CHAPTER 11
ROAD NETWORK DEVELOPMENT MASTER PLAN

11.1 FINANCIAL FRAMEWORK

Proposed future road network consists of various road projects which are required to be systematically implemented in accordance with priority and within the financial framework. At present, the Philippine Government is suffering the severe financial constraints. In this section, possible amount for road investment to the Study Area is discussed for the following terms:

Short Term	:	2005 - 2010	(6 years)
Medium Term	:	2011 – 2016	(6 years)
Long Term	:	2017 – 2022	(6 years)

11.1.1 National Road

1) Procedure to Estimate Possible Investment Amount for Road Development

The procedure to estimate possible investment amount for road development is shown in Figure 11.1-1.

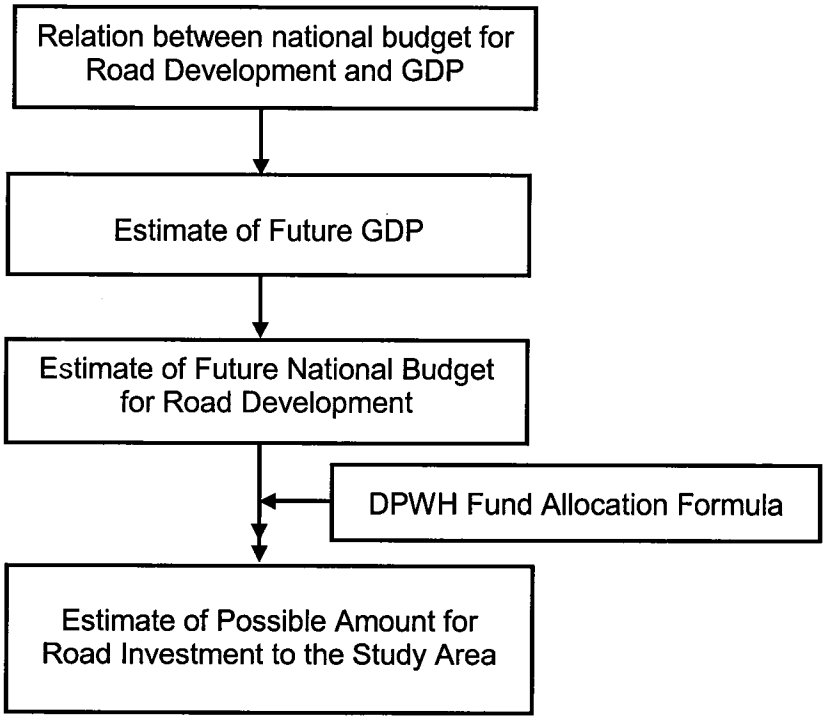

FIGURE 11.1-1 PROCEDURE TO ESTIMATE POSSIBLE INVESTMENT AMOUNT

2) Estimate of Possible Investment Amount for Road Development

a) Relation between National Budget and GDP

Table 11.1-1 shows past capital outlay for road development in relation with GDP. Past trend was as follows:

% share of road investment to GDP

Max.	1.12%	(year 1998)
Min.	0.40%	(year 2002)

b) Future GDP

GDP growth rate was estimated as follows:

Years 2003 and 2004	:	Philippine Medium - Term Development Plan 2001-2004
2005 – 2010	:	5% per annum by the Study Team and accepted by NEDA.
2011 - 2022	:	4.5% per annum by the Study Team and accepted by NEDA.

c) Future % share of Capital Outlay to GDP

Amount of capital outlay for year 2004 was given by DPWH. It is also informed that year 2004 budget level will continue at least for the next 5 years.

From year 2009 to 2022, it was assumed that % share of capital outlay to GDP will increase from 0.45% in 2009 to 0.65% in 2022.

d) DPWH Fund Allocation to the Study Area

DPWH has developed the Fund Allocation Formula to each congressional district. According to the formula, budget allocation to the Study Area will be as follows:

Metro Bacolod	:	0.65 ~ 0.75% of national capital outlay for road development

e) Estimated Possible Amount for Road Development

Possible amount for road development to Metro Bacolod was estimated as shown in Table 11.1-2, and summarized as follows:

	Term	Possible Investment Amount (Million ₱)
Short Term	(2005 ~ 2010)	900 ~ 1,040
Medium Term	(2011-2016)	1,620 ~ 1,870
Long Term	(2019-2022)	2,370 ~ 2,730
Total	**(2005 ~ 2022)**	**4,890 ~ 5,640**

TABLE 11.1-1 GDP AND CAPITAL OUTLAY FOR ROAD DEVELOPMENT

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
GDP (Current Price, Million P)	1,474,457	1,692,932	1,905,951	2,171,922	2,426,743	2,665,060	2,976,905	3,308,318	3,639,980	3,977,380	–
GDP Nominal Growth Rate (% per annum)	9.09	14.82	12.58	13.95	11.73	9.82	11.70	11.13	10.03	9.27	–
GDP Growth Rate in real term (% per annum)	2.12	4.39	4.68	5.85	5.19	-0.58	3.40	4.38	3.22	4.56	(5.20)
Capital Outlay for Highway Development (Current Price, Million P)	10,436	10,925	11,789	15,428	22,723	29,733	24,220	21,469	21,469	15,980	21,014
% share of Capital Outlay to GDP	0.71	0.65	0.62	0.71	0.94	1.12	0.81	0.65	0.59	0.40	–

TABLE 11.1-2 ESTIMATED POSSIBLE INVESTMENT AMOUNT

Year	GDP Growth Rate (%)	Estimated GDP at 2003 Constant Prices (Million Pesos)	% share of Capital Outlay for Highway Development (%)	Estimated Capital Outlay to Highway Development (Million Pesos)	6 Year Total (Million Pesos)	Possible Investment Amount to Metro Bacolod (0.65%~0.75%) (Million Pesos)
2002	-	3,977,380	0.40	15,980		
2003	(5.20)	4,335,300	0.48	21,014		
2004	5.50	4,573,742	0.45	20,400		
2005	5.00	4,802,429	0.42	20,400		
2006	5.00	5,042,550	0.40	20,400		
2007	5.00	5,294,678	0.39	20,400		
2008	5.00	5,559,412	0.37	20,400		
2009	5.00	5,837,383	0.45	26,268		
2010	5.00	6,129,252	0.50	30,646	138,514	900~1,040
2011	4.50	6,405,068	0.50	32,025		
2012	4.50	6,693,296	0.55	36,813		
2013	4.50	6,994,494	0.55	38,470		
2014	4.50	7,309,246	0.60	43,855		
2015	4.50	7,638,162	0.60	45,829		
2016	4.50	7,981,879	0.65	51,882	248,874	1,620~1,870
2017	4.50	8,341,064	0.65	54,217		
2018	4.50	8,716,412	0.65	56,657		
2019	4.50	9,108,651	0.65	59,206		
2020	4.50	9,518,540	0.65	61,871		
2021	4.50	9,946,874	0.65	64,655		
2022	4.50	10,394,483	0.65	67,564	364,170	2,370~2,730
				Total	**751,558**	**4,890~5,640**

11.1.2 Investment Capacity of LGUs

Investment capacity of LGUs for local road development was estimated for the following two (2) cases:

Case - 1 : Development Fund = 20% of Internal Revenue Allotment (IRA)
Investment for local road development = 30% of Development Fund

Case - 2 : Investment for local road development = 25% of Borrowing Capacity
Loan term = 12 years
After initial borrowing, one half of above is borrowed at every 6 years.

Table 11.1-3 shows IRA and borrowing capacity of the Province of Negros Occidental and Bacolod City.

TABLE 11.1-3 IRA AND BORROWING CAPACITY

(Million Pesos)

Financial Position		Province of Negros Occidental	Bacolod City	Bago City	Silay City	Talisay City	Victorias City
Revenues	Local Income	76.6	190.3	52.0	27.7	20.0	38.7
	IRA (2003)	893.2	366.8	251.1	185.6	166.4	151.6
	Total LGU Revenue	969.8	557.0	303.1	213.3	186.4	190.3
Debt Service Ceiling		193.9	111.4	60.6	42.7	37.0	38.1
Net Debt Service Capacity		173.9	111.4	57.2	42.7	34.0	320.0
Borrowing Capacity		1077.4	690.1	354.6	264.3	210.6	198.1

Investment capacity of LGUs for local road development was estimated as shown in Table 11.1-4.

TABLE 11.1-4 INVESTMENT CAPACITY OF LGUs

		IRA or Borrowing Capacity	2005-2010 (6 years)	2011-2016 (6 years)	2017-2022 (6 years)	Total (2005-2022)
Province of Negros Occidental	Case-1 (50% to Study Area)	(893.2) 446.6	160.8	160.8	160.8	482.4
	Case-2 (50% to Study Area)	(1,077.4) 538.7	134.7	67.4	67.4	269.5
Bacolod City	Case-1	366.8	132.0	132.0	132.0	396.0
	Case-2	690.1	172.5	86.3	86.3	345.1
Bago City	Case-1	251.1	90.4	90.4	90.4	271.2
	Case-2	354.6	88.7	44.4	44.4	177.5
Silay City	Case-1	185.6	66.8	66.8	66.8	200.4
	Case-2	264.3	66.1	33.1	33.1	132.3
Victorias City	Case-1	166.4	59.9	59.9	59.9	179.7
	Case-2	210.6	52.7	26.4	26.4	105.5

Investment capacity of LGUs was estimated as follows:

	Short Term (2005-2010)	Medium Term (2011-2016)	Long Term (2017-2022)
Province of Negros Occidental	160.8~134.7	67.4~160.8	67.4~160.8
Bacolod City	132.0~172.5	86.3~132.0	86.3~132.0
Bago Ctiy	90.4~88.7	44.4~90.4	44.4~90.4
Silay City	66.1~66.8	33.1~66.8	33.1~66.8
Victorias City	52.7~59.9	26.4~59.9	26.4~59.9

11.2 PRIORITY OF ROAD PROJECTS

The Alternative 2 Road Network was selected as the most appropriate and preferable future road network for Metro Bacolod. Based on the selected future road network, road projects were identified. Implementation of priority order of the road projects is determined in this section.

11.2.1 Basic Policy and Prioritization Procedure

The following prioritization factors for the road projects were set up in line with the objectives of the road network development;

a) **Reduction of traffic congestion** in the city proper area
b) Road project will **guide and support the planned urban development**
c) Formation of **flexible road network** which will provide alternative routes to road users
d) Road project which will **contribute to the economic development**
e) Road project which will **enhance international and domestic investment**
f) Road project which will **realize expected investment effects of related projects**
g) Road project with **environmental and social considerations**

In addition, the following three (3) more factors were selected:

h) Upgrade of **traffic efficiency**
i) **Traffic safety considerations**
j) **Urgency for road improvement**

The procedure for prioritization of the road projects is shown in Figure 11.2-1.

The indicators of each factor were selected. Indicators for individual road project were measured and scored following the procedure illustrated in Figure 11.2-1.

