CHAPTER 8

FUTURE LAND USE PLAN AND SOCIO-ECONOMIC FRAMEWORK

8.1 FUTURE URBAN DEVELOPMENT VISIONS AND STRUCTURE

8.1.1 Possible Future Development Patterns

As described before, the existing physical urban structure of Metro Bacolod is a rosary pattern focused to the metropolitan center, Poblacion of Bacolod City. This urban structure is giving rise to traffic congestion on the NS-1 (Bacolod Coastal Road) and on streets within the CBD.

For dealing with the existing and future urban problems anticipated, the following three development patterns are presented as shown in Figure 8.1-1.

a. Local Community Development Pattern
b. Airport Axis Development Pattern
c. Sugar Road Development Pattern

1) Local Community Development Pattern

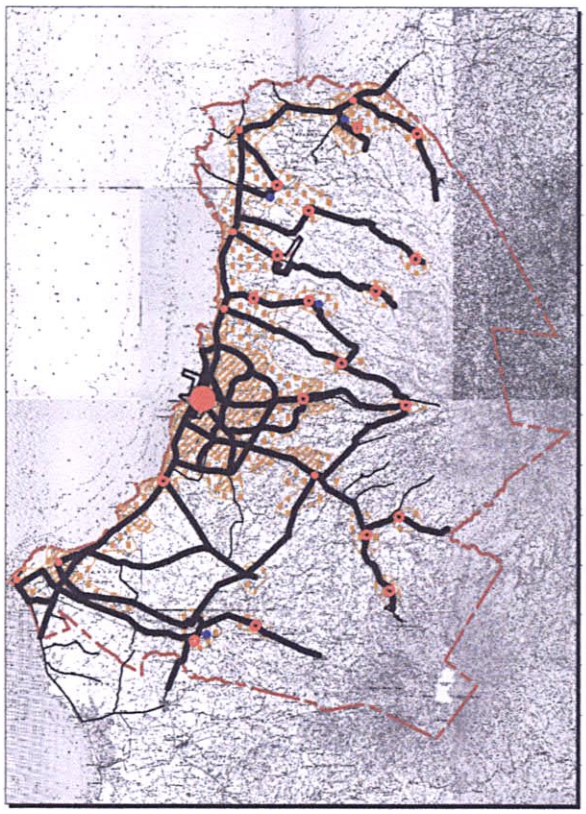
This development pattern intends every city/municipality to make efforts independently to improve the road network under its jurisdiction and to render better public services to the local residents. All barangays are connected with the poblacion or the market place by a paved road network. Public service facilities with enough manpower and equipment are located at main barangay centers.

In addition, the local government tries hard to attract industrial or commercial investments, intending to expand job opportunities of local residents.

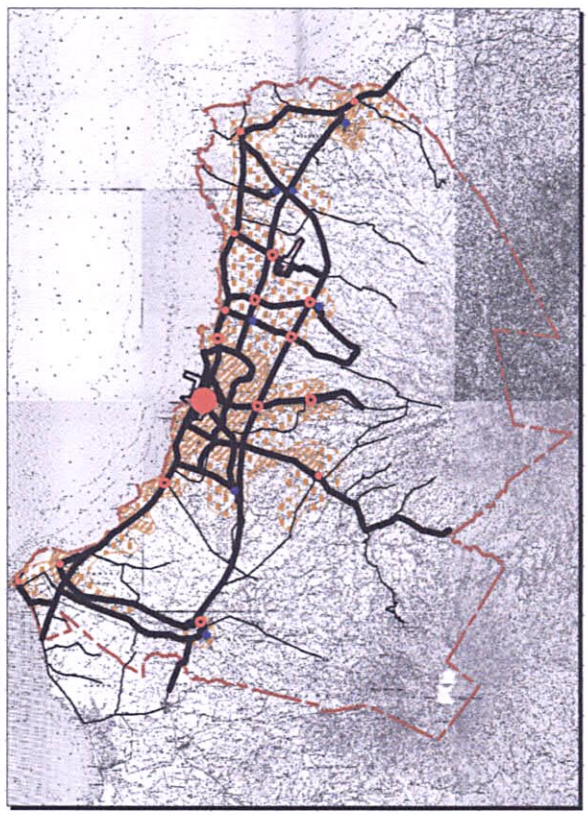
2) Airport Axis Development Pattern

This development pattern is to develop an urban axis between the proposed new airport and Bacolod City. According to the present plan, the new airport located in Silay City will be connected with Bacolod City through NS-1 (Bacolod Coastal Road) and SI-1 (Silay-Guimbalaon Road).

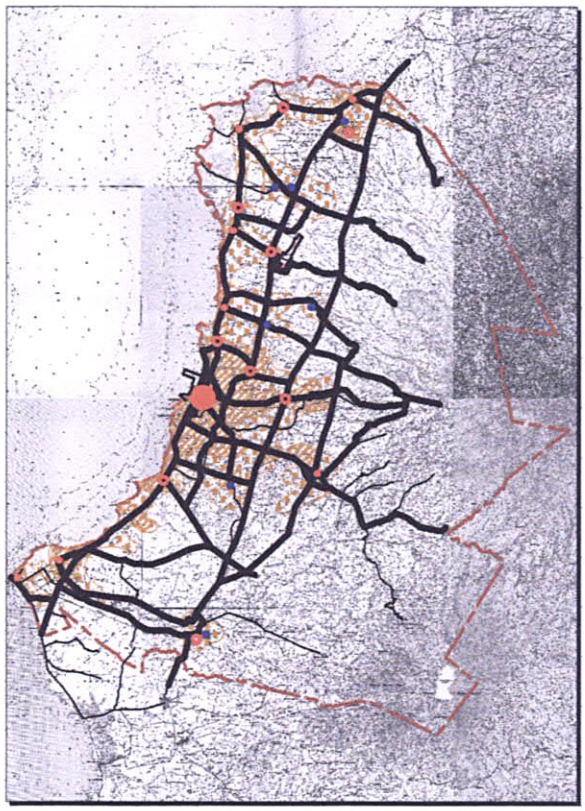
Along this corridor subdivisions are developed in Talisay City and new commercial centers are being formed in Silay City and Talisay City. In addition, Talisay City plans to develop a new industrial zone along TA-1 (Talisay-Concepcion Road). However, population densities of subdivisions are very low and the planned industrial area is still vacant. The new airport is expected to attract more residents, commercial/service establishments and industries.



ALTERNATIVE 1 : MUNICIPAL
COMMUNITY DEVELOPMENT PATTERN



ALTERNATIVE 2 : AIRPORT AXIS
DEVELOPMENT PATTERN



ALTERNATIVE 3 : SUGARCANE ROAD
DEVELOPMENT PATTERN

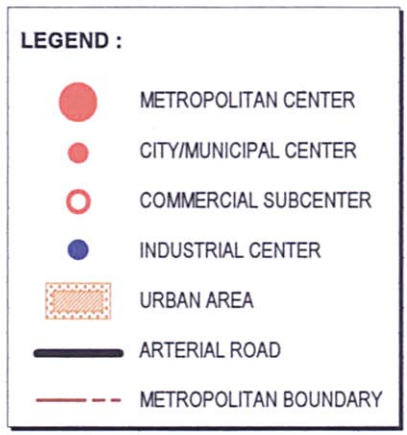


FIGURE 8.1-1 FUTURE URBAN STRUCTURE ALTERNATIVES OF METRO BACOLOD

By constructing a new airport access road (NS-2), the transport conditions of Bacolod City-Talisay City-Silay City-Airport axis will be improved greatly. To alleviate the present traffic congestion in Bacolod City's CBD, some governmental offices at the national and provincial levels shall be relocated to Priority Development Areas (PDAs) planned within Bacolod City along the axis.

3) Sugar Road Development Pattern

As described in 1.3.1, the existing urban structure of Metro Bacolod is a rosary pattern connected by only one trunk road of NS-1. This pattern causes traffic congestion in Bacolod City's central area, and slow-down of travel speed on NS-1 due to slow and heavy large trucks of sugarcane transportation. For the improvement of this situation, construction of parallel roads with economic activities along them and through traffic lanes for sugarcane trucks will be effective. Two new parallel roads are to be constructed with the improvement of existing east-west arterial roads, in order to form a ladder road network pattern in Metro Bacolod.

The second north-south road (NS-2) will be constructed from BC-3 (Bacolod City Circumferential Road) to Victorias City through the new airport northwards, and to the south until BG-1 (Sumag-Abuanan Road).

The third north-south road (NS-3: Sugar Road) will be constructed from Bago City to Victorias City through sugarcane haciendas located in the eastern part of LGUs within Metro Bacolod. Along this road, especially in Bacolod City, commercial/institutional centers shall be developed (including PDAs).

8.1.2 Selection of Future Urban Development Pattern

The presented three urban development patterns have their respective reasons for being. In this section, an evaluation result of them is shown. From the standpoint of project formation intending to achieve the respective future urban pattern under the limited financial capacity, the evaluation is carried out based on the project evaluation method used in the Project Cycle Management (PCM), which is adopted by JICA. Table 8.1-1 shows the evaluation result.

