2.4 Development Plans

2.4.1 National Development Plan

It was the foremost concern of President Aquino's Government when it took power in February 1986 to establish a viable development plan for the nation and its public who had suffered from a long lasting economic recession and social injustice. To this end, the Medium-Term Philippine Development Plan for 1987 to 1992, including the supportive Regional Development Plans and Investment Programs, was prepared and adopted by the President in November 1986. The plan aims at the economic recovery in the short run by placing emphasis on rural development where two thirds of its public resides. The major objectives of the plan may be itemized as follows:

a) Poverty alleviation;
b) Employment generation;
c) Equitable income redistribution; and
d) Durable economic growth.

Due to adverse factors for the administration, such as political unstableness (several coup attempts), large-scale natural disasters (earthquake, typhoon and volcano eruptions) and the hike of petroleum prices caused by the Gulf War crisis, the implementation of the Plan so far is still far from its goal. Agrarian reform, one of the major institutional improvements which the government proclaimed, has not been realized. Nevertheless, the efforts made by the Government toward the objectives of the Plan can be creditable as a whole under the conditions that prevailed.

2.4.2 Development Plan for Region XI, Southern Mindanao

As mentioned previously, the Aquino Government also prepared the Regional Development Plans and Investment Programs to support the National Development Plan. The Plan for Region XI, Southern Mindanao, states that the overall strategy for regional development shall be addressed not only towards promoting internal growth but towards making a significant contribution to the national development. To support the national objectives of self-sufficiency and a favorable balance of payments, Region XI has targeted the production of a marketable surplus of a wide variety of food and commercial crops which can be exported to other regions of the nation as well as the rest of the world.

It was intended that the industrial sector would complement agricultural activities by processing its production surplus and absorbing manpower to be freed from the primary sector by modernization. Through the establishment of small-scale manufacturing factories, the strategy so far seems successful.

2.4.3 Development Plan for Davao City

As the Region XI's premier urban center, Davao City has been making progress in terms of total production output and the transition of employment status from the primary to secondary/tertiary as discussed earlier in section 2.3.2.

Among other various development plans for Davao City and its surrounding districts, the following may be worth noting for the preparation of the air traffic demand forecast in the next step of the Study:

a) Davao City Integrated Area Development Plan;

b) Tourism industry developments at resort beaches of Davao City and Samal island as well as "Resort City in the South" located in foothills of the Mt. Apo National Park;
c) Proposed fishermen's port; and
d) Proposed Regional Industrial Center (RIC) at Barangay Panacan which is some 14 km north of Davao City.

2.5 Tourism

2.5.1 Visitor Arrivals

(1) Visitor Arrivals to the Philippines

The tourism industry has been one of the major foreign exchange earners for the nation since the early 1970s. As seen in "Appendix - 2.5.1, Visitor Arrivals to the Philippines by Country of Residence, 1980 to 1990", the 1980 visitor arrivals exceeded one million for the first time in its history. From 1981, however, visitor traffic started to decline due to economic and political instability as well as corresponding negative publicity. After hitting 1980's bottom of 773 thousand visitor arrivals in 1985, it uptrended in 1986 and quickly exceeded the past record in 1988 and marked nearly 1.2 million in 1989. However, mainly due to depressed international tourism brought on by the Gulf War Crisis in 1990, it dropped again. Nonetheless, it still maintained over one million arrivals in 1990.

Of the total visitors to the Philippines in 1990, 40% were, from the United States and Japan as seen in Appendix- 2.5.1. Large shares were recorded by Hong Kong (7%), Taiwan (6%) and Australia (5%). Changes in visitor shares were relatively small over the past five years and visitors from these countries have been increasing steadily.

(2) Trip Purpose and Tourist Expenditure

Trip purpose of air visitors at ten major countries of residence in 1990 and the estimated tourist expenditures are shown in Figure 2.5.1 and Table 2.5.1 respectively. As seen in Figure 2.5.1, holiday travel represents nearly 60% of the total trip. It is interesting to note that the share of business trips of most countries is less than 20% except for the United Kingdom and Singapore.

Reflecting the large share of holiday trips in the total mentioned above, the average length of stay by visitors were relatively long, nearing two weeks. Reliability of annual expenditure by visitors may not be as complete as other statistics, yet it is believed that the tourism industries earned more than US$ 400 million annually in recent years.

(3) Visitors to Region XI

The characteristics of visitors and relevant information are tabulated in Table 2.5.2. As seen in the Table 2.5.2, the number of annual visitors to Region XI have been fairly constant, around 160 thousand with a 10% plus or minus fluctuation. Of those visitors, some 55% were on business trips and some 30% were on vacation/pleasure trips.

Although the total number of visitors is still small, the average length of stay and average daily expenditures of visitors have been increasing since 1987. As a result, economic benefits from visitors in 1991 was estimated to amount to two billion pesos, more than double size of that in 1987.

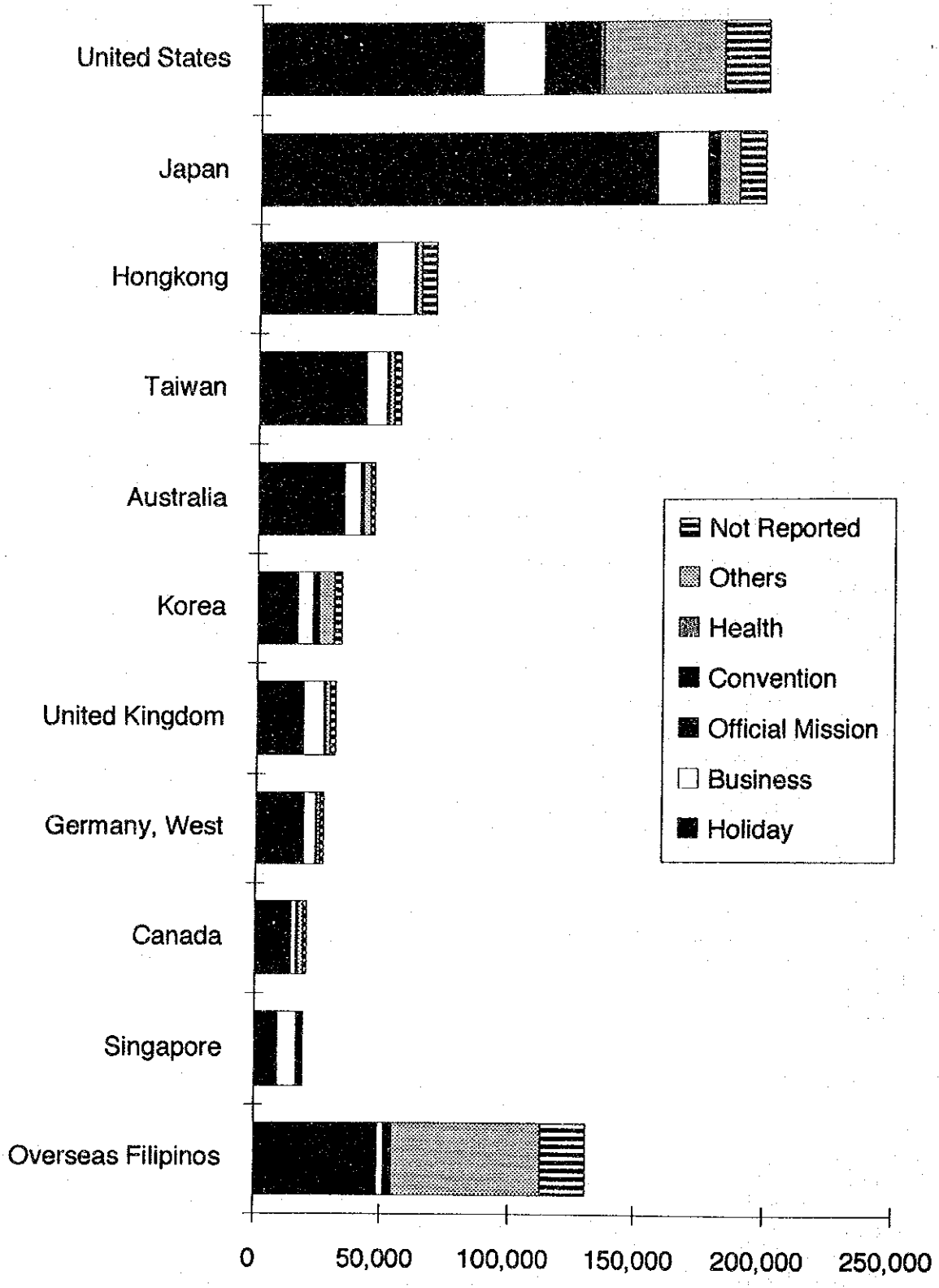


Figure 2.5.1 Air Visitor Arrivals by Purpose of Travel at Ten (10) Major Countries of Residence: 1990

Table 2.5.1 Estimated Tourist Receipts:1970,1975,1980,1985 and 1990

	1970	1975	1980	1985	1990
Number of Visitor Arrivals *1 (actual)	144,071	502,211	1,008,159	773,074	1,024,520
Average length of Stay *2 (days)	7.3	7.8	8.4	9.1	12.1
Total Tourist Receipts (thousand U.S. Dollar)	94,730	109,630	319,740	507,000	466,000
Receipts per Tourist, per day (U.S. Dollars)	90.00	28.00	37.80	72.10	37.80

Note:*1 Starting in 1972, data includes figures on arriving Filipinos permanently residing abroad.

*2 The average length of stay for 1970-1979 was based on the results of the Visitor Sample Survey while the figures for 1980-1983 were computed from the Arrival/Departure Cards.

Source: Tourism Research and Statics Division, Department of Tourism and except for figures on total tourist receipts which were obtained from the Central Bank of the Philippines.