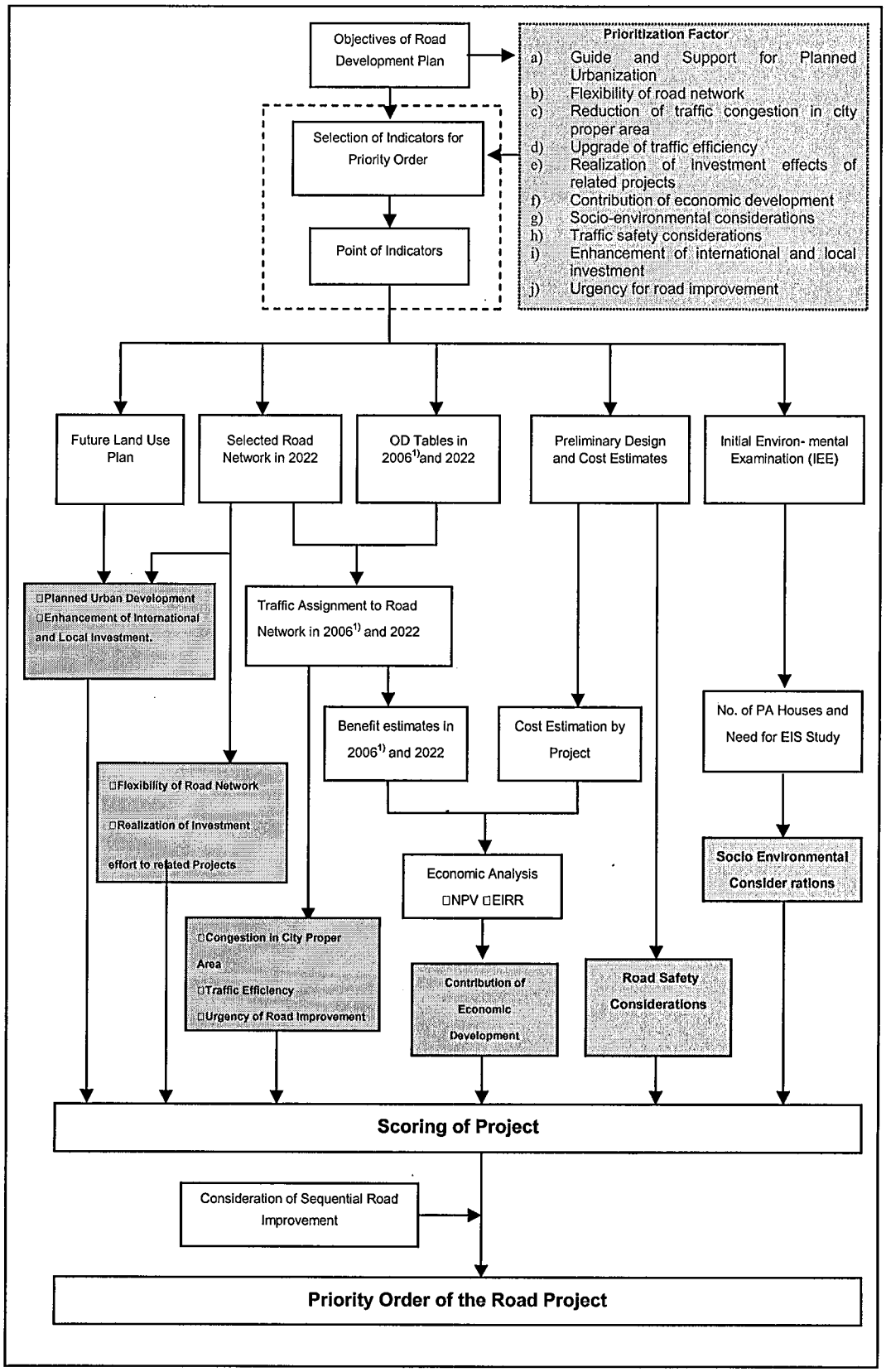

FIGURE 11.2-1 PROCEDURE FOR PRIORITIZATION OF ROAD PROJECT

[1] Opening year of the road project is assumed to be 2006.

11.2.2 Prioritization Criteria

1) Selection of Prioritization Factors

In order to prioritize the road projects, the following prioritization factors which consist of ten (10) factors and fourteen (14) indicators were selected as shown in Table 11.2.-1.

TABLE 11.2-1 PRIORITIZATION FACTORS AND INDICATORS

	Factors	Indicators	How to Measure
1	Guide and Support Planned Urban Development	Planned Urban Road Section Ratio (year 2022)	Section Length along the planned urban area per Total Length RUA = RLu / RLw Where : RUA = Section ratio of planned urban area RLu = Section length in planned urban area RLw = Whole road length
2	Flexibility of Road Network	Function as an Alternative Road	· The road functions as an alternative route or not.
3	Reduction of Traffic Congestion in City Proper	Averge VCR within C-1 in 2022	· VCR of road link within C-1 in 2022 based on traffic assignment.
4	Traffic Efficiency	PCU-Hour in 2022	· PCU-Hour in 2022 with and without project based on traffic assignment
5	Accessibility Improvement for Related Projects	Function as an Access Road to related Projects	· The road functions as an Access Road to New Airport and Marine Port directly or indirectly
6	Contribution to Economic Development	Net Present Value	· Economic analysis of each road project.
		EIRR	· Economic analysis of each road project.
7	Social-Environmental Impact	· No. of Project Affected Houses	· No. of Houses affected by the Project
		· Necessity of EIS Study	· Need of EIS Study or Initial Environmental Examination(IEE)
8	Traffic Safety Considerations	Provision of Sidewalk	· Length of Sidewalk provided in the design In case of partially sidewalk provided, computation is made as follows: SSW = SWL w / TRL x 5 Where: SSW = Score of side walk SWLw= Length with sidewalk TRL = Total road length
9	Enhancement of International / Local Investment	Accessibility to Industrial, Commercial and Housing Developments	· Judgment wheather direct access road or indirect access road to industrial, commercial and housing development sites
10	Urgency for Road Construction, Widening and Improvement	For widening project, year when VCR of existing road becomes 0.9.	· Identify year when VCR of existing road becomes 0.9
		For improvement project, year when traffic volume exceeds 1,000 pcu/day	- Identify year when traffic volume exceeds 1,000 pcu/day.
		For new construction road, year when it will attract more than 10,000 pcu/day	- Identify year when a new road attract more than 10,000 pcu/day.

2) Weight of Factor and Score

Weight of factors and scores was established as shown in Table 11.2-2.

TABLE 11.2-2 POINTS OF EACH INDICATOR

No.	Factor	Range of Indicator	Weight of Factors	Score
1	Guide and Support Planned Urban Development	Planned urban section ratio (RUA) · 80% < RUA <100% · 60 % < RUA < 80% · 40 % < RUA < 60 % · 20 % < RUA < 40 % · 0 % < RUA < 20 %	15	15 12 9 6 3
2	Flexibility of Road Network	Function as an alternative road · Yes · Yes, but indirectly - No	10	10 6 3
3	Reduction of Traffic Congestion in City Proper	Average volume-capacity ratio (VCR) within C-1 · VCR < 0.5 · 0.5 < VCR < 0.75 · 0.75 < VCR <1.00 · 1.00 < VCR <1.25 · 1.25 < VCR	10	10 8 6 4 2
4	Traffic Efficiency	Reduction of vehicle hours · 100,000 < PCU Hr · 10,000 < PCU Hr < 100,000 · 5,000 < PCU Hr < 10,000 · 2,500 < PCU Hr < 5,000 · PCU Hr < 2,500	10	10 8 6 4 2
5	Accessibility Improvement for Related Projects	· Direct access · Indirect access · No Access·	15	15 9 3
6	Contribution to Economic Development	Amount of NPV computed is classified as · 10,000 < NPV · 1,000 < NPV < 10,000 · 500 < NPV Hr < 1,000 · 250 < NPV Hr < 500 · NPV Hr < 250	5	5 4 3 2 1
		EIRR · 50 % < EIRR · 15 % < EIRR < 50 % · EIRR < 15 %·	5	5 (EIRR-15)/7 1
7	Social-Environmental Impact	No. of project affected houses: · No PAH · 0 < PAH < 50 · 50 < PAH < 100 · 100 < PAH <200 · 200 < PAH < 300	2.5	2.5 2.0 1.5 1.0 1.5
		Needs for EIS study · No EIS or IEE · IEE Check List · IEE · EIS Regional · EIS National	2.5	2.5 2.0 1.5 1.0 0.5
8	Traffic Safety Considerations	Provision of sidewalk · Both side sidewalk · Partial sidewalk · No sidewalk	5	5 5 x (L w / Lt) 1
9	Enhancement of International / Local Investment	· Direct access to development area · Indirect access to development area · No direct access	5	5 3 1
10	Urgency for Road Construction, Widening and Improvement	For widening project, year of VCR becomes 0.9 · Year < 2006 · 2006 < Year < 2010 · 2010 < Year < 2016 · 2016 < Year < 2022 · 2022 < Year	15	15 12 9 6 3
		For improvement project, year of traffic volume exceeds, 1,000 pcu/day · Year < 2006 · 2006 < Year < 2010 · 2010 < Year < 2016 · 2016 < Year < 2022 · 2022 < Year		15 12 9 6 3
		Year exceeded more than 10,000 ADT is classified as · Year < 2006 · 2006 < Year < 2010 · 2010 < Year < 2016 · 2016 < Year < 2022 · 2022 < Year		15 12 9 6 3
		TOTAL	100	

11.2.3 Priority Ranking of Road Projects

In accordance with the prioritization criteria, all road projects were evaluated their implementation priority as shown in Table 11.2-3 and supporting data for evaluation are presented in Table 11.2-4.

11.2.4 Specific Consideration in Implementation Sequence

1) Opening of New Bacolod Airport

New Bacolod airport is scheduled to open in 2008. The existing access, SI-1 Silay-Guimbalaon Road, is required to be improved to the new airport at first to meet requirement of traffic generated by the airport. Construction of N-2 New Airport Access Road will start as soon as possible after finance arrangement.

2) Sequence of Implementation

According to form the future road network, sequence of implementation is considered. The order is illustrated as follows.

First Step	Second Step	Third Step
NS-2a: New Airport Access	→ NS2:North Road	
NS-3a:Sugar Road North Section (Urban Section)	→ BC-5: Bacolod Link Road (north)	
	→ NS-3b: Sugar Road: North Section	→ SI-1 Extension → SI-2 → EM-1 → VT-1 → VT-2
	→ NS-3d: Sugar Road: South Section	→BC4:Bacolod Link (South)
	→ NS-3 completion	→NS-4: Murcia-Conception
BC-3: Bacolod Circumferential	→ NS-2: South Road	

3) Stage Construction

Stage Construction will be introduced into 4-lane road construction in order to minimize initial investment cost.

4) Timing of Construction

Timing of construction is decided when road capacity cannot carry traffic volumes (VC Ratio). The Study assumes that construction of two-lane will start when traffic exceeds 10,000pcu; and four-lane for 30,000pcu.

TABLE 11.2-3 PRIORITY SCORES FOR EACH INDICATOR BY PROJECTS IN METRO BACOLOD

OBJECTIVES		Indicators & Weighted Score		NS-1	NS-2	NS-2	NS-2	NS-3	NS-3	NS-4	BC-2	BC-3	BC-4	BC-5	SI-1	SI-2	EM-1	VT-1	VT-2	BG-2	BG-3	MU-1
				Bacolod Coastal Road	New Airport Access Road	North Road	South Road	Sugar Road(North Section)	Sugar Road(South Section)	Murcia-Conception Road	Bacolod Granada Section	Bacolod Circumferential Road	Bacolod Link Road(North)	Bacolod Link Road(South)	Silay-Guimbalaon Road	Silay-Pataq Road	Tanza-Poblacion Road	Roxas-Stado Road	Victorias Link Road	Bago-Busay Road	Bago-Malingin Road	Murcia Bypass
Profile of Road		Road Length		6.7	10.2	12.0	3.8	33.5	12.4	9.9	11.0	15.4	4.3	5.0	16.6	3.5	3.4	6.0	5.0	7.1	3.4	3.5
		Administrative Classification		NR	-	-	-	-	-	-	NR	NR	-	-	City	City	PR	PR/Pri	-	City	City	-
		Function of Road		Arterial Road	Arterial Road	Arterial Road	Arterial Road	Arterial Road	Arterial Road	Arterial Road	Arterial Road	Arterial Road	Arterial Road	Arterial Road	Arterial Road	Arterial Road	Arterial Road	Arterial Road	Arterial Road	Arterial Road	Arterial Road	Arterial Road
		No. of Lanes		4	4	2	2	2&4	2&4	2	4	4	4	2	2	2	2	2	2	2	2	2
		Type of Improvement		Widening	New	New	New	New	New	New	Widening & Improve	Widening	New	New	Improve	Improve	New	Improve	New	New	Improve	New
		Project Cost		354.7	880.5	472.2	145.1	1,943.8	409.3	334.8	372.9	551.6	370.3	195.3	246.7	113.2	94.6	93.9	172.6	151.4	49.0	107.1
1	Guide and Support for Planned Urban Development	Planned Urban Road Section Ratio	15	3	15	3	15	15	15	3	15	15	15	15	15	3	3	3	15	3	3	15
2	Flexibility of Road Network	Funciton as Alternative Road	10	2	10	10	10	10	10	6	6	6	6	6	2	2	6	2	6	6	2	10
3	Reduction of Traffic Congestion in City Proper	Average VCR in CBD in 2022	10	2	6	6	2	8	6	6	2	10	8	6	2	2	2	2	2	2	2	2
4	Traffic Efficiency	PCU-Hour in 2022	10	6	8	8	6	10	8	6	6	8	8	8	6	6	2	2	6	6	4	4
5	Accessibility Improvement for Related Projects	Provision of Accessible Road	15	3	15	15	15	3	3	3	15	9	3	3	15	3	3	3	3	3	3	3
6	Contribution of Economic Developmenty	Net Present Value	5	3	4	4	3	4	3	3	3	4	4	4	3	2	1	2	2	2	3	2
		EIRR	5	3	5	5	3	4	4	4	3	5	5	5	3	4	2	3	3	3	5	3
7	Social-Environmental Impacts	No. of PA Houses	2.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.5	0.5	2.5	2.0	2.5	2.5	2.0	0.5	2.0	2.0	2.5	2.5
		Type of EIA	2.5	1.5	1.0	1.0	1.0	1.0	1.0	1.0	1.5	1.0	1.0	1.0	2.5	2.5	1.0	2.5	1.0	1.0	2.5	2.5
8	Traffic Safety Considerations	Provision of Sidewalk / Paved Shoulder	5	3	5	1	5	3	5	1	5	5	5	5	5	1	1	1	1	1	1	1
9	Enhancement of International / Local Investment	Accessibility to Industrial, Commercial and Housing Development	5	3	5	3	3	5	5	1	5	3	3	3	5	1	3	1	5	1	1	1
10	Construction, Widening and Improvement	Order of Year	15	3	12	6	9	9	6	3	12	9	15	6	15	3	3	3	6	3	15	6
Total Score			**100**	**34**	**88**	**64**	**74**	**74**	**68**	**39**	**75**	**75**	**75**	**64**	**76**	**32**	**29**	**25**	**52**	**33**	**44**	**52**
Ranking				***15***	***1***	***9***	***6***	***6***	***8***	***14***	***3***	***3***	***3***	***9***	***2***	***17***	***18***	***19***	***11***	***16***	***13***	***11***

