

CHAPTER 14
ECONOMIC EVALUATION

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14.1 METHODOLOGY

In this chapter, the bypass project is evaluated from the economic viewpoint, following the cost-benefit analysis. Figure 14.1-1 shows the procedure to measure and compare the cost and the benefit of the bypass project in economic price.

The economic cost is a monetary expression of goods and services to be really consumed to implement the project. Therefore, all the transfer cost (tax and subsidy) will be deducted from the cost measured in market price. In addition, shadow wage rates (SWRs) are applied to unskilled labor costs implied in the project cost. The same process is taken to estimate unit cost of vehicle operation which is used to estimate economic benefits, by excluding all taxes and applying the SWRs to labor cost of mechanics and crews.

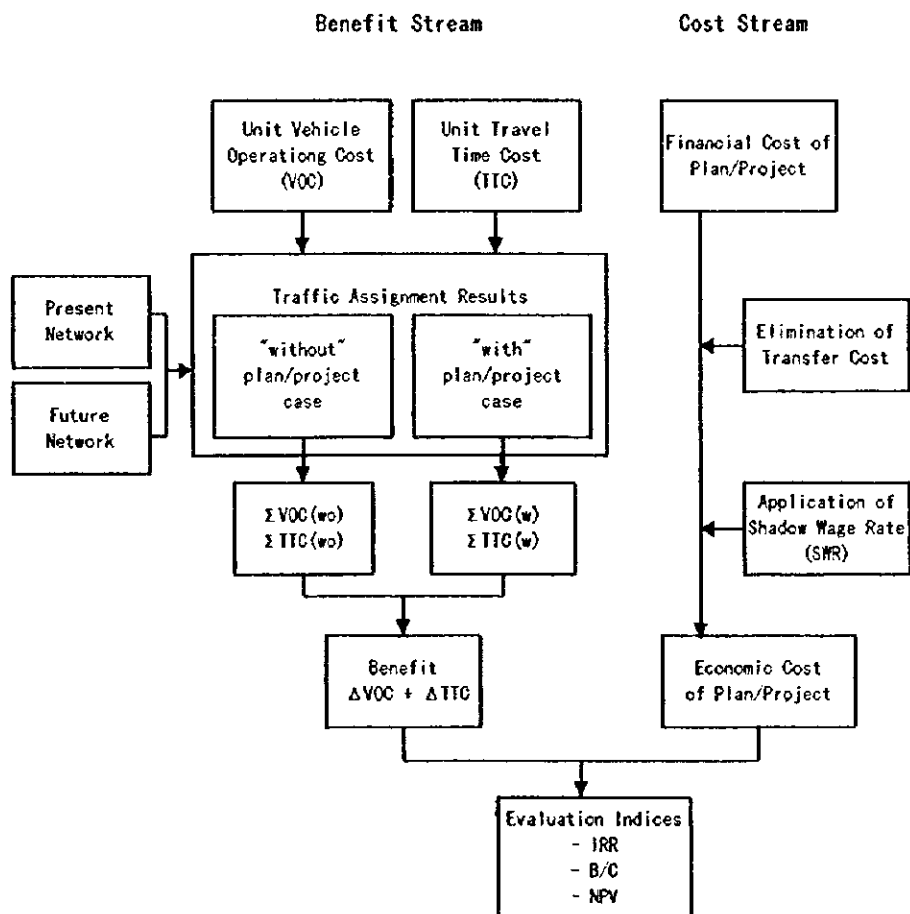


FIGURE 14.1-1 WORK FLOW OF ECONOMIC EVALUATION

The implementation program shown in the previous chapter is preconditioned to identify the year when the project cost is invested or the benefit starts to accrue. Therefore, the evaluation results will be affected by a change in the implementation program.

Economic benefit is defined as the amount of saved travel costs due to a project. Travel costs consist of two components, vehicle operating cost (VOC) and travel time cost (TTC). These are the benefits most direct and comparatively easy to quantify. It is obvious that there exist other benefits of a transportation project than those direct benefits, such as safety improvement and acceleration of urban development as well as mitigation of traffic congestion. In this feasibility study, however, those kinds of benefits are difficult to measure and are neglected in order to exclude an arbitrary evaluation.

Benefit of a project is measured through so-called "with" and "without" comparison. Using the results of traffic assignment to a network with the project in question and also to the same network but without the project, total VOC and TTC of each case are calculated. And then, the benefit is obtained as the difference between "with" and "without" cases.

14.2 ECONOMIC COST OF THE PROJECT

Project costs estimated in Chapter 13 are expressed in the financial price and they are converted into economic cost, taking the process shown in Figure 14.2-1. The points are:

- Construction cost is broken down into three cost items: material cost, equipment cost and labor cost.
- Out of material and equipment cost, import duties and value added tax are deducted. The tax rate is in the range of 12 to 25%, including VAT and import duties.
- To unskilled labor cost, the shadow wage rate (SWR) is applied. According to the Philippine Yearbook, unemployment rate in the Philippines has been in the range of 7 – 9% (see Figure 14.2-2). Assuming 8.3% of the rate in average for the long term up to 2020, the SWG is estimated at 83.5% according to Haveman's formula:

$$\begin{aligned} \text{SWG} &= (\text{Wage rate in market}) \times (1.25 - \text{Unemployment Rate} / 0.2) \\ &= (\text{Wage Rate in market}) \times 0.835 \end{aligned}$$

Total financial cost of 9.4 billion pesos is equivalent to 8.0 billion pesos in economic cost. The ratio of economic / financial cost is 85.3%. Annual maintenance cost will be increased by 15 million pesos due to the implementation of three bypasses (Table 14.2-1).

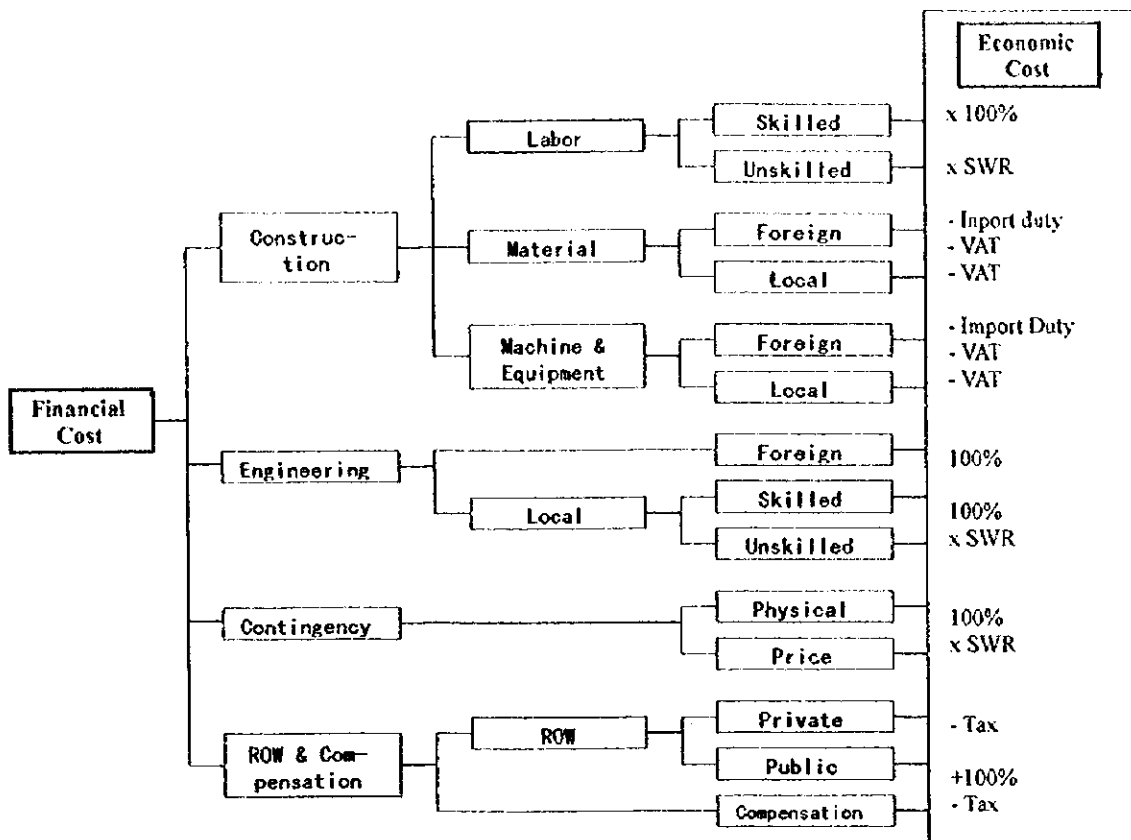
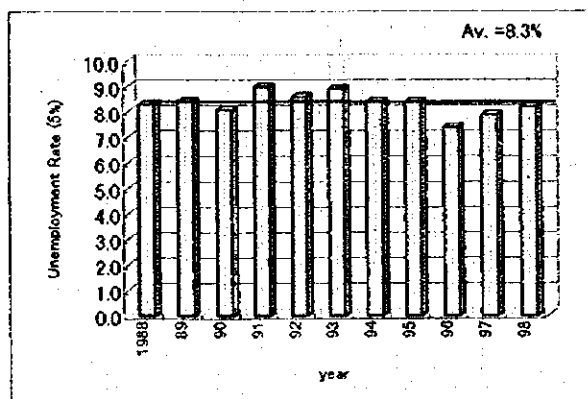


Figure 14.2-1 CONVERSION FROM FINANCIAL COST TO ECONOMIC COST



$$SWR = 1.25 - 0.083 / 0.2 = 83.5\%$$

FIGURE 14.2-2 ENEMPLOYMENT RATE AND SWR

Financial Cost

Economic Cost

(1) Plaridel - Baliuag Bypass

Year	D+Const	Unskilled	Taxes	ROW	Total
2000	42.8	0.0	7.7	0.0	50.5
2001	42.8	0.0	7.7	76.1	126.6
2002	0.0	0.0	0.0	228.4	228.4
2003	451.3	9.7	83.4	76.1	620.5
2004	601.7	12.9	111.2	0.0	725.8
2005	451.3	9.7	83.4	0.0	544.4
2006	20.8	0.0	3.8	0.0	24.5
2007	0.0	0.0	0.0	0.0	0.0
2008	298.9	6.5	55.2	0.0	360.6
2009	597.8	13.0	110.5	0.0	721.2
2010	597.8	13.0	110.5	0.0	721.2
Total	3105.1	64.8	573.3	380.6	4123.9

Year	D+Const	Unskilled	Taxes	ROW	Total
2000	42.8	0.0	0.0	0.0	42.8
2001	42.8	0.0	0.0	76.1	118.9
2002	0.0	0.0	0.0	228.4	228.4
2003	451.3	8.1	0.0	76.1	535.5
2004	601.7	10.8	0.0	0.0	612.5
2005	451.3	8.1	0.0	0.0	459.4
2006	20.8	0.0	0.0	0.0	20.8
2007	0.0	0.0	0.0	0.0	0.0
2008	298.9	5.4	0.0	0.0	304.3
2009	597.8	10.9	0.0	0.0	608.6
2010	597.8	10.9	0.0	0.0	608.6
Total	3105.1	54.1	0.0	380.6	3539.9

(2) Cabanatuan Bypass

Year	D+Const	Unskilled	Taxes	ROW	Total
2000	51.9	0.0	9.4	0.0	61.3
2001	51.9	0.0	9.4	47.1	108.3
2002	77.9	1.8	14.4	109.9	204.0
2003	545.2	12.5	101.1	0.0	658.8
2004	545.2	12.5	101.1	0.0	658.8
2005	389.4	8.9	72.2	0.0	470.6
2006	28.2	0.0	5.1	0.0	33.3
2007	0.0	0.0	0.0	0.0	0.0
2008	426.9	10.3	78.7	0.0	515.9
2009	853.9	20.6	157.3	0.0	1031.8
2010	853.9	20.6	157.3	0.0	1031.8
Total	3824.4	87.3	706.1	157.0	4774.7

Year	D+Const	Unskilled	Taxes	ROW	Total
2000	51.9	0.0	0.0	0.0	51.9
2001	51.9	0.0	0.0	47.1	99.0
2002	77.9	1.5	0.0	109.9	189.2
2003	545.2	10.4	0.0	0.0	555.7
2004	545.2	10.4	0.0	0.0	555.7
2005	389.4	7.5	0.0	0.0	396.9
2006	28.2	0.0	0.0	0.0	28.2
2007	0.0	0.0	0.0	0.0	0.0
2008	426.9	8.6	0.0	0.0	435.5
2009	853.9	17.2	0.0	0.0	871.1
2010	853.9	17.2	0.0	0.0	871.1
Total	3824.4	72.9	0.0	157.0	4054.2

(3) San Jose Bypass

Year	D+Const	Unskilled	Taxes	ROW	Total
2000	2.7	0.0	0.5	0.0	3.2
2001	11.6	0.0	2.1	0.0	13.7
2002	0.0	0.0	0.0	28.0	28.0
2003	123.3	3.3	22.4	0.0	149.0
2004	252.7	6.7	46.1	0.0	305.5
2005	0.0	0.0	0.0	0.0	0.0
2006	0.0	0.0	0.0	0.0	0.0
2007	0.0	0.0	0.0	0.0	0.0
2008	0.0	0.0	0.0	0.0	0.0
2009	0.0	0.0	0.0	0.0	0.0
2010	0.0	0.0	0.0	0.0	0.0
Total	390.3	10.0	71.1	28.0	499.4