Table 2.5.2 Characteristics of Visitors to Region XI

	1985	1986	1987	1988	1989	1990	1991
Trip Purpose							
Business	103,143	93,124	84,955	90,253	89,982	94,426	91,612
Vacation/Pleasure	38,276	41,254	43,276	45,762	49,278	51,501	50,741
Convention/Conference	18,426	17,426	19,968	22,328	24,496	25,419	24,670
Others	1,274	1,546	1,899	2,041	2,421	1,952	1,466
Total	161,119	153,350	150,098	160,384	166,177	173,298	168,489
Estimated Stay/Expenditure of visitors							
Average length of stay (no. of days)	4	4	4	5	5	5	6
Average daily expenditures (P/day)	478	506	520	550	580	600	650
Estimated receipts	308	295	289	397	501	520	613

Source: Department of Tourism XI

2.5.2 Accommodation Establishment

There are 5 hotels, 16 lodging houses, 7 inns and 3 pension houses in Davao City. The total number of rooms is 1,080. Accommodation categories is shown in Table 2.5.3.

Table 2.5.3 Number of Rooms by Accommodation Categories

Category	No. of Room
Hotel	
First Class	153
Standard Class	153
Economy	140
Resort	
Davao City	43
Samal Island	42
Inn	165
Pension Houses	91
Lodging Houses	292
Total	1080 rooms

2.5.3 Tourism Development

A tourism development study named "Tourism Development Plan Samal Island, Davao 1993-2010" has been prepared by the Philippine Tourism Master Project Team sponsored by World Tourism Organization, Department of Tourism and United Nations Development Programme.

The study presents the results of an investigation into the development of major resort estates on the Samal Island located in the Davao Gulf and provided market assessment, social and cultural considerations, site development plan and project economy for the master plan. The proposed tourism project site is located on the southern tip of the Samal Island. The resort master will require a cooperative effort between the public and private sectors to implement the project successfully. A high class resort called "Pearl Farm Beach" has already been completed by the private sector and opened for business in April 1992.

2.6 Air Transportation

2.6.1 Airports

There are 183 airports and 49 private helicopter/helipads in the Philippines. Of these 183 airports, 85 are owned by the National Government for public use as tabulated in Table 2.6.1.

Table 2.6.1 Number of Airports in the Philippines

As of May 1992

Description	Number
1. Airports	
National Government airports	85
Private airports	91
Military airports	7
Total	183
2. Private Heliports/Helipads	49

Source: Civil Aviation Master Plan, DOTC

The 85 National Government airports are classified into five (5) different classes as shown in Table 2.6.2.

Table 2.6.2 Classification of National Government Airports

Class	Description	Number
Regular International Airport	Principal international airport	2
Alternate International Airport	Secondary international airport	3
Trunkline Airport	Domestic airport serving the principal commercial centers of the country	12
Secondary Airport	Domestic airport serving towns and cities with less regular air traffic densities	37
Feeder Airport	Domestic airport serving towns and rural communities with limited air traffic potential	31
Total		85

List of airports by the above classification is shown in Appendix-2.6.1. Regular international airports are Manila International Airports and Cebu (Mactan) International Airport.

2.6.2 Organization

Department of Transportation and Communications (DOTC) has the full responsibility for managing and operating the airports for the civil aviation activity entrusted to the Air Transportation Office (ATO).

2.6.3 Air Services

(1) International Air Services

Bouraq Indonesia airlines commenced scheduled two weekly flights between Davao and Manado using HS-748 aircraft from April 29, 1992. Before the inauguration of the flights, non-scheduled international flights were operated between Davao and Hong Kong, and between Davao and Singapore by the Philippine Airlines (PAL) using A300 and B737 respectively. Details of the current international air services are summarized in Table 2.6.3.

Table 2.6.3 Current International Air Services From/To Davao

As of May 1992

Route	Airline	Aircraft	Frequency	Remarks
(Scheduled)				
Davao-Manado	Bouraq	HS748	2/week	Inauguration on April 29, 1992
(Non-Scheduled)				
Davao-Hong Kong	PAL	A300	Two Flights	April 2 and 6 1992
Davao-Singapore	PAL	B737	Two Flights	December 6 and 9, 1991

Note: 1. HS748: 42 seats
2. 2/week means one arrival and one departure per week

According to the Philippine Airlines and the City of Davao, non-scheduled flights to Hong Kong and Singapore were anticipated to resume in June 1992. The scheduled PAL flights to Manado were scheduled to start from the summer of 1992 to increase the frequency in this sector. These intended inaugurations of international air services are tabulated in Table 2.6.4. As seen in the Table 2.6.4, PAL intended to inaugurate scheduled cargo flights from Davao to Nagoya in Japan using A300 freighters by October 1992. Up to March 1993, these schedules have not yet been realized.

Table 2.6.4 Intended Inauguration of International Air Services From/To Davao

Route	Airline	Aircraft	Scheduled/ Non-Scheduled	Frequency	Remarks
1. Passenger Flight					
Davao - Hong Kong	PAL	–	Non-scheduled	4/month	Hopefully from June 1992
* Attempting to change to a once/week Flight Schedule.					
Davao - Hong Kong	CX	–	–	–	Under consideration
Davao - Singapore	PAL	–	Non-scheduled	2/month	Hopefully from June 1992
Sydney - Queensland - Davao - Manila	QANTAS	–	–	–	After completion of the Davao Airport Development Project
Davao - Manado	Bouraq	F50	Scheduled		From Summer 1992
Davao - Manado		B737	Scheduled		From Summer 1995
2. Cargo Flight		–	–	–	
Davao - Nagoya	PAL	A300 Freighter	Scheduled	2/week	Before October 1992

Source : PAL Davao Branch Office and City of Davao
Note : 4/Month means two arrivals and two departures per month

Flight routes of current and future international air services are illustrated in Figure 2.6.1.

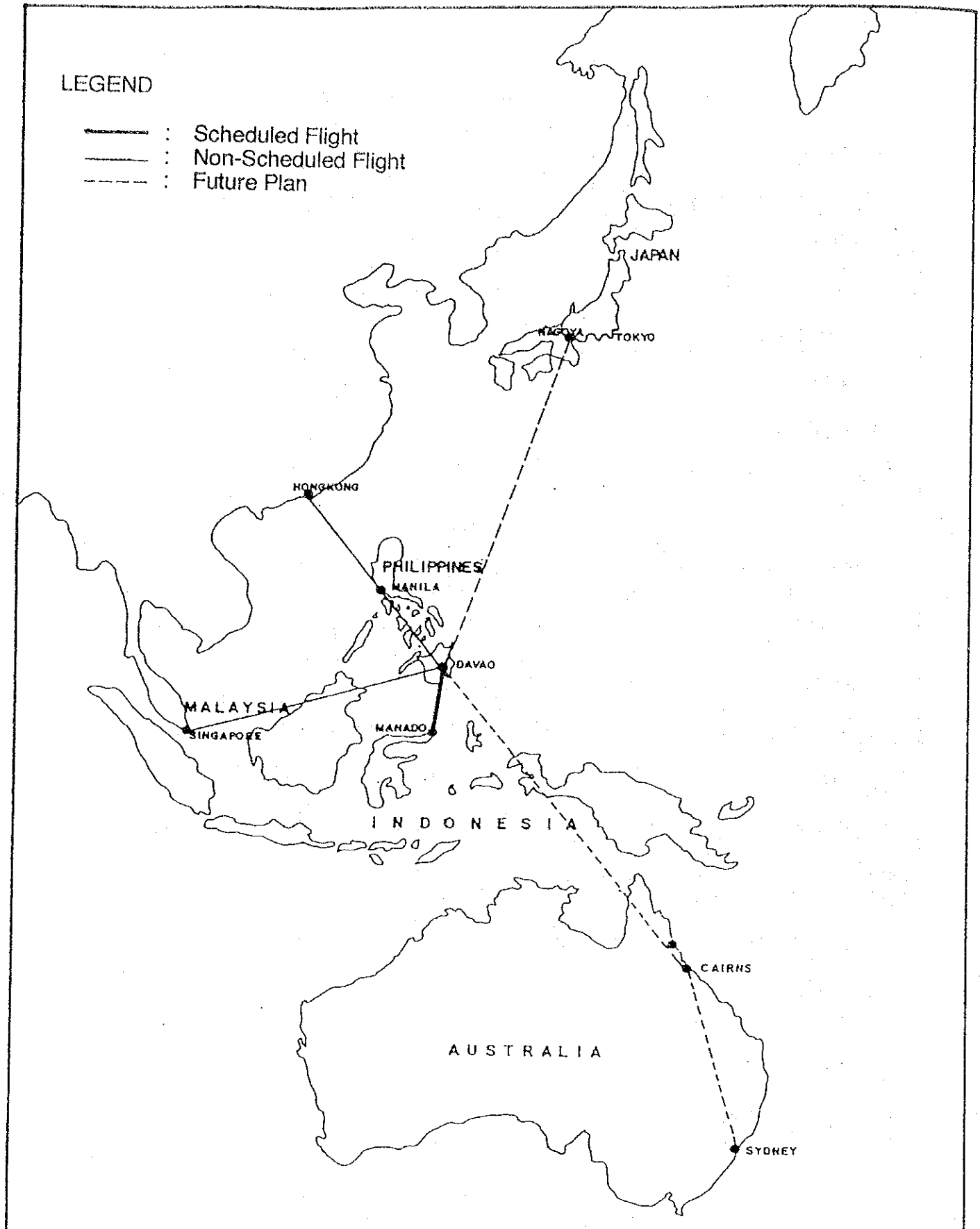


Figure 2.6.1 International Flight Services From/To Davao

(2) Domestic Air Services

The Philippine islands are covered with a domestic air network. Davao is connected by air with four other cities as shown in Figure 2.6.2. NAIA in Manila, Mactan in Cebu, and Davao airports serve as hub airports in the domestic air network. Frequency of domestic flight form/to Davao is 70 flights per week as shown in Table 2.6.5.

