				
					MI 9-3 (No Work)				
MI 10	Colabato - Digos Road	91.9	10.46	5414.2	MI 9-4	54.2	3.87	382.1	III
					MI 9-5 (No Work)				
					MI 9-6 (No Work)				
					MI 9-7 (No Work)				
					MI 9-8	24.6	1.65	53.0	III
MI 11	Maramag - Kibawe - Kabacan Road	31.7	2.25	1149.8	MI 10-1	94.4	9.74	1682.0	I
					MI 10-2	89.5	12.69	843.2	I
					MI 10-3 (No Work)				
					MI 10-4 (No Work)				
					MI 10-5	100.6	13.61	2422.0	I
MI 12	Kalamansig - Isulan - Matalam Road	24.2	1.76	1310.8	MI 10-6	187.3	17.24	359.0	I
					MI 10-7	55.0	5.14	514.9	I
					MI 10-8	61.4	4.82	238.4	I
					MI 11-1 (On-going/Committed)				I
					MI 11-2 (On-going/Committed)				I
MI 13	Katipunan - S. Osmena - Molave - Labangan Road	28.3	1.95	908.6	MI 11-3	19.5	1.34	131.8	I
					MI 12-1	15.1	1.01	4.6	II
					MI 12-2	17.9	1.24	198.4	II
					MI 12-3	89.1	6.58	389.3	III
					MI 12-4	121.5	6.97	314.2	III
MI 14	Iligan - Marawi - Malabang Road	55.3	4.39	1241.6	MI 12-5	100.7	5.45	299.8	III
					MI 12-6	49.5	3.87	681.5	I
					MI 13-1	16.1	1.09	49.1	I
					MI 13-2	25.1	1.80	272.7	I
					MI 13-3	53.1	3.32	103.3	I
MI 15	Mindanao East-West Lateral Road	19.0	1.28	705.0	MI 13-4	97.6	6.93	550.0	I
					MI 14-1	101.7	8.90	345.7	III
					MI 14-2 (No Work)				
					MI 14-3	66.0	5.79	679.1	III
					MI 14-4	41.0	2.88	92.6	III
MI 16	Tagum - Mati Road	74.1	7.06	1669.8	MI 14-5	27.6	1.95	124.3	III
					MI 15-1	7.7	0.52	-273.1	I
					MI 15-2	29.9	2.18	320.2	II
					MI 15-3	6.1	0.41	-121.7	II
					MI 15-4	17.2	1.22	58.0	II
MI 17	Bayugan - Tandag Road	16.4	1.14	123.8	MI 15-5	14.3	0.94	-29.7	II
					MI 15-6	12.8	0.83	-92.5	III
					MI 15-7	19.3	1.33	82.9	III
					MI 15-8	7.2	0.49	-68.7	III
					MI 15-9	4.8	0.38	-62.2	II
MI 18	Surigao - Davao Coastal Road	25.8	1.97	4656.3	MI 15-10	15.5	1.04	15.6	II
					MI 15-11	22.6	1.60	83.8	II
					MI 15-12	26.0	1.98	337.6	I
					MI 15-13	44.7	3.53	850.8	II
					MI 16-1 (No Work)				
MI 19	Agusan River West Side Road	15.7	1.05	84.6	MI 16-2	80.3	7.94	889.8	III
					MI 16-3	55.2	4.06	71.6	III
					MI 16-4	70.9	6.71	708.4	III
					MI 17-1	8.7	0.53	-245.3	I
					MI 17-2	25.6	1.97	645.6	II
MI 20	Bayugan - Esperanza Road	28.4	2.01	174.7	MI 18-1 (No Work)				
					MI 18-2	26.2	1.87	461.2	I
					MI 18-3	19.0	1.29	147.4	I
					MI 18-4	30.5	2.24	234.8	II
					MI 18-5	26.5	1.99	576.0	II
MI 21	Prosperidad - Talacogon Road	19.2	1.29	38.9	MI 18-6	37.7	3.50	2338.1	I
					MI 18-7	36.9	3.56	1632.8	II
					MI 18-8	15.1	1.00	1.7	II
					MI 18-9	23.1	1.59	269.0	II
					MI 18-10	13.9	0.92	-78.8	I
MI 22	San Francisco - Barobo Road	52.7	4.59	433.8	MI 18-11	21.8	1.55	338.5	I
					MI 18-12	17.2	1.16	4.6	I
					MI 19-1	16.5	1.13	83.9	III
					MI 19-2	7.6	0.52	-18.2	III
					MI 19-3	42.9	3.07	180.9	III
MI 23	Montevista - Compostela - Cateel Road	18.0	1.07	60.1	MI 19-4	14.5	0.96	-16.6	III
					MI 19-5	-3.3	0.18	-213.3	III
					MI 19-6	16.2	1.09	47.8	II
					MI 20-1	34.9	2.41	57.1	III
					MI 20-2	26.5	1.89	117.6	III
MI 23	Montevista - Compostela - Cateel Road	18.0	1.07	60.1	MI 21-1	19.2	1.29	38.9	III
					MI 22-1	46.7	3.45	60.3	I
					MI 22-2	54.2	4.89	373.5	I
MI 23	Montevista - Compostela - Cateel Road	18.0	1.07	60.1	MI 23-1 (No Work)				
					MI 23-2	19.9	1.38	185.6	III
					MI 23-3	9.5	0.65	-125.4	III

TABLE 18.2-1 ECONOMIC EVALUATION INDICATORS OF INDIVIDUAL PROJECTS (7/9)

Project Number	Project Name	Project Evaluation			Evaluation by Segment				Program
		IRR (%)	B/C	NPV (M peso)	Segment Number	IRR (%)	B/C	NPV (M. peso)	
MI 24	Compostela - Mati Road	25.2	1.86	679.2	MI 24-1 (On-going/Committed)				I
					MI 24-2	29.9	2.45	585.4	I
					MI 24-3	19.9	1.39	120.7	II
					MI 24-4	21.3	1.53	320.5	III
MI 25	Tagum - Kapaolong - Panabo Road	45.4	3.04	556.4	MI 25-1 (No Work)				
					MI 25-2	49.2	3.05	379.1	I
					MI 25-3	38.7	3.01	177.3	I
					MI 26-1	28.4	2.50	545.4	II
MI 26	Davao City Outer Circumferential Road	81.6	10.95	6771.7	MI 26-2	117.2	20.71	6226.3	II
					MI 27-1	33.6	2.57	233.7	I
MI 27	Malalag - Malita - Kalipagan Road	22.6	1.67	793.6	MI 27-2	21.7	1.56	234.7	I
					MI 27-3	11.6	0.78	-53.1	I
					MI 27-4	30.4	2.59	1801.5	III
					MI 27-5	13.9	0.93	-48.1	III
					MI 28-1 (No Work)				
MI 28	Gen. Santos - Gian - Kalipagan Road	11.8	0.80	-182.1	MI 28-2 (No Work)				
					MI 28-3	33.1	2.46	288.6	III
					MI 28-4	3.8	0.35	-470.7	III
					MI 29-1 (No Work)				
MI 29	Gen. Santos - Kiamba - Kalamansig Road	15.7	1.04	18.0	MI 29-2 (No Work)				
					MI 29-3 (No Work)				
					MI 29-4	18.4	1.23	1.2	I
					MI 29-5	18.9	1.27	62.0	II
					MI 29-6	3.7	-0.42	-204.7	III
					MI 29-7	17.0	1.16	122.1	III
					MI 30-1	32.8	2.50	437.2	I
MI 30	Colabato - Upi - Kalamansig Road	25.0	1.62	465.6	MI 30-2	15.4	1.03	21.5	III
					MI 30-3	10.6	0.72	-83.9	II
					MI 30-4	21.0	1.47	76.3	I
					MI 31-1 (No Work)				
MI 31	Koronadal - Tacurong - Midsayap Road	43.0	4.19	1873.9	MI 31-2	69.3	5.15	173.7	II
					MI 31-3	31.7	2.69	357.8	II
					MI 31-4	49.5	4.63	602.1	II
					MI 31-5	47.7	4.18	604.5	II
					MI 31-6	66.2	6.42	1252.6	III
					MI 32-1	33.4	2.88	922.6	II
MI 32	Gingoog - Villanueva Road	28.9	2.63	1128.8	MI 32-2	26.5	2.41	522.2	I
					MI 33-1 (On-going/Committed)				
MI 33	Cagayan de Oro - Talakag - Kibawe Road	28.7	2.46	1371.0	MI 33-2 (On-going/Committed)				
					MI 33-3	46.1	3.79	218.9	I
					MI 33-4	19.7	1.50	150.6	I
					MI 33-5	28.4	2.52	826.2	II
					MI 33-6	34.1	2.74	1073.6	II
					MI 34-1	33.3	2.99	188.2	II
					MI 34-2	21.8	1.57	230.4	II
MI 34	Cagayan de Oro - Manolo Fortich Road	24.4	1.84	418.6	MI 35-1 (No Work)				
					MI 35-2	38.4	3.17	194.3	I
					MI 35-3	30.1	2.60	783.6	I
MI 35	Lake Lanao Circumferential Road	31.3	2.69	977.9	MI 36-1	18.3	1.35	27.2	I
					MI 36-2	33.9	3.77	275.6	II
MI 36	Tubod - Madamba Road	39.2	4.60	1696.7	MI 36-3	49.9	5.74	2119.9	II
					MI 37-1 (No Work)				
					MI 37-2 (No Work)				
MI 37	Molave - Tangub Road	(No Work)			MI 38-1	163.0	7.68	40.7	I
					MI 38-2	47.8	2.51	271.0	I
MI 38	Kapatagan - R. Magsaysay Road	52.3	2.68	311.6	MI 39-1	17.0	1.16	78.2	II
					MI 39-2	18.4	1.23	54.1	III
					MI 39-3	17.1	1.16	88.5	II
MI 39	Sindangan - R. Magsaysay Road	17.2	1.17	163.3	MI 40-1	36.4	2.86	207.6	I
					MI 40-2	26.6	1.91	173.2	I
MI 40	Dumaliniao - V.A. Sagun Road	30.7	2.26	380.8	MI 41-1	20.2	1.40	169.0	I
					MI 41-2	10.4	0.69	-274.0	II
					MI 41-3	8.0	0.55	-531.6	II
					MI 41-4	20.2	1.50	377.3	III
					MI 42-1	10.6	0.68	-49.9	II
MI 41	Liloy - Siocon - Zamboanga Road	13.7	0.91	-179.2	MI 42-2	23.1	1.70	138.1	II
					MI 43-1	9.4	0.65	-180.3	III
MI 42	Sibuco - Zamboanga Road	18.1	1.25	88.1	MI 43-2 (Deferred)				
					MI 43-3 (Deferred)				
					MI 43-4 (Deferred)				
					MI 43-5	23.1	1.62	200.1	III
MI 43	Surigao West Coast Road	15.3	1.02	19.8	MI 44-1 (Deferred)				
					MI 44-2 (Deferred)				
					MI 44-3 (Deferred)				
					MI 44-4 (Deferred)				
MI 44	Cabadbaran - Madrid Road	(Deferred)			MI 45-1	10.5	0.66	-66.3	III
					MI 45-2	9.4	0.59	-69.9	III
					MI 45-3	15.1	1.01	6.7	III
MI 45	Butuan - Tandag Road	13.4	0.87	-129.4	MI 46-1	7.2	0.50	-415.2	III
					MI 46-2	15.0	1.00	-0.3	III
MI 46	Esperanza - Bukidnon Road	9.2	0.61	-415.4	MI 47-1	-1.9	0.18	-257.0	III
					MI 47-2	8.7	0.60	-162.5	III
					MI 47-3	19.1	1.32	126.2	III
MI 47	Sta. Josefa - Tagum Road	11.1	0.74	-293.2	MI 48-1	11.1	0.74	-68.1	III
					MI 48-2	9.8	0.64	-386.5	III
MI 48	Tagum - Bukidnon Road	11.5	0.75	-493.0	MI 48-3	14.2	0.94	-38.4	III