Year	D+Const	Unskilled	Taxes	ROW	Total
2000	2.7	0.0	0.0	0.0	2.7
2001	11.6	0.0	0.0	0.0	11.6
2002	0.0	0.0	0.0	28.0	28.0
2003	123.3	2.8	0.0	0.0	126.0
2004	252.7	5.6	0.0	0.0	258.3
2005	0.0	0.0	0.0	0.0	0.0
2006	0.0	0.0	0.0	0.0	0.0
2007	0.0	0.0	0.0	0.0	0.0
2008	0.0	0.0	0.0	0.0	0.0
2009	0.0	0.0	0.0	0.0	0.0
2010	0.0	0.0	0.0	0.0	0.0
Total	390.3	8.3	0.0	28.0	426.6

(4) Total

Year	D+Const	Unskilled	Taxes	ROW	Total
2000	97.3	0.0	17.6	0.0	114.9
2001	106.3	0.0	19.2	123.2	248.7
2002	77.9	1.8	14.4	366.3	460.4
2003	1119.8	25.5	206.9	76.1	1428.4
2004	1399.7	32.1	258.4	0.0	1690.2
2005	840.7	18.6	155.6	0.0	1015.0
2006	49.0	0.0	8.8	0.0	57.8
2007	0.0	0.0	0.0	0.0	0.0
2008	725.8	16.8	133.9	0.0	876.5
2009	1451.6	33.6	267.8	0.0	1753.1
2010	1451.6	33.6	267.8	0.0	1753.1
Total	7319.7	162.1	1350.6	565.6	9398.0

Year	D+Const	Unskilled	Taxes	ROW	Total
2000	97.3	0.0	0.0	0.0	97.3
2001	106.3	0.0	0.0	123.2	229.5
2002	77.9	1.5	0.0	366.3	445.7
2003	1119.8	21.3	0.0	76.1	1217.2
2004	1399.7	26.8	0.0	0.0	1426.5
2005	840.7	15.6	0.0	0.0	856.3
2006	49.0	0.0	0.0	0.0	49.0
2007	0.0	0.0	0.0	0.0	0.0
2008	725.8	14.0	0.0	0.0	739.9
2009	1451.6	28.1	0.0	0.0	1479.7
2010	1451.6	28.1	0.0	0.0	1479.7
Total	7319.7	135.4	0.0	565.6	8020.7

D+Const: Sum of design cost and construction cost exclusive of unskilled labor cost

TABLE 14.2-1 FINANCIAL AND ECONOMIC COST OF BYPASS PROJECT

14.3 ECONOMIC BENEFIT

14.3.1 VOC and TTC

DPWH estimates and updates the basic data of vehicle operating cost (VOC) and travel time cost (TTC) every year. The data is used for evaluation of inter-urban highway projects in the Philippines. The data assumes constant operating speed of 25 Km/hour. In this study, however, future traffic volume is forecast to increase almost to the road capacity and then, traffic assignment was done incrementally. To keep the methodological consistency, the VOC and TTC data was modified as a function of operating speed as shown in FIGURE 14.3-1.

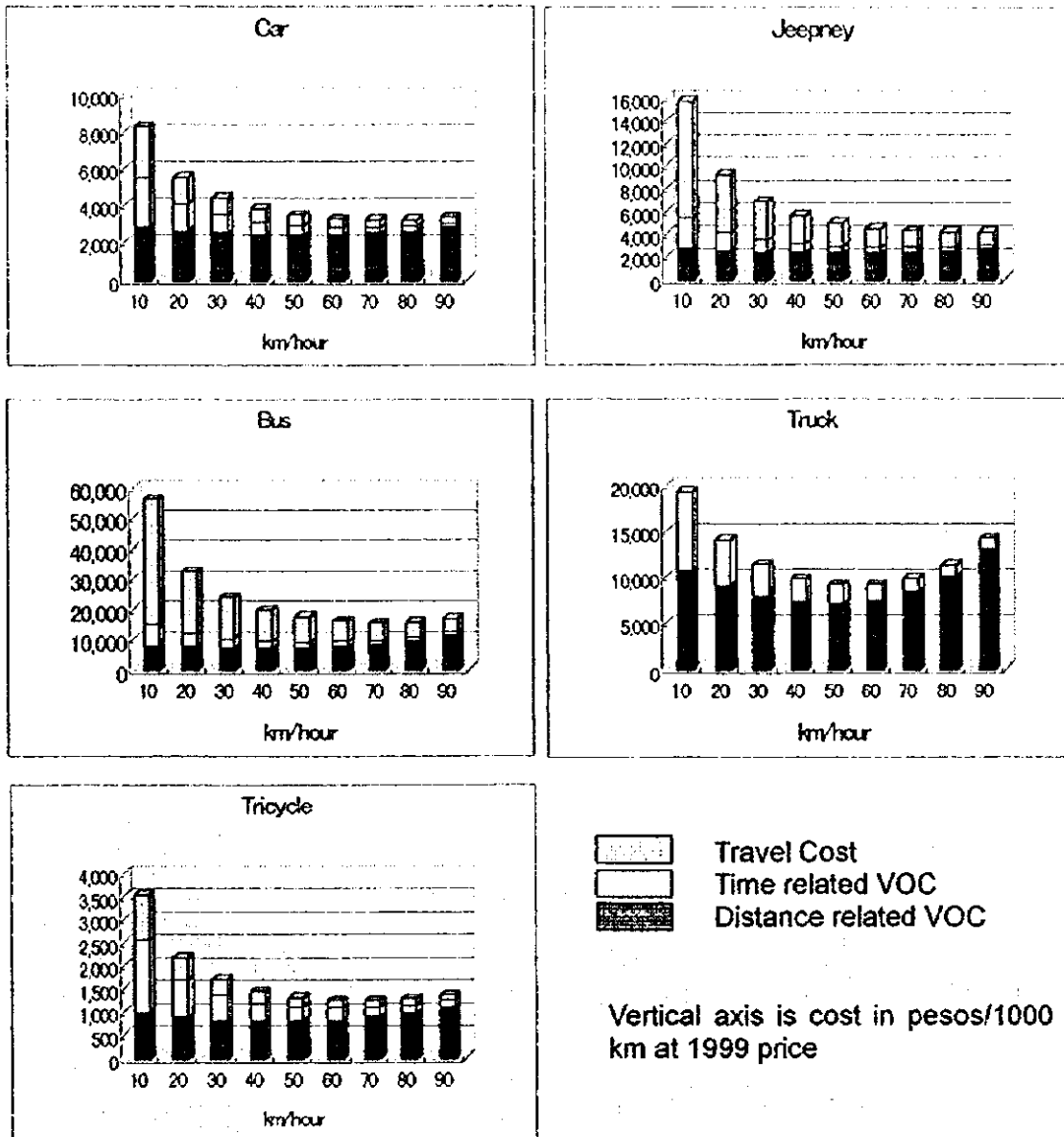


FIGURE 14.3-1 VEHICLE OPERATING COST AND TRAVEL TIME COST BY SPEED

14.3.2 Economic Benefit

Figure 14.3-2 illustrates schematically the flow of benefit generated by the bypass projects. The phase I of the bypass will be opened in the mid-2005. By this, total transport cost is reduced and the reduced amount is regarded as the benefit. In the mid-2010, the phase II and the expressway will be opened at the same time. After this year, the benefit is calculated as the difference of total transport cost between "Do nothing + Expressway" case and "Bypass + Expressway" case.

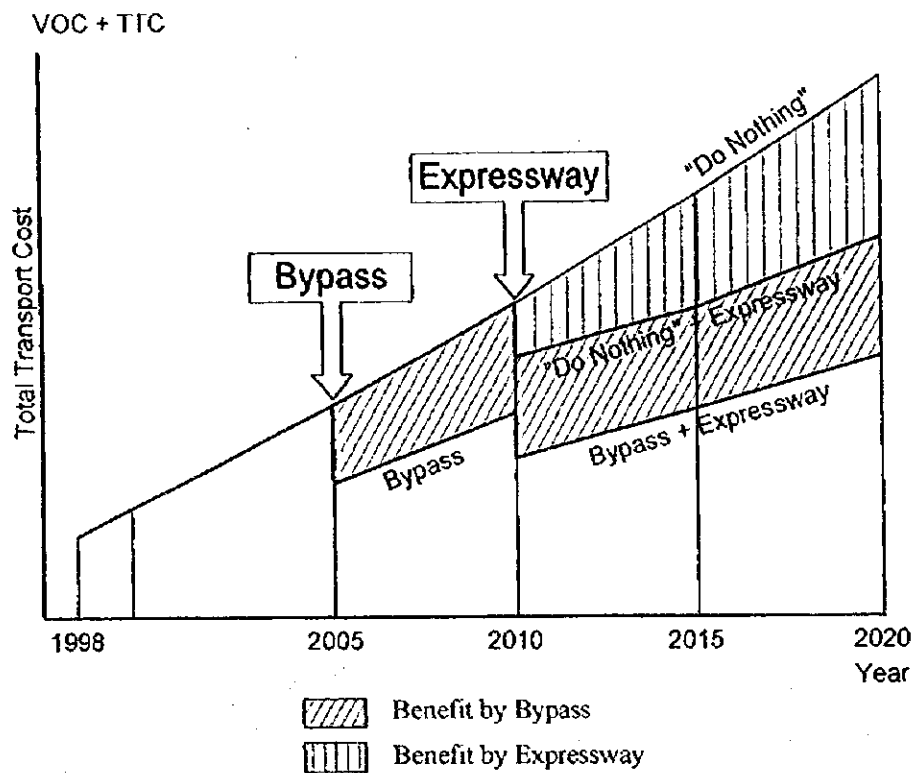


FIGURE 14.3-2 CALCULATION OF BENEFIT OF BYPASS

Economic benefit of the three bypasses is estimated at 244 million pesos in 2005 (a half of the amount is accounted in the cash flow because the opening of the bypasses is scheduled in the mid-2005) and thereafter it will increase rapidly, reaching 5.3 billion pesos in 2020. Approximately, 20 to 25% of the benefit is savings of vehicle operating cost (VOC) and the rest is savings in passengers' travel time cost (TTC) (Table 14.3-1).

TABLE 14.3-1 ECONOMIC BENEFIT BY SOURCE

year	(million pesos p.a.)		Total Benefit
	VOC	TTC	
2005	65	179	244
2010	417	1,266	1,683
2020	1,030	4,277	5,307

14.4 EVALUATION RESULT

14.4.1 Impact on Traffic

(1) Traffic volume of Bypass

As the traffic assignment results, traffic volume of each bypass is forecast as shown in TABLE 14.4-1. The bypasses consist of several road links and each link has different volume. Average volumes were calculated as an average weighted by link length. They are less than the capacity of two-lane road up to year 2010. On the bypasses of Plaridel and Cabanatuan, traffic volume will increase over the capacity of two-lane road in the early 2010s.

TABLE 14.4-1 FORCASTED TRAFFIC VOLUME OF BYPASS

(pcu/day)

year	Case		Plaridel	Cabanatuan	San Jose
2005	2 lane bypass w/o Expressway	Max	31,771	32,022	17,534
		Min	12,584	10,504	14,784
		AV.	19,555	22,606	16,157
2010	2 lane bypass w/o Expressway	Max	34,936	34,016	22,282
		Min	15,958	11,097	18,811
		AV.	22,587	24,120	20,558
2010	4 lane bypass w/ Expressway	Max	35,712	35,344	17,753
		Min	10,715	10,396	13,709
		AV.	20,922	22,298	15,761
2020	4 lane bypass w/ Expressway	Max	68,567	53,288	25,452
		Min	19,877	25,126	19,376
		AV.	42,922	36,531	22,457

(2) Travel Speed

In 2005, average running speed of whole trips assigned on the road network will be 16.2 Km/hr at peak hour and 41.5 Km/hr in a day, which will be improved by the bypasses to 18.0 Km/hr and 44.7 Km/hr, respectively. Due to traffic increase, the speed in 2020 will fall down to 12.3 Km/hr at peak hour without the project.

TABLE 14.4-2 IMPROVEMENT OF AVERAGE SPEED

(km/hr)

Bypass	2005		2020	
	Peak	Average	Peak	Average
Without Project	16.2	41.5	12.3	40.3
Plaridel-Baliuag	17.3	42.7	13.1	42.1
Cabanatuan	17.4	43.4	13.8	42.7
San Jose	16.9	42.0	12.6	41.2
Entire Project	18.0	44.7	14.5	43.5

The bypass project will recover the average speed to 14.5 Km/hr. In case the bypass is implemented individually, Cabanatuan bypass will contribute to the travel speed recovery more than others. (Table 14.4-2)

14.4.2 Results of Economic Evaluation

Figure 14.4-1 and Table 14.4-4 show the cash flow of cost and benefit. Calculating evaluation indicators based on this cash flow, IRR of the project is estimated at 22%, NPV at 2.37 billion pesos and B/C ratio at 1.7, all of which show very high economic return. When evaluating each bypass individually by assuming that only one bypass is implemented and the other two are never Carried out, IRR of Plaridel-Baliuag bypass is 25%, Cabanatuan bypass 20% and San Jose bypass 29% (Table 14.4-3). All the component bypasses are highly feasible economically.