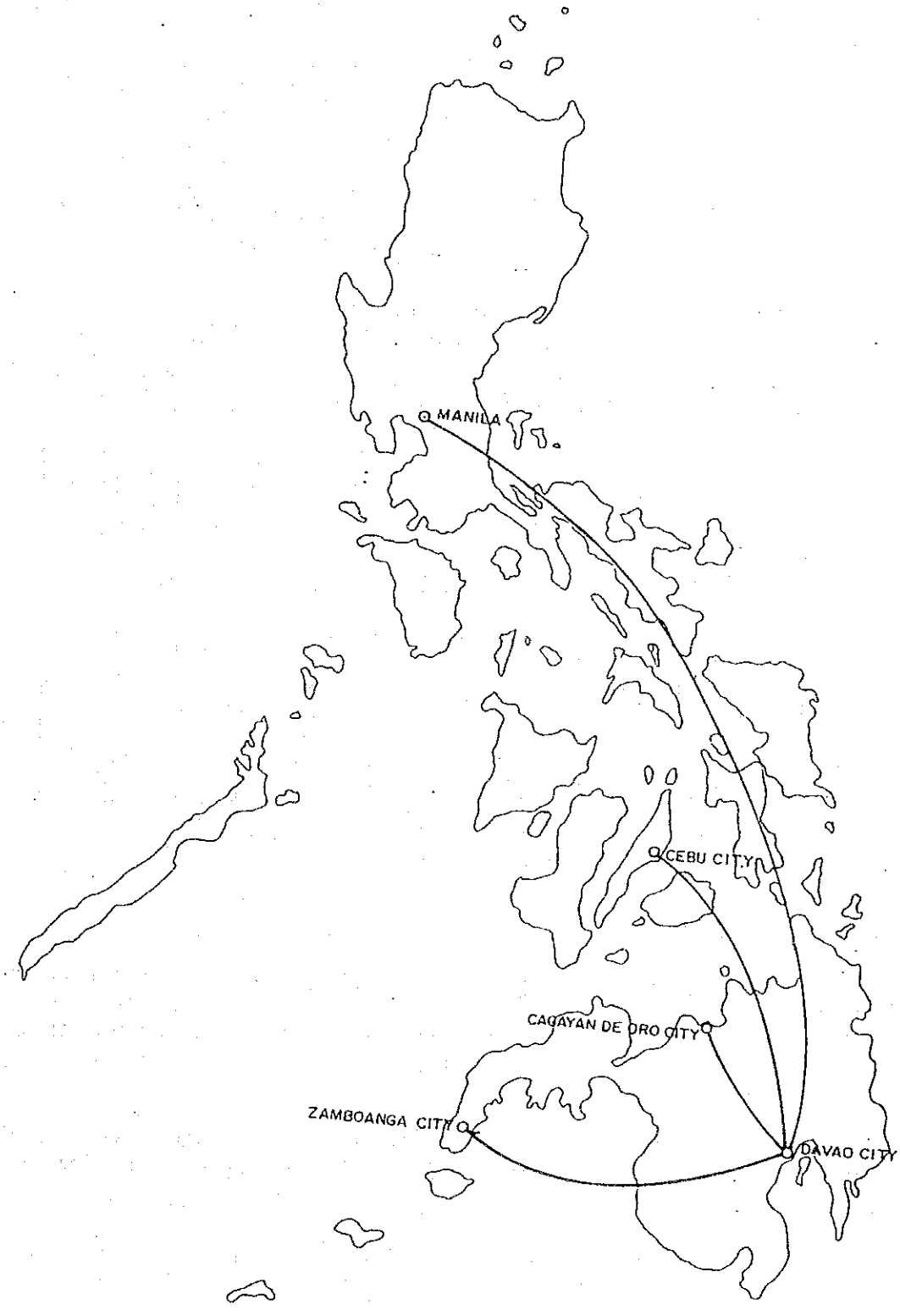


Figure 2.6.2 Domestic Air Routes From/To Davao

Table 2.6.5 Present Domestic Air Services From/To Davao

As of May 1, 1992

Route	Airline	Aircraft	Frequency (arrival and departure)
Manila	PAL	A300	28/week
Cebu	PAL	B737	20/week
Zamboanga	PAL	F50	14/week
Cagayan de Oro	PAL	B737	8/week
Total			70/week

Note: A300 : 244 seats
B737 : 41 seats
F50 : 54 seats

Because of the steady growth of the domestic air traffic demands, PAL has a plan to increase the frequency of flights from/to Davao as shown in Table 2.6.6.

Table 2.6.6 Future Domestic Air Services from/to Davao Planned by PAL

ROUTE	1992-1993	1993-1994	1994-1995	1995-1996	1996-1997
Manila					
(A300)	28	28	28	28	28
(B737)			8	8	14
Cagayan de Oro					
(B737)	8	14	14	14	14
Cebu					
(B737)	20	20	24	24	28
Zamboanga					
(F50)	14	14	14	14	14
Total	70	76	88	88	98

Source: PAL long range plans for Davao (1992-1997) as of January 1992,
PAL Marketing Research 15 Jan, 92.

2.6.4 Airline in the Philippines

There are two airline companies in the Philippines offering scheduled air services to the public: the Philippines Airlines (PAL), a private-enterprise, and Aero Lift, a private company. PAL, as the national flag carrier, monopolistically operates all international routes and most of the domestic routes. Only four domestic routes are operated by Aero Lift.

As of April 1992, PAL connects between Manila/Cebu/Davao and 34 cities in 23 foreign countries by 33 daily international flights on an average, and 42 cities/towns by 170 daily domestic flights on an average.

PAL's current fleet consists of 50 aircrafts as shown in Table 2.6.7. PAL's future fleet plan was indefinite when this report was prepared due to PAL's re-organization process.

Table 2.6.7 Aircraft Owned by PAL

TYPE	NUMBER	SEAT CAPACITY	REMARKS
B747- 200B	9	372-382	
DC10- 30C	2	274	
A300- B4	7	244-264	
B737- 300	9	141	
BACI- 11	5	109	Not used for Scheduled Flight
FOKKER- 50	10	54	
SHORTS-SD3-60	7	36	
KING AIR-E90	1	6	Not used for Scheduled Flight
TOTAL	50		

Source: PAL Aircraft Fleet-PAL Flights Technical Division

2.6.5 Air Traffic

(1) International Traffic

International air traffic in the Philippines is basically handled at two airports, namely Manila and Cebu international airports. For information purpose only, their traffic volume and latest traffic data are summarized in Table 2.6.8.

Table 2.6.8 Annual International Air Traffic Volume at Manila and Cebu

	Passenger	Cargo (ton)	Aircraft Movement	Remartks
Manila	4,360,000	178,080	25,026	Year 1991
Cebu	19,920	--	129	Year 1984

Source: Department of Transportation and Communications (DOTC).

It is reported that passenger and cargo traffic at Manila International Airport has been increasing at an average annual growth rate of 4.9% and 5.3% respectively since 1983. With respect to the traffic at Cebu, there are no current statistics available, but some 20,000 international passengers were handled in 1984.

With respect to Davao International Airport, there were no scheduled international flights until the end of April 1992 and only occasional non-scheduled international flights. Unfortunately, past records of the international traffic at the airport is not available.

(2) Domestic Traffic

Domestic air traffic volumes at all airports in the Philippines are shown in Table 2.6.9.

Table 2.6.9 Domestic Air Traffic Volume in the Philippines

YEAR	PASSENGERS	CARGO (TONS)	AIRCRAFT MOVEMENTS
1980	4,968,418	113,715	102,841
1981	5,011,466	97,699	97,984
1982	5,560,319	83,742	93,120
1983	6,287,422	75,969	103,170
1984	6,457,810	79,490	104,138
1985	6,944,017	86,743	105,615
1986	7,416,505	102,985	107,322
1987	–	–	–
1988	8,423,208	132,431	225,217
1989	9,393,498	155,585	247,677

Source: Air Transportation Office (ATO)

As seen in the Table 2.6.9, domestic air passenger volume of the nation nearly doubled during the decade from 1980-1990 at an average annual growth rate of 6.6%. During the same decade air cargo grew at an average annual growth rate of 3.2%. It should be noted here that air traffic demand did not suffer from the real economic recession in 1985 and 1986.

Domestic air traffic volume at Davao International Airport is shown in Table 2.6.10. It is worthwhile to note here that 1990 air passenger volume ranks in third place, next to Manila and Cebu.

Table 2.6.10 Domestic Air Traffic Volume at Davao International Airport

YEAR	PASSENGER	CARGO (TONS)	AIRCRAFT MOVEMENTS
1980	347,669	7,135	15,002
1981	315,226	4,308	13,014
1982	323,198	2,614	12,299
1983	344,757	4,158	11,580
1984	318,347	6,094	14,706
1985	373,851	6,597	16,459
1986	397,037	8,445	15,355
1987	418,421	11,136	14,962
1988	443,983	10,239	15,970
1989	439,244	13,551	12,712
1990	464,814	22,752	10,698

Source: Air Transportation Office (ATO)

Probably due to political unstability caused by Moslems in Mindanao, air traffic volume at Davao International Airport was stagnant during the early 1980s. Since 1985, however, air passenger traffic grew at an average annual growth rate of 6.5%, similar to that of the national average. On the other hand, growth of air cargo volume has been quite remarkable since 1984, recording nearly fourfold growth in six years. Decrease in aircraft movement is due to the introduction of the larger A300 aircraft .

