社会開発協力部報告書

No. 8

DCUTCLUS

DAVAO CITY URBAN TRANSPORT
CUM LAND USE STUDY

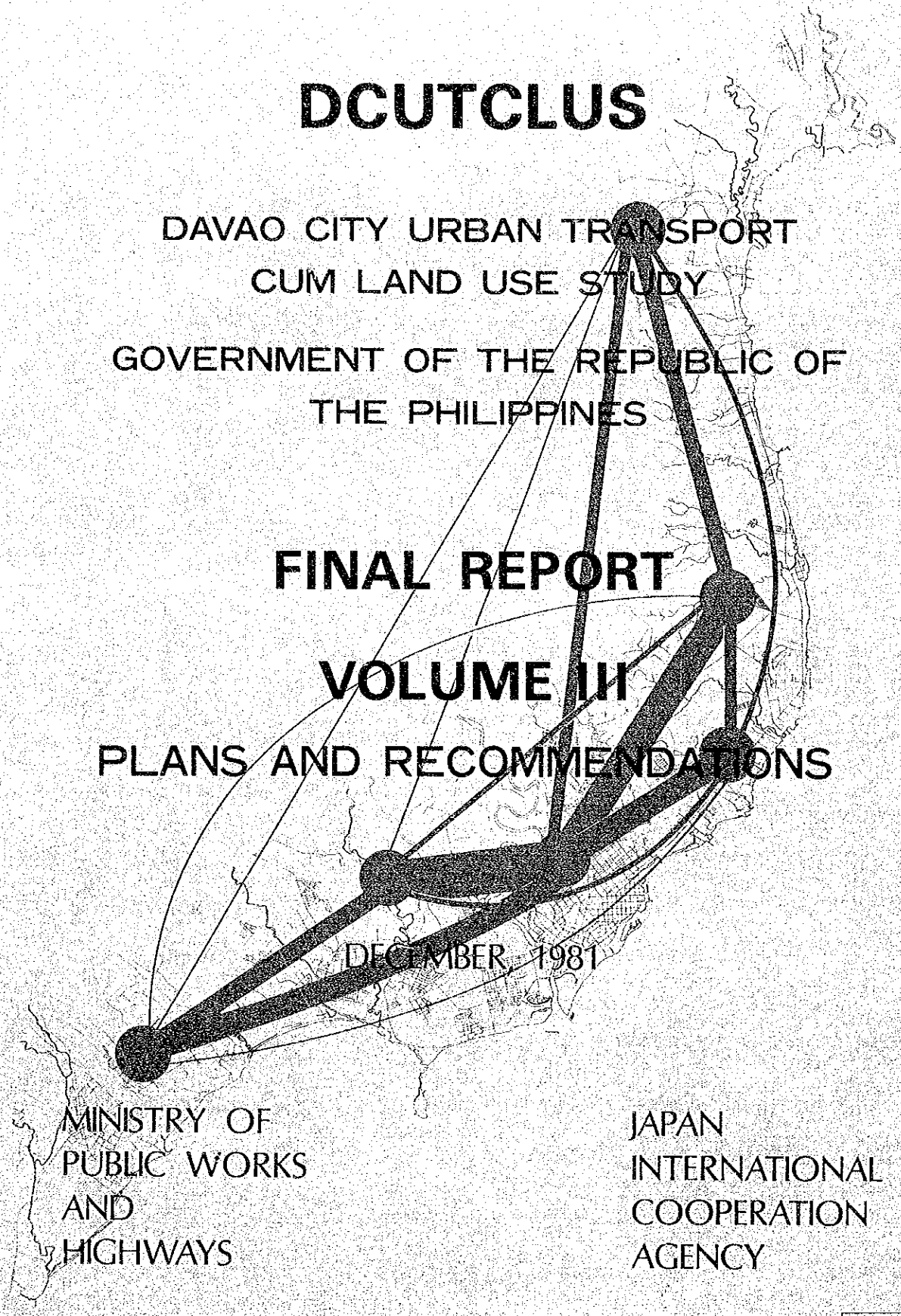
GOVERNMENT OF THE REPUBLIC OF
THE PHILIPPINES

FINAL REPORT

VOLUME III

PLANS AND RECOMMENDATIONS

DECEMBER, 1981



MINISTRY OF
PUBLIC WORKS
AND
HIGHWAYS

JAPAN
INTERNATIONAL
COOPERATION
AGENCY

S D F
[redacted]
81-178(3/4)

JICA LIBRARY
1028988[2]

DCUTCLUS

DAVAO CITY URBAN TRANSPORT
CUM LAND USE STUDY

GOVERNMENT OF THE REPUBLIC OF
THE PHILIPPINES

FINAL REPORT

VOLUME III

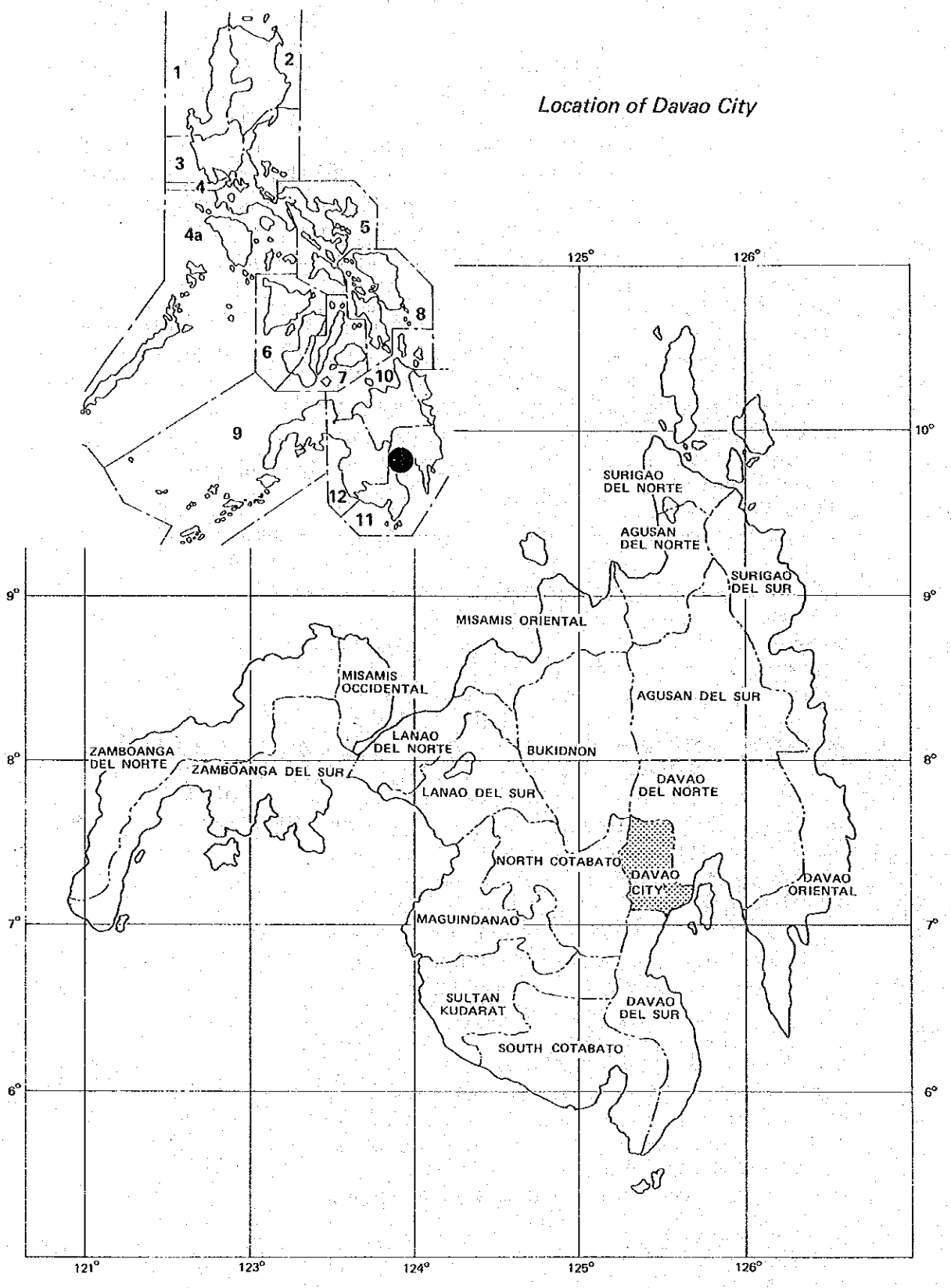
PLANS AND RECOMMENDATIONS

DECEMBER, 1981

MINISTRY OF
PUBLIC WORKS
AND
HIGHWAYS

JAPAN
INTERNATIONAL
COOPERATION
AGENCY

国際協力事業団
受入月日 '84.9.27
登録No. 09782
1180
74
SDF


Location of Davao City
1
2
3
4
4a
5
6
7
8
9
10
11
12
125°
126°
10°
9°
8°
7°
6°
121°
123°
124°
SURIGAO DEL NORTE
AGUSAN DEL NORTE
SURIGAO DEL SUR
MISAMIS ORIENTAL
MISAMIS OCCIDENTAL
AGUSAN DEL SUR
ZAMBOANGA DEL NORTE
ZAMBOANGA DEL SUR
LANAO DEL NORTE
BUKIDNON
LANAO DEL SUR
DAVAO DEL NORTE
NORTH COTABATO
DAVAO CITY
DAVAO ORIENTAL
MAGUINDANAO
SULTAN KUDARAT
DAVAO DEL SUR
SOUTH COTABATO

PREFACE

In response to the request of the Government of the Republic of the Philippines, the Japanese Government decided to conduct a study on the Davao City Urban Transport Cum Land Use Project and entrusted it to the Japan International Cooperation Agency (JICA). The J I C A sent to the Philippines a survey team headed by Mr. Tetsuo Wakui from August 1979 to October 1981, under the guidance of the Supervisory Committee headed by Dr. Yoshiro Watanabe, professor of the Tsukuba University.

The team had discussions with the officials concerned of the Government of the Philippines and conducted a field survey in Davao city. After the team returned to Japan, further studies were made and the present report has been prepared.

I hope that this report will serve for the development of the Project and contribute to the promotion of friendly relations between our two countries.

I wish to express my deep appreciation to the officials concerned of the Government of the Philippines for their close cooperation extended to the team.

December 1981

Keisuke Arita
President
Japan International Cooperation Agency

REPUBLIC OF THE PHILIPPINES
MINISTRY OF PUBLIC WORKS AND HIGHWAYS
OFFICE OF THE MINISTER
MANILA

MESSAGE

We are pleased to have the Final Report on the Davao City Urban Transport Cum Land Use Study (DCUTCLUS).