The bypass project and the preconditioned expressway project are in strongly competitive relation. The expressway is assumed to open in 2010. If it is never realized, the benefit of the bypass will increase enormously and IRR of the bypass project will be as extraordinarily high as 38%.

TABLE 14.4-3 SUMMARY OF EVALUATION RESULT

Project Component	IRR (%)	NPV (Mill. Peso)	B/C
Entire Project (w/Expwy)	22.0	2372.1	1.7
Entire Project (w/o Expwy)	37.6	18739.8	6.4
Plaridel-Baliuag Bypass	24.6	1479.4	1.9
Cabanatuan Bypass	20.2	962.8	1.6
San Jose Bypass	28.6	392.2	2.5

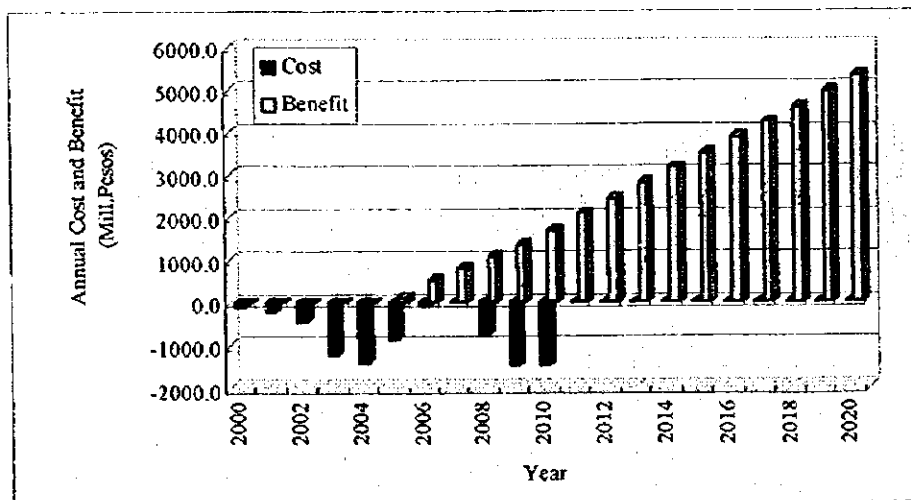


FIGURE 14.4-1 CASH FLOW OF COST AND BENEFIT OF BYPASS PROJECT

TABLE 14.4-4 CASH FLOW OF BYPASS PROJECT

(1) Base Case

(Mill.Peso)

Year	Cash Flow			Discounted CF at 15%		
	Cost	Benefit	Net CF	Cost	Benefit	Net CF
2000	97.3	0.0	-97.3	97.3	0.0	-97.3
2001	229.5	0.0	-229.5	199.5	0.0	-199.5
2002	445.7	0.0	-445.7	337.0	0.0	-337.0
2003	1217.2	0.0	-1217.2	800.3	0.0	-800.3
2004	1426.5	0.0	-1426.5	815.6	0.0	-815.6
2005	856.3	122.3	-734.0	425.7	60.8	-364.9
2006	58.0	523.4	465.4	25.1	226.3	201.2
2007	7.5	802.3	794.8	2.8	301.6	298.8
2008	747.3	1081.1	333.8	244.3	353.4	109.1
2009	1487.2	1359.9	-127.3	422.8	386.6	-36.2
2010	1487.2	1683.8	196.6	367.6	416.2	48.6
2011	14.9	2086.8	2071.9	3.2	448.5	445.3
2012	14.9	2444.6	2429.7	2.8	456.9	454.1
2013	14.9	2802.5	2787.6	2.4	455.5	453.1
2014	14.9	3160.4	3145.5	2.1	446.7	444.5
2015	14.9	3518.3	3503.4	1.8	432.4	430.5
2016	14.9	3876.2	3861.3	1.6	414.2	412.6
2017	14.9	4234.0	4219.1	1.4	393.4	392.1
2018	14.9	4591.9	4577.0	1.2	371.0	369.8
2019	14.9	4949.8	4934.9	1.0	347.8	346.8
2020	14.9	5307.7	5292.8	0.9	324.3	323.4
Residual	-4793.6	0.0	-4793.6	-292.9	-	-292.9
Total	3415.0	42545.0	39130.0	3463.6	5835.7	2372.1

(2) If Expressway is not developed ---

(Mill.Peso)

Year	Cash Flow			Discounted CF at 15%		
	Cost	Benefit	Net CF	Cost	Benefit	Net CF
2000	97.3	0	-97.3	97.3	0.0	-97.3
2001	229.5	0	-229.5	199.5	0.0	-199.5
2002	445.7	0	-445.7	337.0	0.0	-337.0
2003	1217.2	0	-1217.2	800.3	0.0	-800.3
2004	1426.5	0	-1426.5	815.6	0.0	-815.6
2005	856.3	122.3	-734.0	425.7	60.8	-364.9
2006	58.0	523.4	465.4	25.1	226.3	201.2
2007	7.5	802.3	794.8	2.8	301.6	298.8
2008	747.3	1081.1	333.8	244.3	353.4	109.1
2009	1487.2	1359.9	-127.3	422.8	386.6	-36.2
2010	1487.2	1871.5	384.3	367.6	462.6	95.0
2011	14.9	5253.9	5239.0	3.2	1129.3	1126.1
2012	14.9	8564.4	8549.5	2.8	1600.7	1598.0
2013	14.9	11874.9	11860.0	2.4	1930.0	1927.6
2014	14.9	15185.4	15170.5	2.1	2146.1	2144.0
2015	14.9	18495.8	18480.9	1.8	2273.0	2271.2
2016	14.9	21806.3	21791.4	1.6	2330.3	2328.7
2017	14.9	25116.8	25101.9	1.4	2334.0	2332.6
2018	14.9	28427.3	28412.4	1.2	2297.1	2295.9
2019	14.9	31737.8	31722.9	1.0	2201.0	2200.0
2020	14.9	35048.3	35033.4	0.9	2141.5	2140.5
Residual	-4793.6	0.0	-4793.6	-292.9	-	-292.9
Total	3415.0	207271.4	203856.4	3463.6	22203.4	18739.8

(3) Paridat - Bafug

(Mill.Peso)

Year	Cash Flow			Discounted CF at 15%		
	Cost	Benefit	Net CF	Cost	Benefit	Net CF
2000	42.8	0.0	-42.8	42.8	0.0	-42.8
2001	118.9	0.0	-118.9	103.4	0.0	-103.4
2002	228.4	0.0	-228.4	172.7	0.0	-172.7
2003	535.5	0.0	-535.5	352.1	0.0	-352.1
2004	812.5	0.0	-812.5	350.2	0.0	-350.2
2005	459.4	51.9	-407.5	228.4	25.8	-202.6
2006	23.8	268.5	264.7	19.3	124.7	114.4
2007	3.1	473.2	470.1	1.1	177.9	176.7
2008	307.4	657.9	350.5	190.5	215.1	114.6
2009	611.7	842.5	230.8	173.9	239.5	65.6
2010	611.7	1147.4	535.7	151.2	283.6	132.4
2011	6.1	1347.2	1341.1	1.3	289.6	288.3
2012	6.1	1427.0	1420.9	1.1	266.7	265.6
2013	6.1	1506.8	1500.7	1.0	244.9	243.9
2014	6.1	1586.6	1580.5	0.9	224.2	223.4
2015	6.1	1666.3	1660.2	0.7	204.8	204.0
2016	6.1	1746.1	1740.0	0.7	186.5	185.9
2017	6.1	1825.8	1819.7	0.6	169.7	169.1
2018	6.1	1905.6	1899.5	0.5	154.0	153.5
2019	6.1	1985.4	1979.3	0.4	139.5	139.1
2020	6.1	2065.1	2059.0	0.4	126.2	125.8
Residual	-1650.5	0.0	-1650.5	-100.8	-	-100.8
Total	1985.8	20523.3	18557.7	1593.3	3072.7	1479.4

(4) Cabanatuan

(Mill.Peso)

Year	Cash Flow			Discounted CF at 15%		
	Cost	Benefit	Net CF	Cost	Benefit	Net CF
2000	51.9	0.0	-51.9	51.9	0.0	-51.9
2001	99.0	0.0	-99.0	86.0	0.0	-86.0
2002	189.2	0.0	-189.2	143.1	0.0	-143.1
2003	555.7	0.0	-555.7	365.4	0.0	-365.4
2004	555.7	0.0	-555.7	317.7	0.0	-317.7
2005	396.9	29.9	-367.0	197.3	14.9	-182.5
2006	32.6	164.5	131.9	14.1	71.1	57.0
2007	4.4	263.1	258.7	1.7	98.9	97.3
2008	439.9	361.9	-78.1	143.8	118.3	-25.5
2009	875.5	460.6	-414.9	248.9	130.9	-117.9
2010	875.5	595.2	-280.3	218.4	147.1	-69.3
2011	8.8	518.5	509.6	1.9	111.4	109.5
2012	8.8	863.4	854.6	1.6	161.4	159.7
2013	8.8	1208.4	1199.6	1.4	196.4	195.0
2014	8.8	1553.3	1544.5	1.2	213.5	213.3
2015	8.8	1898.3	1889.5	1.1	233.3	232.2
2016	8.8	2243.1	2234.3	0.9	249.7	248.8
2017	8.8	2588.1	2579.3	0.8	240.5	239.7
2018	8.8	2933.0	2924.2	0.7	237.0	236.3
2019	8.8	3278.1	3269.2	0.6	230.3	229.7
2020	8.8	3623.0	3614.2	0.5	221.4	220.8
Residual	-1436.0	0.0	-1436.0	-87.7	-	-87.7
Total	2728.3	22582.4	19854.0	1709.4	2672.2	962.8

(5) San Jose

(Mill.Peso)

Year	Cash Flow			Discounted CF at 15%		
	Cost	Benefit	Net CF	Cost	Benefit	Net CF
2000	2.7	0.0	-2.7	2.7	0.0	-2.7
2001	11.6	0.0	-11.6	10.1	0.0	-10.1
2002	28.0	0.0	-28.0	21.2	0.0	-21.2
2003	126.0	0.0	-126.0	82.9	0.0	-82.9
2004	258.3	0.0	-258.3	147.7	0.0	-147.7
2005	1.5	13.7	12.2	0.7	6.8	6.0
2006	1.5	14.0	12.5	0.7	32.0	31.3
2007	1.5	120.7	119.1	0.6	45.4	44.8
2008	1.5	167.4	165.8	0.5	54.7	54.2
2009	1.5	214.0	212.5	0.4	60.8	60.4
2010	1.5	251.1	249.6	0.4	62.1	61.7
2011	1.5	258.2	256.6	0.3	55.5	55.2
2012	1.5	274.8	273.2	0.3	51.4	51.1
2013	1.5	291.4	289.9	0.3	47.4	47.1
2014	1.5	308.1	306.5	0.2	43.5	43.3
2015	1.5	324.7	323.2	0.2	39.9	39.7
2016	1.5	341.3	339.8	0.2	36.5	36.3
2017	1.5	358.0	356.4	0.1	33.3	33.1
2018	1.5	374.6	373.1	0.1	30.3	30.1
2019	1.5	391.2	389.7	0.1	27.5	27.4
2020	1.5	407.9	406.3	0.1	24.9	24.8
Residual	-185.4	0.0	-185.4	-10.1	-	-10.1
Total	285.9	4170.7	3884.8	259.6	851.8	392.2

14.4.3 TOLL RATE AND IRR

The expressway parallel to the bypass affects much economic feasibility of the bypass more than traffic volume of the bypass, because of its high speed service. Due to its toll resistance, traffic volume of the expressway is less than that of the bypass. However, the reduction effect of total travel time is much larger than that of the bypass.

In this Study, toll rate is assumed at 0.7 peso/Km per 1 pcu. By changing this rate, demand for the expressway and then demand for the bypass will be varied. Thus, economic feasibility of the bypass is affected by the toll rate.

Figure 14.4-2 shows the relation between the toll rate and IRR of the bypass. If the expressway is free of charge, demand for the bypass is lowest and IRR is also lowest at 16.2%. As the toll rate rises, demand for the expressway decreases and IRR rises. If the toll is infinite, no one will use it and IRR will reach 37.6% in the previous table. Although IRR is affected by the toll rate, it should be noted that even if the expressway were free of charge, the bypass project would be still economically feasible.

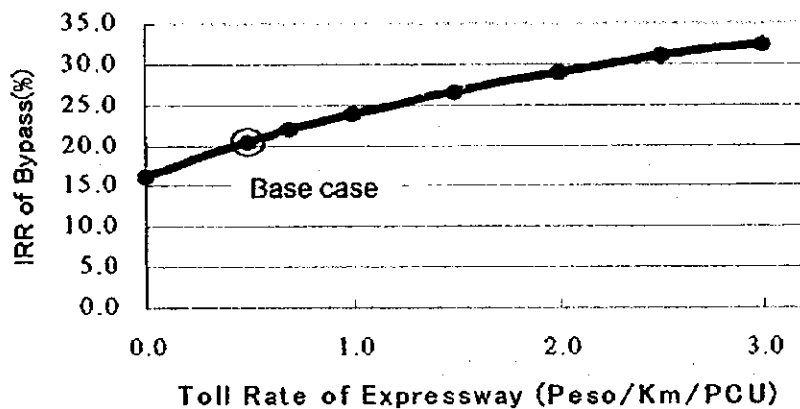


FIGURE 14.4-2 TOLL RATE OF EXPRESSWAY AND IRR OF BYPASS

14.5 NEW BYPASS FUND

There are many cities in the Philippines demanding urban bypass construction while the budget for highway development has been limited. Some new system will be needed to raise the fund for bypass development. In this connection, the following funding measures are worth while to study their applicability based on the "Beneficiaries Pay" principle which is one of the basic policies of the current Philippine Government.