TABLE 18.2-1 ECONOMIC EVALUATION INDICATORS OF INDIVIDUAL PROJECTS (8/9)

Project Number	Project Name	Project Evaluation			Evaluation by Segment				Program
		IRR (%)	B/C	NPV (M.peso)	Segment Number	IRR (%)	B/C	NPV (M.peso)	
MI 49	Peninsula Coastal Road	19.0	1.30	652.3	MI 49-1	33.0	2.46	449.0	III
					MI 49-2	18.4	1.26	219.0	III
					MI 49-3	15.4	1.03	49.9	III
MI 50	Manolo Fortich - Misor Road	(Deferred)			MI 50-1	(Deferred)			
					MI 50-2	(Deferred)			
MI 51	Kidapawan - Arakan - Davao Road	28.9	2.43	1628.3	MI 51-1	28.6	2.42	1012.9	III
					MI 51-2	29.7	2.48	536.2	III
					MI 51-3	27.7	2.31	79.2	III
MI 52	Malungon - Tampakan Road	28.8	2.48	1088.2	MI 52-1	24.5	2.03	469.7	II
					MI 52-2	39.7	3.19	940.6	III
MI 53	Lals - Atabel Road	(Deferred)			MI 53-1	(Deferred)			
					MI 53-2	(Deferred)			
MI 54	Surallah - Lake Sebu - Maitum Road	15.9	1.07	67.1	MI 54-1	16.8	1.15	89.2	I
					MI 54-2	14.1	0.94	-33.6	II
MI 55	Lebak - Maganoy - S.S. Barongis Road	16.8	1.13	178.4	MI 55-1	13.9	0.92	-50.9	III
					MI 55-2	16.5	1.11	63.4	III
					MI 55-3	29.8	2.20	165.9	III
MI 56	Libungan - Banisilan - Wao - Malanod Road	22.4	1.69	943.0	MI 56-1	21.1	1.52	145.9	II
					MI 56-2	21.8	1.57	357.6	III
					MI 56-3	18.8	1.33	118.5	II
					MI 56-4	27.7	2.32	703.4	III
MI 57	Wao - Kallangan Road	(No Work)			MI 57-1	(No Work)			
					MI 57-2	(No Work)			
MI 58	Parang - Lumbayanague Road	25.4	1.95	648.9	MI 58-1	22.2	1.65	300.9	II
					MI 58-2	33.7	2.54	460.3	III
MI 59	San Miguel - Tabina Road	22.3	1.63	229.8	MI 59-1	22.3	1.63	229.8	II
MI 60	Bacungan - Bayog Road	13.0	0.86	-143.1	MI 60-1	11.3	0.75	-124.8	III
					MI 60-2	12.5	0.83	-44.3	III
					MI 60-3	16.4	1.10	26.0	III
MI 61	Imelda - Olutanga Road	18.2	1.24	156.2	MI 61-1	18.2	1.24	156.2	III
MI 62	Sioxon - Tugawan Road	13.2	0.88	-101.6	MI 62-1	10.7	0.72	-130.5	III
					MI 62-2	16.1	1.08	28.9	III
<b>Widening Projects</b>									
PA 1	Iloilo - Roxas Road	128.7	5.83	3610.3	PA 1-2	134.3	16.76	2831.8	I
					PA 1-3	35.7	4.45	333.1	II
					PA 1-4	19.8	1.50	160.7	II
					PA 1-5	3.1	0.34	-130.3	III
					PA 1-6	3.3	0.35	-63.4	III
					PA 1-7	8.9	0.60	-52.8	II
					PA 1-8	23.7	2.19	424.0	II
					PA 1-9	49.3	6.89	860.0	II
PA 6	Iloilo - Cabatuan - Lumbunao Road	41.9	4.00	785.2	PA 6-1	59.6	6.47	774.7	II
					PA 6-2	15.9	1.09	10.5	II
PA 8	Iloilo - Antique Road	65.3	5.24	1950.9	PA 8-1	140.4	12.38	1401.0	II
					PA 8-2	28.6	2.63	550.0	II
NE 1	Bacolod - San Carlos Coastal Road	154.4	6.80	4209.2	NE 1-1	162.9	20.53	3477.0	I
					NE 1-2	19.8	1.61	494.3	II
					NE 1-3	50.1	6.50	786.3	II
NE 2	Bacolod - Kabankalan Road	74.3	5.78	4533.4	NE 2-2	129.1	15.03	2770.7	I
					NE 2-3	86.0	7.77	1513.8	I
					NE 2-4	21.9	1.57	242.5	I
					NE 2-5	15.7	1.06	25.8	III
NE 4	Bals - Dumaguete Road	32.0	3.01	1226.0	NE 4-1	20.0	1.46	83.7	III
					NE 4-2	28.1	2.69	597.2	III
					NE 4-3	69.7	8.42	545.1	III
CE 1	Cebu North Road	59.2	3.29	549.9	CE 1-3	59.2	3.29	549.9	I
CE 2	Cebu South Road	74.1	9.32	2091.5	CE 2-4	74.1	9.32	2091.5	II
CE 3	Naga - Toledo Road	18.9	1.31	160.5	CE 3-1	19.4	1.32	104.2	III
					CE 3-2	18.2	1.30	56.3	III
LE 1	Pan Philippine Highway (Visayas)	20.6	1.63	384.6	LE 1-2	9.0	0.61	-28.5	II
					LE 1-3	47.7	7.03	132.3	II
					LE 1-4	16.3	1.11	14.9	II
					LE 1-5	20.8	1.71	265.9	II
LF 2	Tacloban - Ormoc - Isabel Road	33.1	3.30	1391.3	LE 2-1	19.1	1.43	55.9	II
					LE 2-2	36.4	3.80	1335.4	II
LE 10	North-East Leyte Inland Road	31.0	3.72	450.8	LE 10-1	31.0	3.72	450.8	II
MI 1	Pan Philippine Highway (Mindanao)	159.7	8.79	13747.2	MI 1-5	35.2	3.50	879.2	II
					MI 1-6	59.9	7.25	188.0	II
					MI 1-7	16.0	1.08	3.0	II
					MI 1-8	24.6	2.49	812.8	II
					MI 1-9	17.6	1.26	94.7	III
					MI 1-10	29.1	3.05	492.3	III
					MI 1-12	18.7	1.35	48.6	III
					MI 1-13	18.4	1.33	112.1	III
					MI 1-14	24.8	2.16	290.1	III
					MI 1-15	82.9	12.00	6004.9	II
					MI 1-16	130.1	12.55	3137.6	II
					MI 1-17	284.5	23.07	1661.7	I
					MI 1-18	292.5	25.38	1388.0	I
					MI 1-19	262.7	21.78	1898.4	I
					MI 1-20	147.2	17.77	3039.8	I
					MI 1-21	20.7	1.66	57.7	I
					MI 1-22	13.5	0.90	-13.5	I

TABLE 18.2-1 ECONOMIC EVALUATION INDICATORS OF INDIVIDUAL PROJECTS (9/9)

