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JAPAN INTERNATIONAL COOPERATION AGENCY(JICA)

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS
REPUBLIC OF THE PHILIPPINES

THE STUDY ON SELECTED AIRPORTS MASTER PLANNING PROJECT IN THE REPUBLIC OF THE PHILIPPINES

FINAL REPORT

Volume 2 : MAIN REPORT

March 1997

PACIFIC CONSULTANTS INTERNATIONAL
AERO ASAHI CORPORATION
JOINT VENTURE-TOKYO, JAPAN

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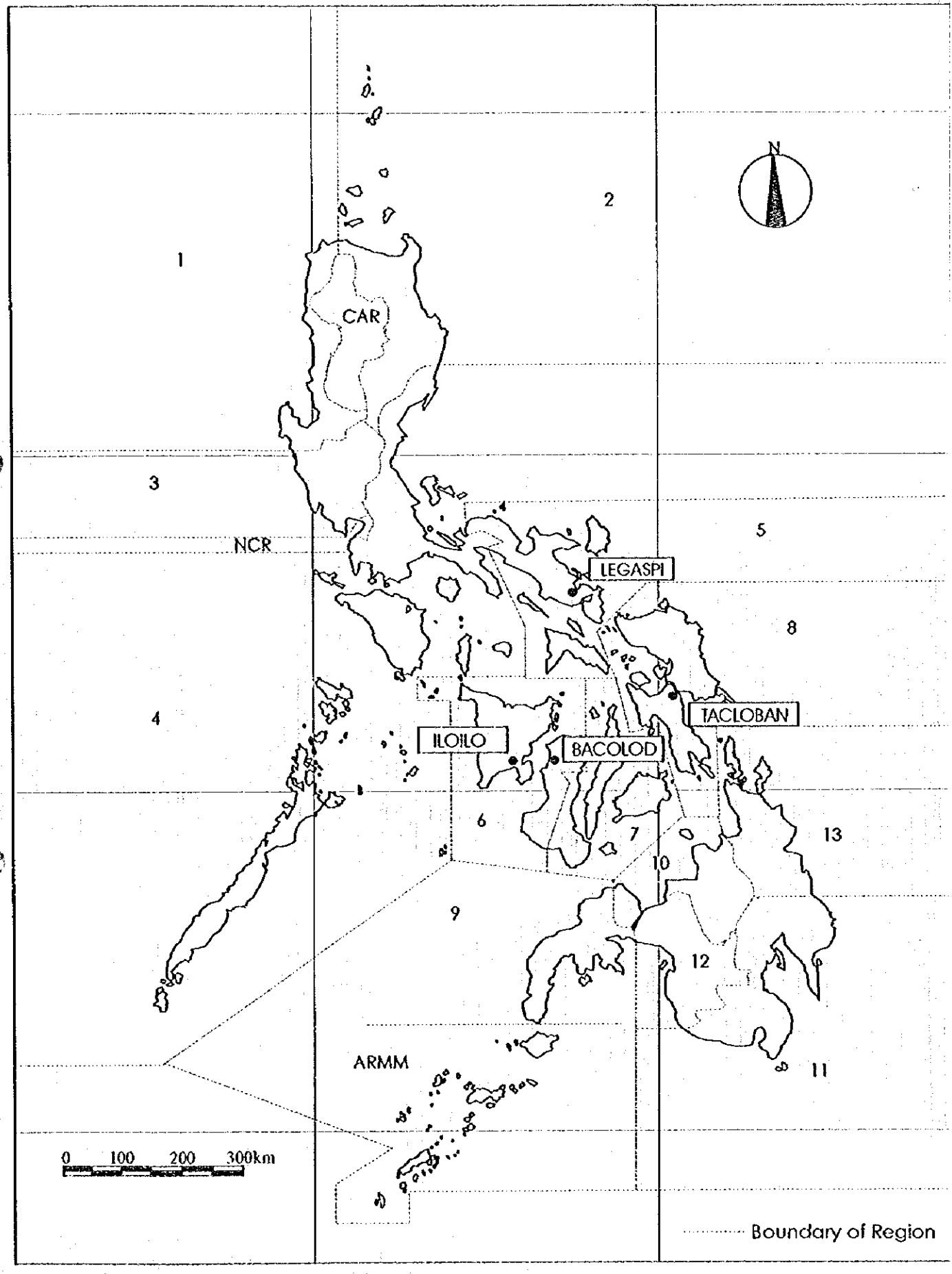
NOTE

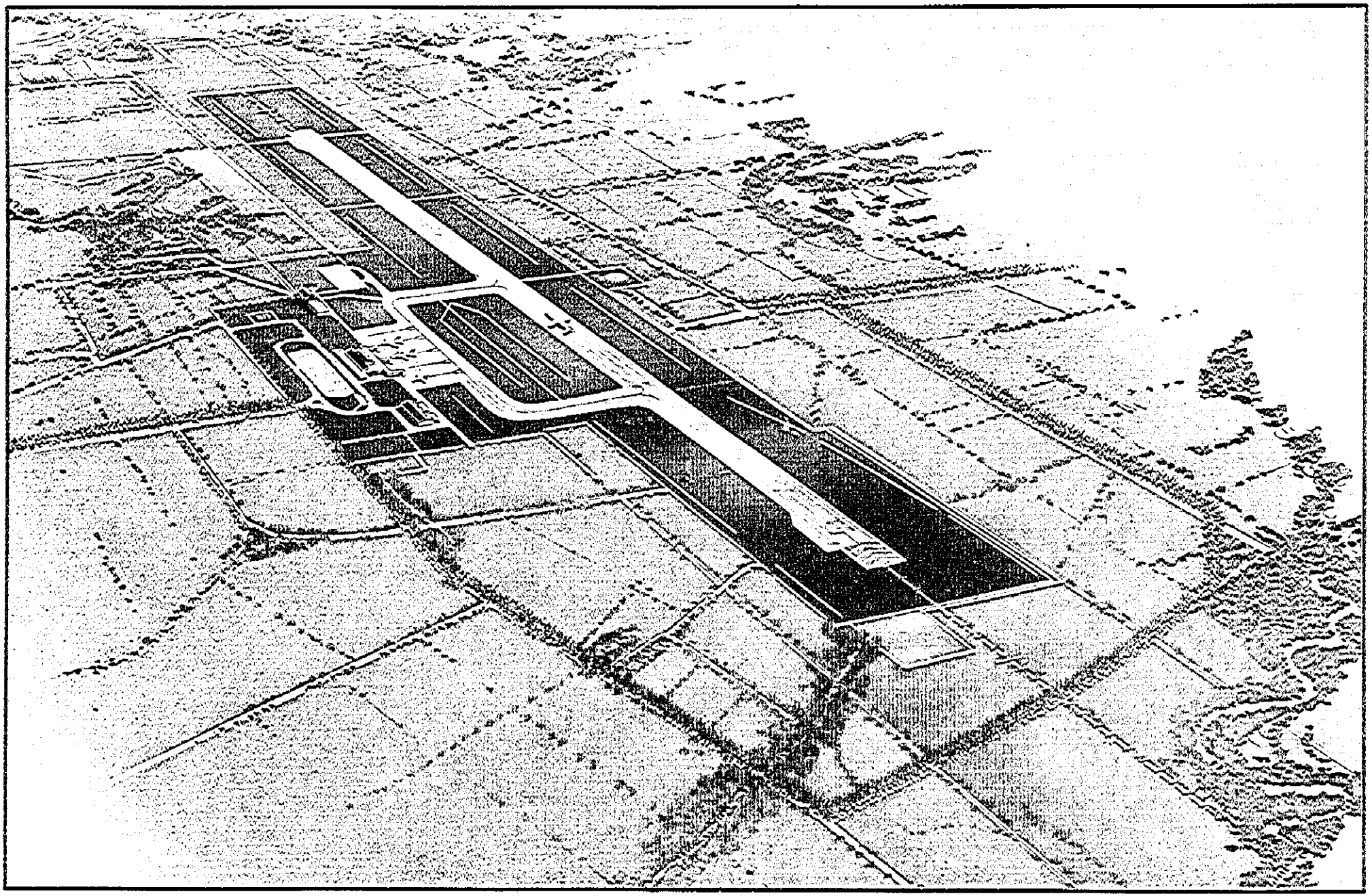
The following exchange rate was adopted throughout this report:

US$ 1.00 = PHP 26.00 = Yen 110 (June 1996)

PHP 1.00 = Yen 4.231



PROJECT LOCATION MAP



NEW BACOLOD AIRPORT DEVELOPMENT PLAN

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List of Abbreviation

A.A.G.R.	Average Annual Growth Rate
ACC	Area Control Center
ADB	Asian Developing Bank
ADP	Aeroports de Paris
AFC	Automatic Flight Control
AIP	Aeronautical Information Publication
ALECO	Albay Electric Cooperative
AMSL	Above Mean Sea Level
ANS	Air Navigation Services
APP	Approach Control
ASEAN	Association of Southeast Asian Nations
ASR	Airport Surveillance Radar
ATO	Air Transportation Office
ATS	Air Traffic Services in the Philippines
ATZ	Air Traffic Zone
AVSECOM	Aviation Security Command of the Philippine National Police
BOD	Biochemical Oxygen Demand
BOT	Built-Operation-and-Transfer
CAB	Civil Aeronautics Board
CAMP	Civil Aviation Master Plan
CCR	Constant Current Regulator
CENECO	Central Negross Electric cooperative
CFR	Crash Fire Rescue
CHB	Concrete Hollow Block
COD	Chemical Oxygen Demand
CRF	Crush Rescue and Fire
CTB	Cargo Terminal Building
CTR	Control Zone
D.A.O.	DENR Administrative Order
D-VOR	Doppler VOR
DDT	Dichlorodiphenyltrichlorocthane
DENR	Department of Environmental and Natural Resources
DME	Distance Measuring Equipment
DOT	Department of Tourism
DOTC	Department of Transportation and Communications
DPWH	Department of Public Works and Highways
ECC	Environmental Compliance Certificate
EIA	Environmental Impact Assessment
EIRR	Economic Internal Rate of Return
EIS	Environmental Impact Statement
EMB	Environmental Management Bureau

List of Abbreviation

EVTELCO	Eastern Visaya Telephone Company
FAA	Federal Aviation Administration
FIR	Flight Information Region
FIRR	Financial Internal Rate of Return
FOB	Foreign Object
FSS	Flight Service Station
GDP	Gross Domestic Product
GNP	Gross National Product
GOJ	Government of Japan
GOP	Government of the Republic of the Philippines
GP	Glide Path
GRDP	Gross Regional Domestic Product
GVA	Gross Value Added
HF	High Frequency
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
ICC	International communication Corporation
IEE	Initial Environmental Examination
IFR	Instrument Flight Rules
ILS	Instrument Landing System
IMC	Instrument Meteorological Conditions
JICA	Japan International Cooperation Agency
JV	Jovellar
LEYECO II	Leyte II Electric cooperative
LLZ	Localizer
LMWD	Leyte Metropolitan Water District
MATELCO	Mayon Telephone Company
MCIAA	Mactan-Cebu International Airport Authority
MIAA	Manila International Airport Authority
MIWD	Metro Iloilo Water District
MSL	Mean Sea Level
MSSR	Monopulse Secondary Surveillance Radar
NAIA	Ninoi Aquino International Airport
NCR	National Capital Region
NDB	Non Directional Beacon
NEDA	National Economy and Development Authority
NPV	Net Present Value
NTPP	National Transportation Planning Projects
OECF	Overseas Economic Cooperation Fund
OPAC	Outside Plant Access Cabinet
P.D.	Presidential Decrees

List of Abbreviation

PABX	Private Automatic Branch Exchanger
PAF	Philippine Air Force
PAGASA	Philippine Atmosphere, Geophysical and Astronomical Services Administration
PAL	Philippine Airline
PALS	Precision Approach Lighting System
PAPI	Precision Approach path indicator
PC	Personal Computer
PCB	Polychlorinated biphenyl
PCN	Pavement Classification Number
PD	Project Description
PECO	Panay Electric Cooperative
PHP	Philippine Peso
PLDT	Philippine Long Distance Telephone Company
PM-10	High Volume 10 micron particle-size inlet; Gravimetric
PTB	Passenger Terminal Building
QNH	Altimeter sub-scale setting to obtain elevation when on the ground
RC	Reinforced Concrete Structure
RCAG	Remote Center Air-Ground Communication
RG	Rodolpo Grecia
RIV	Rapid Intervention Vehicle
RSU	Remote Subscriber Unit
SID	Standard instrument Departure
SSR	Secondary Surveillance Radar
TMA	Terminal Control Area
TSP	High Volume-Gravimetric
TWR	Aerodrome Control Tower or Aerodrome Control
UNDP	United Nations Development Program
UTC	Co-ordinated Universal Time
VFR	Visual Flight Rules
VHF	Very High Frequency
VMC	Visual Meteorological Conditions
VOR	VHF Omni-Directional Radio Range
VSAT	Very Small Aperture Terminal

PART I

INTRODUCTION AND MACRO ENVIRONMENT OF THE PROJECT

Chapter 1 Introduction

PART I

INTRODUCTION AND MACRO ENVIRONMENT OF THE PROJECT

Chapter 1 Introduction

CHAPTER 1 INTRODUCTION

1.1 BACKGROUND OF THE PROJECT

The Republic of the Philippines is one of the largest archipelagic countries in the world, consisting of some 7,700 islands. As the population of some 70 million (estimate in 1995) is scattered over these islands, air transport has been playing an important role for both passenger and cargo transport in the country. Therefore, the Government of the Republic of the Philippines (GOP) has been developing major airports such as Ninoi Aquino (Manila), Mactan (Cebu) and Davao, and aiming more effective, efficient and sustained developments of the other airports based on the Civil Aviation Master Plan (CAMP) prepared by the United Nations Development Program (UNDP) and the International Civil Aviation Organization (ICAO) in July 1992.