(1) Toll Bypass

It is suggested to charge a toll to pass the bypass for a certain period and the toll revenue is used for amortization as well as for maintenance of the road. If users are charged, for example, 5 pesos/ pcu for the first fifteen years, the accumulation of toll revenue would be 1.6 billion pesos for Plaridel-Baliuag bypass, 1.4 billion pesos for Cabanatuan bypass and 0.7 billion pesos for San Jose bypass.

(2) Development Tax along Bypass

Bypasses will give a boost to urban development alongside the bypasses. It is suggested to impose a development tax to absorb a part of the development benefit and to cover a part of construction cost of a bypass. If imposing a special tax of 100 pesos per square meter to urban development within the area of 500m each side of the bypass, the maximum tax revenue of 2.0 billion pesos is expected to Plaridel-Baliuag bypass, 2.8 billion pesos to Cabanatuan bypass and 0.5 billion pesos to San Jose bypass.

CHAPTER 15

ENVIRONMENTAL IMPACT ASSESSMENT AND RESETTLEMENT PLAN FOR AFFECTED PEOPLE

CHAPTER 15

ENVIRONMENTAL IMPACT ASSESSMENT AND RESETTLEMENT PLAN FOR AFFECTED PEOPLE

15.1 ENVIRONMENTAL IMPACT ASSESSMENT

15.1.1 Basis for Assessment of Environmental Impacts

1) Activities undertaken

The proposed bypasses are newly built by acquiring lands, therefore, the Project falls under the "Environmentally Critical Projects (ECP)". At the stage of the feasibility study of ECP, important aspects are as follows:

- to ensure that environmental considerations are incorporated at this stage of project development;
- to ensure that the project conforms with existing and duly approved land use plan of the area; and
- to enhance maximum public participation to validate the social acceptability of the project;

Environmental considerations have been incorporated in the Study as early as the route selection stage. The selection of the best alternative alignment in terms of environmental soundness was based on the following control points:

(i) Natural Environment

- If the physical environment can still assimilate air and noise pollutants;
- With the least abundance of wildlife or wildlife habitats that may be affected

(ii) Socio-Economic Environment

- With no shrines or monuments that are classified as natural patrimony and thus cannot be removed;
- With the least number of communities that will be displaced; and
- With lesser agricultural productivity

To examine if the proposed bypasses conform with existing and duly approved land use plan of the area, the following documents were obtained, studied, and incorporated in the study process:

- (i) Central Luzon Regional Physical Framework Plan (1993-2023);
- (ii) Provincial Physical Framework Plan of Bulacan (1998-2007);
- (iii) Provincial Physical Framework Plan of Nueva Ecija (1993-2002);
- (iv) Various existing and proposed Land Use Plans of Municipalities/Cities to be traversed by the proposed bypass sections

Although maximum public participation is not possible and necessary at this stage, the following steps were already taken to touch base with the concerned stakeholders. First, project presentation and consultation meetings were held both at the provincial and city/municipal levels.

Second, a roadside environmental survey was conducted in January 1999. This was done primarily to obtain a general idea regarding the need and acceptability of the proposed bypass sections. The interviewees consist of (i) drivers of public and private vehicles plying the section of the Pan-Philippine Highway under study, (ii) public transportation commuters, (iii) gasoline station owners, and (iv) rice mill owners. The overall result show that:

- (i) A high 87.6% are in favor of a bypass as a solution to traffic congestion;;
- (ii) A high 92.4% are in favor of limiting the use of the bypass sections to fast moving vehicles.

It was also cited that the bypass can help reduce the high rate of road accidents. It is interesting to note that among tricycle drivers, 94.7% are in favor of this option, pointing out that this will be beneficial to them because they don't have to worry about being side swept or hit by big trucks and buses.

Third, the Study Team conducted a second series of consultation meetings with the concerned LGU Officials to present to them the selected bypass routes. The Team also asked their opinion if there are areas that need to be avoided.

Fourth, the Team ensured that during the Workshop Sessions held, the participants representing the various cities and municipalities were given the chance to express their concerns, views, and opinion about the proposed bypass sections.

2) Data Gathering

Since most of the areas to be traversed by the proposed bypass sections are mostly agricultural, with some build-up areas, the data gathering activity was focused on the following aspects:

- (i) the land's level of productivity, i.e., whether the rice lands are irrigated or non-irrigated;
- (ii) the approximate number of structures (houses, piggery, poultry, fishponds) that will likely be displaced during construction; and
- (iii) the present land valuation in each municipality

Data gathered are of two types, namely, (i) primary, and (ii) secondary. Primary data gathering refers to actual field inspections done at every intersection of the proposed bypass sections with any of the following:

- NIA irrigation canal maintenance road;
- Barangay road
- Municipal/city road
- Provincial road
- National highway

Each intersection is designated as a station. For every station, the type of land use, type of road, and the type and number of structures to be affected are noted. When in doubt, the Team ask information from members of the community. Some informal interviews with owners of rice lands, farmers, and tenants were also conducted to obtain a general idea of the project's level of acceptability.

Secondary data refer to land valuation schedules obtained from the concerned Municipal/City Assessors' Offices.

3) Identification of Environmental Preservation Targets

During the course of the field work, it was noted that there are several areas that need to be protected and preserved. There are three main types of preservation areas identified as follows:

- Prime agricultural lands
- Historical structure(s), and
- Religious institutions

Prime Agricultural Lands

In the present study, prime agricultural lands refer to rice lands that are served by a network of irrigation canals built by the National Irrigation Authority (NIA). According to the farmers, land owners, and municipal officials interviewed, these lands are capable of multi-cropping patterns (up to three (3) harvest periods).

Irrigated, prime agricultural land were observed at the following stations:

TABLE 15.1-1 PRIME AGRICULTURAL LANDS THAT WILL BE TRAVERSED BY THE PROPOSED BYPASS

BYPASS/MUNICIPALITY	BARANGAY(S)	FROM	TO
PLARIDEL-BALIUAG BYPASS			
Plaridel	Bulhan	Sta. 6+100	7+280
Bustos	Camachilihan, Liciada, Ma'amig	Sta. 7+300	13+800
CABANATUAN BYPASS			
San Leonardo	Tambo	Sta. 0+000	0+700
Sta. Rosa	Soledad	Sta. 0+700	4+600
	Tagpos	Sta. 6+600	8+000
Cabanatuan City	Sta. Arcadia	Sta. 8+000	11+700
	Buliran, Pula	Sta. 18+700	22+900
Talavera	Homestead I, Paludpod, Gulod	Sta. 22+900	29+000
SAN JOSE BYPASS			
San Jose City	Malasin, Kita-Kita	Sta. 3+440	7+300

Prime agricultural lands need to be protected from human encroachment to ensure that its productivity is maintained. To achieve this, the following measures can be taken:

- Minimize/avoid putting intersections, but construct underpasses that can accommodate only farming tractors and small pick-ups for transporting agricultural products.
- Municipal/city resolutions/ordinances to prohibits conversion of these prime agricultural lands to other purposes which must be strictly implemented by the respective LGUs;

Historical Sites

During the course of the field investigation, there was only one historical site identified, located in Brgy. Bonga Menor, Bustos, Bulacan along Plaridel – Baliuag Bypass.

The structure is a very old stone house which is the first of its kind in the Philippines. The proposed alignment was so selected that the house is not affected.

Religious Institutions

Another important structure to be avoided are places of worship, such as churches and chapels. There are two (2) religious institutions, both of which are *Iglesia Ni Cristo* Churches along the proposed Plaridel-Baliuag Bypass. One of these is located at Brgy. Bonga Menor, Bustos, and the other at Brgy. Tambubong, San Rafael, both in Bulacan Province. The proposed alignment was so selected that these are not affected.

15.1.2 Identified Impacts and Mitigating Measures

A summary matrix on the identified impacts and mitigating measures is presented in Table 15.1-2.

TABLE 15.1-2 SUMMARY MATRIX OF IMPACTS AND MITIGATION AND ENHANCEMENT (1/3)

IMPACTS	TYPE		MITIGATION/ENHANCEMENT MEASURES
	Negative	Positive	
CONSTRUCTION PHASE			
Physical			
Air Quality & Noise Levels			
Increase in levels of Total Suspended Particulates (TSP) such as dust, dirt, and oil soot	Low		Use of water trucks equipped with horizontal spray jets located on the aft end, and perpendicular to the direction of travel.
Increase in exhaust gas emission levels due to the operation of various heavy equipment and vehicles.	Low		Regular maintenance of heavy equipment and other smoke emitting machinery must be strictly complied with.
Increase in noise levels and vibration due to the operation of heavy equipment and vehicles.	Low		Use of mufflers and appropriate noise suppressors for heavy equipment and machinery; Scheduling of high noise generating activities during the daytime.
Water Quality			
Increase in the amount of suspended solids of receiving natural water ways due to the deposition of high volumes of exposed, loose sediments transported by surface run-off.	Low		Since wetlands have the natural ability to filter and purify water, some areas, particularly those which have low agricultural productivity can be used as natural treatment facilities
Increase in turbidity of rivers and creeks due to bored piling at river bed.	Low		Increase in turbidity of rivers and creeks due to bored piling at river bed is unavoidable but short term; these areas are expected to revert back to its normal condition after some time.
Possible contamination of surface and ground water due to borrow pits and quarries, and other excavation activities.	Low		Contamination of surface and ground water due to borrow pits and quarries, and other excavation activities may be minimized by carefully studying the subsurface profiles before any disturbance is started.
Increase in the bacteriological content of local surface water bodies due to domestic wastewater generated by construction personnel; this may eventually transmit diseases.	Low		Sanitation facilities should be provided by the Contractor to ensure that local water bodies are not polluted.
Washing of construction vehicles and other mobile equipment such as cement mixers, chutes, and related equipment will pollute the surface waters.	Low		Washing of construction vehicles and other mobile equipment along waterways should be prohibited.
Improper storage and handling of chemicals such as lubricants, fuel, paint, and other solutions for routine vehicular operation may contaminate local surface and ground water.	Low		Chemicals such as lubricants, fuel, paint, and other solutions for routine vehicular operation must be handled with care and properly stored.
Land Productivity			
Clogging of irrigation canals that can reduce or even obstruct water flow towards rice lands.	Low		Clogging of irrigation canals can be minimized by providing temporary culverts and locating temporary stockpiles far from irrigation canals.
Loss of fertile top soil which contain moisture-retaining organic humus; the newly exposed soil will have a considerably lower potential for supporting vegetative growth.	Low		Fertile top soil may be transferred to other areas as much as possible

TABLE 15.1-2 SUMMARY MATRIX OF IMPACTS AND MITIGATION AND ENHANCEMENT (2/3)

IMPACTS	TYPE		MITIGATION/ENHANCEMENT MEASURES
	Negative	Positive	
Biological			
Loss of cultivated vegetation--rice, corn, vegetables, and other crops.	Low		Loss of cultivated vegetation--rice, corn, vegetables, and other crops is inevitable and irreversible
As a result of an increase in noise levels and vibration, natural wildlife activities such as mating, nesting, and migratory patterns, particularly of birds will be disrupted/disturbed.	Low		Disruption/disturbance to natural wildlife activities such as mating, nesting, and migratory patterns is inevitable but reversible
As a result of increased turbidity of surface waters, the sediments will block light penetration into the rivers and creeks, and inhibit both natural and algal photosynthesis and visibility of aquatic fauna required for location of food.	Low		Increased turbidity of surface waters is a short term and reversible type of adverse impact
Socio-economic			
Displacement of Communities: Legal Occupants PLARIDEL-BALIUAG BYPASS Guiguinto: 11 Plaridel: 2 Bustos: 32 San Rafael: 25 No. of Houses: 70 No. of Families: 107	Moderate		Government must ensure that legal occupants are properly compensated for loss of land and improvements.
CABANATUAN BYPASS Cabanatuan City No. of Houses: 43 No. of families: 60	Low		
SAN JOSE BYPASS San Jose City No. of Houses: 6 No. of Families: 14	Low		
Displacement of Communities: Informal Settlers			
Plaridel - Baliuag Bypass Bustos : 4 No. of Families: 8	Low		Government through the help of the LGUs must provide a sustainable resettlement area with all the basic social services such as water supply, electricity, health facilities, and means of transportation and communication.
Cabanatuan Bypass None	None		Government must implement a sound Social Development Program (SDP) that will ensure that affected informal settlers get compensated for the disturbance to their normal lives.
San Jose Bypass None	None		The SDP should also include a plan that will encourage the active participation of women and other vulnerable groups (physically challenged, indigenous cultural communities, etc.).
Loss of/damage to means of livelihood; most of the farmers rely on rice production as their only means of livelihood; damage to, or loss of these agricultural land would surely hamper their capacity to support their family.	Moderate		Government must relocate tenant-farmers at a resettlement site where he can have access to agricultural land.