Project Number	Project Name	Project Evaluation			Evaluation by Segment				Program
		IRR (%)	B/C	NPV (M.peso)	Segment Number	IRR (%)	B/C	NPV (M.peso)	
MI 2	Davao - Digos - Gen. Santos Road	83.7	7.91	6198.0	MI 2-1	133.7	15.33	2709.8	I
					MI 2-2	55.8	6.92	2303.1	I
					MI 2-3	38.1	5.12	992.1	II
					MI 2-4	19.7	1.49	63.7	III
					MI 2-5	35.3	3.53	1162.1	III
					MI 2-6	34.6	4.09	185.6	II
					MI 2-7	35.4	4.58	740.6	II
					MI 2-8	829.4	150.43	533.1	II
MI 3	Sayre Highway	23.2	2.08	1093.6	MI 3-1	59.3	6.80	990.8	III
					MI 3-2	26.3	2.59	232.3	III
					MI 3-3	19.2	1.49	346.0	III
					MI 3-4	16.9	1.21	28.2	II
					MI 3-5	23.6	2.22	305.7	II
					MI 3-6	21.1	1.69	230.6	III
MI 4	Davao - Bukidnon Road	20.0	1.48	133.2	MI 4-1	20.0	1.48	133.2	II
MI 5	Gen. Santos - Colabato Road	56.6	6.66	3523.5	MI 5-1	99.9	14.42	2643.7	I
					MI 5-2	27.2	2.99	773.8	I
					MI 5-3	31.8	3.88	106.0	I
MI 6	Colabato - Pagadian - Zamboanga Road	24.6	2.21	1094.9	MI 6-1	26.5	2.59	471.0	III
					MI 6-18	23.1	2.00	604.4	III
					MI 6-19	23.7	2.09	344.5	III
MI 7	Buluan - Cagayan de Oro - Iligan - Tubod Road	65.4	6.04	8447.9	MI 7-1	86.4	7.52	964.8	I
					MI 7-3	117.2	8.75	304.5	I
					MI 7-8	12.3	0.82	-26.3	I
					MI 7-9	49.8	6.34	349.4	I
					MI 7-10	31.7	2.91	418.6	I
					MI 7-11	145.2	18.02	2307.7	I
					MI 7-13	67.6	8.77	2457.2	I
					MI 7-14	40.0	5.51	1535.6	II
					MI 7-15	28.1	3.39	729.3	III
					MI 7-16	28.5	3.04	177.2	II
					MI 7-17	30.1	3.09	472.9	II
MI 8	Dapitan-Oroquieta-Tangub-Tubod-S.N.Dimaporo Rd	16.8	1.17	141.6	MI 8-3	18.3	1.32	171.4	III
					MI 8-4	13.8	0.90	-29.8	III
MI 10	Cotabato - Digos Road	59.2	6.81	11545.9	MI 10-1	22.4	1.88	374.3	III
					MI 10-2	31.7	2.83	611.9	III
					MI 10-3	75.6	9.67	2185.5	III
					MI 10-4	115.3	14.67	1614.6	III
					MI 10-5	75.8	10.36	4902.1	III
					MI 10-6	50.3	6.57	491.2	III
					MI 10-7	39.9	6.10	1020.0	III
					MI 10-8	33.4	4.29	474.9	III
					MI 14-1	81.2	7.45	1823.5	III
					MI 14-2	65.0	6.76	750.9	III
MI 16	Tagum - Mati Road	30.5	3.06	562.1	MI 16-1	30.5	3.06	562.1	III
MI 25	Tagum - Kapalong - Panabo Road	42.0	3.73	466.2	MI 25-1	42.0	3.73	466.2	III
MI 29	Gen. Santos - Kiamba - Kalamansig Road	42.5	5.28	835.3	MI 29-1	42.5	5.28	835.3	II
MI 35	Lake Lanao Circumferential Road	34.5	3.75	138.6	MI 35-1	34.5	3.75	138.6	III
<b>Expressway/Bypass Projects</b>									
PA 110	Iloilo Circumferential Road	41.2	4.20	1930.1	PA 110-1	41.2	4.20	1930.1	II
NE 110	Bacolod Parallel Road	35.6	3.64	3555.9	NE 110-1	33.2	3.08	1682.2	II
CE 100	Cebu Expressway	20.4	1.54	2310.5	NE 110-2	40.7	4.50	2849.7	III
					CE 100-1	29.2	2.72	943.3	II
					CE 100-2	20.5	1.54	1375.2	II
					CE 100-3	14.9	0.99	-8.0	II
					CE 101-1	52.0	6.76	62.3	II
					CE 102-1	50.5	5.49	104.3	II
					CE 103-1	68.5	10.74	395.1	II
					CE 104-1	74.2	13.81	525.8	II
					CE 105-1	56.1	6.28	113.5	II
					CE 106-1	47.7	5.08	170.8	II
					CE 107-1	29.2	2.23	52.0	II
					MI 100-1	43.3	5.84	3381.2	III
					MI 100-2	23.7	1.97	1719.2	III
					MI 100-3	22.1	1.76	933.1	III
					MI 101-1	-28.4	0.53	-10.8	III
					MI 102-1	14.4	0.97	-0.8	III
					MI 103-1	50.1	4.97	85.9	III
MI 104-1	41.1	3.62	41.7	III					
MI 105-1	-	0.00	-28.9	III					
MI 106-1	16.5	1.10	0.8	III					
MI 110-1	15.6	1.05	19.9	II					
MI 110-2	8.9	0.55	-596.2	II					
MI 110-3	17.4	1.19	63.0	II					
MI 111-1	22.0	1.73	527.4	II					
MI 112-1	19.1	1.40	156.0	II					
MI 113-1	28.5	2.31	570.3	II					
MI 114-1	45.3	3.79	368.6	II					
<b>Inter-island Link Projects</b>									
IL 1	Luzon(Batangas) - Mindoro Link	(Deferred)							
IL 2	Iloilo - Guimaras Link	17.3	1.23	1434.5					II
IL 3	Guimaras - Negros Link	(Deferred)							
IL 4	Cebu - Negros Link	(Deferred)							
IL 5	Luzon(Sorsogon) - Samar Link	(Deferred)							

TABLE 18.2-2 COST/BENEFIT FLOW AND ECONOMIC EVALUATION INDICATORS OF OVERALL PLAN (1/4)

unit : million peso

Year	Cost	Benefit				Discounted Cost	Discounted Benefit
		Traffic Cost Saving	Development Benefit	Bridge Improve/ Disaster Prevention	Total		
1999	4267.7	-	-	-	-	4267.7	-
2000	6364.5	800.0	300.5	266.7	1367.3	5534.4	1188.9
2001	5975.1	1681.5	710.7	411.7	2803.9	4518.0	2120.2
2002	7709.6	3441.4	1040.8	516.0	4998.2	5069.2	3286.4
2003	9898.6	6402.3	1699.9	861.1	8963.4	5659.6	5124.8
2004	13644.6	10883.5	2346.7	1005.8	14236.0	6783.8	7077.8
2005	9110.8	17590.1	3540.8	1436.5	22567.4	3938.9	9756.5
2006	3283.7	24167.8	4859.3	1953.2	30980.2	1234.5	11646.6
2007	816.9	26152.4	5533.6	2377.3	34063.3	267.0	11135.4
2008	-	28395.0	6126.2	2582.8	37104.0	-	10547.3
2009	-	29829.4	6133.5	2667.2	38630.2	-	9548.8
2010	-	31535.9	6397.8	2722.5	40656.2	-	8738.8
2011	-	32401.8	6635.3	2786.4	41823.6	-	7817.1
2012	-	33547.2	6946.7	2889.2	43383.1	-	7051.0
2013	-	35108.8	7218.9	2938.4	45266.2	-	6397.4
2014	-	36568.0	7338.1	3026.0	46932.1	-	5767.7
2015	-	34163.9	7549.4	3116.5	44829.7	-	4790.7
2016	-	35366.7	7740.1	3197.8	46304.6	-	4302.9
2017	-	36454.5	7654.8	3260.9	47370.2	-	3827.8
2018	-	38044.4	7871.0	3357.7	49273.1	-	3462.2
2019	-	39578.2	8088.5	3454.5	51121.2	-	3123.5
2020	-	39803.9	7861.7	3257.4	50923.1	-	2705.6
2021	-	38604.1	7294.5	3054.6	48953.2	-	2261.7
2022	-	35460.3	6886.9	2964.6	45311.9	-	1820.4
2023	-	30242.4	5779.4	2512.6	38534.4	-	1346.2
2024	-	22569.6	4875.5	2153.3	29598.3	-	899.1
2025	-	13455.3	3194.0	1431.7	18081.0	-	477.6
2026	-	4650.0	1305.8	712.4	6668.3	-	153.2
2027	-	1376.6	397.9	178.6	1953.1	-	39.0
<b>Total</b>	<b>61071.6</b>	<b>688275.1</b>	<b>143326.3</b>	<b>61093.7</b>	<b>892697.1</b>	<b>37273.0</b>	<b>136414.5</b>
Economic Internal Rate of Return		44.2 %					
Benefit/Cost Ratio		3.66					
Net Present Value		99.141 billion Peso					

TABLE 18.2-2 COST/BENEFIT FLOW AND ECONOMIC EVALUATION INDICATORS OF OVERALL PLAN (2/4)

Program II		Benefit						unit : million peso	
Year	Cost					Total	Discounted Cost	Discounted Benefit	
		Traffic Cost Saving	Development Benefit	Bridge Improve/ Disaster Prevention					
2000	15.2	-	-	-	-	-	30.6	-	
2001	30.4	-	-	-	-	-	53.2	-	
2002	264.5	-	-	-	-	-	402.3	-	
2003	452.9	-	-	-	-	-	599.0	-	
2004	711.3	-	-	-	-	-	818.0	-	
2005	4281.8	-	-	-	-	-	4281.8	-	
2006	10017.9	105.8	84.2	3.9	194.0	8711.2	168.7	-	
2007	14859.9	1944.8	409.1	168.7	2522.7	11236.3	1907.5	-	
2008	15227.0	4672.4	1073.6	555.5	6301.5	10012.0	4143.3	-	
2009	14872.2	7892.1	2371.3	963.7	11227.1	8503.2	6419.1	-	
2010	16555.8	12151.1	3229.1	1179.3	16559.5	8231.2	8233.0	-	
2011	10155.3	18914.1	3986.9	1448.8	24349.8	4390.4	10527.1	-	
2012	6837.6	23202.8	4689.4	1700.1	29592.3	2570.5	11124.8	-	
2013	3087.9	28179.3	5385.3	1777.2	35341.7	1009.4	11553.3	-	
2014	-	31645.5	6808.9	1876.9	40331.3	-	11464.7	-	
2015	-	32118.7	7019.7	1908.2	41046.6	-	10146.1	-	
2016	-	34410.1	7367.1	1980.6	43757.8	-	9405.4	-	
2017	-	35968.2	7432.1	2025.1	45425.4	-	8490.3	-	
2018	-	37997.2	7653.7	2086.9	47737.9	-	7758.7	-	
2019	-	39929.3	7876.4	2148.9	49954.5	-	7060.0	-	
2020	-	41734.8	8090.1	2210.4	52035.3	-	6394.9	-	
2021	-	43540.7	8317.3	2273.0	54131.0	-	5784.7	-	
2022	-	45346.6	8544.5	2335.6	56226.8	-	5224.9	-	
2023	-	47152.5	8771.8	2398.2	58322.5	-	4712.8	-	
2024	-	48958.3	8999.0	2460.9	60418.1	-	4245.3	-	
2025	-	50764.2	9226.2	2523.5	62513.9	-	3819.6	-	
2026	-	52246.0	9256.4	2566.6	64069.0	-	3404.0	-	
2027	-	49151.5	8817.7	2295.8	60264.9	-	2784.3	-	
2028	-	43232.4	7935.7	1750.0	52918.1	-	2126.0	-	
2029	-	38765.0	6157.9	1103.6	46026.5	-	1607.9	-	
2030	-	31841.9	4904.1	813.1	37559.1	-	1141.0	-	
2031	-	23586.2	4084	481.9	28152.1	-	743.6	-	
2032	-	16579.1	3234.1	161.9	19975.1	-	458.8	-	
2033	-	6213.1	2653.1	52.1	8918.2	-	178.1	-	
2034	-	5726	2408.5	-	8134.5	-	141.3	-	
2035	-	5805.6	2454.4	-	8260	-	124.8	-	
2036	-	5885.2	2500.3	-	8385.5	-	110.1	-	
2037	-	5964.8	2546.2	-	8511	-	97.2	-	
2038	-	6044.4	2592.1	-	8636.5	-	85.8	-	
2039	-	6101.4	2638	-	8739.4	-	75.5	-	
2040	-	6158.4	2683.8	-	8842.2	-	66.4	-	
2041	-	2076.9	2729.7	-	4806.6	-	31.4	-	
2042	-	2111.8	2775.6	-	4887.4	-	27.7	-	
2043	-	2146.7	2821.5	-	4968.3	-	24.5	-	
<b>Total</b>	<b>97369.7</b>	<b>896264.8</b>	<b>190528.9</b>	<b>43250.3</b>	<b>1130044</b>	<b>60849.1</b>	<b>151812.6</b>		
Economic Internal Rate of Return	31.1 %								
Benefit/Cost Ratio	2.49								
Net Present Value	90.964 billion Peso								