2.7 Other Transportation

2.7.1 Sea Transportation

Two sea transportation routes between Davao and Manila (approximately 970 nautical miles) operate as follows:

a) Davao - Zamboanga - Manila
b) Davao - Cebu - Manila

Travel time between Davao and Manila is some 62 hours. The fare for one-way economy class is 701 pesos. The fare by boat is only 28% of the economy class air fare of 2,529 pesos.

The annual number of passengers carried on voyages in 1989 was about 289,500. This number of passengers is equivalent to about 65% of passengers carried by air. Although the major role of sea transportation for inter-island passengers is evident at present, it is considered that sea transportation will gradually be replaced by air transportation, especially for passengers, with the rise of income level in the future.

Passenger Traffic by Major Seaports in Mindanao is shown in Appendix 2.7.1.

2.7.2 Road Transportation

Road transportation plays an important role of internal transportation for the archipelagos. Many roads between intercities as priority projects have been constructed and improved in Mindanao.

Road kilometer distance and bus fares from Davao to various destinations are tabulated in Table 2.7.1.

Table 2.7.1 Road Distance and Bus Fare

From Davao City to	Road Kilometer Distance (km)	Bus Fare (pesos)	
		First Class	Premiere Class
Butuan	286	113	116
Cagayan de Oro	483	191	196
Compostela	114	45	46
Cotobato City	226	89	92
Digos	56	22	23
Gen. Santos	142	56	58
Kidapawan	106	42	43
Surigao	419	166	168
Tacurong	162	64	66
Tagum	55	22	22

Source: Provincial Road Passenger Transport Study

No strong competition between air and road transportations exists at present . Air transportation is expected to remain strong in the future as well because of the archipelagic situation of the Philippines.

2.8 Engineering and Construction

2.8.1 Design Standards and Regulation

The following standards and regulations will be applied for the design and construction works:

a) ICAO

b) FAA

c) JCAB

d) DPWH Standard Specification Highways Bridges and Airport (Vol-II)/ICAO/FAA

This book is available for general civil work such as earthwork, subbase and base course, surface course, drainage, miscellaneous structure and material detail.

e) National Structural Code of the Philippines

This is available for the engineering of structures and the consideration of seismic measures.

f) National Building Code of the Philippines

This includes the implementing rules and regulations for the construction of buildings.

g) National Plumbing Code of the Philippines, Philippine Electrical Code, and Fire Code of the Philippines

These are the detailed regulations and rules for the installation and construction of mechanical and electrical works. The basic concept of these codes and regulations are the American standards such as NEC, ASTM, NFPA, etc.

The environmental assessment study for the project was authorized by Presidential Decree P.D. 1586 dated June 1982. The detailed information regarding the environmental assessment study, such as procedure, methodology, and study item are described in the Environmental Impact Analyses Handbook prepared by the Environmental Management Bureau.

2.8.2 Construction Material

Not all construction materials are available in the Davao or Mindanao area. The availability of main construction materials are as follows:

- Cement	: Available
- Asphalt	: Bataan at Luson only
- Steel	: Iligan and Manila
- Wood	: Available
- Steel plate	: Available
- Galvanized steel pipe	: Iligan and Manila
- Aluminum sash	: Available
- Concrete pipe	: Available
- Brick	: Depend on the required volume
- Marble	: Middle of Philippine, Luson and Romblon

- Wire and Cable : Manila
- Generator : Imported and assembled in Manila

The prices of construction material depend upon local conditions but the Construction Materials - Prices and Indices (Metro Manila) are available as reference data.

2.9 Environment

2.9.1 Environmental Impact Assessment/Environmental Impact Statement System (EIA/EIS System)

Environmental Impact Assessment/Environmental Impact Statement System was established and enacted officially in June 1982 to identify and predict the impacts of proposed development projects on the biogeophysical environment and on human being concerns and well being.

The EIA/EIS system has been implemented by the Department of Environment and Natural Resources (DENR) through the Environmental Management Bureau and the DENR Regional Offices. The Environmental Compliance Certificate (ECC) should be issued by the DENR Secretary or his designated representative, the Undersecretary for Environment and Research, or the Regional Director.

The three major environmentally critical projects and proposed development projects located in twelve (12) categories of environmentally critical areas are required to be studied in the EIS prior to implementation of the project and are explained as below:

Three (3) major environmental critical projects:

a) Heavy Industries

- Nonferrous metal industries
- Iron and steel mills
- Petroleum and petrochemical industries
- Smelting plants

b) Resource Extractive Industries

- Major mining and quarrying projects
- Forestry projects
- Logging

c) Insfrastructure Projects

- Major dams
- Power plants
- Reclamation projects
- Major roads and bridges

Twelve (12) environmentally critical areas:

a) National parks, watershed reserves and wildlife preserves and sanctuaries declared by law;
b) Aesthetically potential tourist spots as reserves;
c) Areas which constitute the habitat for any endangered or threatened species if indigenous Philippine wildlife;

d) Areas of unique historical, archaeological or scientific interests;
e) Areas which are traditionally occupied by cultural communities or tribes;
f) Areas frequently visited and/or hard-hit by natural calamities (geological hazards, floods, typhoons);
g) Areas with critical slopes;
h) Areas classified as prime agricultural lands;
i) Acquired recharge areas;
j) Water bodies;
k) Mangrove areas;
l) Coral reefs.

2.9.2 Airport Environment

In general, airport development could have a significant impact on the airport and its surrounding community in terms of air and water quality, noise pollution and ecosystem. The development of Davao International Airport seems to face difficulties from those traditional environmental problems because of the following reasons:

a) Jet aircraft operation is a major source of noise pollution, and could have an adverse influence on the communities located within the vicinity of airport.

b) The land surrounding the airport is basically residential areas. It is most vulnerable to any impact by the airport development.

Accordingly, the environmental factors which require close attention during the stage of the master plan development are as follows:

a) The comprehensive and compatible land use plan especially zoning plan vs. aircraft noise level;

b) Relocation and compensation of residents in the vicinity of the airport; and

c) Proper treatment of industrial wastes and sewage originating at the airport.

CHAPTER 3 EXISTING AIRPORT AND SURROUNDINGS

CHAPTER 3 EXISTING AIRPORT AND SURROUNDINGS

3.1 General

This chapter describes the history of the airport, and outlines the airport facilities, the characteristics of the airport traffic, the existing and planned land use surrounding the airport and the meteorological conditions peculiar to Davao International Airport. The results of the topographic survey and soil investigations conducted during the First Field Survey by the Study Team are also mentioned.

Layout plans of the existing Davao International Airport and its terminal area are shown in Figures 3.1.1 and 3.1.2.