TABLE 15.1-2 SUMMARY MATRIX OF IMPACTS AND MITIGATION AND ENHANCEMENT (3/3)

IMPACTS	TYPE		MITIGATION/ENHANCEMENT MEASURES
	Negative	Positive	
			Another way to improve their living condition is for the Government to provide alternative means of livelihood to the displaced tenant-farmers. This may include among others, livelihood seminars on food processing, handicraft-making, and other agro-based livelihood programs. The Government can also consider providing them with seed capital for starting small business. This capital must not be for free, but through low interest loans.
Loss of/damage to irrigation systems; since the bypass sections will unavoidably cross several irrigation canals, temporary disruption of agricultural activities in areas serviced by these irrigation systems is expected.	Low		Loss of/damage to irrigation systems must be minimized if it cannot be avoided.
Limited accessibility to farm lands; during the construction phase, farmers may experience temporary difficulty in terms of accessibility to the land they are cultivating.	Low		Contractors must provide a safe, alternative route to farmers who need to cross the land they are cultivating (during and after construction phase).
Generation of temporary employment opportunities		Moderate	Contractors must give priority to available local labor.
OPERATIONAL PHASE			
Illegal conversion of prime agricultural land to other land use types.	High		Illegal conversion of prime agricultural land to other land use types must be strictly prohibited by the concerned LGUs.
Reduction of levels of vehicular gaseous emissions and noise level along the existing Pan-Philippine Highway as a result of the diversion of through traffic vehicles to the new bypass routes.		Moderate	To further improve air quality and noise level along the existing Pan-Philippine Highway, LGUs with relatively high local traffic volume (i.e., Plaridel, San Rafael, Gapan, Sta. Rosa, Cabanatuan City, San Jose City) must strictly implement better traffic management systems.
Socio-economic			
Improved accessibility to basic social services such as schools, hospitals, markets, churches, and communication facilities.		High	DPWH must regularly maintain the bypass sections; DPWH must improve/construct access roads to the bypass sections so that more people can have better access to basic social services.
Reduction of transport costs due to improved traffic flow.		High	DPWH must regularly maintain the bypass section and the existing Pan-Philippine Highway.
Better flow of agricultural and agro-industrial commodities from the farm lands to the buying stations.		High	DPWH must regularly maintain the bypass sections to ensure continuous, undisrupted flow of agricultural products.
Urbanization and commercial development of non-agricultural, and non-prime agricultural areas.		Moderate	Concerned LGUs must work hard towards achieving the development plans.
Increase in land values of areas traversed by, and in the vicinity of the bypass sections.		High	Land owners will benefit from a significant increase of land values in areas traversed by, or near the bypass sections.
Increase in employment opportunities as a result of commercial development.		Moderate	Government must ensure that qualified members of the host community are given priority in the hiring of local labor force.

15.1.3 Social Acceptability

In accordance with DAO 96-37, the criteria for evaluating the social acceptability of a project includes:

- (i) It should be consistent with plans/programs and policies of the national, regional, and local authorities;
- (ii) There should be an effective implementation of the public participation process
- (iii) It should be able to contribute to the government's effort in promoting social equity such that the social benefits outweigh the social cost;
- (iv) It should address all of the relevant and valid issues and match them with corresponding mitigating and enhancement measures;
- (v) It should involve women and vulnerable groups (physically handicapped, youth, etc.); and
- (vi) It should incorporate policies on effective environmental monitoring and evaluation.

To a certain extent, all these criteria have been considered during the course of the present study. Table 15.1-3 shows the steps taken to ascertain social acceptability at the feasibility study level:

TABLE 15.1-3 STEPS TAKEN BY THE STUDY TEAM TO ASCERTAIN SOCIAL ACCEPTABILITY

Criteria for Evaluating Social Acceptability	Steps Taken
(i) Consistency with Land use Plans	<ul style="list-style-type: none"> • Provincial and municipal land use plans from the concerned government units were considered in the selection of the best alternative route for each bypass route
(ii) Public Participation	<ul style="list-style-type: none"> • The Governors of Bulacan and Nueva Ecija and the Mayors and officials (City/Mun. Engineers, Planning and Development Officers, Assessors, etc.) of concerned cities/municipalities were consulted before, during, and after the selection of the best bypass routes • More meaningful public participation process involving the host communities should be conducted during the preparation of the EIS for the bypass sections
(iii) Promotion of Social Equity	<ul style="list-style-type: none"> • Preferential hiring of local labor and provision of alternative means of livelihood are included in this report as mitigating and enhancement measures to address adverse socio-economic impacts;
(iv) Mitigating and Enhancement Measures	<ul style="list-style-type: none"> • Included in Table 15.1-2.
(vi) Involve Women & Vulnerable Groups	<ul style="list-style-type: none"> • Active participation of women and vulnerable groups are included in this report as mitigating and enhancement measures to address adverse socio-economic impacts;
(vii) Environmental Monitoring and Evaluation	<ul style="list-style-type: none"> • Included in this report in 15.1-4.

15.1.4 Environmental Management Plan

The following components of the Environmental Management Plan (EMP) can serve as a guide in preparing a more comprehensive EMP that will be included in the EIS document.

1) *Institutional Plan*

The institutional plan to be adopted is the same as for other national highways implemented by the DPWH. Maintenance of national roads and bridges is under the responsibility of DPWH through its Regional and District Offices.

2) *Information, Education, and Communication (IEC) Program*

IEC Programs shall be conducted in five (5) stages, namely (i) Pre-EIA Process; (ii) EIA Proper; (iii) Pre-Relocation Phase; (iv) Relocation Phase; and (v) Post-Relocation Phase.

Pre-EIA Process

This activity refers to the Social Preparation Process, wherein the DPWH, with assistance from the EIS Preparer conducts consultation meetings with the concerned LGUs. During a series of meetings, the proposed project is officially presented to the Municipal Officials, Barangay Officials, and finally to the communities to be affected.

It is also during these consultative meetings that the EIS Preparer explains to the stakeholders the EIA Process, the role of the DPWH as Proponent, the role of the DENR as the Environmental Manager, the role of the EIS Preparer, and their roles as Stakeholders.

Aside from the presentations, an Open Forum is also included to allow the stakeholders to air their queries, opinion, concerns, perceptions, and apprehensions with regards to the project being proposed. Concerned Regional and District Offices of DPWH must be prepared to answer queries from stakeholders even after the Social Preparation Activity.

EIA Proper

IEC during the EIA Proper refers to the participation of the DPWH in the Scoping Process. There are two levels of Scoping under the Philippine EIS System, namely the (i) 1st Level Scoping, and (ii) Formal Scoping Session.

The 1st Level Scoping session is conducted at the DENR-EMB Office, where the DPWH will officially present the proposed bypass project to the prospective EIA Review Committee (EIARC) members. The main objective of this session is for the Proponent, Preparer, and members of the EIARC to agree on the technical and substantive scope of the

EIA study. It is also during this session that an initial list of identified stakeholders is presented to the EIARC for validation.

The Formal Scoping Session is normally held at the proposed project sites. For the Plaridel-Baliuag Bypass, there may be a need for three (3) sessions, one for the Municipalities of Balagtas, Guiguinto, and Plaridel, one for the Municipality of Bustos, and another one for the Municipality of San Rafael. For the Cabanatuan Bypass, three (3) sessions are also necessary. One session will be for the stakeholders from San Leonardo and Sta. Rosa, one for Cabanatuan City, and one for Talavera. For the San Jose Bypass, one scoping session is necessary.

It is during the Formal Scoping Session that the results of the 1st Level Scoping is presented to the stakeholders for validation and comments. Issues and concerns of the stakeholders are also presented during this session. The main objective of this exercise is to come up with an agreement between the Proponent, Preparer, and Stakeholders regarding the scope of work of the EIS.

Pre-Relocation Phase

Community Relations Operation

Before the actual relocation, the DPWH and the LGUs through the barangay officials shall undertake the following:

- (i) Establish communication and rapport with recognized resident community leaders;
- (ii) Meet the affected families to explain the government's shelter program, the need to relocate families from danger areas, the procedures and guidelines on relocation and resettlement; and objectives and schedule of the census and tagging operation
- (iii) Introduce the project team and census enumerators to the Barangay Captain and community leaders
- (iv) After the census, the LGU and/or the DPWH authorized to demolish shall meet the qualified families for resettlement to discuss, among others, the facilities and services in the resettlement projects, and the obligations and responsibilities of the affected families
- (v) A written 30-day notice shall be issued to the affected persons or entities by the LGU or DPWH authorized to demolish together with the representative of the Presidential Commission on Urban Poor. It shall be served to and received by the addressee personally. Should the concern person refuse to acknowledge the notice, the same shall be affixed to the addressee dwelling.

- (vi) Before actual demolition, the LGU or DPWH authorized to demolish shall preside over the consultation meetings to be attended by the barangay chairman, the affected families, and the landowners or their duly designated representatives.

Relocation Phase

- (vii) The DPWH or LGU authorized to demolish shall issue notices of actual relocation to the affected families and shall furnish a copy of the rolling schedule, three (3) days before relocation to the recipient LGU or the NHA.

Post Relocation Phase

- (viii) Organized community-based structures shall be strengthened so as to facilitate the delivery of services in the area. The identified leaders with the assistance of the NGO shall be trained and equipped with proper organizational skills and attitudes necessary to effectively manage the affairs of the community.
- (ix) To promote the general well-being of resettled families, adequate social services in health, nutrition, education, responsible parenthood, environmental sanitation, etc. shall be provided on the resettlement sites jointly or under the auspices of cooperating agencies such as, but not limited to the DECS, DOH, DSWD, and NGOs.

3) *Environmental Monitoring Program*

An environmental monitoring program in all stages of project implementation has to be observed. This is to ensure an effective protection of the environment as the project progresses.

Monitoring Activities

The following activities must be monitored during the Construction Phase:

- (i) Implementation of approved plan/program on structural, drainage, waste disposal, soil protection, TSP control, noise pollution control, tree cutting, relocation of affected families, etc.
- (ii) Implementation of traffic management plan, particularly at intersection with existing major roads such as the:
- Plaridel-Baliuag Bypass:
Balagtas-Bulihan Road
Gen. Alejo Santos Road
 - Cabanatuan Bypass
Sta. Rosa-Fort Magsaysay Road

Valdefuente-Fortaleza Road
Cabanatuan-General Natividad Road
Cabanatuan-Papaya Road, and
Pinagpanaan-Pantabangan Road

- San Jose Bypass
A. Bonifacio Road

- (iii) Compliance to occupational health and safety regulations by the proponent or its contractor;
- (iv) Regular inspection of the sanitary conditions at worker camps to prevent the spread of diseases;

The following are the activities that will be monitored during Operational Phase:

- (i) Maintenance of the road, bridge which includes the pavement, drainage system, embankments, slope protection structures; this will be the responsibility of DPWH;
- (ii) Smoke belching vehicles and enforcement of the current air emission control program of the DENR to minimize pollution from mobile sources. This is particularly important as traffic volume is anticipated to increase within the region;
- (iii) Tree planting and its maintenance on both sides of the highway and on designated open areas;
- (iv) Minimum and maximum speed limits must be observed by motorists to ensure safety;
- (v) Preparation and submission of environmental monitoring report to concerned entities;
- (vi) Monitoring of traffic along completed highway.

15.2 RESETTLEMENT PLAN FOR AFFECTED PEOPLE

There are three types of settlers to be affected, namely *legal occupants* (land owners), *tenants* and *renters* on private land and informal settlers (squatters) on public land.

15.2.1 Legal Occupants (Land Owners)

There are several options for acquiring lands and properties from legal occupants as follows:

- Purchase
- Donation
- Exchange of land
- Easement

This Study assumes that lands and properties will be acquired by a purchase method, of which procedure is presented in Appendix 15.2-1.

In case for the legal occupants, the implementing office is not legally required to provide a resettlement site. However, it is recommended that if some of them wish to have a resettlement site, the implementing office should provide one for them in close coordination with the concerned LGU.

Number of houses and facilities and estimated number of families affected by the project are presented in Table 15.2-1 to 3.

TABLE 15.2-1 NUMBER OF HOUSES AND FACILITIES AFFECTED BY THE PROPOSED PLARIDEL-BALIUG BYPASS

City/Municipality	Station No.	Type of Improvement	Number	No. of Families
Balagtas	0+000 to 1+200	Piggery	1	-
Guiguinto	1+200 to 1+700	Concrete Houses	8	11
	1+700 to 5+860	Piggery	2	-
	1+700 to 5+860	Poultry	2	-
	1+700 to 5+860	Concrete Houses	3	5
Plaridel	5+860 to 6+100	Concrete Houses	2	2
Bustos	11+300 to 13+600	Semi-Concrete Houses	4	8
	13+880 to 14+300	Concrete Houses	28	42
San Rafael	15+700 to 16+000	Semi-Concrete Houses	4	6
	16+000 to 16+200	Concrete Houses	12	18
	16+200 to 17+200	Semi-Concrete Houses	3	5
	17+200 to 19+400	Semi-Concrete Houses	4	6
	17+200 to 19+400	Poultry	1	-
	20+400 to 20+600	Concrete Houses	2	4
		Houses	70	107
		Facilities	6	-
		Total	76	107

TABLE 15.2-2 NUMBER OF HOUSES AFFECTED BY THE PROPOSED CABANATUAN BYPASS

City	Station No.	Type of Improvement	Number	No. of Families
Cabanatuan City	9+000 to 9+200	Concrete Houses	2	2
	11+700 to 11+900	Concrete Houses	6	9
	13+000 to 13+300	Concrete Houses	9	14
	15+400 to 16+100	Concrete Houses	15	22
	17+600 to 18+600	Concrete Houses	5	5
	18+600 to 18+700	Concrete Houses	3	5
	19+600 to 20+800	Concrete Houses	3	3
	TOTAL:			43

TABLE 15.2-3 NUMBER OF HOUSES AFFECTED BY THE PROPOSED SAN JOSE BYPASS

City	Station No.	Type of Improvement	Number	No. of Families
San Jose City	2+250 to 2+400	Semi-Concrete Houses	2	6
	5+920 to 5+980	Concrete Houses	4	8
TOTAL:			6	14

Land acquisition cost and compensation cost were estimated based on the current prevailing market values provided by the concerned Tax Assessor's Offices and included in the project cost.