In no small measure, the Study reflects the technical cooperation of the Government of Japan, through the Japan International Cooperation Agency (JICA), and the Philippine Government, through the Ministry of Public Works and Highways with the assistance of other agencies. The Study, which took two and a half years to complete, aims at the formulation of a comprehensive urban transportation and land use master plan for the large and progressive City of Davao in Mindanao. The cooperation and support of local government authorities in this undertaking underscore their concern to long-term solutions beneficient to the public interest and welfare of the residents of the Project Area.

It is the desire of the national leadership that area development planning adhere to the requirements of growth and national priority targets by clearly defining the issues, problems and options. President Ferdinand E. Marcos, through the organizational frame work of the Ministry of Public Works and Highways, has provided the leadership to document, validate and propose institutional as well as legislative actions to a variety of problems of the City of Davao spawned by rapid population growth and other factors.

The Study, therefore, is creditably the right step towards the right direction for the modernization and balanced growth of this burgeoning metropolis, particularly with respect to the vital transport systems that must be provided in relation to the overall development plan for the city.

It is my hope that the present leaders and future generations of Davao City will be guided by this Study.

May I commend all the members of the DCUTCLUS Steering Committee led by Project Director Prudencio F. Baranda, Project Manager Esther L. Alino, and her staff for a job well done. Special thanks is also extended for the invaluable help of former Mayor Luis T. Santos and the present Davao City Administrator, Mayor Elias B. Lopez, and the local authorities, as well as to Mr. Tetsuo Wakui and the team of Japanese consultants for their tireless efforts to realize the Study.

JESUS S. HIPOLITO
Minister
Ministry of Public Works and Highways

MESSAGE FROM CITY MAYOR

It is with genuine pleasure that I take this opportunity to extend my congratulations to the Philippine and Japanese teams which produced this final report on the Davao City Urban Transport Cum Land Use Study (DCUTCLUS).

As Mayor of Davao City, I am happy to know that there are other people who are also very much concerned with the planning of Davao City's future development. Considering the size of this city, we certainly need all the assistance we can get from other sources.

We are therefore thankful to the Ministry of Public Works and Highways (MPWH) and the Japan International Cooperation Agency (JICA) for having initiated and concluded this study which, to my mind, may prove very useful to the development of our beloved city in the years to come.

The thoroughness of this study shows the deep interest of those involved in this joint efforts between the Philippine and Japanese governments.

In the final analysis, however, is the crucial question on whether these plans contained in this study are implementable or not. This, of course, brings into mind the possible sources of funds needed to transform these plans to reality.

I would suggest, therefore, that those involved in this study should take one step further beyond the context of mere planning and venture into the next logical sequence, which is the realm of reality and implementation.

Again, please accept my warmest best wishes for a job well done.

October 20, 1981
City Hall, Davao City

ELIAS B. LOPEZ
Mayor, City of Davao

CONTENTS

CHAPTER 1 INTRODUCTION

Table and Figures

CHAPTER 1

INTRODUCTION

1.1 Background and Purpose

The City of Davao, the economic, cultural, and administrative center of Mindanao, has been mandated by a Presidential Decree as the Regional Government Center of Southern Mindanao. The 1980 population of the City is estimated at 611,000, which is the second largest in the Philippines, after only that of Metro Manila.

This population concentration in Davao was practically a post-war phenomenon. The City's demographic and economic growths have been so rapid that urban infrastructure development could hardly catch up with demand explosion, and disorderly urban sprawl, traffic jam in peak hours, and other urban problems have emerged. If left alone, these problems will be seriously aggravated in the future.

In realization of this situation, did the Government of the Republic of the Philippines set up, within the organizational frame of the Ministry of Public Works and Highways, a team for a Davao City Urban Transport Cum Land Use Study and a steering committee consisting of representatives from agencies concerned. The DCUTCLUS Team undertook the study during the past two and a half years with technical cooperation from Japan through the Japan International Cooperation Agency and completed the entire process of the study by the end of 1981.

The Terms of Reference for the DCUTCLUS Project set forth two purposes of the study: the formulation and implementation of an Urgent Implementation Program for the remedy of impending problems from which Davao City was currently suffering, and the laying down of a transportation and land use master plan which would provide the City with a guide for development and transportation/traffic administration up to the year 2000.

(i) Urgent Implementation Program

This Program, a part of which is to be implemented and executed by DCUTCLUS Team in 1981/1982 with a budget allocated to the Team, includes the following:

- A Traffic control plan for Poblacion and the vicinity;
- A plan for the improvement/development of streets in downtown Poblacion;
- A PUJ rerouting scheme.

(ii) Transportation Cum Land Use Masterplan

A short term plan to cover up to 1985, a medium term plan covering up to the year 2000 are to be formulated through analyses, forecasts, and programming with the year 2000 as the target year and 1990 as the year for interim review.

- Establishment of a socio-economic framework
- Formulation of medium and long term land use plans
- Designing of a transportation facilities development master plan

- Designing of a public transportation master plan
- Formulation of an investment program
- Pre-feasibility studies of major projects.

1.2 Study Area and Project Area

The Socio-economic study is to survey Davao City as a whole, while the transportation and the land use plans are to be formulated for only the coastal part of the City in a total land space of about 18,000 hectares. The former is referred to as "The Study Area", and the latter, "the Project Area". The part of Davao City outside the Project Area is referred to as "the Non-Project Area."

The Project Area covers the alluvial plains extending along the coast for about 40 kilometers with a breadth of three to five kilometers. All of urban activities in the coastal parts of Davao City are not only currently limited to this Area but will not extend beyond it, inasmuch as urbanization can hardly be spread across the mountains which stand behind it.

A person-trip survey, the most important of the data generating efforts, has been conducted covering approximately 85% of the Study Area. After an aero-photographic survey maps of the entire Project Area have been drawn at the scale of 1:10,000 and those of Poblacion and the vicinity 1:5,000.

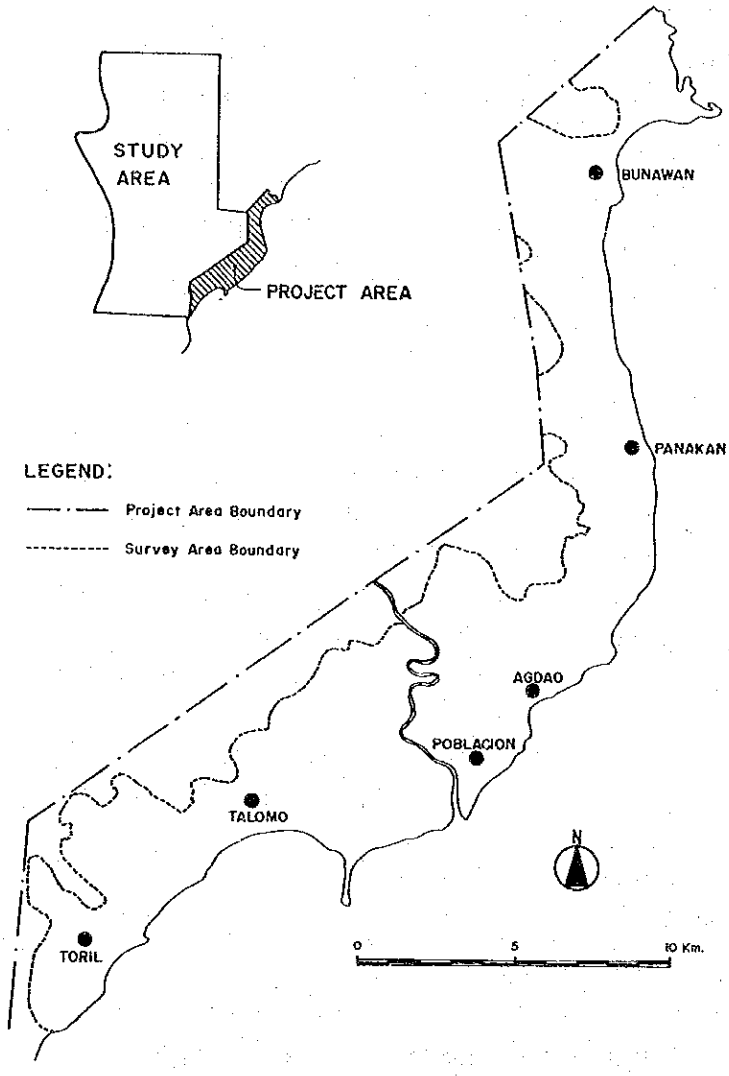


Figure 1.1 Study Area and Project Area

1.3 Study Methodology

1) Approach

In addition to the two purposes discussed in Sub-Chapter 1 above, this Project involved an incidental but important objective of developing skills in the area of transportation and land use planning. In order to achieve this objective, universal approaches and methods which can be applied to other similar projects have been selected as much as possible in each of analysis, forecasting, and programming stages, as follows:

(1) Data Collection and Analysis

a. In the absence of maps of the Project Area which contain adequate information on the current land use and, therefore, can become a land use planning base map, topographical and geographical maps of the required scale have been drawn through aerial photographic survey.

b. In order to understand the transportation demand structure of the area, a person trip survey is conducted through interviews at homes, together with such underlying surveys as screen line survey, cordon line survey, and roadside traffic counting.

c. Available data is to be used as much as possible with regard to population dynamics, business locations, and transportation facilities, provided that any missing information in these areas is to be obtained through independent investigations.

d. The data thus gathered are to be processed into geographical distributions, time series fluctuations, their correlations with other indicators, their comparison with data of other cities, and so forth for input at forecasting and planning stages.

(2) Forecasting

a. Population, labor force, production, and other socio-economic indicators are to be estimated for the Study Area through the extrapolation of past trends, the breaking down of national, regional, or other wide level planning into Davao City Unit, and the use of per capita indicators for planning.

b. Demands for commercial, industrial, housing, and public use land spaces are to be forecast based on the estimated socio-economic indicators. In this process, the per capita indicators prepared by the Ministry of Human Settlement (MHS) for planning are to be used.

c. Transportation demand is to be forecast through the so-called four step method, namely: trip generation, distribution, modal split, and assignment. The modal split forecast is to place a greater emphasis on policy preference of future split than on the past trend.