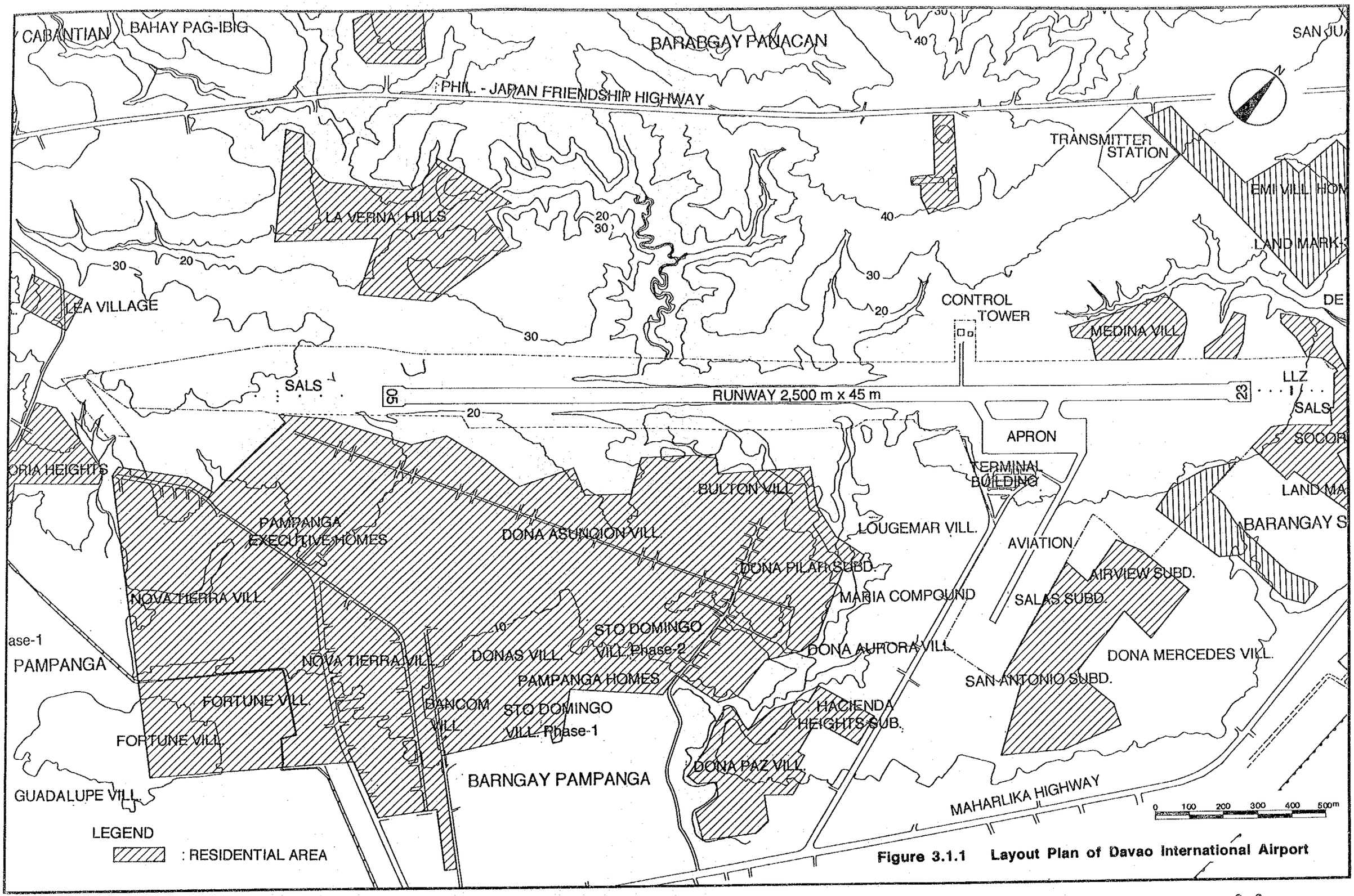


Figure 3.1.1 Layout Plan of Davao International Airport

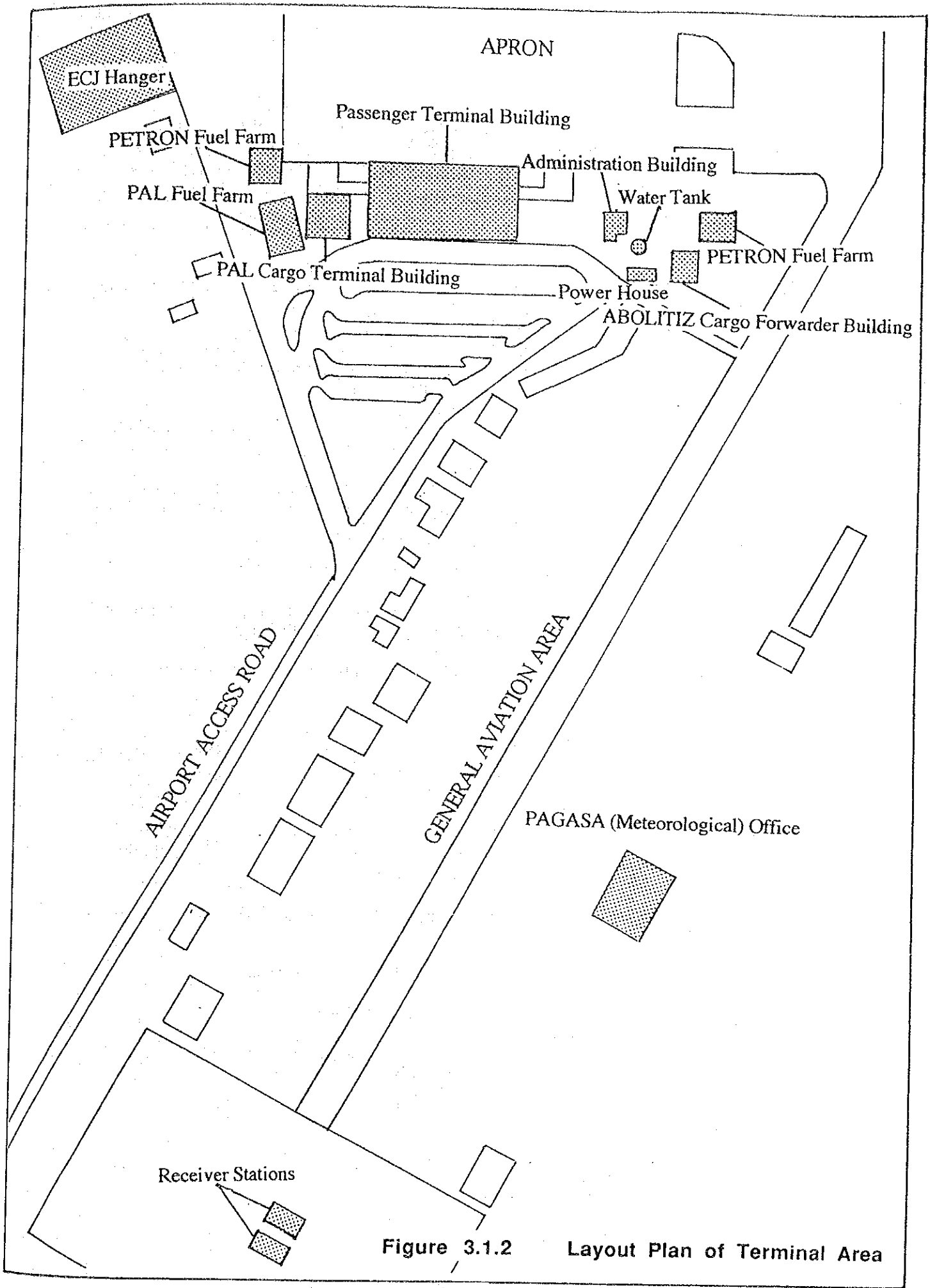


Figure 3.1.2 Layout Plan of Terminal Area

3.2 Airport History

The original Davao Airport, of which a runway is presently being used as a taxiway for general aviation, was constructed during World War II as a temporary air strip for the military. In 1958, a 1,500m long new runway was constructed and the operation was inaugurated as a civil aviation airport.

History of the airport is summarized chronologically below and illustrated in Figure 3.2.1.

During World War II	:	Construction of original airport as a temporary air strip for the military.
1956 - 1958	:	Construction of a runway (1,500m long x 30m wide), taxiways and apron (200m x 60m) by the Philippine Government.
1958	:	Inauguration of airport operations as a civil aviation airport.
1970	:	Extension of the runway to 2,000m length, widening of the runway to 36m wide and expansion of the apron to 200m x 100m
1970	:	Completion of the old control tower
1975	:	Extension of the runway to 2,500m length and construction of a general aviation apron
1976 - 1980	:	Construction of existing passenger terminal building
1983	:	Completion of a new control tower
1988	:	Overlay of general aviation taxiway by asphalt concrete of 5cm (2 inches) thickness on the original macadam pavement.
1988 - 1989	:	Runway overlay at the 1,500m portion of runway threshold 23 side by 25.4cm (10 inches) thickness and widening the runway to 45m.
1988	:	Completion of the existing PAL cargo terminal building
1989	:	Completion of the existing fire station
1st September 1989	:	Inauguration of A300 operations
29th April 1992	:	Inauguration of scheduled international flight by Bouraq to Manado in Indonesia

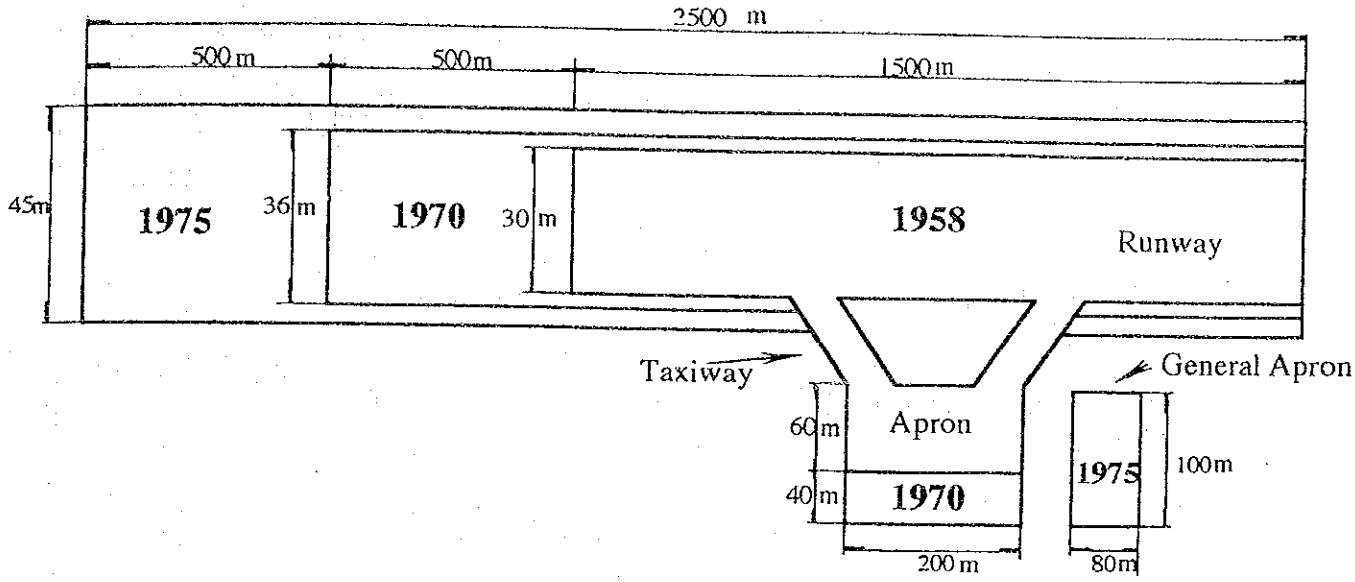


Figure 3.2.1 Construction History of Airfield Pavement

3.3 Airport Inventory

An inventory of Davao International Airport is shown in Table 3.3.1.

Table 3.3.1 Inventory of Davao International Airport

Item	Description
Aerodrome Data	
- City/Aerodrome	Davao/Francisco Bangoy
- International/Domestic	International and Domestic
- ICAO Reference Code	4D
- Aerodrome Reference Point	N07°07'48", E125°38'57" (Center of Runway)
- Distance and Direction from City	12.5 km north from the City
- Elevation	27 m (88 ft)
- Reference Temperature	32.7 C
- Magnetic Variation	0°35'E (1984) Annual decrease 03'
- Operational Hours	24 hours
- Seasonal Availability	All seasons
- Aerodrome Operator	Air Transportation Office (ATO)
- Transportation Available	Limousines, taxis and cars for hire
Aircraft Operational Data	
- Runway Usability	
- Crosswind component not exceeding 13kt	99.94%
- Crosswind component not exceeding 20kt	99.98%
- Operational Category	Non-precision instrument approach
- Established Procedure	VOR for RWY 05 NDB for RWY 05 VOR/DME for RWYs 05/23
- Transition Altitude	11,000 ft
- Local Flying Restrictions	Closed to no-radio aircraft. However, agricultural aircraft may be allowed to operate when under maintenance only with prior coordination with the control tower.
Runway	
- Designation	05/23
- True Bearing	050/230
- Dimension	2,500 m x 45 m
- Longitudinal Slope	0.2%
- Stopway	100 m (05/23)

(To be continued)

Table 3.3.1 (Con't.)