15.2.2 Tenants and Renters on Private Land

For house tenants, the house owner is legally responsible for their relocation. The implementing office shall not negotiate with house tenants.

For farm land tenants, a disturbance compensation fee which is equivalent to an average of harvest of last 3 years determined by the Department of Agrarian Reform shall be paid, which was included in the project cost estimate.

15.2.3 Informal Settlers (or Squatters) on Public Land

1) Policies on Relocation of Informal Settlers

There are two legal framework for the resettlement of informal settlers on public land as follows:

- Republic Act 7279 (Urban Development and Housing Act of 1992)
- DPWH's Policy Framework for Land Acquisition, Resettlement, and Rehabilitation

Urban Development and Housing Act of 1992 (RA 7279)

One of the main objectives of this act is to "Provide decent shelter to the underprivileged and homeless citizens in urban areas and resettlement areas whose lives are generally marked by economic insecurities and whose occupancy of land is uncertain". As such, several guidelines were enacted by various government agencies such as the Housing and Land Use Regulatory Board (HLRB), Housing and Urban Development Coordinating Council (HUDCC), National Housing Authority (NHA), Land Management Bureau (LMB) and the National Mapping and Resource Information Authority (NAMRIA).

One of such is the guideline which directed all city and municipal governments to conduct an inventory of lands and identify sites for socialized housing. Under the same Act, potential socialized housing program beneficiaries must first register with the Barangay Registration Committee (BRC) in their respective areas. It should be noted however, that not all informal settlers are entitled to be resettled in these areas. The following qualifications make applicants eligible to be included in the Master List of Underprivileged and Homeless Citizens:

- (i) Must be a Filipino citizen of legal age;
- (ii) The combined family income must fall within the NEDA-defined poverty threshold;
- (iii) Must not own any real property whether in the urban or rural areas and must not have been a beneficiary of any government housing program except those in leasehold or rental arrangements;
- (iv) Must not be a professional squatter nor a member of a squatting syndicate; and
- (v) Must be the head of the family

DPWH's Policy Framework for Land Acquisition, Resettlement, and Rehabilitation

This policy framework is not yet finalized at this point in time. In fact, the study is still on-going. Nevertheless, some of the salient points are included here for reference. These are:

- (i) All Project Affected Persons (PAPs) residing in, working, doing business, or cultivating land, or having rights over resources within the project area as of the date of the census surveys (Cut-off Date) are entitled to compensation for their lost assets, incomes, jobs and businesses at replacement cost;

- (ii) In cases when the remaining assets of a PAP are not viable for continued use, he will be entitled to full compensation for the entire affected assets;
- (iii) When payment is made for an agricultural land acquired by the DPWH, the landowner will be exempted from capital gains tax on the compensation paid to him; In addition, other expenses such as registration fee, transfer taxes, documentary stamp tax, and notional fees will be paid by DPWH for property transfers made through land acquisition;
- (iv) Replacement agricultural land, premise/business plot will be as close as possible to the land that was lost and/or acceptable to the PAPs;
- (v) All replacement land for agriculture, residential, and business will be provided with secured tenure status and without any additional cost, taxes, surcharge to the PAPs at the time of transfer;
- (vi) The previous level of community services and access to resources will be maintained or improved after the resettlement;
- (vii) The general mechanism for compensation of lost residential and commercial land will be through land-for-land or cash compensation at replacement cost.
- (viii) Tenants are entitled to assistance to transfer to a new location

2) Number of Houses to be Affected

Table 15.2-4 shows the number of houses of informal settlers to be affected by the proposed Plaridel-Baliuag, Cabanatuan, and San Jose Bypass sections. The classification as informal settlers were not based on actual information but on the type of structures observed. It was assumed that houses made of light materials and are located at agricultural areas are either tenants or informal settlers.

TABLE 15.2-4 NUMBER OF INFORMAL SETTLERS TO BE AFFECTED BY THE PROPOSED BYPASS SECTIONS

City/Municipality	Station No.	Type of Improvement	Number of Families
PLARIDEL-BALIUAG BYPASS			
Bustos	7+300 to 9+900	Light Materials House (1)	2
	9+900 to 11+300	Light Materials House (1)	2
	13+600 to 13+880	Light Materials House (1)	2
	14+300 to 15+200	Light Materials House (1)	2
	TOTAL:	4	8
CABANATUAN BYPASS			
None			
SAN JOSE BYPASS			
None			
TOTAL	Sub-Total 1:	Plaridel-Baliuag Bypas (4)	8
	Sub-Total 2:	Cabanatuan Bypass (0)	0
	Sub-Total 3:	San Jose Bypass (0)	0
	TOTAL	(4)	8

3) Possible Relocation Areas

Based on interviews with the Municipal Planning and Development Coordinators of the concerned cities and municipalities, all have not finalized their plan which shows sites for socialized housing. For Bulacan Province, it is expected that if there will be a need for relocation, the most probable site would be the Erap Village. This village was mentioned by Gov. Josie de la Cruz as the Resettlement area for informal settlers in Bulacan. It is located in Barrio Matictic, Norzagaray (refer to Figure 15.2-1).

MPDO of Cabanatuan City specified a proposed relocation site. The proposed housing project of Cabanatuan City is called the "*Bakod Bayan Housing Project*". It is located in Bakod Bayan, Cabanatuan City, with a total land area of approximately 180,000 m², and a target number of 630 beneficiaries. Out of the 630, 500 are earmarked for Cabanatuan City government employees, whereas 130 are allotted as "Other" (beneficiaries) (refer to Figure 15.2-1).

15.2.4 Social Development Program

DPWH must support the a Social Development Program (SDP) that will be designed to ensure that the affected communities get compensated for the disturbance to their normal lives, not only in terms of monetary settlement for the damages. It is just fair that they be assisted so that the processing of payment due them can be expedited. Aside from these, DPWH must also make sure that the relocation plan is sustainable; i.e., aside from the basic amenities at

the resettlement area, an alternative livelihood assistance program must be included.

Employment Opportunities and Livelihood Assistance

Qualified, *bonafide*, residents of the Direct Impact Areas must be given first priority in hiring during the pre-construction and construction stage of the project. If the proposed relocation site for affected families are close to their present location, that they can still continue with their existing source of livelihood. Nevertheless, welfare services must still be available to assist them in uplifting their standard of living.

In relocation sites far away from the community's main source of livelihood, the following technical training activities are recommended:

- Livelihood Seminars on Dressmaking, Food Processing, Handicraft Making, Stuff Toys Making, and Crop Production Enhancement;
- Productivity Skills Training
- Gender Awareness and Self Enhancement Skills Development;

The DPWH, the LGUs, the DSWD, the NGOs operating in the area, and other concerned private entities must join hands in the realization of these proposed training programs.

15.2.5 Disturbance Compensation

1) For Farmer-Land Owners of Agricultural Land

Farmers who are title holders are entitled to cash compensation for lost land at replacement cost. In cases where more than 25% of the land holding is needed, or if the remaining land becomes economically unviable, the owner is entitled to full compensation for the entire affected assets at replacement cost.

"Land-for-Land" compensation can also be arranged, depending on the preference of the landowner. For this option, the new parcel of land should have equivalent productivity, free of taxes, registration, and transfer cost. The location should also be acceptable to the affected landowner and must have long term security of tenure.

2) For Farmer-Tenants of Agricultural Land

Under the DPWH Policy Framework under study, Agricultural lessees and tenants are entitled to "*disturbance compensation*" equivalent to five (5) times the average of the gross harvests on his landholding during the last five (5) years preceding calendar years for the land being acquired from them.

3) For Residential and Commercial Land Owners

The title holder will be entitled to cash payment or land-for-land compensation. The new replacement land must be of equivalent size, or at least a size acceptable to the owner, with adequate physical and social infrastructure. As in agricultural lands, replacement land would be free from taxes, registration, and transfer costs.

Where the affected households at any given place exceed twenty (20), the DPWH in consultation with affected households, may offer relocation option to fully developed resettlement sites, or alternative facilities to housing projects. The replacement land for resettlement will be provided in fixed plot sizes in accordance with existing zoning laws and practices. If the lost land is larger than the lot sizes for relocation, the affected landowner is entitled to receive a cash compensation to cover the difference.

4) For Residential Land Tenants/Renters

Residential tenants or renters are entitled to cash compensation equivalent to three (3) months rental allowance, and assistance in transferring to a new location. For tenants who built their own house, they will be entitled to be compensated in full for their affected house or structure, paid the transport allowance, and assisted in finding another site. The level of assistance will depend on the type of existing tenorial status of the affected communities.

5) For Crops and Trees Lost

Owners of trees lost shall be entitled to cash compensation calculated on the basis of type, age, and productive value of affected trees.

6) For Informal Settlers (Squatters)

Settlers displaced from agricultural land would be entitled to "*financial assistance*" equivalent to one (1) year's gross harvest, and shall in no case be less than P15,000 per hectare.

7) Conditions/Requirements Prior To Removal or Demolition of Improvements

- (i) If the owner is willing to remove and transfer the building to another lot, then an Agreement to Demolish or Remove the Improvements should be executed at a consideration to be determined pursuant to P. D. 76 as amended.
- (ii) The Agreement to Demolish or Remove the Improvements should be signed by both parties and approved by an Official of the DPWH.

8) Payment of Improvements

The following documents must be submitted as part of the Claim:

- (i) A certified true copy of tax declaration;
- (ii) Certified true copy of sworn statement or a certification issued by the Assessor concerned attesting the failure of the owner to file such statement aside from the affidavit executed by the owner attesting the failure to file such sworn statement;
- (iii) Tax Clearance from the Municipal/City Treasurer (Real Estate Taxes);
- (iv) Picture of pictures of the improvements to be duly certified by the Project Engineer;
- (v) Inspection report duly signed by the Project Engineer and the Auditor's representative;
- (vi) In case the improvements were introduced by the claimant on the land of another, the latter must execute a Quit Claim or Waiver of Claim to Improvements;

Note: All Regional and District Engineering Offices must submit to the Assistant Secretary for Legal Affairs of the DPWH copies of Deeds of Sale and Agreements (for improvements), including other supporting papers. Likewise, the corresponding titles of said properties in the name of the government should be submitted and transmitted to the Records Management and Archives Office for safekeeping

PART VI
PROJECT IMPLEMENTATION

CHAPTER 16

MAINTENANCE AND MANAGEMENT STRATEGY

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MAINTENANCE AND MANAGEMENT STRATEGY

16.1 PRESENT MAINTENANCE SYSTEM

The main objectives of road maintenance are:

- To provide comfortable, safe, efficient and reliable facilities to road users.
- To prevent prematured deterioration and to prolong life of the road structure, thus protecting the road facilities from costly renovation or reconstruction.

1) Maintenance Organization

The present DPWH road maintenance organization is shown in Figure 16.1-1. Overall planning and technical guidance is provided by the Bureau of Maintenance (BOM) in the DPWH Central Office. Actual maintenance works are implemented by the District Engineering Offices (DEO) under the supervision of the Regional Office (RO).

2) Maintenance Budget

Maintenance budget is determined by the EMK System which is described as follows:

$$\text{Maintenance Budget} = \text{Basic Cost} \times \text{EMK}$$

Where: Basic Cost : cost to maintain one equivalent maintenance kilometer for one year.

EMK : equivalent maintenance kilometer to be determined by a physical length times EMK factors.

EMK Factors : EMK factors are established for type of pavement, width of roadway and traffic volume.

Maintenance budget allocation to DEOs is also determined by the EMK system.

Basic cost and total maintenance budget for the last 5 years are shown in Table 16.1-1.