TABLE 18.2-2 COST/BENEFIT FLOW AND ECONOMIC EVALUATION INDICATORS OF OVERALL PLAN (3/4)

Program III		Benefit						unit : million peso	
Year	Cost	Benefit				Total	Discounted Cost	Discounted Benefit	
		Traffic Cost Saving	Development Benefit	Bridge Improve/ Disaster Prevention					
2006	134.6	-	-	-	-	-	270.8	-	
2007	67.3	-	-	-	-	-	117.7	-	
2008	139.2	-	-	-	-	-	211.7	-	
2009	419.1	-	-	-	-	-	554.2	-	
2010	1350.6	-	-	-	-	-	1553.2	-	
2011	10181.0	-	-	-	-	-	10181.0	-	
2012	15650.4	102.8	99.7	32.1	234.5	13609.0	203.9		
2013	25185.4	1127.1	700.9	225.2	2053.3	19043.8	1552.6		
2014	24644.1	3491.2	2100.6	525.5	6117.3	16203.9	4022.2		
2015	18134.9	12591.6	2904.8	775.8	16272.2	10368.7	9303.7		
2016	12090.5	16656.3	3531.8	927.8	21115.9	6011.1	10498.3		
2017	417.1	23375.1	4548.5	1058.4	28982.0	180.3	12529.7		
2018	417.1	24697.8	4683.6	1091.1	30472.4	156.8	11455.7		
2019	417.1	26095.5	4819.5	1123.7	32038.8	136.4	10473.5		
2020	-	27613.8	5034.4	1156.6	33804.8	-	9609.4		
2021	-	29055.4	5177.0	1189.3	35421.6	-	8755.7		
2022	-	30497.0	5319.6	1221.9	37038.5	-	7961.2		
2023	-	31938.6	5462.1	1254.6	38655.4	-	7225.0		
2024	-	33380.2	5604.7	1287.3	40272.2	-	6545.4		
2025	-	34821.8	5747.3	1319.9	41889.0	-	5920.1		
2026	-	36263.4	5889.9	1352.6	43505.9	-	5346.6		
2027	-	37707.0	6032.5	1385.3	45124.8	-	4822.3		
2028	-	39151.1	6175.1	1418.0	46744.1	-	4343.7		
2029	-	40597.1	6317.4	1450.6	48365.2	-	3908.2		
2030	-	42083.5	6448.5	1461.4	49993.4	-	3512.8		
2031	-	43657.8	6566.7	1490.7	51715.2	-	3159.8		
2032	-	45065.3	6555.3	1496.7	53117.2	-	2822.2		
2033	-	44129.9	5619.0	1187.3	50936.2	-	2353.3		
2034	-	40577.0	3580.7	715.8	44873.6	-	1802.8		
2035	-	31654.4	2446.7	373.6	34474.7	-	1204.3		
2036	-	22785.4	1582.4	172.9	24540.7	-	745.5		
2037	-	6494.6	146.8	-	6641.4	-	175.4		
2038	-	6620	149.9	-	6769.9	-	155.5		
2039	-	6745.4	152.9	-	6898.3	-	137.8		
2040	-	6703.9	-	-	6703.9	-	116.4		
2041	-	6826.5	-	-	6826.5	-	103.1		
2042	-	6949.2	-	-	6949.2	-	91.3		
2043	-	7071.8	-	-	7071.8	-	80.8		
2044	-	7194.4	-	-	7194.4	-	71.4		
<b>Total</b>	<b>109248.5</b>	<b>773722.1</b>	<b>113398.3</b>	<b>25694.2</b>	<b>912814.4</b>	<b>78598.7</b>	<b>141009.6</b>		
Economic Internal Rate of Return		24.2 %							
Benefit/Cost Ratio		1.79							
Net Present Value		62.411 billion Peso							

TABLE 18.2-2 COST/BENEFIT FLOW AND ECONOMIC EVALUATION INDICATORS OF OVERALL PLAN (4/4)

Total Program		Benefit					unit : million peso	
Year	Cost	Traffic Cost Saving	Development Benefit	Bridge Improve/ Disaster Prevention	Total	Discounted Cost	Discounted Benefit	
1999	4267.7	-	-	-	-	4267.7	-	
2000	6379.7	800.0	300.5	266.7	1367.3	5547.6	1188.9	
2001	6005.5	1681.5	710.7	411.7	2803.9	4541.0	2120.2	
2002	7974.1	3441.4	1040.8	516.0	4998.2	5243.1	3286.4	
2003	10351.5	6402.3	1699.9	861.1	8963.4	5918.5	5124.8	
2004	14355.9	10883.5	2346.7	1005.8	14236.0	7137.4	7077.8	
2005	13392.7	17590.1	3540.8	1436.5	22567.4	5790.0	9756.5	
2006	13436.2	24273.6	4943.5	1957.0	31174.1	5051.2	11719.5	
2007	15744.2	28097.3	5942.8	2546.0	36586.0	5146.8	11960.0	
2008	15366.2	33067.4	7199.8	3138.3	43405.5	4368.0	12338.6	
2009	15291.2	37721.5	8504.9	3631.0	49857.3	3779.8	12324.0	
2010	17906.4	43687.0	9626.8	3901.9	57215.7	3848.9	12298.1	
2011	20336.3	51315.9	10622.1	4235.3	66173.3	3801.0	12368.3	
2012	22487.9	56852.7	11735.7	4621.4	73209.9	3654.9	11898.7	
2013	28273.4	64415.2	13305.1	4940.8	82661.1	3995.8	11682.4	
2014	24644.1	71704.7	16247.7	5428.4	93380.7	3028.6	11476.0	
2015	18134.9	78874.2	17473.8	5800.4	102148.5	1938.0	10916.1	
2016	12090.5	86433.1	18639.0	6106.1	111178.3	1123.5	10331.3	
2017	417.1	95797.7	19635.4	6344.4	121777.6	33.7	9840.3	
2018	417.1	100739.4	20208.3	6535.7	127483.4	29.3	8957.7	
2019	417.1	105603.1	20784.5	6727.1	133114.5	25.5	8133.3	
2020	-	109152.6	20986.2	6624.4	136763.2	-	7266.3	
2021	-	111200.2	20788.8	6516.9	138505.8	-	6399.1	
2022	-	111303.9	20751.0	6522.2	138577.2	-	5567.3	
2023	-	109333.4	20013.3	6165.4	135512.3	-	4734.0	
2024	-	104908.0	19479.2	5901.4	130288.6	-	3957.9	
2025	-	99041.3	18167.5	5275.1	122483.9	-	3235.5	
2026	-	93159.4	16452.1	4631.6	114243.1	-	2624.1	
2027	-	88235.1	15248.1	3859.7	107342.8	-	2144.0	
2028	-	82383.5	14110.8	3168.0	99662.3	-	1731.0	
2029	-	79362.1	12475.3	2554.3	94391.7	-	1425.6	
2030	-	73925.4	11352.6	2274.4	87552.5	-	1149.8	
2031	-	67243.9	10650.7	1972.6	79867.3	-	912.1	
2032	-	61644.4	9789.4	1658.6	73092.4	-	725.8	
2033	-	50342.9	8272.1	1239.4	59854.4	-	516.9	
2034	-	46303	5989.2	715.8	53008.1	-	398	
2035	-	37460.1	4901	373.6	42734.7	-	279	
2036	-	28670.6	4082.7	172.9	32926.2	-	186.9	
2037	-	12459.5	2692.9	-	15152.4	-	74.8	
2038	-	12664.4	2741.9	-	15406.4	-	66.1	
2039	-	12846.8	2790.9	-	15637.7	-	58.4	
2040	-	12862.3	2683.8	-	15546.1	-	50.5	
2041	-	8903.4	2729.7	-	11633.2	-	32.8	
2042	-	9061	2775.6	-	11836.6	-	29.1	
2043	-	9218.5	2821.5	-	12040.1	-	25.7	
2044	-	7194.4	-	-	7194.4	-	13.4	
<b>Total</b>	<b>267689.8</b>	<b>2358262.0</b>	<b>447255.5</b>	<b>130038.1</b>	<b>2935556.0</b>	<b>78270.4</b>	<b>228402.9</b>	
Economic Internal Rate of Return		41.3 %						
Benefit/Cost Ratio		2.92						
Net Present Value		150.133 billion Peso						

### 18.2.3 Financial Evaluation of Expressway Projects

To assess the profitability of expressway projects, financial analysis was carried out in the following two cases:

Case 1	Toll rate	0.75 peso/km for car / jeepney 1.0 peso/km for bus / truck
Case 2	Toll rate	1.50 peso/km for car / jeepney 2.00 peso/km for bus / truck

The results of the analysis are shown in Table 18.2-3, which are summarized as follows:

	EIRR (%)	
	Case 1	Case 2
Cebu City Expressway	1.496	5.847
Davao City Expressway	0.761	3.336

Analysis Period: 30 years

In the diversion model shown in 18.1.4, difference in the traffic volume on the expressway between Case 1 and Case 2 was very small in Cebu City Expressway, while that was relatively big in Davao City Expressway. This implies that the competitive roads in Cebu is highly saturated.

The financial evaluation results do not show the high profitability to easily attract the capital in the private sector, therefore public investment might be needed in some extent. Further study in detail is expected.