There are 90 national government airports, consisting of 7 international, 12 trunk line, 37 secondary, and 34 feeder airports, in the Philippines. Bacolod, Iloilo, Daniel Z. Romualdez (Tacloban) and Legaspi Airports were the top four airports of the trunk line airports in terms of passenger traffic at the time of the CAMP study. The passengers at these airports are expected to grow by about 5% per year up to the year 2000 by the CAMP study. However, the airports are facing the problems of obsolete facilities, limitations of development due to the seas, rivers, hills, squatters, and/or urbanization around the airports. Since the airports have been developed without airport master plans, it has become more and more difficult to cope with increasing demand with piecemeal development as in the past.

Therefore, the establishment of long term development master plans are urgently required for developments/improvements of these airports. As the master planning, through efficient air transportation, will contribute to the social and economic development of not only the provinces but also whole the Philippines, the GOP included master planning projects for these four airports in the Medium-Term Philippine Development Plan 1993-1998. Under this circumstance, the GOP requested the Government of Japan (GOJ) to conduct a study on master planning of these four airports.

In response to the request of the GOP, the GOJ decided to implement the Study on Selected Airports Master Planing Project in the Republic of the Philippines (hereinafter referred to as "the Study"), and exchanged the Note Verbales with GOP concerning the implementation of the Study.

The Japan International Cooperation Agency (JICA), the official agency responsible for the implementation of technical cooperation programs of the GOJ, was entrusted to undertake the Study in accordance with the relevant laws and regulations in force in Japan.

On the part of GOP, Department of Transportation and Communications (hereinafter referred to as "DOTC") acted as the counterpart agency to the Japanese study team and also as coordinating body in relation with other governmental and non-governmental organizations concerned for the smooth implementation of the Study.

The Implementing Arrangement and the Minutes of Meeting for the Study were agreed upon between the DOTC and the JICA on November 16, 1995.

1.2 OBJECTIVES OF THE STUDY

Objectives of the Study are:

a) to formulate a master plan of each of Bacolod, Iloilo, Tacloban and Legaspi airports for the year 2015;

b) to conduct a feasibility study on a selected airport project for the year 2005; and

c) to pursue technology transfer to the counterpart personnel in the course of the Study.

1.3 SCOPE OF THE STUDY

The Scope of the Study is defined in the Implementing Arrangement as follows.

1) Study on Existing Conditions

a) Socio-Economic Conditions

b) Existing Study and Developments Plans Related to the Study

c) Air Transport Network and Air Transport Demand, Including the Relations to Other Airports

d) Airport Facilities and their Utilization

e) Airspace Use, Air Traffic Control System and Aircraft Operation Procedures

f) Operation and Management System of Airport Facilities

g) Financial Management System

h) Access Transport

i) Natural and Environmental Conditions

2) Formulation of a Master Plan

a) Forecast of Future Demand for Air Transport

b) Analysis of Facility Requirements

c) Initial Environmental Examination (IEE)

d) Preliminary Cost Estimates

e) Formulation of Development Strategies

f) Formulation of a Staged Implementation Plan

g) Recommendation on Management and Operation Systems for Airport Facilities

3) **Feasibility Study on a Selected Airport Project**

a) Preliminary Design

b) Environmental Impact Assessment (EIA)

c) Cost Estimates

d) Implementation Programs

e) Economic and Financial Analyses

f) Formulation of Operation and Management Plan for Airport Facilities

g) Overall Evaluation and Recommendation

In order to complete the Study, 65 study items are identified and programmed as illustrated in Figure 1.3.1.

1.4 OUTLINE OF THE STUDY

The Study is divided into seven stages as follows:

a) Preparatory Work in Japan : Preparation of Inception Report

b) First Field Survey in the Philippines : Presentation of Inception Report, Study on Existing Conditions, and Preparation of Progress Report

c) First Study Work in Japan : Formulation of Master Plan, and Preparation of Selection Report and Interim Report

d) Second Field Survey in the Philippines : Presentations of Selection Report and Interim Report, and Detailed Survey of a Selected Airport

e) Second Study Work in Japan : Feasibility Study on the Selected Airport Project and Preparation of Draft Final Report

f) Third Field Survey in the Philippines : Presentation of Draft Final Report

g) Third Study Work in Japan : Preparation of Final Report

The Study schedule is shown in Table 1.4.1.

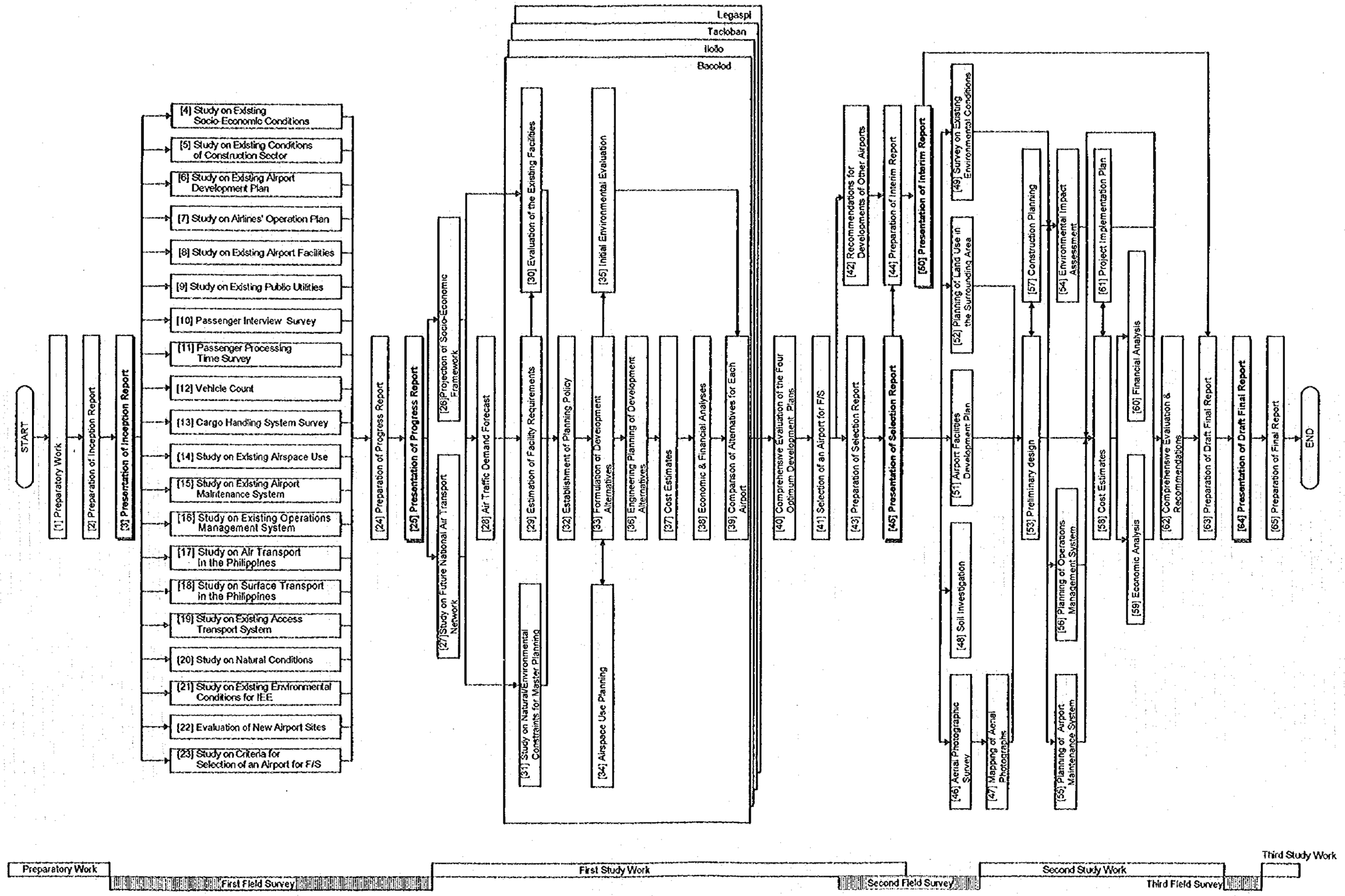
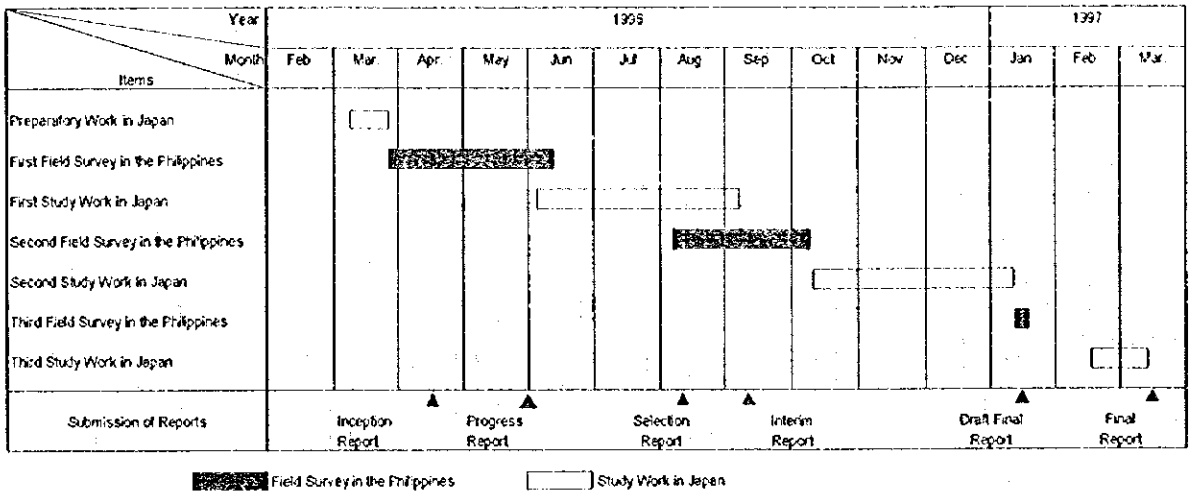


Figure 1.3.1 Flowchart of the Study

Table 1.4.1 Study Schedule



The Study Team arrived in Manila on March 24, 1996, and commenced the First Field Survey in the Philippines. The outline of the Study explained in the Inception Report was discussed with and accepted by the DOTC. The Minutes of Meeting on the Inception Report are attached as Appendix 1.4.1.

Investigations of the four airports were conducted as follows:

a) Bacolod : March 27, April 17 & 18, and from April 27 to May 3, 1996
b) Iloilo : March 26, March 10, and from April 22 to 26, 1996
c) Tacloban : March 28, April 11, and from May 6 to 10, 1996
d) Legaspi : March 29, April 12, and from May 13 to 17, 1996

Data and information were collected at the four airports, their surrounding areas and in Manila. Organizations interviewed at the site include Air Transportation Office (ATO) and Philippine Atmosphere, Geophysical and Astronomical Services Administration (PAGASA) at the airports; airlines; provincial and municipal governments; regional offices of National Economy and Development Authority (NEDA), Department of Environment and Natural Resources (DENR), Department of Tourism (DOT), Department of Public Works and Highways (DPWH); power, telephone and water supply companies; and others. Progress Report was submitted to the DOTC on 30 May, 1996. It was accepted, in principle, by the DOTC, and DOTC selected an alternative site for Bacolod Airport. The Minutes of Meeting on the Progress Report are attached as Appendix 1.4.2.

Master planning of the four airports was conducted in Japan from June to August 1996. As a summary result of the master planning, Selection Report was submitted to DOTC on August 5, 1996. After the presentation and discussion the DOTC selected the new Bacolod Airport at Site 3 for the Feasibility Study

in the subsequent stages of the Study. The Minutes of Meeting on the Selection Report are attached as Appendix 1.4.2.

Based on the above decision a topographic survey, soil investigations, and an environmental survey were conducted at and around the new airport site about 5km east of Silay City.

The Interim Report which describes all the results of the master planning of the four airports was submitted to DOTC on September 16, 1996. After the presentations and discussions the DOTC accepted, in principle, the Interim Report and agreed to proceed with the Second Study Work in Japan. The Minutes of Meeting on the Interim Report are attached as Appendix 1.4.3.