(3) Planning

a. Existing plans and projects are to be reviewed for their effectiveness and feasibility and incorporated into the Master Plan as need be.

b. A land use plan is to be formulated through the geographical distribution of said demands for various land spaces over the desirable future urban develop-

ment pattern map drawn based on an inventory of available land spaces for their quantity, quality, and location.

c. The primary requisite to the transportation plan to be developed is that it must be able to meet the future transportation demand.

d. Care is to be used so as not to allow the plans to remain a mere dream but to ensure that they will be fully feasible based on the amount of public investment funds to be available, as estimated through macro-economic approach.

e. All prepared projects are to be compared and analyzed for their mutual relationship and, as appropriate, grouped into packages.

f. Paying attention to these packages, an investment schedule to cover through the year 2000 is to be drawn with care so as not to cause uneven concentration of investments in any particular year or years.

g. Based on this investment schedule, the economy of the Master Plan as a whole and of each of major project packages is to be assessed. If any of them fails to prove economically justifiable, the plan is to be revised.

h. In addition, financial evaluation is to be done of projects wherein initial investments and administrative expenses are to be met with operational incomes.

2) Reporting

The DCUTCLUS Study was completed by the end of 1981 and the findings have been compiled into a report consisting of the four volumes listed below. In addition, an Urgent Implementation Program was proposed in August 1980, approved by the Steering Committee, and is now being implemented by the DCUTCLUS Team. All the maps and computer printouts generated in the process of the Study have been submitted to MPWH under a separate cover.

Volume 1 Executive Summary

Volume 2 Current Status of the Project Area

1. Introduction
2. A Profile of the Study Area
3. Intercity Transport System
4. Current Status of Road Facilities
5. Road Traffic
6. Person Trips in the Survey Area
7. Current Status of Public Transportation
8. Traffic Control Analysis

Volume 3 Plans and Recommendations

1. Introduction
2. Problem Identification and Planning Theme
3. Socio-Economic Framework and Land Use Plan
4. Future Transportation Demand Estimation
5. Alternative plans: Formulation and Evaluation
6. Road Network Masterplan

7. Public Transport plan
8. Investment Program
9. Project Evaluation
10. Recommendations to Authorities

Volume 4 Supporting Report

1. Survey Manuals
2. Technical Reports
3. Supporting Reports
4. Selected Data

1.4 Study Organization

1) Organization of DCUTCLUS

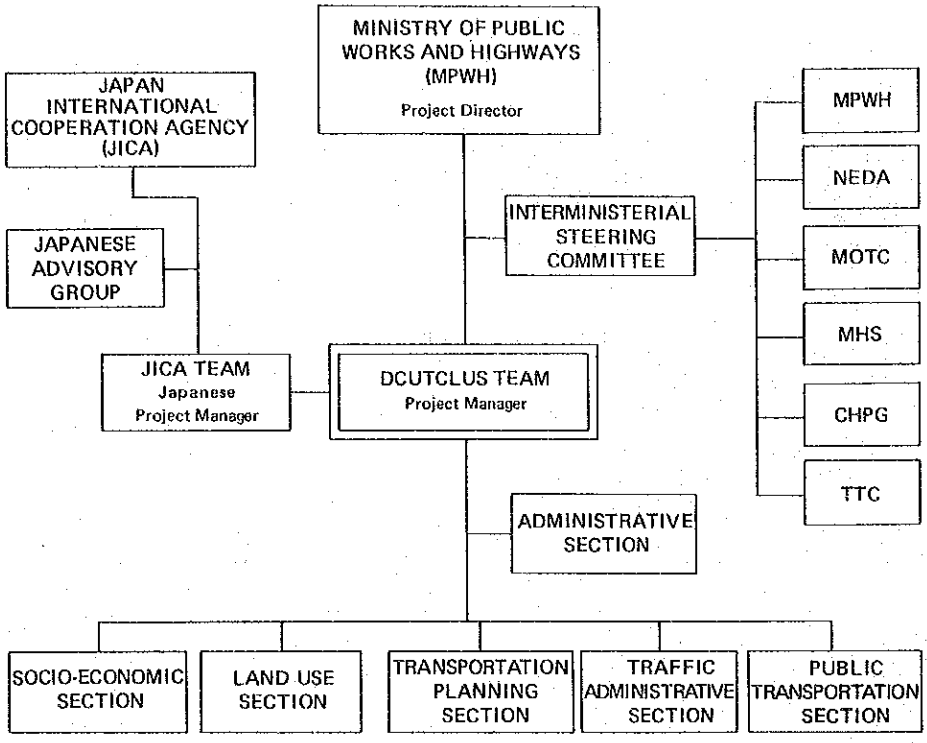


Figure 1.2 Organization of DCUTCLUS

Table 1.1 Steering Committee Meeting

	Date	Place	Agenda
1st	Oct. 30, 1979	Manila	• Methodology and schedule of Person Trip Survey and other traffic surveys
2nd	Nov. 28, 1979	Davao City	• Progress of Person Trip Survey and other traffic surveys
3rd	Feb. 13, 1980	Davao City	• Conceptual Land Use Plan • Reporting on Field Surveys
4th	July 8, 1980	Manila	• Socio-Economic Framework • Person Trip Data Processing • Major Characteristics of Current Person Trips
5th	Sept. 25, 1980	Manila	• Socio-Economic Framework and Land Use Plan • Urgent Traffic Recommendations
6th	Nov. 27, 1980	Davao City	• Finalization of Urgent Traffic Recommendations • Future Traffic Demand Forecast
7th	March 3, 1981	Davao City	• Outline of Medium and Long-Term Alternative Transport Plans • Implementation of Urgent Projects
8th	Aug. 27, 1981	Manila	• Outline of Master Plan
9th	Sept. 29, 1981	Davao City	• Submission and Presentation of Draft Final Reports

2) Participants

STEERING COMMITTEE MEMBERS

Chairman:	Prudencio F. Baranda	Director, PPDO, MPWH
Members:	Laureano S. Mendiola	Director, MPWH, Region XI
	Orlino P. Tuzon	Director, MOTC
	Jesus M. Sunga	Director, NEDA
	Benedicto Selerio	Director, TTC, UP
	Rodolfo Parane	Major, CHPG, Manila
	Benjamin T. Yu	Major, CHPG 11, Davao City
	Guillermo Celis	NEDA, Region XI
	Jose Tadeo Sayson	MHS, Region XI
Coordinator:	Linda Templo	PPDO, MPWH

DCUTCLUS TEAM

Esther L. Aliño	Project Manager
Servillano Z. Quirante	Public Transportation Planner
Sixto Caday	Road/Street Network Planner
Loreto Joaquin	Traffic Management Planner
Pelagio Bantol	Land Use Planner
Josefina Detablan	Socio-Economic Planner
Carlota Contreras	Socio-Economic Planner
Bayani P. Lorenzo	Actg. Administrative Officer
Edgar Fabregas	Researcher

Supporting Staff

Nelia Domigpe	Senior Researcher
Carlito Buenafe	Junior Civil Engineer
Teddy Templo	Junior Civil Engineer
Ma. Mayumi Baclig	Researcher
Elena Fernandez	Researcher
Jane Jamora	Researcher
Demetrio Agustin, Jr.	Researcher
Eustaquio Patana, Jr.	Researcher
Paz Palaran	Researcher
Lina Baguasan	Researcher
Corazon Rioferio	Researcher
Leticia Laderas	Researcher
Jaime Batobalani	Researcher
Virgilio David	Copywriter
Carmelita Torres	Senior Clerk
Luisito Manalili	Bookkeeper
Horacio Almario	C.E. Draftsman
Ariel Saldua	C.E. Draftsman
Samson Saldua	C.E. Draftsman
Gerardo Rañon	C.E. Draftsman
Other Staff	

JICA SUPERVISORY COMMITTEE

Yoshiro Watanabe	Chairman of the Group Professor, University of Tsukuba
Sukeyuki Wada	Vice Chairman of the Group Fukuoka City
Kazuo Sato	Vice Chairman of the Group Ministry of Construction
Michio Noma	Ministry of Construction
Katsutoshi Okawa	Ministry of Construction
Yukio Yamauchi	Ministry of Construction
Kengo Nishi	Ministry of Construction
Yasusuke Agata	Ministry of Construction

Japan International Cooperation Agency (JICA)

Yasushi Hirotani	Head of Development Survey Division Social Development Cooperation Dept.
Hisashi Fujishita	Development Survey Division
Ichiro Kubota	Development Survey Division
Kyojin Mima	Development Survey Division
Koichi Goto	Manila JICA Office
Hiroyuki Arai	Manila JICA Office

JICA Team

Yasuhiro Kimura	Team Leader
Tetsuo Wakui	Team Leader
Ken Takagi	Socio-Economic Planner
Yukuo Senba	Socio-Economic Planner
Isao Suzuki	Land Use Planner
Akio Morikawa	Land Use Planner
Kenji Funaki	Road/Street Network Planner
Mitsuo Hatakeyama	Road/Street Network Planner
Kazuhiro Hasegawa	Road/Street Network Planner
Masato Kotoh	Systems Analyst
Kenji Hiramoto	Systems Analyst
Yoshimi Ikeda	Systems Analyst
Koichi Kaneko	Public Transportation Planner
Nobuho Sone	Traffic Management Planner
Takashi Shoyama	Financial and Economic Analyst
Kiyoshi Arai	Land Measuring Specialist

INDIVIDUALS AND ORGANIZATIONS CONSULTED

The following are Agencies and individuals consulted during the Study and whose advice and help have been invaluable to the team:

AGENCIES

Central Government Offices

- Ministry of Public Works and Highways
- Ministry of Transportation and Communication
- National Economic & Development Authority
- Constabulary Highway Patrol Group
- National Census & Statistics Office
- Central Bank
- TEAM Project
- Philippine National Railways
- Transport Training Center, University of the Philippines
- Philippine Ports Authority
- Export Processing Zone Authority
- National Transport System Study

Regional Offices

- Ministry of Works and Highways
- National Economic & Development Authority
- Constabulary Highway Patrol Group
- Ministry of Human Settlement
- Ministry of Public Works
- Ministry of Education & Culture
- Ministry of Public Information
- Bureau of Land Transportation
- Board of Transportation
- Highway District Engineer's Office
- Integrated National Police
- Davao Gulf Master Plan Study Office
- Regional Cities Development Project (RCDP)
- Southern Philippine Development Authority
- Commission on Election
- Philippine Atmospheric Geophysical & Astronomical Service Administration (PAGASA)
- Bureau of Soils
- Cotabato-Agusan River Basin Development Project Office (CARBDP)

City Government Offices

- Office of the Mayor
- City Council
- City Planning & Development Office
- City Engineer's Office
- City Assessor's Office
- Davao City Transport & Traffic Management Council (DCTTMC)
- Slum Improvement and Resettlement Office (SIR)
- Barangay Secretariat/Barangay Hall

Japanese Government Agencies

- Japan International Cooperation Agency (JICA)
- Embassy of Japan
- Overseas Economic Cooperation Fund (OECF)

