Chapter 2 Development Issues for the DIDP Area

2.1. Development Issues and Potentials

The existing urban and spatial system in the DIDP Area may be characterized by the following:

1) High primacy of Davao City with the urban population of 771,844 in 1995 accounting for 57% of the total DIDP urban population,

2) Lack of sizeable urban centers other than Davao City nor any urban cluster,

3) Presence of isolated/remote settlements with poor access from anywhere due to peninsular/island and mountainous topography and self-contained rural economies,

4) Limited access of good conditions from neighboring regions,

5) Under-utilized sea lanes despite the presence of many public and private ports, and

6) Existence of two airports one (Davao International Airport) close to its capacity (the expansion project is on-going) and the other (Mati) largely unused.

These conditions may work as constraints to integrated socioeconomic development of the DIDP Area. On the other hand, alliances of neighboring municipalities are being strengthened by the PAIC initiatives. This may be instrumental in the formation of urban clusters, and also encourage the integration of rural communities.

Larger urban centers in the DIDP Area, Davao City and a few others having more or less 100 thousand population, face the following common problems:

1) rapid population growth;

2) proliferation of squatted areas;

3) inadequate road networks and traffic control;

4) poor drainage conditions;

5) improper solid waste management systems;

6) no sewerage system of the liquid wastes;

7) insufficient telecommunication systems;

8) encroachment of urban areas on agricultural land and a mixed land use;

9) lack of open space and shortages of the urban amenity; and

10) issuance of development permits through arbitrary reclassification of areas already classified under the zoning ordinances.

Common development problems facing municipal centers in the DIDP Area are identified as follows:

1) inadequate water supply systems such as slow installment of Level III despite the expansion of the urbanized area by the population increase;

2) insufficient power supply in terms of quality such as voltage fluctuation and frequent brown-outs;

3) insufficient road pavement and network;

4) inadequate solid waste dumping sites;

5) no flood control in extended alluvial plains; and

6) insufficient telecommunication systems with line shortages and non-direct connection within the same area due to different telephone operators.

2.2. Land Capability

(1) Existing land use and capability

Existing land use

Existing land use in the DIDP Area is characterized by the following.

1) Large designated forest land covering 12,296 km^2 or 62.5% of the DIDP land area, but much smaller woodland area (5,012 km^2 or 25.5% in 1994), which has been decreasing rapidly,

2) Conversion of agricultural land for urban/industrial uses, on the one hand and increase in extensive upland farming area, on the other to maintain the total agricultural land at the similar level in recent years (6,762 km^2 in 1994),

3) Extensive grassland/shrubland (7,491 km^2 in 1994), increased by deforestation in recent years,

4) Low service coverage of irrigation at 39% in 1996 of potential irrigable area (1,033 km^2),

5) Relatively small protected area (774 km^2 or 4%) that is partly encroached upon by upland communities, and

6) Disorderly use of coastal areas due to squatters, segmented beach resort development, dumping of solid wastes, destruction of mangrove forests etc.

Land capability

Land capability in the DIDP area has the following features that are important in land use planning.

1) Limited prime agricultural land in the lowland,

2) Extensive upland area suited to various tree crops and other upland crops, and also irrigable area in the upland,

3) Highland areas suited to temperate vegetables production, and

4) Limited grazing land.

Conditions to determine land capability include erosion potential, flood susceptibility, land slide risks and geological conditions (e.g. active faults) as well as land morphology, elevation and soil conditions.

(2) Land use planning

Planning criteria

Criteria for land use planning for the DIDP Area include the following.

1) Existing protected area should be protected;

2) Preservation area and conservation area should be designated following the proposed environmental management zoning with clear definition of allowable land uses in respective areas in line also with ancestral domains claims;

3) Prime agricultural land in the lowland should be protected unless such land is subject to habitual floods that cannot be controlled in a cost-effective way;

4) Land use in upland/hillyland should be rationalized especially for agriculture with respect to the selection of crops and farming systems, including the extensive grassland/shrubland and over-used land in the lowland area; and

5) Urban and industrial land should be selected based on the criteria established.

Forest conservation and preservation

According to the proposed environmental management zoning, areas for forest conservation and forest preservation have been delineated by applying the following criteria:

1) Areas above 500 m elevation covered by primary forest are classified as forest preservation areas; and

2) Areas below 500 m elevation covered by primary forest and areas above 500 m covered by secondary forest are classified as forest conservation areas.

Results show that preservation and conservation areas cover 4,245 km^2 and 3,190 km^2 in the DIDP Area. The total area for forest preservation and conservation is 7,434 km^2, corresponding to 38% of the DIDP land area.

Agricultural land

Four capability maps were prepared for lowland paddy, upland crops, orchard and pasture, respectively classifying the land into three suitability categories according to the criteria set by BSWM for each crop group: highly suitable (class 2), suitable (class 3) and unsuitable (class 4). A consolidated land capability map has been prepared by using a GIS, combining the four capability maps. Out of all the combined suitability classes, six broad classes are defined using the following criteria:

1) Areas where only one group has the highest suitability class among lowland paddy, upland crops, orchard and pasture, are designated as suitable areas for the group;

2) Areas where more than one group has the same suitability class, priority is put on lowland paddy, followed by upland crops, orchard, and pasture for the designation of suitable group; and

3) Areas where suitability is class 3 for all the four groups, are designated as suitable areas for both upland crops and orchard.

Results are shown in Figure 4. Areas for different categories are summarized below.

Suitability category		Area (km^2)
Suitable area:	Lowland paddy	2,149
	Upland crops	240
	Orchard	5,549
	Pasture	1,559
	Upland crops/pasture	3,359
Unsuitable area		6,092
Unclassified		723
Total		**19,671**

Urban/industrial land

Lands suitable for urban/industrial development are selected by the following procedure:

1) Exclude the land not suitable from physical points of view: slope over 18%, severe erodability, flood susceptibility, or existing land use being built-up, lowland paddy, forest, woodland or other special uses (e.g. water area, livestock, mining etc.);

2) Select the land, from the rest, physically suitable for urban use: slope 0-8%, no apparent or slight erodability, no flood susceptibility, and existing land use not being any of the above;

3) Classify most suitable land, out of the selected land, satisfying socioeconomic criteria distance from major urban centers and trunk roads, and moderately suitable land satisfying only one of the two criteria; and

4) Classify the rest of land not falling in either "not suitable" nor "physically suitable as marginally suitable land.

These criteria and suitability classification are summarized in Table 7.

Results are shown in Figure 5. Land suitable for urban use spreads along the urban corridor: the Tagum-Panabo-Davao-Sta. Cruz-Digos corridor. Sizable lands marginally suitable for urban use are found also in mid-stream areas of the Tagum-Libuganon river in Davao del Norte, the Palada river in Davao del Sur, Agusan river in Compostela Valley and Mati and Baganga in Davao Oriental.

2.3. Settlement System

(1) Conditions for improving settlement system

Given the characteristics of existing settlement system listed above, and in line with the DIDP strategy, three conditions need to be satisfied to improve the settlement system in the DIDP Area. First, more orderly urbanization of Davao City should be pursued so that the City will serve as the "trade capital" of the BIMP-EAGA and a gateway for international tourism. Second, to avoid excessive concentration of urban and industrial activities in Davao City, other secondary urban centers need to be strengthened in line with PAIC initiatives. Third, lower tier urban centers should serve effectively to integrate rural communities in their respective hinterlands by providing essential services.

More specifically, in addition to Davao City and its immediate vicinities, two more broad areas are defined for accelerated urbanization. Hierarchical structure of urban centers is conceived with Davao City as the regional center, provincial urban centers, sub-provincial growth centers, major growth centers, and community development centers. These are described below.

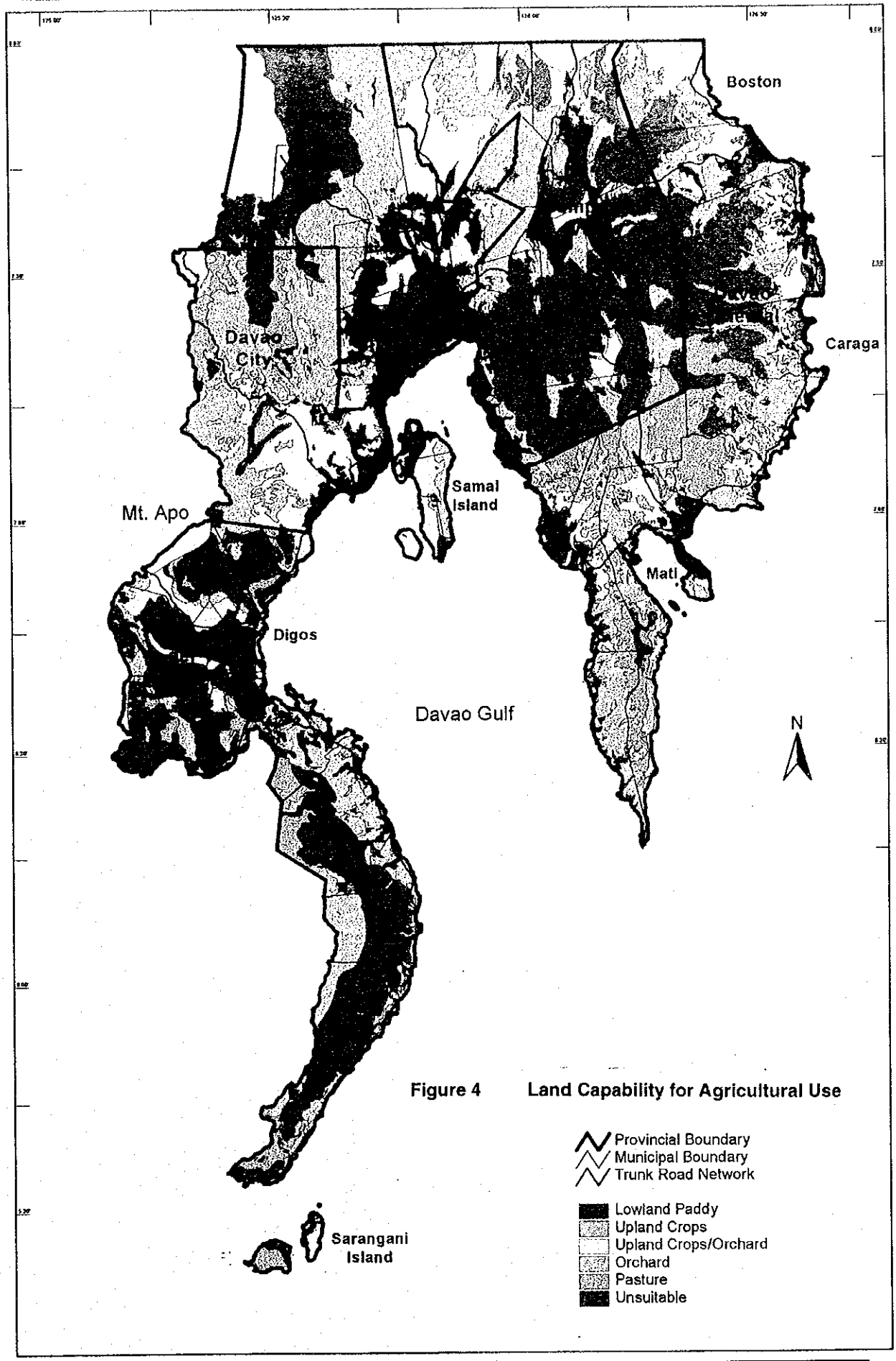

Figure 4 Land Capability for Agricultural Use

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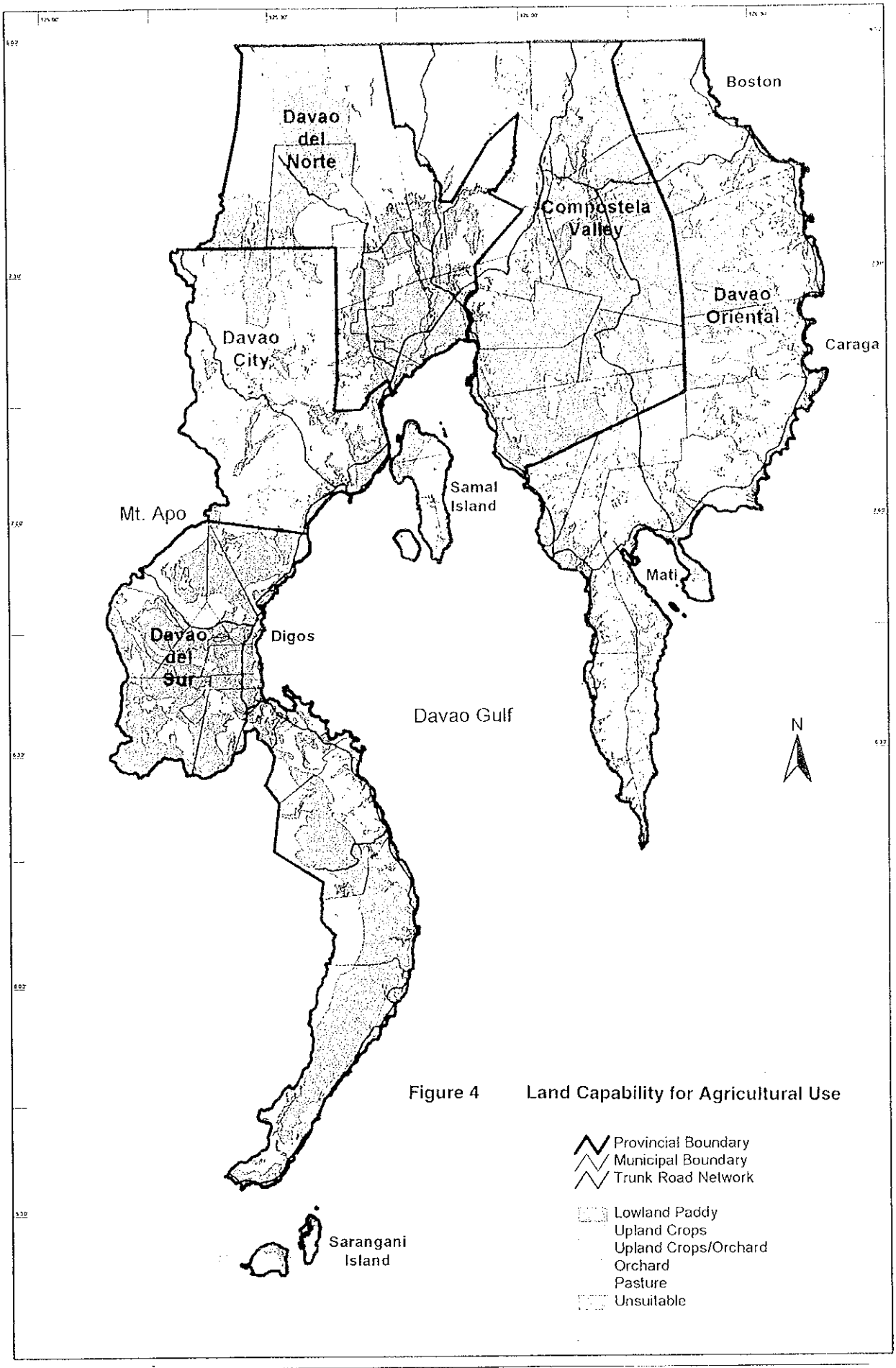


Figure 4 Land Capability for Agricultural Use

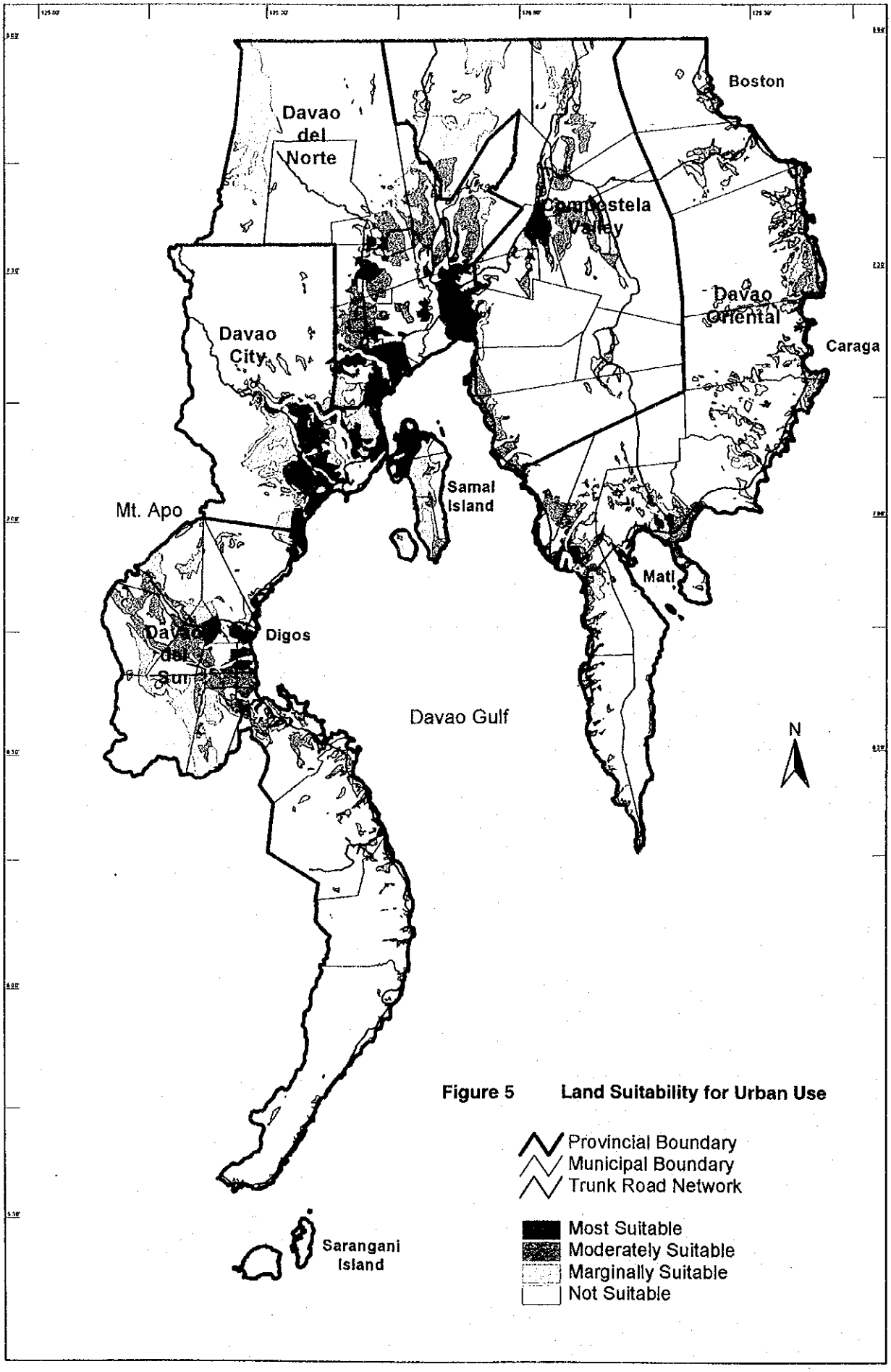


Figure 5 Land Suitability for Urban Use

Table 8 Urban Development Suitability Criteria

Criteria	Most suitable	Moderately Suitable	Not suitable	Marginally Suitable
Characteristics	Suitable both from Physical and socio-economical points	Physically suitable	Physically not suitable	The rest of the area
Slope	0-8%		18%	
Erosion	No apparent, or Slight		Severe	
Flood	Non		Flood prone	
Distance from urban centers	- Davao City (30km) - Tagum (10 km) - Digos (10 km) - Mati (10 km) - Nabuntoran (7.5 km) - Panabo (10 km) - Sto. Tomas (7.5 km) - Sta. Cruz (7.5 km) - Lupon (7.5 km)	- either the distance from the urban centers or trunk road is met, but not both.	-	-
Distance from trunk road	0 10 km			
Present land use	Not - built-up area - lowland paddy field - forest - wetland - other miscellaneous (water surface, livestock, mine)		- built-up area - lowland paddy field - forest - wetland - other miscellaneous (water surface, livestock mine)	

Source: JICA Study Team

(2) Accelerated urbanization areas

1) Davao metropolitan area

Urban population in Davao City would reach one million before 2005 from 770 thousands urban population in 1995. Therefore Davao City will be classified into a primary metropolitan center based on the criteria of indicative hierarchy of urban centers in the Philippines. The metropolitan area has a shpere more or less 25 km radius extending to Panabo and northern half of Kaputian in the Samal Island and Sta. Cruz in Davao del Sur. The area includes one RAIC, two PAICs and one eco-tourism zone with the combined total population of 1.18 million or 36% of that in the DIDP Area and the urban population of 822 thousand or 60% of the total DIDP urban population in 1995.

As land availability of urban and industrial development reaches the saturation point in any metropolitan area, some extent of urbanization activities are spilled-over to the vicinities. In the vicinities of Davao City, some residential and industrial estate developments are proceeding in Panabo and Sta. Cruz.

In the long-term future, the Samal Island may be connected to Davao City by a bridge. The Samal Island, due to its proximity to Davao City and well preserved environment, has high potentials for high-grade residential development, environment friendly industrial estates, cultural and financial centers under the BIMP-EAGA scheme and resort development. The bridge connection would open opportunities for residents on the island, numbering 77 thousand as of 1995, to commute to Davao City and also to receive better social and other services

(health, medical, water supply etc.). Such developments, however, should be subject to strict enforcement of the zoning ordinance for conservation of environment, the vital condition for the developments.

2) Panabo-Tagum conurbation area

This area extents along the Pan-Pacific Highway and could be the most accelerated urbanization area following Davao City, because of the proximity to Davao City and large flat plains. The area covers two PAICs including two municipalities of Panabo, Carmen and Tagum City. The combined population was 340,700 in 1995 of which 135,600 or 40.0% was urban.

3) Sta. Cruz-Digos urban corridor

This area including two municipalities of Sta. Cruz and Digos had combined total and urban population of 165,700 and 74,900 respectively or 45% urbanization rate in 1995. Sta. Cruz, situated at a center point between Davao City and Digos, is designated as a PAIC. The Sta. Cruz PAIC will be developed comprising industrial, residential and tourism developments with more than 2,000 ha of the land area. The northern part closer to Davao City would be developed in the early stage. The corridor itself will become an accelerated urbanized corridor in the medium to long-term following the development in Sta. Cruz.

(3) Hierarchical structure of urban centers

Urban centers are classified with respect to delivery capacity and effectiveness of various urban services. Determining factors include: 1) existing and expected urban population, 2) accumulated various economic and social activities like number of establishments, infrastructure, educational and health facilities, 3) existing and expected administrative functions and specific functions like PAIC, 4) resources and constraints, and 5) location in relation to artery, other major urban centers and air and sea transport facilities. Five tiers of urban centers are defined.