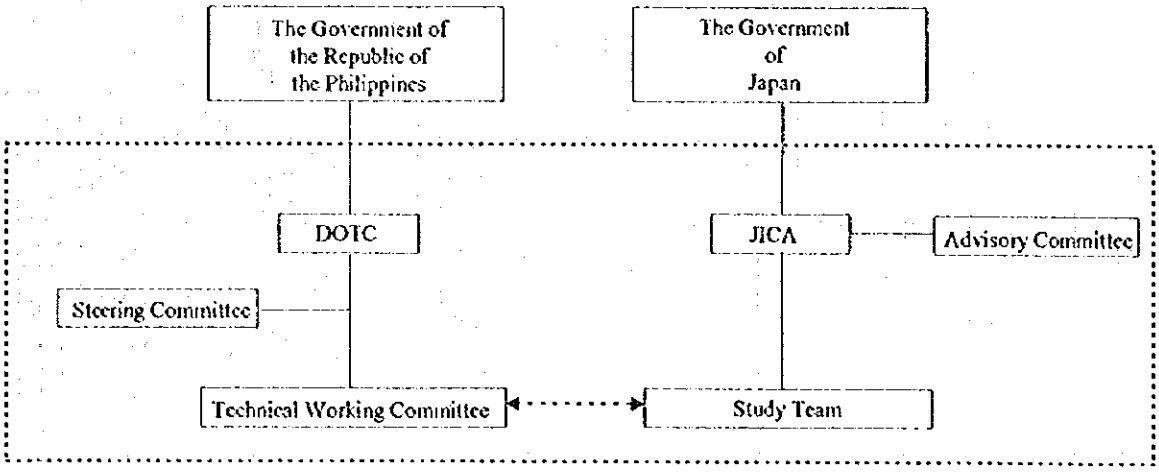
The preliminary design and feasibility study on the New Bacolod Airport have been conducted in Japan from October to December 1996, and the all the results of the Study are summarized in the Draft Final Report, and submitted to DOTC on January 19,1997. After the presentations and discussions the DOTC accepted, in principle, the Draft Final Report. The Minutes of Meeting on the Draft Final Report are attached as Appendix 1.4.4.

As JICA did not receive the DOTC's written comment by the date agreed in the Minutes, this Final Report was prepared taking account of the discussions made on the Draft Final Report as much as practicable.

1.5 STUDY ORGANIZATION

The Study was carried out by the JICA Study Team under the supervision of the JICA. The Advisory Committee was also organized to assist the JICA. The Study was conducted in close coordination with a Steering Committee and a Technical Working Committee that had been organized by the DOTC.

The overall organization frame work is shown below:



JICA Study Team

Mr. Hideki MURATA	:	Team Leader
Mr. Toru SHIMADA	:	Airport Planner/Airport Maintenance Specialist
Mr. Hiroyuki UEDA	:	Airport Civil Engineer
Mr. Masashi KABURAGI	:	Airport Architect
Mr. Tadamitsu ITO	:	Air Navigation Systems/Air Traffic Control/ Airspace Utilization Specialist
Mr. Motoyoshi YAMADA	:	Demand Forecast/Economic Analyst
Mr. Staffan KARLSSON, Mr. Per TOORN	:	Airport Operations Management Specialist/ Financial Analyst
Mr. Takashi HARADA	:	Topographic Survey Specialist
Mr. Masato DOMON	:	Environmental Specialist
Mr. Yutaka YAMASAKI	:	Construction Planner/Cost Estimator
Ms. Eiko MORI	:	Coordinator

JICA Advisory Committee

Mr. Kazuhito ARAO [Chairman]	:	Director, Office for Airport Construction Market Access, Construction Division, Aerodrome Department, Civil Aviation Bureau, Ministry of Transport
Mr. Seinosuke IWATA [Airport Planning]	:	Chief of Coordination Section, Office for Airport Construction Market Access, Construction Division, Aerodrome Department, Civil Aviation Bureau, Ministry of Transport
Mr. Shinichiro KOIKE [Air Navigation Systems]	:	Chief of Section 2, Planning Division, Aerodrome Department, Civil Aviation Bureau, Ministry of Transport
Mr. Kazuto TSUJI [Project Evaluation]	:	Director, 3rd Division, Operation Department I , The Overseas Economics Cooperation Fund

JICA Coordinator

Mr. Hiroyuki KANZAKI	:	Project Officer, First Development Study Division, Social Development Study Department, Japan International Cooperation Agency (JICA)

The designated members of the Steering Committee and Technical Working Committee were initially as follows:

Steering Committee

Mr. Primitivo C. CAL [Chairman]	:	Under Secretary, Department of Transportation and Communications (DOTC)
(Former) Mr. Panfilo V. VILLARUEL, Jr [Vice-Chairman]	:	Assistant Secretary, Air Transportation Office (ATO)
(Successor) Mr. Carlos F TANEGA [Vice-Chairman]	:	Assistant Secretary, Air Transportation Office (ATO)
Mr. Cesar T. VALBUENA [Project Director]	:	Assistant Secretary, Department of Transportation and Communications (DOTC)
Mr. Manuel GASPAY	:	Director, Environmental Management Bureau, Department of Environment and Natural Resources
Mr. William Russel SOBREPENA	:	Undersecretary, Department of Tourism
Mr. Ruben S. REINOSO, Jr.	:	Director, Infrastructure Staff National Economy and Development Authority
Ms. Margaret DEFENSOR	:	President, Federation Aviation Organization

Technical Working Committee

Project Management

Mr. Cesar T. VALBUENA [Project Director]	:	Assistant Secretary, DOTC
Mr. Raphael S. LAVIDES [Project Manager]	:	Division Chief, Air Transport Planning Division, Transport Planning Service, DOTC
Mr. Reynaldo CACATIAN [Asst. Project Manager]	:	Airport Maintenance Section, ATO

Technical Advisory Group

Mr. George D. ESGUERRA [Chairman]	:	Director III Transport Planning Service, DOTC
Mr. Florante MAGDAMO [Co-Chairman]	:	Director, Air Traffic Service, ATO

Mr. Manuel ESCOBAR	:	Airways Navigation Service, ATO
Ms. Ligaya POSTRERO	:	Airport Maintenance Section, ATO

Representatives of domestic airlines

Counterpart Study Team

Mr. Edmundo GEROCHI [Airport Management Planner]	:	Area Manager, Iloilo Airport ATO
Mr. Frisco Sto. DOMINGO [Airport Management Planner]	:	Area Manager, Legaspi Airport ATO
Mr. Ricardito IGUNA [Airport Management Planner]	:	Manager, Bacolod Airport ATO
Ms. Merle NEGRADAS [Airport Management Planner]	:	Officer-in-Charge, Tacloban Airport ATO
Ms. Filipina L. LARRACAS [Airport Planner]	:	Air Transport Planning Division, Transport Planning Service, DOTC
Mr. Alfredo NERA [Airspace Specialist]	:	Air Traffic Service, ATO
Ms. Adelaida OLBOC [Financial Analyst]	:	Air Transport Planning Division, Transport Planning Service, DOTC
Mr. Virgilio BAUTISTA, Sr. [Air Navigation Specialist]	:	Airways Navigation Section, ATO
Ms. Ma. Filipinas CABANA [Navaids/Comms. Planner]	:	Air Transport Planning Division, Transport Planning Service, DOTC
Mr. Andrew BASALLOTE [Airways Engineer]	:	Airways Navigation Section, ATO
Ms. Elmira DOMINGO [Airport Engineer]	:	Air Transport Planning Division, Transport Planning Service, DOTC
Mr. Roy GAMOSA [Airport Engineer]	:	Airport Maintenance Section, ATO
Mr. Brendo ELEGIO [Airport Planner]	:	Air Transport Planning Division, Transport Planning Service, DOTC
Mr. Felicisimo PANGILINAN, Jr. [Forecast/Facility Planner]	:	Air Transport Planning Division, Transport Planning Service, DOTC

Ms. Elsa PINEDA [Airport Economist]	:	Air Transport Planning Division, Transport Planning Service, DOTC
Ms. Ruby MANZO [Airport Management Planner]	:	Air Transport Planning Division, Transport Planning Service, DOTC
Ms. Carmela LAZARO [Architect]	:	Engineering, Architectural and Design Division, Project Management Service, DOTC

In September 1996, the members of the Steering Committee and Technical Working Committee were reconstituted as follows:

Steering Committee

Mr. Carlos F TANEGA [Chairman]	:	Assistant Secretary, Air Transportation Office (ATO)
Mr. Cesar T. VALBUENA [Co-Chairman]	:	Assistant Secretary & Officer in Charge, Office of the Undersecretary for Staff Services, DOTC
Mr. Miguel Cesar O. Cordero	:	Assistant Secretary, Telecommunications Office (TELOF)
Mr. Manuel GASPAY	:	Director, Environmental Management Bureau, Department of Environment and Natural Resources
Mr. William Russel SOBREPENA	:	Undersecretary, Department of Tourism
Mr. Ruben S. REINOSO, Jr.	:	Director, Infrastructure Staff National Economy and Development Authority
Mr. Arturo Valdez	:	Chief of Staff, Office of the Secretary, DOTC
Mr. Anacleto V. Venturina	:	Director, Air Traffic Services, ATO
Ms. Margaret DEFENSOR	:	President, Federation Aviation Organization

Technical Working Committee

Project Management

Mr. George D. ESGUERRA [Project Director]	:	Director III Transport Planning Service, DOTC
Mr. Zosimo S. Pascua, Jr. [Deputy Project Director]	:	Director III Project Management Service, DOTC

Mr. Raphael S. LAVIDES [Project Manager]	:	Chief, Planning Division, ATO
Ms. Elmira DOMINGO [Deputy Project Manager]	:	Planning Division, ATO
Mr. Brendo ELEGIO [Assistant Project Manager]	:	Special Assistant to the ATO ASSEC and Acting Chief, Operations Center, ATO

Technical Advisory Group

Mr. Reynaldo CACATIAN [Chairman]	:	Assistant Chief, Airport Maintenance Section, ATO
Mr. Manuel ESCOBAR [Co-Chairman]	:	Airways Navigation Service, ATO
Mr. Andrew BASALLOTE	:	Airways Navigation Service, ATO
Ms. Ma. Filipinas CABANA	:	Planning Division, ATO
Mr. Porvenir P. PORCIUNCULA		Office of the Secretary, DOTC
Mr. Victor DATO	:	Chief, Transportation Division, Infrastructure Staff, NEDA
Mr. Rolando C. MENDOZA		Manager, Flight Technical Div., Flight Operations Dept. Philippine Airlines

Counterpart Study Team

Mr. Edmundo GEROCHI [Airport Management Specialist]	:	Area Manager, Iloilo Airport ATO
Mr. Frisco Sto. DOMINGO [Airport Management Specialist]	:	Area Manager, Legaspi Airport ATO
Mr. Ricardito IGUNA [Airport Management Specialist]	:	Manager, Bacolod Airport ATO
Ms. Merle NEGRADAS [Airport Management Planner]	:	Officer-in-Charge, Tacloban Airport ATO
Mr. Francis Diez [Airways Engineer]	:	Airways Navigation Service, ATO
Mr. Mario Radaza [Navaids/Comms. Planner]	:	Airways Navigation Service, ATO
Mr. Roy GAMOSA [Airport Engineer]	:	Airport Maintenance Section, ATO

Mr. Felicisimo PANGILINAN, Jr. [Forecast/Facility Planner]	:	Transport Planning Service, DOTC
Ms. Liberty Garcia [Economist]	:	Project Management Service, DOTC

Chapter 2 Macro Environment of the Project

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CHAPTER 2 MACRO ENVIRONMENT OF THE PROJECT

2.1 GENERAL

This chapter describes environment of the four airports, i.e. Bacolod, Iloilo, Tacloban and Legaspi, from the macro viewpoints. It covers socio-economic environment; overview of air and surface transport systems; engineering and construction; and environmental protection in the Philippines. Existing conditions of the four airports are described in Chapters 4 through 7.

2.2 SOCIO-ECONOMIC CONDITIONS

The airports that have been selected as the targets of the Master Planning Project are Legaspi, Iloilo, Bacolod and Tacloban Airports. These four airports are situated in the central part of the Philippines.

Legaspi Airport is situated on the southern edge of Luzon Island in Region 5 - Bicol. Iloilo Airport is situated on the east coast of Panay Island, and Bacolod Airports is on the west coast of Negros Island. These two airports are directly facing each other, and belong to Region 6 - Western Visayas. Tacloban Airport is situated on the west coast of Leyte Island where it adjoin the east coast of Samar Island. In administrative terms, this airport belongs to Region 8 - Eastern Visayas.

These four airports are all regarded as trunkline airports within the Philippines and, for an archipelago country that consists of more than 7,000 island of all sizes, they play an important role in linking up the two main islands of Luzon in the north and Mindanao in the south.

This section analyzes the current socio-economic conditions and trends in the regions and provinces where the four airports are situated based on the data and information collected during the Study.

The analyses include population and urbanization from the viewpoint of social concentration; Gross Regional Domestic Product (GRDP), per capital GRDP and regional industrial structure from the viewpoints of economic growth and industrialization; and, based on local characteristics, tourism trends in the regions. As well as analyzing each of this item with the aid of statistical data, comparisons are made between the region and provinces.