TABLE 18.2-3 COST/REVENUE CASH FLOW AND FIRR OF EXPRESSWAY PROJECTS

Case-1 Fare : Car/Jeepney 0.75 peso/km  
Bus/Truck 1.00 peso/km

Case-2 Fare : Car/Jeepney 1.50 peso/km  
Bus/Truck 2.00 peso/km

Cebu Expressway		FIRR= 1.496 %	
Year	Constructor Cost	O/M Cost	Toll Revenue
2002	73.761	0.000	0.000
2003	147.522	0.000	0.000
2004	156.881	0.000	0.000
2005	189.082	0.000	0.000
2006	401.741	0.000	0.000
2007	2,907.086	0.000	0.000
2008	2,599.886	0.000	0.000
2009	2,599.886	0.000	0.000
2010	2,599.886	0.000	0.000
2011	0.000	57.446	366.165
2012	0.000	57.446	380.112
2013	0.000	57.446	394.058
2014	0.000	57.446	408.006
2015	0.000	57.446	425.135
2016	0.000	57.446	434.422
2017	0.000	57.446	448.962
2018	0.000	57.446	463.502
2019	0.000	57.446	478.041
2020	0.000	57.446	492.581
2021	0.000	57.446	507.121
2022	0.000	57.446	521.661
2023	0.000	57.446	536.201
2024	0.000	57.446	550.741
2025	0.000	57.446	565.281
2026	0.000	57.446	579.820
2027	0.000	57.446	594.360
2028	0.000	57.446	608.900
2029	0.000	57.446	623.440
2030	0.000	57.446	637.980
2031	0.000	57.446	652.520
2032	0.000	57.446	667.059
2033	0.000	57.446	681.599
2034	0.000	57.446	696.139
2035	0.000	57.446	710.679
2036	0.000	57.446	725.219
2037	0.000	57.446	739.759
2038	0.000	57.446	754.298
2039	0.000	57.446	767.393
2040	0.000	57.446	776.613
Total	11,675.730	1,723.392	17,187.770

Cebu Expressway		FIRR= 5.847 %	
Year	Constructor Cost	O/M Cost	Toll Revenue
2,002.000	73.761	0.000	0.000
2,003.000	147.522	0.000	0.000
2,004.000	156.881	0.000	0.000
2,005.000	189.082	0.000	0.000
2,006.000	401.741	0.000	0.000
2,007.000	2,907.086	0.000	0.000
2,008.000	2,599.886	0.000	0.000
2,009.000	2,599.886	0.000	0.000
2,010.000	2,599.886	0.000	0.000
2,011.000	0.000	57.446	670.221
2,012.000	0.000	57.446	698.305
2,013.000	0.000	57.446	726.387
2,014.000	0.000	57.446	754.470
2,015.000	0.000	57.446	794.941
2,016.000	0.000	57.446	821.134
2,017.000	0.000	57.446	851.879
2,018.000	0.000	57.446	882.624
2,019.000	0.000	57.446	913.369
2,020.000	0.000	57.446	944.114
2,021.000	0.000	57.446	974.859
2,022.000	0.000	57.446	1,005.604
2,023.000	0.000	57.446	1,036.349
2,024.000	0.000	57.446	1,067.094
2,025.000	0.000	57.446	1,097.839
2,026.000	0.000	57.446	1,128.584
2,027.000	0.000	57.446	1,159.329
2,028.000	0.000	57.446	1,190.074
2,029.000	0.000	57.446	1,220.819
2,030.000	0.000	57.446	1,251.564
2,031.000	0.000	57.446	1,282.309
2,032.000	0.000	57.446	1,313.054
2,033.000	0.000	57.446	1,343.799
2,034.000	0.000	57.446	1,374.544
2,035.000	0.000	57.446	1,405.289
2,036.000	0.000	57.446	1,436.034
2,037.000	0.000	57.446	1,466.779
2,038.000	0.000	57.446	1,497.524
2,039.000	0.000	57.446	1,528.269
2,040.000	0.000	57.446	1,547.992
Total	11,675.730	1,723.392	33,385.150

Davao City Expressway		FIRR= .761 %	
Year	Constructor Cost	O/M Cost	Toll Revenue
2006	158.395	0.000	0.000
2007	79.198	0.000	0.000
2008	158.397	0.000	0.000
2009	158.397	0.000	0.000
2010	591.360	0.000	0.000
2011	2,177.941	0.000	0.000
2012	2,177.941	0.000	0.000
2013	2,177.941	0.000	0.000
2014	2,177.941	0.000	0.000
2015	0.000	73.723	283.010
2016	0.000	73.723	299.594
2017	0.000	73.723	310.664
2018	0.000	73.723	323.534
2019	0.000	73.723	336.407
2020	0.000	73.723	349.275
2021	0.000	73.723	360.428
2022	0.000	73.723	371.582
2023	0.000	73.723	382.735
2024	0.000	73.723	393.888
2025	0.000	73.723	405.042
2026	0.000	73.723	416.195
2027	0.000	73.723	427.348
2028	0.000	73.723	438.502
2029	0.000	73.723	449.655
2030	0.000	73.723	460.808
2031	0.000	73.723	471.962
2032	0.000	73.723	483.115
2033	0.000	73.723	494.268
2034	0.000	73.723	505.422
2035	0.000	73.723	516.575
2036	0.000	73.723	527.728
2037	0.000	73.723	538.882
2038	0.000	73.723	550.035
2039	0.000	73.723	561.188
2040	0.000	73.723	572.342
2041	0.000	73.723	583.495
2042	0.000	73.723	594.648
2043	0.000	73.723	605.802
2044	0.000	73.723	616.955
Total	9,857.511	2,211.687	13,631.090

Davao City Expressway		FIRR= 3.336 %	
Year	Constructor Cost	O/M Cost	Toll Revenue
2,006.000	158.395	0.000	0.000
2,007.000	79.198	0.000	0.000
2,008.000	158.397	0.000	0.000
2,009.000	158.397	0.000	0.000
2,010.000	591.360	0.000	0.000
2,011.000	2,177.941	0.000	0.000
2,012.000	2,177.941	0.000	0.000
2,013.000	2,177.941	0.000	0.000
2,014.000	2,177.941	0.000	0.000
2,015.000	0.000	73.723	358.637
2,016.000	0.000	73.723	388.516
2,017.000	0.000	73.723	405.229
2,018.000	0.000	73.723	426.706
2,019.000	0.000	73.723	448.182
2,020.000	0.000	73.723	469.659
2,021.000	0.000	73.723	492.675
2,022.000	0.000	73.723	515.691
2,023.000	0.000	73.723	538.707
2,024.000	0.000	73.723	561.723
2,025.000	0.000	73.723	584.739
2,026.000	0.000	73.723	607.755
2,027.000	0.000	73.723	630.771
2,028.000	0.000	73.723	653.787
2,029.000	0.000	73.723	676.803
2,030.000	0.000	73.723	699.819
2,031.000	0.000	73.723	722.835
2,032.000	0.000	73.723	745.851
2,033.000	0.000	73.723	768.867
2,034.000	0.000	73.723	791.883
2,035.000	0.000	73.723	814.899
2,036.000	0.000	73.723	837.915
2,037.000	0.000	73.723	860.931
2,038.000	0.000	73.723	883.947
2,039.000	0.000	73.723	906.963
2,040.000	0.000	73.723	929.979
2,041.000	0.000	73.723	952.995
2,042.000	0.000	73.723	976.011
2,043.000	0.000	73.723	999.027
2,044.000	0.000	73.723	1,022.043
Total	9,857.511	2,211.687	20,873.450



### 18.3 IMPACT ON ROAD NETWORK DEVELOPMENT

#### 18.3.1 Impact on Road Density and Pavement Ratio

Additional 1,489 km of new road will be constructed and 8,075 km. of roads will be paved under this Plan, resulting in the following improvement.

	Present (1995)	2016
National Road Density	0.21	0.23
Paved National Road Density	0.11	0.22
Pavement Ratio	51%	91%

Current inaccessible vast areas would be provided with a road network except the central mountainous area of Mindoro, the south-western coastal area of Palawan, the western mountainous area of Panay and the northern mountainous area of Samar Islands.

#### 18.3.2 Road Development By Road Class

The progress of road development by road class is shown in Table 18.3-1 and Figure 18.3-1, and summarized as follows:

	Cumulative % Accomplishment Against Needs		
	Program I	Program II	Program III
NS Backbone	73%	92%	100%
EW Lateral	32%	64%	90%
Strategic Road (A)	30%	66%	100%
Strategic Road (B)	2%	12%	71%
Total	31%	57%	91%

#### 18.3.3 Traffic Congestion

Traffic capacity expansion projects were planned to be completed before the volume-to-capacity ratio becomes 1.25, thus excessive traffic congestion would not be expected, except some intra-urban sections of major urban centers such as Cebu City, Davao City, Cagayan de Oro City. In these cities, intra-urban road projects should be planned separately from this Study.