TABLE 8.1-1 EVALUATION OF THREE URBAN DEVELOPMENT PATTERNS

	Local Community Development Pattern	Airport Axis Development Pattern	Sugar Road Development Pattern
Relevance	In accordance with the policies for poverty alleviation and improvement of living standards in rural communities	In accordance with the policy for development of local industrial zones and improvement of traffic conditions of Metro Bacolod	In accordance with the policy for development of provincial growth centers and improvement of road network as a whole in Metro Bacolod
Effectiveness	It is necessary for each LGU to have enough administrative, financial and technical capacity for the road construction and creation of job opportunities	There are strong development seeds such as the new airport and a planned industrial zone in Talisay City. When improvement of arterial roads and development of commercial/institutional centers along the corridor, the project purpose can be achieved.	NS-2 and PDAs will be developed in near future. NS-3 can be constructed with donations of ROW lands from hacienda owners. When development of PDAs is completed along NS-2 and NS-3, the project purpose can be achieved.
Efficiency	The total length of the roads to be improved is very long and costs for roads will amount to large even if at the minimum standard. So necessary inputs are too much for getting expected outputs.	The length of the roads to be constructed and improved is not long and costs for roads are not large. Expected outputs are large for the related LGUs along the axis. However, the other LGUs cannot receive the benefits directly.	The length of roads to be constructed and improved is long but costs for roads are not large by applying "Beneficiaries Pay Principle" for the acquisition of ROW. Outputs can be received by all LGUs included in Metro Bacolod.
Impact	Direct impacts of the road improvement are exclusion of through traffic from the municipal center by construction of by-pass and rise in transport conditions of rural communities to and from the municipal center by the improvement of municipal arterial roads. In addition, the efforts made by LGUs for the attainment of the goal will have politically, institutionally, socially, economically and technically good and important impacts on the local community.	Direct impacts of the road construction and improvement are alleviation of traffic congestion on NS-1, and rise in transport conditions between the new airport and Bacolod City CBD. Development of commercial centers and an industrial zone will create employment and have economic and social impacts on the LGUs along the axis.	Direct impacts of road construction and improvement are alleviation of traffic congestion in the Bacolod City CBD and rise in transport conditions among LGUs comprised in Metro Bacolod. Development of commercial centers and industrial zones will create employment and have economic and social impacts on all the LGUs within Metro Bacolod.
Sustainability	In order for LGUs to keep up with the capacity for conducting such kind of projects, financial and technical supports by related national and provincial agencies are necessary.	The national and provincial agencies and related LGUs will coordinate each other based on the ordinary rules.	The national and provincial agencies and all LGUs will coordinate each other based on the ordinary rules.

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According to the evaluation table, the sugar road development pattern will give benefits to all LGUs comprised in Metro Bacolod, with comparatively small amount of road investment. So it was selected as the best one for the future target.

8.2 FUTURE LAND USE PLAN

8.2.1 Institutional System of Land Use Planning in the Philippines

Pursuant to the Local Government Code of 1991, cities and municipalities shall continue to prepare their respective comprehensive land use plans (CLUPs) enacted through zoning ordinances. The Housing and Land Use Regulatory Board (HLURB) is the government's regulatory body responsible for land use and housing. It is mandated to formulate land use planning guidelines and standards. A city/municipality with rural areas within its jurisdiction prepares its CLUP (General Land Use Plan and Urban Land Use Plan) based on the guidelines of HLURB. The general land use plan covers the whole area of the LGU. The urban land use plan is for the built-up area (the poblacion and its vicinity). The formulated CLUP is translated into a new zoning ordinance of the LGU. The zoning ordinance is enforced through the approval of the Planning Office of the province and the signature of the HLURB.

8.2.2 Land Use Plan for 2010

Bacolod City and cities/municipalities comprised in Metro Bacolod have already prepared their CLUPs based on the ordinary legal and institutional procedures above mentioned. Figure 8.2-1 shows an integrated illustration of these CLUPs.

8.2.3 Land Use Plan for 2022

Figure 8.2-2 shows a land use plan for Metro Bacolod for 2022 based on the projected population and employment distribution described in the following sections. For the formulation of the land use plan, the targeted urban development pattern of the "sugar road development pattern" is considered.

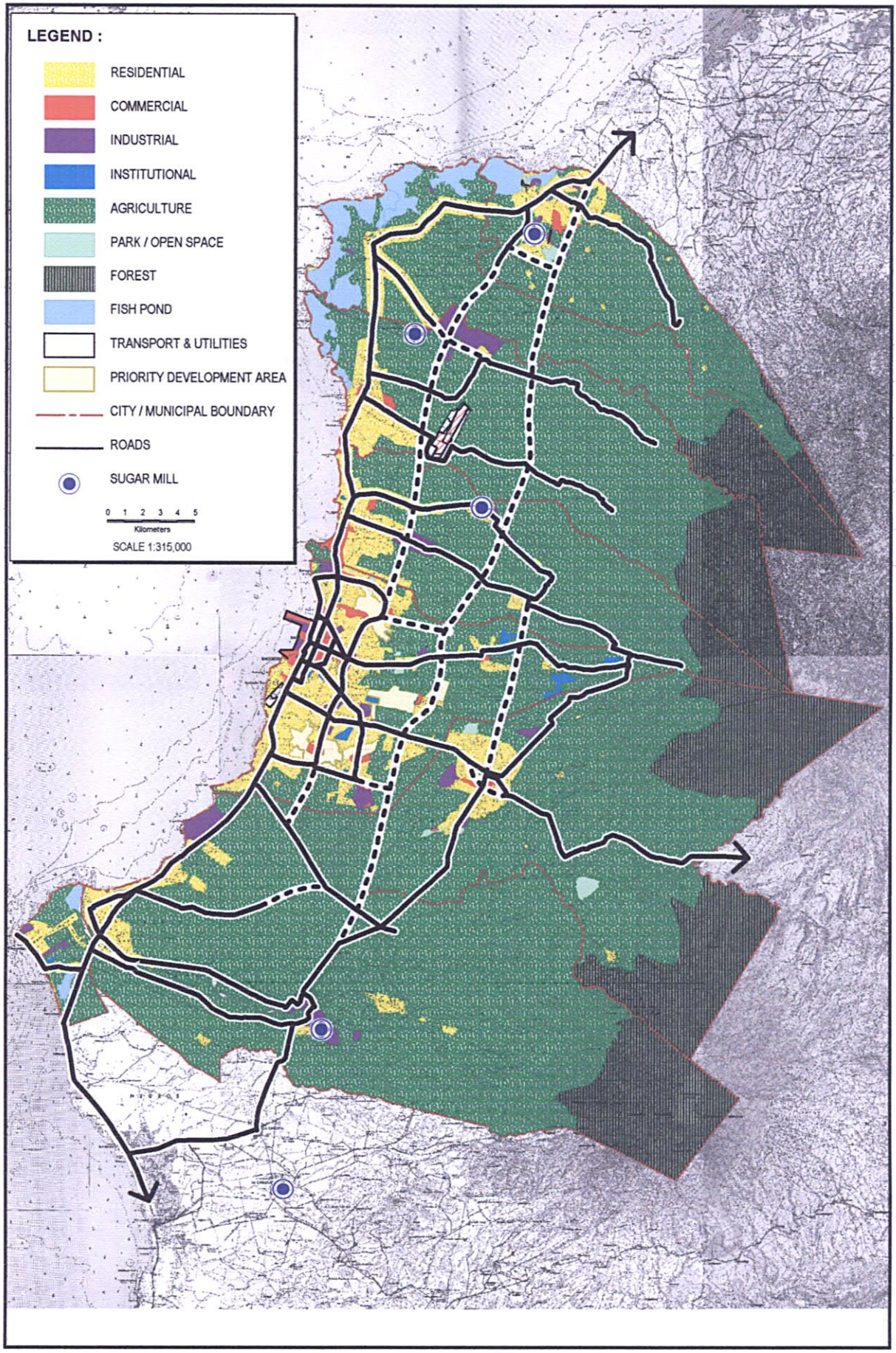

FIGURE 8.2-1 METRO BACOLOD FUTURE LAND USE : 2010

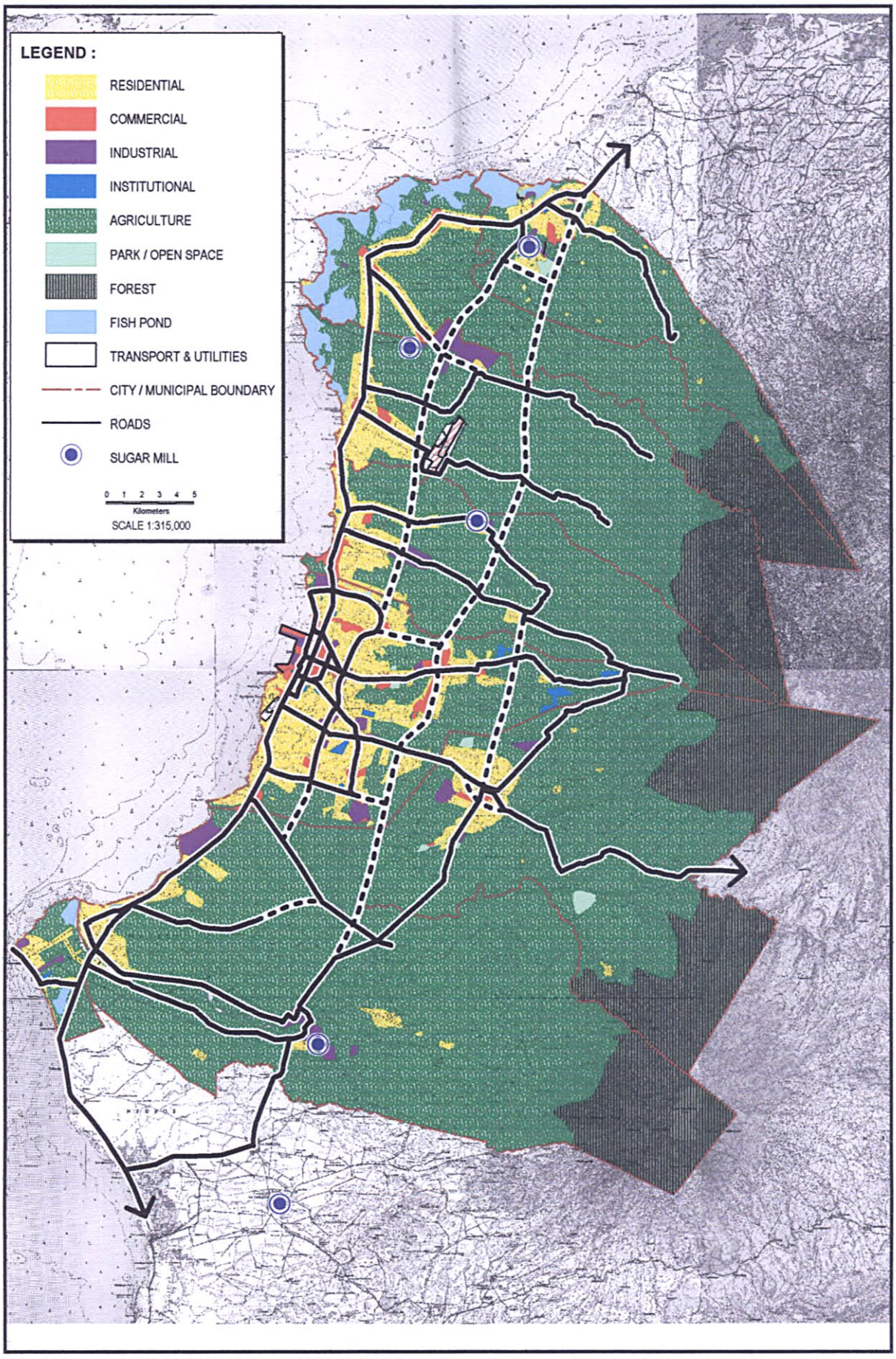

FIGURE 8.2-2 METRO BACOLOD FUTURE LAND USE MAP : 2022

8.3 FUTURE SOCIO-ECONOMIC FRAMEWORK

8.3.1 Population

Future population projection for Metro Bacolod is carried out as a revision of the NSO projections (Medium Assumption) for the national, provincial and city/municipality levels based on the 1995 Census. The medium assumption (moderate pace of fertility decline) assumes that the Net Reproduction Rate (NRR) = 1 will be realized in 2020. Projection results are shown in Table 8.3-1.