TABLE 11.2-4 BASIC DATA FOR EACH INDICATOR BY PROJECT IN METRO BACOLOD

Effects / Impact	Indicators	Unit	NS-1	NS-2	NS-2	NS-2	NS-3	NS-3	NS-4	BC-2	BC-3	BC-4	BC-5	SI-1	SI-2	EM-1	VT-1	VT-2	BG-2	BG-3	MU-1
			Bacolod Coastal Road	New Airport Access Road	North Road	South Road	Sugar Road(North Section)	Sugar Road(South Section)	Murcia-Conception Road	Bacolod Granada Section	Bacolod Circumferential Road	Bacolod Link Road(North)	Bacolod Link Road(South)	Silay-Guimbalaon Road	Silay-Pataq Road	Tanza-Poblacion Road	Roxas-Stado Road	Victorias Link Road	Bago-Busay Road	Bago-Malingin Road	Murcia Bypass
Profile of Road	Road Length	Km	6.7	10.2	12.0	3.8	33.5	12.4	9.9	11.0	15.4	4.3	5.0	16.6	3.5	3.4	6.0	5.0	7.1	3.4	3.5
	Administrative Classification	-	NR	-	-	-	-	-	-	NR	NR	-	-	City	City	PR	PR/Pri	-	City	City	-
	Function of Road	-	Arterial Road	Arterial Road	Arterial Road	Arterial Road	Arterial Road	Arterial Road	Arterial Road	Arterial Road	Arterial Road	Arterial Road	Arterial Road	Arterial Road	Arterial Road	Arterial Road	Arterial Road	Arterial Road	Arterial Road	Arterial Road	Arterial Road
	No. of Lanes	Lanes	4	4	2	2	2 & 4	2 & 4	2	4	4	4	2	2	2	2	2	2	2	2	2
	Type of Improvement		Widening	New	New	New	New	New	New	Widening & Pavement	Widening	New	New	Pavement	Pavement	New	Pavement	New	New	Pavement	New
	Project Cost	M Pesos	354.7	880.5	472.2	145.1	1,943.8	409.3	334.8	372.9	551.6	370.3	195.3	246.7	113.2	94.6	93.9	172.6	151.4	49.0	107.1
Traffic Demand	Traffic Volume in 2022	ADT	10,100	34,000	11,700	12,900	47,100	27,500	5,000	25,900	32,600	35,500	12,600	9,100	900	4,200	700	10,100	6,300	2,300	11,500
	Traffic Volume in 2006	ADT	5,700	9,000	5,400	2,200	15,500	12,700	600	13,600	12,600	12,800	4,200	4,100	500	3,200	600	7,000	1,100	1,700	7,600
	Trip Length in 2022	km / trip	28.1	27.4	30.4	31.5	28.7	36.3	26.5	19.3	24.8	22.0	26.5	11.6	23.6	24.5	24.0	35.0	30.6	25.3	33.5
	Saving PCU-Hour in 2022	PCU-Hr	6,529	27,185	14,343	2,004	54,898	12,560	7,382	6,085	21,129	14,749	20,251	3,728	2,875	44	29	3,498	2,756	418	585
Traffic Efficiency	Congestion Degree in 2022		0.70	0.66	0.63	0.71	0.60	0.69	0.71	0.70	0.67	0.57	0.66	0.65	0.60	0.54	0.72	0.60	0.72	0.72	0.71
	Congestion Degree inside BCCR in 2022	-	0.95	0.92	0.90	0.95	0.80	0.91	0.92	0.96	0.78	0.74	0.93	0.92	0.81	0.78	0.95	0.81	0.95	0.95	0.95
Economic Feasibility	Net Present Value	M Pesos	254	2,348	1,183	208	3,848	1,069	708	256	1,893	1,376	1,990	193	116	2	25	82	129	1,007	59
	EIRR	%	26%	41%	42%	30%	37%	38%	39%	24%	45%	51%	61%	27%	32%	16%	21%	21%	28%	148%	25%
Traffic Safety	Sidewalk	-	NO	YES	NO	NO	NO	NO	NO	NO	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO	NO
Environmental Impact	No. of PA House		44	5	5	17	29	5	44	75	698	0	22	0	0	16	0	1	8	0	0
	Type of EIA	-	IEE	EIS Regional	EIS Regional	EIS Regional	EIS Regional	EIS Regional	EIS Regional	IEE	EIS Reginal	EIS Reginal	EIS Reginal	-	-	EIS Reginal	-	EIS Regional	Regional	-	-
Urgency for Road Improvement	More than 0.9 VCR in case of widening		after 2022							2014	2013										
	More than 1000 ADT in case of garavel road													2006	after2022		after2022			2006	
	More than 10000 ADT in case of new construction	-		2008	2019	2020	2006	2006	after 2022			2006	2019			after 2022		2022	after 2022		2017

11.2.5 Order of Implementation

Table 11.2-5 summarizes the order of implementation, in due consideration of priority order and construction sequence.

TABLE 11.2-5 PRIORITY ORDERS OF THE ROAD PROJECTS

	Code	Project Name	Score	Sequence
First Priority	NS-2a	New Airport Access Road	1	
	SI-1	Silay-Guimbalacion Road (up to new airport)	2	
	BC-2	Bacolod-Granada Section	3	
	BC-3	Bacolod Circumferential Road	6	
Second Priority	NS-1	Bacolod Coastal Road (Bridge only)	-	
	NS-3a	Sugar Road (North Section) (Urban)	4	
	BC-4	Bacolod Link Road	4	After NS-3a
	BC-1	Bacolod-Murcia-San Carlos (Bridge only)	-	
	NS-2	South Road	7	After BC-3
Third Priority	NS-3b	Surgar Road (North Section)	4	After NS-3a
	NS-3c	Sugar Road (South Section) (Urban)	8	After NS-3a
	NS-3d	Sugar Road (South Section) (Sub-urban)	8	After NS-3a
	BC-5	Bacolod Link (South)	9	After NS-3d
	VT-2	Victorias Link	11	After NS-3b
	MV-1	Murcia Bypass	11	
Fourth Priority	NS-1	Bacolod Coastal (North)	15	
	NS-2	North Road	9	After NS-2a
	NS-4	Murcia-Conception Road	14	After NS-3

11.3 ROAD NETWORK MASTER PLAN

The Master Plan was formulated for the following three terms:

Short-Term	:	2005 to 2010
Medium-Term	:	2011 to 2016
Long-Term	:	2017 to 2022

Financial framework (or possible investment amount) for each term is summarized as follows:

Financial Framework

Million ₱

Terms	National Road	Provincial Road	City Road
Short Term	900~1,040	160.8~134.7	341.2~3,87.9
Medium Term	1,620~1,870	67.4~160.8	190.2~349.1
Long Term	2,370~2,730	67.4~160.8	190.2~349.1
Total	4,890~5,140	295.6~456.3	721.6~1,086.1

In due consideration of above financial framework and priority of road projects, the implementation schedule was established as shown in Table 11.3-1. Due to financial constraint of the period of Short-Term, the scale of the project is limited.

NS-2, New Airport Access Road should be ideally constructed as a 4-lane divided road, however, it needs to be constructed by stages, i.e., a 2-lane road at the initial stage, then widened to a 4-lane divided road in the ultimate stage due to fund availability.

Figure 11.3-1 shows progress of road network development by each tem.

TABLE 11.3-1 IMPLEMENTATION PROGRAM FOR METRO BACOLOD FUTURE ROAD NETWORK PLAN

Detailed Design ▪▪▪ Bidding ROW Acquisition/Resettlement Construction/Const. Supervision