1) Regional center

Davao City is a regional center for Region XI. It has shares of 31% of total population and 57% of urban population in the DIDP Area in 1995. The City has the dominant number of commercial and industrial establishments, a regional hospital and other large private hospitals, and 36 universities and colleges.

The City is designated as both the regional center and a regional agri-industrial center in the DIDP Area. It may be characterized toward 2016 as follows:

- the second largest, pivotal urban economic center in the Philippines, serving Mindanao;
- a predominant destination of direct foreign investments due to proximity to BIMP-EAGA countries and East Asia;
- a predominant area of export industries, trade and other supporting urban services;
- an international gateway serving as the regional hub in air and sea transport networks; and
- an outstanding international tourist destination in the Southern Philippines.

2) Provincial urban centers

Tagum

Tagum City, the second largest urban center in the DIDP Area, is the capital of previous Davao Province and the new Province of Davao del Norte after administration reorganization in the middle of 1998. Tagum is located at a strategic point, 56 km north of Davao City and at the junction to Davao Oriental and Agusan del Sur. Shares of the total population (155 thousand) and urban population (84 thousand) were 13% and 26% respectively of the province' s total in 1995. It occupies only 2% of the provincial land. While agriculture remains main economic activities, processing activities of gold, copper and chromite are accelerating.

Tagum City is designated as a PAIC with about 745 ha of the development area including 300 ha for ecotourism development. Tagum has functions of administration, financial, trading, mining-processing and education centers in the province. Under the decentralization policy, Tagum could absorb some extent of urban and industrial functions away from Davao City, and will have a function of sub-regional center covering Davao Oriental and the new province of Compostela Valley.

Nabunturan

Nabunturan is new capital of Compostela Valley province. The population was 54,400 in 1995 of which 14 thousands or 25.7% was urban. The municipality is a food basket for the north-eastern part of the Davao Province and is designated as a PAIC for agro-processing and mineral processing industries. Nabunturan would have functions of a mining center and a tourism gateway for Mainit Hot Springs National Park as well as administration and social services functions.

Digos

Digos, the provincial capital of Davao del Sur, is strategically located 56 km south of Davao City and 81 km north of General Santos City along the foothills of Mt. Apo and at the junction to North Cotabato. Digos is the fourth largest urban center, having 107 thousand population or 16% of the province' s total and 40 thousand urban population or 26% of the total in the province in 1995. The municipality is largely agriculture based especially for coconut, while production of staple crops remains minimal, resulting in heavy dependence on the neighboring towns for its food supply.

Digos has 45% share of number of establishments in the province especially in services sector represented by administration, education and health, as well as a trading center for the province.

Mati

Mati is the provincial capital of Davao Oriental, the fifth largest town in the DIDP Area with 94 thousand population in 1995. It is located 165 km from Davao City in the southern part of the province. The main economic activities are cultivation of mango, citrus and coconut. The Pujada bay has rich tourism development potentials.

Presently, Mati functions as a provincial trading center for export commodities notably copra, corn and wood products. In the medium to long-terms, with the PAIC development, infrastructure development of road, port and airport, and tourism development, it could become a trading center for the DIDP and the Mindanao Pacific-Rim region and a tourism center for the DIDP Area linked with BIMP-EAGA countries.

Panabo

Panabo with 130 thousand population is the third largest town in the DIDP Area, of which 43,500 or 33.5% was urban in 1995. The municipality at the border area of Davao City is most affected by spill-over with residential and industrial developments proceeding from Davao City. Agricultural products, mainly banana, are presently exported to Japan, Korea, the Middle East etc. through two private ports of TADECO and DOLE wharves.

Panabo would be a commuters' town for Davao City and an engine for agri-industrialization in the DIDP Area together with Tagum City. The agri-industrialization including a variety of industries will be undertaken along the coastal area as a model of PAICs.

Sta. Cruz

Sta. Cruz had 59 thousand population in 1995, of which 34 thousand or 58% was urban. The municipality is located at the southern border area of Davao City and the foothill of Mt. Apo. Sta. Cruz will play an important role for industrialization along the coastal area and the Pan-Pacific Highway and urbanization as commuters town for Davao City.

3) Major urban growth centers

These centers are Island Garden City of Samal in Davao del Norte, Malalag and Malita in Davao del Sur, and Lupon and Baganga in Davao Oriental.

A new city has been established combining three municipalities on Samal Island called the Island Garden City of Samal. The new capital is located in the former Samal municipality. The City had about 77 thousand population in 1998, of which about 17 thousand or 20% was urban. Kaputian is presently designated as an eco-tourism zone, but once the Samal Island bridge is realized, the entire Samal Island would become favorable tourism destinations.

The Malalag Bay area is designated as a PAIC covering municipalities of Malalag, Santa Maria, Sulop, Kiblawan and Padada. These areas had 157 thousand population with 25 thousand urban population in 1995. Kiblawan has one tertiary school and a district hospital, and Malalag has a well protected port in the Malalag bay. Malalag, having 31 thousand population in 1995 of which 4.5 thousand or 14.5% was urban, is considered as a trading center.

Malita has the largest population of 83 thousand in 1995 in the southern part of Davao del Sur. It has a Special Economic Zone (SEZ). Tourism oriented development is considered with 2,000 ha land including marina, theme park, accommodation facility etc.. Even from the mediumto long-term viewpoint, scaling down of the plan seems to be required because of the inadequate accessibility and difficulty in land acquisition.

The coastal areas from Malita to Jose Abad Santos including the Sarangani municipality have rich tourism sources. The Tourism Development Master Plan for Southern Mindanao by DOT Region XI designates these areas as one of tourism destination clusters together with the Eden-Bayabas, the Davao City-Samal Island and other clusters.

Lupon had 51 thousand population in 1995, and is one of most urbanized municipalities in Davao Oriental with the urbanization ratio exceeding 50%. The municipality is situated at a strategic point between Mati and Tagum. Lupon had the second largest number of establishments in the province following Mati. With the introduction of fast sea craft' s operation linking Sta. Ana Wharf to Lupon by one hour, accessibility to Mati from Davao City would be drastically improved through Lupon. Lupon will be a new gateway of Davao Oriental and a sub-provincial center of the southern part of the province.

Baganga with about 40 thousand population is the largest town in the northern part of Davao Oriental, and one of PAICs covering the other four municipalities of Boston, Cateel, Caraga and Manay. One private port, abandoned by a timber concessionnaire, will be improve to support the PAIC scheme.

4) Service urban centers

Nine service urban centers may be designated: Kapalong in Davao del Norte, Compostela and Maco in Compostela Valley, Toril, Bunawan and Calinan in Davao City, Bansalan and Jose Abad Santos in Davao del Sur and Manay in Davao Oriental. These centers have functions of supporting socioeconomic activities and community development in the respective hinterland areas.

Calinan, located about 20 km from the City proper in the north-western part of the City, may be a new center for agri-industrial activities covering Paquibato and Marilog districts.

The urban hierarchy system in the DIDP Area is summarized in Table 8 and illustrated in Figure 6.

2.4. Transport System

(1) Conditions for improving transport system

Given the characteristics of the existing transport system listed above, and in line with the DIDP strategy, three conditions need to be satisfied to improve the transport system for the DIDP Area. First, a multi-modal transport system should be established in steps centering around Davao City to strengthen links with neighboring regions and BIMP-EAGA as well as inter-provincial links. For this, the road network needs to be improved as the prime mode of transportation, alternative mode of railway transport (LRT) introduced/strengthened, and terminal facilities upgraded.

Second, intra-provincial links should be strengthened to support the formation of urban clusters. In addition to road improvement, sea lanes may be established in some areas. Third, access to remote rural communities should be ensured, including island municipalities.

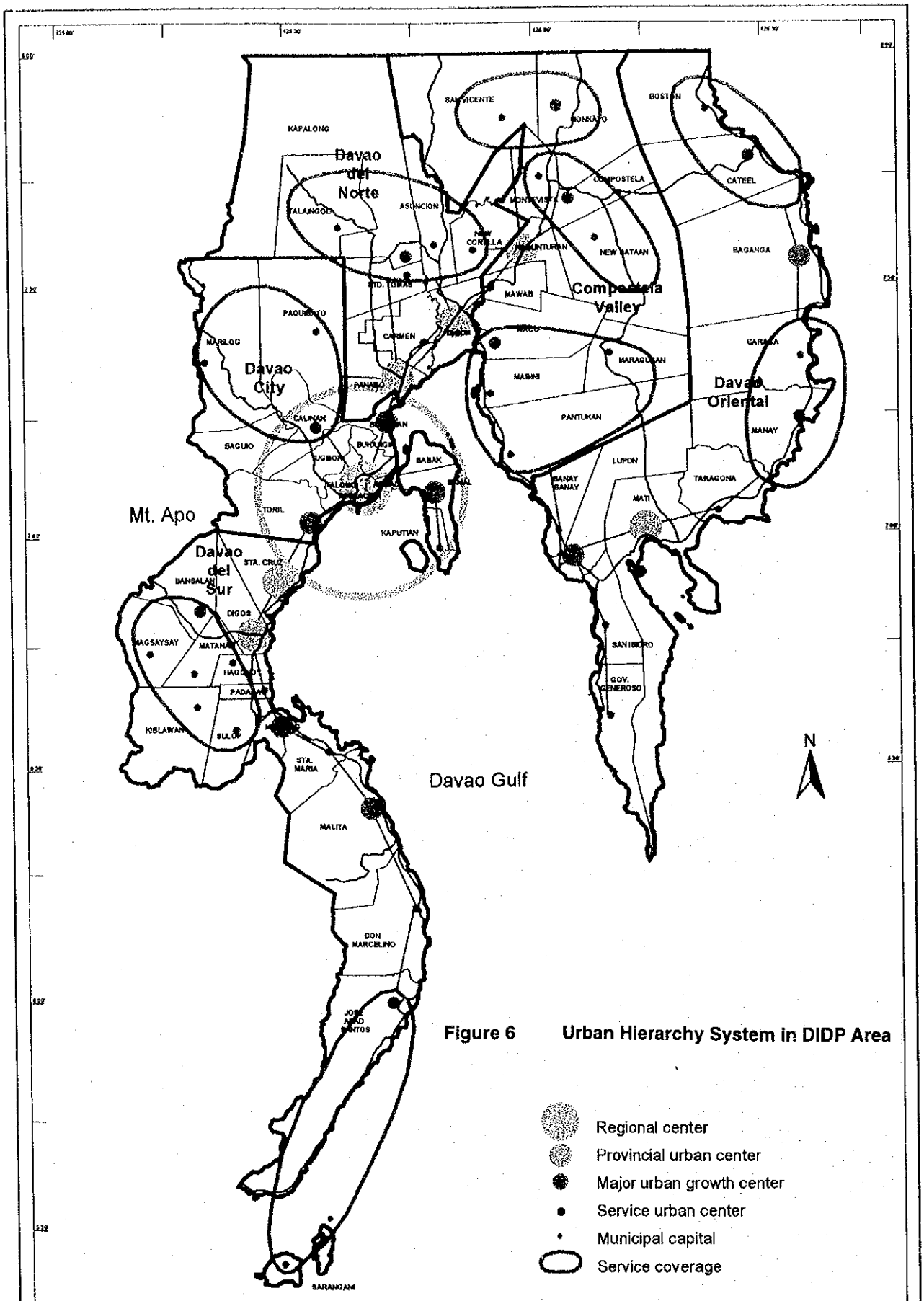


Figure 6 **Urban Hierarchy System in DIDP Area**

- Regional center
- Provincial urban center
- Major urban growth center
- Service urban center
- Municipal capital
- Service coverage

Table 9 Urban Centers for the DIDP Area

Order Level	Name of Urban Center	Functions
Regional Center	Davao City	Highly functional urban center to support regional socioeconomy, regional agri-industrial center, international gateway of Mindanao and BIMP-EAGA
Provincial Urban Center	Tagum	Administration, financial, trading, jewelry centers, Agri-industrial center, sub-regional center
	Nabunturan	New administration center, food basket, mining center
	Digos	Administration, financial, trading, social center
	Mati	Administration, tourism, agri-industrial, trading center, educational center, mining and quarrying center
	Panabo	Agri-industrial, trading, sub-provincial center, commuters' town of Davao City
	Sta. Cruz	Agri-industrial center, commuters' town of Davao City, sub-provincial center, eco-cultural village
Major Urban Growth Center	Island Garden City of Samal	Tourism core, BIMP-EAGA development center
	Toril	Sub-CBD and commercial center, industrial center
	Bunawan	Agro-industrial center, trading center
	Malalag	Tourism sub-center, social development center
	Malita	Agro-industrial and trading center, social service center
	Lupon	Gateway of the province, sub-provincial center
	Baganga	Agri-industrial center, trading center, social center
Service Urban Center	Compostela	Agricultural center, mining center, trading sub-center, financial sub-center
	Monkayo	Agricultural sub-center
	Kapalong	Agricultural center, trading sub-center
	Maco	Trading center, commuters' town of Tagum City
	Calinan	Agri-industrial center, social development center, education center
	Bansalan	Social development sub-center
	Jose Abad Santos	Social developmetn sub-center
	Manay	Social development sub-center
	Cateel	Social development sub-center, trading sub-center
Municipal Capital	Other municipality Capital	Municipal administration center, trading and financial sub-centers

(2) Artery development

The multi-modal transport system centering around Davao City and the inter-provincial links constitute the artery network for the DIDP Area. Elements of the artery network are described by mode (Figure 7).

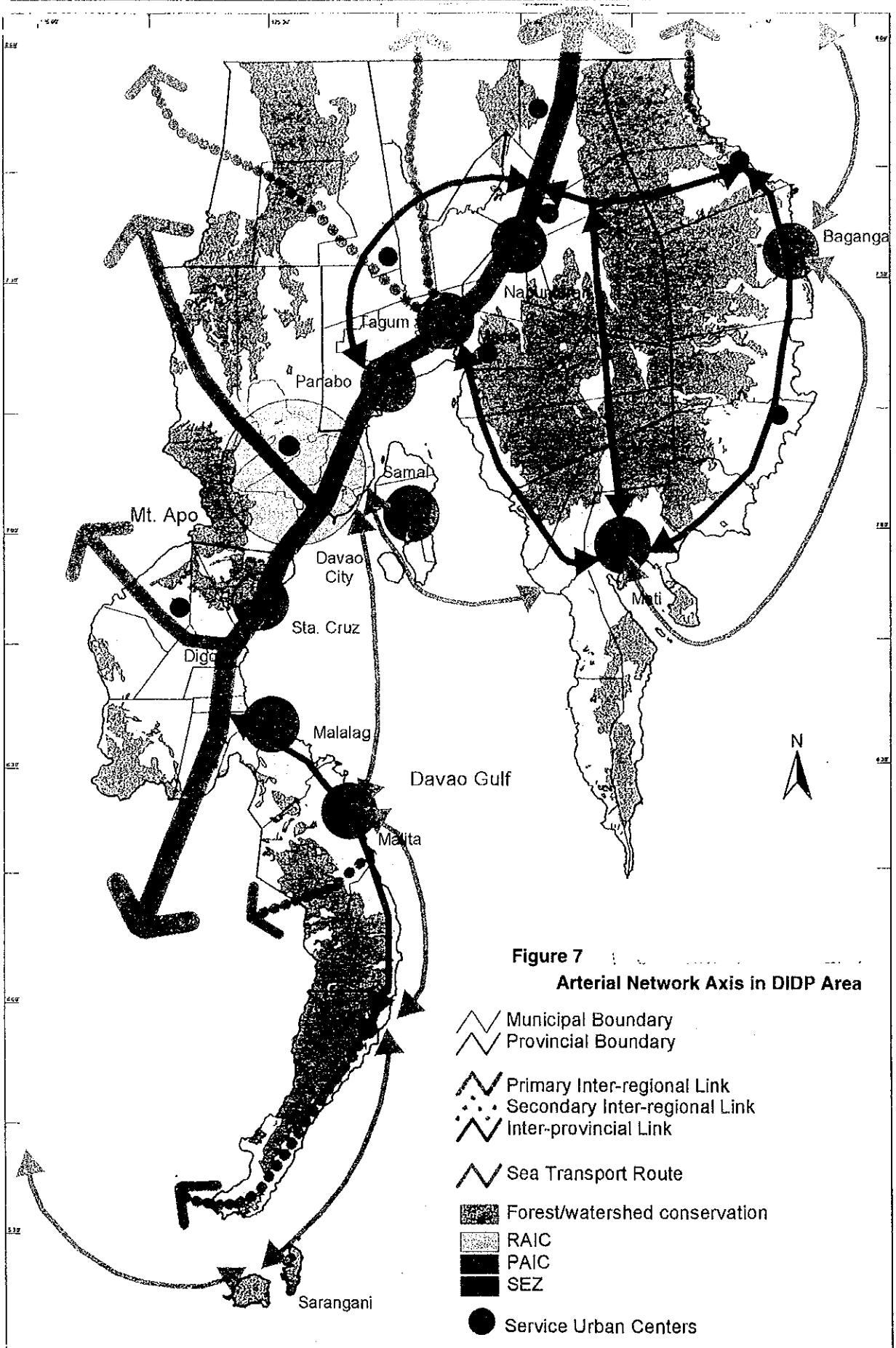


Figure 7

Arterial Network Axis in DIDP Area

Land transport

Land transport by roads continues to be the prime mode of transportation in the DIDP Area for both passengers and cargoes.

1) Primary inter-regional links

The Agusan-Davao-General Santos corridor on the Pan-Philippine Highway shall be strengthened as a backbone axis for various socioeconomic activities in DIDP Area connecting with other major growth centers such as General Santos, Butuan and Surigao. The improvement of the Panabo-Davao City section with lane expansion and new road will support the corridor development as well. The Davao-Cotabato between Digos and Cotabato City and the Davao-Bukidnon inter-regional arteries shall be improved for strengthening the economic linkages with other regions.

2) Secondary inter-regional links

The Tagum-Mati-Surigao del Sur link should be improved to support agri-industrialization and to the promote tourism development corridor in Davao Oriental. The Santo Tomas-Bukidnon and the Tagum-Asuncion-Agusan del Sur arteries shall be newly constructed to strengthen the economic linkages with other regions and to establish alternative road links. The Ticulan-Lagumit-Little Baguio-Alabel road shall be newly constructed to link Malita and General Santos with shorter distance.

3) Inter-provincial links

The Compostela-Cateel and the Nabunturan-Mati roads could contribute to vitalization of local economies through improvement of accessibility to depressed areas in the northern part of Davao Oriental and establishment of alternative routes to Mati. The former would contribute to supporting two PAICs of Nabunturan and Baganga, and the latter would vitalize agricultural and tourism potentials in the Maragusan area and reduce the travel time between Compostela Valley and Davao Oriental. The Sulop-Malita-General Santos corridor shall be improved to support agri-industrial and social activities, and to the promote tourism development corridor between Malita and Jose Abad Santos extending to Sarangani islands.

4) Intra-provincial links

The Tagum-Asuncion-Kapalong-Santo Tomas-Panabo corridor shall be formulated as a collector road in Davao Province to support agri-industrial activities and social services delivery. The Panacan-Toril circumferential road function shall be strengthened to sustain efficient traffic movement and to formulate orderly urban development in Davao City.

Sea transport

Efficiency in shipping and port services is critical in promoting the domestic and international trade and tourism development of the DIDP Area.

1) International port

Sasa Port, as an international gateway, needs to be highly functional to respond to future demand expected through agri-industrialization and tourism development. It should be strengthened by increase of cargo handling capacity

and to link with the national trunk network and international network through new alternative port development.

2) Internal sea transport of DIDP

Improvement of the Sta. Ana wharf could play an important role on strengthening internal sea transport of the DIDP Area connecting with the Samal Island, Lupon and Mati, including commuting to Davao City and tourism circuits linking the DIDP Area with BIMP EAGA countries.

3) Industrial ports

Public and private ports shall be developed to promote agri-industrial activities for PAICs like Maco, Sta. Cruz, Malalag, Mati and Baganga.

4) Tourist ports

Ports of eco-tourism zone in Samal, coastal areas in Davao Oriental and in the southern part of Davao del Sur including the Sarangani municipality shall be developed as tourist ports considering tourism cluster developments of the DIDP Area. Ports to island municipalities of Samal Island and Sarangani will be improved to ensure the accessibility under all conditions.

Air transport

Air transport also plays crucial role in promoting tourism development and agri-industrialization, and integration of Mindanao by establishing island-wide and international networks to BIMP EAGA countries, other East Asia countries, Australia, Europe and United States.

1) Davao international airport

The Davao international airport is under improvement to meet the international standards with extension of runway upto 3,000 m, construction of passenger and cargo terminals and installation of a navigation system. The handling capacity of exiting airport is expected to reach the saturation level in near future, considering on-going agri-industrialization and booming tourism development. Further upgrading to the full status international airport will be necessary in accordance with proceed of the developments from the long term viewpoint.

2) Mati airport

The Mati airport as a secondary airport will play a role to connect with other destinations of Surigao, Zamboanga, Cagayan de Oro, General Santos etc. mainly for tourism purposes and for agri-industry business. Charter flights would be operated for tourism purpose connected with the above cities as the first step. In accordance with the development, the operation would be changed to the regular flights.

Chapter 3 Development Strategy for Urban and Spatial Development

3.1. Urban and Spatial Development Strategy

(1) DIDP strategy in urban and spatial system

The Internal Integration strategy will encourage more dispersed population distribution as comparatively more employment opportunities will be generated in rural areas and small towns. To support this strategy, farm-to-market roads need to be improved or alternative transport means established, and small towns should be equipped with basic facilities for marketing of agro-products and simple agro-processing as well as basic social services.

Under the Globalization Drive strategy, some secondary urban centers should be strengthened respectively with specialized functions such as agro-processing, marketing/distribution, and tourism-related services. The PAIC initiatives should be effectively utilized for this purpose. Linkages with neighboring regions and BIMP-EAGA should be strengthened. Such inter-regional and international linkages should inevitably center on Davao City, but other secondary urban centers should be linked to the network.

The High Tech High Services strategy will encourage further concentration of population and economic activities in Davao City and a few larger urban centers in its influence area. Various urban infrastructure needs to be much improved in this area, and international linkages centering on Davao City will go beyond BIMP-EAGA. For the latter, port and airport facilities and services need to be much upgraded.

(2) Urban and spatial development strategies

Specific strategies for urban and spatial development in the DIDP Area are established to support the DIDP strategy.

1) Improving farm-to-market access

As the first step toward integrating isolated rural economies, farm-to-market access should be improved. For some remote communities in coastal areas, sea routes may provide alternative means of transportation. At the same time, service urban centers at the fourth tier of urban hierarchy should be equipped with basic facilities to serve rural communities in respective hinterlands, including those for simple agro-processing, distribution of agro-products, daily needs and market information, and agricultural/ rural credit.