Item	Description
- Clearway	120 m(05)/150 m(23)
- Surface	Asphalt concrete (23 side, 1,500 m) Cement concrete (05 side, 1,000 m)
- Strength	PCN 52.0 R/B/W/U
Runway Strip	
- Dimension	2,540 m x 200 m
Taxiway	
- Configuration	2 connections with apron
- Dimension	110 m x 23 m wide
- Surface	Cement concrete
- Strength	PCN 27.7 R/B/W/T
Apron	
- Aircraft Stands	A300 x 2
- Parking Configuration	Self-maneuvering
- Area	200 m x 100 m (for airlines) 80 m x 100 m (for general aviation)
- Surface	Cement concrete
- Strength	PCN 27.7 R/B/W/T
Passenger Terminal Building	
- Total Floor Area	3,205 sq.m. (including VIP Lounge 80 sq.m.)
- Strength	Reinforced concrete structure 2 stories
Cargo Terminal Building	
- Floor Area	625 sq.m.
- Structure	Steel frame, one story
Control Tower Building	
- Floor Area (VFR Room)	255 sq.m.
- Structure	Reinforced concrete structure, 5 stories
- Height	15.9 m above ground
- Operators Eye Level	43.1 m above sea level
- Ground Level	26.0 m above sea level
- Sight Angle to threshold	26°45'

(To be continued)

Table 3.3.1 (Con't.)

Item	Description
Administration Building	(Old control tower building)
- Floor Area	325 sq.m.
- Structure	Reinforced concrete structure, 4 stories
Car Parking	
- Area	5,000 sq.m. excluding green area
- Capacity	154 cars and 20 taxis
- Surface	Cement concrete
Access Road	
- Width	10 m
- Surface	Cement concrete
Air Navigation System	
- Radio Navigation System	C-VOR/DME NDB LLZ
- Telecommunication System	Air-Ground VHF Communications (2 freq.) Air-Ground HF Communications (2 freq.) SALS (RWYs 05/23) VASIS (RWYs 05/23)
- Aeronautical Ground Lighting System	Runway Threshold End Lights Runway Edge Lights Taxiway Edge Lights Apron Flood Lights Aerodrome Beacon Obstacle Lights Iluminated Wind Direction Indicator
- Meteorological System	- Observation by PAGASA. - Wind direction and velocity. Temperature and QNH by sensors - Visibility and sky condition by visual observations
- Emergency Power Supply System	Emergency lighting and secondary power supply systems are provided

(To be continued)

Table 3.3.1 (Con't.)

Item	Description
Rescue and Fire Fighting Facilities	
- Fire Vehicles	- 1 RIV and 2 major vehicles - Water tank capacity: 10,000 L - Type of Agent: AFFF. - Amount of agent: Foam 8,270 L Dry chemical 204 kg.
- Fire Station	235 sq.m.
- Structure	Reinforced concrete structure
- Level of Protection	Category - 6
- Trained Personnel	37 persons
Airport Utilities	
- Power Supply System	- Independent receiving by each building - Total capacity : 300 KVA - Stand by generators are provided
- Water Supply System	- 2 Deepwells and 2 elevated water tanks - Total water tank capacity: 3,000 l
- Sewerage System	- Independent septic tank
- Telephone System	- Separate contract with PLDT by each customer
Other Facilities	
- Aviation Fuel Supply System	- PAL fuel depot capacity, Jet-A1: 180 kl - PETON Fuel depot capacity, Jet-A1: 30 kl - Hydrant System: 4 pits - Refueler: 1 for Avgas
- Airport Vehicles	3 vehicles (1970)
- Aircraft Maintenance Hangar	for general aviation aircraft
- Airport Maintenance Equipment	2 portable grass cutters
- Airport Housing	1 house

3.4 Airport Traffic Characteristics

This section describes airport traffic characteristics as for passengers, cargo and aircraft movements at Davao International Airport. Passenger characteristics and processing time of airlines' passenger handling and government formalities are evaluated based on the past traffic statistics and the results of the passenger interview survey conducted at the airport as shown in Appendices-3.4.1 and 2.

3.4.1 Passengers

(1) Domestic Passengers by Route

Proportion of domestic passengers by route is shown in Table 3.4.1 as of 1989-1991.

Table3.4.1 Proportion of Domestic Passengers by Route

Year	Route								Total
	Manila		Cebu		Cagayan de Oro		Zamboanga		
	Pax	%	Pax	%	Pax	%	Pax	%	Pax
1989	247,000	55.8	134,000	30.2	36,000	8.1	26,000	5.9	443,000
1990	281,500	61.5	119,900	26.7	34,600	7.6	21,400	4.7	457,400
1991	246,800	61.5	95,800	23.9	34,000	8.5	24,700	6.1	401,300
Average %	59.7%		26.9%		7.8%		5.6%		100.0%

Source: Historical Record of Passenger/Cargo Traffic to/from Davao (1980 - 1991), PAL Corporation Statistics Data
Note: Pax: Passengers

Table 3.4.1 indicates that about 60% of domestic passengers is from/to Manila, 27% from/to Cebu, 8% from/to Cagayan de Oro and 5% from/to Zamboanga.

(2) Peak Month

The monthly distribution of domestic passengers in 1991 is shown in Table 3.4.2 together with those of cargo and commercial aircraft movements.

Table 3.4.2 Monthly Air Traffic Volume at Davao Airport in 1991

Month	Domestic Passengers	Domestic Cargo (ton)	Commercial Aircraft Movement
January	32,500	1,229	431
February	24,800	1,027	345
March	27,600	1,217	448
April	36,100	1,111	486
May	*38,700	1,281	483
June	31,000	1,421	465
July	30,200	1,963	*522
August	31,600	**2,071	488
September	32,700	*2,012	491
October	36,700	1,950	496
November	37,600	1,965	515
December	**41,800	1,688	**634
Total	401,300	18,881	5,804

Note: ** First Peak
* Second Peak

Source: Annual Activity Report of Davao Tower 1991, ATO
1991 Passenger/Cargo Traffic to/from Davao, PAL Cooperation Statistic Data

The first and second peak months of domestic passengers in 1991 occurred in December and May respectively. These peaks are considered to be attributed to the Christmas holiday and summer vacation.

The peak month ratio (the first peak month traffic over the total annual traffic volume) of the domestic passengers was 1/9.6 in 1991.

(3) Load Factor

Load factor of domestic flight from/to Davao in 1991 is shown in Table 3.4.3.

Table 3.4.3 Monthly Passenger Load Factor by Route

As of 1991

ROUTE	MANILA	CEBU	CAGAYAN DE ORO	ZAMBOANGA
January	64.68%	76.32%	65.52%	49.45%
February	56.63%	67.61%	67.68%	49.82%
March	59.46%	65.91%	62.49%	44.91%
April	71.35%	68.45%	76.25%	68.85%
May	72.15%	74.25%	82.50%	76.80%
June	71.20%	68.15%	67.55%	58.20%
July	61.20%	55.90%	73.95%	60.05%
August	62.10%	54.20%	75.80%	63.95%
September	64.45%	53.80%	80.15%	69.65%
October	70.35%	62.60%	80.90%	80.60%
November	74.45%	68.80%	82.50%	75.10%
December	80.95%	54.65%	72.30%	76.50%
Annual Average	67.39%	64.22%	73.97%	64.49%

Source: PAL

In case of the flight from/to Manila, the average load factor in 1991 was 67% and that of the first peak month (December) was 81%.

(4) Typical Peak Hour

Based on the present flight schedule at Davao International Airport, the typical peak hour aircraft movements and passengers are estimated as shown in Table 3.4.4.

Table 3.4.4 Typical Peak Hour Traffic

Description	Remarks
1. Domestic	
a) Both Ways	
- Aircraft: 4 movements	1 arrival and 1 departure of A300, and 1 arrival and 1 departure of B737
- Passengers: 600	
b) One Way	
- Aircraft: 2 movements	1 arrival or 1 departure of A300, and 1 arrival or 1 departure of B737
- Passengers: 300	
2. International	
a) Both Ways	
- Aircraft: 1 movement	1 arrival and 1 departure of HS748 to Manado
- Passengers: 34	
b) One Way	
Same as those in case of both ways	
3. Overall	
a) Both Ways	
- Aircraft: 5 movements	1 arrival and 1 departure of A300 1 arrival and 1 departure of B737, and 1 arrival of HS748
- Passengers: 630	
b) One Way	
- Aircraft: 3 movements	1 arrival or 1 departure of A300 1 arrival or 1 departure of B737, and 1 arrival of HS748
- Passengers: 330	

Note 1: Load factor
- Domestic flight : From/to Manila : 80%
  From/to Cebu : 76%
- International flight : 80% (assumption)

Note 2: Seat capacity
- Domestic flight A300 : 244
  B737 : 141
- International flight HS748 : 42

The present flight schedule at Davao International Airport is shown in Appendix-3.4.3.

3.4.2 Aircraft Movements

Aircraft movements by traffic category at Davao International Airport is shown in Table 3.4.5. The proportion of commercial, general aviation and military aircraft movement in 1991 was 42%, 47% and 11% respectively.