TABLE 8.3-1 FUTURE POPULATION PROJECTION BY CITY/MUNICIPALITY

	Projected Population					Annual average growth Rate (%)			
	2000	2003	2010	2016	2022	2000-03	2003-10	2010-16	2016-22
Philippines	76,786,119	81,546,617	92,395,353	100,952,019	108,482,296	2.03	1.80	1.49	1.21
Region VI	6,224,185	6,555,498	7,305,688	7,872,316	8,346,675	1.74	1.56	1.25	0.98
P. Of Negros Oc.	2,570,361	2,707,561	3,012,061	3,231,513	3,406,911	1.75	1.53	1.18	0.88
Metro Bacolod	980,616	1,048,889	1,204,400	1,326,720	1,435,462	2.27	1.99	1.63	1.32
Bacolod City	430,029	463,109	539,227	600,881	657,094	2.50	2.20	1.82	1.50
Talisay City	79,545	83,695	92,782	99,149	104,180	1.71	1.48	1.11	0.83
Silay City	107,238	116,301	137,414	154,904	171,192	2.74	2.41	2.02	1.68
E.. B. Maganola	54,492	56,709	61,401	64,187	65,969	1.34	1.14	0.74	0.46
Victorias City	81,865	87,670	100,889	111,354	120,695	2.31	2.03	1.66	1.35
Murcia	59,510	62,538	69,144	73,713	77,270	1.67	1.44	1.07	0.79
Bago City	142,056	151,996	174,591	192,409	208,252	2.28	2.00	1.63	1.33
Pulupandan	25,881	26,872	28,954	30,124	30,810	1.26	1.07	0.66	0.38

1) Projections at the national to provincial level to 2020 are based on the revision results of the NSO's "1995 Census-Based National, Regional and Provincial Population Projections", taking into account of the results of 2000 Census.

2) From 2020 to 2022, the changing trends from 2015 to 2020 are extended.

3) Projections at the city/municipality level to 2010 are based on the revision results of the NSO's "1995 Census-Based City/Municipality Population Projections", taking into account of the results of 2000 Census

4) From 2010 to 2022, the changing trends of the percentages to the provincial projections from 2000 to 2010 are extended and applied.

For the preparation of CLUP, cities/municipalities adopted the constant population growth rate method based on their respective population growths during the 1990s. Accordingly, the projected future population in this Study is lower than those used in CLUPs.

The future populations of city/municipalities are broken down to the traffic zones, considering the past trend and population density. The results are shown in Figure 8.3-1.

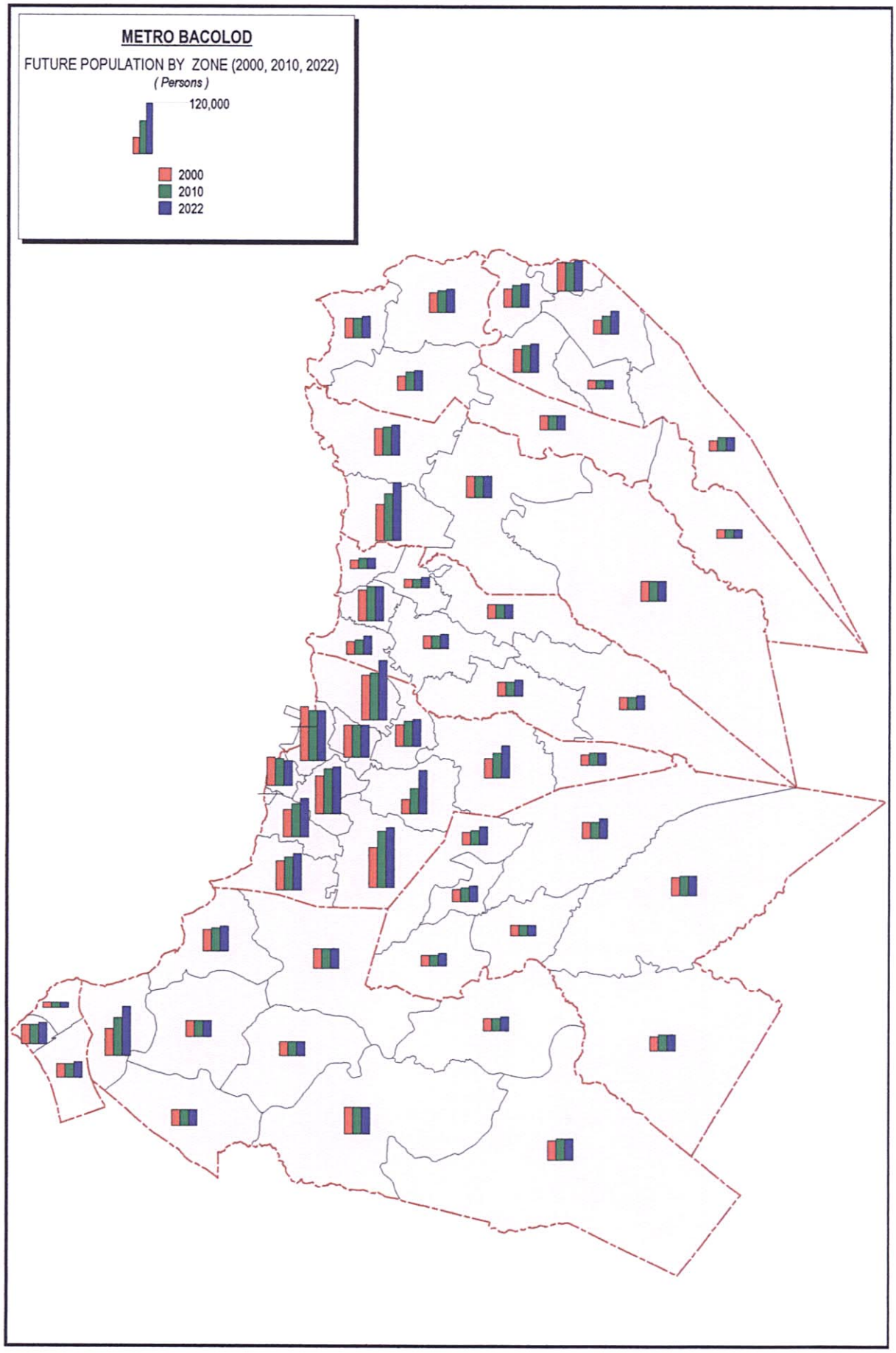

FIGURE 8.3-1 FUTURE POPULATION BY ZONE

8.3.2 GRDP

The Gross Regional Domestic Product (GRDP) of Region VI (Western Visayas) has steadily grown during the past decade with the average annual growth rate of 3.3 %. Particularly the Region's economy has shown resiliency in the recent three years from 1998 to 2001 after the financial crisis, with slightly higher growth rate than the national total, equivalent to the Gross Domestic Product (GDP). This is mainly attributed to the rapid recovery and further growth in the agriculture sector as well as the manufacturing sector including agro-industries.

According to the Western Visayas Regional Development Plan, 2001-2004, the region's development effort will be focused on the agro-industry and tourism. It may have positive influences on the related industries, particularly manufacturing and service sectors. On the other hand, the Region's economy is inevitably depending on the national economic growth, since the domestic market has the predominant share in these sectors.

In November 2001, the National Economic Development Authority (NEDA) published the Medium Term Development Plan for 2001 – 2004, including the Philippines economic growth targets till the year 2006, which were recently revised slightly downward based on the actual economic growth rate in the year 2001.

Table 8.3-2 shows the GDP projection for the coming 20 years by making use of the revised target growth rates developed by NEDA. For the years from 2001 to 2004, NEDA has projected the annual economic growth as 4.3%, 5.2% and 5.5%. According to the latest National Accounts of the Philippines published by National Statistical Coordination Board (NSDB), the actual economic growth in 2002 was 4.56%, which was slightly higher than the NEDA's projection. Therefore, the NEDA's projection for the years 2003 and 2004 seems to be attainable target, even though the growth rate is increasing year by year. In the long run, however, it may be difficult to keep high economic growth continuously, judging from the past trend during the last two decades: only 1% for the 1980's and 3.3% for 1990's in terms of average annual growth rate.