Other Agencies

- SOPI, Davao Chapter
- Davao City Chamber of Commerce and Industry
- Davao City Contractors Association
- Jeepney Owners Association
- Kabataang Barangay
- Davao City Print & Broadcast Media
- F.F. Cruz
- Acre Survey & Development
- Asian Data Entry Corporation

INDIVIDUALS

Dr. Salvador Reyes	Former TTC Director & Steering Committee Member
Col. Pablo Magaro	Former Steering Committee Member
Maj. Aniano Fajardo	— do —
Jesse Evidente	Project Director, RCDP
Tatsuro Ogihara	JICA Expert to MPWH
Tateo Ashimi	JICA Export to MPWH
Kenjiro Izumi	Embassy of Japan
Tamio Shimogami	Embassy of Japan
Hisao Tanimoto	OECF, Manila
Catalino Boquieren	Asst. Chief, RDS, NEDA
Bashir Rasuman	Asst. Director, MPWH Region XI
Glicerio Canela	Highway District Engineer
Marcelino Gorospe	Former District Engineer
Juanito Abergas	Asst. District Engineer
Ben Ortiz	Board of Transportation
Chito Gavino III	Architect, CPDO
Renato Ramos	CPDO, Urban IV
Hector Esguerra	CPDO
Emilio de Peralta	City Engineer
Vicente Garcia, Jr.	Former City Secretary
Cesar Nuñez	City Secretary
Nestor Gil	Project Manager, Urban IV
Jose Dalodo	Chief, INP Traffic Div.
Gil Abarico	City Press Secretary
Bert Tesorero	Former Chairman DCTC
Antonio Uy	President, SOPI Davao Chapter
C.M. Dayrit	MOTC, Manila
N.C. Gaviola	MOTC, Manila
R.J. Jimenez	Chief Project Engineer, Project Management Office PNR
Pedro Durano	Davao City Chamber of Commerce and Industry
Ranulfo Lagunzad	P-T Survey Counterpart
Noel Montinola	Traffic Management, Counterpart
Ronald Galvez	Region I
Reynold Rodriguez	Region II
Eloy Bonus	Region III
Rommel Falcon	Region IV-A
Nelia Macalindol	Region IV-B
Precioso Sañosa	Region V
Dannie Bustillo	Region VI
Nydia Tiongzon	Region VII
Pergentino Mercado	Region VIII
Tita Rayo	Region X
David Sindol	Region XII

CHAPTER 2 PROBLEM IDENTIFICATION AND PLANNING THEME

Figure

CHAPTER 2

PROBLEM IDENTIFICATION AND PLANNING THEME

The existing problems and long-and medium-term planning themes will be identified through a cursory review of the socio-economic and land use status of the Project Area, as well as the existing traffic demand structure, traffic phenomena, public transport system, and traffic management condition in the Area, which were analyzed in the Volume II of the DCUTCLUS Report.

2.1 Land Use and Demography

In the Project Area, the most urbanized area is Poblacion, while Bucana, Agdao and Buhangin in the vicinity of Poblacion are presently urbanizing. The biggest commercial center is located in Poblacion, widely spread out along C.M. Recto, San Pedro, Quirino and R. Magsaysay Avenue. Many institutions are also in Poblacion, as it is the center of administration, economy, culture and education. Residential area in Poblacion is densely built up and many subdivisions are detachedly built up away from the trunk road mainly from Bunawan to Agdao.

Davao City has a total population of 611,311 according to the Preliminary report of 1980 Census which represents a higher annual growth rate of 4.8 percent within 1975-1980 than that of 4.3 percent within 1970-1975. Poblacion has the largest population of 122,375 and the highest population density of 119 persons per hectare in 1975. The proportion of the younger age group (0-14 years), of working age group (15-64 years) and of the older age group (65 years and over) is 43 percent, 55 percent and 2 percent, respectively. The dependency ratio is 82 which reveals that this large share of non-working age group may be a burden to the sound economic growth of the City.

Davao is one of the cities in the world where population increased faster than the pace of infrastructural and economic development to meet the population pressure, and urban problems such as unemployment and the formation of slums have started to appear. In 1977, at least some forty squatter colonies were identified in the City, comprising 12,529 families occupying 412 hectares of land.

In the absence of an effective zoning system to encourage desirable development while curtailing undesirable land use, certain unwelcome situations have come about to include the housing estates development in a sprawl fashion and the coexistence of houses and factories. Fortunately, such confused and random land use has not yet caused a serious problem in the Project Area, where only 20% of land is urbanized. However, as urbanization will expand, these problems will increase in both number and difficulty of solution.

2.2 Road/Street

Davao City road network consists of roads whose total length is 1,731 kilometers, 12% of which (or 204 kilometers) are national roads, 62% (1,080 kilometers) are barangay roads, and 26% (447 kilometers) city road. The total length of road existing within the Project Area is 398 kilometers or 23% of the City's total.

In the area of transportation, some degree of morning and evening rush hour traffic congestion is observed only in and around Poblacion, and the serious degree of traffic congestion and accidents which are plaguing world's metropolises has not yet come about, inasmuch as road development has so far been relatively favorable and the number of vehicles is still relatively small in Davao. However, continued dependence on the existing accumulation of social capital will no longer be permissible under incessantly surging traffic demand expansion in the future.

There are problems presently encountered in the existing road/street network as follows:

(1) Poor design of cross section

Some roads are too narrow to function. Lack of sidewalks in major road/street causes not only capacity shortage and congestions, but danger to both pedestrians and vehicle drivers.

(2) Lack of proper design standard

Road pavements are failing, either due to inadequate sub-grade preparation, drainage, curb and gutter or poor surfacing.

(3) Unpaved roads

Some portions of the major roads are still unpaved, resulting in traffic diversification which causes traffic congestion to other roads, like R. Castillo Street to J.P. Laurel Avenue. Dacudao Avenue, Roxas Avenue and part of Jacinto Street are unpaved major roads.

(4) Complicated intersections with more than five (5) legs

The design and control system of some major intersections is not suited to the current traffic conditions like the C.M. RECTO/MAGSAYSAY/ JACINTO Intersection which has six (6) legs and the AGDAO Intersection which has five (5) legs.

All the major intersections in the project area are not fully channelized. Some intersections lack the safety islands and some have no exclusive lanes for left turn, where needed.

(5) Formation of the Road/Street network

The present road/street network in the project area was not properly planned. There was no apparent pattern adopted in the formation of the network which resulted in the over-concentration of traffic flow on some preferred major roads. Some major roads do not function as they are anticipated due to their physical deficiency (ex. width, pavement, exclusive lanes for PUV, Loading/Unloading lanes, etc.).

2.3 Traffic Volume

As a result of the Person Trip survey conducted in 1979 by DCUTCLUS, Sixty-three percent (63%) of the total trips was attributed to commuting trips (eg. going to office, school and home) which has an impact to the project area. These commuting trips were envisaged as home-based trips which customarily occurred during morning and afternoon peak hour thereby creating an alarming traffic congestion.

Davao-Cotabato Road and Davao-Agusan Road, which run in the north-south direction, are the arteries of Davao City, and the volume of traffic between Toril and Bunawan is currently from 7,000 to 15,000 vehicles per day. On this longitudinal trunk road, the volume of traffic rises near the edge of Poblacion, reaching the level of about 30,000 vehicles per day at Bankerohan Bridge over the Davao River, and, at Bolton Bridge, about 10,000 vehicles per day. On the other hand, a majority of traffic flowing into Poblacion from north uses J.P. Laurel Avenue, on which traffic is 12,000 to 20,000 vehicles per day. Within Poblacion, heavy traffic roads are R. Magsaysay Avenue with 30,000 vehicles per day and C.M. Recto Avenue, A. Pichon Street, and San Pedro Street, each with 15,000 to 20,000 vehicles per day.

A comparison of the traffic capacities with traffic demand at major road cross sections are presented in Figure 2.1, wherein the hatched portions indicate the excess demand (the volume of traffic which attempt to use the road in excess of road's capacity). As shown, the volume of traffic oriented toward Poblacion is large, and traffic demand (burden) often excess the capacity of road sections on the perimeter of Poblacion.

At cross section 8, road capacity has already become short of meeting the demand, and congestion ratio has reached 2.5 at the heavily utilized Bankerohan Bridge, where traffic jam extends for more than one kilometer in the morning and evening peak hours. Uneven degrees of utilization is observed at this Cross Section also; traffic utilizing Bankerohan Bridge has reached 27,000 PCU per day, or about twice that of Bolton Bridge.

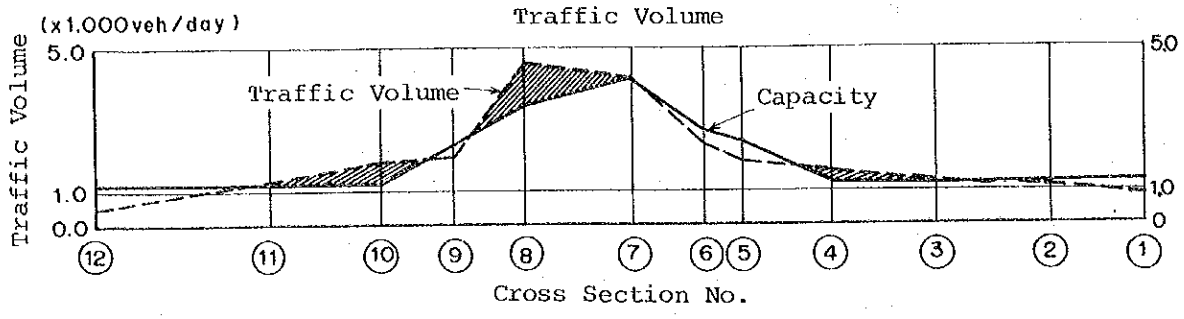
Highly congested routes are concentrated within and on the perimeter of Poblacion, most of which are PUJ routes. They are:

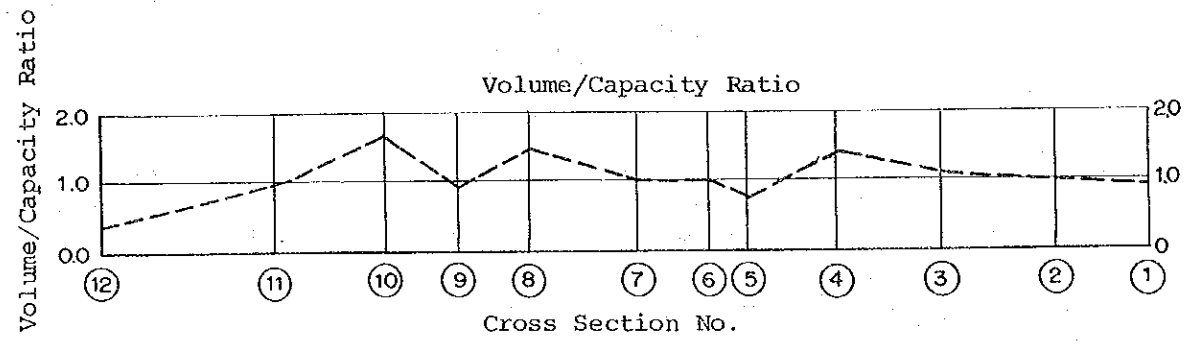
Vicinity of Bankerohan Bridge

- A. Pichon Street
- C.M. Recto Avenue
- J.P. Laurel Avenue
- Lapu-Lapu Street

In addition, the congestion ratios of 1.0 to 1.5 are indicated on the following routes, for which some solution will be necessary:

- M. Quezon Boulevard
- E. Quirino Avenue
- L. Garcia Street
- Sta. Ana Avenue





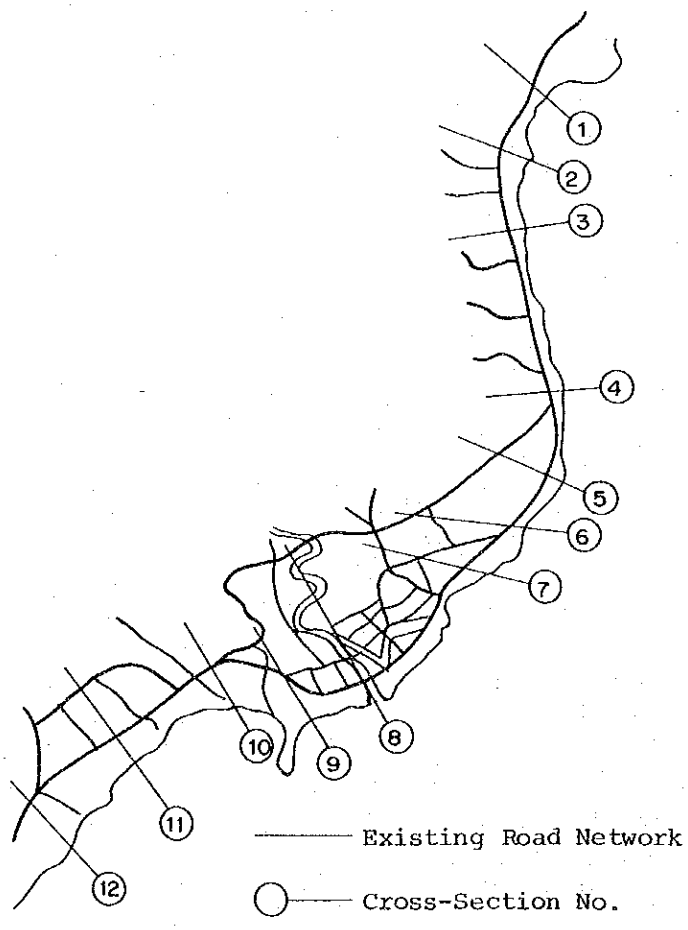


Figure 2.1 Volume/Capacity Ratios at Major Road Cross Sections

2.4 Traffic Accidents

Traffic accidents have been on the yearly increase in Davao City; according to the Traffic Control Division data the number of traffic accidents increased by a factor of 2.58 in eight years from the 1,507 in 1970 to 3,896 in 1978. The breakdown of those accidents was 2% fatal accidents, 23% casual accidents, and 76% property damage accidents on the average, one out of every 4 accidents involved personal death or injury.

Traffic accidents concentrated in Poblacion are noted to have been distributed primarily to its south-western part (downtown area in the vicinity of the City Hall) and secondarily to the Magsaysay Avenue/ Agdao Market area of its northeastern part.

Also, the concentration of traffic accidents was conspicuous at intersections. Whereas accidents concentrated to areas along national highways in 1977, they spread out to areas along almost all of access roads in the downtown around the City Hall in 1978.

Types of traffic accidents and their causes are enumerated below:

Types:

- Motor vehicle with other motor vehicle
- Motor vehicle with pedestrian
- Motor vehicle with Bicycle-Motorcycle
- Non-collission traffic accident

Causes:

- Did not scan ahead for guidance
- The driver failed to give proper signal
- The driver did not grant right of way to vehicle
- Did not look on his side mirror

2.5 Public Transportation Services

In Davao City there are five kinds of public transport modes namely, PUJ, AC, Tricycle, Bus and PU among which PUJ and AC are considered the major ones. About 2,500 PUJs and 500 ACs are in operation at present and almost all of these vehicles are concentrated in the project area during daytime.

AC is one kind of a taxi shared by passengers which may go to different destinations each other but to the same direction and AC is operated without any designated route. Usually, AC service limits itself within the confines of Poblacion.

On the other hand, PUJ is operated along fixed routes designated by the BOT franchise, serving commuters in and out of the project area and act as distributor within the project area for the purpose of business and leisure activities. PUJ routes which connect in and out of the project area as commuting routes are concentrated on McArthur Highway from the southern part of the city and on J.P. Laurel Avenue and J.P. Cabaguio St. from the north.

PUJs have their terminals such as Bankerohan and Agdao Terminals at the exit of the Poblacion along said major streets. Long distance service buses also have their terminals located beside the PUJ terminals in the same areas. Because of the agglomeration of PUJ routes and public transport facilities near the entrance to Poblacion, traffic congestion which occur in the morning and evening peak hours around these entrances is becoming severe year by year.

Along with the expansion of urban scale of the Project Area, the demand for public transportation service has been changed both in quantity and quality. Thus, the service has been changed both in quantity and quality. Thus, the service system of the PUJ, is no longer in tune with the status of demand and, despite the repeated efforts of the relevant authorities, finally acceptable routing scheme has not yet been devised.

PUJs and ACs are excellent modes of transportation to meeth the demand within a relatively narrow area with random orientations in the fashion of Brown's movement. However, when demands concentrate in certain direction, the poor transport efficiency and economy of small-capacity vehicles such as PUJs and ACs become more apparent than their advantage of being convenient. To meet concentrated demands with some means of public transport with a large capacity and, therefore, a high transport efficiency, is more favorable than to meet them with a small-capacity mode.

Therefore, the administration is now under demand to establish a new policy and a prospect of public transport in view of the current status of the PUJ service and from a long-term perspective.

2.6 Planning Themes

The main themes of this Study, already explained in the previous chapter, can be summarized as shown below, based on the current problems identified in sections 2.1 to 2.5.

(1) The estimation and establishment of future population, labor force, production, and other socio-economic indicator values to form a planning framework.

(2) The formulation of a practical land use masterplan, translating the socio-economic framework onto maps. The masterplan must be such that future land use demand will be adequately met, the safety and amenity of urban life be guaranteed, and an attractive and vital urban complex be developed.

(3) The formulation of an urban transport masterplan based on the forecast of future traffic demand. Along with the important objectives of safety and amenity, economy must also be pursued. In this sense, the existing stock must be used to a maximum extent, while the traffic network of the masterplan must be able to fully support the continuing urban development after the turn of the century.

(4) The formulation of a traffic management plan and a public transport plan for the effective utilization of the future traffic network. In this regard, the passenger safety and amenity, and the economy of transport operation are to be pursued.

The keenest attention should be paid to make each plan, mentioned above, a practical and realizable one. Whether or not a plan can be realized must be reviewed from both economic aspect and social aspect. (Technical feasibility is usually absorbed into and understood as a matter of economic feasibility, because with the money available, transportation facility projects are rarely beyond the capability of modern technology).

Review from the economic aspect is accomplished by answering two questions: if the scale of investment is not extravagant, and if the plan (or the project) is worth the investment. Referred to in the former question are the past investment records, the possibilities of future economic growth and the expansion of financial scale and the government investment policies. In the later, the economic evaluation of the plan (project) is essential.

Most important question in review from social aspect is whether the society will accept or tolerate the impact of the plan (project) implementation. Generally, the community cannot or would not swallow but resent rapid changes, and, therefore, careful negotiations and adjustment with parties concerned must be accomplished, taking an ample period of time, before plan implementation, if unnecessary frictions and confusions are to be avoided. Squatter clearance, the abolition of inefficient mode of public transport, and the transition from the PUJ to the city bus are the very examples.

CHAPTER 3 SOCIO-ECONOMIC FRAMEWORK AND LAND USE PLAN

Tables and Figures

CHAPTER 3

SOCIO-ECONOMIC FRAMEWORK AND LAND USE PLAN

3.1 A Review of Existing Plans

3.1.1 National Plans

Currently authorized national plans include the Five-Year Philippine Development Plan, 1978-1982, and the Long-Term Philippine Development Plan up to the Year 2000, both formulated by the Cabinet Committee on Development Plans under the authority of Presidential Decree No. 1200 and released by the Government in 1977. The former was created in accordance with the long-term objectives set forth by the latter.

Five-Year Philippine Development Plan, 1978-1982

This is one of the most consequential national plan, establishing policy, development strategy, resources allocation, and all other aspects of the socio-economic development of the Philippines as a whole, together with investment program, project list, and other practical matters. Since its release, this Plan has often been referred to as economic guideline not only by government agencies but also by private parties. Due, however, to the rapid energy price increases, apparent disparities have begun to appear between the Plan objectives and actual achievements in certain aspects of the Plan, and NEDA is now reviewing the socio-economic framework in preparation for the next Five-Year Plan to start in 1983.

The feature of this 1978-1982 Plan is to achieve relatively rapid economic growth of just under 8% annual GNP increases and just under 5% annual per capita GNP increases chiefly through priority investments in industry. While agriculture is to remain the base of the Philippine economy not only in terms of employment and production, but also as the source of industrial materials, the ratio of employment between agricultural and non-agricultural activities is to be shifted from the 50:50 in 1977 to 46:54 by 1982.

Table 3.1 Gross National Product, Population, and per Capita GNP, 1977–1982 and 1987

Description/Year	Value (In Million Pesos)				Annual Growth Rates (In percent)		
	1977[1/]	1978	1982	1987	1978 1982	1978 1987	1982 1987
GNP (In Million pesos at 1972 prices	77,804	83,250	112,214	164,879	7.7	7.9	8.0
Total Population (In thousands, medium assumption)	45,208	46,350	52,026	59,903	2.9	2.9	2.9
Per Capita (In Pesos at constant 1972 prices)	1,728	1,796	2,157	2,752	4.7	4.9	5.0

[1/] Estimate
Source: 5-Year Development Plan 1978 - 1982

Long-Term Philippine Development Plan up to the Year 2000

This Plan importantly provides a long-term perspective to said 5-Year Plan but, because of the far away target year of 2000, remains short of giving any detailed investment programs or project list. As in the case of 5-Year Plan, the Long-Term Plan is also being reviewed because of the recently conspicuous gaps between the objectives and the reality.