2) Developing clusters of secondary urban centers, using the PAIC initiatives, in line with the Dispersed Concentric Strategy for Region XI

Urban functions in different urban centers in a cluster should be strengthened in a mutually complementary manner to support as a whole prospective socioeconomic activities in a corresponding PAIC. Improvement of links with rural hinterland would be an important part of this.

3) Improvement of an urban environment such as poor drainage and solid waste

As an improvement of the urban environment, the integrated solid waste management and flood control projects shall be implemented immediately. The solid waste management system shall address the worsening waste disposal

conditions in Davao City and other major centers in the DIDP Area handling domestic and municipal solid wastes and sewerage in an environmentally sound manner, through a composting process combined with provision of a new sanitary landfill.

The urban drainage and flood control project, in the short term, shall upgrade and rehabilitate the existing drainage structure and construct identified drainage mains and sub-mains in major urban centers. In the long term, it aims to formulate a program of implementation which could serve as a continuation of initial efforts.

4) Strengthening Davao City with clarification of its urban functions in line with the Bipolar Strategy for Region XI with General Santos City

The Davao City will increase its population by half a million within the next 20 years. The City as an international gateway of the Southern Philippine and a regional center of Region XI and the DIDP Area shall be converted into a modernized city through decentralization to Bunawan, Toril, Tugbok and Calinan in the City.

Population pressure by Davao City shall be absorbed in the outside of the City as well, according to the PAIC strategy, to the Tagum-Panabo area in Davao del Norte, Sta. Cruz-Digos area in Davao del Sur, and to some extent in Lupon and Mati of Davao Oriental. Decentralization of urban functions shall be accelerated to Lupon and Mati as well introducing rapid sea transport (super fast craft) from the City to Lupon in the short to medium term.

To avoid excessive concentration in the City proper, subcenters should be developed respectively having characteristic functions and facilities. The Bunawan sub-center will lead the industrial development with technological innovations, capitalizing on its strategic location along the artery road, close to the international airport and the seaport. The Toril subcenter will be a major commercial center with good access to the City proper, beach resorts, Mt. Apo and newly urbanizing areas in Davao del Sur.

The Tugbok R & D center may develop through active interactions between industries, academic institutes and government agencies. The Calinan subcenter will be strengthened as an agro-processing and agricultural support center surrounded by productive areas. The Three Ridge eco-tourism center will become a mountain resort for Mindanao, comparable to Baguio for Luzon, and form a tourism circuit with Samal Island.

5) Establishment of an integrated transport system for the Davao Metropolitan Area

An efficient road network shall be formulated in the urbanization area of Davao City, constructing the circumferential and radial roads to disperse the traffic movement and to prevent the through traffic from the CBD area during the short to the long terms.

In order to alleviate the severe traffic congestion existing in Davao City, an integrated traffic management system including signalization and road channeling shall be immediately implemented. A Light Railway Transit (LRT) may be introduced between Sta. Cruz and Tagum, starting from the Panacan - Toril section in Davao City in the medium to the long term.

Creating the parking space in the CBD of the major urban centers will contribute to alleviating the traffic congestion. The construction of a new bus terminal is crucial to reduce the traffic in the urban center. A new bus terminal together with a relocation of public market and/or commercial and institutional facilities would provide an opportunity to improve the physical structure of the CBD through urban renewal.

6) Creation of urban amenity in major urban centers and tourism areas

Creation of the urban amenity (e.g. shopping center, water front, amusement facility, museum, park, modernized avenue etc.) is crucial to attract both domestic and foreign tourists and investors for industrial development and to establish the comfortable living conditions for the local populace in the DIDP Area.

Intensified land use development in the existing built-up areas through the area redevelopment and an enforcement of zoning ordinances with the high total floor area to land area ratio, will be required for urban areas in the major towns of Davao City, Tagum City, Panabo, Sta. Cruz, Mati, Digos etc. New zoning ordinances shall be adopted for new urban area development.

A new modernized urban area will be created near Sta. Ana Wharf including a waterfront development of fisherman' s wharf, marina, commercial and business area development, a container terminal development and tollway development in the short to long terms. New town development to absorb the residential demand in terms of the quantity and the quality and to create modernized residential area could be realized in the Davao City and/or its vicinities in the long term.

The urban plan for greenery and open spaces will include a zoning system designating zones where greenery will be maintained in the form of public facilities such as city/municipality planning parks, green areas and cemeteries and also zones for viable forest and agricultural areas. The plan also will cover regional green areas where greenery will be protected by regulation and guidelines. Only through the organic and systematic distribution of these green and open spaces will be pleasant urban environment be secured.

In this regard, a Davao Metropolitan Area Urban Development Plan including Samal Island, newly established as the Island Garden City of Samal, shall be immediately formulated providing an urban structure, land use plan, multi-modal transport system and infrastructure in the area. Areas for the tourism development are the Eden-Bayabas eco-tourism area of Davao City and Samal Island in the short term, and the coastal areas between Malita and Jose Abad Santos and the Sarangani municipality in Davao del Sur, and the coastal area from Lupon to Boston via Mati in Davao Oriental in the medium to long terms for creation of attractive amenity.

3.2. Strategy for Davao City Urban Development

An integrated urban development plan shall be formulated for improvement of the urban areas as a systematized basic plan to integrate various public sector efforts for developing urban areas from a long-term and comprehensive perspective. The plan shall be prepared, coordinated with the City Comprehensive Plan and the basic plan of each district. The Plan is to spell out appropriate countermeasures against the numerous problems such as drainage and flooding, traffic congestion, lack of open

space, existence of squatter areas, etc., thereby to promote a systematic development of the urban areas in such way that the city becomes well prepared for the coming 21st century under the DIDP strategy.

(1) Development of sub-centers

In order to avoid excessive concentration of the city proper, the sub-centers development will be promoted, each sub-center equipped with some facilities to support business, commercial, cultural, entertainment, residential and other living functions. Each sub-center shall be developed with unique personality and dynamism based on its local characteristics and resources.

Taking advantage of strategic transportation facilities such as the international airport and the seaport, the Bunawan Urban Sub-center will be promoted as the core of a leading industrial area in the DIDP Area including the technological development industry of the Bunawan – Panabo commuters' town development.

In the Toril Urban Sub-center, various functions and facilities for enjoyable life are to be developed. This center will include not only work and study related facilities, but others such as theaters, shopping centers, dining zones and beach resorts.

The Tugbok R & D Center development aims at growing around the core of educational research and development to create an area rich with the interactions generated by the interweaving of industries, schools and government.

The Calinan Urban Sub-center is targeted at the creation of a fascinating base in the middle to northern part of the city which is in harmony with its rich natural environment and has a well developed base for agri-industry and everyday living.

The Three Ridge Eco-tourism Center of Eden – Bayabas area shall serve as the mountain resort for Mindanao and BIMP-EAGA regions. The wholesome tourism development potential in terms of its natural landscape, strategic location, panoramic scenery and its climate offer a favorable and enduring impression among tourists. The development of the area will formulate a tourism circuit with the coastal tourism activities of Samal Island.

The growth and reorganization of business and commercial facilities in the city proper and the subcenters will be sought through the activities of these urban development system to realize a Davao of comfortable yet dynamic living environment on a balance between work and residence.

(2) Redevelopment of Davao City proper

The economic energy produced by business and commercial facilities function have played a large role in Davao' s development up to now. In spite of the non-excessive concentration of business and commercial facilities in the city proper over the recent years, Davao City has serious problems related to land use, open space and traffic in the city proper and its vicinity due to non-intensive land utilization, inadequate road development without sufficient traffic control and poor parking space.

With the goal of revitalizing the city proper as an attractive urban area with a variety of functions, quantitative expansion and concentration of business function will be restricted while qualitative advancement will be pursued unlike that of Manila. Meanwhile, cultural, inter-personal, commercial and other functions will be

introduced into the area to develop an attractive area truly open to the world including land claimed area development as a future-type sub-center that meets the need of vital exchange of information, international activities and sophisticated commercial activity along the shoreline of the city proper.

Redevelopment of the existing urban area is necessary for improving the degrading environment and thereby ensuring the construction of a comfortable town. The objective is the intensified utilization of urban land in a sound and rational manner through the concerted and uniform improvement of privately owned lands and public facilities. The plan will be classified into two types by means of the "Title Conversion Method" and through the "Land Purchase Method".

The Land Readjustment project, one of the title conversion methods, is to select a particular area and to improve land use efficiently in the area by means of land area reduction and land distribution, and to improve public facilities such as road widening and establishment of greenery, and car parking areas wihtout fund of land acquisition.

(3) Housing development

Housing development shall be conducted by means of the following: 1) creating the sustainable housing development, 2) easy access to purchasing housing units for the low to middle income class families (improvement of housing delivery system), 3) rationalization of land use and town planning and 4) integration of environmental concern in planning and development. The objectives of the housing development are to provide adequate, affordable and sustainable housing units, to alleviate squatter areas, to provide slum upgrading and sites and service programs and to establish housing financial body and public rental housing project. In addition to the above, the housing development shall be promoted resolving "Right of Way" problems for infrastructure development.

(4) Transport development

Arterial road network

The arterial road network plan was formulated in the Davao City Comprehensive Development Plan, 1996-2021 in 1995. Planned arterial road network consists of five radial roads, three circumferential roads and a coastal road.

Urbanized area is designated to expand to the north upto Bunawan – Binugao road (C2) in the land use zoning plan. Area between C2 and Bunawan – Calinan road (C3) is designated as agriculture areas and partially forest areas. Generally urbanized areas expands along the newly open-up road in the urbanizing area. In this context, C3 road shall be graded down from circumferential road to bypass road status for preventing the urbanization along the C3 road, and the area between C2 and C3 shall be considered as buffer zone for the Davao City.

In order to alleviate the present traffic congestion in the Central Business District (CBD), extension of Diversion Road (C1) and construction of new Buhangin – Callawa road shall be completed in the short term period. Since some sections of C1 road is suspended due to the topographical difficulty, the alignment shall be changed the northward. After the completion of these above roads, through-traffic will pass on the route between Buhangin and Toril (refer to Figure 10).

Light railway transit (LRT)

A feasibility study (F/S) shall be carried out for LRT development project in Davao City to examine the financial viability of the project vis-à-vis demand, costs and revenue.

Usually, more than one million urban population is required for a light railway transit system to be justified. Urban population in Davao City is projected by the JICA Study Team to be 1.01 million in 2003.

LRT development has high initial investment cost for construction of the structure and the stock yard, installment of telecommunication facilities, purchase of the rolling stock etc. Therefore LRT fare has to be set at higher than that of jeepney, the existing main transport mode. Much increased family income in the City is one of prerequisites. Also other business development associated with the LRT should be combined to enhance the viability of the project and attractiveness to the investors such as operation of station buildings and housing estates development around the stations.

(5) District planning

The district planning with community base shall be undertaken to establish detailed city plans at a district level. A district city plan pursues improvement and preservation at the same time, specifying placement and scale of roads, parks etc., configuration, use and sites of buildings and other restrictions on land use in a comprehensive manner. Improvement and preservation corresponding to each district' s characteristics can be carried out by guiding and regulating development and construction activities.

(6) Greenery development

The urban plan will include a zoning system designating zones where greenery will be maintained in the form of public facilities such as city parks, green areas and cemeteries and also zones for city forest and agricultural areas. The plan will also cover regional green areas where greenery will be protected by regulation and guidelines. Only through organized and systematic distribution of these green and open spaces will pleasant urban environment be secured.

The greenery development plan indicates the overall distribution of various green and open spaces. The basic concepts consist of 1) conservation of natural areas and restoration of ecosystems, 2) formation of a greenery network to serve as a basic structure for the city development, 3) full realization of parks close to living spheres, 4) formation of green areas which provide a base of safety and reliability, 5) responses to demands for various forms of recreation and 6) protective nurturing of green landscapes. Furthermore, the framework for greenery distribution will be to form a water and greenery network, creating the east-west axis "coastal water systems" , which link points to go with the "river water systems" which will run mainly along the north-west axis, Eden – Bayabas eco-tourism zone and the Mt. Apo National Park.

Chapter 4 Urban Sector Projects and Programs

In line with the proposed spatial and urban development strategies, the following eight projects and programs are proposed in the urban system sub-sector, including one anchor denoted by asterisk (*).

4.1. Individual Projects/Programs

(1) *PAIC Support Infrastructure Program

Provincial agri-industrial centers (PAICs) represent the local initiative to establish viable economic activities by utilizing indigenous resources. The PAIC initiative is considered instrumental in developing the DIDP Area as a whole under the agri-industrialization strategy. PAICs are expected to develop in a mutually complementary manner, each having characteristic activities based on indigenous resources.

The program is to improve various infrastructure facilities for seven PAICs and the Malita Special Economic Zone (SEZ) to support their developments. Specific support infrastructure for each PAIC or SEZ would be different such as port, farm-to-market roads, water supply, solid waste management and electricity. Some infrastructure may be improved under different programs. In particular, Port Development Project for Mati, Baganga, Maco, Malalag and Sta. Cruz, and Farm-to-Market Roads Project may be implemented.

(2) Service Urban Centers Strengthening Project

The Service Urban Centers Strengthening Project will provide urban facilities and services to facilitate service delivery for the respective rural hinterlands. Two common components are (1) citizens' hall complex including multi-purpose hall, accommodations, broadcasting studio, recreation facilities, day care/day center or other social facilities, and (2) multi-purpose information network to transmit a variety of information on health, education and training opportunities, community activities, and marketing.

(3) Comprehensive Housing Program

The Comprehensive Housing Program aims to provide adequate and affordable housing units for all. It will contribute also to minimizing squatter areas through slum upgrading and site and services. Another important component of the program is the introduction of new institutions such as new housing cooperatives and finance entity and public rental housing programs.

(4) Sta. Ana, Bolton and Davao River Waterfront Development Project

The Sta. Ana, Bolton and Davao River Waterfront Development Project has two components: (a) Bolton and Davao River Waterfront Development (IN-31a), and (b) Sta. Ana Wharf Area Development (IN-31b). The former is to create pleasant water-front area in the heart of Davao City. The water-front area may accommodate conference facilities, hotels, shopping centers, fisherman's wharves, commercial buildings, amusement facilities and parks. Urban renewal of existing built-up areas and socialized housing would be a prerequisite. The latter is to redevelop the area around Sta. Ana Wharf with multiple purposes including tourism promotion, trade development and urban amenity creation (refer to Figure 9).

(5) New Town (Commuters' Town) Development Projects

Town Development Project aims to guide the urbanization centering around Davao City and to realize more orderly urbanization patterns. Two new towns are proposed to be developed: one in Sta. Cruz and the other in the border area between Davao City and Panabo.

(6) Davao City Greenery Development Project

The Davao City Greenery Development Project aims to create pleasant and comfortable living environment in Davao City through the planned development of a network of artery road with roadside trees and vegetative separation strips, urban parks, and conservation of river banks and other environmentally critical or vulnerable areas. The project will contribute not only to attracting visitors and investors, but also to protecting watershed areas of the City' s future water sources and safeguarding citizens from possible natural disasters as well as fires.

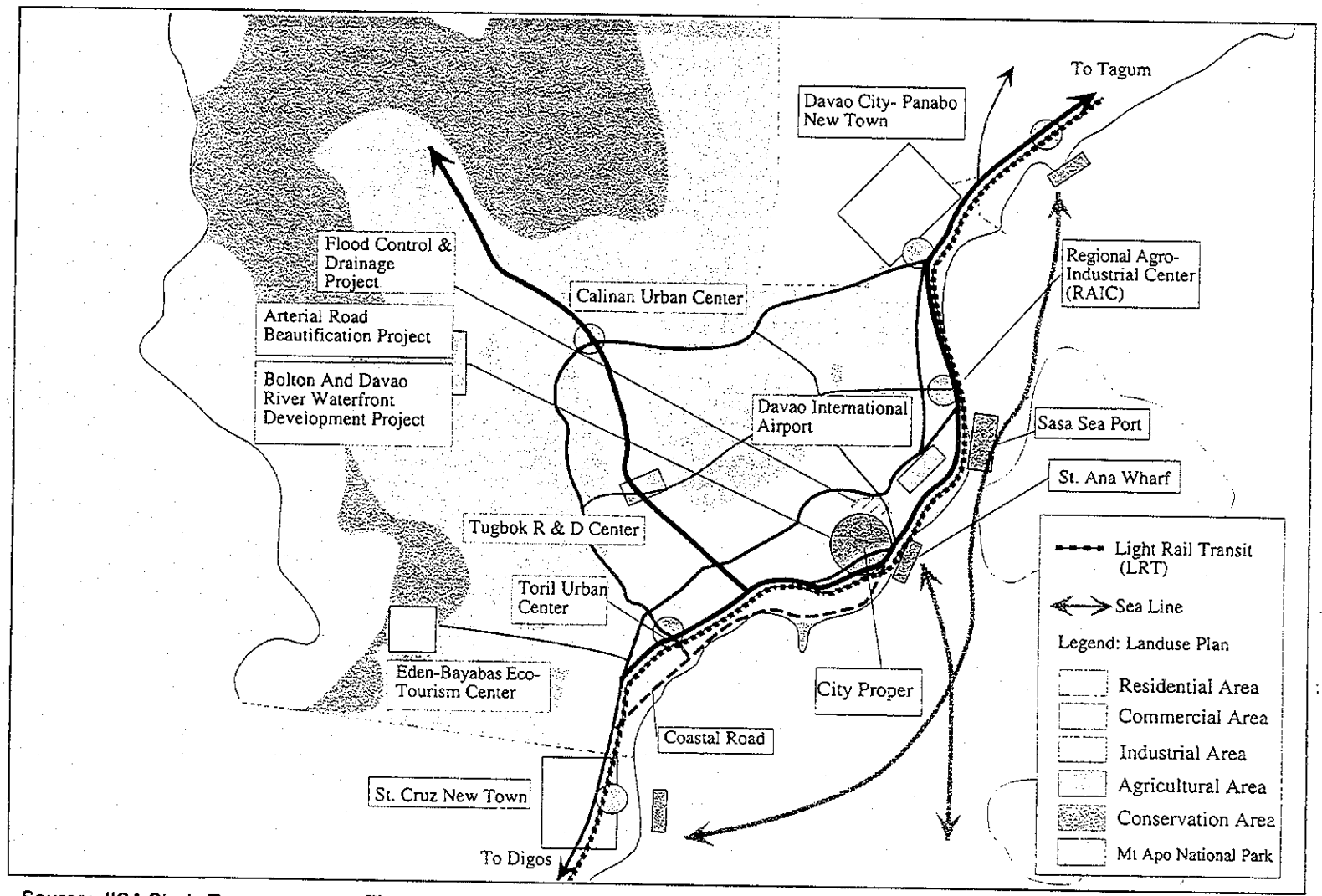
4.2. Area-wide Development Projects

(1) Davao Metropolitan Area Integrated Urban Development Study

The Davao Metropolitan Area Integrated Urban Development Study is conducted for areas within some 25 km radius from the Davao City center to prepare a comprehensive urban development plan, which will specify urban land use zoning, multi-modal urban transport system, and core urban infrastructure and facilities. The plan will be used to effect law enforcement.

(2) Samal Island Integrated Area Development Project

The Samal Island Integrated Area Development Project is a study to prepare an area development master plan for Island Garden City of Samal, focusing on tourism. The study will cover a land use plan including new zoning ordinances, transport development plan, social and infrastructure development plan, environmental management plan, and institutional arrangements.