TABLE 8.3-2 GDP PROJECTION (IN 1985 PRICES)

Sector		GDP (million pesos)							Average Annual Growth Rate					
		1991	2001	2002	2003	2004	2010	2022	'91-'01	'01-'02	'02-'03	'03-'04	'05-'10	'11-'22
Primary	High						293,274	508,901					4.7%	4.7%
	Med	162,937	197,737	204,690	212,694	222,635	281,704	418,330	2.0%	3.5%	3.9%	4.7%	4.0%	3.4%
	Low						270,518	343,082					3.3%	2.0%
Secondary	High						534,536	1,016,264					5.5%	5.5%
	Med	248,718	336,697	348,906	367,545	387,670	513,606	851,220	3.1%	3.6%	5.3%	5.5%	4.8%	4.3%
	Low						496,213	715,768					4.2%	3.1%
Tertiary	High						759,857	1,528,981					6.0%	6.0%
	Med	304,867	454,824	478,051	505,533	535,669	740,706	1,337,823	4.1%	5.1%	5.7%	6.0%	5.5%	5.1%
	Low						721,959	1,169,288					5.1%	4.1%
Total	High						1,587,667	3,054,146					5.6%	5.6%
	Med	716,522	989,258	1,031,647	1,085,772	1,145,974	1,536,016	2,607,373	3.3%	4.3%	5.2%	5.5%	5.0%	4.5%
	Low						1,488,690	2,228,138					4.5%	3.4%

Note: The figures in 1991 and 2001 are actual, those from 2002 to 2004 and others are projected by NEDA and Study Team, respectively.

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Accordingly, the growth rates by industry for 2003-2004 projected by NEDA is employed as a high case for the years 2005 – 2022. As a low case, the growth rate is assumed to eventually approach to the average growth rate in the past 10 years.

As for the GRDP of the Region VI, the percentage share to the national total, GDP, has been almost stable within the range from 7.0% to 7.2% during the past decade as seen in Table 8.3-4.

Assuming that the economic contribution of the Region VI to the national total will be maintained at the level of 2001 with due consideration of past growth tendency by sector, the GRDP of Region VI is projected as shown in Table 8.3-3.

As a result, the GRDP of Region VI is expected to grow from about 70 billion pesos in 2001 to 218 billion pesos as the high growth case and 159 billion pesos as the low growth case in the year 2022.

TABLE 8.3-3 PROJECTED GRDP OF REGION VI (IN 1985 PRICES)

Sector		GRDP (million pesos)							Annual Growth Rate					
		1991	2001	2002	2003	2004	2010	2022	'91-'01	'01-'02	'02-'03	'03-'04	'05-'10	'11-'22
Primary	High						29,327	47,328					4.2%	4.1%
	Med	17,599	20,552	21,242	22,004	22,977	28,170	38,905	1.6%	3.4%	3.6%	4.4%	3.5%	2.7%
	Low						27,052	31,907					2.8%	1.4%
Secondary	High						29,399	58,943					6.0%	6.0%
	Med	10,651	17,617	18,365	19,527	20,767	28,248	49,371	5.2%	4.2%	6.3%	6.4%	5.3%	4.8%
	Low						27,292	41,515					4.7%	3.6%
Tertiary	High						54,710	111,616					6.4%	6.1%
	Med	22202	31,389	33,240	35,406	37,792	53,331	97,661	3.5%	5.9%	6.5%	6.7%	5.9%	5.2%
	Low						51,981	85,358					5.5%	4.2%
Total	High						113,437	217,887					5.7%	5.6%
	Med	50,452	69,558	72,847	76,937	81,536	109,750	185,937	3.3%	4.7%	5.6%	6.0%	5.1%	4.5%
	Low						106,325	158,779					4.5%	3.4%

Note: The figures in 1991 and 2001 are actual, those from 2002 to 2004 and others are projected by NEDA and Study Team respectively.

TABLE 8.3-4 SHARE OF GRDP IN REGION VI TO GDP

Sector	1991	1996	2001	2002	2003	2004	2010	2022
Primary	10.8%	10.8%	10.4%	10.4%	10.3%	10.3%	10.0%	9.3%
Secondary	4.3%	4.9%	5.2%	5.3%	5.3%	5.4%	5.5%	5.8%
Tertiary	7.3%	7.4%	6.9%	7.0%	7.0%	7.1%	7.2%	7.3%
Total	7.0%	7.2%	7.0%	7.1%	7.1%	7.1%	7.1%	7.1%

Source: NSCB, Study Team

With regard to the provincial GRDP, there is no published data available. Assuming that the labor productivity is proportionally reflecting the average income level, the GRDP of the Province of Negros Occidental is estimated as

shown in Table 8.3-5, where the medium economic growth rates by industry of the Region VI are employed for the future projection.

Consequently, the GRDP of Negros Occidental will increase from 25,958 million pesos in 2001 to 41,354 million pesos in 2010 and 70,890 million pesos in 2022 in terms of 1985 prices. The per capita GRDP will grow approximately 1.4 times in 2010 and 2.1 times current value in 2022.

TABLE 8.3-5 GRDP OF THE PROVINCE OF NEGROS OCCIDENTAL (IN 1985 PRICES)

	GRDP (million pesos)						Ave. Annual Growth Rate				
	2001	2002	2003	2004	2010	2022	'01-'02	'02-'03	'03-'04	'05-'10	'10-'22
Primary	6,285	6,496	6,729	7,026	8,614	11,897	3.4%	3.6%	4.4%	3.5%	2.7%
Secondary	7,180	7,485	7,958	8,464	11,513	20,121	4.2%	6.3%	6.4%	5.3%	4.8%
Tertiary	12,494	13,231	14,093	15,042	21,227	38,872	5.9%	6.5%	6.7%	5.9%	5.2%
Total	25,958	27,211	28,780	30,532	41,354	70,890	4.8%	5.8%	6.1%	5.2%	4.6%
Population ('000)	2,615	2,661	2,708	2,749	3,012	3,407	1.8%	1.8%	1.5%	1.5%	1.0%
Per capita (pesos)	9,927	10,226	10,629	11,106	13,730	20,807	3.0%	3.9%	4.5%	3.6%	3.5%

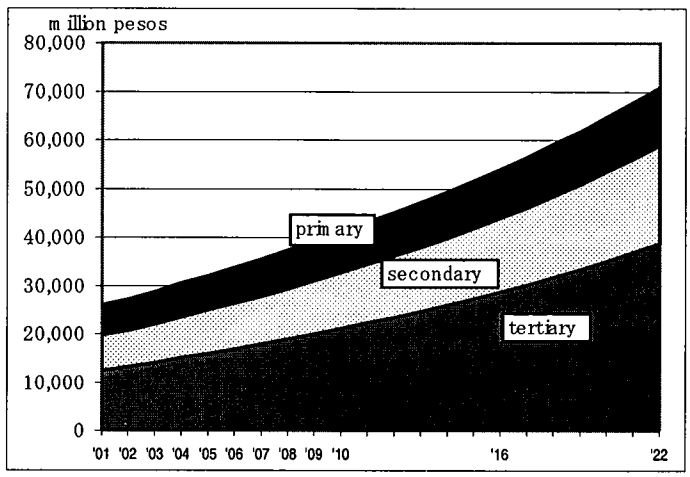

FIGURE 8.3-2 FUTURE TREND OF PROVINCIAL GRDP BY SECTOR

8.3.3 Employment

Based on the projected provincial GRDP, population, labor force participation rates, employment rates and labor productivity by sector, future employment by sector at the provincial level is first estimated. Then, it is broken down to the city/municipality level considering the ratios of city/municipal employment by sector to that of the province on residence base. Applying the ratios of employment on workplace base to that on residence base obtained from 2000 Census, the employment on workplace base is estimated. The results are shown in Figure 8.3-3.

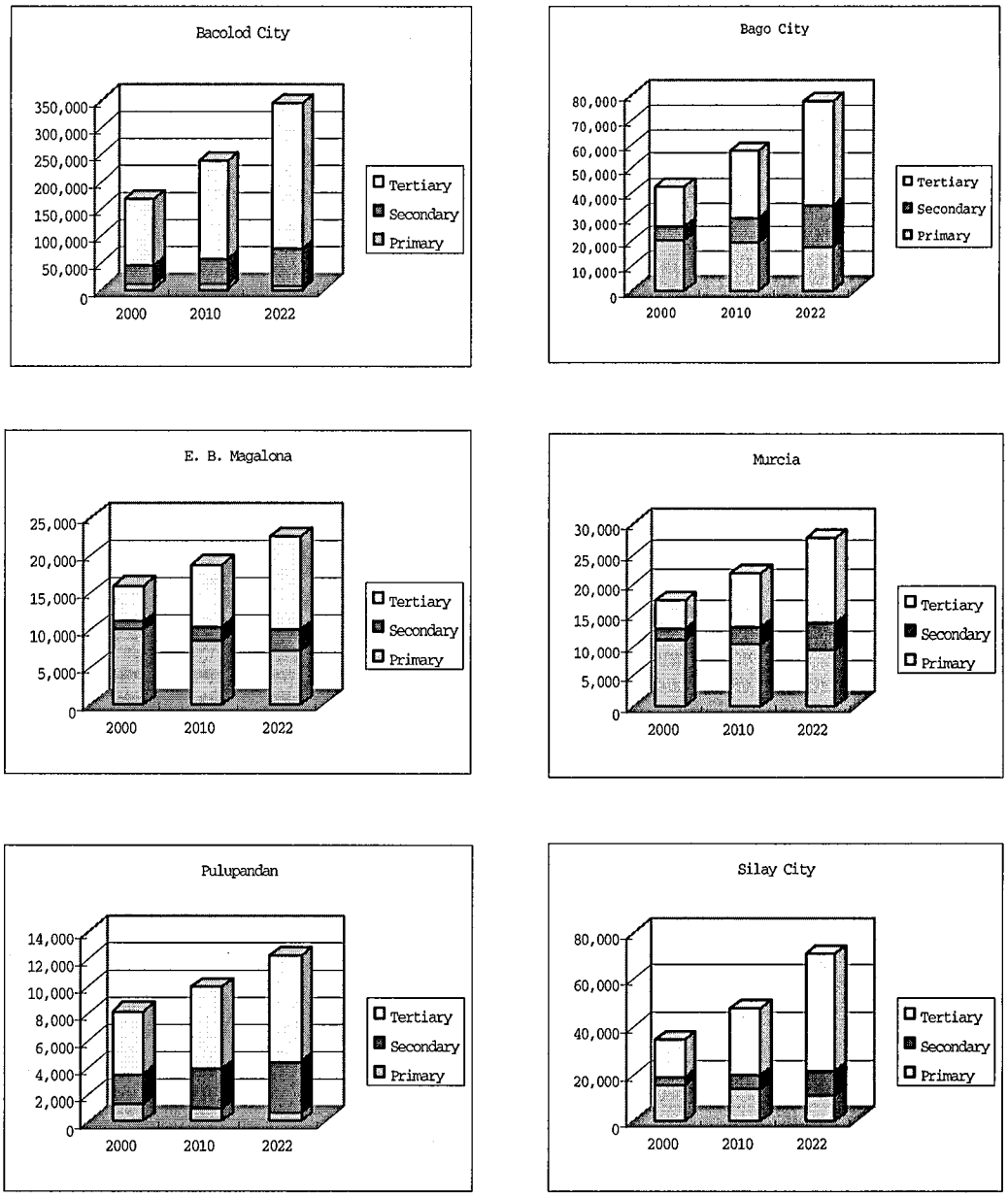

FIGURE 8.3-3 FUTURE NO. OF EMPLOYED PERSONS BY SECTOR (Workplace Base), Metro Bacolod