Table 3.4.5 Breakdown of Aircraft Movements at Davao International Airport

Year	Commercial		General Aviation		Military		Total
	Movement	Share	Movement	Share	Movement	Share	
1981	4,939	(32.50%)	8,687	(57.16%)	1,572	(10.34%)	15,198
1982	4,670	(30.77%)	7,709	(50.79%)	2,798	(18.44%)	15,177
1983	4,567	(30.74%)	7,310	(49.20%)	2,982	(20.07%)	14,859
1984	4,533	(60.82%)	8,657	(58.86%)	1,517	(10.31%)	14,707
1985	4,406	(26.77%)	10,112	(61.44%)	1,941	(11.79%)	16,459
1986	5,170	(29.05%)	8,016	(55.84%)	2,170	(15.12%)	45,356
1987	7,713	(51.53%)	5,028	(33.59%)	2,227	(14.88%)	14,968
1988	7,905	(49.50%)	5,585	(34.97%)	2,479	(15.52%)	15,969
1989	5,093	(37.99%)	5,013	(37.40%)	3,299	(24.61%)	13,405
1990	6,709	(46.71%)	5,348	(37.23%)	2,306	(16.06%)	14,363
1991	5,804	(41.68%)	6,522	(46.84%)	1,599	(11.48%)	13,925

Source: Air Traffic Statistics, ATO

3.4.3 Utilization of Car Parking and Access Road

The utilization of car parking and access road was investigated in relation to the number of passengers. The result of the survey is detailed in Appendix-3.4.4. Average parking ratio (the number of parked cars/the number of peak hour passengers) of 0.54 was obtained from the survey. Average car traffic ratio (the number of incoming or outgoing cars/the number of peak hour passengers) was 1.2.

3.5 Meteorological Condition

3.5.1 Wind Velocity and Direction

A wind rose was produced based on the wind data during the three years from 1989 through 1991 as shown in Figure 3.5.1.

The characteristics of the wind velocity and direction are summarized as follows:

a) The calm condition (wind speed from nil up to 5kt) accounted for 79.9% of total observations.

b) Occurrence of a wind velocity of more than 10kt was rare at the airport with only 0.5% of the total observations.

c) The northern winds (north-northwest to north-northeast) and southern winds (south-southeast to south-southwest) are predominant throughout the year. The northern winds and southern winds respectively accounted for 51.1% and 28.2% of the total observations, excluding calm conditions.

d) The northern winds were predominant with 69.7% of all the winds, except calm conditions, during the dry season (December to May). The southern winds were predominant with 57% during the wet season (June to November). However, their wind velocity is quite low.

3.5.2 Wind Coverage

The wind coverage for the existing runway orientation is calculated as shown in Table 3.5.1. As seen in the Table 3.5.1, the wind coverage for the crosswind component not exceeding 13kt and 20kt is 99.94%, and 99.98% respectively. Further examination of the wind rose revealed that wind coverage for any runway orientation at the airport site would be more than 99%, which satisfies the requirement of the 95% minimum aerodrome usability factor specified in the ICAO Annex 14.

Table 3.5.1 Wind Coverage

Crosswind Component	Wind Coverage
Less than 13 kt	99.94%
Less than 20 kt	99.98%

3.5.3 Low Ceiling and Poor Visibility

Low ceiling and poor visibility conditions are analyzed based on the data during the three years from 1989 to 1991. There was no low ceiling and reduced visibility at the airport. Thus, the occurrence of weather condition equivalent to the existing VOR minima (ceiling-900 ft and visibility-4.4 km for approach category D) or less was 0% of the total observations.

3.5.4 Rainfall

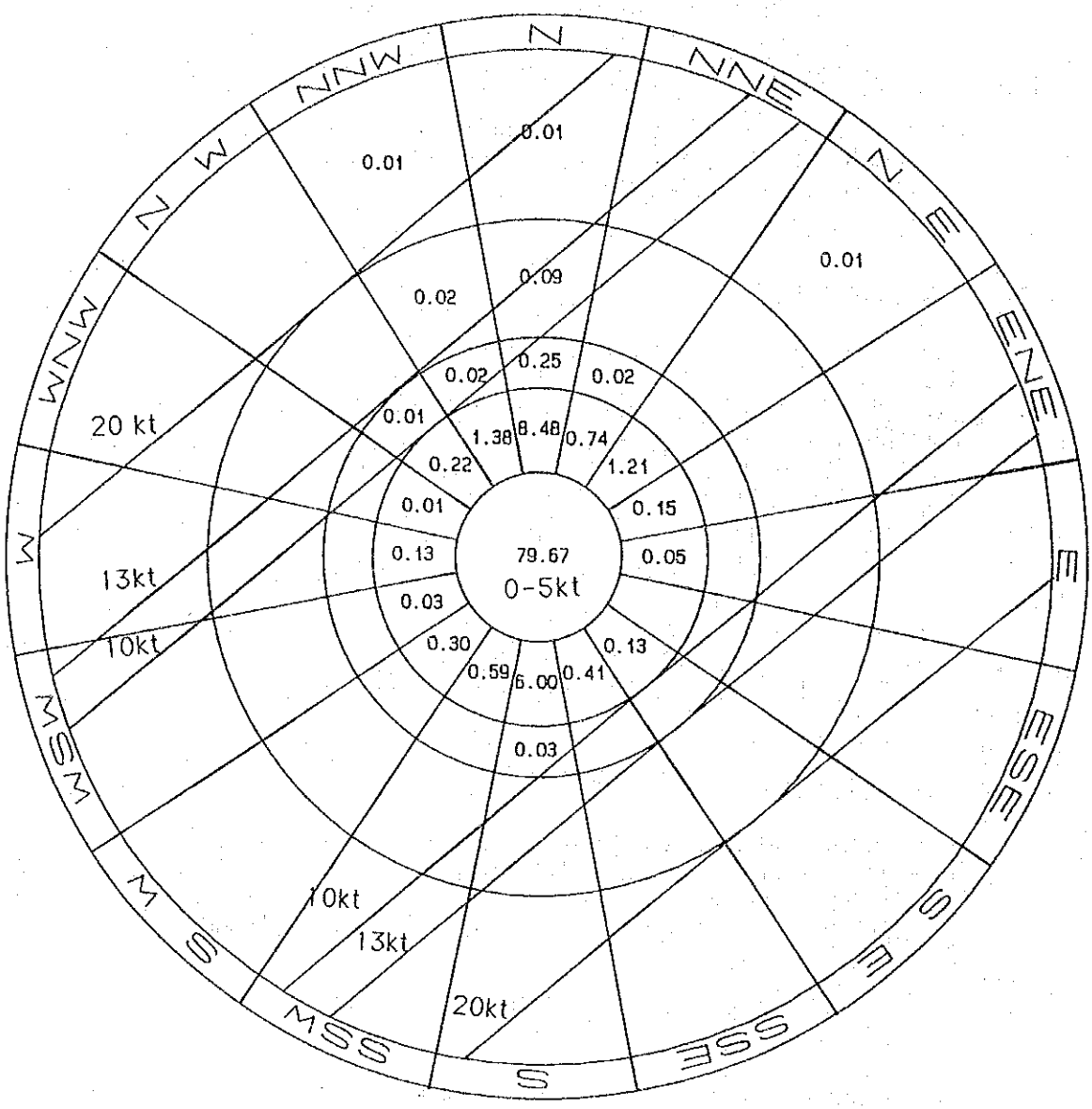
According to rainfall data at Davao recorded by PAGASA since 1952, the maximum annual rainfall was 2,353 mm recorded in 1954 and the maximum monthly rainfall was 588 mm recorded in December 1954.

Rainfall intersity at Davao, on which drainage design will be based, is estimated as talulated in Table 3.5.2.

Table 3.5.2 Rainfall Intensity

Duration	10 min.	60 min.
10 Year Recurrence	168 mm	103 mm
5 Year Recurrence	145 mm	80 mm

Calculation of the above rainfall intensity and formulas of rainfall intensity are shown in Appendix-3.5.1.



Source	:	Philippine Atmospheric, Geophysical Astronomical Services Administration (PAGASA)
Location	:	Davao International Airport
Period	:	1989 to 1991
Runway Orientation	:	N50°E
Wind Coverage	:	99.94 (Cross Wind 13 kt)
	:	99.98 (Cross Wind 20 kt)

Figure 3.5.1 Wind Rose at Davao International Airport

3.6 Topographic Survey

A topographic survey was executed to cover the entire airport property area and possible area for future terminal facilities and runway extension. The areas covered by the survey are shown in Appendices-3.6.1 through 3.6.3.

The survey result indicates that a longitudinal slope of the existing runway centerline is 1.28% at the part of the runway between 800 and 1,100 m from the RWY 23 threshold.

3.7 Obstruction Survey

An obstruction survey result is shown in Figure 3.7.1.

It is noted that the elevation of obstacle limitation surface is calculated based on the present condition of the 200 m wide runway strip.

3.8 Soil Investigation

Soil Investigation was carried out to obtain essential information on soil strata and the exiting runway pavement structure. Location map and test items of the investigation are shown Appendices-3.8.1 and 3.8.2 respectively.

The results of the investigation are summarized in the subsequent subsections.

3.8.1 Result of Auger Boring and Mechanical Boring

Result of auger boring and mechanical boring is shown in Appendix-3.8.3. Logs of the mechanical boring are shown in Appendix-3.8.4.

Soil conditions at the existing airport site are briefly summarized as follows:

a) The surface of the ground is covered with silty clay of about 3 m thick. Under the surface layer, the constitution of strata is different at each boring hole. But, generally, the ground is composed of sandy silt layer and silty sand layer.

b) Consistency and N value are also different by the layers. In the surface layer, there is very soft portion about 2 to 3 m below ground level of which N value was zero. This condition was encountered at boring holes C1, C2, C3, C4, and C5. Except for the very soft portion, N values were approximately 10 to 60 at the C1, C2, C3, and C5. At the C4, N values were more than 60 at 4 m below ground level. At boring holes B1, B2, B3, B4 and B5, N values were about 5 to 15 up to 8 m below ground level and at the deeper layer N values were about 30 and more.