Source: JICA Study Team

Figure 8 Main Urban Related Projects in Davao City

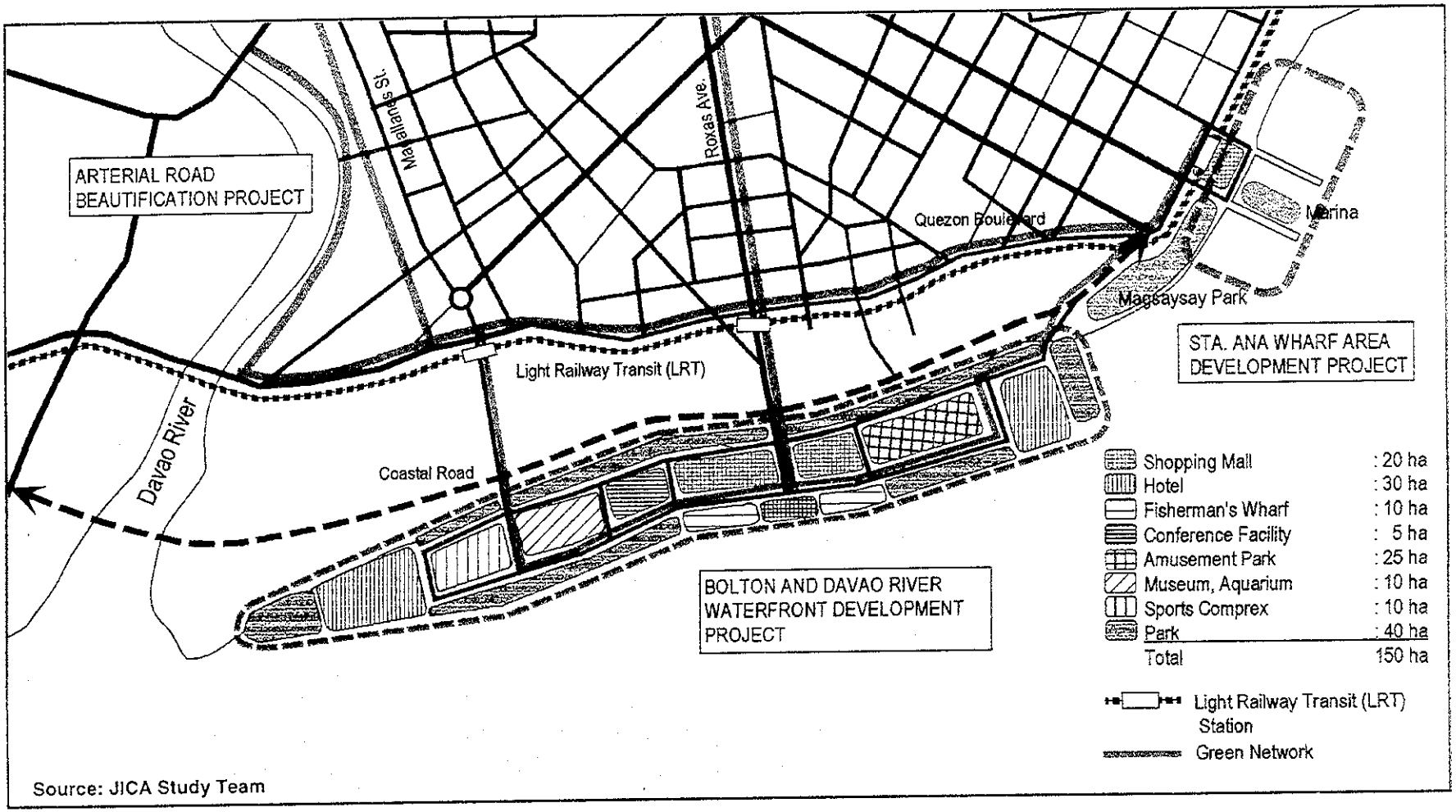
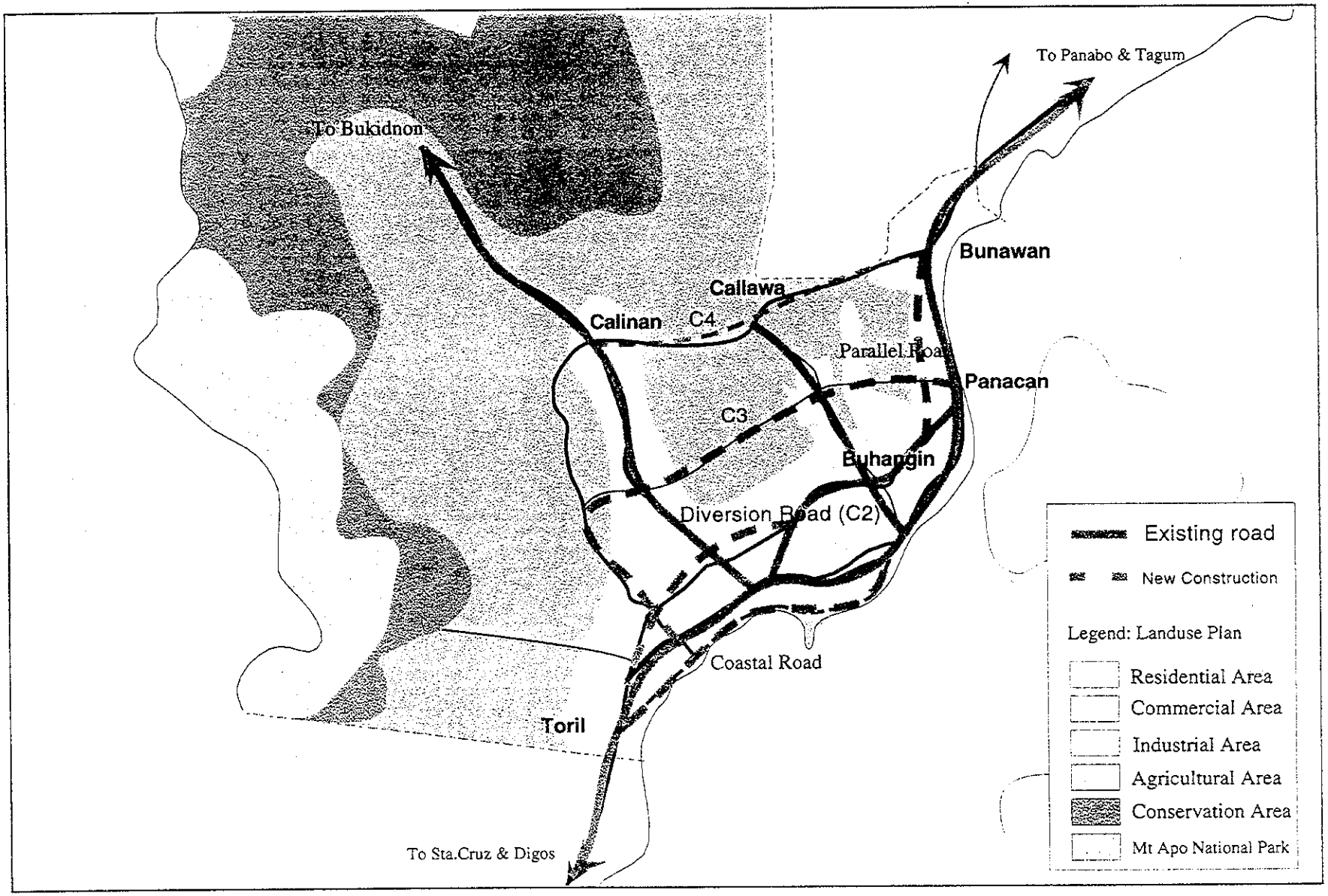


Figure 9 Conceptual Layout Plan of Waterfront Development of Davao City



Source: Davao City Comprehensive Development Plan, 1996 - 2021

Figure 10 Proposed Arterial Road Network for Davao City

APPENDICES

Appendix 1: Population Projections

Population Projection for DIDP Area

Province/City	1995	2000	2005	2010	2015	2016
Davao Province	1,174,016	1,321,000	1,470,000	1,623,000	1,779,000	1,812,000
Urban	326,053	396,376	527,784	665,415	786,662	812,617
Rural	847,963	924,624	942,216	957,585	992,338	999,383
Davao City	1,006,841	1,144,000	1,281,000	1,413,000	1,531,000	1,556,000
Urban	771,844	945,681	1,156,694	1,332,612	1,459,659	1,484,685
Rural	234,997	198,319	124,306	80,388	71,341	71,315
Davao del Sur	677,069	743,000	846,000	929,000	1,017,000	1,035,000
Urban	158,580	173,655	225,673	275,998	323,462	333,553
Rural	518,489	569,345	620,327	653,002	693,538	701,447
Davao Oriental	413,472	466,000	520,000	574,000	630,000	641,000
Urban	105,017	130,288	168,949	208,675	245,817	253,746
Rural	308,455	335,712	351,051	365,325	384,183	387,254
DIDP Area	3,271,398	3,674,000	4,117,000	4,539,000	4,957,000	5,044,000
Urban	1,361,494	1,646,000	2,079,100	2,482,700	2,815,600	2,884,600
Rural	1,909,904	2,028,000	2,037,900	2,056,300	2,141,400	2,159,400

Population Growth Rate for DIDP Area

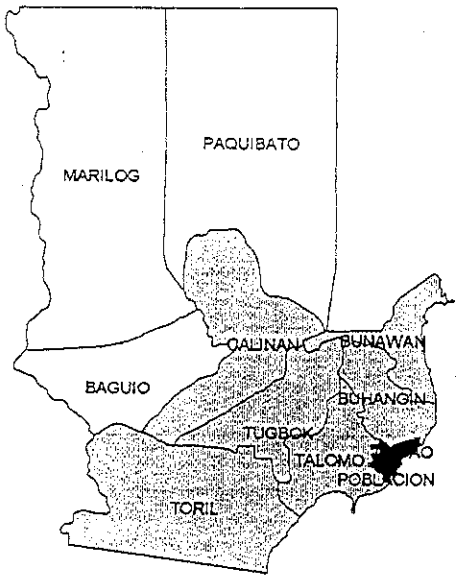
Province/City		2000/95	2005/00	2010/05	2015/10	2016/15	2016/1995
Davao Province	(Total)	2.39	2.16	2.00	1.85	1.85	2.09
	(Urban)	3.98	5.89	4.74	3.40	3.30	4.44
Davao City	(Total)	2.59	2.29	1.98	1.62	1.63	2.09
	(Urban)	4.15	4.11	2.87	1.84	1.71	3.16
Davao del Sur	(Total)	1.88	2.63	1.89	1.83	1.77	2.04
	(Urban)	1.83	5.38	4.11	3.22	3.12	3.60
Davao Oriental	(Total)	2.42	2.22	2.00	1.88	1.75	2.11
	(Urban)	4.41	5.33	4.31	3.33	3.23	4.29
DIDP Area	(Total)	2.35	2.30	1.97	1.78	1.76	2.08
	(Urban)	3.87	4.78	3.61	2.55	2.45	3.64

Urbanization Rate for DIDP Area

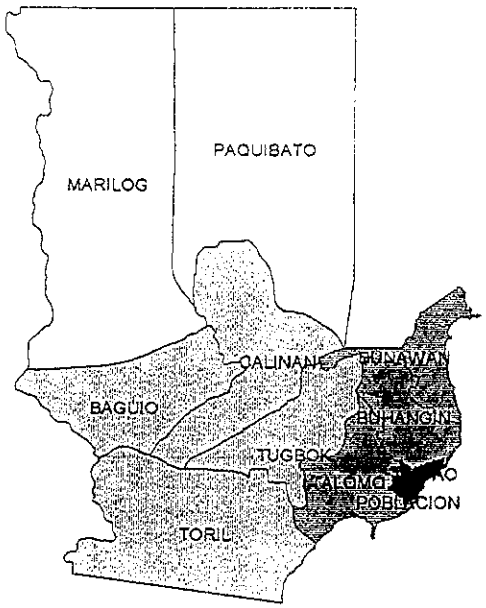
Province/City	1995	2000	2005	2010	2015	2016
Davao Province	27.8	30.0	35.9	41.0	44.2	44.8
Davao City	76.7	82.7	90.3	94.3	95.3	95.4
Davao del Sur	23.4	23.4	26.7	29.7	31.8	32.2
Davao Oriental	25.4	28.0	32.5	36.4	39.0	39.6
DIDP Area	41.6	44.8	50.5	54.7	56.8	57.2

Population Projection by Municipality for the DIDP Area

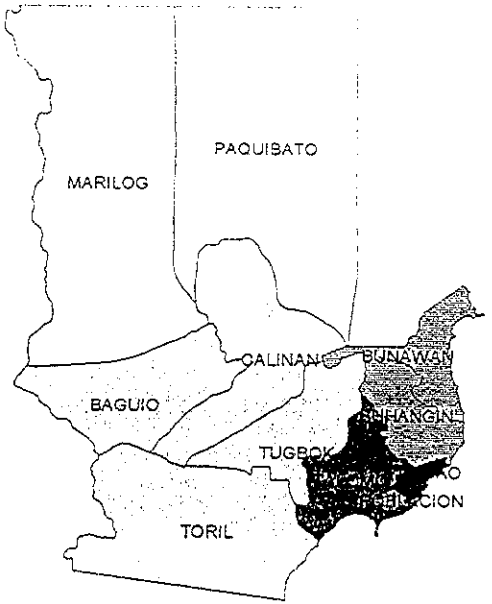
Municipal	Total Population					Urban Population					Rural Population				
	1995	2000	2005	2010	2016	1995	2000	2005	2010	2016	1995	2000	2005	2010	2016
DAVAO PROVINCE	1,174,016	1,310,000	1,430,800	1,612,000	1,799,000	326,053	381,600	451,700	589,300	769,600	847,962	928,800	979,200	1,022,500	1,029,600
Asuncion	56,767	59,200	61,800	65,800	70,300	7,223	8,400	9,800	12,500	15,600	49,544	50,800	52,000	53,300	54,700
Babak	28,691	33,100	36,600	41,700	46,500	7,686	8,800	10,100	12,400	15,200	21,005	24,300	26,500	29,300	31,300
Carmen	55,515	62,100	69,000	80,100	91,200	8,142	8,900	10,200	14,300	20,900	47,373	53,200	58,800	65,800	70,400
Compostela	53,259	54,900	56,900	60,700	65,100	17,254	19,000	21,400	25,800	30,900	36,505	36,000	35,500	34,900	34,300
Kapalong	61,823	67,800	72,000	77,300	82,100	9,910	11,800	14,000	18,100	23,300	51,913	56,000	58,000	59,200	58,800
Kapalian	26,889	28,900	30,700	33,800	36,900	3,595	4,100	4,700	5,800	7,200	23,294	24,800	26,100	28,000	29,700
Mabini	29,421	34,500	38,700	44,500	50,100	5,839	7,500	9,200	12,300	15,500	23,591	27,000	29,600	32,200	34,600
Maco	58,351	62,200	65,900	72,500	80,300	6,713	8,100	9,900	13,700	19,400	51,638	54,100	56,000	58,800	60,900
Mawab	28,767	30,400	31,700	33,700	36,000	12,157	12,800	14,200	17,300	21,000	16,610	17,600	17,500	16,300	15,000
Monkayo	65,400	74,000	80,600	88,900	95,800	11,456	12,800	14,400	17,300	20,500	53,944	61,200	66,200	71,700	75,300
Montevista	32,196	35,400	38,000	42,200	46,600	6,649	7,100	7,700	9,000	10,400	25,547	28,300	30,300	33,300	36,200
Nabunturan	54,437	56,700	59,300	63,900	69,400	13,954	16,100	18,800	23,800	30,000	40,483	40,700	40,500	40,100	39,400
New Bataan	42,894	46,800	49,400	53,000	56,200	9,001	10,800	13,200	18,200	25,000	33,893	35,900	36,200	34,800	31,300
New Corella	41,612	47,300	51,800	58,100	63,700	7,775	9,400	11,600	16,100	22,500	33,837	37,900	40,300	42,000	41,200
Panabo	129,826	153,800	178,200	216,800	258,400	43,504	53,700	66,400	91,100	124,400	86,322	100,100	111,800	125,700	134,000
Pantukan	54,328	63,000	69,500	77,200	83,700	15,423	16,000	17,100	19,400	22,000	38,905	47,000	52,400	57,800	61,700
Samal	21,318	23,100	24,800	27,400	30,400	4,426	4,800	5,400	6,400	7,600	16,892	18,300	19,400	21,000	22,800
Santo Tomas	75,902	85,400	93,500	106,300	120,000	27,483	32,200	37,600	48,500	62,200	48,419	53,300	55,900	57,800	57,800
Tagum	155,343	181,100	204,100	238,500	275,900	84,163	103,700	127,900	174,600	237,000	71,180	77,400	76,200	63,800	38,800
Maragusan (San Mariano)	39,866	40,700	41,700	43,900	46,500	9,345	10,700	12,200	15,100	18,500	30,521	30,000	29,500	28,800	28,100
San Vicente	50,167	57,800	64,000	72,100	79,400	5,125	5,600	6,200	7,200	8,400	45,042	52,200	57,700	64,800	71,000
Talaingod	10,744	11,800	12,600	13,600	14,400	9,199	9,300	9,700	10,400	11,100	1,545	2,500	2,900	3,100	3,300
DAVAO CITY	1,006,841	1,161,000	1,268,000	1,406,000	1,535,000	771,844	922,500	1,046,600	1,237,100	1,351,000	234,997	238,500	221,700	169,000	184,300
Poblacion	144,796	147,000	144,000	133,400	121,200	144,796	147,000	144,000	133,400	121,200	0	0	0	0	0
Talomo	233,255	284,900	318,000	360,600	393,100	232,340	284,400	318,000	360,600	393,100	915	500	100	0	0
Agdao	87,964	98,700	104,800	110,500	113,300	87,964	98,700	104,800	110,500	113,300	0	0	0	0	0
Buhangin	162,026	209,700	244,600	284,300	314,500	157,640	205,900	243,900	284,300	314,500	4,386	3,800	800	0	0
Bunawan	81,218	92,100	101,400	117,200	143,900	75,687	87,100	100,400	117,200	143,900	5,531	5,000	1,000	0	0
Paquibato	31,772	34,900	36,700	38,300	39,800	0	0	1,700	8,000	8,800	31,772	34,900	35,100	30,300	31,000
Baguio	20,706	21,200	22,200	24,100	26,300	0	0	3,300	15,100	15,200	20,706	21,200	18,900	8,100	11,200
Calinan	58,768	63,400	68,800	79,700	92,600	18,082	23,200	29,000	42,300	51,000	40,686	40,200	39,800	37,400	41,700
Marilog	37,794	38,900	40,000	42,000	44,800	0	0	0	4,200	8,300	37,794	38,900	40,000	37,800	36,600
Toril	94,309	106,100	116,000	132,900	150,500	42,468	57,800	76,200	118,900	130,600	51,841	48,300	39,800	14,000	19,900
Tugbok	54,233	64,100	71,500	83,000	95,000	12,867	18,400	25,300	41,600	51,100	41,366	45,700	46,300	41,400	43,900
DAVAO DEL SUR	677,069	743,000	815,700	924,000	1,038,000	158,580	183,900	220,300	298,200	414,400	518,489	559,000	597,100	631,100	633,500
Bansalan	48,894	52,600	56,000	60,500	65,000	15,179	17,100	19,500	24,400	31,400	33,715	35,500	36,500	36,100	33,600
Digos	106,565	120,000	136,200	162,700	191,600	40,460	47,900	58,100	80,100	113,000	66,105	72,000	77,800	82,700	78,500
Don Marcelino	29,968	33,700	37,500	42,800	48,400	0	0	1,700	5,400	10,200	29,968	33,700	35,800	37,400	38,200
Hagonoy	41,752	46,000	50,200	56,300	62,700	13,249	14,700	17,000	22,300	30,200	28,503	31,300	33,200	34,000	32,500
Jose Abad Santos	47,833	52,300	57,300	64,600	72,400	4,456	4,800	5,400	6,700	8,600	43,377	47,500	51,900	57,900	63,800
Kiblawan	36,375	42,000	46,600	52,400	58,300	3,851	4,200	4,700	5,700	7,300	32,524	37,800	42,000	46,700	51,000
Magsaysay	41,979	46,100	49,900	54,100	58,100	6,557	7,400	8,500	10,700	13,900	35,422	38,700	41,300	43,300	44,100
Malalag	30,733	34,400	38,300	44,300	50,900	4,455	5,300	6,300	8,600	12,400	26,278	29,100	32,100	35,600	38,500
Malita	83,457	89,100	95,700	105,400	115,300	12,660	15,300	18,800	26,300	37,900	70,797	73,800	76,900	79,100	77,400
Matanao	43,455	46,600	49,400	53,100	56,700	3,905	4,300	5,000	6,400	8,500	39,550	42,300	44,400	46,700	48,200
Padada	22,384	24,200	26,300	29,300	32,400	4,406	5,000	5,900	7,700	10,400	17,978	19,200	20,400	21,600	21,900
Santa Cruz	59,139	64,800	74,200	90,500	108,200	34,468	40,800	49,500	68,300	96,600	24,671	24,000	24,600	22,300	11,700
Santa Maria	41,919	44,700	47,900	52,400	56,900	6,568	7,600	8,800	11,300	14,900	35,351	37,100	39,200	41,100	42,000
Sarangani	16,648	18,600	20,400	23,100	26,000	2,659	3,200	3,800	5,100	7,000	13,989	15,400	16,700	18,000	18,900
Sulop	25,968	27,900	29,800	32,500	35,100	5,707	6,300	7,300	9,200	12,100	20,261	21,600	22,600	23,200	23,000
DAVAO ORIENTAL	413,472	466,000	519,500	596,000	673,000	153,522	161,100	185,700	235,000	302,700	259,950	305,000	333,900	361,100	370,300
Baganga	39,750	44,200	49,300	56,400	63,300	15,298	16,500	19,100	23,800	29,600	24,452	27,700	30,300	32,600	33,700
Banaybanay	33,082	39,000	44,900	52,800	59,900	17,758	18,300	20,800	25,400	30,900	15,324	20,700	24,100	27,300	29,000
Boston	10,424	11,600	12,700	14,000	15,000	2,595	2,600	2,900	3,600	4,300	7,829	8,900	9,800	10,400	10,800
Caraga	31,617	35,900	40,000	44,700	48,200	9,018	9,200	10,300	12,500	15,900	22,599	26,700	29,600	32,200	32,200
Cateel	27,211	30,600	34,100	38,900	43,000	5,304	5,400	6,100	7,400	9,100	21,907	25,200	28,000	31,500	34,000
Governor Generoso	41,433	45,700	49,800	54,600	58,600	3,022	3,300	3,900	5,600	9,000	38,411	42,400	45,800	49,000	49,500
Lupon	50,668	57,300	64,500	76,000	88,800	24,383	26,400	30,900	39,800	52,300	26,285	30,900	33,700	36,400	36,500
Manay	35,428	39,500	43,100	47,400	50,900	14,783	15,100	17,100	20,900	25,400	20,645	24,400	26,000	26,500	25,500
Mati	93,801	106,400	119,200	140,000	165,000	56,701	53,400	62,300	80,900	108,100	37,100	53,000	57,000	59,100	56,900
San Isidro	30,279	33,400	36,900	42,300	47,100	8,092	8,300	9,400	11,700	14,700	22,187	25,200	27,500	30,600	32,300
Tarragona	19,779	22,400	25,000	28,900	33,200	2,568	2,600	2,900	3,400	4,300	17,211	19,800	22,100	25,500	28,900
DIDP	3,221,398	3,680,000	4,034,000	4,538,000	5,045,000	1,409,999	1,669,100	1,904,300	2,359,600	2,837,700	1,861,399	2,011,300	2,129,900	2,178,700	2,207,300



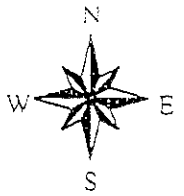
Davao City
Population Density 1980



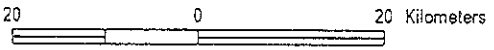
Davao City
Population Density 1990

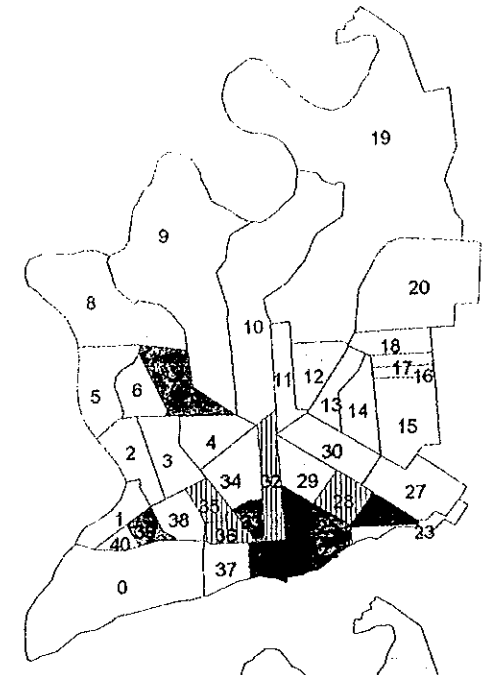


Davao City
Population Density 1995



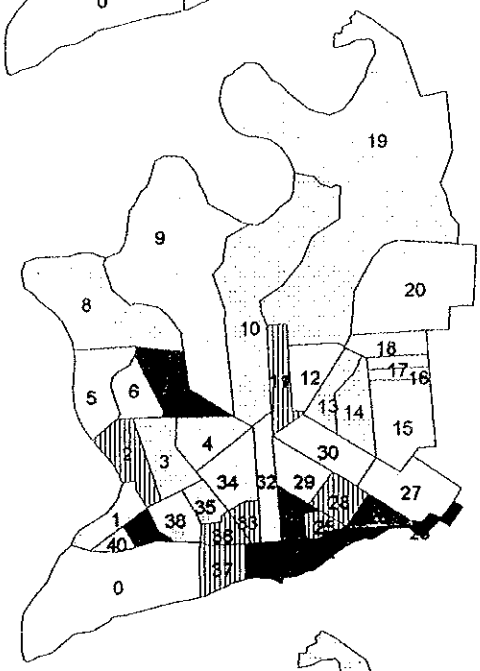
Population Density (persons/km2)
- 1
1 - 10
10 - 20
20 - 50
50 -