Employment by traffic zone is estimated based on the following assumptions:

a. The number of employed persons in the primary sector on workplace base is the same as that on residence base.

b. Employment of the primary sector will reduce parallel to reduction in agricultural land

c. The secondary and tertiary sector employment is classified into two categories: barangay level service (for example, bakeries in the secondary sector and sari-sari store in the tertiary sector) and city/municipality level and above

d. The barangay level employment on workplace base is the same as that on residence base.

e. The secondary sector employment at the city/municipality level is divided into two categories: construction and manufacturing (mining and electric/gas/water

are negligible).

f. Employment in the construction industry is distributed to the poblacion and commercial zones.

g. Employment in the manufacturing industry is distributed to the industrial zones.

h. The tertiary sector employment at the city municipality level is distributed to the poblacion, commercial/institutional zones.

The results are shown in Figure 8.3-4

8.3.4 Vehicle Ownership Projection

Future vehicle ownership is estimated by using the relationship between family income and vehicle ownership, which has been already explained in Chapter 1. Future family income growth can be obtained by using the growth rate in the per capita GRDP of Region VI and the changes in the number of household members.

As a result, the number of vehicles in the Metro Bacolod is forecasted to grow 1.56 times in 2010 and 2.6 times the current number of vehicles in 2022. Therefore, the vehicle ownership will increase from 35 vehicles /1000 persons in 2002 to 44 vehicles/1000 persons in 2010 and 63 vehicles/1000 persons in 2022.

It indicates that the vehicle ownership will be one vehicle per 4 households in Metro Bacolod and one vehicle per 2 households in Bacolod City in 2022

TABLE 8.3-6 FUTURE VEHICLE OWNERSHIP IN METRO BACOLOD

City/Municipality	2002		2010		2022	
	Number of Vehicles	Vehicles / 1000 persons	Number of Vehicles	Vehicles / 1000 persons	Number of Vehicles	Vehicles / 1000 persons
Bacolod City	28,975	67.5	45,275	84.0	76,542	116.5
Silay City	1,013	9.4	1,621	11.8	2,839	16.6
Talisay City	892	11.3	1,341	14.5	2,187	21.0
Bago City	834	5.9	1,297	7.4	2,194	10.5
Victorias City	1,263	15.5	2,000	19.8	3,478	28.8
Enrique Magalona	328	6.0	487	7.9	793	12.0
Pulupandan	240	9.3	323	11.2	454	14.7
Murcia	598	10.1	823	11.9	1,183	15.3
Total	**34,143**	**34.9**	**53,167**	**44.4**	**89,670**	**62.5**

Note: Excluding vehicles for hire and motorcycles/tricycles

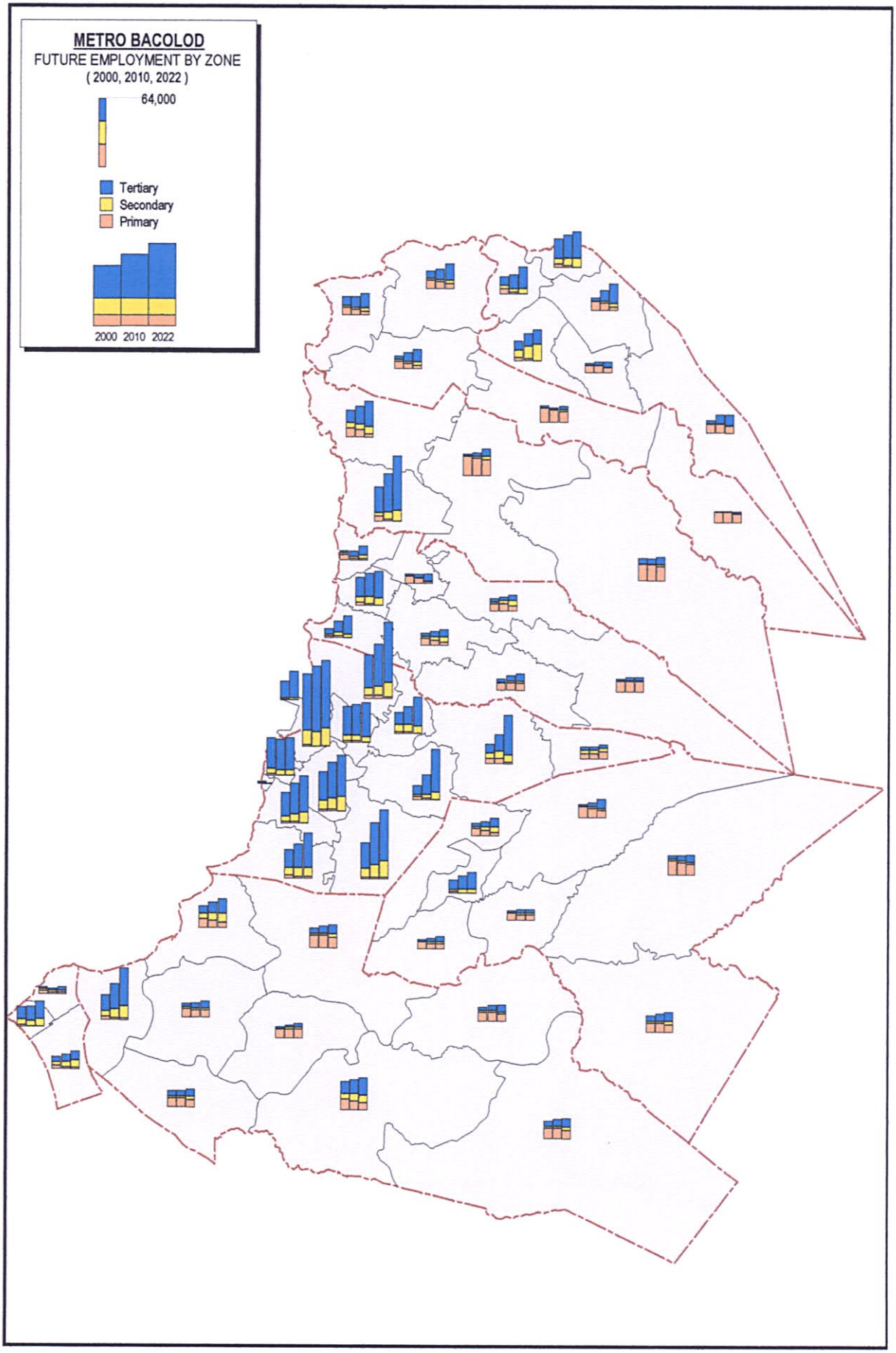

FIGURE 8.3-4 FUTURE EMPLOYMENT BY ZONE (WORK PLACE BASE)

CHAPTER 9

TRAFFIC DEMAND FORECAST

9.1 DEMAND FORECAST MODELS

9.1.1 Traffic Generation/Attraction Models

After examining various explanatory variables, the most appropriate ones were selected. As a consequence, the traffic generation/attraction models were established as follows.

TABLE 9.1-1 GENERATION/ATTRACTION MODELS

	Generation/ Attraction Models
Person Trips	$Gi, Ai = a_1Xi + a_2Yi + a_3Di$ Where Gi, Ai: Trip Generation/Attraction in Zone i Xi: Population in Zone i Yi: Total Employment in Secondary and Tertiary Sectors in Zone i Di: Dummy Variable a_1: 0.079 a_2: 3.356 a_3: 49592 R^2: Multiple Correlation Coefficient: 0.934
Cargo Movement	$Gi, Ai = a_1Xi + a_2Di + a_0$ Where Gi, Ai: Cargo Generation/Attraction in Zone i Xi: Total Employment in Secondary and Tertiary Sectors in Zone i Di: Dummy Variable a_0: 527 a_1: 0.102 a_2: 1682 R^2: Multiple Correlation Coefficient: 0.934

9.1.2 Trip Distribution Model

As a trip distribution model, the gravity model was employed, taking into account that the current linkage pattern among zones will remain in the future. Simultaneously, new linkage pattern was created reflecting the development of new growth centers located along new highways.

The gravity model is expressed by the following formula.

$Tij = K \cdot Gi^{\alpha} Aj^{\beta} / dij^{\gamma}$

Where Tij: Person Trip or Cargo Volume between Zone i and Zone j

Gi: Person Trip or Cargo Volume Generation in Zone i

Aj: Person Trip or Cargo Volume Attraction in Zone j

dij: Travel Time Distance between Zone i and Zone j

K, α,β,γ: parameters as shown in the following table

R^2: Multiple Correlation Coefficient

	K	α	β	γ	R
Model for Passengers	0.00038	0.592	0.592	1.051	0.722
Model for Cargo	0.0295	0.405	0.405	0.782	0.620

9.1.3 Modal Split Model

As already explained in Chapter 2 of Part A, the modal split between private vehicles and public transport is determined by the vehicle ownership in the Metro Bacolod Area and trip production rate per private vehicle. Accordingly the total number of future person trips by private vehicles is obtained by the following formula.