TABLE 16.1-1 BASIC COST AND MAINTENANCE BUDGET

Year	Basic Cost (Current Price in ₱)	Maintenance Budget (Current Price in Million ₱)
1995	62,463	3,237.3
1996	63,351	3,399.2
1997	66,835	3,586.1
1998	70,511	3,696.0
1999	70,511	3,786.6

SOURCE: BOM, DPWH

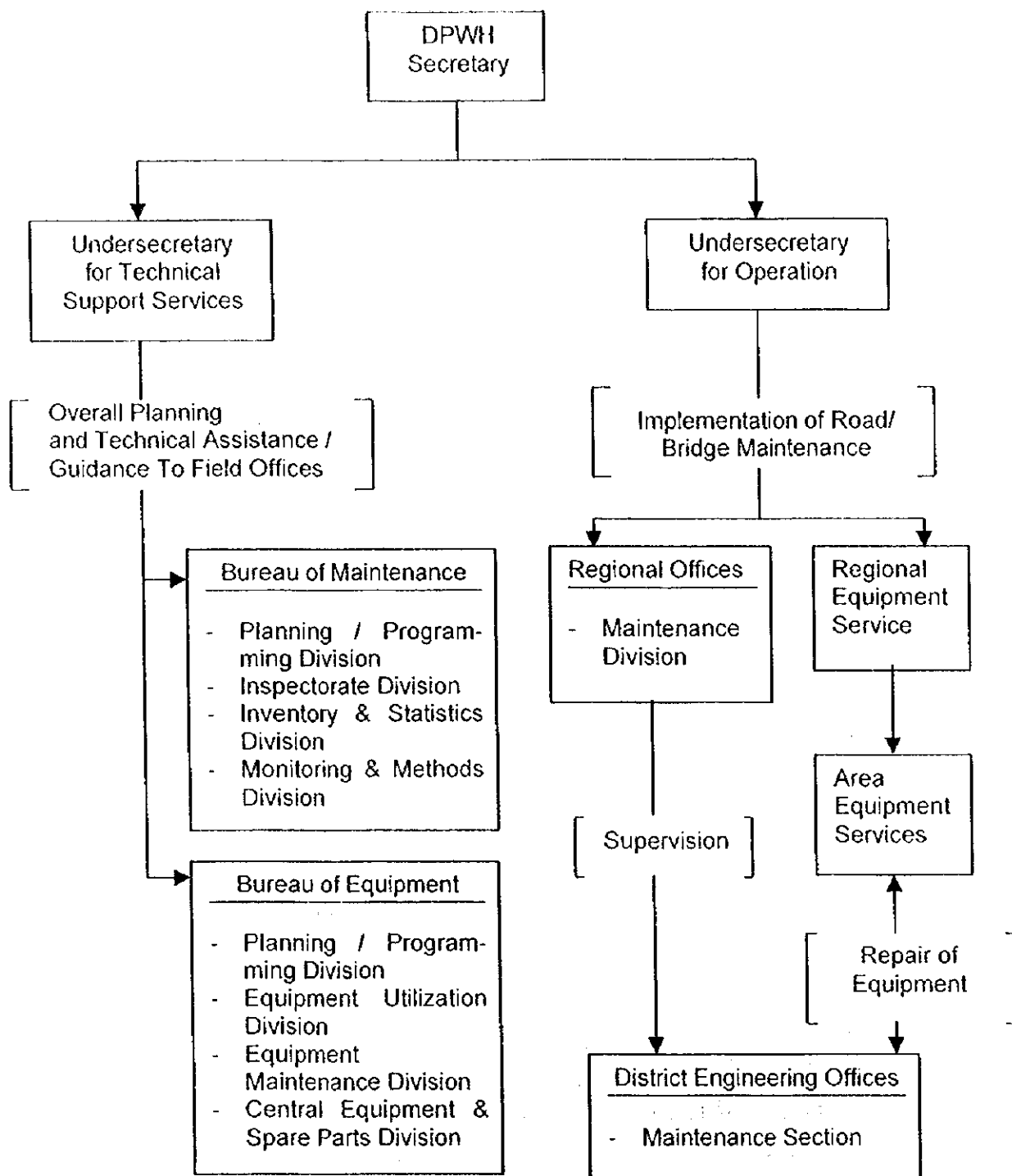


FIGURE 16.1-1 DPWH MAINTENANCE ORGANIZATION

3) Maintenance Planning and Programming

Two programs are prepared as follows:

- Annual Maintenance Work Program and Performance Budget (AMWPB) for Maintenance by Administration (MBA)
- Annual Work Program (AWP) for Maintenance by Contract (MBC)

The annual criteria / guidelines in the preparation of AMWP/PB and AWP are established by BOM, based on which each DEO prepares AMWP/PB and AWP. Quantity standards for maintenance activities which indicate average quantity to be used for the planning and programming for each maintenance activity are also given by BOM.

4) Implementation Mode of Maintenance Works

Maintenance works are implemented by the following two modes:

- Maintenance by Administration (MBA)
- Maintenance by Contract (MBC)

A maximum of 70% of maintenance budget is allowed to be undertaken by MBC in 1999.

5) Implementation of Maintenance Work

Road Inspection

An area engineer of DEO who is responsible for 70~100 kms of national roads inspects roads with a following frequency:

Standard Frequency of Inspection

Major Arterial Roads	:	Everyday
Other Roads	:	Twice a Week

During inspection, an area engineer oversees the maintenance activities being undertaken and also identify road deficiencies to be immediately treated.

MBA Implementation

Based on the inspection report of an area engineer and AMWP/PB, DEO prepares a 15-day schedule which is called "the Quincenal Schedule (QS)". Maintenance works under MBA are implemented in accordance with QS.

MBC Implementation

Once a contract is awarded to a Contractor, DEO prepares a tri-monthly or quarterly schedule based on AWP. A quarterly schedule contains the activities to be undertaken, corresponding quantities, the deadline for the completion of each activity, a resource schedule, daily accomplishment, crew days, crew size, man-days required and a list of equipment with the required number of days to be used.

16.2 RECOMMENDATIONS ON MAINTENANCE OF A BYPASS AFTER ITS COMPLETION

This section discusses recommendations on maintenance of a bypass after its completion. The type of carriageway pavement is assumed to be PCC.

1) Road Inspection

One of the most important aspects of road maintenance is to identify deficiencies / defects / damages at their earliest stage and to undertake repair works as soon as they are found. Progress of deficiencies / defects / damages should be prevented. A road inspection is very important to realize above objectives.

A careful and in depth inspection should be carried out at least once a month. Identified deficiencies / defects / damages, etc., should be recorded on a straight road diagram or other field inspection sheet designed for the purpose.

Identified deficiencies should be prioritized and reflected to the Quincenal Schedule (MBC) and / or the Quarterly Schedule (MBC) for timely treatment.

Another important timing of road inspections is as follows:

- Before, during and after rainy season
- Before, during and after heavy rainfall and/or a typhoon

If some major damages / defects which would affect safety of road users are found, appropriate warning signs should be immediately installed.

2) Maintenance Activity List and Frequency

Table 16.2-1 shows a maintenance activity list for a road with PCC pavement carriageway, frequency of each activity and demarcation of each activity into MBA or MBC.

TABLE 16.2-1 MAINTENANCE ACTIVITY LIST AND FREQUENCY

Element	Type	Maintenance Activity	Frequency	Demarcation	Note
Carriageway	PCC	Crack and Joint Sealing	As soon as identified	MBA	
		Patching	When crack sealing is no longer effective.	MBC	
		Replacement of Concrete	When wide cracks are found	MBC	
		Resurfacing with AC (overlay)	When PSI or RRI becomes 2.5	MBC	Timely implementation of this activity is important
Shoulder	PCC	"Same as Carriageway PCC pavement"			
	Gravel	Patching	As soon as a depressed portion identified	MBA	
		Grading	At least 3 times a year	MBC	Before, during and after a rainy season.
		Regravelling	Once in 5 years		
Drainage	Side Ditches (all types)	Ditch Cleaning (regular)	3 times a year	MBC	Before, during and after a rainy season.
		Ditch cleaning (as needed)	every after heavy rain / typhoon	MBA	
	RCPC / RCBC	Culvert cleaning (regular)	3 times a year	MBC	Before, during and after a rainy season.
		Ditch cleaning (as needed)	every after heavy rain / typhoon	MBA	
		Digging inlet / outlet sides canal within ROW (regular)	2 times a year	MBC	Before and after rainy season.
		Digging inlet / outlet sides canal within ROW (as needed)	every after heavy rain / typhoon	MBA	
	Digging inlet / outlet sides canal outside ROW	as required	MBC	Condition of siltation should be always inspected.	
Traffic	Pavement Markers	Centerline and lane line repainting	2 times a year	MBC	Before and after rainy season
		Repainting channelization curbs and other markings at intersection	2 times a year	MBC	Before and after rainy season.
	Traffic Signs, Warning Signs, Guide Signs	Cleaning Signs	As needed	MBA	
		Repainting / Replacement of signs	As needed	MBC	
	Traffic Signal Light	Maintenance of traffic signal light	As needed	MBC	
Guardrail	Repainting / replacement of guardrail	As needed	MBC		
Roadside Features		Vegetation control	4 times a year	MBC	
		Erosion repair and control on roadside	As needed	MBA	
		Maintenance of trees, plants, flowers, etc in environmental zone	4 times a year	MBC	
		Road cleaning	As needed	MBC / MBA	
		Sodding slopes	As needed	MBC / MBA	

3) Maintenance Cost

Maintenance costs of three bypasses were estimated in Chapter 13, and summarized hereunder.

Bypass	Unit: Thousand P/Km/Year			EMK Allocation
	Estimated Maintenance Cost			
	Pavement Condition			
	Good	Fair	Bad	
Plaridel-Baliuag Bypass (4-lane, Phase-2)				
Cabanatuan Bypass (4-lane, Phase-2)				
With Frontage Road	160	235	382	166.2
Without Frontage Road	56	104	197	129.7
San Jose Bypass (2-lane)	97	131	197	93.3

As shown above, allocated maintenance budget based on the EMK system will be sufficient, if pavement condition is good. However, with the deterioration of pavement, allocated maintenance budget will not be sufficient. Expenditure of allocated maintenance budget should be strategically planned within the District Engineering Office to cope with pavement deterioration.

CHAPTER 17

PROJECT IMPLEMENTATION

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PROJECT IMPLEMENTATION

17.1 MAXIMUM AMOUNT OF ANNUAL FUND ALLOCATION

The Project requires relatively high amount of investment due to long bridges needed along the bypasses. In order to establish a realistic implementation schedule, the key factor is to estimate maximum amount which DPWH can allocate for the Project annually.

Maximum amount of annual fund allocation for a project was estimated based on the 1999 actual allocation and estimated future budget for the highway sector.

1999 budget for the highway sector (capital investment) was as follows:

• For locally funded projects	11,593.3 Million Pesos
• For foreign-assisted projects	12,626.3 Million Pesos
Total	24,219.6 Million Pesos

Table 17.1-1 shows budget allocation to large scale projects and its share to the total budget. Based on Table 17.1-1, the maximum amount of annual fund allocation to this project was estimated to be 5% of the highway sector capital investment budget.

TABLE 17.1- BUDGET ALLOCATION TO LARGE SCALE PROJECTS
(1999)

Project Name	Allocated Amount (Million P)	% Share to Total Budget
• Second Mandaue-Mactan Bridge Project	993.8	4.1%
• Philippine-Japan Friendship Highway Rehabilitation Project, Phase I	1,605.5	6.6%
• Arterial Road Links Development Project, Phase I	1,821.4	7.5%
• Highway Management Project (10 provinces)	1,099.8	4.5%
• ADB 6 th Roads Improvement Project (28 provinces)	2,728.0	11.3%

SOURCE: 1999 General Appropriations Act

Future budget for the highway sector capital investment was estimated based on the estimate of the Master Plan Study on Visayas and Mindanao Islands Strategic Road Network Development Project (1999). The maximum amount of annual fund allocation to this Project was estimated as follows (see Table 17.1-2):

ESTIMATED MAXIMUM FUND ALLOCATION

Year	Max. Allocation to this Project (Million Peso in 1999 Price)
2000	1,300
2001	1,380
2002	1,470
2003	1,560
2004	1,740
2005	1,920

2006	2,110
2007	2,290
2008	2,400
2009	2,520
2010	2,710

TABLE 17.1-2 FUTURE HIGHWAY SECTOR CAPITAL INVESTMENT BUDGET AND ALLOCATION TO THIS PROJECT

	Highway Sector Capital Investment Budget (Million Pesos) (*)		Maximum Allocation to this Project (Million Pesos in 1999 Prices)
	1995 Prices	1999 Prices	
2000	19,305	26,040	1,300
2001	20,510	27,660	1,380
2002	21,791	29,390	1,470
2003	23,152	31,230	1,560
2004	25,838	34,480	1,740
2005	28,525	38,480	1,920
2006	31,264	42,170	2,110
2007	34,003	45,870	2,290
2008	35,629	48,060	2,400
2009	37,333	50,360	2,520
2010	40,120	54,120	2,710

Note: (*) Master Plan Study on Visayas and Mindanao Islands Strategic Road Network Development Project. Low Assumption
 Inflation rate : 9.1%, 6.0%, 8.0% and 8.0% for 1996, 1997, 1998 and 1999, respectively.

17.2 IMPLEMENTATION PRIORITY OF BYPASS

All three bypasses are urgently needed. All of them should be completed as soon as possible, as traffic situation is already beyond tolerable level. However, relative implementation priority of three bypasses is in the order of the following (see Table 17.2-1):

- Cabanatuan Bypass
- Plaridel – Baliuag Bypass
- San Jose Bypass

TABLE 17.2-1 EVALUATION OF IMPLEMENTATION PRIORITY

	Traffic Volume 1998 (PCU/day)	Level of Service (1998)		Travel Speed (1998) (km/hr)	Traffic Volume On Bypass (2005) (PCU/day)	EIRR (%)	Implemen- tation Priority
		Intersection	Roadway				
Plaridel - Baliuag Bypass	20,900- 24,900 (6-17%)	F 1	E 2	20-28 2	19,600 2	24.6 2	2 9
Cabanatuan Bypass	27,900- 43,200 (28-35%)	F 1	F 1	11-23 1	24,100 1	20.2 3	1 7
San Jose Bypass	28,600- 29,400 (53-56%)	F 1	F/B (*) 3	33 3	15,800 3	28.6 1	3 11

Note: () shows % share of tricycle.
(*) partially 4-lane.