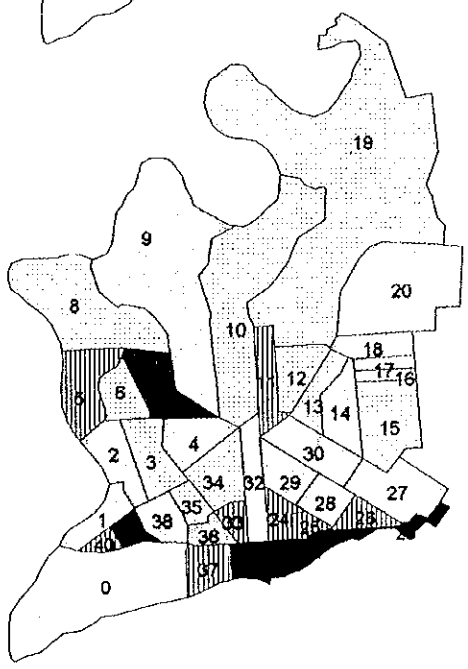
Poblacion District
Population Density 1980

Population Density (persons/ha)
- 100
100 - 200
200 - 300
300 - 400
400 - 500
500 -
No Data



Poblacion District
Population Density 1990

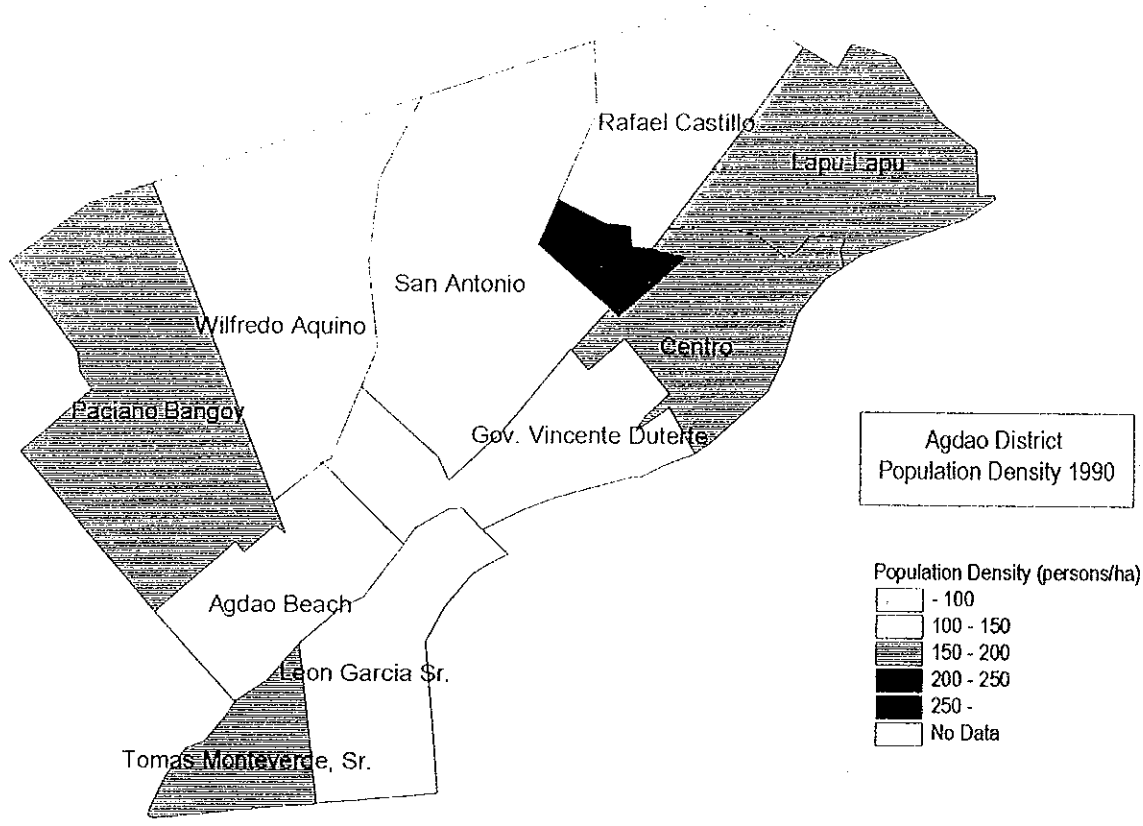
Population Density (persons/ha)
- 100
100 - 200
200 - 300
300 - 400
400 - 500
500 -
No Data

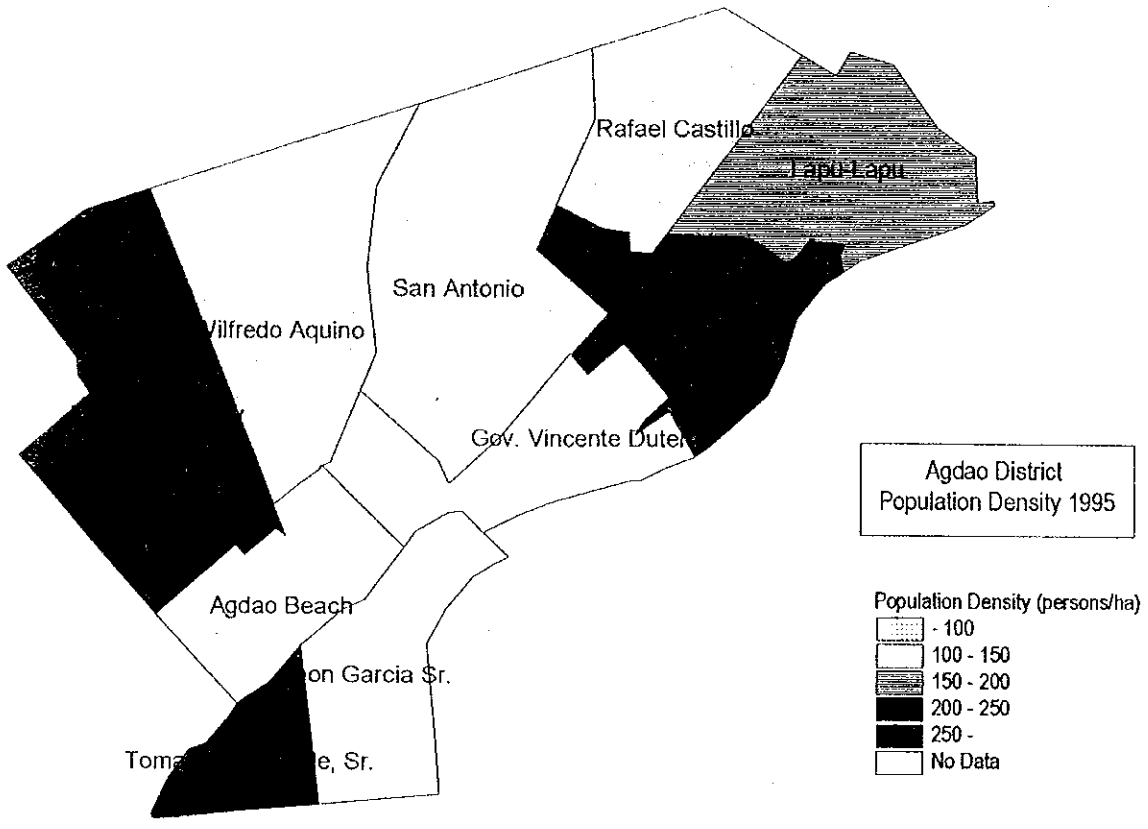


Poblacion District
Population Density 1995

Population Density (persons/ha)
- 100
100 - 200
200 - 300
300 - 400
400 - 500
500 -
No Data

Source; 1995 Census of Population Davao City
Comprehensive Development Plan, 1996-2021, City of Davao





Source; 1995 Census of Population Davao City
Comprehensive Development Plan, 1996-2021, City of Davao

	District	Barangay	Land area (ha)	Population 1980	1990	1995	Land Area (ha)	Population Density (persons/ha) 1980	1990	1995
District I	Poblacion	Barangay 1	24.0	2,836	3,275	3,053	24.0	118.2	136.5	127.2
District I	Poblacion	Barangay 2	17.8	3,267	3,903	3,304	17.8	183.6	219.3	185.7
District I	Poblacion	Barangay 3	18.4	1,721	1,466	1,103	18.4	93.6	79.7	60.0
District I	Poblacion	Barangay 4	21.1	3,451	2,901	2,416	21.1	163.6	137.5	114.5
District I	Poblacion	Barangay 5	34.4	5,012	6,058	7,686	34.4	145.7	176.1	223.5
District I	Poblacion	Barangay 6	33.2	3,710	3,409	2,396	33.2	111.8	102.7	72.2
District I	Poblacion	Barangay 7	16.4	5,064	5,030	5,166	16.4	308.8	306.8	315.1
District I	Poblacion	Barangay 8	92.0	5,433	5,000	5,583	92.0	59.1	54.4	60.7
District I	Poblacion	Barangay 9	43.2	4,811	6,471	6,792	43.2	111.4	149.8	157.3
District I	Poblacion	Barangay 10	76.0	2,724	3,481	3,077	76.0	35.8	45.8	40.5
District I	Poblacion	Barangay 11	12.0	2,117	2,444	2,730	12.0	176.5	203.7	227.5
District I	Poblacion	Barangay 12	14.7	1,308	1,646	900	14.7	89.0	112.0	61.2
District I	Poblacion	Barangay 13	13.6	1,405	1,308	348	13.6	103.3	96.2	25.6
District I	Poblacion	Barangay 14	15.2	1,663	1,365	1,653	15.2	109.4	89.8	108.8
District I	Poblacion	Barangay 15	34.4	4,335	4,378	3,025	34.4	126.0	127.3	88.0
District I	Poblacion	Barangay 16	8.4	1,271	1,056	1,006	8.4	151.3	125.7	119.8
District I	Poblacion	Barangay 17	8.4	1,446	1,185	1,146	8.4	172.2	141.1	136.5
District I	Poblacion	Barangay 18	12.8	2,518	2,342	2,026	12.8	196.8	183.0	158.3
District I	Poblacion	Barangay 19	240.5	10,806	14,759	20,053	240.5	44.9	61.4	83.4
District I	Poblacion	Barangay 20	42.6	5,331	6,133	5,826	42.6	125.2	144.0	136.8
District I	Poblacion	Barangay 21	8.8	4,803	5,624	6,414	8.8	545.9	639.2	729.0
District I	Poblacion	Barangay 22	10.3	4,103	5,237	5,844	10.3	398.4	508.5	567.5
District I	Poblacion	Barangay 23	11.6	1,052	6,370	8,716	11.6	90.7	549.2	751.5
District I	Poblacion	Barangay 24	8.4	3,375	2,842	2,461	8.4	401.9	338.4	293.0
District I	Poblacion	Barangay 25	6.8	2,042	1,568	1,598	6.8	300.4	230.6	235.0
District I	Poblacion	Barangay 26	8.0	3,433	2,533	2,284	8.0	429.2	316.7	285.6
District I	Poblacion	Barangay 27	19.2	3,117	2,805	3,176	19.2	162.4	146.1	165.4
District I	Poblacion	Barangay 28	11.2	2,588	2,530	2,234	11.2	231.1	225.9	199.5
District I	Poblacion	Barangay 29	13.6	2,203	2,058	1,633	13.6	162.0	151.4	120.1
District I	Poblacion	Barangay 30	18.0	3,426	2,621	2,036	18.0	190.4	145.6	113.1
District I	Poblacion	Barangay 31	8.8	5,287	5,546	5,841	8.8	600.9	630.3	663.9
District I	Poblacion	Barangay 32	17.2	3,690	3,314	3,163	17.2	214.6	192.7	183.9
District I	Poblacion	Barangay 33	9.2	3,534	2,026	2,522	9.2	384.2	220.3	274.2
District I	Poblacion	Barangay 34	25.6	3,889	2,772	1,781	25.6	151.9	108.3	69.6
District I	Poblacion	Barangay 35	8.4	1,722	1,169	789	8.4	205.0	139.2	93.9
District I	Poblacion	Barangay 36	10.0	2,284	2,117	1,550	10.0	228.4	211.7	155.0
District I	Poblacion	Barangay 37	26.0	4,232	5,275	5,323	26.0	162.8	202.9	204.8
District I	Poblacion	Barangay 38	10.0	1,671	1,583	1,272	10.0	167.1	158.3	127.2
District I	Poblacion	Barangay 39	8.4	2,582	3,730	4,869	8.4	307.4	444.1	579.8
District I	Poblacion	Barangay 40	9.6	1,809	1,760	2,001	9.6	188.5	183.4	208.5
District I	Talomo	Bago Aplaya	211.6	-	4,547	5,522	224.3	-	20.3	24.6
District I	Talomo	Bago Gallera	784.5	5,412	3,157	9,302	831.8	6.5	3.8	11.2
District I	Talomo	Baliok	234.5	367	915	974	248.6	1.5	3.7	3.9
District I	Talomo	Bucana	699.2	14,000	41,210	52,730	741.3	18.9	55.6	71.1
District I	Talomo	Catalunan Grande	1486.5	4,406	7,924	9,609	1,576.0	2.8	5.0	6.1
District I	Talomo	Catalunan Pequeno	763.0	7,389	4,551	6,041	809.0	9.1	5.6	7.5
District I	Talomo	Dumoy	593.5	7,371	11,446	13,882	629.2	11.7	18.2	22.1
District I	Talomo	Langub	469.2	1,117	959	1,069	497.5	2.2	1.9	2.1
District I	Talomo	Ma-a	808.5	13,695	25,017	34,819	857.2	16.0	29.2	40.6
District I	Talomo	Magtuod	2119.2	1,378	1,186	1,592	2,246.8	0.6	0.5	0.7
District I	Talomo	Matina Aplaya	384.5	5,563	12,892	17,319	407.7	13.6	31.6	42.5
District I	Talomo	Matina Crossing	490.3	26,230	36,637	38,480	519.8	50.5	70.5	74.0
District I	Talomo	Matina Pangi	690.0	2,033	3,779	4,370	731.6	2.8	5.2	6.0
District I	Talomo	Talomo	678.3	19,561	29,136	37,546	719.2	27.2	40.5	52.2
District I			11,441	239,593	324,446	378,051	12,068.0	19.9	26.9	31.3
District II	Agdao	Agdao	N.A.	50,076	10,740	10,223	-	102.4	154.0	179.9
District II	Agdao	Gentro (San Juan)	N.A.	-	9,464	11,636	53.6	102.4	154.0	179.9
District II	Agdao	Gov. P. Bangoy	81.1	-	9,109	11,003	49	102.4	154.0	179.9
District II	Agdao	Gov. V. Duterte	N.A.	-	5,672	7,240	-	102.4	154.0	179.9
District II	Agdao	Capt. T. Monteverde Sr	N.A.	-	5,414	6,083	30	102.4	154.0	179.9
District II	Agdao	Lapu-Lapu	N.A.	-	6,350	7,305	40	102.4	154.0	179.9
District II	Agdao	Leon Garcia, Sr.	N.A.	-	7,684	9,272	-	102.4	154.0	179.9
District II	Agdao	Rafael Castillo	N.A.	-	4,298	5,589	42	102.4	154.0	179.9
District II	Agdao	San Antonio	N.A.	-	6,088	8,860	72	102.4	154.0	179.9
District II	Agdao	Ubalde	N.A.	-	3,270	2,745	10.5	102.4	154.0	179.9

	District	Barangay	Land area (ha)	Population 1980	1990	1995	Land Area (ha)	Population Density (persons/ha) 1980	1990	1995
District II	Agdao	Wilfredo Aquino	N.A.	-	7,206	8,008	65	102.4	154.0	179.9
District II	Buhangin	Acacia	927.8	1,187	1403	1,691	947.6	1.25	1.48	1.78
District II	Buhangin	Buhangin	734.8	23,016	36,772	53,877	750.5	30.67	49.00	71.79
District II	Buhangin	Cabantian	716.0	1,906	2,765	7,686	731.2	2.61	3.78	10.51
District II	Buhangin	Callawa	912.0	1,419	2,115	2,351	931.4	1.52	2.27	2.52
District II	Buhangin	Communal	545.9	1,240	2,940	3,343	557.5	2.22	5.27	6.00
District II	Buhangin	Indangan	1069.5	2,401	1,685	2,408	1,092.3	2.20	1.54	2.20
District II	Buhangin	Mandug	1243.5	8,018	9,849	10,432	1,270.0	6.31	7.76	8.21
District II	Buhangin	Pampanga	614.5	7,327	25,409	36,063	627.6	11.67	40.49	57.46
District II	Buhangin	Sasa	718.5	17,881	30,486	33,896	733.8	24.37	41.55	46.19
District II	Buhangin	Tigatto	696.7	3,894	3,262	8,244	711.5	5.47	4.58	11.59
District II	Buhangin	Wa-an	370.7	-	1,814	2,035	378.6	-	4.79	5.38
District II	Bunawan	Alejandro Navarro	710.0	4,646	6,002	6,963	561.7	8.27	10.69	12.40
District II	Bunawan	Bunawan	835.5	10,884	14,846	16,318	661.0	16.47	22.46	24.69
District II	Bunawan	Gatungan	1175.0	627	514	680	929.5	0.67	0.55	0.73
District II	Bunawan	Ilang	470.0	5,370	7,568	8,134	371.8	14.44	20.35	21.88
District II	Bunawan	Mahayag	965.0	1,087	1,355	1,613	763.4	1.42	1.77	2.11
District II	Bunawan	Mudiang	1360.7	970	1,135	1,377	1,076.4	0.90	1.05	1.28
District II	Bunawan	Panacan	1113.5	14,502	20,103	26,428	880.9	16.46	22.82	30.00
District II	Bunawan	San Isidro (Licanan)	425.0	978	1,963	1,861	336.2	2.91	5.84	5.54
District II	Bunawan	Tubungco	1225.0	13,254	15,299	17,844	969.1	13.68	15.79	18.41
District II	Paquibato	Colosas	N.A.	3,681	3,408	4,309		0.4	0.4	0.5
District II	Paquibato	Fatima	N.A.	3,188	2,363	2,724		0.4	0.4	0.5
District II	Paquibato	Lumiad	N.A.	1,208	846	1,136		0.4	0.4	0.5
District II	Paquibato	Mabuhay	N.A.	499	502	677		0.4	0.4	0.5
District II	Paquibato	Malabog	N.A.	8,773	9,412	9,600		0.4	0.4	0.5
District II	Paquibato	Mapula	N.A.	855	680	1,222		0.4	0.4	0.5
District II	Paquibato	Panalum	N.A.	734	730	976		0.4	0.4	0.5
District II	Paquibato	Pandaitan	N.A.	1,920	2,674	2,551		0.4	0.4	0.5
District II	Paquibato	Paquibato	N.A.	1,241	959	1,725		0.4	0.4	0.5
District II	Paquibato	Paradise (Embak)	N.A.	1,462	1,557	1,651		0.4	0.4	0.5
District II	Paquibato	Salapawan	N.A.	732	809	743		0.4	0.4	0.5
District II	Paquibato	Sumimao	N.A.	1,716	713	1160		0.4	0.4	0.5
District II	Paquibato	Tapak	N.A.	1,435	3,103	3298		0.4	0.4	0.5
District II ŠŤ			16,911	198,127	290,336	362,980	81,406.00	2.4	3.6	4.5
District III	Bauio	Baguio	1017.0	1,872	2,465	2,716		0.9	1.1	1.1
District III	Bauio	Cadalian	704.5	1,373	1,621	1,700		0.9	1.1	1.1
District III	Bauio	Carmen	445.3	1,095	1,122	1,376		0.9	1.1	1.1
District III	Bauio	Gumalang	1441.7	2,747	3,356	3,209		0.9	1.1	1.1
District III	Bauio	Malagos	1016.8	2,126	3,129	3,393		0.9	1.1	1.1
District III	Bauio	Tambobong	1356.9	2,386	3,037	3,262		0.9	1.1	1.1
District III	Bauio	Tawan-Tawan	784.5	2,345	2,798	2,762		0.9	1.1	1.1
District III	Bauio	Wines	763.9	2,046	2,366	2,288		0.9	1.1	1.1
District III	Calinan	Biao Joaquin	654.2	912	1,053	1,247		1.8	2.4	2.6
District III	Calinan	Calinan	1286.0	10,959	16,390	18,082		1.8	2.4	2.6
District III	Calinan	Cawayan	476.0	1,099	1,403	1,336		1.8	2.4	2.6
District III	Calinan	Dacudao	1380.6	1,889	2,479	2,850		1.8	2.4	2.6
District III	Calinan	Dalagdag	416.0	604	449	576		1.8	2.4	2.6
District III	Calinan	Dominga	539.0	1,003	688	1,013		1.8	2.4	2.6
District III	Calinan	Inayangan	N.A.	-	3,224	3,695		1.8	2.4	2.6
District III	Calinan	Lacson	833.8	1,745	2,715	2,692		1.8	2.4	2.6
District III	Calinan	Lamanan	374.0	6,859	2,670	3,156		1.8	2.4	2.6
District III	Calinan	Lampiano	464.8	595	424	542		1.8	2.4	2.6
District III	Calinan	Megkawayan	N.A.	-	2,046	1,944		1.8	2.4	2.6
District III	Calinan	Pangyan	373.0	896	1,200	1,390		1.8	2.4	2.6
District III	Calinan	Riverside	469.5	2,429	2,899	3,306		1.8	2.4	2.6
District III	Calinan	Saloy	N.A.	-	1,244	1,475		1.8	2.4	2.6
District III	Calinan	Sirib	1443.6	3,358	4,041	3,779		1.8	2.4	2.6
District III	Calinan	Subasta	1175.9	2,141	2,514	2,528		1.8	2.4	2.6
District III	Calinan	Talomo River	946.7	1,911	2,539	2,607		1.8	2.4	2.6
District III	Calinan	Tamayong	1507.8	2,507	2,333	3,092		1.8	2.4	2.6
District III	Calinan	Wangan	1038.2	2,328	3,068	3,458		1.8	2.4	2.6
District III	Marilog	Baganihan	640.0	-	1,190	1,246		0.3	0.6	0.6
District III	Marilog	Bantol	N.A.	-	1,183	1,584		0.3	0.6	0.6
District III	Marilog	Buda	N.A.	-	1,469	1,309		0.3	0.6	0.6