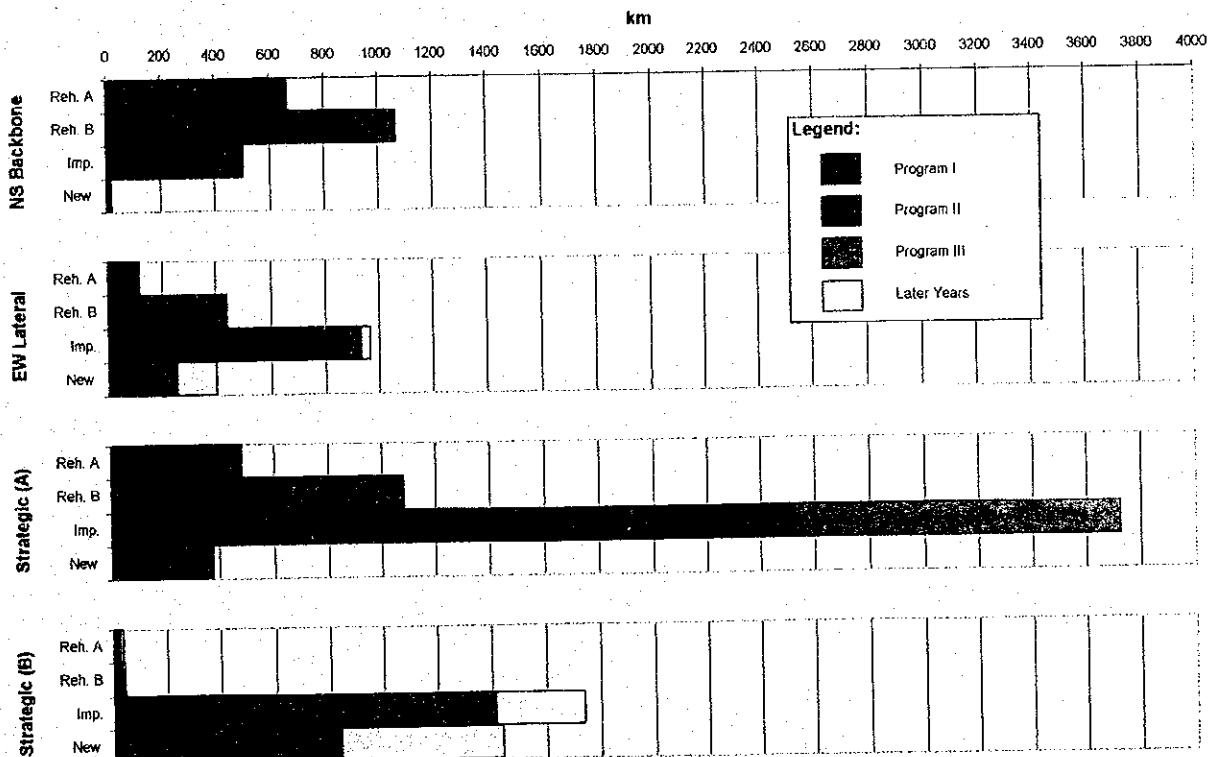
#### 18.3.4 Road Closure During Natural Calamity

The proposed Master Plan Network still requires rather long detour when one of the link will be closed due to natural calamities. In the Master Plan, recommended is to construct a road strong enough to natural calamities. Costs for disaster prevention works were included in the estimates. If constructed as planned, most of road closures by natural calamity would be eliminated and the reliable road network would be achieved.



**TABLE 18.3-1 PROGRESS OF ROAD DEVELOPMENT BY ROAD CLASS**  
 - Group 1 Projects -

Road Class	Type of Work	Improvement Needs (km)	Physical Target of the Master Plan			
			Program I	Program II	Program III	TOTAL
NS Backbone	Reh. A	668	524	131	13	668
	Reh. B	1,071	700	217	154	1,071
	Imp.	509	412	85	12	509
	New	18	11	6	1	18
	Total	2,266	1,647	439	180	2,266
EW Lateral	Reh. A	120	67	26	22	115
	Reh. B	443	71	53	319	443
	Imp.	967	436	434	62	932
	New	404	49	104	102	255
	Total	1,934	623	617	505	1,745
Strategic (A)	Reh. A	486	173	211	102	486
	Reh. B	1,085	266	377	442	1,085
	Imp.	3,730	1,264	1,265	1,201	3,730
	New	379	13	186	180	379
	Total	5,680	1,716	2,039	1,925	5,680
Strategic (B)	Reh. A	37	1	9	13	23
	Reh. B	44	4	16	24	44
	Imp.	1,741	53	291	1,071	1,415
	New	1,443	-	15	822	837
	Total	3,265	58	331	1,930	2,319
Total	Reh. A	1,311	765	377	150	1,292
	Reh. B	2,643	1,041	663	939	2,643
	Imp.	6,947	2,165	2,075	2,346	6,586
	New	2,243	73	311	1,105	1,489
	Total	13,144	4,044	3,426	4,540	12,010



**FIGURE 18.3-1 PROGRESS OF ROAD DEVELOPMENT BY ROAD CLASS**



## 18.4 IMPACT ON TRANSPORT EFFICIENCY

Pavement condition improvement and new links would greatly improve the transport efficiency. Values which express the transport efficiency, such as vehicle-km, vehicle-hour, etc. are shown in Table 18.4-1.

Major improvement would be made for vehicle-hours and the vehicle operating cost. Vehicle-hours (or travel time) would be reduced by 14%, 30% and 44% in the year 2004, 2010 and 2016, respectively. The vehicle operating cost (VOC) would be reduced by 10%, 21%, and 30% in the year 2004, 2010 and 2016, respectively. These improvements are mainly due to improvement of pavement condition, traffic capacity expansion and alternative means of transportation such as bypasses and expressways.

Whereas, vehicle-kms would be slightly improved, but negligible as a whole. This is because major traffic routes have already exist in the manner of the shortest route. Effects of several short cut routes are not so high, as traffic volume on these route is still light.

**TABLE 18.4-1 IMPROVEMENT OF TRANSPORT EFFICIENCY**

End Year of Each 6-Year Period		Vehicle-Km Per day (in 1,000)	Vehicle-Hr. Per day (in 1,000)	Vehicle Operating Cost		
				Million P/Year	Million P/day	Per Vehicle-Km (Pesos)
2004	Without	30,480	889	94,044	257.7	8.455
	With	30,395	768	84,297	231.0	7.600
	Reduction	85 (0.3%)	121 (14%)	9,747 (10%)	26.7	0.855 (10%)
2010	Without	40,199	1,228	127,524	349.4	8.692
	With	39,999	857	100,287	274.8	6.870
	Reduction	200 (0.5%)	371 (30%)	27,237 (21%)	74.6	1.822 (21%)
2016	Without	49,392	1,554	161,425	442.3	8.955
	With	48,562	863	113,566	311.1	6.406
	Reduction	830 (1.7%)	691 (44%)	47,859 (30%)	131.2	2.549 (28%)

## 18.5 TIME-DISTANCE REDUCTION

Time-distance reduction or travel time reduction is best represented by Mindanao Island. At present, major urban centers in Mindanao are all developed along the coast and they are rather independently functioning due to longer travel time required between urban centers. If travel time between urban centers is reduced, inter-urban centers' socio-economic activities would be more active and development efforts would be efficiently and effectively integrated, resulting in higher economic growth with cheaper development cost. Time-distance map of Mindanao Island is illustrated in Figure 18.5-1.



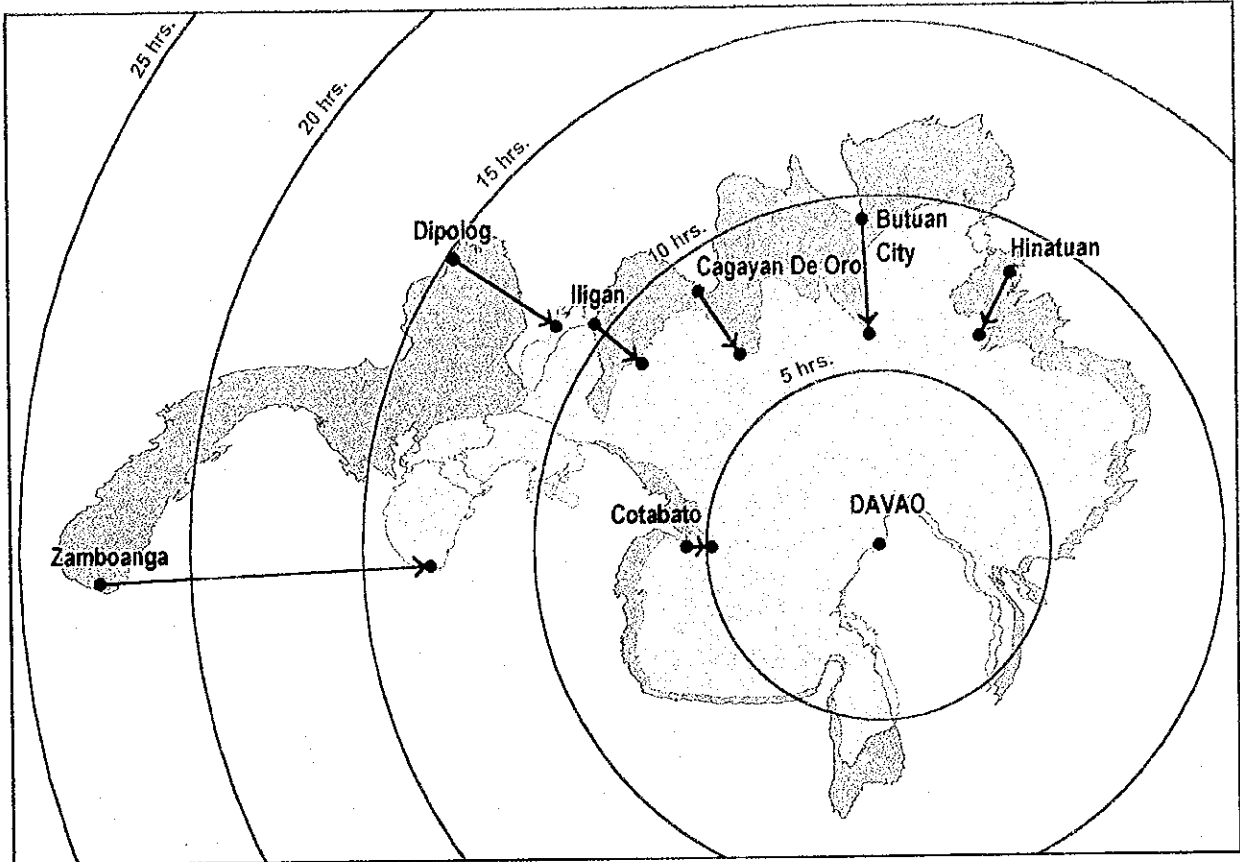


FIGURE 18.5 - 1 CHANGES IN TRAVEL TIME FROM DAVAO CITY





## 18.6 IMPACT ON REGIONAL ECONOMY AND DEVELOPMENT

### 18.6.1 General

Improved transport system would greatly contribute to social and economic development. Travel time reduction, transport cost reduction, accessibility improvement and safe, comfort and reliable means of transportation would directly and indirectly impact on the following:

#### (1) Transport cost reduction

- Higher farm gate prices → higher income for farmers upgrading their living standards → incentive for farmers to produce more → higher regional economic growth.
- Lower prices of farm – inputs such as seed, fertilizers, etc → improve agricultural productivity → higher income for farmers.
- Cheaper selling prices of products → people buy more → higher needs to produce more → higher economic growth.

#### (2) Travel time reduction

- Various markets become nearer. → more business chances → more active and inter-regional trades and socio-economic activities → more integrated development.
- Farmers are provided with more chances to diversify kinds of agricultural products from mono-cropping to market oriented products such as vegetables, fruits, etc → upgrading their living standards

#### (3) Improved accessibility

- More chances of developing un-utilized potential lands in remote areas.
- More opportunities to access various markets in terms of different kinds of demands as well as locations.
- Contribution to effective land use and unity of nation.