17.3 STAGE CONSTRUCTION

The annual fund requirement was examined when a 4-lane divided bypass is constructed from the initial stage for Plaridel-Baliuag Bypass and Cabanatuan Bypass. Total project cost including San Jose Bypass (2-lane) was estimated at 8,106 million pesos. The annual fund requirement was estimated as follows (refer to Appendix 17.3-1):

Year	Annual Fund Requirement Million Pesos at 1999 Prices (4-lane Bypasses except San Jose Bypass)	Ratio to Estimated Maximum Allocation
2000	100.79	(0.08)
2001	316.96	(0.23)
2002	596.92	(0.41)
2003	1,796.50	(1.15)
2004	2,869.62	(1.65)
2005	2,425.46	(1.26)

Note: () shows a ratio to estimated maximum fund allocation to this project.

Annual fund requirement under this Scheme exceeds the estimated maximum fund allocation in years 2003, 2004 and 2005. It was judged that funding for the project under this Scheme is quite difficult and not realistic.

Based on the above analysis, the stage construction was recommended for Plaridel – Baliuag Bypass and Cabanatuan Bypass as follows:

	Stage Construction	
	Phase - 1	Phase - 2
Plaridel – Baliuag Bypass	2-lane	Widening to 4-lane
Cabanatuan Bypass	2-lane	Widening to 4-lane
San Jose Bypass	2-lane	-

17.4 IMPLEMENTATION SCHEDULE AND ANNUAL FUND REQUIREMENT

1) Implementation Schedule

In view of the urgency of the project, completion of Phase-1 was targeted in 2005. Completion of Phase-2 was so planned that level of service of a 2-lane bypass will not drop to F and was targeted in 2010.

Implementation Schedule was established as follows (see Table 17.4-1):

Construction Stage	Plaridel-Baliuag Bypass	Cabanatuan Bypass	San Jose Bypass
Phase-1			
Detailed Design	Apr. 200-Sep.2001	Apr.2000-Sep.2001	Oct.2000-Sep.2001
ROW Acquisition	July 2001-Mar. 2003	July 2001-Dec.2002	Oct. 2000-Dec.2002
Tender	Jan. 2002-Dec.2002	Oct.2001-Sep.2002	Oct.2002-Sep.2003
Construction	Jan.2003-June 2005	Oct.2002-June 2005	Oct.2003-June 2005
Phase-2			
Review of Det. Design	July 2006-Dec.2006	July2006-Dec.2006	-
ROW Acquisition	-	-	-
Tender	Jan.2007-Dec.2007	Jan.2007-Dec.2007	-
Construction	Jan.2008-Dec.2010	Jan.2008-Dec.2010	-

It was planned that the detailed design in Phase-1 covers that of Phase-2, so that the road ROW can be exactly determined, based on which ROW acquisition is to be undertaken.

2) Annual Fund Requirement

Annual fund requirement was estimated as shown in Table 17.4-1. Comparison of annual fund requirement and estimated maximum fund allocation is as follows:

Year	Fund Requirement (A)	Estimated Max. Allocation (B)	A / B
2003	1,324.80	1,560	0.85
2004	1,634.67	1,740	0.94
2005	1,174.06	1,920	0.61
2008	876.54	2,400	0.37
2009	1,753.06	2,520	0.70
2010	1,753.07	2,710	0.65

Annual fund requirement will not exceed the estimated maximum allocation to this project, therefore, the project is judged financially viable.

TABLE 17.4-1 IMPLEMENTATION SCHEDULE AND ANNUAL FUND REQUIREMENT

Unit: Million Posos at 1999 Prices

CONSTRUCTION STAGE		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	TOTAL
Implementation Schedule	Plaridel - Baliuag Bypass			Phase - 1						Phase - 2			
	Detailed Design												
	ROW Acquisition												
Cabanatuan Bypass	Tender												
	Construction												
	Detailed Design												
San Jose Bypass	ROW Acquisition												
	Tender												
	Construction												
Plaridel - Baliuag Bypass	Detailed Design	50.5	50.5	-	-	-	-	24.5	-	-	-	-	125.58
	ROW Acquisition	-	76.12	228.37	76.13	-	-	-	-	333.91	667.82	667.82	3,349.72
	Construction	-	-	-	504.05	672.07	504.05	-	-	26.71	58.42	58.42	267.96
Cabanatuan Bypass	Const. Supervision	-	-	-	40.32	53.76	40.32	-	-	360.52	721.24	721.25	4,123.98
	Total	50.52	126.64	228.37	620.50	725.83	544.37	24.54	-	-	-	-	155.81
	Detailed Design	61.2	61.2	-	-	-	-	33.2	-	-	-	-	156.95
San Jose Bypass	ROW Acquisition	-	47.09	109.86	-	-	-	-	-	477.70	955.39	955.39	4,131.46
	Construction	-	-	87.15	610.04	610.04	435.75	-	-	38.22	76.43	76.43	330.52
	Const. Supervision	-	-	6.97	48.80	49.81	34.86	-	-	515.92	1,031.82	1,031.82	4,774.74
San Jose Bypass	Total	61.26	108.35	203.98	658.84	658.85	470.61	33.29	-	-	-	-	16.84
	Detailed Design	6.7	10.1	-	-	-	-	-	-	-	-	-	28.04
	ROW Acquisition	-	-	28.04	-	-	-	-	-	-	-	-	420.86
Total	Construction	-	-	-	42.09	231.47	147.30	-	-	-	-	-	23.67
	Const. Supervision	-	-	-	3.37	18.52	11.78	-	-	-	-	-	499.41
	Total	6.74	10.10	28.04	45.46	249.99	159.08	-	-	-	-	-	298.23
Total	Detailed Design	118.5	121.8	-	-	-	-	57.8	-	-	-	-	565.61
	ROW Acquisition	-	123.21	366.27	76.13	-	-	-	-	811.61	1,623.21	1,623.21	7,902.04
	Construction	-	-	87.15	1,156.18	1,513.58	1,087.10	-	-	64.93	129.85	129.86	622.15
Total	Const. Supervision	118.52	245.09	460.39	1,324.80	1,634.67	1,174.06	57.83	-	376.54	1,753.06	1,753.07	9,398.03
	Total	249.02	366.10	820.78	2,481.78	3,269.34	2,251.16	115.63	-	412.09	1,876.12	1,876.13	11,777.03
	Detailed Design	249.02	249.02	249.02	249.02	249.02	249.02	249.02	249.02	249.02	249.02	249.02	249.02
Total of Each Phase	Phase - 1	565.61	3,844.01	307.51	4,957.53								
	Phase - 2					57.83							
	Total	565.61	3,844.01	307.51	4,957.53	57.83							4,058.03
Total of Each Phase		565.61	3,844.01	307.51	4,957.53	57.83							4,440.50

CHAPTER 18
OVERALL EVALUATION AND
RECOMMENDATIONS

CHAPTER 18

OVERALL EVALUATION AND RECOMMENDATIONS

18.1 OVERALL EVALUATION

1) Needs of the Project

The traffic function of the Study Road is seriously affected at urban sections, particularly at Plaridel Urban Section, Cabanatuan Urban Section and San Jose Urban Section. The travel speed of 40 to 60 km/hour on the inter-urban sections is drastically reduced to 10 to 20 km/hour at the urban sections. The level of service at major intersections and urban sections has already been reached to F (the worst level) and E, respectively.

The road right-of-way of the Study Road ranges from 15 to 20 meters. Additional road right-of-way acquisition along the Study Road is not practical due to the ribbon type of development, particularly along the urban sections.

To restore the traffic function of the Study Road, construction of three bypasses at the Plaridel Urban Section, Cabanatuan Urban Section and San Jose Urban Section is definitely and urgently needed.

2) Technical Feasibility

All proposed works can be carried out by usual construction methods commonly used in the Philippines in accordance with the DPWH Standard Specifications. All equipment and materials are obtained in the Philippines. No technical problems is expected in the project implementation.

3) Economic Feasibility

Sufficient economic return is expected by each of three bypass projects as proved by the economic evaluation which also suggests the early implementation of the projects.

4) Financial Feasibility

The projects can be implemented within the reasonable budgetary framework of DPWH in accordance with the proposed implementation schedule.

5) Environmental Impacts

The project acceptability was found to be high. All concerned LGUs expressed their strong support to the project. Among persons interviewed, about 88% expressed their support to the project.

Social impacts were assessed to be moderate (-). A total of 119 houses (or about 181 families) of legal occupants is estimated to be affected. Number of informal settlers are not high and estimated to be only 8 families (or 4 houses). Loss of and/or damage to means of livelihood was assessed to be moderate (-). All affected people should be properly taken care of to mitigate negative social impacts.

Impacts on all other factors such as air/water quality, biology, etc. were assessed to be low (-).

During the operation phase, high impacts (+) are expected on transport efficiencies, improved accessibilities, sound urban development, etc..

Overall negative impacts of the project were assessed to be low and these could be mitigated. Overall positive impacts were assessed to be high.

6) Impacts on Regional and Local Development

Positive impacts on regional and local development are expected high. Transport linkage between Region III / Region II and Metro Manila is expected to become more efficient and reliable, socio-economic inter-dependence between the said Regions will be more active which will greatly contribute to the regional development.

Impacts on local development are expected to be high. Urban development plan will be soundly guided by the bypass and its access roads. Socio-economic activities will be stimulated by the improved accessibility and an efficient transport facilities.

7) Conclusion

The three bypass projects were evaluated highly feasible from every aspect and recommended to be implemented at the earliest possible time.

18.2 RECOMMENDATIONS

18.2.1 Recommendations on the Three Bypass Projects

1) Early Implementation

Three bypass projects are urgently needed and should be implemented at the earliest possible time. Possible factors which might affect the implementation of the projects are as follows:

- Securing ECC

The detailed EIA should be carried out during the detailed engineering design stage in accordance with the DENR Guidelines with the participation of concerned LGUs and the project-affected people.

- Road ROW Acquisition

As soon as the road right-of-way is determined by the detailed engineering design, the parcellary survey should be carried out to identify land owners, residents affected, facilities affected and areas to be acquired.

Based on the results of the parcellary survey, DPWH and concerned LGUs should start ROW acquisition.

- Resettlement of Project-affected People

The Resettlement Plan and the Social Development Program for project-affected people should be established during the EIA preparation stage and implemented soon after the detailed engineering design completed.

- Fund Preparation

Judging from the magnitude of the projects, foreign assistance for funding will be needed. Necessary arrangement and negotiation with a lending institution should be made at a proper timing.

2) Development Control Within the Road ROW of the Proposed Bypass

As soon as the road ROW is determined, concerned LGUs should promulgate an ordinance which prohibit any development within the road ROW and it should be strictly implemented.

3) Review and Update of the Land Use Plan by LGUs

Concerned LGUs should review and update their land use plans based on the proposed bypass alignment and its access roads. Future site

for a bus/jEEPney terminal, local road network, agro-industrial areas, etc. should be incorporated in the land use plan, so that sound urbanization is achieved.

4) Stage Construction

In view of the funding requirement of the projects, the stage construction was recommended for Plaridel – Baliuag Bypass and Cabanatuan Bypass. Initially a 2-lane bypass is scheduled to be constructed by the middle of year 2005 and widening to a 4-lane divide bypass is scheduled to be completed by the end of year 2010.

If the financial situation of the Government is improved, it is recommended that a 4-lane divided bypass be constructed at the initial stage and frontage roads should be added in the second stage.

5) Utilization of this Study for Other Similar Projects

There are many urban sections along arterial roads in the country which suffer similar problems as this Study Road. It is recommended that this Study should be always referenced and fully utilized for the similar projects.

18.2.2 Recommendations on Other Sections of the Study Road

1) Inter-urban Sections

The existing road ROW is limited to 15 to 20m for the most of the inter-urban sections. The ribbon type urbanization is progressing, therefore, widening should be planned and implemented within the existing road ROW.

Even within the existing road ROW, removal of encroached houses, trees and public utilities are expected to be required. Proper coordination should be made with concerned LGUs for relocation of affected houses and facilities.

2) Urban Sections

Other urban sections such as Gapan, San Ildefonso, San Rafael, etc., suffer the similar problems, but urban section length is not so long. Such urgent measures as follows should be implemented:

- Traffic management
 - Installation of traffic signals and exclusive left turn lanes at major intersections.
 - Strict enforcement of roadsides parking ban.
 - Loading and unloading at only designated areas.
- Paving of shoulders to be used by slow moving vehicles
- Construction of side walks

18.2.3 Recommendations on North Luzon Expressway East

The inter-urban sections of the Study road is difficult for conversion to a mobility oriented arterial road due to limited road ROW and roadside development. The proposed three bypasses will function as an urban arterial in the future. Therefore, planned North Luzon Expressway East (NLEE) is required to serve as the major transport axis in addition to proposed bypasses. DPWH should exercise continuous efforts to realize NLEE.

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