	District	Barangay	Land area (ha)	Population 1980	1990	1995	Land Area (ha)	Population Density (persons/ha) 1980	1990	1995
District III	Marilog	Dalag	N.A.	680	1,147	1,267		0.3	0.6	0.6
District III	Marilog	Datu Salumay	3119.0	-	1,544	1,331		0.3	0.6	0.6
District III	Marilog	Gumitan	N.A.	-	789	948		0.3	0.6	0.6
District III	Marilog	Magsaysay	N.A.	-	1,799	1,368		0.3	0.6	0.6
District III	Marilog	Malamba	1691.9	2,418	3,613	4,542		0.3	0.6	0.6
District III	Marilog	Marilog (Poblacion)	958.0	8,050	9,852	12,182		0.3	0.6	0.6
District III	Marilog	Salaysay	1020.5	2,106	2,980	2,642		0.3	0.6	0.6
District III	Marilog	Suawan (Tuli)	763.9	2,631	3,534	2,755		0.3	0.6	0.6
District III	Marilog	Tamugan	2119.6	3,717	6,195	6,620		0.3	0.6	0.6
District III	Toril	Alambre	405.7	846	713	1,073		1.9	2.6	2.9
District III	Toril	Atan-Awe	509.5	771	849	940		1.9	2.6	2.9
District III	Toril	Bangkas Heights	258.3	997	3,021	4,131		1.9	2.6	2.9
District III	Toril	Baracatan	763.0	1,430	1,970	1,813		1.9	2.6	2.9
District III	Toril	Bato	952.2	1,838	2,307	3,168		1.9	2.6	2.9
District III	Toril	Bayabas	1186.0	1,406	1,284	1,369		1.9	2.6	2.9
District III	Toril	Binugao	532.0	2,456	3,010	3,492		1.9	2.6	2.9
District III	Toril	Camansi	337.0	600	737	616		1.9	2.6	2.9
District III	Toril	Catigan	2373.0	2,146	2,465	2,151		1.9	2.6	2.9
District III	Toril	Crossing Bayabas	323.0	10,558	11,301	11,804		1.9	2.6	2.9
District III	Toril	Dalio	130.0	10,282	14,999	16,057		1.9	2.6	2.9
District III	Toril	Dalion Plantation	1017.0	1,164	2,010	2,166		1.9	2.6	2.9
District III	Toril	Eden	1018.0	869	1,590	1,717		1.9	2.6	2.9
District III	Toril	Kilate		750	798	768		1.9	2.6	2.9
District III	Toril	Lizada	232.0	3,377	7,488	9,802		1.9	2.6	2.9
District III	Toril	Lubogan	254.0	3,186	3,774	5,810		1.9	2.6	2.9
District III	Toril	Marapangi	875.2	1,555	2,061	2,473		1.9	2.6	2.9
District III	Toril	Mulig	932.2	1,842	1,859	2,009		1.9	2.6	2.9
District III	Toril	Sibulan	529.0	1,389	1,240	2,071		1.9	2.6	2.9
District III	Toril	Sirawan	940.3	2,378	3,506	4,088		1.9	2.6	2.9
District III	Toril	Tagluno	452.0	652	835	956		1.9	2.6	2.9
District III	Toril	Tagurano	424.0	781	900	800		1.9	2.6	2.9
District III	Toril	Tibuloy	1032.7	1,196	1,205	1,298		1.9	2.6	2.9
District III	Toril	Toril	254.2	8,542	10,465	11,560		1.9	2.6	2.9
District III	Toril	Tungkalan	1822.0	1,775	2,114	2,176		1.9	2.6	2.9
District III	Tugbok	Angalan	476.6	-	1,662	1,902		2.5	3.4	4.1
District III	Tugbok	Bago Oshiro	1017.9	2793	3012	2810		2.5	3.4	4.1
District III	Tugbok	Balengaeng	450.1	1586	1451	1521		2.5	3.4	4.1
District III	Tugbok	Bao Escuela	1357.2	1722	1715	1901		2.5	3.4	4.1
District III	Tugbok	Biao Guianga	473.0	1578	1784	1978		2.5	3.4	4.1
District III	Tugbok	Los Amigos	475.0	1903	2231	2678		2.5	3.4	4.1
District III	Tugbok	Manambulan	746.5	1249	1655	1754		2.5	3.4	4.1
District III	Tugbok	Manuel Guianga	1073.9	2711	3611	3418		2.5	3.4	4.1
District III	Tugbok	Matina Biao	780.4	938	1087	1197		2.5	3.4	4.1
District III	Tugbok	Mintal	84.2	5755	6832	8630		2.5	3.4	4.1
District III	Tugbok	New Carmen	1376.0	1141	741	1119		2.5	3.4	4.1
District III	Tugbok	New Valencia	1311.1	684	855	1003		2.5	3.4	4.1
District III	Tugbok	Sto. Nino	N.A.	-	5477	10938		2.5	3.4	4.1
District III	Tugbok	Tacunan	955.2	1296	1571	1781		2.5	3.4	4.1
District III	Tugbok	Tagakpan	820.2	2577	3221	3107		2.5	3.4	4.1
District III	Tugbok	Talandang	950.0	1506	2284	2402		2.5	3.4	4.1
District III	Tugbok	Tugbok	1492.8	4007	3372	4237		2.5	3.4	4.1
District III	Tugbok	Ula	882.2	1596	1535	1857		2.5	3.4	4.1
District III	Tugbok	Poblacion		-	-	-		2.5	3.4	4.1
District III	Tugbok	Ulas		-	-	-		2.5	3.4	4.1
District III 計			63,497	172,655	235,165	265809	150,525	1.1	1.6	1.8
総計				610,375	849,947	########	243,999	4.1	5.6	6.7

SPATIAL/INFRASTRUCTURE SECTOR REPORT

Part 3: Transportation

Chapter 1 Existing Conditions

1.1. Existing Transport Policies and Related Organizations

1.1.1. Transport policies

(1) Overall transport policies

The comprehensive transport system plays a major role in developing production areas, strengthening linkages between production and consumption areas, and improving services delivery as well as moving people. Emphasis of transport policies shifts as the economy expands, marketing opportunities vary, and needs of people change. Focuses of the current transport policies may be summarized as follows (The Medium-Term Philippine Development Plan, 1993-1998):

- To strengthen inter-regional and urban-rural linkages to ensure people's mobility and continuous flow of goods, especially to support the agro-industrialization throughout the Nation:
- To ensure the safety and efficiency of transport services to meet the needs of an increasing population and dynamic market demands; and
- To develop international gateways to optimum standards to enhance the Country's global competitiveness.

(2) Regional transport policies and strategies

Under the overall policies mentioned above, the Southern Mindanao Region Development Plan (1993-1998) was formulated for Region XI consisting of the DIDP Area, provinces of Surigao del Sur, South Cotabato and Sarangani, and General Santos City. Specific development objectives, targets and strategy for the DIDP Area are summarized in Table 1. Of the total investments for transportation projects related to DIDP programmed in the Updated Regional Development Investment Program (1996-1998), 56% is allocated to roads and bridges and 4.2% to air transport.

(3) Physical framework plan objectives

The three provinces and the City in the DIDP Area have formulated respective physical framework plans (1993-2002). They set the goal for the infrastructure component so as to allow efficient provision of, and access to infrastructure and community services with the following objectives:

- To maximize accessibility within development opportunity (under-used) production lands,
- To minimize accessibility within non-sustainable (over-used) lands, and
- To maximize effectiveness of hospital coverage and other infra-support facilities and utilities.

Table 1 Transportation Policies of Southern Mindanao Region Development Plan,1993-1998, Transportation Sector

Sub-Sector	Development Objectives	Development Targets	Development Strategies	No. of Programs
Roads and Bridges	• Strengthen intra and inter-regional linkages to ensure people's mobility and flow of goods and provision of service	• Construct, improve and/or rehabilitate a total of 2,190.10 km of roads • Implement 2,249.69 linear meters of bridges	• Construct, improve and rehabilitate the region's road network, especially major routes which will facilitate intra and inter-regional linkages • Improve farm-to-market roads • Establish alternative routes which will traverse the region from east and west • Construct and improve coastal roads	29
Land Transport	Improve the management and delivery of frontline services such as: • Processing of registration on motor vehicles • Supervision and coordination of the enforcement of traffic rules and regulations • Inspection of motor vehicles • Insurance of licenses and permits • Investigation and prosecution of law violators • Collection of pertinent fees and charges	• Construct 7 office buildings for land transportation districts • Rehabilitate and renovate 5 office buildings for land transportation districts • Establish a motor vehicle inspection station • Construct 8 office buildings for land transportation and franchising regulatory	• Improve motor vehicle registration, processing of applicants and renewal of the licenses and permits through computerization methods • Improve the supervision and coordination of traffic enforcement in the urban centers through traffic management studies • Intensify measures to control pollution coming from vehicle emissions • Strict enforcement of vehicle safety requirement	4
Water Transport	• Develop and improve the port system to support the expansion of export and domestic trade and the establishment of provincial agro-industrial enterprises and regional agro-industrial centers • Improve accessibility of island municipalities • Promote maritime safety and convenience	• Establish a bulk handling facilities • Construct and improve berth facilities, container yards, transit sheds and passenger terminals • Modernize maritime communications for safety and efficiency	• Improve secondary ports to accommodate large shipping fleets • Improve and rehabilitate feeder port system for better access between rural settlements and markets. • Develop fishing port complexes • Install and/or improve maritime navigation aids and communications facilities to enhance the safety of shipping operations • Establish cargo handling facilities for grains and agricultural products	6
Air Transport	• Upgrade facilities of the DIA and General Santos (Tambler) Airport to meet international standards • Upgrade air navigational facilities in other airports	• Modernize air navigational facilities in 4 airports • Improve terminal buildings, runways, aprons and access roads in 4 airports	• Promote the integrated planning of airport systems between government and air carrier operators • Improve airport facilities and system to increase their operational efficiency and service level, safety and security	5

Source: Updated Regional Development Investment Program (RDIP, 1996-1998), Regional Development Council, NEDA Region XI

1.1.2. Transport administration

(1) Policy and regulatory agencies

The Department of Transportation and Communications (DOTC) is the primary government agency responsible for planning and policy formulation related to road, rail, air and water transportation. Under DOTC, the Land Transportation Office (LTO) is responsible for planning, formulation of policy and rules, and regulations governing the land transport system. It is also tasked with the registration of motor vehicles, issuance of drivers' and conductors' licenses, enforcement of the land transport laws and regulations, and adjudication of traffic violations.

The Land Transportation Franchising and Regulatory Board (LTFRB), also under DOTC, is responsible for improvement of systems and procedures, particularly on the processing of franchising applicants, and the strengthening of economic-based route-measured capacities as inputs to the Board's quasi-judicial function.

(2) Roads

The Department of Public Works and Highways (DPWH) is responsible for planning, construction and maintenance of national roads including bridges. Provincial, city and municipal roads are under the responsibilities of respective local government units (LGUs). The responsibility for barangay roads has been transferred from DPWH to LGUs.

(3) Ports and shipping

The Philippine Port Authority (PPA), one of the agencies attached DOTC, is responsible for the provision of ports and other port structures. It facilitates the implementation of an integrated program for the planning, development, financing, operation and maintenance of the ports or port districts for the entire Country. Under the control of PPA, there are five Port District Offices (PDOs): Manila, Luzon, Visayas, Northern and Southern Mindanao.

Under these PDOs are Port Management Offices (PMOs) which are responsible for management and administration of all ports within the respective port district. They are also undertaking the operation, engineering, maintenance, finance, and commercial development functions, generating revenues and incurring expenses out of its operations. The Maritime Industry Authority (MARINA), also under DOTC, is responsible for development of inter-island shipping, overseas shipping, shipbuilding and repair, and maritime manpower.

(4) Airports and air transport

The economic aspect of civil aviation is administered by the Civil Aeronautics Board (CAB), while the technical aspect is administered by the Air Transportation Office (ATO). Both of them are agencies under DOTC. CAB exercises general supervision and regulation of, and jurisdiction and control over air carriers as well as their property right, equipment, facilities, and franchise.

ATO performs duties and functions related to the promotion and development of policies, plans, programs and standards for the construction and maintenance of airports and other facilities. Construction of runways and terminals is the responsibility of DOTC and ATO, while the maintenance of those facilities is the responsibility of ATO.

1.2. Existing Transportation Conditions in the DIDP Area

The existing transportation network in the DIDP Area is shown in Figure 1.

1.2.1. Road system

(1) Road network

The total road network in the DIDP Area was 12,635 km in 1996 including national, provincial, city, municipal and barangay roads (Table 2). The road density was 0.63 km/km^2, much lower than the national standard of 1.0 km/km^2. Barangay roads accounted for 58% of the total road network, while national roads with 1,180 km accounting for only 9% of the total length.

Davao Province had the most extensive road network, recorded at 5,429 km or 43% of the DIDP total. In terms of road density, Davao del Sur had the highest density of 0.87 km/km^2 due to the length of barangay roads. In particular, 1st District of Davao del Sur had the highest road density of 1.52 km/km^2, with 72% of total length due to barangay roads. Davao Oriental had the lowest density of 0.40 km/km^2. The density is particularly low in 2nd District of Davao Oriental with 0.30km/km^2. In terms of density of national and provincial roads, Davao City had the highest with 0.36 km/km^2.

Major intra/inter-provincial roads in the DIDP Area are as follows.

- Agusan – Davao Road — paved
- Davao – Digos Road — paved
- Digos – GSC Road — under restoration
- Tagum – Mati Road — paved
- Digos – Cotabato Road — paved
- Davao City – Bukidnon Road — under restoration
- Davao City Diversion Road — paved
- Tagum – Panabo Circumferential Road — paved (partially gravel)
- Mati – Boston Road — gravel (partially paved)
- Sulop – J.A. Santos Road — gravel (partially paved)
- San. Isidro – G. Generoso Road — gravel (partially paved)
- Montevista – Compostela – Cateel Road — gravel
- Compostela – Maragusan – Mati Road — gravel (partially paved)

(2) Road Conditions

Of the total length of national roads, 48% was paved by concrete or asphalt (Table 3). By district, 1st District of Davao Province records the highest pavement ratio of 80%, second and third were 1st District of Davao del Sur and Davao City with ratios of 76% and 65%, respectively. Coastal areas record lower pavement ratio; 1st District of Davao Oriental had the lowest ratio of 5%, and the second lowest was 2nd District of Davao del Sur with 11%.

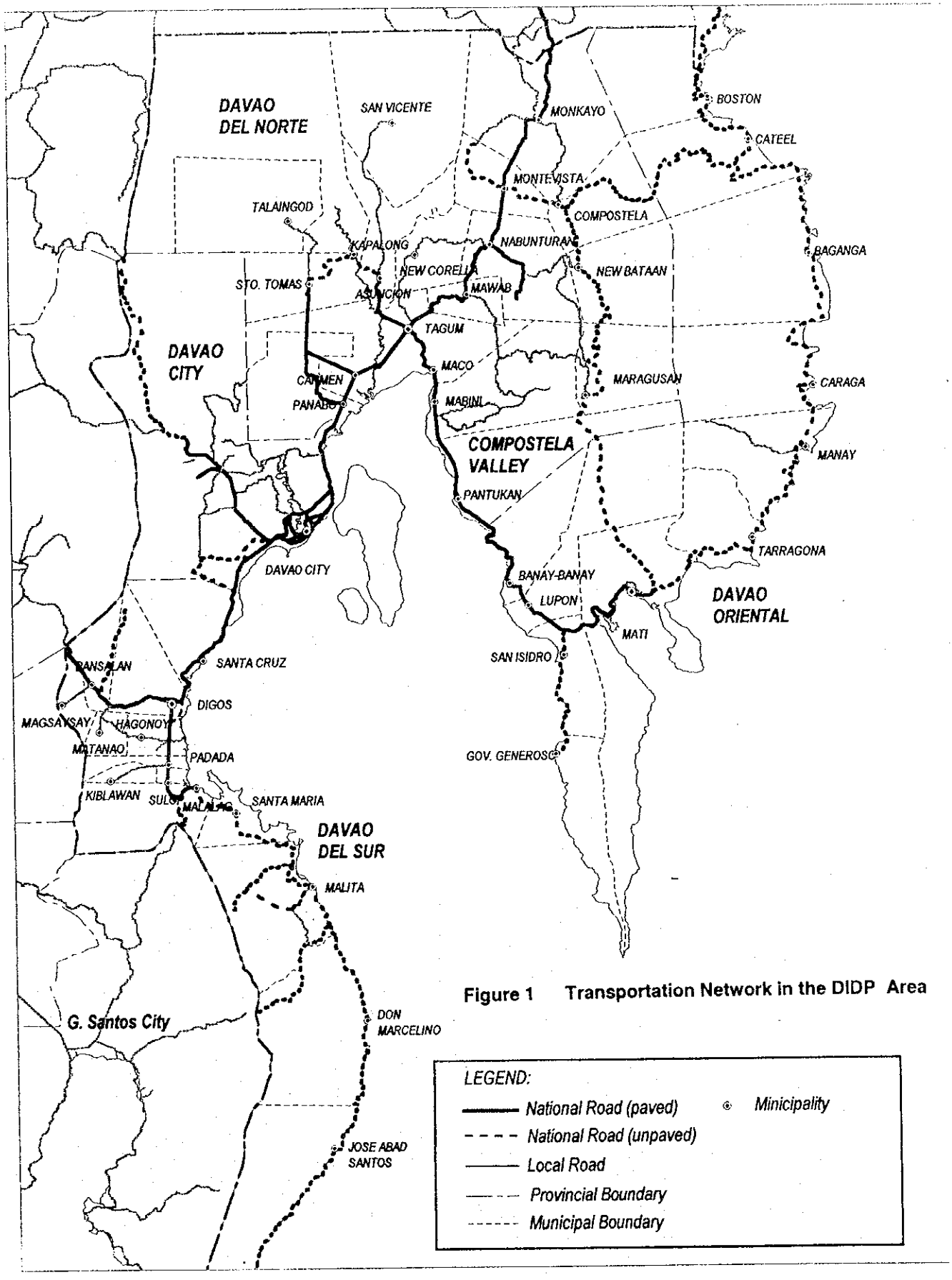


Figure 1 Transportation Network in the DIDP Area

Table 2 Road Network by Road Class (as of December 1996)

Province/City District	1996 Road Network (km) National Road	Provincial/ City Road	Municipal Road	Barangay Road	Total Length (km)	Land Area (km^2)	Road Density (km/km^2) National/ Prov./City	All Roads
Davao City	219.87	653.46	0.00	823.75	1,697.08	2,440.00	0.36	0.70
Davao Province	356.26	1,642.26	420.41	3,010.86	5,429.79	8,420.72	0.24	0.64
1st District	165.60	1,014.71	190.06	1,657.55	3,027.92	4,366.38	0.27	0.69
2nd District	190.66	627.55	230.35	1,353.31	2,401.87	4,054.34	0.20	0.59
Davao del Sur	266.49	446.65	287.50	2,435.74	3,436.38	3,934.01	0.18	0.87
1st District	108.43	258.64	162.74	1,348.87	1,878.68	1,237.28	0.30	1.52
2nd District	158.06	188.01	124.76	1,086.87	1,557.70	2,696.73	0.13	0.58
Davao Oriental	336.89	579.40	93.07	1,062.28	2,071.64	5,201.58	0.18	0.40
1st District	156.75	386.99	53.01	464.78	1,061.53	1,836.47	0.30	0.58
2nd District	180.14	192.41	40.06	597.50	1,010.11	3,365.11	0.11	0.30
TOTAL	1,179.51	3,321.77	800.98	7,332.63	12,634.89	19,996.31	0.23	0.63
% to Total	9.3	26.3	6.3	58.0	100.0	-	-	-

Source: DPWH Region XI

Table 3 Surface Conditions of National Roads (as of December 1996)

Province/City District	Paved Concrete	Asphalt	Paved Total	Unpaved (Gravel)	Total Length km	Pavement Ratio
Davao City	83.91	58.88	142.79	77.08	219.87	0.65
Davao Province	210.95	19.28	230.23	126.03	356.26	0.65
1st District	112.86	19.28	132.14	33.46	165.60	0.80
2nd District	98.09	0.00	98.09	92.57	190.66	0.51
Davao del Sur	64.43	35.80	100.23	166.26	266.49	0.38
1st District	63.11	19.52	82.63	25.80	108.43	0.76
2nd District	1.32	16.28	17.60	140.46	158.06	0.11
Davao Oriental	57.04	35.89	92.93	243.96	336.89	0.28
1st District	47.88	35.89	83.77	72.98	156.75	0.53
2nd District	9.16	0.00	9.16	170.98	180.14	0.05
TOTAL	416.33	149.85	566.18	613.33	1,179.51	0.48
% to Total	35.3	12.7	48.0	52.0	100.0	-

Source: DPWH Region XI

(3) Budgeting for road development

In 1997, a total of ₱898 million of budget was allocated for arterial/secondary roads and bridges in the DIDP Area (Table 4). It accounts for 3.6% of the total highway budget in the Country. Of the total, 29% was funded by foreign assistance agencies such as IBRD and OECF. Of the total budget 65% was allocated for arterial road projects, and 35% for secondary roads. Unit cost for road improvement such as paving and/or widening, is roughly calculated to be ₱5 million per km, and that for bridge construction ₱500 thousand per meter. Therefore, the budget can allow to implement at most 200 km long road section.

Table 4 Cost of National Road Project by Funding Source, 1997

(Unit: P Million)

Province/City	Arterial Road		Sub-	Secondary Road		Sub-	Grand-
	Foreign	Local	Total	Foreign	Local	Total	Total
Davao City	31,563	18,600	50,163	0	123,611	123,611	173,774
Davao Province	0	64,000	64,000	0	100,000	100,000	164,000
1st District	0	44,000	44,000	0	42,000	42,000	86,000
2nd District	0	20,000	20,000	0	58,000	58,000	78,000
Davao del Sur	214,412	54,000	268,412	0	46,000	46,000	314,412
1st District	0	24,000	24,000	0	12,000	12,000	36,000
2nd District	0	30,000	30,000	0	34,000	34,000	64,000
Inter-district	214,412	0	214,412	0	0	0	214,412
Davao Oriental	17,666	187,000	204,666	0	42,000	42,000	246,666
1st District	0	25,000	25,000	0	18,000	18,000	43,000
2nd District	17,666	162,000	179,666	0	24,000	24,000	203,666
TOTAL	263,641	323,600	587,241	0	311,611	311,611	898,852
% to Total	29	36	65	0	35	35	100

Source: DPWH Region XI

1.2.2. Road transport

(1) Registered vehicles and issued licenses

In the DIDP Area, a total of 93,396 motor vehicles were registered in 1996, increased by 39,000 vehicles since 1990 at a high annual growth rate of 8.5% (Table 5). By type of vehicle, "cars/jeeps" including cars and jeepneys made up 44% of the DIDP total. "Motorcycles" including tricycles accounted for 43%. The average rate of motor vehicle ownership was 27.8 per 1,000 population. The number of vehicles for private use accounted for 74.4% of the total vehicle registration in the Region XI.