Code	Road Name		Class	Length (km)	Type of work	D/D	C/S	Civil Work Cost	ROW Resettle	Total Cost	2003	2004	Short-Term 2005	2006	2007	2008	2009	2010	Medium-Term 2011	2012	2013	2014	2015	2016	Long-Term 2017	2018	2019	2020	2021	2022	
NS-1	Bacolod Coastal Road	North Section	NR	6.7	Widening to 4-lane (on-going)	14.2	28.4	354.7	0.0	401.7																					
									4.4																						
		South Section	NR		Bridge widening	3.2	6.4	79.9	0.0	89.5																			14.2	4.4	127.7	255.4
									0.0										3.2		86.3										
NS-2	New Airport Access Road		NR	10.1	New construction (2-lane)	15.1	30.2	378.0	198.1	643.2																					
						19.2			2.6						34.3	100.3	100.4	204.1	204.1												
					Widening to 4-lane divided		38.3	478.8	0.0	517.1																						
									0.0																						
	North Road		NR	12.0	New construction (2-lane)	18.2	36.3	454.2	18.0	527.2																			172.3	172.3	172.5	
									0.5																						
	South Road		NR	3.8	New construction (2-lane)	5.6	11.2	139.4	5.7	163.5																			18.2	9.2	9.3	490.5
									1.7										5.6	7.4	75.3	75.3									
NS-3	Sugar Road North section	(Suburban)	NR	23.8	New construction (2-lane)	38.4	76.8	959.7	267.7	1,344.6																					
									2.0													38.4	134.8	134.9	259.1	259.1	259.1	259.2			
		(Urban 4-lane)	NR	10.2	New construction (2-lane)	19.0	38.1	475.9	144.2	696.9																					
						13.8			4.9										32.8	149.1	171.3	171.3	171.4								
					Widening to 4-lane divided		27.6	345.6	0.0	373.2																						
									0.0																						
	South section	(Urban 4- lane)	NR	3.0	New construction (2-lane)	4.7	9.5	118.2	13.4	152.2																				186.6	186.6
						5.9			0.5														10.6	6.9	7.0	53.8	53.9				
					Widening to 4-lane divided		11.8	147.9	0.0	159.7																						
									0.0																					79.8	79.9
		(Suburban)	NR	9.1	New construction (2-lane)	12.0	24.0	300.4	13.0	349.4																					
									0.0														12.0	6.5	6.5	108.1	108.1	108.2			
NS-4	Murcia-Conception Road		NR	9.9	New construction (2-lane)	13.1	26.2	327.9	6.9	378.6																					
									4.4																				13.1	11.3	354.1
BC-1	Bacolod-Murcia-San Carlos Road		NR		Bridge improvement	3.6	7.2	90.6	0.0	101.5																					
									0.0																						
BC-2	Bacolod-Granada Section		NR	11.0	Widening /Improvement	14.9	29.8	372.9	0.0	425.1													3.6		97.8							
									7.5					14.9	7.5	201.3	201.4														
BC-3	Bacolod Circumferential Road		NR	15.4	Widening	22.1	44.1	551.6	0.0	687.6																					
									69.8						22.1	34.9	34.9	148.9	148.9	148.9	149.0										
BC-4	Bacolod Link Road (North)		NR	4.3	New construction (2-lane)	6.3	12.5	156.5	18.4	201.5																					
						7.8			0.0										14.1	9.2	9.2	84.5	84.5								
					Widening to 4-lane divided		15.6	195.4	0.0	211.1																						
									0.0																						
BC-5	Bacolod Link Road (South)		NR	5.0	New construction (2-lane)	5.9	11.9	148.2	47.1	215.3																				105.5	105.5
									2.2														5.9	24.6	24.7	80.0	80.1				
TA-3	Conception-Campuestuhan Road		City	1.2	Improvement	0.7	1.4	17.3	0.0	19.4																			0.7		18.7	
									0.0																						
SI-1	Silay-Guimbalaon Road		City	12.1	Improvement (after airport)	6.8	13.6	169.8	0.0	190.1																					
				4.5	upto airport	2.5	5.1	63.1	0.0	70.7					2.5		68.2														
SI-2	Silay-Patag Road		City	3.5	Improvement	4.5	9.1	113.2	0.0	126.8															6.8		45.8	45.8	45.8	46.0	
									0.0																						
EM-1	Tarza-Poblacion Road		PR	3.4	New construction (2-lane)	3.5	7.1	98.5	5.1	106.8																					126.8
									1.6																						
VT-1	Roxas-Stado Road		City	6.0	Improvement	3.7	7.5	93.3	0.0	104.5																					
									0.0												3.5	7.7	47.8	47.8							
VT-2	Victorias Link Road		NR	5.0	New construction (2-lane)	6.5	13.1	163.4	9.4	192.5																					104.5
									0.1																						
BG-2	Bago-Busay Road		City	7.1	Improvement	5.9	11.9	148.7	2.7	170.0															6.5	9.5	88.2	88.3				
					New construction				0.8																							
BG-3	Bago-Malingin Road		City	3.4	Improvement	2.0	3.9	49.0	0.0	54.9																5.9	3.5	80.3	80.3			
									0.0																						
BG-4	Bago-Mlaao Road		NR		Bridge improvement	0.7	1.5	18.2	0.0	20.4													2.0		52.9							
									0.0																						
MU-1	Murcia Bypass		NR	3.5	New construction (2-lane)	4.2	8.4	104.6	2.5	119.7																					20.4
									0.0																						
	Total			168.4		284.1	568.4	7,104.9	956.3	8,813.7			0.0	17.4	63.9	404.7	336.7	353.0	408.7	314.6	494.7	382.8	467.0	378.0	323.8	505.2	838.6	698.8	244.8	757.5	1723.8
	Funding Demarcation				DPWH				Total	7,175.6			0.0	14.9	53.9	336.5	336.7	353.0	408.7	314.6	491.1	373.1	419.2	277.2	311.0	601.7	712.5	572.1	199.0	692.8	1,492.5
									Total forTerm									1,105.0						2,284.0						3,089.0	1,492.5
					Provincial Government				Total	318.2			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.5	7.7	47.8	47.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
									Total forTerm									0.0						106.8						0.0	0.0
					Respective LGU				Total	734.0			0.0	2.5	0.0	68.2	0.0	0.0	0.0	0.0	0.0	2.0	0.0	52.9	12.7	3.5	126.1	125.8	45.8	64.7	231.3
									Total forTerm									70.7						54.9						379.6	231.3
					Grand Total for Term					8,227.7								1,175.7						2,445.7						3,468.6	1,723.8

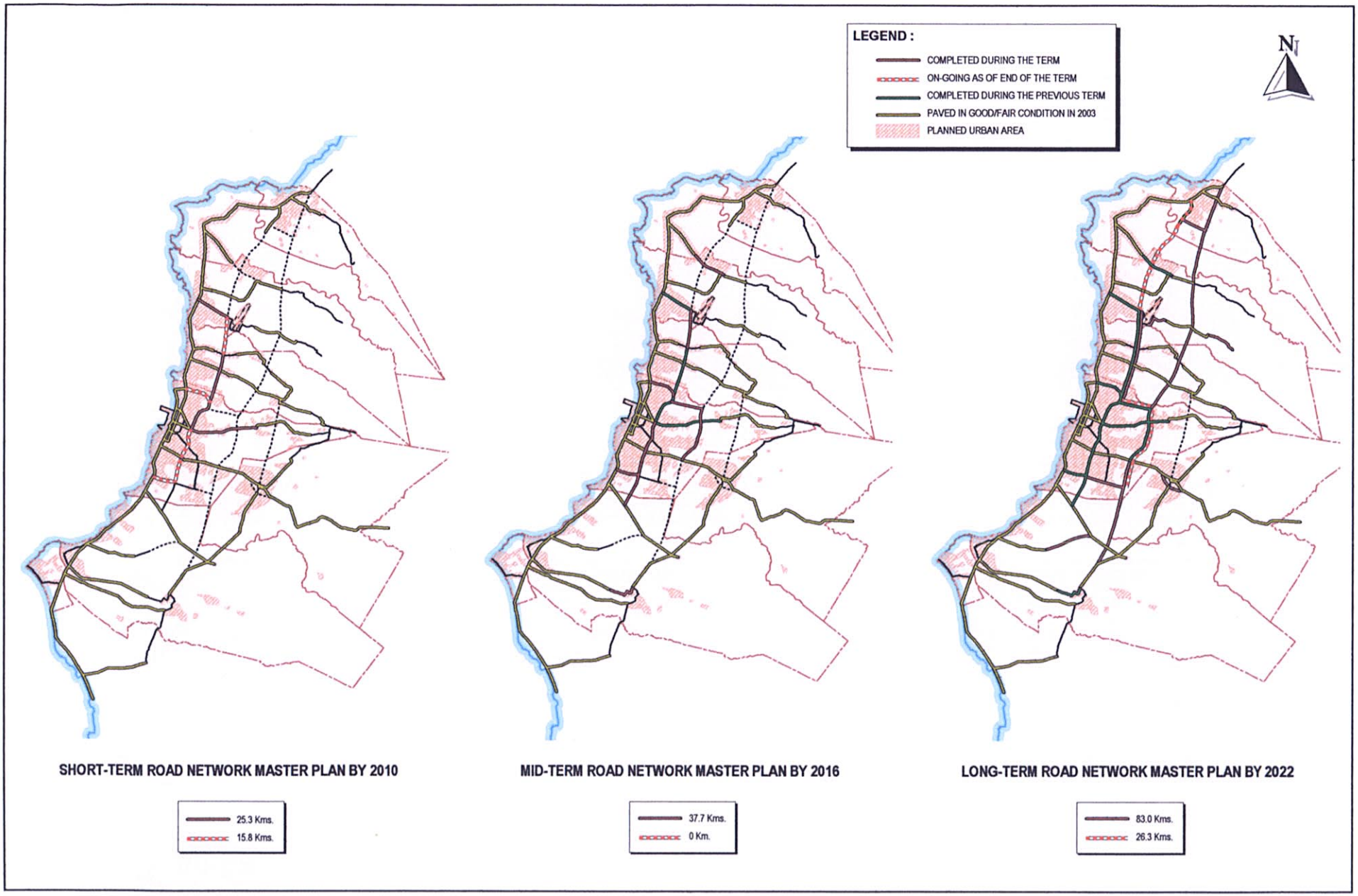

FIGURE 11.3-1 MASTER PLAN ROAD NETWORK : BACOLOD

11.4 EVALUATION OF ROAD NETWORK DEVELOPMENT MASTER PLAN

The Master Plan was evaluated from the following factors;

- Improvement of transport efficiency
- Economic viability
- Achievement of road network development objectives by Master Plan

11.4.1 Improvement of Transport Efficiency By Master Plan

Transport efficiency was evaluated on the following indicators by comparing "Do Nothing" Case with the Master Plan;

- PCU – Km (vehicle travel distance)
- PCU – hour (vehicle travel time)
- Average travel speed
- Congested road section length
- Vehicle operating cost

Traffic assignment was carried out for the final year of each term and shown in Figure 11.4-1 to 11.4-3.

Evaluation results of transport efficiency are shown in Table 11.4-1 and Figure 11.4-4, and concluded as follows:

a) Although reduction in PCU-Km is minimal, pcu-hours will be drastically reduced by about 50 to 59% in 2022, thus time saving is achieved by the Master Plan.

b) Average travel speed will be increased by about 51 to 60% in 2022 by the Master Plan.

c) Congested road section will be reduced by about 60% to 83% in 2022 by the Master Plan.

d) Drastic reduction in vehicle operating cost (VOC) is expected. VOC will be reduced to about 67% to 77% in 2022 by the Master Plan.

FIGURE 11.4-1 TRAFFIC ASSIGNMENT TO SHORT-TERM ROAD NETWORK MASTER PLAN (2010)

FIGURE 11.4-2 TRAFFIC ASSIGNMENT TO MEDIUM-TERM ROAD NETWORK

MASTER PLAN (2016)

FIGURE 11.4-3 TRAFFIC ASSIGNMENT TO LONG-TERM ROAD NETWORK MASTER PLAN (2022)

TABLE 11.4-1 TRANSPORT EFFICIENCY BY MASTER PLAN

Indicators	Area	Case	Short Term (in 2010)	Medium Term (in 2016)	Long Term (in 2016)
PCU-Kilometer ('000)	Whole Area	Do- Nothing	4,235 (1.00)	5,197 (1.00)	7,085 (1.00)
		Master Plan	4,135 (0.98)	4,991 (0.96)	6,299 (0.89)
	Inside BCCR	Do- Nothing	1,200 (1.00)	1,465 (1.00)	1,832 (1.00)
		Master Plan	1,161 (0.97)	1,326 (0.91)	1,465 (0.80)
PCU-Hour ('000)	Whole Area	Do- Nothing	128.7 (1.00)	175.2 (1.00)	286.8 (1.00)
		Master Plan	111.5 (0.87)	137.0 (0.78)	168.4 (0.59)
	Inside BCCR	Do- Nothing	35.6 (1.00)	48.5 (1.00)	74.1 (1.00)
		Master Plan	28.8 (0.81)	31.9 (0.66)	37.2 (0.50)
Average Travel Speed (km/hr)	Whole Area	Do- Nothing	32.9 (1.00)	29.7 (1.00)	24.7 (1.00)
		Master Plan	37.1 (1.13)	36.4 (1.23)	37.4 (1.51)
	Inside BCCR	Do- Nothing	33.7 (1.00)	30.2 (1.00)	24.7 (1.00)
		Master Plan	40.3 (1.20)	41.6 (1.38)	39.4 (1.60)
Congested Section Length (VCR>0.9)	Whole Area	Do- Nothing	46.9 (1.00)	65.7 (1.00)	115.9 (1.00)
		Master Plan	26.2 (0.56)	33.2 (0.51)	45.8 (0.40)
	Inside BCCR	Do- Nothing	13.6 (1.00)	18.2 (1.00)	33.0 (1.00)
		Master Plan	4.4 (0.32)	4.4 (0.24)	5.5 (0.17)
Vehicle Operation Cost (M. Peso)	Whole Area	Do- Nothing	7,382 (1.00)	9,541 (1.00)	13,780 (1.00)
		Master Plan	7,002 (0.95)	8,272 (0.87)	10,562 (0.77)
	Inside BCCR	Do- Nothing	2,135 (1.00)	2,953 (1.00)	4,274 (1.00)
		Master Plan	1,893 (0.89)	2,228 (0.75)	2,867 (0.67)

Note: Figure in the ( ) is Transport Efficiency Improvement Index vs Do-Nothing Case