Under the Long-Term Plan, it is predicted that GNP of the Philippines will grow by average annual rate of 8%, in the achievement of more than three times increase in per capita GNP from 1976 to the year 2000, which, multiplied by population increase (to 83,400,000 by 2000), will be an over six times increase in GNP during the same period of time. Precondition to this achievement is rapid progress of industrialization. The share of agricultural sector in NDP is estimated to decline from 31% to 17% and that of service sector, from 41% to 31%.

Table 3.2 Net Domestic Product by Industrial Origin (at 1972 Prices)

	Value in Million Pesos		Percentage Distribution		Annual Growth Rates (in percent 1976-2000)
	1976	2000	1976	2000	
Agriculture, Fishery and Forestry	18,403	67,403	30.9	16.7	5.6
Industrial Sector	16,856	210,235	28.3	52.1	11.1
Mining and Quarrying	1,050	8,762	1.8	2.2	9.2
Manufacturing	11,382	130,008	19.1	32.2	10.7
Construction	4,048	64,902	6.8	16.1	12.3
Electricity, Gas and Water	376	6,563	0.6	1.6	12.7
Service Sector	24,279	125,565	40.8	31.1	7.1
Transport and Communication and Storage	2,446	19,728	4.1	4.9	9.1
Commerce	13,123	68,559	22.0	17.0	7.1
Services	8,710	37,278	14.6	9.2	6.2
NET DOMESTIC PRODUCT at factor set	59,538	403,203	100.0	100.0	8.3

Note: Details may not add up to total due to rounding.

Source: Long-Term Phil. Development Plan

3.1.2 Regional Plans

A fairly large variety of development plans have been formulated for Region XI, of which Davao City is a part. Of them, those which are more significant are:

A. Southern Mindanao Five-Year Development Plan, 1978-1982 (NEDA)

B. A Twenty-Five-Year Perspective Plan for Southeastern Mindanao Region, 1976-2000 (NEDA)

C. Cotabato-Agusan River Basin Development Program (MPW)

D. Davao Gulf Masterplan Study (MOTC/PPA)

E. The Regional Development Investment Program for Region XI, 1981-1985 (NEDA)

Of these, Southern Mindanao 5-Year Plan (A) is a part of the national Five-Year Plan and, as such, is now being reviewed. During the five years from 1978 to 1982, the GRDP of Region XI is predicted to increase by 8.4% per annum, which is somewhat higher than the GNP increase rate envisaged by the national plan. This higher increase rate is to depend also on industrial development, which will supplement relatively low increases in the agricultural sector.

Table 3.3 Region XI Gross Regional Domestic Product, 1978–87 (in Million of Pesos at 1972 Constant Prices)

	PROJECTED			GROWTH RATE (%)		
SECTOR	1978	1982	1987	1978-82	1982-87	1978-87
GRDP	₱6,020.8	₱8,327.6	12,876.1	8.4	9.1	8.8
Per Capita GRDP	1,860.0	2,163.0	2,756.1	3.8	4.9	4.5
Agriculture, Fishery and Forestry	2,805.7	3,505.9	4,686.9	5.7	5.9	5.8
Industry	1,023.5	1,782.1	3,618.2	14.9	15.2	15.1
Manufacturing	776.7	1,324.1	2,562.3	14.3	14.1	14.2
Mining and Quarrying	8.0	16.0	38.1	18.9	18.3	18.7
Construction	222.8	408.1	939.9	16.3	18.2	17.5
Electricity, Gas and Water	18.1	33.3	77.5	16.5	18.4	17.5
Service	2,191.6	3,039.6	4,571.0	8.5	8.5	8.5
Transport, Communication and Storage	174.6	349.8	605.2	18.9	11.6	14.8
Commerce	1,535.3	1,940.3	2,652.5	6.0	6.4	6.3
Other Services	481.7	749.5	1,313.4	11.7	11.9	11.8

Source: Republic of the Philippines, Southern Mindanao Five-Year Development Plan 1978-1982, including the Ten Year Development Plan, 1978-87

Southeastern Mindanao Region's 25-Year Plan (1976-2000) (B) supplements and offers a long term perspective to (A), just as does the national Long-Term Plan to national 5-Year Plan.

Cotabato-Agusan River Basin Development Program (C) was organized by DPWTC, NEDA, NIA and other agencies under Presidential Decree No. 518 and aims at the regional development with focus on the exploitation of water resources of a wide 32-thousand square kilometer area extending over Regions X, XI, and XII. The City of Davao is given the position of the core city of this area and is predicted to have a population of 1.3 million in the year 2000.

Davao Gulf Masterplan is the long-term plan for the port and harbor development in the Gulf of Davao, which is being carried out by West Germany under the request of PPA. The feature of this Masterplan is that it predicts a lower economic growth up to the year 2000 than the revised prediction of NEDA and a relatively high growth rate for the agricultural sector.

As a result, the average annual rate of GRDP increase in Region XI is held to a low 7.5% from 1980 to 2000, which is fairly much lower than the 9.3% anticipated by Southeastern Mindanao Region Twenty-Five Year Plan.

Development Investment Program for Region XI (E) is a rewrite, for easy implementation, of the 1981-1985 portions of said Southern Mindanao Five-Year Plan and Southeastern Mindanao Twenty-Five Year Plan. It was released by the Regional Development Council of Davao City in 1980. Therefore, there is no basic difference between A, B, and E, but discussions in 1976 to 1980 have resulted in the current efforts to adjust the objective slightly toward a greater public investment in rural areas.

3.1.3. City Plans

Three plans exist for the development of Davao City:

A. Comprehensive Development Plan of Davao City, 1979-2000

B. Davao City Integrated Area Development Plan

C. Regional Cities Development Project

Of these, the Comprehensive Plan (A), formulated chiefly by the efforts of the City Government and the Regional Development Council, have incorporated various programs previously existed and comprehensively covers areas of land use plans, zoning ordinances, enforcement systems and procedures and so forth. Important projects recommended by this long-term plan are:

i) Development of Calinan, Mintal, Toril, and Bunawan as regional cores

ii) Development of Calinan as industrial base for processing agricultural products

iii) Development of Mintal as educational center

iv) Development of heavy industries in Panacan and Bunawan.

In other words, it recommends the development of various infrastructures, industrial promotion, residential area development, and enhancement of social welfare toward the objective of developing Davao City as a multi-core urban complex.

The Integrated Plan (B), formulated by the City Government and the Development Academy of the Philippines in 1977, deals, in details of the City's development strategy, project implementation guideline, and so forth, and recommends the following important projects:

i) Calinan Agricultural Product Processing Industrial Base
ii) Construction of an abattoir in Ma-a.
iii) Health and education service centers in Paquibato, Calinan, Malabog, Baguio, Tugbok, and Malagos.
iv) Construction of Calinan-Panacan Road for the improvement of access to Sasa Wharf and Sta. Ana Pier.
v) Expansion of Sasa Wharf, Sta. Ana Pier, and Bangoy Airport
vi) Development of strategic bases in Panacan, Calinan and Talomo-Toril area
vii) Inducement of heavy industries to Sasa - Panacan area
viii) High quality housing areas and service industry promotion in Toril-Talomo are.
ix) Development of government facilities in Mintal
x) Nature-oriented urban development in Eden-Bayabas area
xi) Preservation of fertile agricultural land in Calinan, Buhangin, and Ma-a (southern area).
xii) Establishment of bus terminals in areas adjacent to Poblacion (Buhangin and Matina)
xiii) Rigidification of land use regulation

The Regional Cities Development Project (C) was formulated by NEDA under Presidential Executive Order 605 in 1980, and aims at the short term but comprehensive development of regional core cities. This project, which is financed by the World Bank, covers four cities: Davao, Cagayan de Oro, Bacolod, and Iloilo. Projects have been identified in the areas including transportation, industry, water supply, public health, and slum improvement for early implementation. In Davao City, the disbursement of World Bank loan is being awaited for the implementation of a large number of projects listed up to include fishery port development, urban roads development, road maintenance, bus terminal, traffic control, industrial estate, urban drainage, and flood control trash disposal abattoir, market, and so forth.

3.2 Socio-Economic Framework

3.2.1 Basic Policy

The concentrated development investments made in Metro Manila in the past has accelerated the economic growth of the metropolitan area on one hand, while, on the other hand, it not only has brought about rapid population swell and consequential aggravation of transportation, housing, unemployment and other urban problems in that area, but also has hindered sound development of local cities. In order that limited funds be effectively investmented, the strategic and emphatic fosteration of local core cities, which will become development bases, will be essential. The fosteration of Davao City as the core city of Mindanao will facilitate the mitigation of population pressure and help the solution of urban problems in Metro Manila, while it will stimulate local economies for a well-balanced national development.

Davao City is and will continue to be the administrative, economic, and cultural center of Mindanao. As economic activities will increase their vigor, population influx and social/economic capital accumulation will be accelerated in the City. Without the formation of a well-balanced economic base, urbanization can progress toward an unwelcome direction of swelling unemployment, spreading slum, and ultimate paralyzation of urban functions.

In this view, the following basic policies have been established for the Project area and non-Project area to guide the laying of a proper future socio-economic framework for the City of Davao.

- Project Area

  Industrial and commercial activities that will facilitate the efficient accommodation of population influx and the elevation of productivity are to be the base of the economy. To be emphatically promoted are industries for the processing of agricultural products brought from outside the Project Area and commercial activities having a large sphere of service beyond the boundary of the Project Area, in order that the socio-economic structure of the Area will maintain a desirable interrelationship with the neighboring economies and perform central function for the entire economy of Davao.

- Non-Project Area

  While basically an agricultural economy now and in the future, the shares of industry and commerce in the total production are to somewhat increase due to the rise of agro-based industries and relating commercial activities.

3.2.2 National/Regional Frameworks

National and Regional socio-economic frameworks are to be first established so as to offer a base for, and a macroscoping perspective to, the formulation of such framework for Davao City.

Tables 3.4 and 3.5 show population, Gross Domestic Products, and other important indicators estimated for the entire nation of the Philippines and for Region XI, based on the data chiefly from the following two sources, as updated per the latest (1979) edition of the Statistical Yearbook of the Philippines:

- Long-Term Philippine Development Plan up to the Year 2000
- Southern Mindanao Five-Year Development Plan 1978-1982

The estimated indicators are expressed in constant 1972 prices, which can be translated into current prices by the application, item by item, of the stipulated price indices.