$Xv = V \cdot r \cdot N$

Where Xv: Total Number of Person Trips by Private Vehicles

Vi: Total Number of Private Vehicles in Zone i

r: Trip Production Rate per Private Vehicle (= 2.74)

N: Average Vehicle Occupancy (= 2.4 persons/vehicle)

For the modal split between bus and jeepney was estimated by the relationship between zone i and zone j in distance calculated on the basis of the present OD matrices.

Modal share of jeepney among the person trips by public transport is as follows:

TABLE 9.1-2 MODAL SHARE OF JEEPNEYS TO TOTAL PUBLIC TRANSPORT TRIPS

Distance between zone i and j	Share of Jeepney
Less than 10 km	100 %
10 km – 20 km	95 %
20 km – 30 km	68 %
30km – 40 km	24 %
40 km or more	14 %

9.2 Future Traffic Demand

The future traffic demand is estimated by using the forecast models with the target years for 2010, 2016, and 2022.

9.2.1 Passenger Trip

1) Total Demand

The future passenger trips in Metro Bacolod were estimated as shown in Table 9.2-1. A total passenger demand was forecasted to grow from 936,000 trips in 2003 to 1.2 million trips in 2010, 1.4 million trips in 2016, and 1.8 million trips in 2022. The percentage share of Bacolod City to the Metro Bacolod Area will slightly decrease, however, will still occupy the predominant share, 73% of the total trip generation in 2022. Among the cities and municipalities in the Metro Bacolod, Talisay and Silay show higher growths during the coming two decades, owing to the new growth centers to be developed along the new access to the new Bacolod Airport. The growth in the passenger trip generation by integrated zone is illustrated in Figure 9.2-1.

TABLE 9.2-1 PASSENGER TRIP GENERATION IN METRO BACOLOD

City / Municipality	Trips (1000 person trips/day)				Growth Ratio		Average Growth Rate	
	2003	2010	2016	2022	'03-'10	'03-'22	03-'10	03-'22
Bacolod City	705.8	898	1054.6	1305.7	1.27	1.85	3.5%	3.3%
Talisay	31.9	48.2	58.6	75.3	1.51	2.36	6.1%	4.6%
Silay	20.2	28.6	36.0	47.0	1.41	2.33	5.0%	4.6%
E. Magalona	9.5	13.8	16.5	20.5	1.45	2.16	5.5%	4.1%
Victorias	20.4	28.3	33.4	41.0	1.38	2.01	4.7%	3.7%
Murcia	23.5	32.8	39.7	49.5	1.38	2.09	4.7%	4.0%
Bago	43.2	61.9	76.4	98.2	1.43	2.27	5.2%	4.4%
Pulupandan	13.8	15.6	17.6	20.2	1.14	1.47	1.9%	2.0%
External Area	68.0	96.0	116.7	141.8	1.41	2.09	5.0%	4.0%
Total	936.3	1223.2	1449.5	1799.2	1.31	1.92	3.9%	3.5%

2) Transport mode

The passenger trips by transport mode related to the Metro Bacolod Area is shown in Table 9.2-2, The share of private vehicles is expected to grow from 23% in 2003 to 31% in 2022, while the share of jeepneys is predicted to decline.

TABLE 9.2-2 PASSENGER TRIP BY TRANSPORT MODE

(1000 person trips/day)

Transport Mode	2003		2010		2022	
	Trips('000)	%	Trips('000)	%	Trips('000)	%
Private vehicles	213.5	22.8%	327.5	26.8%	557.2	31.0%
Jeepney	622.2	66.5%	760.5	62.2%	1043.9	58.0%
Bus	100.6	10.7%	135.2	11.0%	198.3	11.0%
Total	936.3	100.0%	1223.2	100.0%	1799.4	100.0%

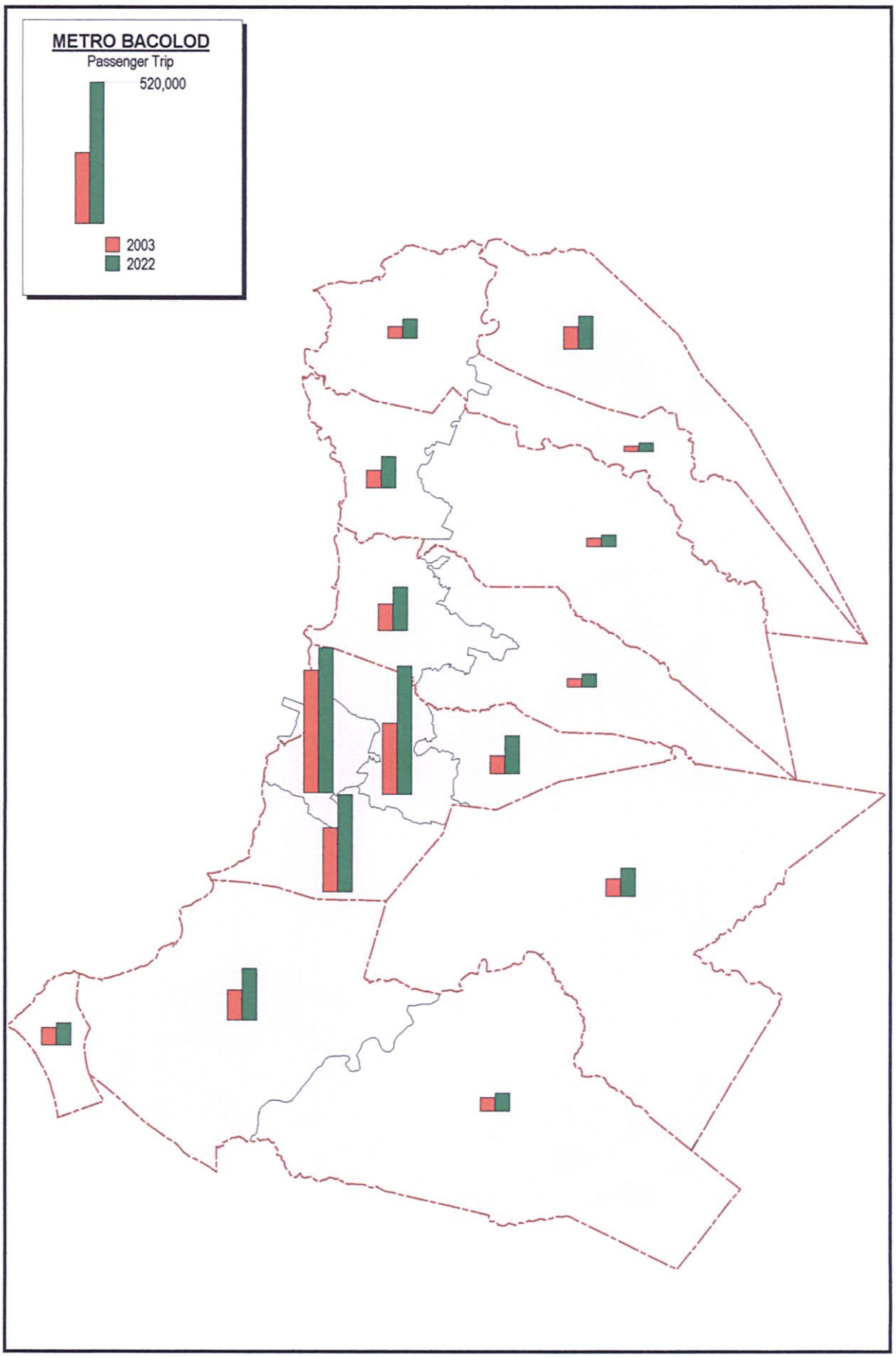

FIGURE 9.2-1 PASSENGER TRIP GROWTH BY ZONE

3) Desired Line of Passenger Trips

Figure 9.2-2 shows the desired line of passenger trips in 2022, which is characterized by radial pattern focusing to Bacolod City. It does not differ so much from the present OD pattern; namely the majority of trips concentrates to Bacolod City from the rest of areas in Metro Bacolod. Most of the OD volumes become double or triple the present demand. In addition to these main trip patterns, some new OD patterns are found among the local zones such as Talisay-Granada, Silay-Talisay, Bago-Granada, etc.

9.2.2 Cargo Flow

Table 9.2-3 shows the total cargo transport demand in the Metro Bacolod Area. The total cargo volume related to the Metro Bacolod is expected to increase from 117,882 ton per day in 2003 to 145,791 ton per day in 2010 and 184,829 ton per day in 2022.

Bacolod City has the highest cargo transport demand, but other cities/ municipalities also have considerable amount of cargo transport demand. Due to the development of new growth centers in the suburbs of Bacolod City along the Bacolod-Granada Road, Bacolod-Murcia Road, etc. as well as the port cargo growth, Bacolod City is expected to increase its relative importance in the cargo transport in the future (refer to Figure 9.2-3).

TABLE 9.2-3 CARGO TRANSPORT DEMAND PROJECTION IN METRO BACOLOD AREA

City / Municipality	Cargo Demand (ton/day)				Growth Ratio		Growth Rate	
	2003	2010	2016	2022	'03-'10	'03-'22	'03-'10	'03-'22
Bacolod City	29,986	39,598	45,680	54,040	1.32	1.80	4.00	3.10
Talisai	10,176	12,044	13,024	14,259	1.18	1.40	2.40	1.80
Silay	11,120	14,137	15,907	18,250	1.27	1.64	3.50	2.60
E. Magalona	7,499	8,891	9,472	10,202	1.19	1.36	2.50	1.60
Victorias	14,135	16,534	18,139	19,971	1.17	1.41	2.30	1.80
Murcia	5,312	6,154	6,554	7,139	1.16	1.34	2.10	1.60
Bago	13,603	16,876	18,251	20,132	1.24	1.48	3.10	2.10
Pulupandan	4,280	4,858	5,186	5,595	1.14	1.31	1.90	1.40
External Area	21,771	26,699	30,617	35,241	1.23	1.62	3.00	2.60
Total	117,882	145,791	162,830	184,829	1.24	1.57	3.10	2.40

Figure 9.2-4 shows the desire line of cargo transport demand in 2022. The OD pattern is almost same as that in 2003, but the cargo demand itself will be expanded by about 30% to 70% of the current demand depending on the zone pairs. The increase is mainly due to the expansion of the current production and further development in agriculture and light industries such as agro-industry, construction materials in terms of quantity as well as variety.