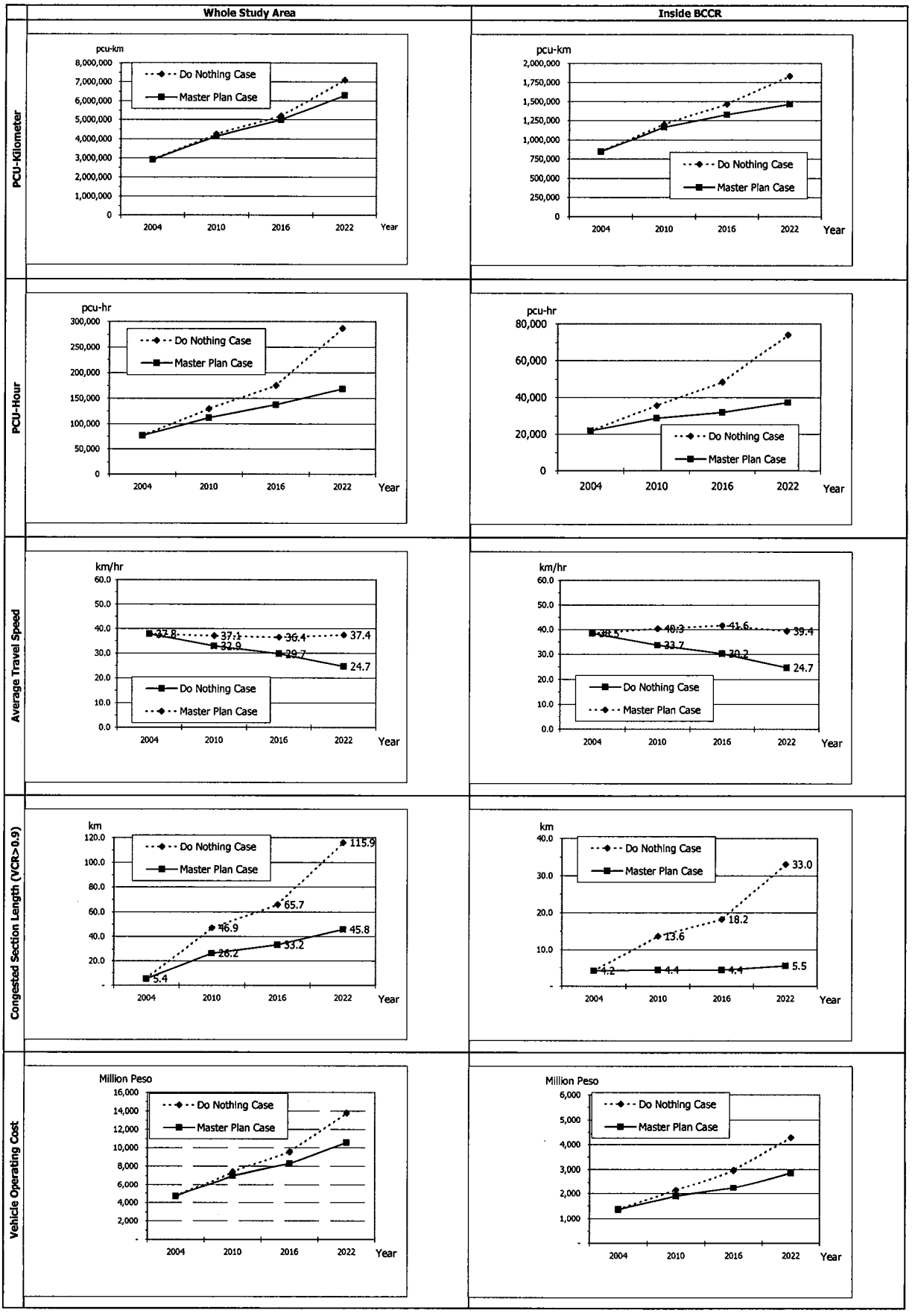

FIGURE 11.4-4 TRANSPORT EFFICIENCY IMPROVEMENT BY MASTER PLAN

11.4.2 Economic Viability

Economic viability of the Master Plan was evaluated in accordance with the assumptions and procedure presented in Appendix 11.4-1. Economic evaluation results were as follows:

	Net Present Value (Million Pesos)	B/C Ratio	EIRR (%)
Short Term Plan	3,702	6.41	59.3
Medium Term Plan	2,275	5.43	44.4
Long Term Plan	363	1.75	30.6
Whole Master Plan	6,913	5.11	61.7

Notes: 1) Project life was assumed to be 20 years
2) Discount rate at 15%

As shown above, the Master Plan was evaluated highly economically feasible.

11.4.3 Achievement of Road Network Development Objectives By the Master Plan

Prior to formulation of future road network development plan, road network development objectives were established. Whether the established objectives can be achieved by the Master Plan in each term was evaluated and summarized in Table 11.4-2.

It can be concluded that the Master Plan will successfully achieve the objectives of road network development.

TABLE 11.4-2 ACHIEVEMENT OF ROAD NETWORK DEVELOPMENT OBJECTIVES BY MASTER PLAN

Road Network Development Objectives	SHORT TERM (2005-2010)	MEDIUM TERM (2011-2016)	LONG TERM (2017-2022)
Physical Target	• New construction of new Airport Access Road (2-lane) • Widening of Bacolod-Granada Section • Widening of Bacolod Circumferential Road • Improvement of Silay-Guimbalan Road	• New construction of NS-2 South Road (2-lane) • New construction of Sugar Road North Section (Urban 4-lane) • New constructon of Bacolod Link Road (North) • New construction of Tanza-Poblacion Road (2-lane) • Improvement of Bago-Malingui Road	• New construction of sugar road North Section-Sub-urban Section (2-lane) • Widening of new airport access road to a 4-lane divided road • New construction of NS-2 North Road (2-lane) • New construction of Sugar Road-North Section (Sub-urban) (2-lane) • New construction of Sugar Road-South Section (Urban) (4-lane) • New construction of Sugar Road-South Section (Sub-urban) (2-lane) • New construction of Bacolod Link Road (South, 2-lane) • Improvement of Conception-Campuestuhan Road • New construction of Victorias Link Road (2-lane) • Improvement of Bago-Busay Road • New construction of Murcia Bypass
• Reduction of traffic congestion in the City Proper Area.	• Widening of Bacolod Circumferential Road will contribute to mitigation of traffic congestion in Bacolod City.	• Construction of Sugar Road North Section together with Bacolod Link Road (North) will contribute to mitigate traffic congestion in Bacolod City.	• Construction of Sugar Road-South Section together with Bacolod Link Road (South) will contribute to mitigate rather traffic congestion in Bacolod City.
• Road network which guide and support planned urban development.	• Planned urban development along Airport Access Road will be guided and accelerated by its construction.	• Planned urban development along NS-2 South Road and Sugar Road-North Section will be guided and accelerated by construction of these roads.	• Planned urban development along Sugar Road-South Section will be guided and accelerated by the construction of the road.
• Formation of flexible road network which provide alternative routes to road users.	• Construction of new Airport Access Road will provide alternative routes for road users especially new airport users, thus road network to the North becomes highly flexible.	• Completion of NS-2 South Road and Sugar Road-North Section will provide with alternative routes to choose, thus road network becomes highly flexible.	• In addition to Medium-Term situation, north-south traffic will have three alternative routes for selection.
• Road network which contribute to the economic development in the Study Area as well as its hinterland.	• Due to improvement of accessibility and less transport cost, the economic development along the corridor of Airport Access Road will be accelerated.	• In addition to Airport Access Road corridors, economy along NS-2 sourth road and Sugar Road - North Section will be stimulated.	• Overall transport efficiency in the Study Area will be improved which will contribute to economic development in the Study Area as well as its hinterlands.
• Road network which enhance international and domestic investment in the Study Area as well as its hinterland.	• Due to improvement of accessibility to the Silay Industrial Estates, more local / international investors will be attracted.	• Sugar Road will provide another route of access road to the Silay Industrial Estates, more local / international investors will be attracted.	• Efficient transport linkage between industrial estates and transport facilities (an airport and a port) will attract more local / foreign investors.
• Road network which will realize expected investment effects of related project.	• Accessibility to New Airport and the International Port will be improved, thus economic return of investment to these project will be realized.	• Due to improvement of accessibility to new Bacolod Airport by NS2-North Road, intended effects and investment return of the new airport project will be realized as planned.	• Widening of new airport access road will improve accessibility to the Bacolod International Port.
• Road network development with environmental and social consideration.	• Relocation of affected families and ROW acquisition must be so undertaken that adverse social impact will be minimized.	• Same as Short-Term	• Same as Short-Term

11.5 PROPOSED ADMINISTRATIVE CLASSIFICATION AND IMPLEMENTING AGENCY

As discussed in "Section 11.1 Financial Framework", funding capacity for road development of LGUs is quite limited, thus LGUs can not make investment for large scale projects such as new road construction. It is recommended that new road construction be implemented by DPWH. Widening, improvement and rehabilitation of existing roads should be implemented by presently responsible agency.

Present Classification	Proposed Administrative Classification	Proposed Implementing Agency
None (new road)	National Road	DPWH
National Road	National Road	DPWH
Provincial Road	Provincial Road	Provincial Government
City Road	City Road	City Government

In order to reduce maintenance burden of DPWH, the following roads are recommended to be turned over to Bacolod City after the project is completed:

- Bacolod – Granada Road
- Bacolod Link Road (North)
- Bacolod Link Road (South)

11.6 ROAD MAINTENANCE PLAN

11.6.1 Estimated Road Maintenance Cost

1) Unit Rate Of Maintenance

Unit rate of maintenance is shown in Table 11.6-1.

TABLE 11.6-1 UNIT RATE OF MAINTENANCE ACTIVITY

Maintenance Definition	Activity	Unit Rate (Economic)	Unit Rate (Financial)
I. Routine Maintenance			
	1.Vegetable control	21,279.10 *P/km*	25,950.62 *P/km*
	2.Clearing and repair of culverts	6,845.27 *P/km*	10,792.68 *P/km*
	3.Replace, clean and repair traffic signs	4,808.83 *P/km*	6,282.67 *P/km*
	4.Clearing side ditches	11,273.51 *P/km*	15,418.86 *P/km*
	Total per annum	**44,206.71 P/km**	**58,444.83 P/km**
II. Periodic Maintenance			
	1.Gravel (Surface)	2,485.27 *P/m3*	2,968.48 *P/m3*
	1.1 Regrade and reshape gravel	12.00 *P/m2*	16.41 *P/m2*
	a. Traveled way (carriage way)	20.17 *P/m2*	27.61 *P/m2*
	b. Shoulder	83.75 *P/m2*	107.73 *P/m2*
	2. Resurfacing	248.35 *P/m2*	316.51 *P/m2*
	a. DBST (SST)	389.73 *P/m2*	495.00 *P/m2*
	b. AC (3cm)	575.92 *P/m2*	728.17 *P/m2*
	3. Overlays	711.06 *P/m2*	897.74 *P/m2*
	a. AC (5cm)	3,626.50 *P/m2*	4,732.20 *P/m2*
	b. AC (8cm)	3,336.24 *P/m2*	4,353.45 *P/m2*
	c. AC (10cm)	2,901.20 *P/m2*	3,785.76 *P/m2*
	4. Replacement of failed bays	2,766.86 *P/m2*	3,595.90 *P/m2*
	a. t=250mm	2,610.87 *P/m2*	3,406.91 *P/m2*
	b. t=230mm	31,785.12 P/km	42,818.06 P/km
	c. t=200mm	2,386.81 *P/m3*	2,834.42 *P/m3*
	d. t=190mm	687.75 *P/m2*	842.90 *P/m2*
	e. t=180mm	127.80 *P/m2*	168.54 *P/m2*
	5. Repair cracks/joints	188.60 *P/m2*	245.52 *P/m2*
	6. Patching and potholes repair	856.32 *P/m2*	1097.98 *P/m2*
	a. Pothole repair (Gravel)	107.62 *P/m2*	140.25 *P/m2*
	b. Pothole repair (DBST)	602.15 *P/m2*	785.09 *P/m2*
	b.1 Repair (DBST)	588.93 *P/m2*	767.08 *P/m2*
	b.2 Sealing (DBST)	1026.13 *P/m2*	1,302.10 *P/m2*
	b.3 Patching (DBST)	28.63 *P/lm*	34.60 Pllm

Source: DPWH, April 2003

2) Routine Maintenance and Minor Repair Cost

Maintenance cost by pavement type is estimated by adopting the above cost estimate. Table 11.6-2 presents the annual maintenance costs including routine maintenance and minor repair cost.