2.2.1 Population and Urbanization

Table 2.2.1 shows the population of the Philippines and target regions, and Table 2.2.2 shows annual average growth rates in population. As seen, the average rates of the population increase in Regions 5, 6 and 8 were 1.18%, 1.77% and 0.88% respectively during 1980 - 1990, and far lower than the national average of 2.35%. These figures suggest a major movement of the population from these regions to the major urban centers such as Manila and Cebu.

In the period between 1990 and 1994, the rates of increase in Regions 5, 6 and 8 were 2.94%, 2.83% and 3.06% respectively, and only slightly below the national average of 3.11%. This indicates that the aforementioned trend of demographic movement towards the urban centers has come to an end.

As of 1994, the population of Region 5 was 4.39 billion (6.4% of the national population), that of Region 6 was 6.03 billion (8.8%), and that of Region 8 was 3.45 billion (5.0%).

Table 2.2.1 Population by Region

	1980	1990	1991	1992	1993	1994
Philippines	48,098,500 100%	60,703,200 100%	63,692,000 100%	65,339,000 100%	66,982,000 100%	68,624,000 100%
Region V	3,477,000 7.2%	3,910,000 6.4%	4,094,000 6.4%	4,193,000 6.4%	4,292,000 6.4%	4,391,000 6.4%
Region VI	4,526,000 9.4%	5,392,000 8.9%	5,646,000 8.9%	5,773,000 8.8%	5,900,000 8.8%	6,028,000 8.8%
Region VIII	2,800,000 5.8%	3,055,000 5.0%	3,203,000 5.0%	3,284,000 5.0%	3,365,000 5.0%	3,446,000 5.0%

Source: 1995 Philippines Statistical Yearbook

Table 2.2.2 Average Annual Growth Rate in Population (%)

	1980~1990	1990~1994
Philippines	2.35	3.11
Region V	1.18	2.94
Region VI	1.77	2.83
Region VIII	0.88	3.06

Source: 1995 Philippines Statistical Yearbook

Table 2.2.3 shows percentages of urbanized population in the Philippines and the target regions and provinces. The urbanized population in the Philippines was 48.6% in 1990, and the same was 31.2% in Region 5, 35.8% in Region 6 and 31.2% in Region 8. This clearly indicates that these three regions are predominantly agriculture based. Comparing the degree of urbanization in terms of the urban population in each of the provinces where the target airports are located, it can be seen that urbanized population accounts for 31.7% of the total population in Albay Province (Legaspi Airport), 35.8% in

Iloilo Province (Iloilo Airport), 45.6% in Negros Occidental Province (Bacolod Airport), and 32.7% in Leyte Province (Tacloban Airport). From these figures, it can be seen that urbanization is most advanced in Negros Occidental Province, where Bacolod Airport is located, with the other three provinces displaying more or less the same degree of urban concentration. (See Table 2.2.3).

Table 2.2.3 Urbanization in Population (%)

	1980	1990	Growth Rate
Philippines	37.3	48.6	2.68
Region V	21.5	31.2	3.79
Albay	19.6	31.7	4.93
Region VI	28.3	35.8	2.38
Iloilo	27.6	29.7	0.74
Negross Occidental	36.8	45.6	2.17
Region VIII	21.8	31.2	3.65
Layte	24.5	32.7	2.93

Source: Census Facts and Figure: National Statistical Office

2.2.2 Economic Growth and Industrial Structure

Table 2.2.4 shows Gross Regional Domestic Product (GRDP) in the Philippines and target regions. The GRDP in Region 5 is 23.4 billion pesos (representing 3.1% of the overall GRDP in the Philippines), that in Region 6 is 57.2 billion pesos (7.5%), and that Region 8 is 18.4 billion pesos (2.4%).

Table 2.2.4 Gross Regional Domestic Product by Region

(million Pesos; at constant 1985 prices)

	1981	1990	1991	1992	1993	1994
Philippines	630,645 100%	720,691 100%	716,523 100%	718,942 100%	734,155 100%	765,629 100%
Region V	19,513 3.1%	21,687 3.0%	21,734 3.0%	21,902 3.0%	22,503 3.1%	23,353 3.1%
Region VI	48,279 7.7%	50,747 7.0%	50,451 7.0%	53,331 7.4%	54,909 7.5%	57,170 7.5%
Region VIII	15,452 2.5%	17,322 2.4%	17,396 2.4%	17,088 2.4%	17,554 2.4%	18,388 2.4%

Source: 1995 Philippines Statistical Yearbook

Table 2.2.5 shows the annual average growth rates in GRDP. In the period between 1981 and 1990, economic growth in the target regions was lower than the national average. In the period between 1990 and 1994, the economic growth rates in Regions 5, 6 and 8 were 1.87%, 3.02% and 1.50%, while the national average was 1.52%. Economic growth in Regions 5 and 6 has outpaced the national average, and the recent growth rate in Region 6 has been especially pronounced.

Table 2.2.5 Annual Average Growth Rate in GRDP

	1981~1990	1990~1994
Philippines	1.49	1.52
Region V	1.18	1.87
Region VI	0.56	3.02
Region VIII	1.28	1.50

Source: JICA Study Team

Table 2.2.6 shows the per capita GRDP. The national average has remained more or less the same since 1981. The per capita GRDP in the Region 6 has remained slightly below (approximately 80%) the national average. However those in the other two regions have been quite low, approximately 40 to 45% of the national average. This clearly shows how undeveloped these regions are within the country.

Table 2.2.6 Per Capita Regional Domestic Product by Region

(at constant 1985 prices)

	1981	1990	1991	1992	1993	1994	
Philippines	12,731	11,722	11,397	11,188	11,181	11,422	100%
	100%	92.1%	89.5%	87.9%	87.8%	89.7%	
Region V	5,463	4,942	4,847	4,781	4,810	4,890	42.8%
	100%	90.5%	88.7%	87.5%	88.0%	89.5%	
Region VI	10,391	8,947	8,715	9,032	9,120	9,319	81.8%
	100%	86.1%	83.9%	86.9%	87.8%	89.7%	
Region VIII	5,408	5,155	5,087	4,909	4,956	5,104	44.7%
	100%	95.3%	94.1%	90.8%	91.6%	94.4%	

Source: 1995 Philippines Statistical Yearbook

The underdeveloped nature of the target regions is also reflected in their industrial structure; each region has a monocultural structure in which primary industry is predominant and secondary industry is undeveloped. Table 2.2.7 shows industrial structure by sector in the Philippines and the target regions, and Table 2.2.8 shows the same in the target provinces.

Table 2.2.7 Industrial Structure by Sector, Region

	Philippines		Region V		Region VI		Region VIII	
	1980	1990	1980	1990	1980	1990	1980	1990
Primary Industries	52.1	38.3	66.5	56.3	60.9	50.0	71.6	57.9
Secondary Industries	14.6	13.7	9.4	11.1	9.2	9.8	6.7	7.6
Tertiary Industries	32.2	32.5	23.0	27.7	28.6	32.9	20.5	25.9

Source: Census Facts and Figure: National Statistical Ofice

Table 2.2.8 Industrial Structure by Sector, Province

	Albay Province		Iloilo Province		Negros Province		Leyte Province	
	1980	1990	1980	1990	1980	1990	1980	1990
Primary Industries	55.5	42.8	58.9	45.8	59.5	52.9	68.1	52.3
Secondary Industries	16.6	18.8	8.9	10.0	9.3	10.7	8.0	7.9
Tertiary Industries	26.3	32.5	30.4	36.0	30.1	36.4	22.7	28.8

Source: Census Facts and Figure: National Statistical Office

Region 6 may be the exception, as the proportion of the tertiary industry in this region exceeds the national average, which indicates a healthy development in terms of commercial activity. The industrial structure in each of the four provinces where the target airports are located is similar to that found in the respective region. However, local characteristics is apparent in Albay Provinces (Legaspi Airport), where the proportion of secondary industry slightly exceeds the national average, and in Iloilo Province (Iloilo Airport) and Negros Occidental (Bacolod Airport), where the proportion of tertiary industry also exceeds the national average.

2.2.3 Tourism Demand

Tourist arrivals in the three regions are shown in Table 2.2.9. As seen, the demand is highest in Region 6, followed by Region 5 and Region 7. The high proportion of foreign tourists in Region 6 and the high proportion of domestic tourists in Region 5 are characteristic features. It is considered that the former feature is a result of the abundant marine tourism resources in Region 6, and the latter feature is down to the easy means of land access to Region 5 from the Metro Manila.

Table 2.2.9 Tourist Arrivals Recorded by Region

		1990	1991	1992	1993	1994	1995	
Region V								
	Foreign	3,954	5,419	1,752	8,128	3,803	8,073	3.0%
	Domestic	69,628	146,971	51,782	107,500	82,380	257,426	97.0%
	Total	73,582	152,390	53,534	115,628	86,183	265,499	100%
		100%	207%	73%	157%	117%	361%	
Region VI								
	Foreign	23,214	40,025	39,795	56,212	91,851	92,077	23.6%
		100%	172%	171%	242%	396%	397%	
	Domestic	180,064	203,563	133,687	267,279	281,018	298,320	76.4%
		100%	113%	74%	148%	156%	166%	
	Total	203,280	243,588	173,482	323,291	372,869	390,403	100%
		100%	120%	85%	159%	183%	192%	
Region VIII								
	Foreign	8,857	7,456	4,834	13,062	13,248	13,037	12.9%
		100%	84%	55%	147%	150%	147%	
	Domestic	73,447	79,035	65,345	72,053	76,198	87,965	87.1%
		100%	108%	89%	98%	104%	120%	
	Total	82,304	86,491	70,179	85,115	89,446	101,002	100%
		100%	105%	85%	103%	109%	123%	

Source: Department of Tourism, Region V, VI, VII

2.3 AIR TRANSPORT SYSTEM

2.3.1 Administration of Civil Aviation

Civil aviation of the Philippines is administrated by the Department of Transportation and Communications (DOTC) under the Civil Aeronautics Act (R.A. No. 776). Headquarters (Office of the Secretary) of DOTC provide air transportation policies, conduct planning of the public air transportation facilities and services, and implement airports and airways facility development/ improvement projects. There is Air Transportation Office (ATO) within DOTC, and it is responsible for operation of airports; inspection and registration of air transportation facilities and aircraft; determination of aeronautical charges and airfares; and others.

There are attached agencies to DOTC. They include the Civil Aeronautics Board (CAB), Manila International Airport Authority (MIAA), Mactan-Cebu International Airport Authority (MCIAA), and others.

Appendices 2.3.1 and 2.3.2 show organization charts of DOTC and ATO.

2.3.2 Airports

There are 90 National Government Airports in the Philippines, and they are classified as follows:

a) International Airport - serves for the international air transport : 7 airports
b) Trunkline Airport - serves for the principal commercial centers of the country : 12 airports
c) Secondary Airport - serves for towns and cities : 37 airports
d) Feeder Airport - serves for towns and rural communities : 34 airports

Location map of the National Government Airports is shown in Figure 2.3.1. List of these airports and their runway dimensions is shown in Appendix 2.3.3.

The National Government Airports except for Ninoy Aquino (Manila), Mactan (Cebu), Subic Bay and Clark International Airports are operated by ATO. Manila, Cebu, Subic Bay and Clark International Airports are operated by MIAA, MCIAA, Subic Bay Metropolitan Authority and Clark International Airport Corporation, respectively.

2.3.3 Air Traffic Services

The Air Traffic Services (ATS) in the Philippines are provided by ATO with the exception of aviation meteorology, which is operated by the Philippine Atmosphere, Geophysical and Astronomical Services Administration (PAGASA). Aviation security is controlled by Aviation Security Command (AVSECOM) of the Philippine National Police.