Davao City had the largest number of registered vehicles (58.9% of the DIDP total) and the highest ownership rate of 52.8, but the annual growth rate was relatively low. Davao Province had 27.8% of the DIDP total and the second highest ownership rate of 21.2 and the highest growth rate of 11.7% annually. Davao del Sur and Davao Oriental had small numbers at 8,500 and 3,900, respectively. In Davao City, 59% of registered vehicles were "cars/jeeps". On the other hand, in the three provinces, "motorcycle" including tricycle made about 70% of each total and "car/jeeps" made only 20%.

Issued licenses/permits also increased to 92,956 in 1996 from 62,483 in 1990 with annual growth rate of 6.8% (Table 6). Of license holders 54% were in Davao City. Ownership rate of licenses was 27.6 per 1,000 population.

Table 5 Number of Registered Vehicles

Province/City	Vehicle Type	Registered Vehicles 1990	1996	% (1996)	Growth Rate 1990-96 (%)	Ownership Rate (veh./000pop.)
Davao City	Cars/Jeeps	23,837	32,584	59.2	5.3	31.3
	Trucks/Buses	4,701	8,385	15.2	10.1	8.0
	Motorcycles	8,270	13,341	24.2	8.3	12.8
	Trailers	509	737	1.3	6.4	0.7
	Sub-Total	37,317	55,047	100.0	6.7	52.8
Davao Province	Cars/Jeeps	4,010	5,509	21.3	5.4	4.5
	Trucks/Buses	1,042	2,112	8.1	12.5	1.7
	Motorcycles	8,202	18,181	70.2	14.2	14.9
	Trailers	76	114	0.4	7.0	0.1
	Sub-Total	13,330	25,916	100.0	11.7	21.2
Davao del Sur	Cars/Jeeps	1,409	1,801	21.1	4.2	2.6
	Trucks/Buses	676	690	8.1	0.3	1.0
	Motorcycles	2,251	6,010	70.5	17.8	8.8
	Trailers	107	24	0.3	-22.1	0.0
	Sub-Total	4,443	8,525	100.0	11.5	12.4
Davao Oriental	Cars/Jeeps	746	827	21.2	1.7	2.0
	Trucks/Buses	155	285	7.3	10.7	0.7
	Motorcycles	1,344	2,793	71.5	13.0	6.7
	Trailers	0	3	0.1	-	0.0
	Sub-Total	2,245	3,908	100.0	9.7	9.4
DIDP Total	Cars/Jeeps	30,002	40,721	43.6	5.2	12.1
	Trucks/Buses	6,574	11,472	12.3	9.7	3.4
	Motorcycles	20,067	40,325	43.2	12.3	12.0
	Trailers	692	878	0.9	4.0	0.3
	Total	57,335	93,396	100.0	8.5	27.8

Source: LTFRB Region XI

Note: "Cars/Jeeps" includes car, jeep, taxi, pick-up, van and Jeepney
"Trucks/Buses" includes mini-bus, large-bus and truck
"Motorcycles" includes Tricycle and motorcycle

Table 6 Number of Issued License/Permits

Province/City	Issued Licenses/Permits 1990	1996	% (1996)	Growth Rate 1990-96 (%)	Ownership Rate (per 1,000 pop.)
Davao City	39,687	50,250	54.1	4.0	48.2
Davao Province	12,649	24,713	26.6	11.8	20.3
Davao del Sur	7,513	11,965	12.9	8.1	17.4
Davao Oriental	2,634	6,028	6.5	14.8	14.5
DIDP Total	62,483	92,956	100.0	6.8	27.6

Source: LTFRB Region XI

(2) Road based public transport services and industry

Functions of public utility vehicles

In the DIDP Area, various types of vehicles are providing public passenger transport services as shown in Table 7. Basically, buses serve for inter-provincial routes, jeepneys for inter-municipal/intra-city routes and tricycles for intra-municipal/city routes. Buses and Jeepneys as public utility vehicles (PUVs) have to register at LTFRB, and tricycles at municipality.

Public transport services and industry

A total of 158 operators are engaging public bus operation in the DIDP Area as shown in Table 8. Most bus operators are small-scale enterprises/cooperatives with average number of 6 units. Davao City is registered the largest number of 672 bus units, 71% of the DIDP total. The highest average number of operating units per operator is also indicated in Davao City, 10.8 bus units per operator. Some of bus units are not regularly operated due to the insufficient maintenance and management. There was no available data for jeepney; however it is considered that jeepney operators are basically smaller than bus operators as the most jeepney units are owned by individual private investors.

Table 9 presents the number of bus/jeepney routes and units plying in the DIDP Area by type of service. Most PUB (public utility bus) units are plying on inter-provincial/city and/or inter-regional routes. Especially the number of operating PUB units on routes to/from Davao City accounts for 97% of the DIDP total. PUJ (public utility jeepney) units are plying mainly on intra-provincial and/or city services. A total of 5,475 jeepney units, 88 % of the DIDP total are operating on routes within Davao City.

Table 7 Functions of Public Utility Vehicles by Province/City

	Davao City	Davao Province	Davao del Sur	Davao Oriental
Inter-Provincial Service	Large Bus Jeepney	Large Bus Jeepney	Large Bus Jeepney	Large Bus Jeepney
Inter-Municipal Service	-	Jeepney Large Bus (provincial)	Jeepney Large Bus (provincial)	Jeepney Large Bus (provincial)
Intra-Municipal/City Service	Jeepney Tricycle Mini-Bus Taxi	Tricycle Skylab (Samal Is.)	Tricycle Skylab (coastal area)	Tricycle Skylab (coastal area) Motorcycle

Source: JICA Study Team

Table 8 Scale of Bus Operators in the DIDP Area

Province/City	No. of Operators	No. of Units	Average No. of Units
Davao City	62	672	10.8
Davao Province	63	210	3.3
Davao del Sur	11	30	2.7
Davao Oriental	22	32	1.5
DIDP Total	158	944	6.0

Note: data as of January 1998
Source: LTFRB Region XI

Table 9 Number of PUB/PUJ Routes and Units in the DIDP Area

Route Type	Bus		Jeepeny	
	Routes	Units	Routes	Units
Intra-Province/City	**33**	**85**	**133**	**6,015**
Within Davao City	25	69	84	5,475
Within Davao Province	3	6	29	338
Within Davao del Sur	1	3	8	140
Within Davao Oriental	4	7	12	62
Inter-Province/City	**26**	**339**	**14**	**206**
Davao City – Davao	12	126	2	31
Davao City – Davao del Sur	6	119	10	169
Davao City – Davao Oriental	6	83	0	0
Davao – Davao del Sur	0	0	0	0
Davao – Davao Oriental	2	11	2	6
Davao del Sur – Davao Oriental	0	0	0	0
Inter-Regional	**25**	**660**	**3**	**6**
Davao City – Outside DIDP Area	24	658	0	0
Davao – Outside DIDP Area	0	0	2	4
Davao del Sur – Outside DIDP Area	0	0	1	2
Davao Oriental – Outside DIDP Area	1	2	0	0
Total Routes Plying in DIDP Area	**84**	**1,084**	**150**	**6,227**

Note: Data as of January 1998
Source: LTFRB Region XI

(3) Road traffic characteristics

Traffic volume on major arterial roads

DPWH conducts traffic count surveys periodically along national roads under the National Traffic Count Program (NTCP), and the annual average daily traffic (AADT) is estimated. Table 10 and Figure 2 show 1996 traffic volume on major arterial roads in the DIDP Area.

Except road sections in some urbanized areas such as Poblacion in Davao City and some provincial capitals, the section between Davao City and Panabo (Davao del Norte Province) had highest traffic volume with 8,345 AADT. Second highest section was Digos – Sta. Cruz (Davao del Sur Province) with 6,836 AADT. The national road connecting Tagum, Davao City and Digos had relatively large traffic. Traffic volume on other arterial roads was around 1,000 or smaller.

Table 10 1996 Traffic Volume on Major Arterial Roads in the DIDP Area

Sta. No.	Road Section	Car	Jeepney	Bus	Truck	Total
	Davao City					
53	Boundary Davao City - Bukidnon	104	10	54	111	279
1139	Davao - Bukidnon Rd. (Calinan Sec.)	517	428	52	214	1,211
	Davao Province					
50	Boundary Panabo - Davao City	4,213	1,357	885	1,890	8,345
51	Boundary Monkayo - Agusan del Sur	499	130	286	545	1,460
1101	Tagum - Sto. Tomas (Asuncion Sec.)	919	429	396	860	2,604
1102	Carmen - Sto. Tomas (Mangalcal Sec.)	290	439	62	461	1,252
1105	Monkayo - Montevista	896	112	374	977	2,359
1106	Nabuntuan - Mawab	1,479	150	533	1,116	3,278
1107	Montevista - Compostela	239	22	233	329	823
	Davao del Sur					
52	Boundary Bansalan - North Cotabato	742	338	205	645	1,830
190	Boundary Sta. Cruz - Davao City	1,536	594	525	941	3,596
191	Boundary Sulop - South Cotabato	344	19	210	631	1,204
1108	Sta. Cruz - Digos	3,840	488	143	2,365	6,836
1110	Hagonoy - Padada	3,161	885	50	1,242	5,338
1111	Malalag - Sta. Maria	385	263	83	166	897
1112	Sta. Maria - Malita	166	79	86	87	418
1113	Malita - Don Marcelino	116	71	2	65	254
	Davao Oriental					
192	Baganga - Boston	101	40	3	87	231
193	Boundary Mati - Davao Prov.	13	42	0	5	60
194	Boundary Pantukan - Davao Prov.	252	148	132	160	692
1114	Mati - Baganga	98	34	3	69	204
1115	Lupon - Mati	411	451	150	411	1,423

Source: DPWH Region XI

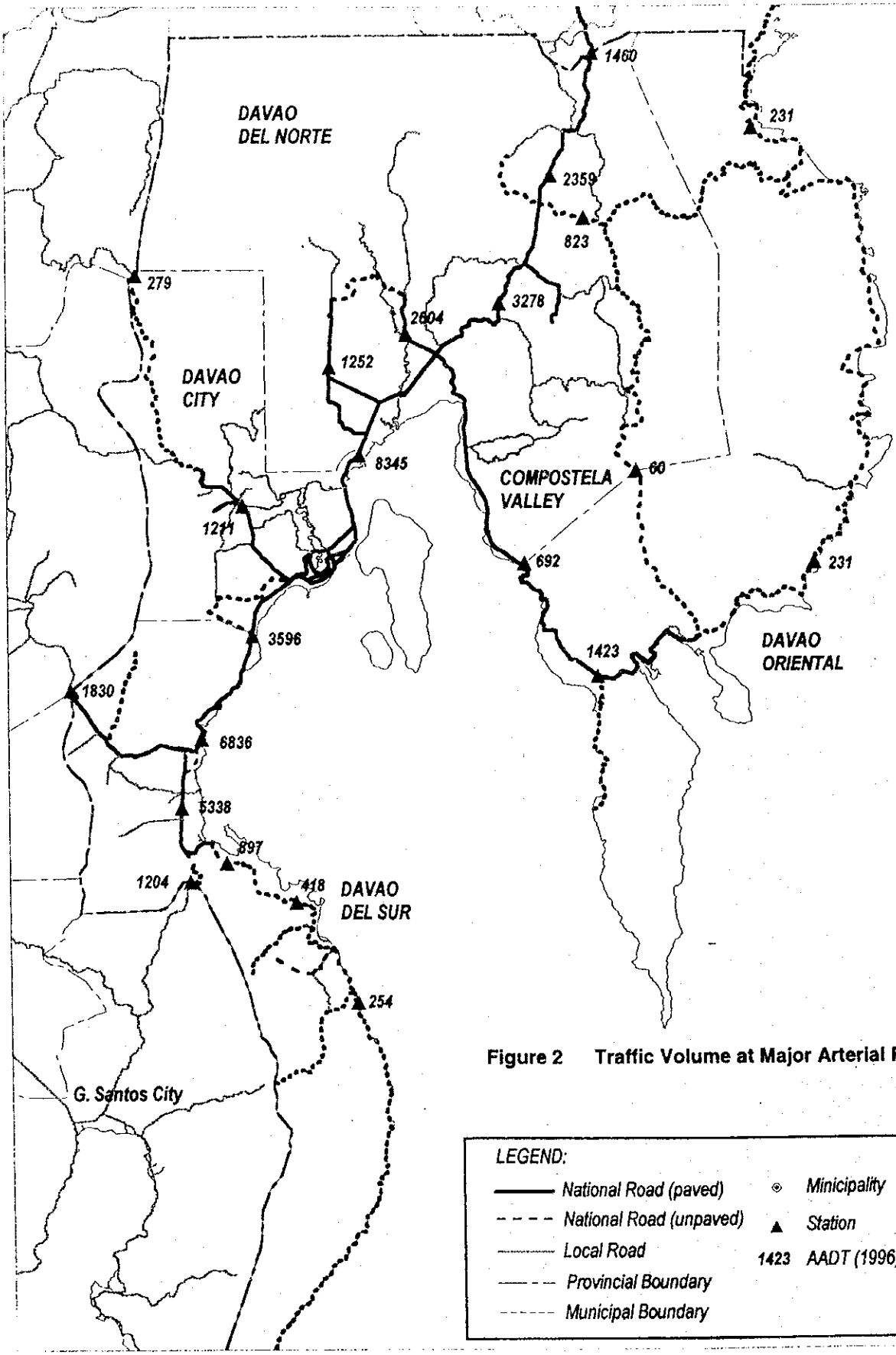


Figure 2 Traffic Volume at Major Arterial Roads

Traffic volume at major intersection in Davao City

Under the DIDPMP Study, an intersection traffic survey was conducted on 22nd and 23rd October 1997. There were 11 stations selected from major intersections in the urban area of Davao City. Hourly traffic volume was counted by direction and by flow for 14 hours (6:00 – 20:00). Figure 3 presents location of survey stations.

Table 11 shows intersection traffic flow by vehicle type. Heavy traffic intersections were located mainly in Poblacion. Station No. 6 (cor. Quirino St./Pichon St.) had highest traffic volume among 11 stations. The total number of traffic passing this intersection was more than 52,000. Traffic flows from both of Agdao and Matina were more than 20,000.

The second heaviest traffic intersection was Station No. 5 (cor. J.P. Laurel Ave./Quirino St.) with 50,000 vehicles passed this intersection. Main flows of traffic were from J.P. Laurel Ave. and C.M. Recto. The third intersection was Station No. 8 (cor. McArthur Highway/Ecoland Diversion) in Matina with total traffic volume of 42,000. The main flow was from Toril with 20,000 vehicles. Other intersections with total traffic volume of more than 30,000, were Station Nos. 2, 4 and 7.

Detailed data and other findings such as hourly variation and historical changes have been compiled separately in the Traffic Survey Report.

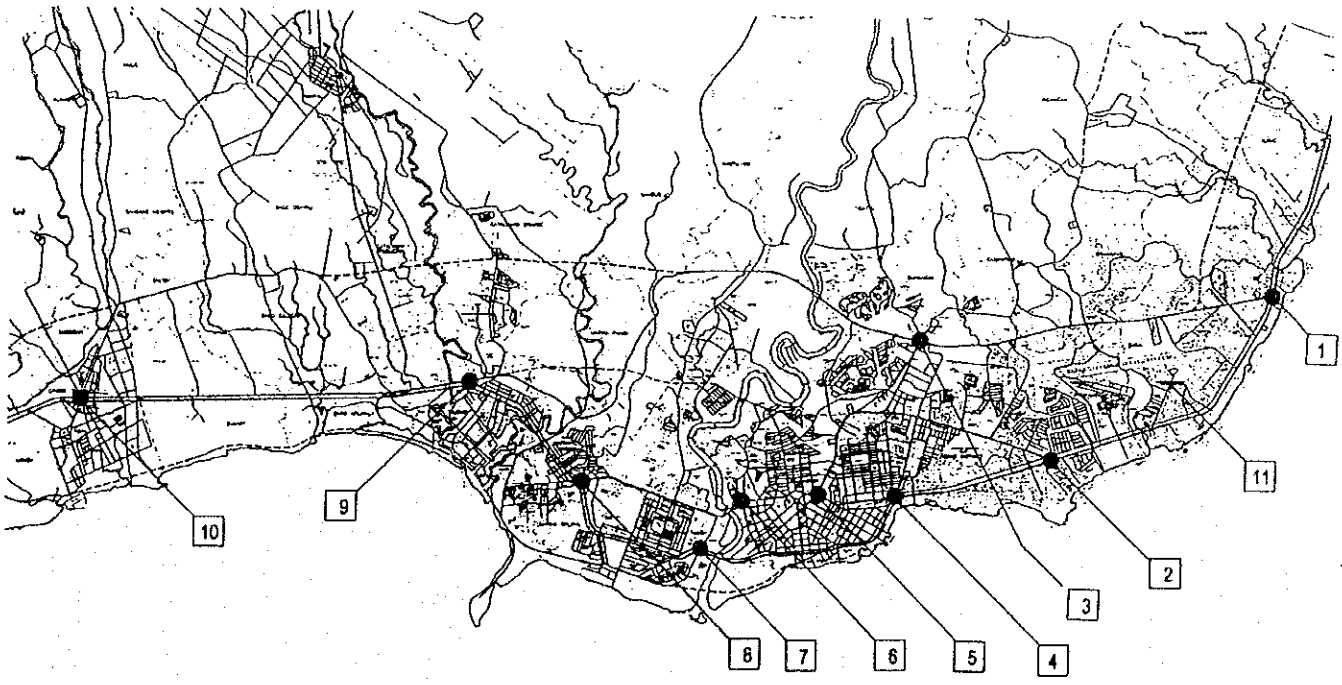


Figure 3 Location of Intersection Traffic Survey Stations

Table 11 Intersection Traffic Flow by Vehicle Type and Station

Station	Road Section	Traffic Flow From	L-Veh. (1)	Jeepney (2)	M-Bus (3)	L-Bus (4)	Truck (5)	Tricycle (6)	MC (7)	Others (8)	Total A (1-5)	Total B (1-8)
	National HW	(Bunawan)	3,404	2,804	28	447	1,533	65	596	197	8,216	9,074
No.1	National HW	(downtown)	2,382	2,256	54	348	941	44	373	200	5,981	6,598
	Friendship HW	(Buhangin)	1,656	955	24	102	909	23	267	70	3,646	4,006
	Total Passing Traffic Volume		7,442	6,015	106	897	3,383	132	1,236	467	17,843	19,678
	National HW	(Panacan)	10,749	3,232	11	254	779	111	1,125	221	15,025	16,482
No.2	C. Castillo St.	(Agdao)	5,298	695	3	346	729	271	657	295	7,071	8,294
	J.P.Laurel Ave.	(Bajada)	6,719	2,886	14	62	652	34	510	123	10,333	11,000
	Total Passing Traffic Volume		22,766	6,813	28	662	2,160	416	2,292	639	32,429	35,776
	Friendship HW	(Panacan)	3,976	2,396	25	235	1,297	51	498	103	7,929	8,581
No.3	Dacudao Ave.	(downtown)	4,039	2,470	21	175	1,254	76	664	190	7,959	8,889
	Friendship HW	(Ma-a)	3,530	438	31	194	1,743	86	492	156	5,936	6,670
	Dacudao Ave.	(subdivision)	2,020	483	4	98	579	44	418	89	3,184	3,735
	Total Passing Traffic Volume		13,565	5,787	81	702	4,873	257	2,072	538	25,008	27,875
	R. Castillo St.	(Lanang)	4,749	1,200	22	165	481	3,355	570	336	6,617	10,878
No.4	Leon Garcia St.	(Mag. Park)	5,957	1,745	33	328	790	4,384	826	180	8,853	14,243
	Lapu Lapu St.	(Sta. Ana)	3,616	2,454	6	1	150	386	492	318	6,227	7,423
	Cabaguio Ave.	(DMC)	3,644	3,140	43	28	86	980	442	233	6,941	8,596
	Total Passing Traffic Volume		17,966	8,539	104	522	1,507	9,105	2,330	1,067	28,638	41,140
	Sta. Ana Ave.	(Agdao)	7,182	501	13	26	373	33	746	219	8,095	9,093
No.5	C.M. Recto St.	(Bolton)	6,692	7,165	51	187	158	6	570	192	14,253	15,021
	Quirino St.	(Bankerohan)	9,136	419	67	84	290	16	834	257	9,996	11,103
	J.P.Laurel Ave.	(Bajada)	7,182	5,982	28	201	276	17	823	183	13,669	14,692
	Total Passing Traffic Volume		30,192	14,067	159	498	1,097	72	2,973	851	46,013	49,909
	Quirino St.	(Agdao)	13,763	5,077	35	351	354	10	1,483	414	19,580	21,487
No.6	McArthur HW	(Matina)	15,918	4,209	21	227	342	20	1,494	320	20,717	22,551
	Pichon St. Ext.	(Exodus Vill.)	4,530	3,076	4	5	181	42	367	320	7,796	8,525
	Total Passing Traffic Volume		34,211	12,362	60	583	877	72	3,344	1,054	48,093	52,563
	Quimpo Blvd.	(bridge)	7,006	2,055	38	204	294	11	1,062	168	9,597	10,838
No.7	Sandawa Rd.	(Bus Terminal)	5,727	3,158	46	404	112	59	496	191	9,447	10,193
	Quimpo Blvd.	(Toril)	6,537	631	13	190	649	47	924	147	8,020	9,138
	Sandawa Rd.	(McArthurHW)	5,431	1,365	18	190	195	94	502	105	7,199	7,900
	Total Passing Traffic Volume		24,701	7,209	115	988	1,250	211	2,984	611	34,263	38,069
	McArthur HW	(Bankerohan)	7,464	5,262	23	390	404	32	1,132	193	13,543	14,900
No.8	Ecoland Div.	(Ecoland)	4,386	289	2	577	205	18	644	64	5,459	6,185
	McArthur HW	(Toril)	12,423	5,503	4	499	570	35	1,660	261	18,999	20,955
	Total Passing Traffic Volume		24,273	11,054	29	1,466	1,179	85	3,436	518	38,001	42,040
	Diversion Rd.	(Matina Hill)	1,876	196	1	37	1,060	3	241	9	3,170	3,423
No.9	McArthur HW	(Matina)	5,071	3,479	0	425	510	22	976	30	9,485	10,513
	McArthur HW	(Toril)	7,397	3,748	1	587	1,733	20	1,628	132	13,466	15,246
	Total Passing Traffic Volume		14,344	7,423	2	1,049	3,303	45	2,845	171	26,121	29,182
	McArthur HW	(Talomo)	2,359	1,551	1	305	921	1,319	358	414	5,137	7,228
No.	Rasay St.		399	111	2	3	46	329	271	473	561	1,634
10	Public Market		713	1,177	1	55	158	2,955	288	325	2,104	5,672
	McArthur HW	(Binogao)	1,594	417	2	302	841	369	368	590	3,156	4,483
	Calinan Rd.	(Lobogan)	412	276	3	2	194	2,645	363	673	887	4,568
	Total Passing Traffic Volume		5,477	3,532	9	667	2,160	7,617	1,648	2,475	11,845	23,585
	Airport Road	Airport	2,700	51	7	0	90	697	211	83	2,848	3,839
No.	Airport Road	National Rd.	2,680	61	3	0	115	689	256	83	2,859	3,887
11	Total Passing Traffic Volume		5,380	112	10	0	205	1,386	467	166	5,707	7,726

Note: 14 hours traffic counts (6:00 - 20:00)
Source: DIDPMP Traffic Survey, 1997

Characteristics of inter-municipal passenger/community movement in Mindanao

The inter-municipal origin-destination (OD) matrices were developed based on roadside interview survey conducted in 1997 by JICA-DPWH Study Team for the *Study on Visayas and Mindanao Islands Strategic Road Network Development Project*. Vehicle, passenger and cargo OD matrices were prepared.