#### (4) Safe, comfortable and reliable means of transportation

- Reliable delivery of goods in good condition → more investment.
- Less transport losses → higher selling profits.

The Master Plan is expected to contribute to the improvement of living standards of the Study Area which would lead to the preservation of peace.

### 18.6.2 Impact on Commodity Prices

Reduction of transport cost, particularly of trucks would favorably affect commodity prices. The transport cost (in terms of VOC per vehicle-km) of trucks would be reduced in Mindanao as shown in Table 18.6-1.

**TABLE 18.6-1 TRANSPORT COST REDUCTION OF TRUCKS IN MINDANAO**

Year		Truck Veh-Km/day (1,000)	Truck VOC		
			Million P Per Year	Million P Per Day	VOC per Veh. Km.
2004	W/O	3,261	14,020	38.4	11.78 P
	W	3,251	12,159	33.3	10.24 P
	Reduction	10 (0.3%)	1,861 (13%)	5.1	1.54P (13%)
2010	W/O	4,518	19,839	54.4	12.04 P
	W	4,405	14,946	40.9	9.28 P
	Reduction	113 (2.5%)	4,893 (25%)	13.5	2.76P (23%)
2016	W/O	5,846	26,319	72.1	12.33 P
	W	5,638	17,581	48.2	8.55 P
	Reduction	208 (3.6%)	8,738 (33%)	23.9	3.78 P (31%)

The transport cost savings of trucks in Mindanao would be 1.86 Billion Pesos, 4.89 Billion Pesos and 8.74 Billion Pesos in Year 2004, 2010 and 2016, respectively. The transport cost savings per vehicle-km would be 1.54 pesos (13%), 2.76 pesos (23%) and 3.78 pesos (31%) in year 2004, 2010 and 2016, respectively. These reduction would be reflected to commodity prices and people would enjoy cheaper commodity prices.

### 18.6.3 Improved Inter-modal Linkage

Inter-modal linkage would be greatly improved, particularly with Ro-Ro Service ports and new airports to be opened in Iloilo, Bacolod and Cagayan de Oro. Transport connection with Metro Manila as well as among major Islands would be strengthened, resulting in more active economic activities, effective use of resources, more business chances with more job opportunities, integration of development efforts and effective investment.

### 18.6.4 Impact on the Construction Industry

The constantly increasing investment on road building would greatly contribute to the construction industry. Local contractors would be provided opportunities to strengthen their financial, technical and managerial capability.

## CHAPTER 19

### RECOMMENDATIONS

#### 19.1 REINFORCEMENT OF PLANNING BODY

##### 19.1.1 Reinforcement of the Planning Service of DPWH Central Office

The Planning Service of the DPWH Central Office is the body to select, schedule and program all projects of DPWH in close coordination with NEDA, DPWH Regional Offices, Regional Development Councils and Local Government Units. At present, the "Bottom Up" planning procedure is being adopted in preparing the Annual Program, wherein the project lists and proposals are submitted from LGUs level to Regional Level, then finally to the Central Office. This procedure is one of the best ways to reflect local needs for road network development. On the other hand, the following factors should also be considered.

- Road network development from the viewpoint of national level transport efficiency, particularly for arterial roads.
- About 53% of road projects are foreign-assisted. Foreign-assisted projects should be planned and programmed under the initiative of the Central Office with proper coordination with the local level agencies and offices.

In order to systematically and successfully implement the Master Plan recommendations, the role of the Planning Service is quite important. In the preparation of the Annual Program, the Master Plan should be always referred to, and the previous accomplishment on the Master Plan should be always reviewed. While, local demands for road network development are also required to be accommodated which should be implemented harmoniously with the Master Plan scenario. In view of above, the following two divisions are recommended to be organized through restructuring of the Planning Service.

##### **Arterial Roads Division**

- To plan and program the arterial roads projects proposed under this Master Plan and the Luzon Master Plan (LISR) from the viewpoints of National level transport efficiency. Arterial roads projects should preferably be planned with an initiative of the Central Office. Proper coordination with local level offices and agencies should be made and the Central Office plan should be agreed by them. Thus, the planning of arterial roads projects will be rather "top-down" oriented.
- Over 50% of major roads projects are and would be foreign-financed. Foreign fund preparation at proper timing is important for the achievement of the Master Plan, thus is one of the important roles of this Division. It will be worthwhile to prepare a medium plan (5 to 6 years plan) for each lending institution.

### **Minor Road Division**

- To plan and program the minor roads projects accommodating local demands and request. The planning procedure will be "bottom-up" oriented. Selection of projects should be made in a harmonious manner with the Master Plan Scenario.
- As the arterial roads projects may concentrate in certain areas resulting in in-balanced regional investment, proper balance in terms of regional road investment should be maintained through this category of roads.
- Both Divisions should be fully coordinated with each other to maximize the effects and impacts of the road investment.

#### **19.1.2 Strengthening of the PMO-Feasibility Studies**

Another Important body during the planning and project preparation stage is the PMO-Feasibility Study. A feasibility Study is a basis for funding, therefore, if it is delayed, the implementation will be also delayed. The PMO-Feasibility Studies should prepare an annual schedule for feasibility studies based on the Master Plan, especially for projects intended for foreign-assistance. In the preparation of the annual schedule, proper coordination should be made with the Planning Service. Necessary budgetary support to this office should be provided to implement the annual schedule.

#### **19.1.3 Role of PMO - BOT**

PMO-BOT is the office to plan and invite private investors for funding toll road projects. For expressway projects proposed in the Master Plan, PMO-BOT should take the initiative for realization of two projects. The financial viability of two projects was evaluated not to be so high, therefore private investors would not be interested in the projects. In order for the projects to be attractive to private investors, the following measures would be required:

- Co-financing of public and private sectors
- Introduction of soft loans from bi-lateral sources on the international lending institutions

PMO-BOT should arrange above measures to realize the expressway projects.

### **19.2 ROAD FUNDS**

Still a lot of investments have to be made for the road network development and maintenance of roads. Road funds need to be steadily increased.

#### **19.2.1 Capital Investment Fund**

##### **(1) Present Road and Transport Sector Tax Revenue**

The Study on Better Roads Philippines (BRP) estimated the road and transport sector tax revenue in 1997 as shown in Table 19.2-1.

**TABLE 19.2-1 CURRENT ROAD AND TRANSPORT SECTOR TAX REVENUE**

(Billion Pesos)

	Road and Transport Sector Tax Revenue					Total
	Vehicle Ownership	Parts/ Tires	Fuel		Sub-Total	
			Diesel	Gas		
Customs	0.4	3.8	6.9	4.6	11.5	15.7
VAT	2.6	9.2	-	-	-	11.8
Excise	4.1	-	8.2	17.4	25.6	29.7
Registration Fee	2.5	-	-	-	-	2.5
<b>Total</b>	<b>9.6</b>	<b>13.0</b>	<b>15.1</b>	<b>22.0</b>	<b>37.1</b>	<b>59.7</b>

Source: Financial Report, BRD

Investment for the road sector in 1997 is shown in Table 19.2-2.

**TABLE 19.2-2 ROAD SECTOR INVESTMENT, 1997**

Road Sector Investment (Billion Pesos)	% Share to Road Transport Sector Tax Revenue
Capital Investment	38%
Maintenance	6%

The road users (or "beneficiaries") are paying taxes, but only 38% were spent for national road network development and 6% for road maintenance.

(2) Estimation of Future Road and Transport Sector Tax Revenue

Future road and transport sector tax revenue was roughly estimated on the assumption that revenue would increase in proportion to increase of the vehicle-km. Vehicle-km growth rate in the Study Area was estimated as shown in Table 19.2-3.

**TABLE 19.2-3 VEHICLE-KM GROWTH RATE**

Vehicle-Km (in 1,000)		Average Annual Growth Rate
1997	2016	
13,825	48,562	5.2%

Note: Average growth rate of GDP for the same period is targeted at 5.0% p.a.

Assuming that an average annual growth rate of vehicle-km in Luzon is the same as in the Study Area, total road and transport sector tax revenue for each 6-year period was estimated. While, possible investment amount at 1998 prices was compared with the estimated revenue.

**TABLE 19.2-4 FUTURE ROAD/TRANSPORT SECTOR TAX REVENUE AND ESTIMATED POSSIBLE INVESTMENT AMOUNT**

(1998 Prices)

Period	Estimated Road and Transport Sector Tax Revenue (Billion Pesos)	Estimated Possible Investment Amount (Billion P)		
		Low	Medium	High
First 6-Year Period (1999 - 2004)	480 (80 per year)	160.8 (33.5%)	171.5 (35.7%)	192.6 (40.1%)
Second 6-Year Period (2005 - 2010)	650 (108 per year)	258.4 (39.8%)	272.9 (42.0%)	302.0 (46.4%)
Third 6-Year Period (2011 - 2016)	890 (148 per year)	365.8 (41.1%)	384.3 (43.2%)	421.3 (47.3%)

(3) Investment Requirement of Master Plan and Revenue

Investment requirement of the Master Plan in comparison with estimated possible investment amount is shown in Table 19.2-5.

**TABLE 19.2-5 INVESTMENT REQUIREMENT IN COMPARISON WITH ESTIMATED POSSIBLE INVESTMENT**

Period	Investment Requirement in Comparison with Estimated Possible Investment	
	Excluding Expressways	Including Expressways
First 6-Year Period	Within Medium Assumption	Within Medium Assumption
Second 6-Year Period	Within Medium Assumption	Slightly higher than High Assumption
Third 6-Year Period	Within High Assumption	Slightly higher than High Assumption

Investment requirement including expressways is higher than the possible investment amount by 2.8 Billion Pesos in the second period and 2.6 Billion Pesos in the third period. On the other hand, FIRR of expressway projects were expected not high enough for the private sector to finance all project costs. In view of above, funds for expressway projects would need to be raised from both public and private sectors. Proposed funding share is presented in Table 19.2-6.