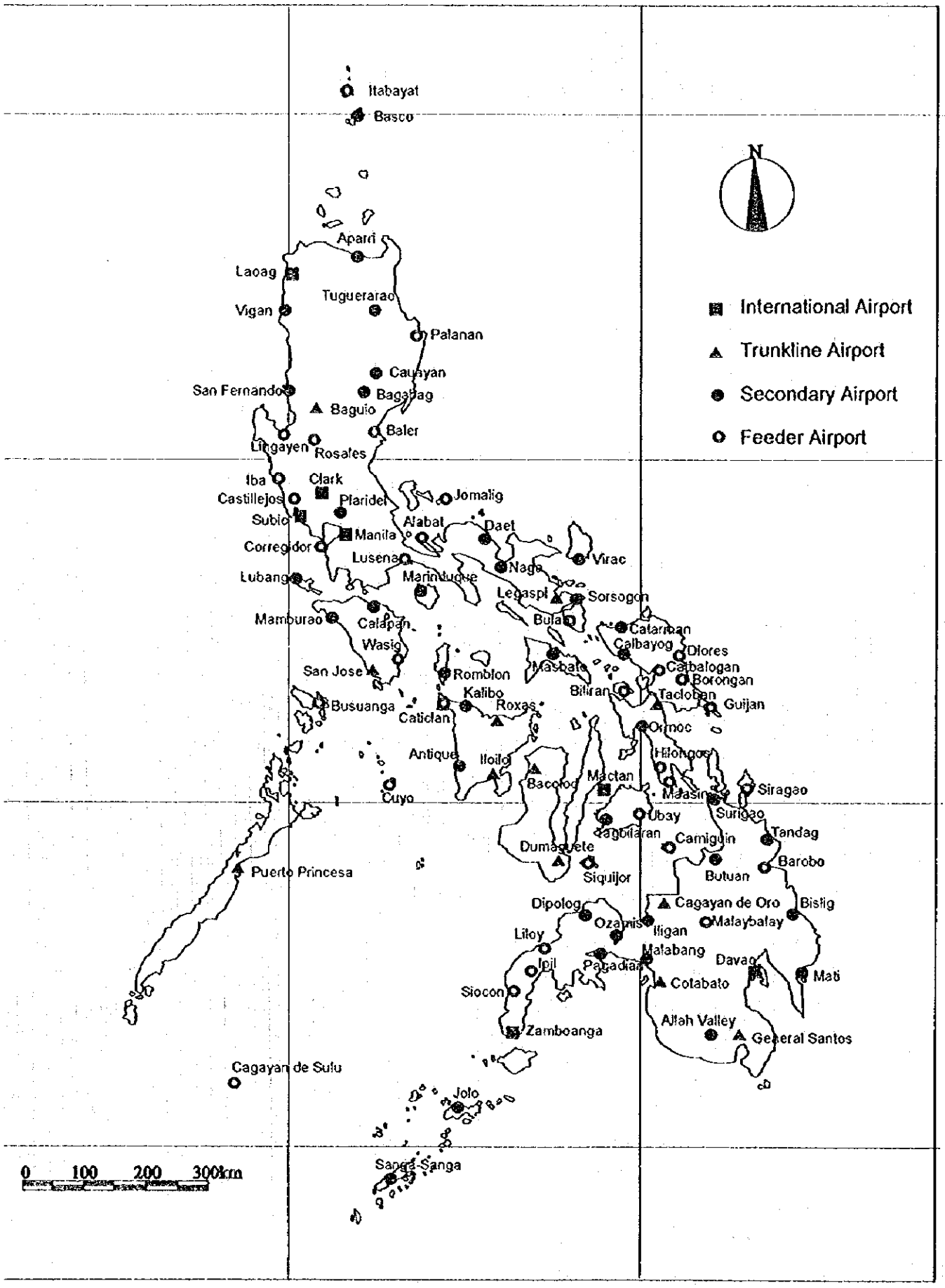


Figure 2.3.1 Location Map of National Government Airports

Airspace of the Philippines consists of the Manila Flight Information Region (FIR). The Manila FIR is divided into four sectors, North Sector, West Sector, East Sector, and Mactan Sector (up to Flight Level 280). The Manila Area Control Center (ACC) is responsible for the North, West, and East Sectors, and Mactan Sub-ACC is responsible for the Mactan Sector. Terminal Control Areas (TMAs) are established at Bacolod (covering also Iloilo), Davao, Laoag, Mactan, Manila, Tacloban and Zamboanga. Aerodrome Control are provided at 18 airports, i.e. Bacolod, Baguio, Basa, Cagayan, Cotabato, Davao, Fernando, Iloilo, Laoag, Legaspi, Mactan, Manila, Plaridel, Puerto, Sangley, Subic, Tacloban and Zamboanga Towers.

There are 45 airways, 13 danger areas and 21 flight training areas in the Manila FIR.

2.3.4 Current Development Plans and Projects

1) Civil Aviation Master Plan

The Civil Aviation Master Plan (CAMP) was prepared by the UNDP/ICAO in July 1992. It aimed the strengthening of the air transport subsector by providing a management tool for a more effective, efficient and sustainable aviation program planning and implementation. The GOP accepted, in principle, the recommendations of CAMP, and intends to implement them.

Contents of the CAMP report were as follows:

1. The Civil Aviation Master Plan and the National Development Planning Framework
2. Civil Aviation Policy and Legislation
3. Civil Aviation Organizations
4. Role of Air Transport in the Economy
5. Air Transport Demand
6. Airlines
7. Aerodromes
8. Air Traffic Services
9. Telecommunications
10. Manpower and Training
11. Financial and Economic Evaluation
12. Indirect benefits of Civil Aviation
13. Implementation of the Master Plan Recommendations

Regarding the aerodromes, the CAMP report described aerodrome classification, reference code, runway width and length, runway strip, terminal apron, pavement strength, obstacle removal and passenger terminal building. However, the report provided no master plan for individual airports.

Regarding telecommunications, the CAMP report recommended replacement and expansion program of Instrument Landing System (ILS), VHF Omni-Directional Range (VOR), Distance Measuring Equipment (DME) and Non Directional Beacon (NDB).

Regarding manpower and training, the CAMP report indicated, among others, a surplus of manpower at airports and needs of training. To solve the problems, it recommended development of 5-year Recruitment Plan and 5-year Training Plan.

2) **Five Year (1995 - 2000) National Airport Development Program**

The Five Year National Airport Development Program is a roling five year development plan prepared by DOTC. The 1995 - 2000 program was used for requesting national budget of the year 1996. The projects over PHP 300 million are excluded from the program, and foreign financial assistance is sought for these projects. The 1995 - 2000 program covers 87 airports including new airports of Pinamalayan, Guimaras, Panglao and Sultan Kudarat.

Total investment requirements during 1994 - 2000 is estimated to be about PHP 5.4 billion. Airports with more than PHP 100 million investment during 1994 - 2000 are;

a) Naga (Secondary Airport) : includes upgrading of airport (congressman insertion); runway extension at end of Runway 22; completion of riprapping of runway strip at the end of Runway 04; construction/improvement of perimeter fence; resealing of runway cracks and joints; grading of runway shoulders and improvement of drainage system; re-orientation of existing runway (subject to the result of study); total investment PHP 247 million.

b) Calbayog (Secondary Airport) : includes obstruction removal at both runway approaches; site acquisition for runway extension and strip width correction; ashphalt overlay and widening of existing runway; extension of runway and construction of stopway; apron expansion and construction of additional taxiway; improvement/expansion of existing terminal building; asphalt paving of existing vehicular parking area and access road; expansion of existing vehicular parking area; construction of perimeter fence at newly acquired site and improvement of perimeter fence; total investment PHP 169 million.

c) Surigao (Secondary Airport) : includes improvement of terminal and fire station buildings; expansion of existing terminal building; construction/relocation of perimeter fence to the new airport property line; construction of apron expansion; obstruction removal on Runway 18 (hill obstruction); site acquisition for runway extension and strip width correction; resealing of runway cracks and joints; construction of runway extension; asphalt overlay of existing runway; widening of existing runway to 45m; expansion of vehicular parking area; total investment PHP 167 million.

d) Catarman (Secondary Airport) : includes improvement of terminal building; construction of shore protection; apron expansion and construction of taxiway; riprapping of runway strip at newly extended runway; construction/relocation of perimeter fence at newly acquired site; site acquisition for strip width correction, land side facilities and runway extension; runway extension to 1,830m and construction of stopway; asphalt overlay and widening of existing runway; construction of new apron, taxiway, terminal building, fire station building; total

investment PHP 161 million.

e) San Fernando (Secondary Airport) : includes runway extension; construction of perimeter fence; site acquisition for runway extension and runway width correction; extension of runway by 580 m and construction of 100 m long stopway; asphalt overlay of existing runway; widening of existing runway; obstacle removal at both runway approaches; expansion/renovation of existing terminal building including water system; relocation/ construction of fire station building to the building restriction line; repair/improvement of administration building; total investment PHP 160 million.

f) Masbate (Secondary Airport) : includes asphalt overlay of runway; construction of runway extension up to 1,830 m including reclamation works; upgrading of runway shoulder and improvement of drainage system; site acquisition for runway strip correction and landside facilities; construction of new apron and taxiway, new terminal building, new vehicular parking area, new fire station building, warehouse and quarters and perimeter fence to the new acquired site; obstacle removal at approach zone of runway 03; total investment PHP 145 million.

g) Ozamis (Secondary Airport) : includes repair of office and terminal building; concrete paving of asphalt paved portion of runway; concreting of airport (Department of Budget and Management incertion); obstruction removal at both runway approaches; runway extension to 1,830m and construction of stopway; widening of runway to 45m; expansion and resurfacing of apron including construction of taxiway; expansion of existing terminal building; site acquisition and construction/expansion of access road and vehicular parking area; construction of perimeter fence; total investment PHP 145 million.

h) Marinduque (Secondary Airport) : includes repair/improvement of existing terminal building; site acquisition for runway strip width correction, landside facility area and runway extension; runway extention from 1,400m to 1,830m; construction of new apron and taxiway, new terminal building, new vehicular parking area, perimeter fence, new fire station; and re-routing national highway; total investment PHP 139 million.

i) Bacolod (Trunkline Airport) : total investment PHP 133 million, refer to Section 4.2.3 for scope of works.

j) Zamboanga (International Airport) : includes construction of terminal building; asphalt overlay pf existing runway (2,610m x 45m); Repair of fire station building; expansion of vehicular parking area and improvement of access road; construction of perimeter fence; apron expansion (east side of the runway) and taxiway; total investment PHP 132 million.

k) Legaspi (Trunkline Airport) : total investment PHP 135 million, refer to Section 7.2.3 for details.

l) Sanga-Sanga (Secondary Airport) : includes concrete paving of existing runway; runway extension up to 1,900m and construction of stopway; grade correction of runway strip and shoulder; construction of taxiway (60m x 23m) and apron; expansion of existing terminal

building; construction of new vehicular parking area; construction/improvement of perimeter fence; obstruction removal at both runway approaches; total investment PHP 112 million.

m) Caticlan (Feader Airport) : includes construction of apron and taxiway; additional payment for site acquisition for runway extension; runway extension by 400m and construction of 100 m long stopway; upgrading of shoulders and drainage system; construction/relocation of perimeter fence to the new property line; site acquisition for runway extension (560m x 150m), landside area (250m x 150m) and runway strip width correction (60,000 sq.m); construction of new terminal building, new fire shed, vehicular parking area and access road; removal of hill obstruction at approach of Runway 24; total investment PHP 108 million.

n) Cagayan de Oro (Trunkline Airport) : includes asphalt overlay of runway (middle portion 1,900m x 36m); renovation of existing terminal building; expansion of apron (170m x 100m) and additional taxiway (75m x 23m); asphalt paving of vehicular parking area at new terminal building; construction of turn-around pads; widening of 2,200m long runway from 36m to 45m; runway strip grade correction; runway extension by 250m; ashphalt overlay of existing apron and taxiway; construction of complete perimeter fence; total investment PHP 107 million.

3) Ninoy Aquino International Airport (Terminal 2) Development Project

A new domestic passenger terminal (Terminal 2) of Ninoy Aquino International Airport is being constructed with the financial assistance from the Overseas Economic Cooperation Fund (OECF) of Japan. Total project cost is about US$ 185 million. Groundbreaking ceremony was held in December 1995, and completion is targeted in 1997.

There is a Built-Operation-and-Transfer (BOT) project to construct a new international passenger terminal (named Terminal 3, design capacity of 10 million passengers per year) at Villamor Air Base site, including its ancillary apron and taxiway, access tunnel to the new domestic terminal, multi-story car parks and access road improvements.

4) Mactan (Cebu) International Airport Development Project

Mactan (Cebu) International Airport Development Project Phase I is nearing completion with the OECF financial assistance. It includes runway extention to 3,300 m; extention of taxiway and apron; overlay of existing runway, taxiways and apron; construction of rapid exit taxiways, expansion/renovation of existing passenger terminal facilities; and others. Construction works commenced in April 1993, and is expected to be completed in 1997. Total project cost is about US$ 100 million.

Installation of lighting systems for runway, taxiway and runway approach is financed by Belgian

Government.

5) **Davao International Airport Development Project**

A feasibility study of Davao International Airport was conducted by JICA in 1992-93. It was reviewed by the Asian Development Bank (ADB) in 1994. Major amendments made by ADB were;

a) construction of a new 2,500 m runway → extension of existing runway to 3,000 m; and
b) runway strip : 300 m (200 m in medium term) based on ICAO → 150 m based on FAA.

Estimated project cost is about US$ 110 million, and completion target year is 1999.

6) **New General Santos Airport Construction Project**

New General Santos Airport is intended to replace the existing General Santos Airport and to accommodate a projected traffic volume of about 200,000 passengers and 25,000 tons of cargo in the year 2005. The project includes the construction of an international standard airport capable of accommodating up to A300 and B737 type aircraft, including a 3,200 m runway, exit taxiways, aprons, and a 6.7 km airport access road, a vehicular parking area, a passenger terminal building, hangar/maintenance building, flight service station/ control tower/CFR building, fuel farm, communications and utilities, airfield lighting systems, automated Weather Observation System, and air navigation systems (ILS, VOR/DME).