TABLE 11.6-2 ANNUAL ROUTINE AND MINOR REPAIR COST

Unit: peso/km/year

Pavement (PCC)		Pavement (AC)		UnPaved (Gravel)	
Good	Bad	Good	Bad	Good	Bad
84,482	153,545	94,850	221,104	98,002	169,298

The cost estimate is mostly same as base cost of Equivalent Maintenance Kilometer (EMK) estimated by DPWH (EMK=82,000 peso in 2003). Since new maintenance cost estimate has not been established, the Study will apply the above cost.

3) Rehabilitation Cost

Overlay on the new road is considered as rehabilitation after 10 year opening. The following cost will be adapted.

TABLE 11.6- 3 OVERLAY COST

Overlays	Unit	Economic Cost (Peso)	Financial Cost (Peso)
a. AC (5cm)	P/m2	389.73	495.00
b. AC (8cm)	P/m2	575.92	728.17
c. AC (10cm)	P/m2	711.06	897.74

11.6.2 Road Maintenance Plan

In progress of implementing the master plan, maintenance cost will be increased by addition of lengths of new roads. Table 11.6-4 summarizes the annual increase of maintenance cost by administration.

TABLE 11.6-4 MAINTENANCE EXPENDITURE (1000 PESO)

Term	Year	DPWH	Term Total	Province	Term Total	City/ Municipality	Term Total
Short-Term (2005~2010)	2006	0		0		0	
	2007	0		0		0	
	2008	0		0		0	
	2009	0		0		0	
	2010	0	0	0	0	0	0
Medium-Term (2011~2016)	2011	0		0		0	
	2012	862		0		0	
	2013	862		0		0	
	2014	862		0		0	
	2015	1183		0		0	
	2016	2137	5905	0	0	0	0
Long –Term (2017~2022)	2017	2137		287		0	
	2018	2137		287		0	
	2019	2137		287		0	
	2020	3531		287		0	
	2021	41906	(Rehabilitation)	287		0	
	2022	6563	58413	287	1723	596	596
After 2023 (Annual cost)	2023	7425	7425	287	287	596	596

11.6.3 Requirement of Total Maintenance Expenditure

(1) Requirement of Total Maintenance Expenditure

Requirement for total maintenance expenditure for the road network in Metro Bacolod is estimated as follows.

TABLE 11.6-5 REQUIREMENT OF TOTAL MAINTENANCE EXPENDITURE

Unit:1000 peso

Administration	Annual Cost		Maintenance Expenditure			Annual Cost (After2023)
	Road	Bridge	Short Term (2005~2010)	Medium Term (2011~1016)	Long Term (2017~2022)	
National	27,575	827	170,413	176,318	228,826	35,827
Province	4,521	136	27,941	27,941	29,664	4,944
City	16,309	489	100,789	100,789	101,385	17,394
Barangay	1,081	32	6,679	6,679	6,679	1,113
Total	**49,486**	**1485**	**305,823**	**311,728**	**366,554**	**59,278**

(2) Maintenance Capacity Building for LGU

Besides budgetary arrangement, capacity building for road and bridge maintenance to LGU is required by organizing periodic seminar and training for technical staff in the province, city and municipality engineer's offices from DPWH staff. Major training issues are;

- Maintenance operation management;
- Contract management; and
- Engineering technology update.

11.7 TRAFFIC MANAGEMENT PLAN

Traffic management issues are identified and recommended measures are presented in the preceding sections. Some of the improvement measures require time to implement and some take time before tangible effect is observed. Among the recommended measures, those that can be implemented immediately are presented here with the tentative list of target intersections and road sections.

These measures are intended to enhance the efficiency and safety of traffic in the study area by regulating the flow. More specific objectives of the works are to reduce the traffic accident along Lacson Street and improve traffic circulation in CBD. The latter objective involves the review and modification of current one-way system, which in turn requires turning movement count survey and intersection inventory survey. The task is, however, beyond the scope of the study and left for the future study.

1) Geometric Improvement

Intersection geometric improvement work modifies intersection geometry. Basic objectives of the work are to:

- Regulate and guide traffic movement at intersection by such facilities as median and island
- Provide left turn lane to the intersection where left turn volume is high and intersection geometry permits it.
- Provide or improve sidewalk for better pedestrian environment

A total of 22 intersections and a stretch of Lacson Street between Magsaysay and Circumferential Road are tentatively selected for the work as listed below and shown in Figure 11.7-1. Intersection inventory survey and turning volume count survey must be conducted. Then geometric improvement work can be designed based on the analysis of the collected data.

Geometric Improvement Intersections

	Intersection		Median	Island	Left turn lane	Side-walk	Pavement	Others
1	Araneta	Magsaysay	O		O			
2	Araneta	Lizares	O		O			
3	Araneta	Libertad	O		O			
4	Araneta	Luzuriaga				O		
5	Lacson	Magsaysay	O		O	O	O	
6	Lacson	Circum.	O		O	O		
7	Lacson	Sabi	O					
8	Burgos	Hidalo	O		O			
9	Burgos	Lopes Jaena	O					
10	Burgos	Circum.	O		O			
11	Aquino Dr.	Lopes Jaena	O	O				
12	Hidalo	6th	O					
13	Libertad	Mabini		O				
14	Libertad Ext.	Taculing	O			O		
15	Libertad Ext.	Circum.	O			O		
16	Libertad Ext.	Murcia		O		O		
17	Circum.	Montelibano	O		O	O		
18	Circum.	Murcia	O			O		
19	Araneta	Hidalo				O	O	
20	Araneta	Tomaro				O	O	
21	Araneta	Abuanan	O		O	O		
22	Araneta	Napales	O		O		O	
23	Lacson		O					

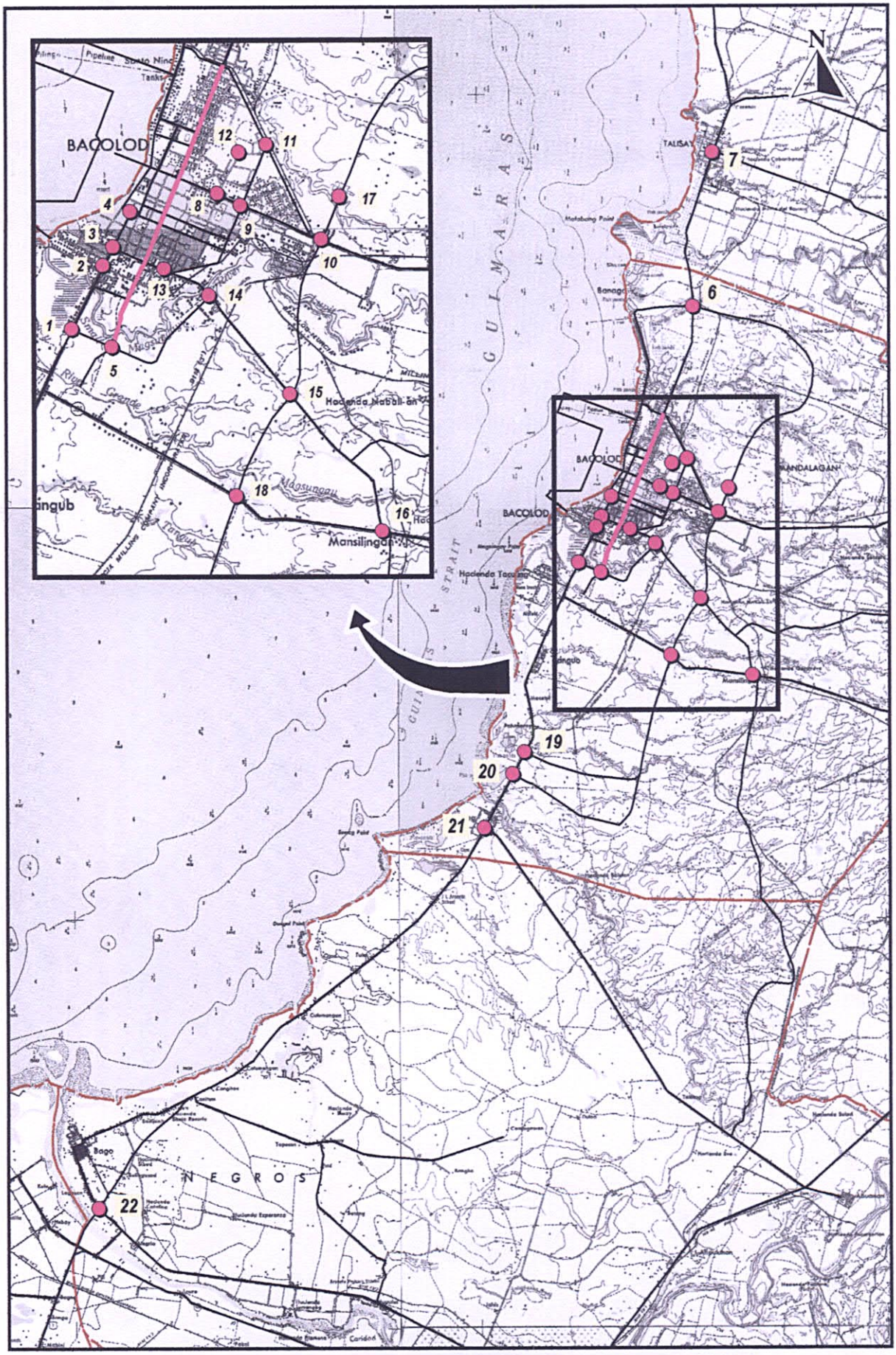

FIGURE 11.7-1 GEOMETRIC IMPROVEMENT INTERSECTION

In addition to the geometric improvement work at intersections, median will be provided along Lacson Street between Magsaysay Avenue and Circumferential Road. Construction of median is intended to reduce the accident along Lacson Street, which is the most accident prone street in Metro Bacolod area.

2) Traffic signal

Traffic signal is a basic tool to control right-of-way at intersection, where conflicting movements cross each other. There are at the moment six (6) traffic signals in Bacolod City but two of them are not operating. The proposed work will repair or replace the malfunctioned signals and signal timing will be adjusted for the working signals. Modification of inadequate phase sequence is necessary at two signals as pointed out earlier. In addition, 15 signals will be newly installed (see Figure 11.7-2). It is noted, however, these new signal intersections are selected without signal warrant analysis. Turning movement count survey must be conducted and signal warrant must be checked before the final selection of intersections for signalization. Besides, more intersections would be added to the list or some would be dropped as a result of the review and modification of one-way system in CBD.

Traffic Signal Intersections

	Intersection of			Signal	
	Street 1	Street 2	New	Repair	Modification
1	Lacson	Burgos			O
2	Lacson	Galo		O	
3	Lacson	Rizal			O
4	Lacson	Libertad			O
5	Lacson	Aquino Dr.			O
6	Araneta	Libertad		O	
7	Araneta	Luzuriaga	O		
8	Gatuslao	Luzuriaga	O		
9	Gatuslao	Rizal	O		
10	Lacson	Circum.	O		
11	Lacson	17th St.	O		
12	Lacson	Lizares	O		
13	Araneta	Lizares	O		
14	Burgos	Hilado	O		
15	Burgos	Lopes Jaena	O		
16	Burgos	Circum.	O		
17	Aquino Dr.	La Salle	O		
18	Aquino Dr.	Hilado	O		
19	Aquino Dr.	Lopes Jaena	O		
20	Libertad	Taculing	O		
21	Araneta	Magsaysay	O		

3) Pavement Markings

Some arterial streets in Metro Bacolod have still visible center line and pedestrian crossing marking is functioning at some intersections. But these are exceptions and many roads do not have marking at all. Such situation seems to contribute disorder of the traffic in the area. Another shortcoming is that the existing markings, in particular design of pedestrian crossing and dimension and location of directional arrow symbols, do not conform to the national standards.