Table 12 presents the summary of inter-municipal trip characteristics for the Mindanao regions excluding regions of IX, XII and ARMM. Average lengths of vehicle and passenger trips were 63.5 km and 59.6 km, respectively. Vehicles and passengers of bus made longest trip with average length of 107.9 km and 78.6 km, respectively. Vehicles and passengers of jeepney made shortest trip with length of 49.2 km and 43.5 km, respectively. The average numbers of passengers in vehicle were 3.4 passengers for cars, 16.0 for jeepneys and 45.9 for buses. Inter-municipal trip rate was low at 0.068 trips per person.

Commodities transported in Mindanao amounted to 57,000 tons per day. By commodity type agricultural products accounted for 37.3% of the total cargo volume, and manufactured products for 26.7%. By vehicle type, most of the commodity (96.5%) was transported by truck. Average load factors of cars and trucks were 0.07 and 2.96 tons per vehicle, respectively.

Trip generation and attraction in the DIDP Area

To analyze the existing condition of road-based traffic by area, the municipalities in the DIDP Area were integrated into 10 zones based on the proposed RAIC/PAIC zoning system. Remaining provinces in Mindanao were integrated into three zones such as northern, western and southwestern areas. The inter-municipal trips were aggregated based on this integrated zoning system.

Table 13 shows the present inter-zonal trips of vehicles, passengers and cargoes generated/attracted by integrated zone. Inter-municipal trips within integrated zone are also presented as intra-zonal trips. Among integrated zones, Davao City (Zone No.1) made largest trip generations and attractions. More than 30% of the DIDP total, trips for 6,500 vehicles, 110,000 passengers and 14,000 tons of cargoes were made between Davao City and other zones. Second largest zones were No.4 (Tagum, Maco, Mabini and Pantukan), No.5 (Panabo, Carmen and Sto. Tomas) and No.6 (Digos, Sta. Cruz, Bansalan, Magsaysay and Matanao).

The total intra-zonal trips of vehicles, passengers and cargoes accounted for 2,686 vehicles, 38,118 passengers and 6,070 tons, respectively. The zone with high intra-zonal trips was Zone 5. It means that there were relatively strong connections between municipalities of Panabo, Carmen and Sto. Tomas.

Present traffic movement in the DIDP Area

Present OD matrices of vehicles, passengers and cargoes were prepared based on the integrated zoning system. Desire lines are presented in Figures 4, 5 and 6.

1) Vehicle traffic: it was found that most inter-zonal vehicle trips were made by private vehicles and large volume of vehicles were moved to/from Davao City, mostly related with zones of Panabo/Tagum and Digos. By type of vehicles, private vehicles and trucks made wide-range distance trips. Most trips were short between Davao City and surrounding zones as well as within Davao Province. Longer trips were generated or attracted to/from Davao City. Most

jeepneys made short distance trips, while buses made longer distance trips; most of bus trips were generated or attracted to/from Davao City.

2) Passenger traffic: most inter-zonal passenger trips were made by bus, and large volume of passengers were moved mainly to/from Davao City, mostly connected with the zones of Panabo, Tagum – Davao Province and Digos – Davao del Sur Province and other provinces outside the DIDP Area. By type of modes, passengers by bus and private vehicle made wide-range distance trips; however in terms of volume, most trips were short between Davao City and surrounding zones. Most jeepney passengers made short distance trips.

3) Cargo traffic: major type of commodities transported in the DIDP Area was agricultural products, and they are generated mainly from zones in Davao and Davao del Sur provinces and attracted in Davao City. Manufactured products are generated mainly in Davao City and attracted in zones of Tagum, Panabo and Digos. Mineral products were transported mainly within zones in Davao Province and Davao City. Large movement of construction materials was from Panabo to Davao City, because Panabo has production area of sand and Davao City is biggest consumption area in the DIDP Area.

Table 12 Summary of Inter-Municipal Traffic Characteristics in Mindanao

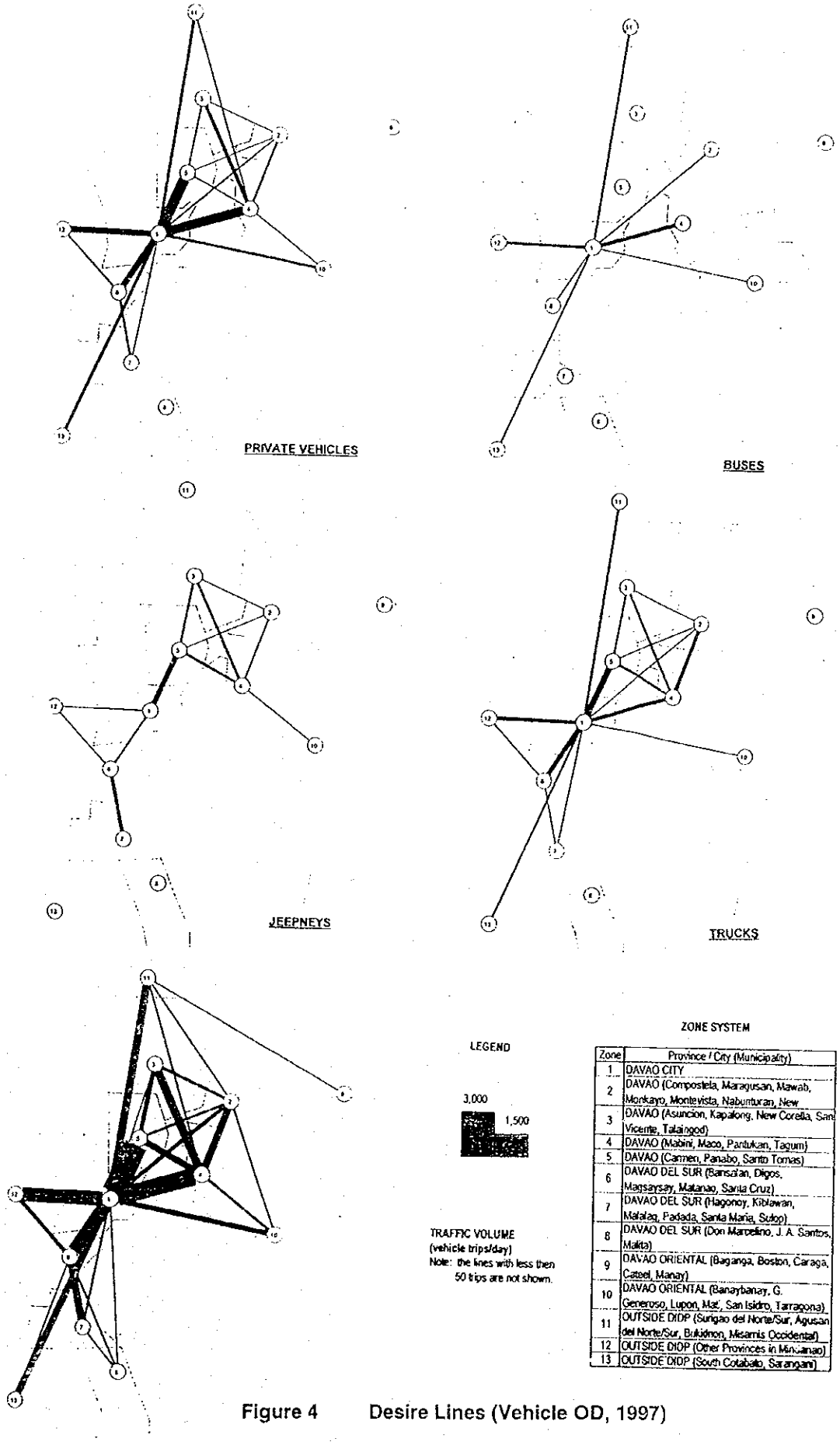
Item	Traffic Characteristics			
Average Trip Length and Average Number of Passengers		Average Trip Length (km)		Average Number
	Vehicle Type	Vehicle	Passenger	of Passengers(km)
	Car	63.1	65.8	3.4
	Jeepney	49.2	43.5	16.0
	Bus	107.9	78.6	45.9
	Truck	66.9	-	-
	All vehicles	63.5	59.6	11.9
Inter-Municipal Person Trip Rate	0.068 (trip / person)			
Cargo Movement by type of Commodity	Commodity Type		% share	
	Agricultural Products		37.3 %	
	Manufactured Products		26.7 %	
	Mineral Products		12.3 %	
	Construction Materials		23.7 %	
	Total Cargo Volume		57,189 tons/day	
Cargo Movement by type of vehicle			% share	Average Load Factor
	Car		3.5 %	0.07 ton / vehicle
	Truck		96.5 %	2.96 ton / vehicle
				2.21 (average)

Note: Figures are excluding the region of ARMM, IX and XII.
Source: Visayas and Mindanao Islands Strategic Road Network Development Project, JICA-DPWH, 1997

Table 13 Present Trip generation and Attraction by Integrated Zone

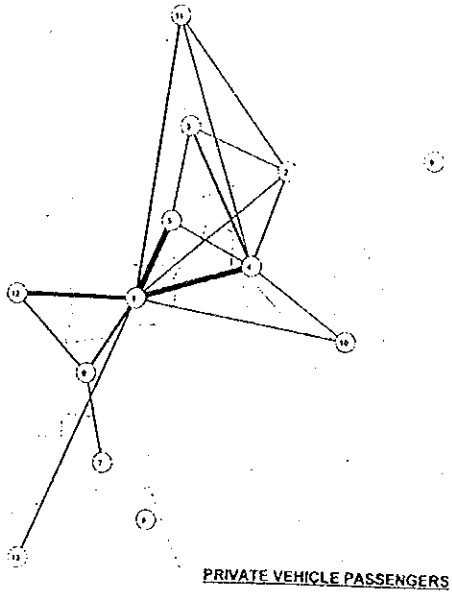
Zone	Vehicle			Passenger		Cargo (tons)		
	Generation	Attraction	Intra-Zone	Gen./Att.	Intra-Zone	Generation	Attraction	Intra-Zone
1	3,555	2,907	-	54,261	-	5,760	8,125	-
2	717	663	275	9,098	3,710	1,748	1,304	829
3	408	718	72	7,176	1,218	1,286	1,327	124
4	2,521	514	92	24,582	2,996	2,472	3,309	135
5	415	2,169	935	19,184	11,070	5,151	1,770	2,709
6	1,571	365	348	17,240	2,512	2,374	1,532	591
7	127	633	224	6,704	5,564	892	849	256
8	173	104	123	2,638	1,798	182	271	219
9	91	50	143	925	1,784	122	70	221
10	275	435	474	6,077	7,466	366	534	986
Total	9,853	8,558	2,686	147,885	38,118	20,353	19,091	6,070

Note: No. of intra-zonal trips are not included in generation and attraction
Source: Visayas and Mindanao Islands Strategic Road Network Development Project, JICA-DPWH, 1997

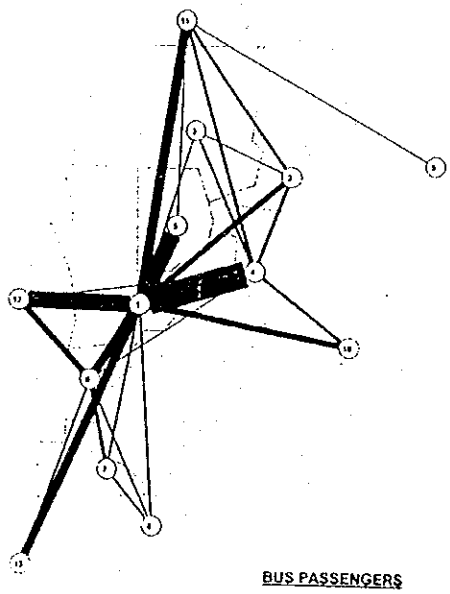


Zone	Province / City (Municipality)
1	DAVAO CITY
2	DAVAO (Compostela, Maragusan, Mawab, Monkayo, Montevista, Naburturan, New
3	DAVAO (Asuncion, Kapalong, New Corella, San Vicente, Talaingod)
4	DAVAO (Mabini, Maco, Pantukan, Tagum)
5	DAVAO (Carmen, Panabo, Santo Tomas)
6	DAVAO DEL SUR (Bansalan, Digos, Magsaysay, Matanao, Santa Cruz)
7	DAVAO DEL SUR (Hagonoy, Kiblawan, Malalag, Padada, Santa Maria, Sulop)
8	DAVAO DEL SUR (Don Marcelino, J. A. Santos, Malita)
9	DAVAO ORIENTAL (Baganga, Boston, Caraga, Cateel, Manay)
10	DAVAO ORIENTAL (Banaybanay, G. Generoso, Lupon, Mat', San Isidro, Tarragona)
11	OUTSIDE DIDP (Surigao del Norte/Sur, Agusan del Norte/Sur, Bukidnon, Misamis Occidental)
12	OUTSIDE DIDP (Other Provinces in Mindanao)
13	OUTSIDE DIDP (South Cotabato, Sarangani)

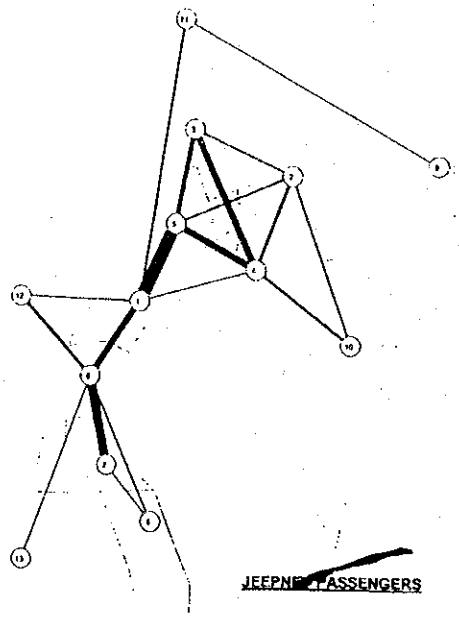
Figure 4 Desire Lines (Vehicle OD, 1997)



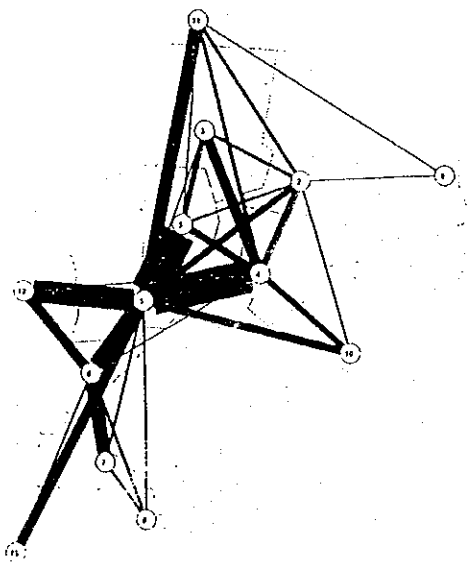
PRIVATE VEHICLE PASSENGERS



BUS PASSENGERS



JEEPNEY PASSENGERS



ALL PASSENGERS

LEGEND

40,000

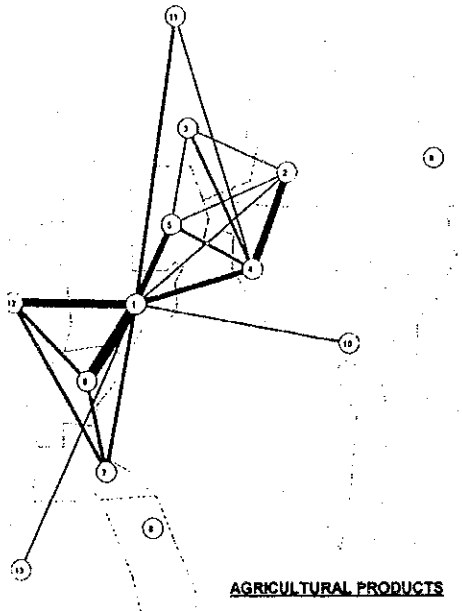
20,000

TRAFFIC VOLUME
(passenger trips/day)
Note: the lines with less then 300 trips are not shown.

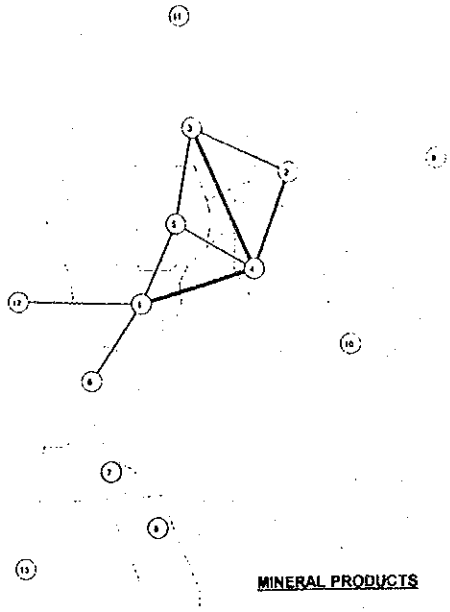
ZONE SYSTEM

Zone	Province / City (Municipality)
1	DAVAO CITY
2	DAVAO (Compostela, Maragusan, Mawab, Monkayo, Montevista, Nabunturan, New
3	DAVAO (Asuncion, Kapalong, New Corella, San Vicente, Talaingod)
4	DAVAO (Mabini, Maco, Pantukan, Tagum)
5	DAVAO (Carmen, Panabo, Santo Tomas)
6	DAVAO DEL SUR (Bansalan, Digos, Magsaysay, Matanao, Santa Cruz)
7	DAVAO DEL SUR (Hagonoy, Kiblawan, Malalag, Padada, Santa Maria, Sulop)
8	DAVAO DEL SUR (Don Marcelino, J. A. Santos, Malita)
9	DAVAO ORIENTAL (Baganga, Boston, Caraga, Cateel, Manay)
10	DAVAO ORIENTAL (Banaybanay, G. Generoso, Lupon, Mati, San Isidro, Tarragona)
11	OUTSIDE DIDP (Surigao del Norte/Sur, Agusan del Norte/Sur, Bukidnon, Misamis Occidental)
12	OUTSIDE DIDP (Other Provinces in Mindanao)
13	OUTSIDE DIDP (South Cotabato, Sarangani)

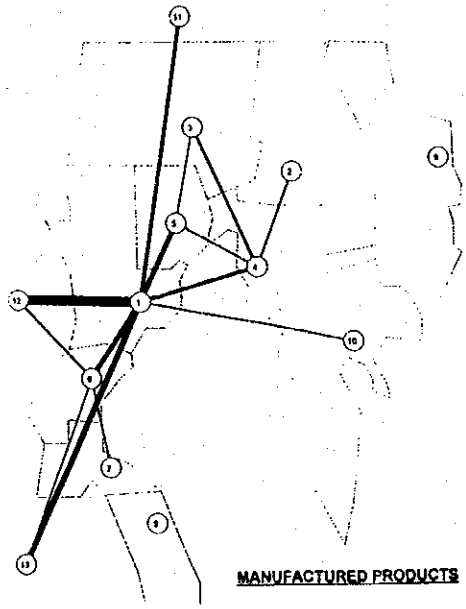
Figure 5 Desire Lines (Passenger OD, 1997)



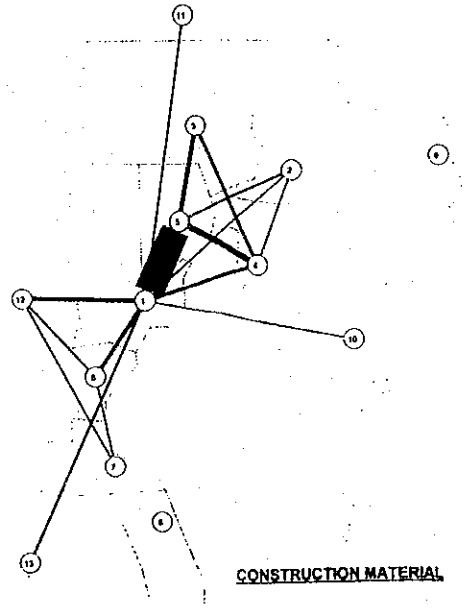
AGRICULTURAL PRODUCTS



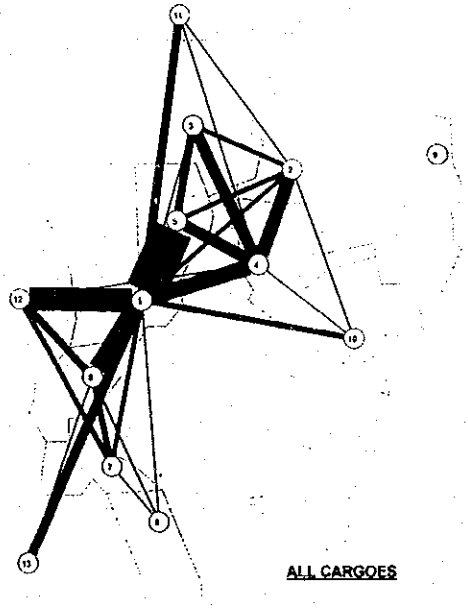
MINERAL PRODUCTS



MANUFACTURED PRODUCTS



CONSTRUCTION MATERIAL



ALL CARGOES

LEGEND

6,000

3,000

TRAFFIC VOLUME (tons/day)
Note: the lines with less then 100 tons are not shown.

ZONE SYSTEM

Zone	Province / City (Municipality)
1	DAVAO CITY
2	DAVAO (Compostela, Maragusan, Mawab, Monkayo, Montevista, Nabunturan, New
3	DAVAO (Asuncion, Kapalong, New Corella, San Vicente, Talaingod)
4	DAVAO (Mabini, Maco, Pantukan, Tagum)
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Figure 6 Desire Lines (Cargo OD, 1997)