The project is co-financed by USAID and the Government of the Philippines. Total construction contract amount is about US$ 37 million. The construction is expected to be completed in August 1996.

Finance from the private sector is being considered for construction of cargo terminal building.

7) **Laguindingan Airport Development Project**

This is a project to construct a new airport at Laguindingan site, Misamis Oriental so as to provide support infrastructure required in the Iligan - Cagayan de Oro Corridor Development Program. It is the DOTC's plan to close the existing Cagayan de Oro and Iligan Airports after the completion of the new airport. Financial assistances of South Korean Government and USAID have been sought.

8) **Nationwide Air Navigation Facility Modernization Project**

The Nationwide Air Navigation Facility Modernization Project has been implemented under the financial assistance of the Overseas Economic Cooperation Fund (OECF) of Japan since 1978. The project includes construction of flight service stations and control towers; installation and

replacement of radio air navigation systems such as VOR, DME, GP and LLZ, communication equipment such as transmitter, receiver, facsimile and VSAT; tower equipment; ASR/SSR; etc, and covers the following airports and stations.

Phase II (1987 - 1995) : Butuan, Davao, Mamburao, Dipolog, Dumaguete, Manila Transmitter, Mactan, Mt. Majic, NAIA, Manila AFC, Roxas, Tagaytay, Virac, and Zamboanga.

Phase III (1996 -) : Bacolod, Baguio, Cagayan de Oro, Caticalan, Cauyan, Davao, Dipolog, Iloilo, Jomalig, Kalibo, Laoag, Legaspi, Lipa, Mactan, Masbate, Naga, NAIA, Plaridel, Puerto Princesa, Roxas, San Jose, Tacloban, Tagbilaran, Tuguegarao and Zamboanga airports, Basilan RCAG, Manila AFC, Manila Technical Maintenance Center, Mt. Majic RCAG, and Tagaytay RCAG & ER Station. (Refer to Sections 4.2.3, 5.2.3, 6.2.3 and 7.2.3 for details of the project at Bacolod, Iloilo, Tacloban and Legaspi.)

9) Upgrading of Air Navigation Facilities, Phase II

Upgrading of air navigation facilities, such as ILS, VOR, DME, NDB and ATC equipment, has been implemented at 18 airports nationwide, namely Manila, Puerto Princesa, Bacolod (ILS, DME and ATC equipment), San Jose, Cotabato, Cebu, Legaspi, Iligan, Baguio, Davao, Iloilo (ILS, DME and ATC equipment), Zamboanga, Cagayan de Oro, Basco, General Santos, Sanga Sanga, Alabat and Kalibo, by USAID. It was expected to complete by the end of 1994. However, site developments, installation of equipment and flight checks are still outstanding at Iloilo, Davao and Zamboanga Airports. Total project cost is about US$ 13 million.

10) Philippine Airways Modernization Project, Phase I

The project aims to establish Monopulse Secondary Surveillance Radar (MSSR) at Laoag and Mt. Majic at Cebu to cover the whole Manila FIR and to provide Manila ACC with the latest ATC equipment. Project cost is about US$ 23 million, and the project is assisted by French Government.

11) Crash Fire Rescue (CFR) Equipment Procurement Project, Phase III

The project includes procurement of 19 CFR vehicles to upgrade fire fighting and rescue capabilities in 16 airports, namely Bacolod, Basco, Butuan, Cagayan de Oro, Cebu, Cotabato, Davao, Dipolog, Dumaguete, Iloilo, Kalibo, Legaspi, Roxas, San Jose, Surigao and Tuguegarao. Twelve vehicles will be procured under the French Financial Protocole Phase III (about US$ 7 million). The first 6 CFR vehicles have been delivered at Manila in May 1996.

2.3.5 Air Carriers

Philippine Airlines (PAL) is the national flag carrier of the Philippines. There are seven other domestic scheduled operators, i.e. Aerolift Philippines, Air Philippines, Airline Employees Cooperative (Asian Spirit), Cebu Pacific Air, Corporate Air, Grand International Airways, and Star Asia Airways, and 46 domestic non-scheduled/charter operators in the Philippines as of May 1996.

Current fleets of the scheduled operators are as follows:

a) Philippine Airlines : 3 x B747-400, 11 x B747-200B, 1 x DC-10-30C, 12 x A300-B4, 12 x B737-300, 10 x Fokker F50, 2 x Shorts SD3-60, and 1 x King Air E90 (Note that domestic services require 3 x A300-B4, 9 x B737-300 and 8 x F50 approximately.)
b) Aerolift Philippines : 1 x DHC-6
c) Air Philippines : 1 x B737-200, 4 x YS-11 (Note that 3 x YS-11 is under the process to obtain air worthiness.)
d) Asian Spirit : 2 x DHC-7
e) Cebu Pacific Air : 4 x DC-9 (Note that one is not operational as of May 1996)
f) Corporate Air : 2 x Cessna 208, 1 x DHC-6
g) Grand International Airways : 3 x A300-B4, 1 x B737-200 (Note that one A300 is used for international services, and B737 is under C-Check in Malaysia as of May 1996.)
h) Star Asia Airways : 3 x Do-228, 1 x LET

Number of foreign airlines providing scheduled services in the Philippines are 36 in May 1996.

2.3.6 Air Services

Scheduled international services are provided at Manila / Ninoi Aquino, Cebu / Mactan and Davao International Airports.

Scheduled domestic services are provided at 39 airports by PAL. Manila and Cebu are hubs of the PAL's domestic services. A300s are operated at Manila, Cebu, Davao and Puerto Princesa, and there is a plan to start A300 operations at General Santos and Zamboanga from July and November 1996, respectively.

Scheduled domestic services by other operators (as of May 1996) are as follows:

a) Aerolift Philippines : at Manila and Busuanga by DHC-6
b) Air Philippines : at Manila, Iloilo, Puerto Princesa, Subic and Zamboanga by B737, and at Manila, Kalibo and Subic by YS-11
c) Asian Spirit : at Manila, Caticlan, San Jose Cauayan by DHC-7
d) Cebu Pacific Air : at Manila, Cebu, Iloilo, Cagayan de Oro and Davao by DC-9
e) Corporate Air : at Manila and Subic by DHC-6 and Cessna
f) Grand Int'l Airways : at Manila, Cebu and Davao by A300

g) Star Asia Airways : at Cebu, Caticlan and Sandoval by Dornier

Air Philippines intends to start B737 operations at Bacolod, Cebu, Cagayan de Oro, Davao, General Santos, and Tacloban., and YS-11 operations at Baguio, Legaspi, Naga, Roxas, and Virac from June or July 1996. Cebu Pacific intends to operate DC-9 at Tacloban hopefully from September 1996. Grand International Airways has schedule to start B737 operations at Iloilo, Tacloban and Cagayan de Oro in June and at Bacolod, Calibo and Zanboanga from July 1996, and start A300 operations at Puerto Princesa and General Santos.

2.4 SURFACE TRANSPORTATION

2.4.1 General

As is to be expected in an archipelagic country consisting of more than 7,000 islands, the transport system in the Philippines has been formed to suite the natural conditions. For example, transport within individual islands (inter-district transport) is dominated by road transport, except for Luzon Island, where a rail transport system has been developed in and around Manila. Regarding transport between islands (inter-region transport), the natural conditions indicate that either sea transport or air transport be relied upon.

This section outlines trends in the surface transport system based on data and information gathered in the Study, and also describes the transport volumes by mode of transport between the target regions (Regions 5, 6 and 8) and Manila.

2.4.2 Sea Transport

Sea transport in the Philippines has been playing an extremely important role in inter-region transportation, not only in terms of social, culture and economic activities, but also in administrative and security (military) terms. In this sense, the demand for the sea transport is increasing every year, in the sector itself is becoming more and more modernized.

Table 2.4.1 shows the number of ships entering and leaving major ports in the Philippines. As seen, the level of ship traffic throughout the whole country has increased at annual average growth rate of 6.4% in the period between 1990 and 1994, although there are fluctuations between the individual ports. This is a clear indication of the fact that the demand for sea transport is increasing every year. In particular, Iloilo Port indicates the rapid average increase of 23.1%.

Table 2.4.2 shows the current numbers of passengers using ships that are based in the target provinces. Although it is not possible to conclude any uniform trends in the numbers of passengers using the ports, it is worth noting that the numbers of passengers boarding at ports in and around Iloilo Province are far greater than those of the other ports. The same trends can also be seen in shipping volumes of commodities in 1993 from each of the targeted ports (see Table 2.4.3). Again, it should be noted that the amount of freight shipped at ports in and around Iloilo Province is far in excess of freight handled at the other ports.

Table 2.4.1 Number of Vessels Entered and Cleared in Selected Port, Domestic Used

	1990		1991		1992		1993		1994	
Total	163,366	100%	130,308	100%	163,970	100%	172,991	100%	209,585	100%
	100%		80%		100%		106%		128%	
Manila	21,731	13.3%	9,981	7.7%	18,132	11.1%	19,251	11.1%	19,859	9.5%
	100%		46%		83%		89%		91%	
Cebu	21,738	13.3%	16,625	12.8%	33,404	20.4%	35,654	20.6%	38,693	18.5%
	100%		76%		154%		164%		178%	
Iloilo	10,349	6.3%	9,708	7.5%	22,526	13.7%	21,962	12.7%	23,785	11.3%
	100%		94%		218%		212%		230%	
Others	109,548	67.1%	93,994	72.1%	89,908	54.8%	96,124	55.6%	127,248	60.7%
	100%		86%		82%		88%		116%	

Source: 1993 Commodity Flow in the Philippines: National Statisrical Office

Table 2.4.2 Number of Passenger by Port of Origin

	1989	1990	1991	1992	1993
Albay Pro.	40,656	42,726	44,443	40,397	5,307
Iloilo Pro.	291,580	586,521	362,237	300,553	423,476
Negros Pro.	196,400	89,301	49,289	50,260	42,299
Leyte Pro.	425,574	178,487	182,699	152,039	98,966

Source: 1993 Commodity Flow in the Philippines: National Statistical Office

Table 2.4.3 Quantity of Coastwise Trade by Port of Origin (1993)

(in tons)

Albay Pro.	Iloilo Pro.	Negros Pro.	Leyte Pro.
96,520	1,143,795	127,229	210,823

Source: 1993 Commodity Flow in the Philippines : National Statistical Office

2.4.3 Road Transport

As mentioned previously, the road transport system plays an extremely important role in transport within islands (inter-district transport) in the Philippines. The motorization of road transport has been significant in recent years. As can be seen in Table 2.4.4, the average rate of increase in the number of registered vehicles has been as high as 9.6% for all vehicle types between 1990 and 1994.

Table 2.4.4 Number of Motor Vehicle registered in the Philippines by Type

	Cars		Buses		Others		Total	
1981	318,085	31.6%	17,821	1.8%	670,124	66.6%	1,006,030	100%
1990	454,554	28.1%	24,603	1.5%	1,141,085	70.4%	1,620,242	100%
1991	456,606	26.6%	20,690	1.2%	1,238,070	72.2%	1,715,366	100%
1992	483,622	25.7%	25,827	1.4%	1,370,114	72.9%	1,879,563	100%
1993	531,240	25.0%	24,603	1.2%	1,569,272	73.8%	2,126,115	100%
1994	572,766	24.5%	27,595	1.2%	1,741,108	74.4%	2,341,469	100%
A.A.G.R. (1981~1994)	4.6%		3.4%		6.7%		-	
A.A.G.R. (1990~1994)	5.9%		8.9%		9.6%		-	

Source: 1995 Philippines Statistical Yearbook

Despite this growing trend of motorization, there has been no corresponding satisfactory improvement in the road infrastructure, as can be seen in Table 2.4.5. There has been almost no increase in the overall length of the public road, and the preparation of concrete or asphalt paved road to guarantee the smooth and economic vehicle traffic is failing to keep step with the rate of motorization.

Table 2.4.5 Public Road Length by Surface Type (kilometers)

	Asphalt		Concrete		All Type	
1980	17,634	11.6%	10,085	6.6%	151,919	100%
1990	12,753	7.9%	10,358	6.4%	160,710	100%
1991	13,113	8.2%	10,682	6.6%	160,710	100%
1992	12,864	8.0%	13,388	8.3%	160,843	100%
1993	13,130	8.2%	13,409	8.3%	160,883	100%
1994	13,165	8.2%	13,625	8.5%	161,035	100%
A.A.G.R. (1990~1994)	0.8%		7.1%		0.07%	

Source: 1995 Philippines Statistical Yearbook

The road transport situation in Manila and other major cities and also within local districts and between regional cities is one of heavy congestion and long arrival times, and so on, and many issues need to be overcome in the near future.

2.4.4 Rail Transport

As seen in Table 2.4.6, rail transport in the Philippines has witnessed stagnation or a fall in the number of passengers and volume of freight in the period between 1990 and 1994. The rail transport, which is a public means of transport, should play an important role in the future development of industry. In

order to respond to the demand for rail transport, the improvement and expansion of the transport system needs immediate attention as an important issue.