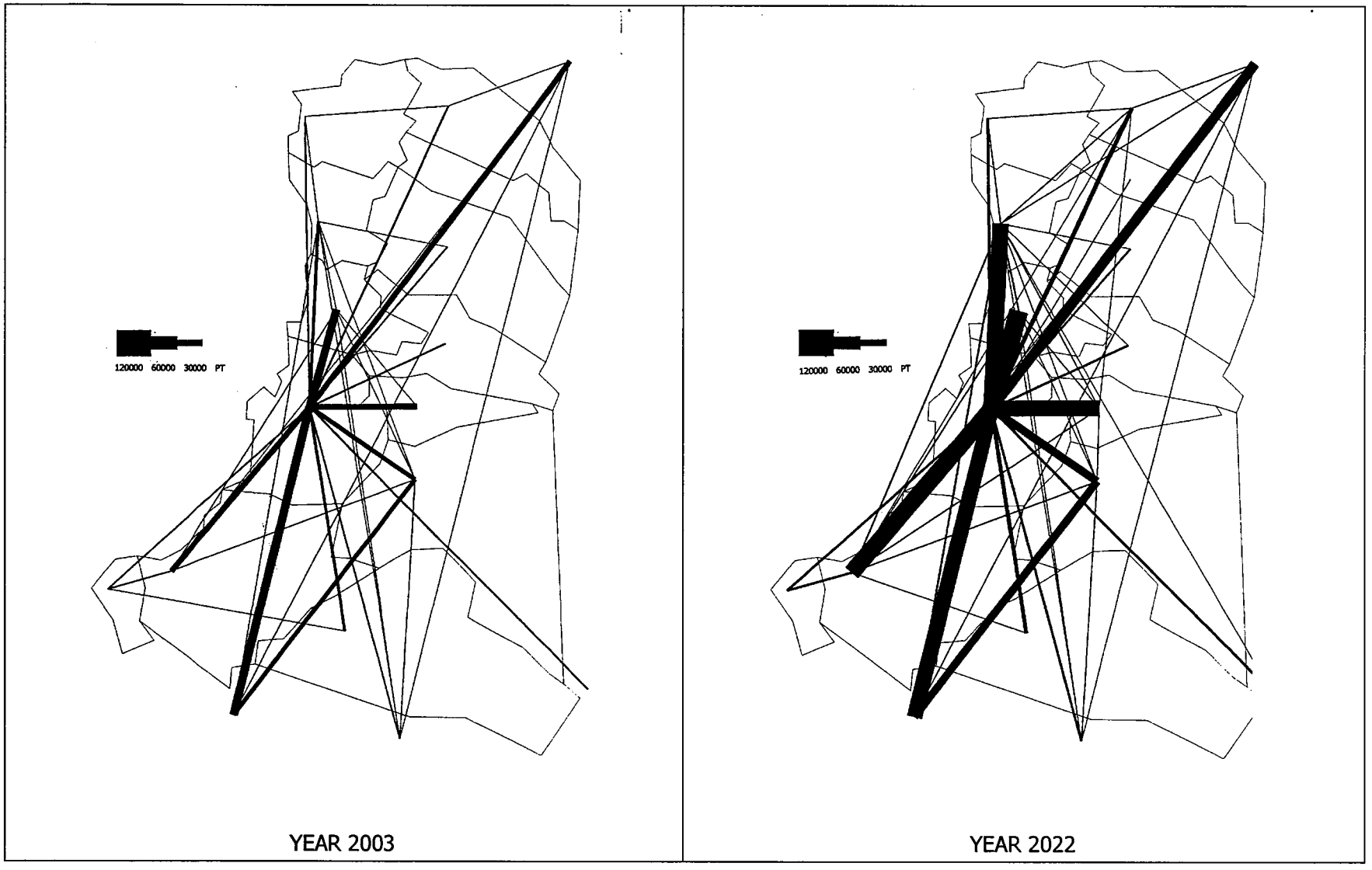

FIGURE 9.2-2 PASSENGER DESIRE LINE

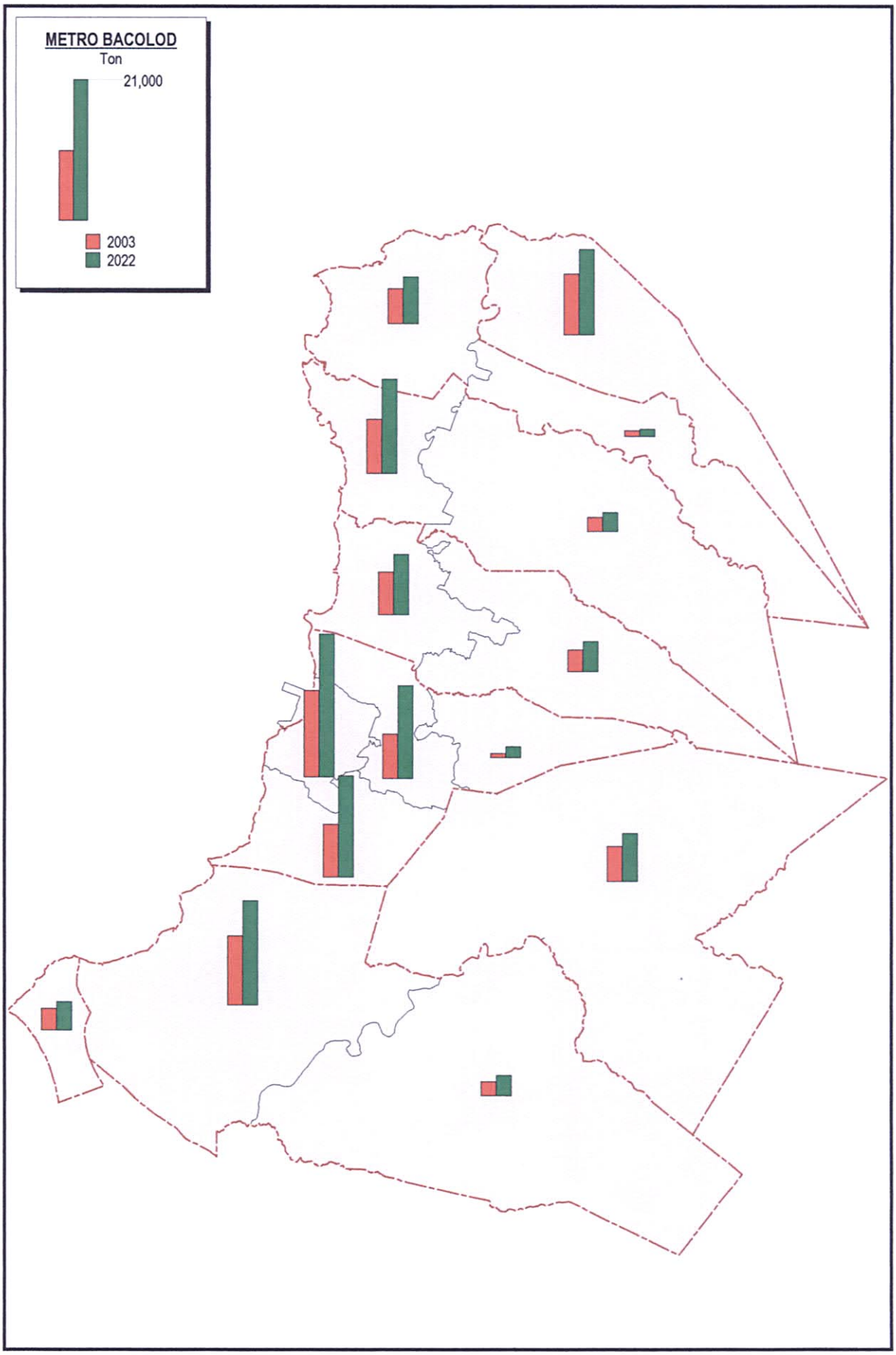

FIGURE 9.2-3 CARGO TRANSPORT GROWTH BY ZONE

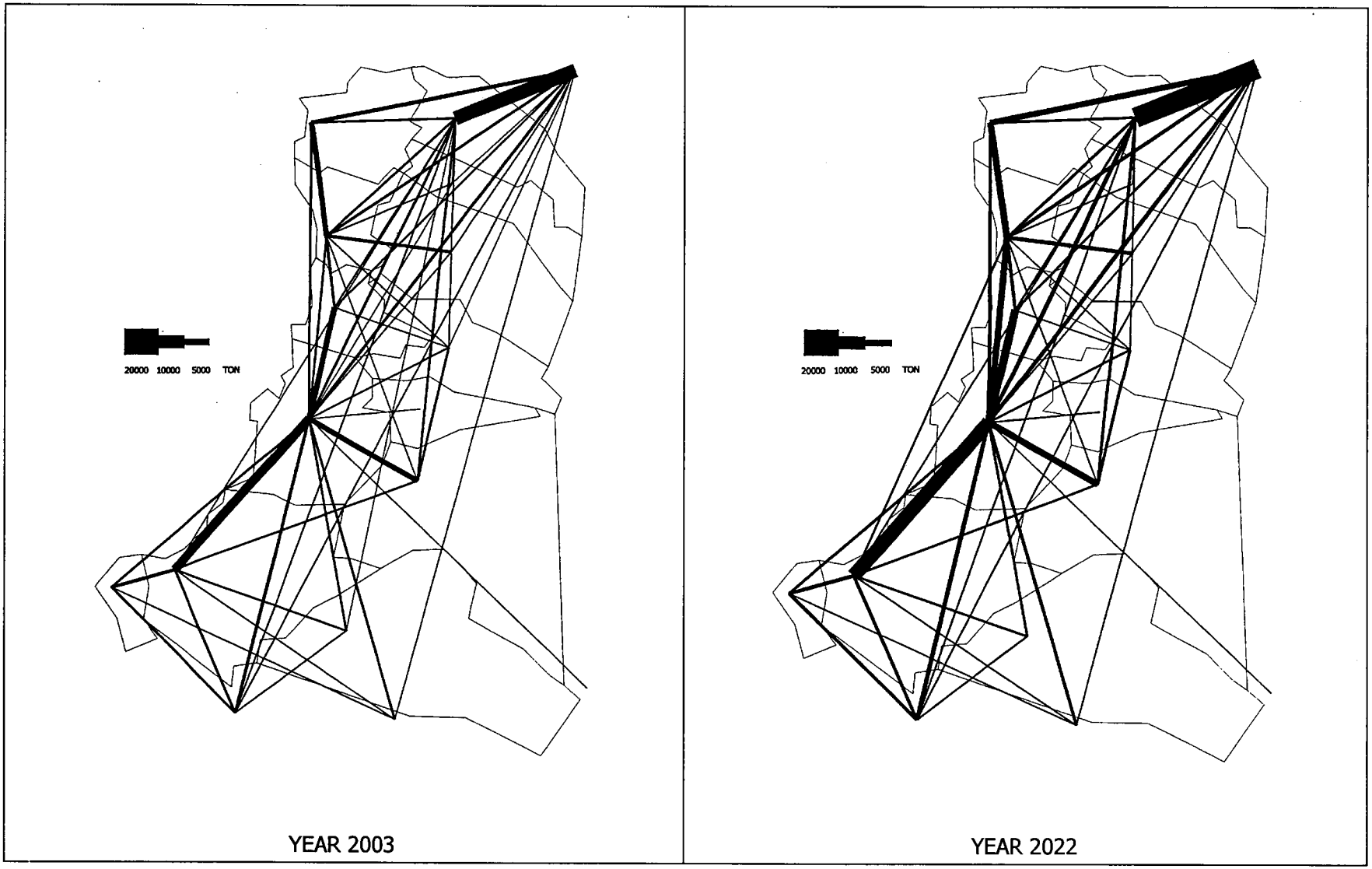

FIGURE 9.2-4 CARGO DESIRE LINE

9.2.3 Airport and Port Related Traffic

1) Airport

As for the future passengers and cargo volume related to the Bacolod Airport, the projection made by DOTC is applied. The growth rate for the passengers in the projection seems to be somewhat overestimated when compared to the past growth during the recent five years. However, the number of passengers may be suddenly jumping up when the New Bacolod Airport is opened, owing to the new airport facilities which will be able to accommodate much larger aircrafts like B747. As a result, the number of passengers will grow from 511,000 persons per annum or 1,700 persons per day in 2002 to 1.78million persons per annum or 6,000 persons per day in 2022. Air cargo is also expected to increase from 24 tons per day in 2002 to 94 tons per day in 2022.

Based on the passenger growth rate, traffic related to the Bacolod Airport will increase from 5,470 vehicles per day in 2002 to 20,044 vehicles per day in 2022.

TABEL 9.2-4 PROJECTION OF FUTURE PASSENGERS ,CARGO AND VEHICLE TRAFFIC MOVEMENT AT BACOLOD AIRPORT

Total departure / arrival		2002	2010	2015	2020	2022	Annual Growth Rate	
							'02-'10	'10- '22
Passengers (persons)	Annual Total	511,108	1,229,000	1,436,000	1,680,120	1,788,537	11.6%	3.2%
	per day	1,704	4,097	4,787	5,600	5,962		
Cargo (ton)	Annual Total	7,097	19,000	22,400	26,432	28,236	13.1%	3.4%
	per day	23.7	63.3	74.7	88.1	94.1		
Vehicle Traffic (veh./day)		5,470	13,150	15,370	17,980	20,044	11.6%	3.2%

Source: Projection from 2010 to 2020: projected by Department of Transportation and Communication
Projection in 2022: projected by using the growth rate from 2010 to 2020

2) Port

a) Passengers

The number of passengers at Bacolod Port is forecasted by using the elasticity of passenger growth to the population growth in the Metro Bacolod Area. Since it is difficult to forecast the terminal share, same growth rate is applied to all the terminals in Bacolod except for Barcelona, which is exclusively used for liquid cargo. As a result, the total number of passengers is expected to grow from 2.2 million in 2002 to 2.6 million in 2010, and 3.3 million in 2022.

Based on passenger growth rate, traffic related to the Bacolod Airport will increase from 5,470 vehicles per day in 2002 to 20,044 vehicles per day in 2022

Based on the passenger growth rate, traffic related to the Bacolod Ferry port will increase from 2,680 vehicles per day in 2002 to 4,140 vehicles per day in 2022.

TABLE 9.2-5 PROJECTION OF PASSENGERS AND VEHICLE TRAFFIC AT BACOLOD PORT

	Port Terminal	1997	2002	2010	2022	Annual Growth Rate		
						'98 - '02	'02 - '10	'10 - '22
Passengers (Annual Total)	Banago	1,737,597	381,847	467,434	585,263	-31.5%	2.6%	1.9%
	Bredco	349,110	751,942	2,178,658	2,727,848	38.5%		
	Bredco II	0	1,027,806					
	Barcelona	0	0	0	0	0	0	0
	Total	2,086,707	2,161,595	2,646,092	3,313,111	0.9%	2.6%	1.9%
Vehicle Traffic (veh./day)			2,680	3,300	4,140	-	2.6%	1.9%

b) Cargo

The volume of cargo in the future is projected for domestic and foreign cargo respectively.