For the Regional framework, the average of increase rates during the past seven years is used for the primary industrial sector, while rates much higher than the past are used for the secondary and tertiary industrial sectors. Particularly for future industrial growth, a high 13.9% is used on the premise that investments will concentrate in industries. The average annual rate of per capita GDP increase is to jump from the past 7-year average of 1.3% to 5.5% in the future.

Table 3.4 Basic Framework for National Economy

	ACTUAL OR ESTIMATE								Average Annual Growth Rate 72 - 79	PROJECTION					Average Annual Growth Rate 80 - 00
	72	73	74	75	76	77	78	79		80	85	90	95	00	
POPULATION[1] (Thousands as of July 1)	38,751	39,827	40,934	42,071	43,398	44,766	46,17847,635		3.0%	49,137	56,742	65,041	73,867	83,444	2.7%
GROSS NATIONAL PRODUCT[2] (Million pesos at 1972 prices)	55,526	60,881	64,739	68,530	73,341	77,958	82,477	92,201	7.5%	96,206	143,333	213,546	318,152	474,001	8.3%
PER CAPITA GNP (pesos at 1972 prices)	1,433	1,529	1,582	1,629	1,690	1,741	1,786	1,936	4.4%	1,958	2,526	3,283	4,307	5,680	5.5%
GROSS DOMESTIC PRODUCT[2] (million pesos at 1972 prices)	56,075	60,931	64,139	68,361	73,585	78,161	82,681	92,902	7.5%	96,937	144,422	215,168	320,570	477,605	8.3%
PER CAPITA GDP (pesos at 1972 prices)	1,447	1,530	1,567	1,625	1,696	1,746	1,790	1,950	4.4%	1,973	2,545	3,308	4,340	5,724	5.5%
NATIONAL INCOME[2] (million pesos at 1972 prices)	45,791	49,864	52,263	55,063	59,458	63,280	66,129	75,659	7.4%	79,055	118,803	178,536	268,303	403,203	8.5%
PER CAPITA INCOME (pesos at 1972 prices)	1,182	1,252	1,277	1,309	1,370	1,414	1,432	1,588	4.3%	1,609	2,094	2,745	3,632	4,832	5.7%

SOURCE: [1] 1975 NCSO, Projection by NEDA and other years estimated by exponential interpolation.
[2] 1972 - 1978 NEDA, 1979 Central Bank and projection made based on Long-Term Philippine Development Plan

Table 3.5 Basic Framework for Regional Economy

ITEMS	1/4 ACTUAL OR ESTIMATE								Average Annual Growth Rate 72 - 79	PROJECTION					Average Annual Growth Rate 80-00
	72	73	74	75	76	77	78	79		80	85	90	95	00	
POPULATION[1/] (thousands as of July 1)	2,394	2,496	2,603	2,715	2,879	3,053	3,237	3,393	5.1%	3,556	4,344	5,158	6,126	7,274	3.6%
GROSS REGIONAL DOMESTIC PRODUCT[2/] (million pesos at 1972 prices	4,182	4,454	4,363	4,623	4,937	5,286	6,021	6,497	6.5%	7,059	10,816	17,004	26,733	42,029	9.3%
GRDP BY SECTOR[2/] (million pesos at 1972 prices															
Agriculture, Forestry & Fishery	1,934	2,060	1,981	2,119	2,265	2,422	2,806	2,960	6.3%	3,142	4,175	5,917	8,287	11,264	6.3%
Industry	690	735	767	789	842	907	1,024	1,166	7.8%	1,320	2,736	5,237	9,758	17,904	13.9%
Manufacturing	587	625	617	625	664	712	777	881	6.0%	1,003	2,001	3,724	6,844	12,399	13.4%
Mining & Quarrying	2	2	4	5	6	5	8	9	24.0%	11	22	51	80	126	13.0%
Construction	92	98	134	146	160	175	223	253	15.5%	282	660	1,326	2,566	4,875	15.3%
Electricity, Gas & Water	9	10	12	12	13	14	18	19	11.3%	21	54	136	267	504	17.2%
Service	1,557	1,658	1,615	1,716	1,829	1,957	2,192	2,371	6.2%	2,598	3,905	5,849	8,688	12,861	8.3%
Transport, Communication & Storage	92	98	99	107	116	126	175	220	13.3%	261	454	782	1,283	2,186	11.2%
Commerce	1,199	1,277	1,230	1,305	1,389	1,481	1,535	1,632	4.5%	1,744	2,542	3,673	5,266	7,439	7.5%
Other Services	266	283	286	304	325	350	482	499	9.4%	593	909	1,394	2,139	3,286	8.9%

Note; Totals may not sum due to rounding.

Source: [1/] Estimated based on 1970 and 1975 Census data, Long-Term Philippine Development Plan and Southern Mindanao 5-Year Development Plan

[2/] Estimated based on Long-Term Philippine Development Plan and Southern Mindanao 5-Year Development Plan

3.2.3 Davao Socio-Economic Framework

1) Population

(1) Year 2000 Population

A review of past population trend in Davao City reveals that population increases tended to slow down the average of annual rate of 6.1% during the period of 1948 to 1960, to 5.7% during the decade of 1960 to 1970, and further to 4.3% in the 5-year period of 1970 to 1975. The 1980 census preliminary report shows, however, that population increase was accelerated again to an average annual rate of 4.8% during the 5-year period of 1975 to 1980. Based partly on this past trend, the population of Davao City in the year 2000 is estimated varyingly by various methods as follows:

i) By linear regression of population 880,000

ii) By exponential regression of population 1,860,000

iii) By linear regression of population increase rate 1,250,000

iv) By exponential regression of population increase rate 1,300,000

Generally, the linear regression of population is unsuitable for long term projections, while the exponential regression of population tends to over-estimate the future population in the case of Davao, where population increase rate tended to decline. In view of the gradually shifting increase rate in Davao City, the regression of increase rate is believed appropriate, and little variance is noted between the result of linear regression and the result of expotential regression.

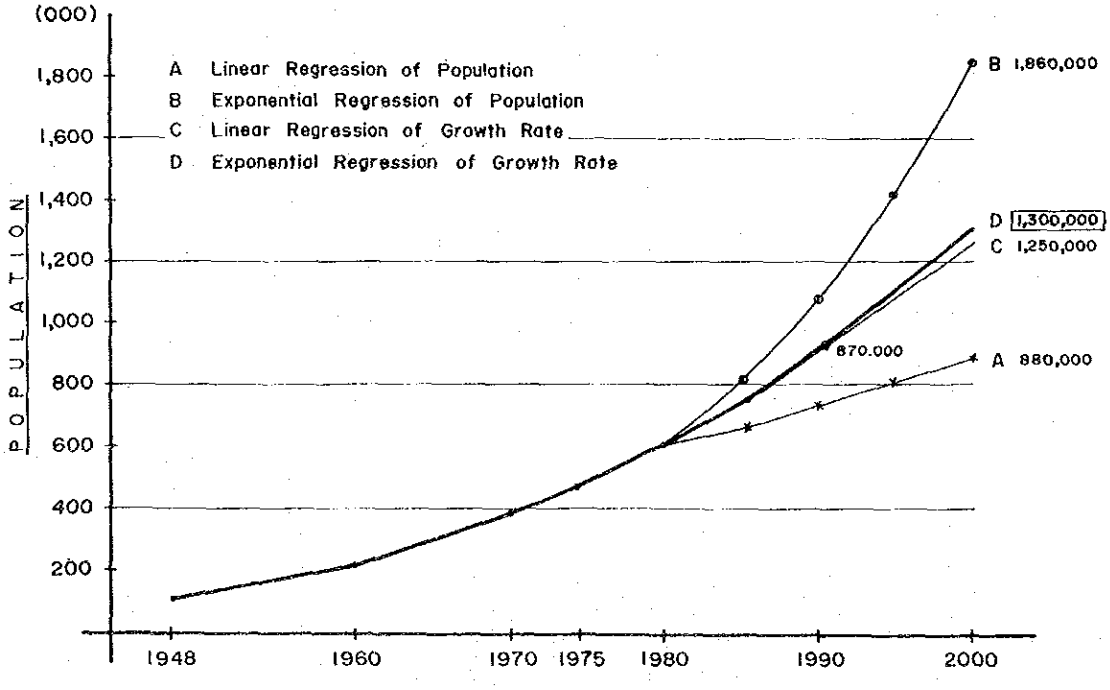


Figure 3.1 Population Projection of Davao City

Also, various government agencies have estimated the population of Davao in 2000, and their estimates ranged from 1.1 million to 1.5 million. However, in view of the indicated population increase slowdown tendency, NEDA subsequently adjusted its estimate of Davao's 1990 population downward to about 780,000, which, projected by the same increase rate, will become just under one million in 2000. This substantial downward adjustment was made based on the date for the 1970s, which reflected the economic stagnation that followed the oil crisis but did not take into consideration the effects of various large scale development projects. Then, an upward turn of population curve was indicated recently as a result of the 1980 census.

The Davao's 2000 population of 1.3 million, used by CPDO of the City Government of Davao for all its future plans, falls within the range of various government estimates and agrees with the result of projection by the exponential regression of population increase rate. Thus, the population of 1.3 million is used for the framework of Davao, provided that his value should be understood as policy target assuming social increases of population to be caused by various developmental efforts in the future.

The average annual population increase rate underlying this 1.3 million estimate is higher than comparable averages estimated for the entire Philippines and for Region XI, but such is believed reasonable in view that Davao is and will be the administrative, economic, and cultural center of the Region and of Mindanao.

Table 3.6 Projected Population of Davao City for the Year 2000

	1979	2000	Average Annual Growth Rate (%)
Davao City Population (x000)	560	1,300	4.1

(2) Year 2000 Population Distribution

Now, year 2000 population is estimated separately for the Project Area and for non-Project Area. The methods and the results of population estimation by blocks are shown in Volume IV 3.1.

Davao City population increased from 1970 to 1979 by an increment of 167,527; 68.1% contributed by natural increase (114,054) and 31.9% by social increase (54,473). These increases are divided between the Project Area and non-Project Area as follows:

Table 3.7 Population Increase, Davao City, 1970-1979

	Project Area	Non-Project Area	Davao City
1970 Population	264,242	128,231	392,473
1979 Population	371,740	188,260	560,000
Total Increase	107,498	60,029	167,527
Natural	76,790	37,264	114,054
Social	30,708	22,765	53,473

Then, natural and social increases in the population of the Project Area and that of non-Project Area are estimated as follows. Based on the natural increase rate estimated by NEDA, average annual rate of natural increase from 1979 to 2000 is estimated at 2.6% and the absolute value of increase at 273,260 for the Project Area and 138,740 for non-Project Area. In the absence of supporting data, social increases are estimated as follows:

i) Most of future development projects will be implemented in the Project Area and, therefore, most of future population flow into Davao City will flow into the Project Area.

ii) For this reason, it is assumed that the same rate of social increase in the non-Project Area as registered during 1970 to 1979 will remain true up to the year 2000, and social increase in the Project Area is obtained by deducting the social increase in non-Project Area from social increase in the entire Davao City.

iii) The above estimate, however, can result in an underestimation of social increase in non-Project Area, in view of the expected development of Calinan and others. Therefore, the above estimate is adjusted for the social increase to be caused by some new developments in non-Project Area.