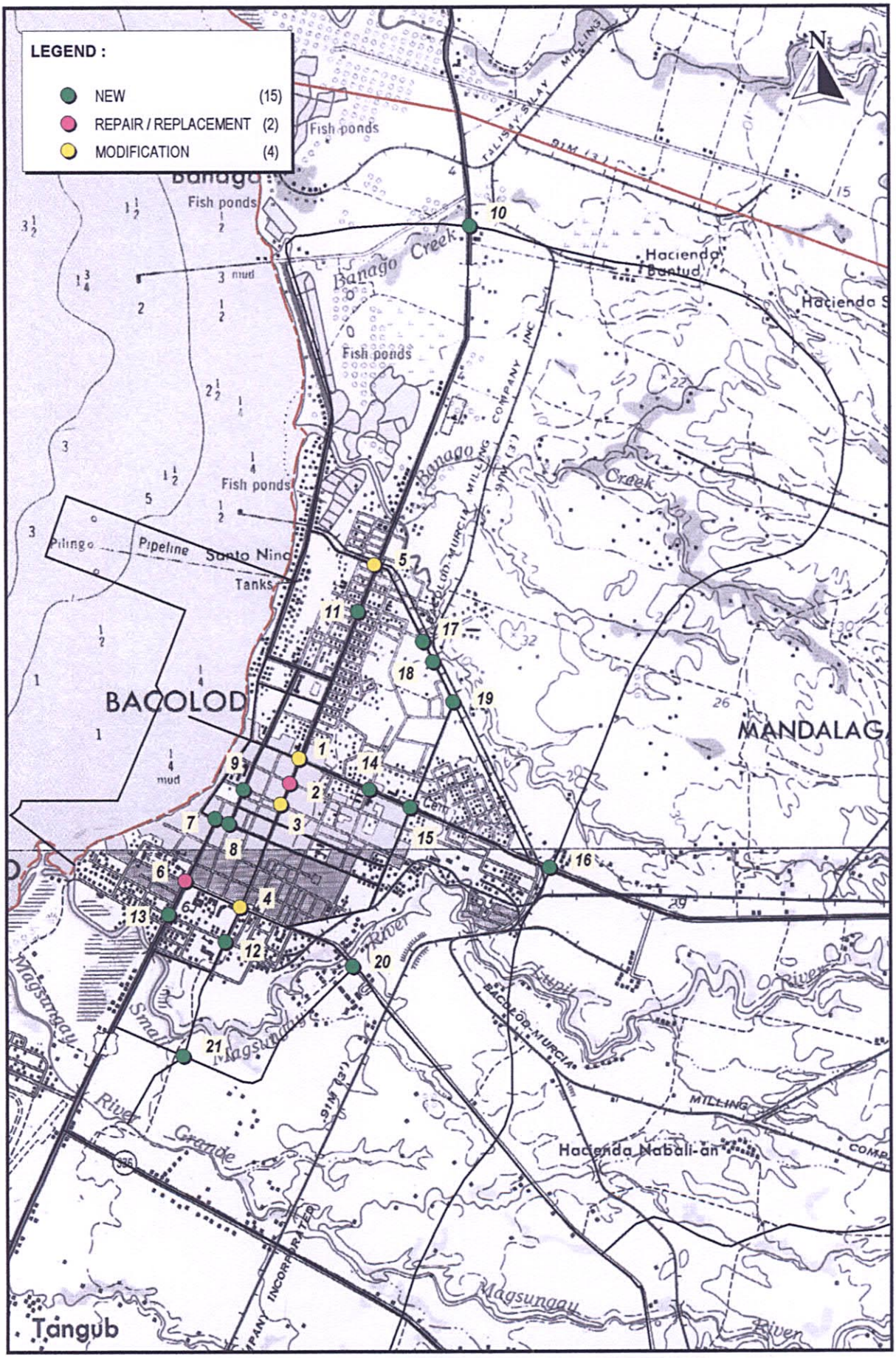

FIGURE 11.7-2 TRAFFIC SIGNAL INTERSECTIONS

Arterial streets within the outer central area are selected for pavement marking. The total road length is 34.9 km covering 44 sections of 22 roads and 99 intersections as shown in the table below and in Figure 11.7-3. Center line, lane line, stop line, directional arrow and pedestrian crossing will be drawn. Reflective thermoplastic pavement marking materials shall be applied with the standard thickness of 2.0 mm.

Road Sections for Pavement Marking Work

	Street Name	From	To	Length (m)	Lane	Median	Oneway
1	Lacson	Magsaysay	Burgos	2,300	4		
2	Lacson	Burgos	Circum.	3,920	4		
3	Araneta	Gonzaba	San Sebastian	310	4		Y
4	Araneta	San Sebastian	Murcia	2,300	4		
5	San Juan	Rosario	Gonzaga	350	4		
6	San Juan	Gonzaga	Rizal	280	4		Y
7	San Juan	Rizal	Burgos	330	4		
8	Gatuslao	Libertad	San Sebastian	300	4		
9	Gatuslao	San Sebastian	Rizal	460	4		Y
10	Gatuslao	Rizal	North Capital	920	4		
11	Locsin	Libertad	Gonzaga	630	4		
12	Locsin	Gonzaga	Galo	280	4		Y
13	Locsin	Galo	Burgos	150	4		
14	Mabini	Lizares	Market	160	4		
15	Mabini	Market	Libertad	100	4		Y
16	Mabini	Libertad	Galo	950	4		
17	Hilado	Rizal	Aquino Dr.	1,360	4		
18	Lopes Jaena	Libertad	Aquino Dr.	2,100	4		
19	Aquino Dr.	Lacson	Lopes Jaena	1,100	4	Y	
20	Aquino Dr.	Lopes Jaena	Burgos	1,150	2		
21	North Capital	Lacson	Gatuslao	250	4		
22	6th Street	Lacson	Hilado	450	4	Y	
23	6th Street	Hilado	Aquino Dr.	600	4		
24	South capital	Lacson	Gatuslao	250	4		
25	Burgos	San Juan	Circum.	2,380	4		
26	Galo	San Juan	Locsin	270	4		Y
27	Galo	Locsin	Lopes Jaena	1,020	4		
28	Rizal	San Juan	Gatuslao	160	4		Y
29	Rizal	Gatuslao	Lopes Jaena	1,160	4		
30	Gonzaga	San Juan	Gatuslao	210	4		Y
31	Gonzaga	Gatuslao	Lacson	270	4		Y
32	Gonzaga	Lacson	Lopes Jaena	860	4		
33	Luzuriaga	San Juan	Lacson	530	4		Y
34	Luzuriaga	Lacson	Lopes Jaena	850	4		
35	San Sebastian	San Juan	Gatuslao	270	2		Y
36	San Sebastian	Gatuslao	Lopes Jaena	1,020	4		
37	Rosario	San Juan	Araneta	170	2		
38	Rosario	Araneta	Gatuslao	140	2		Y
39	Rosario	Gatuslao	Lopes Jaena	820	4		
40	Libertad	Araneta	Mabini	720	4		
41	Libertad	Mabini	Lopes Jaena	120	4		Y
42	Libertad	Lopes Jaena	Circum.	1,690	4		
43	Lizares	Araneta	Mabini	710	4		
44	Magsaysay	Araneta	Lacson	540	4		

4) Traffic Sign

Another shortcoming in terms of traffic management facility in Bacolod area is that there are only few standard traffic regulatory signs. Temporary and make shift signs, which are less visible and less effective in enforcement, are often used instead. Whether on-street parking is allowed or not is not clear at many road sections, for example. Traffic signs for parking regulation, speed limit, one-way, no entry, turn restriction, loading/unloading zone, etc. must be extensively installed. The target road sections and intersections will be same as those for pavement markings.

5) Cost Estimates

Cost for implementing these improvement works is estimated. The table below presents the estimated costs. It is pointed out that the cost at this stage is very rough as the target intersections and road sections are tentative and scope of work is not defined.

Estimated Cost for Traffic Management Improvement Works

	Improvement Measure	Cost ('000 Pesos)	Remarks
1.	Geometric improvement	21,354	22 intersections and 1 road (Lacson)
2.	Traffic signal	44,869	6 existing signals and 15 new signals
3.	Pavement marking	34,340	44 road sections and 99 intersections with total length of 34.9 km
4.	Traffic sign	1,541	602 traffic signs. Project sites are same as pavement marking
	Total	**102,111**	

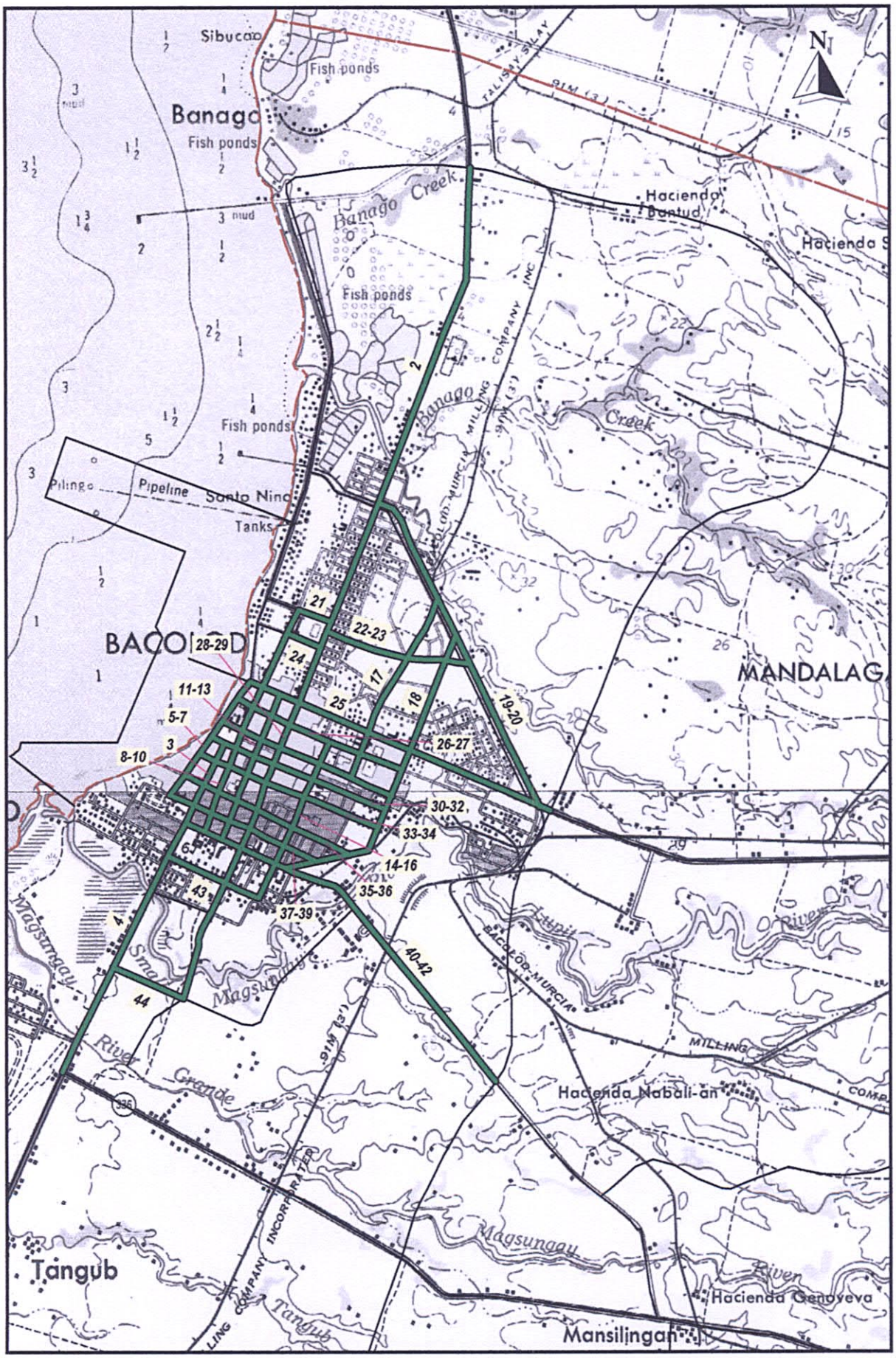

FIGURE 11.7-3 ROAD SECTION FOR PAVEMENT MARKINGS & TRAFFIC SIGNS

11.8 Measures to be Taken for Inside Area of Bacolod Circumferential

New road construction as well as widening of existing roads inside area of Bacolod Circumferential Road (BCR) is extremely difficult due to expansion of built-up areas and heavy roadside development. Master Plan recommended measures other than road development. If other measures are not implemented, some road sections within BCR area will suffer heavy traffic congestion as shown in Figure 11.4-3, even after completion of the Master Plan. Some of measures to be undertaken are discussed hereunder.