In case of Bacolod Port, all the three general cargo terminals, Banago, Bredco and Bredco II are serving the vessels for both the short and long distance. Barcelona is exclusively handling liquid cargo, but it may be also related to the growth of general cargo in the long run. Hence, the cargo demand projection was made for the total of the terminals at Bacolod Port. The growth of the domestic cargo during the recent five years was only 0.87% per annum, while the Region VI's GRDP growth was 3.4% per annum. By using the cargo growth elasticity to GRDP growth, the future domestic cargo is projected. Total domestic cargo at Bacolod and Pulupandan Port is forecasted to grow from 2.2 million tons in 2002 to about 3.2 million tons in 2010 and 5.1 million tons in 2022.

With regard to the foreign cargo, it is projected by assuming that the current percentage share of Bacolod Port to the national total foreign cargo will be maintained in the future. The national total cargo volume is forecasted by using the elasticity of foreign cargo growth to the GDP growth. Consequently, the foreign cargo is estimated to grow from 164,000 tons in 2002 to 215,000 tons in 2022.

Based on the tonnage growth rate of Domestic Cargo, traffic related to the Bacolod Cargo Port will increase from 3,000 vehicles per day in 2002 to 5,800 vehicles per day in 2022(See in Table 9.2-7).

TABLE 9.2-6 PROJECTION OF DOMESTIC CARGO AND FOREIGN CARGO AT BACOLOD AND PULUPANDAN PORT

Domestic Cargo	Tonnage				Annual Growth Rate		
	1997	2002	2010	2022	'97-'02	'02-'10	'10 - '22
Banago	799,099	646357	909,468	1,433,393	-4.2%		
Barcelona	18,906	213130	299,888	472,648	62.3%	4.4%	3.9%
Bredco	758,464	299226	421,031	663,578			
Bredco II		1076821	1,515,160	2,388,012	12.7%		
Bacolod total	1,576,469	2,235,534	3,145,547	4,957,631	7.2%	4.4%	3.9%
Pulupandan	645,001	83,850	92,978	106,021	-33.5%	1.3%	1.1%
Total	2,221,470	2,319,384	3,238,525	5,063,652	0.87%	4.3%	3.8%
Foreign Cargo	Tonnage				Annual Growth Rate		
	1997	2002	2010	2022	'97-'02	'02-'10	'10 - '22
Bredco II	0	164,111	184,277	214,906	-	2.3%	1.3%
Pulupandan	1,430	0	0	0	-		
Total	1,430	164,111	184,277	214,906	158%	2.3%	1.3%
% Share to Philippines	0.00%	0.26%	0.26%	0.26%			

TABLE 9.2-7 PROJECTION OF VEHICLE TRAFFIC AT BACOLOD AND PULUPANDAN CARGO PORT

Cargo Port	Vehicle Traffic(vehicle/day)			Annual Growth Rate	
	2002	2010	2022	'02-'10	'10 - '22
Bacolod	3,000	3,700	5,800	4.3%	3.8%
Pulupandan	50	70	95	4.3%	3.9%

9.2.4 Vehicle Trips

1) Total Vehicle Trips in the Metro Bacolod Area

The vehicle trips in the Metro Bacolod Area are estimated by converting the passenger trips and cargo flow into equivalent number of vehicle traffic.

As shown in Table 9.2-8, the total vehicle trips in the Metro Bacolod by using average passenger occupancy and boarding weight in 2022 is estimated to be 374 thousand trips per day, which will be more than double of the current demand. Among them, the growth rate of the passenger car trips will be remarkably high. Therefore, the modal share of passenger car to the total vehicle trips increases from 51% at present to 62% in 2022.

TABLE 9.2-8 VEHICLE TRIPS IN METRO BACOLOD

Type of Vehicle	2003		2010		2022	
	Trips	%	Trips	%	Trips	%
Passenger car	88,985	51.0%	136,328	56.6%	232,094	62.1%
Jeepney	59,237	33.9%	72,276	30.0%	99,303	26.6%
Bus	3,580	2.1%	4,675	1.9%	6,879	1.8%
Truck	22,729	13.0%	27,780	11.5%	35,597	9.5%
Total	174,531	100.0%	241,059	100.0%	373,873	100.0%

2) OD Pattern

Figure 9.2-5 shows the OD pattern of vehicle traffic in 2022. The traffic concentration pattern to Bacolod City will be maintained in the future. The prominent traffic movements with more than 10,000 vehicles/day are those between Bacolod City and Talisay/Silay, between Bacolod and Bago and between Bacolod and Granada area (Eastern part of Bacolod City).

FIGURE 9.2-5 VEHICLE TRIP DESIRE LINE