Table 2.4.6 Number of Passenger, Freight by Railway

(unit: thousand)

	Passenger		Freight Tons		Express Tons	
1990	928.0	100%	32.2	100%	16.8	100%
1991	654.9	70.6%	11.6	36.0%	10.3	61.3%
1992	466.8	50.3%	4.9	15.2%	8.6	51.2%
1993	401.7	43.3%	17.5	54.3%	7.3	43.5%
1994	426.0	45.9%	12.3	38.2%	7.2	42.9%

Source: 1995 Philippines Statistical Yearbook

2.4.5 Commodity Flows by Transport Mode between NCR and Target Regions

Tables 2.4.7 through 2.4.9 indicate the flows of commodities between the National Capital Region (NCR) and each of the target regions (Region 5, Region 6, Region 8) by mode of transport.

Table 2.4.7 Mutual Regional, Commodity Flow (NCR and Region 5)

(000kg)

	1989	1990	1991	1992	1993	1994
Rail Mode						
NCR -> Region V	29,051	6,896	2,801	2,742	2,000	
NCR <- Region V	6,744	6,641	3,735	2,954	2,169	
Sub Total	35,795	13,537	6,536	5,696	4,169	
		16.7%	9.3%	9.8%	6.9%	
Water Mode						
NCR -> Region V	-	24,134	29,939	35,623	37,190	
NCR <- Region V	-	42,445	32,635	15,412	17,974	
Sub Total		66,579	62,574	51,035	55,164	
		82.1%	89.2%	88.0%	91.7%	
Air Mode						
NCR -> Region V	-	484	552	722	343	366
NCR <- Region V	-	537	503	516	479	624
Sub Total		1,021	1,055	1,238	822	990
		1.3%	1.5%	2.1%	1.4%	
Grand Total		81,137	70,165	57,969	60,155	

Source: 1995 Philippines Statistical Yearbook and 1993 Commodity Flow in the Philippines: National Statistical Office

Table 2.4.8 Mutual Regional, Commodity Flow (NCR and Region 6)

(000kg)

	1989	1990	1991	1992	1993	1994
Water Mode						
NCR → Region VI	-	165,704	630,708	266,612	323,481	-
NCR ← Region VI	-	755,734	707,077	1,022,633	723,917	-
Sub Total		921,438	1,337,785	1,289,245	1,047,398	
		99.3%	99.5%	99.4%	99.1%	
Air Mode						
NCR → Region VI	-	3,489	4,603	4,509	4,650	8,016
NCR ← Region VI	-	3,048	2,525	3,343	4,947	3,812
Sub Total		6,537	7,128	7,852	9,597	11,828
		0.7%	0.5%	0.6%	0.9%	
Grand Total		927,975	1,344,913	1,297,097	1,056,995	

Source: 1995 Philippines Statistical Yearbook and 1993 Commodity Flow in the Philippines: National Statistical Office

Table 2.4.9 Mutual Regional, Commodity Flow (NCR and Region 8)

(000kg)

	1989	1990	1991	1992	1993	1994
Water Mode						
NCR →Region VIII	-	70,669	119,419	165,783	130,269	-
NCR ←Region VIII	-	217,171	209,762	27,265	22,596	-
Sub Total		287,940	329,181	193,048	152,865	
		99.6%	99.6%	99.4%	99.3%	
Air Mode						
NCR →Region VIII	-	906	1,142	1,070	1,002	1,192
NCR ←Region VIII	-	328	228	150	135	292
Sub Total		1,234	1,370	1,220	1,137	1,484
		0.4%	0.4%	0.6%	0.7%	
Grand Total		289,174	330,551	194,268	154,002	

Source: 1995 Philippines Statistical Yearbook, and 1993 Commodity Flow in the Philippines: National Statistical Office

As mentioned earlier, rail transport is only available between Region 5 and NCR. The flow of commodities between NCR and Region 5 is broken down into 6.9% by the rail mode, 92.0% by the water mode and 1.1% by the air mode. The same flow between NCR and Region 6 is broken down into 99.1% by the water mode and 0.9% by the air mode, and flow between NCR and Region 8 consists

of 99.3% by the water mode and 0.7% by the air mode. Each of these flow patterns with respect to commodities clearly demonstrate the immovable superiority of sea transport.

Regarding the demand for air transport, a slight increase was only found to be occurring between NCR and Region 6, and the flow of commodities in the other cases was found to show no marked changes.

With respect to rail transport between Manila and Region 5, demand levels have fallen greatly in the period between 1989 and 1994, however it is expected that the demand for freight transport will recover as a result of the economic benefit to be gained from using the railway, in parallel with the improvement and expansion of the rail system.

2.5 ENGINEERING AND CONSTRUCTION

2.5.1 General

This section summarizes data collection on engineering and construction at Bacolod, Iloilo, Tacloban and Legaspi. The data collected through interviews, questionnaire and site investigations includes on construction companies, materials, equipment/plant, labors and regulations.

2.5.2 Local Construction Companies

The contractors were asked to complete questionnaire form which included the unit rates of construction materials, labors and the works, and list of available constructional equipment and plant owned by them. These construction companies surveyed were supposedly large scale ones in Iloilo, Bacolod, Tacloban and Legaspi cities. According to the survey results including the contractors' replies to the questionnaires, the aforesaid contractors do not possess sufficient number/kind of constructional equipment and plant.

In particular, the contractors mostly do not own pavement equipment such as asphalt mixing and concrete batching plants, asphalt and concrete pavers, etc. which account for an important part of the construction works for the project. (Only one contractor in Iloilo city alone owns 65-ton/hour asphalt concrete plant.) They seem to have no or a little experience in large scale pavement works such as airport pavement.

From the viewpoints of airport construction work experience, engineering and technical capability, financial and human resources, constructional equipment/ plant in possession, construction management ability, none of the contractors based in those four cities is qualified to execute large scale construction work such as a new airport development.

2.5.3 Construction Materials

The survey results reveals that major construction materials for civil and building works are readily available at four cities. These materials include cement, reinforcing steel bars, straight asphalt, sand, aggregates, ready mixed concrete, asphalt concrete mixtures, roofing, and flooring and finishing materials for building.

However, there are also some comments by the consultant supervising the on-going large scale construction works that reinforcing steel bars of normal strength by local manufacturer are readily available but those of high grade needs to be imported and that the contractors often encounter shortage of cement supply and result in the delay.

With regard to the quality of materials, there seems to be no major problems. However, it was also mentioned that the quality of the Philippine-made cement fluctuates and requires much more quantity than

foreign made good quality ones in the case of the concrete pavement slabs. This suggests that the cement quality of local product may not be as good as it should be.

With regard to the quality of straight asphalt, it is considered substandard for the following reasons :

The runways at the Iloilo, Bacolod and Legaspi airports were overlaid by asphalt concrete mixture in 1993. This means that only less than 3 years have elapsed since then. However, by observation made at sites indicates that the straight asphalt has been fairly weathered and have already lost some of its tenacity and combination force. Particularly, from the surface of the overlaid asphalt concrete layer on the runway of Iloilo airport, asphalt mortar has come off and scattered, and coarse aggregates are exposed on the pavement surface and formed very rough surface. It is considered that this defect has been caused mainly by the rapid weathering of the poor- quality straight asphalt. Further more, coarse aggregates consisting of the asphalt concrete mixtures paved at the four airports are not fully crushed and contain a sizable quantity of aggregates without crushed surfaces and this results in lacking of interlocking force between the aggregates in the mixtures and low Marshall Stability. Coarse aggregates used for asphalt concrete should be fully crushed. These facts suggest that the poor workmanship may also attributed for the poor quality of asphalt pavement.

2.5.4 Construction Equipment and Plant

Constructional equipment and plant owned by the surveyed contractors at each locals are a few both in their kinds and numbers. Apparently, they are not prepared to carry out the large scale construction work such as a new airport development works. Manila- based contractors operating in Iloilo and Tacloban cities, however, possesses relatively abundant constructional equipment and plant.

All contractors except the Manila-based ones have almost no paving equipment and plant such as asphalt mixing/concrete batching plants, concrete and asphalt pavers.

Nevertheless, it is worthwhile to note that construction equipment lease companies are available in Iloilo, Bacolod, Tacloban, and Legaspi cities. It was informed that these lease companies can provide various kinds of equipment to be required for the construction works of the project.

2.5.5 Labors

Construction workers can be classified by their occupational categories such as carpenter, steelfixer, stonemason, plumber, roofer, plasterer and others. The survey results indicate that all kind of labors are available in all four cities.

The workmanship of civil and architectural works at these four airports surveyed are considered generally good except paving works.

With regard to the workmanship of the paving works, it is judged that surface finishing is poor on both cement and asphalt concrete pavements at those four airports. it is deemed that workers are not experienced in large scale paving works. In summary observations made at those sites on pavements and its workmanship are as follows:

a) Concrete Pavement:

The evenness (flatness) of the pavement surfaces on the runways, aprons and taxiways is bad. As a result, there are countless spots or areas in which the rainwater is stagnant and the trafficability of aircraft takeoff or landing with high speed is poor.

b) Asphalt Concrete Pavement:

In general, the surface texture is coarse (rough) and at many areas aggregates gather on the surfaces without asphalt mortar and form honey-combs.

c) The poor workmanship is considered attributable to poor techniques of paver operators and finishing by rake-men.

Labor wages per 8-hours range from PHP 110 for common labor to PHP 300 for heavy equipment operator. These wages also varies by each contractor.

2.6 ENVIRONMENTAL PROTECTION

2.6.1 Laws and Regulations

The basic environmental ordinance consists mainly of two Presidential Decrees (P.D.); the P.D. No. 1151 (Established and enacted on June 1977) known as the "Philippine Environmental Policy" and the P.D. No. 1152 (Established and enacted on July 1977) known as the "Philippine Environmental Code".

The P.D. No. 1151 provides a provisions for the national environmental policies, the objectives of the state towards environment, the right to have healthy environment, and the requirements of Environmental Impact Assessment (EIA). It requires, not only to the government agencies but also to all organizations including the private companies, the preparation and the submission of the Environmental Impact Statement (EIS) for the activities and projects that may seriously affect the environment.

The P.D. No. 1152, on the other hand, is composed of seven titles, namely; Air Quality Management, Water Quality Management, Land Use Management, Natural Resources Management and Conservation, Waste Management, Miscellaneous Provisions, and Final Provision. These chapters provides guidelines for each clause on the matters pertinent to the policy for setting environmental standards, the responsibilities and powers of the implementing agency, measures to maintain the environment, and the plans to maintain the environment.

Other ordinances relevant to the environment are:

a) the DENR Administrative Order (D.A.O.) No. 14 which establishes environmental standards for air pollution, exhaust emission standards, exhaust emission standards for automobiles and air quality management standards,
b) the D.A.O. Nos. 34 and 35 which establishes criteria for water quality and effluent,
c) the D.A.O. No. 29 "Implementing Rules and Regulations of Republic Act 6969" which establishes various ordinances with several government agencies involved, such as DENR, Ministry of Public Affairs, and Ministry of Health, and
d) the "Ordinance for the Conservation of Nature" like P.D. No. 3915 which establishes provision for the parks for public good and game preserve/sanctuaries to protect wild life.

2.6.2. Environmental Impact Assessment System

1) Positioning of Environmental Impact Assessment (EIA) System

The early EIA System of the Philippines was established by the implementation guideline of P.D. No. 1151 (May 1978) and the Environmental Impact Statement (EIS) System was indicated in the Section 4 of P.D. No. 1151.

By the P.D. NO. 1586 (June, 1978), the Philippine EIS was officially established and enacted in

June, 1982 with its basic policy objectives "to attain and maintain a rational and orderly balance between socio-economic growth and environmental protection".

Also, the government has established a rules and regulations prescribing the function of related agencies and committees as well as the framework of EIA System in July 1983. Furthermore, in 1992, the additional policy objectives of the EIS System was promulgated in D.A.O. No. 21 to promote its proper administration and reinforcement in order to achieve further preservation of the environment. These additional policy objectives are:

a) Incorporate environmental considerations in the early stages of project development;
b) Assess the direct and indirect costs and benefits of projects to the local community and the country as a whole;
c) Reduce the unacceptable impacts of projects and describe the most appropriate and cost-effective mitigation measures, including both pollution prevention and control;
d) Encourage early and continuous public involvement to help ensure that projects are socially acceptable;
e) As much as possible, involve a wide spectrum of concerned sectors and the adjacent communities that will be affected by the project development in the exchange of views, information and concerns in order to effect projects that are beneficial to the majority and acceptable to the community; and
f) Provide the basis for assessing the actual impacts of implemented and completed projects, and identify other significant impacts in order to effect corrective actions and improve future projects of similar type and magnitude.

2) Environmental Administrative Agencies Involved in EIA System

The administration that involves environment is done by DENR and Environmental Management Bureau (EMB), a subordinate agency of DENR. Their duty and responsibility is on the management and examination of EIA, and has an authority to impose penalties for the violation. Presently, the EIA Section is established in EMB. The EIA will be examine in this section and the project proponent can implement its project when the Environmental Compliance Certificate (ECC) is approved and issued. Figure 2.6.1 shows EIA system and project cycle.