Social increase in non-Project Area in 1979 to 2000 is estimated at 53,000 using the same rate as in 1970 to 1979. With a 20,000 developmental increase, total social increase in non-Project Area in 1979 to 2000 is estimated at 73,000. Thus, social increase in the Project Area is calculated as 255,000, which is 3.5 times that in non-Project Area which is believed reasonable in view of the differences of present economic activity level and future land use density between the two areas. Thus, the 2000 population is estimated at 900,000 for the Project Area and at 400,000 for non-Project Area.

Table 3.8 Population Increase, Davao City, 1979-2000

	Project Area	Non-Project Area	Davao City
1979 Population	371,740	188,260	560,000
2000 Population	900,000	400,000	1,300,000
Total Increase	528,260	211,740	740,000
Natural	273,260	138,740	412,000
Social	255,000	73,000	328,000

(3) Year 1990 Population and Distribution

Davao's population in 1990 is estimated by using the average annual increase rate from 1979 to 2000. As thus estimated, 1990 population is compared with 1979 population and 2000 population as follows:

Table 3.9 Population, Davao City, 1979, 1990 & 2000

	Project Area	Non-Project Area	Davao City
1979	371,740	188,260	560,000
1990	590,000	280,000	870,000
2000	900,000	400,000	1,300,000

2) Employment

(1) Total

Considering population increase, change in population age structure, increase of female workers, and other factors, the rate of labor force to population is estimated to increase from the present 32.5% to 36%, the target rate for Region XI used in the Long Term Plan 2000, in Davao City. As a result, the number of persons at work is calculated to be 468,000 in the year 2000, which is about three times the present count.

Table 3.10 Employment, Davao City, 1979. 1990 & 2000

	Project Area		Non-Project Area		Davao City	
	Population	Employment	Population	Employment	Population	Employment
1979	371,740	115,000	188,260	67,000	560,000	182,000
1990[1/]	590,000	198,000	280,000	100,000	870,000	298,000
2000	900,000	324,000	400,000	144,000	1,300,000	468,000

Note: [1/] Estimated by interpolation

(2) Sectoral Estimates

a. Project Area

The number of persons at work in the primary industrial sector in the Project Area is divided into agricultural workers and fishery workers. It is presumed that those engaged in agriculture will reduce substantially as urban area will expand in the future. It is planned that a total of about 6,000 hectares of agricultural land will be preserved near the outer rim of the Project Area, which, assuming the average farm size of one hectare per farmer, will support 6,000 farmers. This average farm size is believed reasonable in view that, although such average for the entire Davao City is about 1.5 hectares, few large plantations exist in the Project Area and reduction in the number of farmers is believed to be slower than reduction in the total size of farms. Thus, the number of agricultural workers is predicted to decline from the estimated 20,000 in 1979 to 6,000 by the year 2000.

In the Project Area, it is estimated that a total of 4,000 fishery workers existed in 1979. In view that fishing grounds will shrink as well agricultural land, due to industrial and commercial development, the 4,000 is estimated to contract to 3,000 by the year 2000. Thus, the number of primary industrial workers in the

Project Area in the year 2000 is estimated at 9,000, which is three-eights of that in 1979.

As of 1979, the rates of secondary and tertiary industrial workers to the total number of those at work were 19% and 60%, respectively, in the Project Area. It is desirable that harmonious and well-balanced development of commerce and industry be accomplished in Davao City as the administrative, economic, and cultural center of Mindanao. The current rate of industrial workers to total workers in the Project Area is not so high compared with the national average, and it will be important that such rate be much increased in view of the future land use in the Project Area.

The high 60% rate of tertiary industry workers to the total will further rise in view that the tertiary industry's share of Region XI's GRDP is expected to rise by an average annual rate of 8.3% from 1979 to 2000.

Based on the above, the numbers of secondary and tertiary industry workers are estimated at 88,000 and 227,000, respectively, using 27% and 70% as the rates of these workers to the total workers (with the remaining 3% being primary industry workers).

The industrial shares of total workers and the average number of workers per 1,000 population in the Project Area are compared between 1979 and 2000, as follows:

Table 3.11 Sectoral in Employment and No. of Employment per 1,000 Population, Project Area, 1979 and 2000

	Sectoral Share (%)		No. of Employment/ 1000 Population	
Sector	1979	2000	1979	2000
Primery	21	3	65	10
Secondary	19	27	59	98
Tertiary	60	70	186	252
Total	100	100	310	360

b. Non-Project Area

Presently, non-Project Area is an agricultural area, with the exception of Calinan. In the future, a number of development projects will be implemented for Calinan and Mintal. Nevertheless, non-Project Area will remain basically rural in the future. Using the data for similarly characterized areas (such as Cebu, Leyte, and Isabela), the number of workers in non-Project Area in 2000 is estimated as follows.

Primary Industry	70%	101,000
Secondary Industry	10%	14,000
Tertiary Industry	20%	29,000

c. Forecast for 1990

The number of those at work in 1990 is estimated by industrial sectors based on the 1979 values and by the interpolation of the above estimated 2000 values. The result of estimation is presented in the table below.

Table 3.12 Employment by Sector, Davao City, 1979. 1990 & 2000

	Project Area			Non-Project Area			Davao City		
	1979	1990[1/]	2000	1979	1990[1/]	2000	1979	1990[1/]	2000
Primary	24,000	18,000	9,000	51,000	73,000	101,000	75,000	91,000	110,000
Secondary	22,000	48,000	88,000	5,000	9,000	14,000	27,000	57,000	102,000
Tertiary	69,000	132,000	227,000	11,000	18,000	29,000	80,000	150,000	256,000
Total	115,000	198,000	324,000	67,000	100,000	144,000	182,000	298,000	468,000

Note: [1/] Estimated by interpolation.

3) Number of Students

In the absence of adequate supporting data, it is difficult to accurately estimate the number of students. The 1978 rates of the numbers of primary school children, high school students, and college students to the population, 17.0%, 7.0%, and 4.5% are adjusted to 17%, 10%, and 5% for the year 2000, because it is natural to assume that the education level will substantially rise in Davao City, which is to function as, among other things, the educational and cultural center of Mindanao. Based on these rates, the number of students in the Project Area in 2000 is estimated as follows:

Table 3.13 Estimated No. of Students of the Project Area, 2000

Population in 2000	900,000	(100%)
No. of Students in 2000		
Primary School	153,000	(17%)
High School	90,000	(10%)
University, College	45,000	(5%)
Total	288,000	(32%)

4) Gross Regional Domestic Products (GRDP)

(1) Labor Productivity Improvement

No data is available which reveals the present level of labor productivity in Davao City — not to talk about the future level. For the inevitable estimation, the sectoral labor productivity is first estimated for the entire Philippines as follows:

Table 3.14 Labour Productivity by Sector, Philippines, 1975 & 2000

(pesos/year/employment at 1972 prices)

	1975[1/]	2000[2/]	Average Annual Growth Rate (%)
Primary	2,700	7,200	4.0
Secondary	12,400	30,300	3.6
Tertiary	7,100	11,600	2.0
Total	5,500	14,800	4.0

Source: [1/] Estimated based on 1979 Philippine Statistical Yearbook
[2/] Estimated based on Long-Term Plan 2000

Being the center of Region XI and of Mindanao, labor productivity in Davao is assumed to be substantially higher than the levels of Region and of Mindanao. For this reason, per capita GRDP of Region XI is compared with that of other areas in Table 3.15 below in order to support the estimation of a reasonable and acceptable rate of Davao's labor productivity to the national average. In this table, the policy of the Long-Term Plan 2000 to gradually eliminate regional gaps in the Philippines is reflected.

Table 3.15 Comparison of per Capita GDP

		Philippines	Luzon	Metro Manila	Mindanao	Region XI
1975[1/]	Per capita GDP (pesos at 1972 prices)	1,625	1,936	4,577	1,158	1,703
	Indicator (National ave. = 100)	100	119	282	71	105
	Population (000)	42,071	22,790	4,790	9,147	2,715
2000[2/]	Per capita GDP (pesos at 1972 prices)	5,724	6,354	9,000	4,698	5,778
	Indicator (national ave. = 100)	100	111	157	82	101
	Population (000)	83,444	44,485	11,905	23,480	7,274

Source: [1/] Estimated mainly based on 1979 Philippine Statistical Yearbook.
[2/] Estimated based on Long-Term Plan 2000

On the hypothesis that the position of Davao in Mindanao is analogous to that of Metro Manila in the Philippines, the ratio of per capita GRDP in Davao to that of the national GDP is calculated as 2.0 in 1975 and 1.3 in 2000. Assuming that these rates hold true for all industrial sectors, the sectoral labor productivity in Davao is estimated as follows:

Table 3.16 Labour Productivity Sector, Davao City, 1975, 1979 & 2000

(pesos/year/employment at 1972 prices)

	1975	1979[1/]	1990	2000	Average Annual Growth Rate (%)
Primary	5,400	5,900	7,530	9,400	2.2
Secondary	24,800	26,700	32,700	39,400	1.9
Tertiary	14,200	14,300	14,700	15,100	0.2
Average	11,000	12,000	15,300	19,200	2.3

Note: [1/] Estimated by interpolation

(2) GRDP

The value of GRDP is arrived at by applying the number of persons at work to the value of labor productivity, as presented in Table 3.17.

Table 3.17 GDP by Sector, Davao City, 1979, 1990 & 2000

(million pesos at 1972 prices)

Sector	Project Area			Non-Project Area			Davao City		
	1979	1990 1/	2000	1979	1990 1/	2000	1979	1990 1/	2000
Primary	142	109	85	301	549	949	443	691	1,034
Secondary	587	1,488	3,467	134	281	552	721	1,773	4,019
Tertiary	987	1,895	3,428	157	269	438	1,144	2,165	3,866
Total GDP	1,716	3,492	6,980	592	1,099	1,939	2,308	4,629	8,919
Per Capita GDP (pesos at 1972 prices)	4,616	5,919	7,756	3,145	3,925	4,848	4,121	5,321	6,861

Note: 1/ Estimated by interpolation