**TABLE 19.2-6 PROPOSED FUNDING SCHEME FOR EXPRESSWAY PROJECTS**

Expressway	Cost (Billion P)	Fund Source	
		Public Sector	Private Sector
Cebu Engineering Fee	1.705	1.705 (100%)	-
City Construction Cost	10.033	3.344 ( 33%)	6.689 (67%)
Expressway Row	0.655	0.655 (100%)	-
Total	12.393	5.704 ( 46%)	6.689 (54%)
Davao Engineering Fee	1.392	1.392 (100%)	-
City Construction Cost	8.189	4.094 ( 50%)	4.095 (50%)
Expressway Row	0.611	0.611 (100%)	-
Total	10.192	6.097 ( 60%)	4.095 (40%)

Note: Under the proposed funding share, FIRR of Cebu and Davao City Expressways would be 10.9% and 9.7%, respectively.

(4) Proposed Allocation of Road and Transport Sector Tax Revenue to National Road Development Fund

Investment requirements for the national road development (national level) were concluded as follows:

- First 6-Year Period : Equivalent amount to the estimated possible investment amount under the medium assumption (171.5 Billion Pesos)
- Second 6-Year Period : Equivalent amount to the estimated possible investment amount under the high assumption (302.0 Billion Pesos)

Third 6-Year Period : Equivalent amount to the estimated possible investment amount under the high assumption (421.3 Billion Pesos)

In order to cope with increasing capital investment requirement, higher share of the road and transport sector tax revenue should be exclusively allocated to the national road development fund as follows:

Period	Allocation of Road/Transport Sector Tax Revenue to National Road Development Fund	
First 6-Year Period	38%	(maintain present share)
Second 6-Year Period	46%	
Third 6-Year Period	47%	

### 19.2.2 Maintenance Fund

Maintenance budget is proposed to be doubled in order to maintain present level of pavement condition (refer to 19.3).

Maintenance budget in 1997 was 3.59 Billion Pesos which will need to be increased to 7.2 Billion Pesos. If 10% of the road/transport sector tax revenue is allocated to road maintenance fund, the said target could be achieved.

Improved road condition would greatly benefit the road users ("benefisharies"). It is estimated that the vehicle operating cost saving will be 9.7 Billion Pesos in 2004, 27.2 Billion Pesos in 2010 and 47.8 Billion Pesos in 2016. Slight increase in fuel tax could be paid off by reduction in the vehicle operating cost.

It is the fact that trucks are the main "causers" of pavement deterioration and bridge damages. Nevertheless, vehicle registration fee is cheaper compared to other types of vehicles.

If "benefisharies to pay" and "causers to pay" principles are applied to taxation and accepted by road users, the said amount of maintenance fund could be collected. Collected tax should preferably treated as the special (or earmarked) tax and should be spent exclusively for the purpose of road maintenance.

For example, if additional tax or fee is imposed, the increment in revenue will be about 7.5 Billion Pesos as shown below:

• Additional 1.00 Pesos for gasoline and 0.5 Pesos for diesel (see Table 19.2-8) .....	5.9 Billion P
• Additional registration fee (see Table 19.2-9) .....	1.6 Billion P
<b>Total</b>	<b>7.5 Billion P</b>

**TABLE 19.2-8 SAMPLE ESTIMATE OF ADDITIONAL TAX ON FUEL**

	Consumption (Million Liter)	Present		Additional	Additional
		Fuel Price (P/Liter)	Tax (P/Liter)	Tax (P/Liter)	Revenue (Billion/Pesos)
Gasoline					
Regular	708.3	10.27	4.80	1.00	0.7
Premium-lead	2,197.9	12.03	5.35	1.00	2.2
Premium-unlead	511.0	11.69	4.35	1.00	0.5
Diesel (Road Sector)	5,059.4	8.36	1.63	0.50	2.5
<b>Total</b>					<b>5.9</b>

**TABLE 19.2-9 SAMPLE ESTIMATE OF ADDITIONAL VEHICLE REGISTRATION FEE**

Vehicle Type	No. of Unit (1,000)	Current Registration Fee (P/year)	Proposed Additional Fee/Revenue	
			Additional Fee (P)	Revenue (Billion P)
Cars				
Light (Less 1600 cc)	565.6	1,000	1,000	0.566
Medium (1601-2800 cc)	128.6	2,400	2,500	0.322
Heavy (2801 & above)	8.4	6,000	6,000	0.050
Trucks				
Small	94.8	750	1,000	0.095
Medium	50.7	1,600	3,000	0.152
Heavy 3 axle	57.3	3,150	6,000	0.344
Buses				
Small	5.9	700	500	0.003
Large	23.5	2,100	1,000	0.024
<b>Total</b>				<b>1.556</b>

### 19.3 ROAD MAINTENANCE

Existing road maintenance problems are summarized in section 3.7.3 of this report. Based on the identified problems, recommendations are set forth hereunder.

#### (1) Maintenance Budget

In order to properly treat pavement distresses and to prevent further deterioration of pavements, maintenance budget was estimated to be increased by 1.7 to 2.2 times. Major assumptions used for the estimate were as follows:

Pavement Type	Existing Pavement Distresses (Region XI)	Present DPWH Maintenance Level (% treated)	Proposed Maintenance Level (% treated)	
PCC	Cracks/Joint	299,000 m	40%	100%
	Scalling/Pot	69,000 sq. m	34%	72%
	Holes	6,650 sq. m	38%	50%
	Depression			
AC	Cracks	117,000 m	88%	100%
	Pot Holes	36,000 sq. m	79%	100%
	Depression	1,200 sq. m	78%	100%

Source : Road Maintenance Sustainability Study (OECF-assisted)

Maintenance budget for all national roads was 3.59 Billion Pesos in 1997 and 3.70 Billion in 1998, thus about 4.0 Billion Pesos would need to be additionally allocated in order to prevent further deteriorations of road conditions.



## (2) EMK Budget Allocation System

New EMK budget allocation system will be needed to equitably allocate maintenance budget to District Offices by introducing factors of road and bridge conditions. The IBRD-assisted Road Information and Management Support System (RIMSS) is studying new EMK system to include factors of road/bridge conditions.

## (3) Effective Utilization of Limited Maintenance Budget

In order to effectively utilize limited maintenance budget, the following two aspects should be reassessed and new guidelines should be established:

**Maintenance Level (or standards)** – higher maintenance level should be set for the paved roads and that for unpaved roads could be relaxed. At present, much maintenance budget is spent for unpaved roads which usually have light traffic and will be improved sooner or later.

**Prioritization of Maintenance Works** – higher priority should be set for paved roads than unpaved roads. Other important factors to be considered are traffic volume, class of road, and type of works (for example, drainage maintenance works should be given higher priority than maintenance works for roadside features).

## (4) Strengthening of MBA

MBA will be gradually reduced, but 30% of maintenance works are planned to be undertaken by MBA even at the ultimate stage, in order to immediately cope with emergency cases such as road closure due to natural calamity.

Many District Offices assess themselves that the productivity of MBA is getting lowered due to inappropriate equipment and old age of staff and is about 70% of standard productivity set in the Maintenance Manual. In order to strengthen MBA, recommended are:

- To purchase new sets of equipment, particularly those required in emergency cases.
- To provide equipment support for old aged staff and to undertake trainings for younger staff.

## (5) Improvement of MBC

Major problem is that maintenance oriented contractors are still few, as most contractors do not consider MBC as their main line of business. In order to attract contractors and promote MBC oriented contractors, recommended are:

- To increase size of contract (an average contract is currently about 2.3 Million Pesos which needs to be increased to about 5 Million Pesos in order for a contractor to work continuously throughout a year, thus mobilization and demobilization of equipment at every quarter will be eliminated).

- To prepare a contract including only particular work items, for example a contract for pavement markings, thereby a contractor will be encouraged to invest for equipment needed for the specific work items.

On the part of DPWH, the following are recommended:

- The organization of District Offices is still that of MBA. Management/ Supervisory staff should be strengthened.
- Maintenance contract should be more flexible to cope with immediate maintenance needs. At present, the change order is limited to 15% of a contract amount.

#### (6) MBC Share

MBC share should be gradually increased to support and promote the Government policy of privatization and active participation of a private sector in the Government Projects.

Under the present workforce and equipment, MBA output (or capacity) in terms of amount and work volume is almost fixed, unless workforce and equipment is increased or MBA productivity is improved. MBA share should not be increased more than the present level.

### **19.4 STRONGER ROAD BUILDING AGAINST NATURAL CALAMITIES**

The Philippines is exposed to stern natural environments. Roads are frequently damaged by natural calamities. Stronger roads against natural calamities should be planned, designed and constructed. River-related road damages are also increasing due to lack of flood control measures. River control works alongside a road such as spur dikes and other river training works should be jointly implemented with road construction.

### **19.5 ROAD ROW ACQUISITION AND RELOCATION OF PROJECT AFFECTED PEOPLE**

Road right-of-way acquisition and relocation of project-affected people are major causes of delayed implementation due to late start of activities and lack of budgetary support. Resettlement plan should be prepared during the feasibility study stage and the parcellary survey should be undertaken as soon as the road alignment is determined. ROW acquisition and resettlement of project-affected people should be completed before construction starts. For project-affected people, measures should be taken to mitigate their sufferings.

### **19.6 REVIEW AND UPDATING OF THE MASTER PLAN**

The Master Plan must be reviewed and updated periodically (or at least every 6 years) by reflecting progress of the proposed road projects, prevailing economic conditions and the focus of Government's policies.

## 19.7 EARLY EXECUTIONS OF FEASIBILITY STUDIES

To implement projects as scheduled, feasibility studies, especially those projects planned to be implemented in the latter part of the 1<sup>st</sup> 6-Year period and the early part of 2<sup>nd</sup> 6-year period should be conducted immediately, since the projects scheduled in the early part of the 1<sup>st</sup> 6-Year period are mostly on-going/committed projects or the detailed design already completed. Studies should include route selection and environmental assessment as well as technical, economical and financial analysis. Major projects to be studied immediately are:

- Mindanao East-West Lateral Road (MI 15)
- Palawan North Road (PL 1-5 & 6)
- Surigao – Davao Coastal Road (MI 18-7, 8, 9)
- Liloy – Siocon, Zamboanga Road (MI 41-1, 2, 3)
- Kalamansig – Isulan – Matalam Road (MI 12-1, 2)
- Capacity Expansion Projects
  - Iloilo – Roxas Road Road (NE 1-1, 2, 3)
  - Butuan – Cagayan de Oro – Iligan – Tubod Road (MI 7-8 to 17)
  - Sayre Highway (MI 3-4, 5)
- Cebu City Expressway
- Iloilo – Guimaras Link (Guimaras Bridge)









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