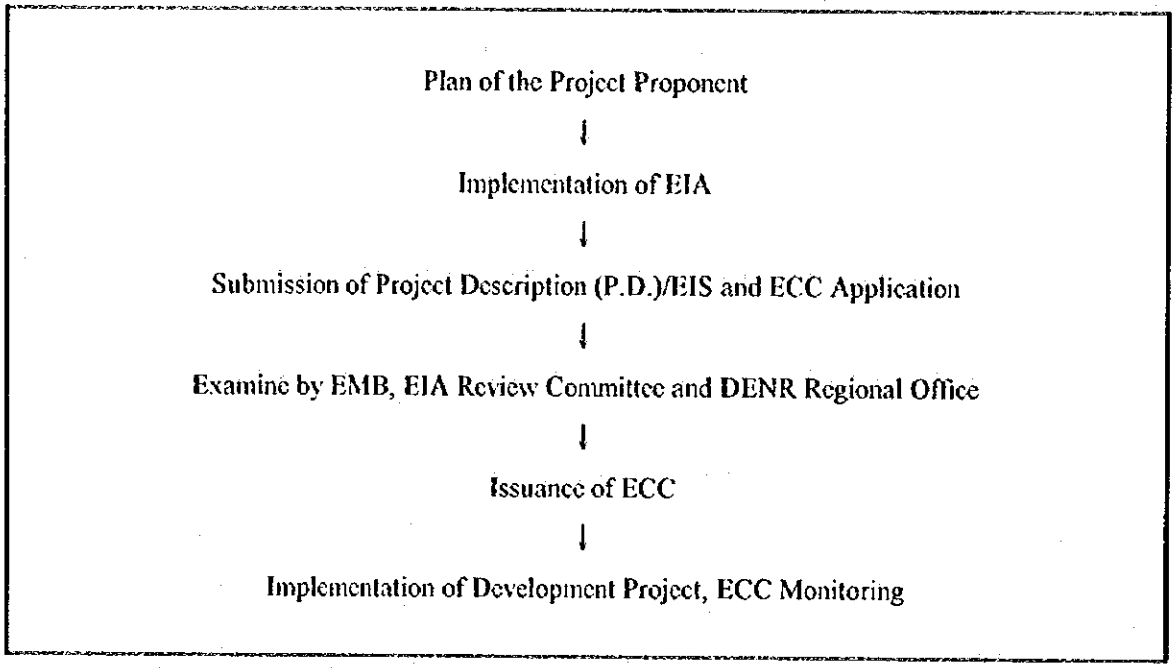


Figure 2.6.1 EIA System and Project Cycle

3) Type of Project Subjected for EIA System

Three types of projects subjected for EIA System are described in Table 2.6.1 below:

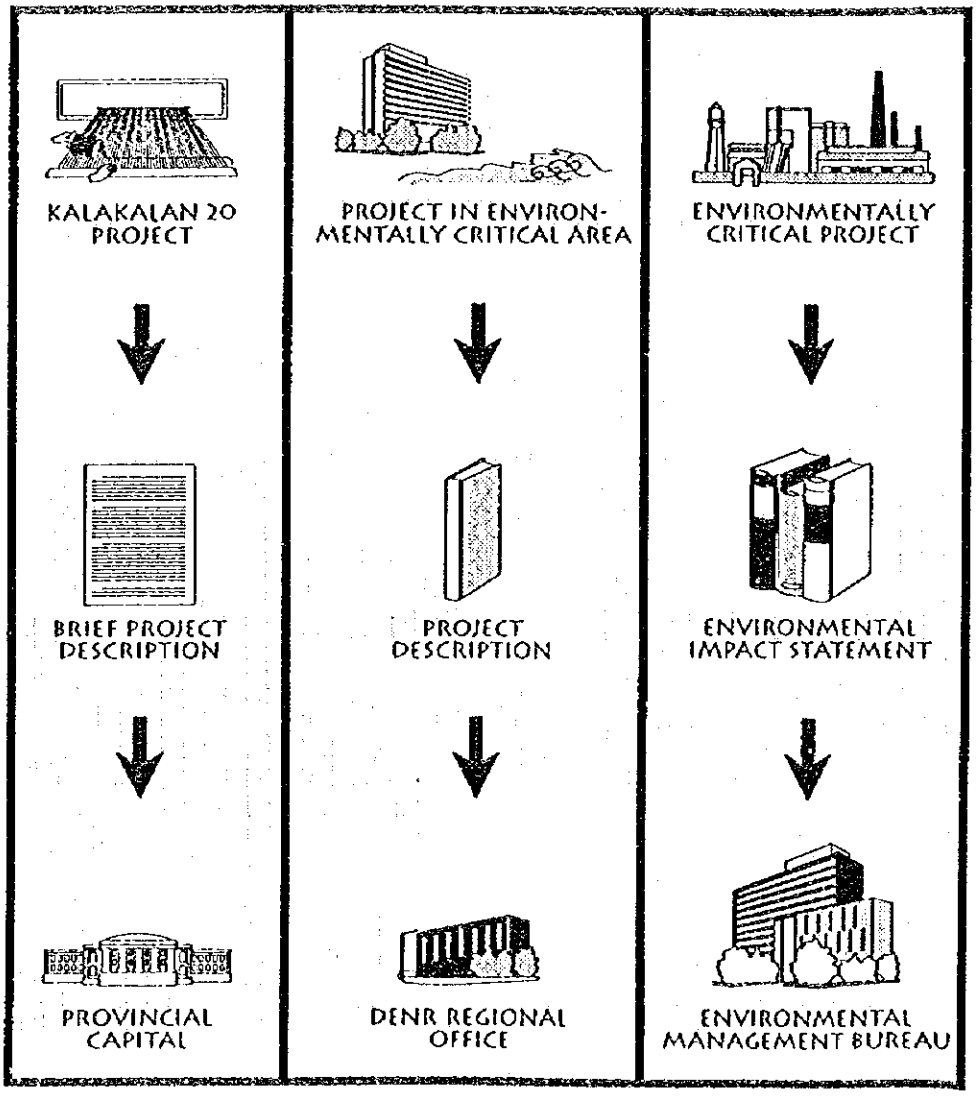
Table 2.6.1 Type of Projects in the EIA System

Kalakalan 20 Projects	*Projects in Environmentally Critical Areas*	*Environmentally Critical Projects*
A business entity, association or cooperative engaged in the production, processing or manufacturing of products or commodities or other productive services that is: o Located anywhere in the country except 4 cities and 13 municipalities of Metro Manila or other highly urbanized areas and has o A total of 20 employees or less and has o Total assets, at the time of registration, of P500,000 or less and is o Not an existing business that has been collapsed and/or transferred from an ineligible area to an eligible area.	Non-critical projects located in: o National parks, watershed reserves, wildlife preserves, sanctuaries o Potential tourist spots o Habitat for any endangered or threatened species of indigenous Philippine flora and fauna o Areas of unique historical, archaeological or scientific interest o Areas traditionally occupied by cultural communities or tribes o Areas frequently visited and/or hard-hit by natural calamities o Areas with critical slopes or classified as prime agricultural lands o Recharge areas of aquifers o Water bodies o Mangrove areas or coral reefs.	o Heavy industries: non-ferrous metal industries, iron and steel mills, petroleum and petrochemical industries, smelting plants o Resource extractive industries: major mining and quarrying projects, forestry projects, dikes and/or fishpond development projects o Infrastructure projects: major dams, major power plants, major reclamation projects, major roads and bridges.

Source: Philippine EIS System Guide : Policies and Procedures / EMB

4) **Types of Documents Required and Principal Reviewing Agencies**

Each project described in the previous section is classified into two types of project in accordance ith EIA Guideline as shown in Figure 2.6.2 below; the project that would require an implementation of environmental survey on Project Description (PD) level and the one that would require an implementation of larger scale environmental survey and submit EIS:



Source: Philippine EIS System Guide : Policies and Procedures / EMB

Figure 2.6.2 Types of Projects, Documents and Principal Reviewing Agencies

The PD report must contain 11 items of considerable matters such as "Project Operation Plan" and "List of All the Substances to be Emitted from the Project". The EIS must contain the following 16 items:

1.0 Name and Address of Project Proponent
2.0 Type of Project
3.0 Overview Summary
4.0 The Project Setting
  4.1 Declaration and Objective
  4.2 The Need
  4.3 Alternatives
  4.4 Associated Projects
5.0 The Proposal
  5.1 General Layout
  5.2 Pre-Construction Details
  5.3 Operation and Maintenance
  5.4 Contingency Plans
  5.5 Abandonment
6.0 A Brief History of Past Environmental Conditions and a Description of Existing Environment
  6.1 Climate
  6.2 Terrain
  6.3 Hydrology
  6.4 Oceanography
  6.5 Atmosphere
  6.6 Vegetation
  6.7 Fish and Wildlife
  6.8 Land and Resource Use
  6.9 Socio-economic Aspects
7.0 Future Environmental Conditions without the Project (An Average of Five Years Projection)
8.0 Prediction and Assessment of Impacts
  8.1 Physical/Chemical Effects
  8.2 Ecological Effects
  8.3 Aesthetic Effects
  8.4 Socio-economic Effects
9.0 Contingency Plans
10.0 Environmental Briefings and Monitoring

11.0 Mitigation Measures
12.0 Residual/unavoidable Impacts
13.0 Information Deficiencies
14.0 Appendices
15.0 Consultation and Comments including Public Recommendations
16.0 Other Documents to be Attached

2.6.3. Environmental Standards

The Philippine Environmental Standards is found in P.D. No. 1152 (July 1977) (Philippine Environmental Code) where the policies of the setting of environmental standards is promulgated for each environmental item. However, after all the administration relevant to the environment has been solely managed by DENR by Executive Order No. 192 (June 1987), the revision of each field including the former environmental standards and the effluent standards has been undertaken by the DENR since 1990.

The present Philippine Environmental Standards are the Emission Standards, Air Quality Standards, Water Quality Criteria, Effluent Standards and Noise Standards by the P.D. No. 984 (Environmental Standards), D.A.O. No. 14 (Air Pollution Management), D.A.O. No. 34 (Revised Water Usage and Classification Water Quality Criteria.), D.A.O. No. 35 (Revised Effluent Regulations.).

1) Emission Standards

National Emission Standard are promulgating the environmental standards for 13 specific pollutants, namely Antimony, Arsenic, Cadmium, Carbon Monoxide, Copper, Hydrofluoric Acid, Hydrogen Sulfide, Lead, Mercury, Nickel, NO3, Phosphorous, and zinc.

2) Air Quality Standards

National Ambient Air Quality are promulgating the environmental standards for 7 criteria pollutants and 11 specific pollutants as stated below:

a) Criteria Pollutant:

Suspended particulate matter TSP and PM-10, Sulfur Dioxide, Nitrogen Dioxide, Photochemical Oxidants, Ozone, Carbon Monoxide, and Lead.

b) Specific Pollutants:

Ammonia, Carbon Disulfide, Chlorine and Chlorine compounds expressed as CL2, Formaldehyde, Hydrogen Chloride, Hydrogen Sulfide, Lead, Nitrogen Dioxide, Phenol, Sulfur Dioxide, Suspended particulate matter TSP and PM-10.

3) **Water Quality Criteria**

By classifying fresh surface water into 5 categories (class AA up to D) and coastal and marine water into 4 categories (class SA up to SD), the standards are being established for 17 conventional and other pollutants and 17 toxic and other deleterious substances as stated below:

a) Conventional and Other Pollutants:

Color, Temperature, pH, Dissolved Oxygen, 5-Day 20C ° BOD, Total Suspended Solids, Total Dissolved Solids, Surfactant, Oil/Grease, Nitrate as Nitrogen, Phosphate as Phenolic Substances as Phenols, Total Coliforms, or Fecal Coliforms, Chloride as Cl, and Copper.

b) Toxic and Other Deleterious Substances:

Arsenic, Cadmium, Chromium, Cyanide, Lead, Total Mercury, Organophosphate, Aldrin, DDT, Dieldrin, Heptachlor, Lindane, Toxaphane, Methoxychlor, Chlordane, Endrin, and PCB.

4) **Effluent Standards**

Same as water quality criteria above, the effluence are likewise as of the present moment being classified into nine categories and the standards are as of the current situation being established for 12 other conventional and other pollutants and 8 toxic and other deleterious substances as stated below:

a) Conventional and Other Pollutants:

Color, Temperature, pH, COD, Settleable Solids, 5-Day 20C° BOD, Total Suspended Solids, Total Dissolved Solids, Surfactants, Oil/Grease, Phenolic Substances as Phenols, and Total Coliforms.

b) Toxic and Other Deleferious Substances;

Arsenic, Cadmium, Chromium, Cyanide, Lead, Mercury, PCB, and Formaldehyde.

5) **Noise Standards**

The following 4 standards are established:

a) Noise standards in general areas (Class AA-D)
b) Noise standards in areas directly fronting/facing 4-lane road (Class AA-D).
c) Noise standards in areas directly fronting/facing 4-lane or wider (Class AA-D).
d) Maximum noise standards for construction activities and allowable working hours per area (Class 1-4)