1) Control of further urban development within the presently urbanized area and shifting urbanization towards outside area of BCR

- The City Government should control further development within the presently urbanized area
  - control of high-rise building
  - control of new commercial establishment
- The City Government should accelerate urbanization outside BCR, particularly at priority development zones identified by the City
  - some government / public facilities should be transferred to outside BCR
  - bus / jeepney terminals together with public market should be developed along the BCR corridor
  - the City Government should guide investors to promote urbanization outside areas of BCR

2) Full Utilization of Existing Road Stocks

As presented in 11.7 "Traffic Management Plan", efficient traffic management should be implemented and strict enforcement of traffic rules and regulations should be exercized.

3) Gradual Modal Shifting from Jeepney to Bus

Modal shifting from jeepney to bus transport should be implemented. Jeepneys should be gradually shifted to feeder transport services.

If all jeepney services are converted to bus services along major arterial roads, traffic congestion will be drastically reduced as shown in Figure 11.8-1.

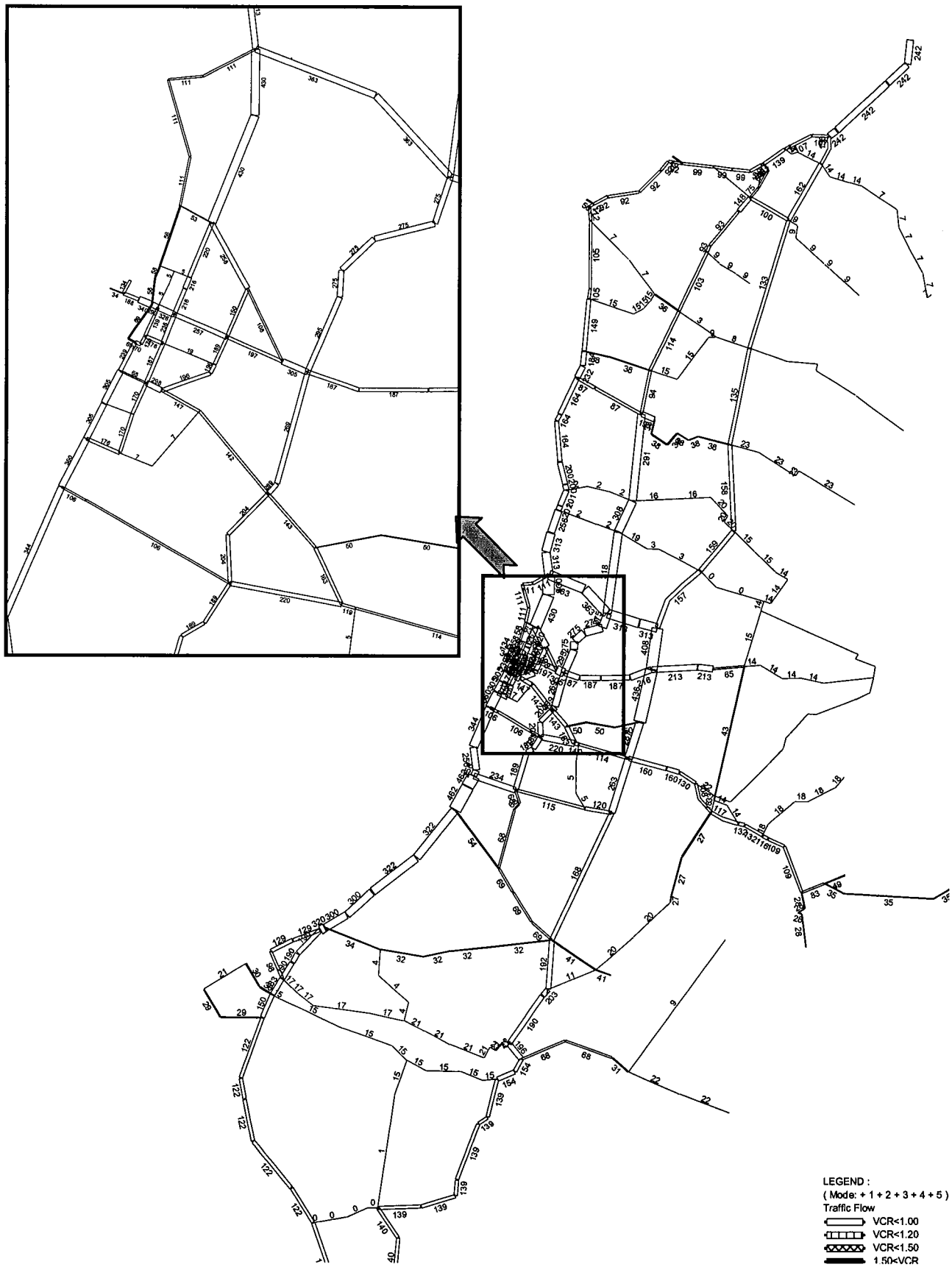

FIGURE 11.8-1 TRAFFIC ASSIGNMENT IN METRO BACOLOD-2022

(Modal Shifting from Jeepney to Bus)

11.9 SELECTION OF ROAD PROJECTS FOR F/S

Road projects subjected to a feasibility study under this Study are selected in this section.

1) Selection Criteria

Selection criteria were established as follows:

- Implementation priority is high and the project is planned to be implemented in the Short Term or early part of Medium Term.
- Proposed road right-of-way needs to be determined as early as possible, so that any development within the proposed road right-of-way can be controlled, then future ROW acquisition can be done without affecting structures and houses.
- The road project is vitally needed to support on-going related projects.
- The road project is expected to be implemented by DPWH.

2) Selection of Road Projects for F/S

Candidate road projects selected based on above criteria were as follows:

Candidate Projects for F/S

- New Airport Access Road (NS-2)
- Bacolod-Granada Road (BC-2)
- Bacolod Circumferential Road (BC-3)
- Silay-Guimbalaon Road up to New Airport (SI-1)
- NS-2 South Road
- Sugar Road : North Section (NS-3)
- Bacolod Link Road : North (BC-4)

Assessment of candidate projects are shown in Table 11.1-1. It is recommended that the following projects be selected for feasibility study under this Study:

Recommended Road Projects for F/S

• New Airport Access Road (NS-2)	L = 10.2 km
• Sugar Road : North Section (NS-3)	L = 33.8 km
Total	**L = 44.0 km**

Location map of road projects for F/S is shown in Figure 11.9-1

TABLE 11.9-1 ASSESSMENT OF CANDIDATE PROJECTS

Candidate Projects	Road Length (Km)	Type of Work	Assessment	Recommendations
1) New Airport Access Road (NS-2)	10.2	New Construction	• New airport will be opened in 2008. • Road alignment and ROW need to be determined.	◎
2) Bacolod - Granada Road (BC-2)	11.0	Widening of existing road	• PMO-FS has already undertaken a feasibility study.	—
3) Bacolod Circumferential Road (BC-3)	15.4	Widening of existing road	• Over 600 houses affected, detailed social impact study needed. • Technical study is not difficult.	—
4) Silay - Guimbalaon Road up to New Airport (SI-1)	4.5	Improvement of existing road	• City road • No full scale F/S needed • Implementation by City or DOTC recommended.	—
5) NS-2 South Road	3.8	New Construction	• Road alignment and ROW need to be determined, but beginning point is fixed, thus alignment study is not difficult.	—
6) Sugar Road: North Section (NS-3)	33.8	New Construction	• Road alignment and ROW need to be determined.	◎
7) Bacolod Link Road: North Section (BC-4)	4.3	New Construction	• Road alignment and ROW need to be determined. • Short road, thus alignment study and technical study are not difficult.	—
			Road Length for F/S (Km)	44.0

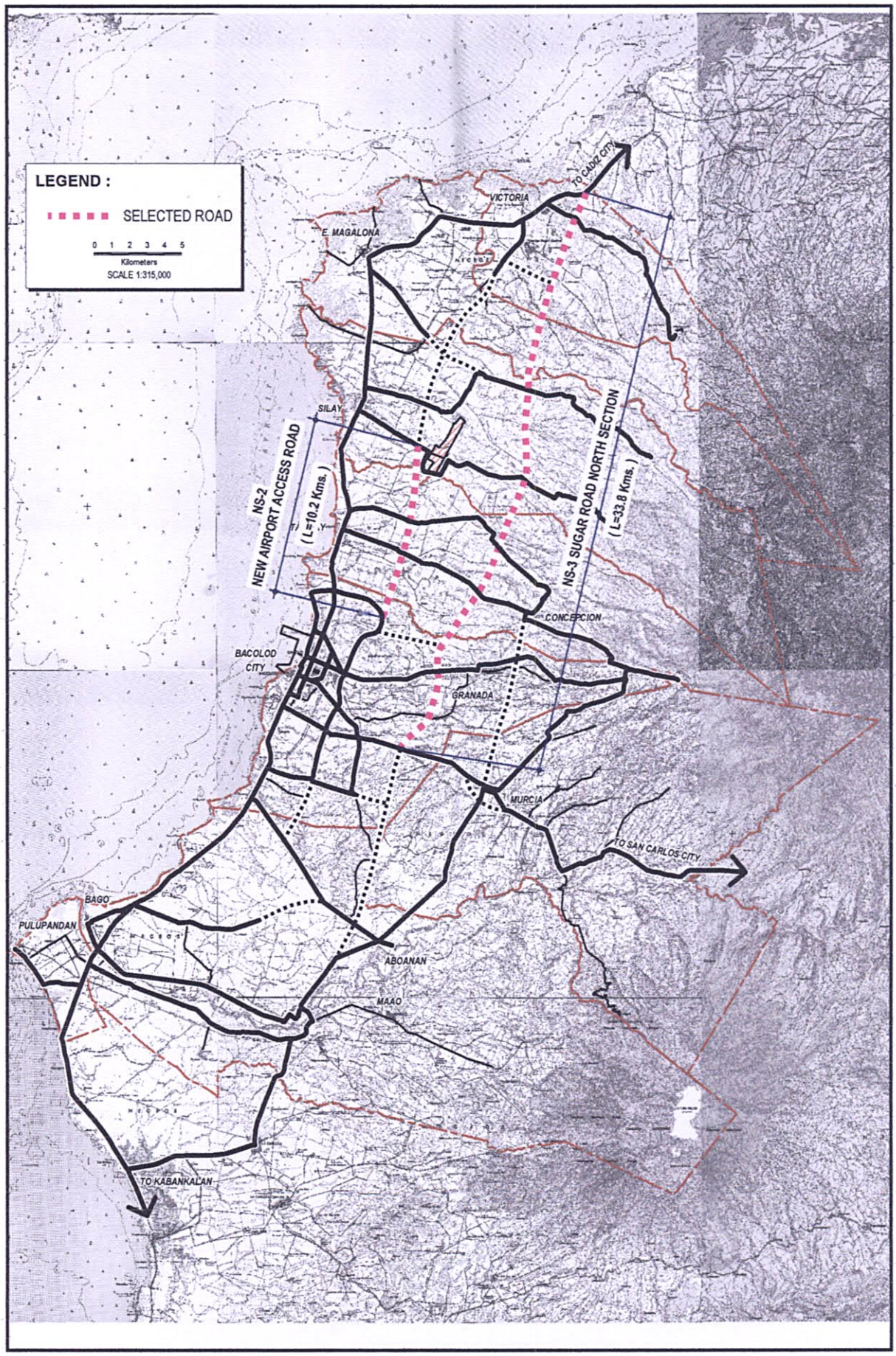

FIGURE 11.9-1 SELECTED ROAD PROJECT FOR F/S