The above findings prove that the ground at the airport is a part of recent alluvium spread in Davao Plain and is composed of gravel, sand and clay deposits along the flood plains.

No.	Obstacle	Elevation of Obstacle	Location		Elevation of Runway Centerline	Elevation of Obstacle Limitation Surface	Hight of Conflict
			Longitud Disance from RWY 05 Threshhold	Transverse Disance from RWY Centerline			
1	IPIL IPIL TREE	40.65	2,240	102.50	27.15	27.51	13.14
2	IPIL IPIL TREE	42.23	2,189	100.00	27.15	27.15	15.08
3	IPIL IPIL TREE	42.29	2,134	107.50	27.11	28.18	14.11
4	VOR/DME ANTENA	33.44	2,145	71.50	27.12	27.12	6.32
5	OLD TOWER	38.61	1,890	210.00	26.30	42.01	-3.40
6	PASSENGER TERMINAL B LD	42.53	1,767	197.00	25.67	39.53	3.00
7	NEW TOWER	44.70	1,673	169.75	24.66	34.62	10.08
8	ECJ HANGER	34.11	1,594	162.00	23.65	32.51	1.60
9	MANGO TREE	36.45	635	202.30	21.07	35.68	0.77
10	COCONUT	40.01	539	105.60	21.40	22.20	17.01

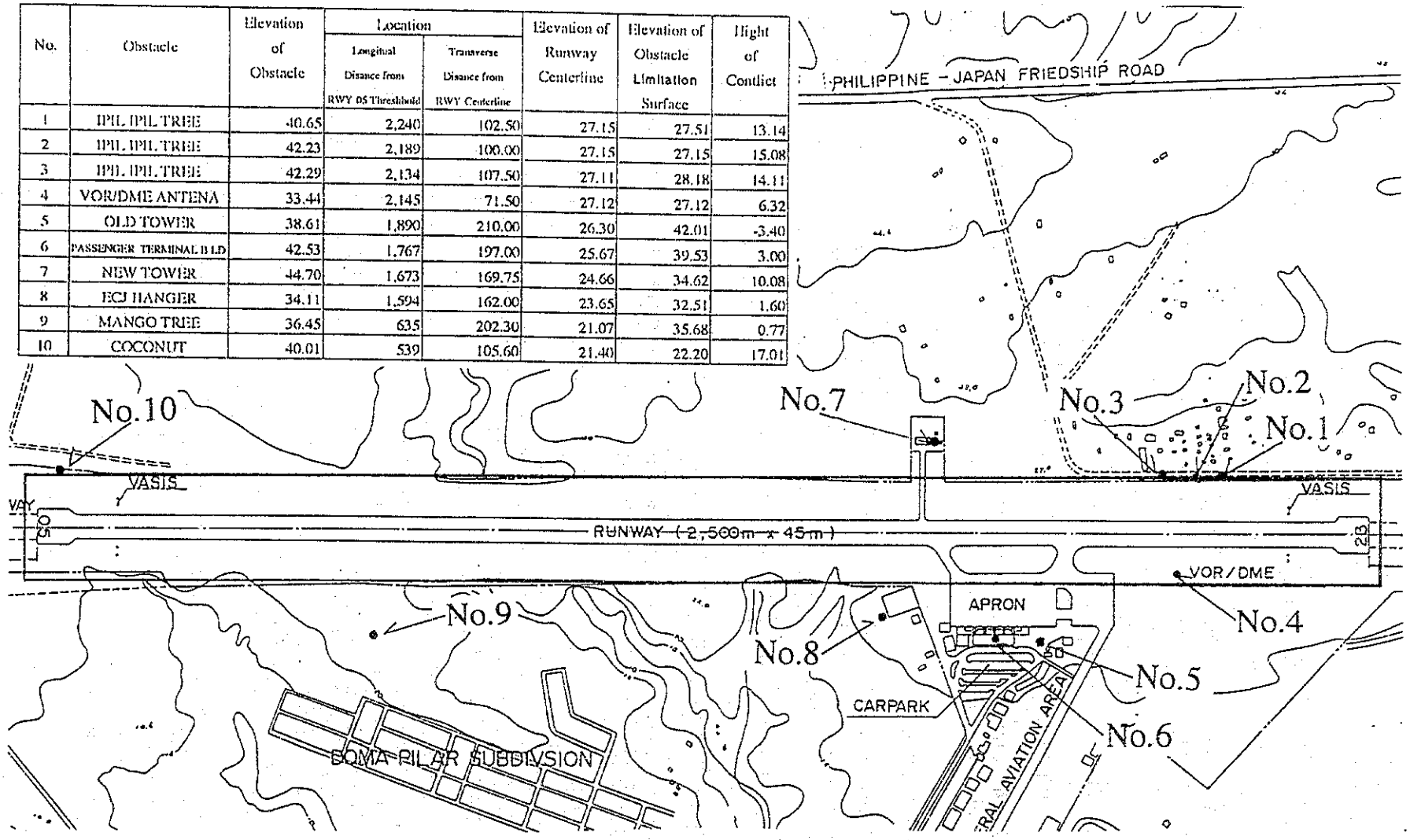


Figure 3.7.1 Result of Obstruction Survey

3.8.2 Result of Unconfined Compression Test

Result of unconfined compression test is shown in Appendix-3.8.5

Unconfined compressive strength obtained by the test is summarized in Table 3.8.1.

Table 3.8.1 Result of Unconfined Compression Test

Type of Soil	Strength (kg/sq.cm)
Silty Clay	0.6 ~ 4.6
Clayey Sand	0.2 ~ 1.1
Clayey Silt	3.1

3.8.3 Condition of the Existing Runway Pavement

Three types of test were conducted in order to investigate the conditions of the cement concrete slab, base course and subgrade. They included the plate bearing test, concrete flexural strength test and laboratory test. The results of the above tests are summarized below.

(1) Pavement Structure

Structure of the existing runway pavement at test pit D is illustrated in Figure 3.8.1.

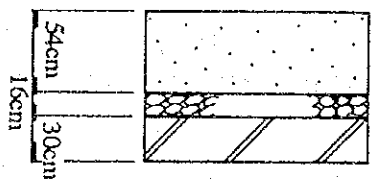


Figure 3.8.1 Pavement Structure of Existing Runway

(2) Plate Bearing Test

Plate bearing tests at test pit D indicated the following K values:

Base course K30 = 20.07 kg/cm³

Subgrade K30 = 39.67 kg/cm³

The above values are converted into K75 as follows:

Base course $K75 = \frac{K30}{3.0} = \frac{20.07}{3.0} = \underline{6.7 \text{ kg/cm}^3}$

Subgrade $K75 = \frac{K30}{2.5} = \frac{39.67}{2.5} = \underline{15.9 \text{ kg/cm}^3}$

(3) Concrete Flexural Strength Test

The concrete flexural strength test was performed on the core samples extracted from the existing cement concrete slab. The results are tabulated in Table 3.8.2.

Table 3.8.2 Results of Concrete Flexural Strength Test

Sample No.	Concrete Flexural Strength (kg/cm^2)
C - 1	60.1
C - 2	30.4
C - 3	38.0
Average	42.8

(4) Laboratory Test

Laboratory CBR test was conducted as one of the laboratory tests. This test was performed on samples obtained from test pit D. The result indicated the following CBR values:

Base course : 38.9%

Subgrade : 16.8%

3.8.4 Condition of Subgrade

Laboratory CBR test was performed for 12 samples. The results of which are shown in Table 3.8.3.

Table 3.8.3 Results of Laboratory CBR

Location	A1	A5	A7	A10	A13	A16
CBR(%)	6.6	6.1	7.8	22.7	11.3	8.2
Soil Classification	Silty Clay	Silty Clay	Clayey Sand	Silty Sand	Clayey Silt	Clayey Silt
Elevation(m)	21	30	22	20	24	27
Location	A18	A19	A25	A30	D Subgrade	D Base Course
CBR(%)	24.5	45.8	6.2	6.5	16.8	38.9
Soil Classification	Sand	Silty Sand	Silty Clay	Silty Clay	Silty Sand	Gravel
Elevation(m)	13	9	29	43	22	22

For the estimation of design CBR value, the CBR values of A18 and A19 are excluded considering the proposed elevation of the planned pavement structure.

The design CBR value is estimated as follows:

Average of CBR = 10.2%

$$\text{Design CBR} = 10.2 - \frac{22.7-6.1}{4.445} = 6.5\%$$

Based on the above design CBR value, design K value is estimated to be 4.5 kg/cm^3 by the correlation between CBR value and K value.

As for the evaluation of the existing runway pavement, design CBR and K values are estimated based on the test result of A7, A10, A13, A16 and D, which were located adjacent to and in the runway, as follows:

Average of CBR = 13.4%

$$\text{Design CBR} = 13.4 - \frac{22.7-7.8}{3.489} = 9.1\%$$

K value = 5.0 kg/cm^3

3.9 Pavement Investigation

Pavement investigation was conducted by a visual inspection at the existing runway, taxiway, apron, car park and road.

Findings of the investigation are as follows:

a) Surface Condition of Existing Runway

Between Sta.2 + 550 and 3 + 313, the pavement surface is very rough due to the disappearance of binder and fine aggregate as shown in Figure 3.9.1.

Some of the aggregate is very loose and tends to be blown away by aircraft engine blasts.

Between Sta.1 + 970 and 3 + 500, reflection cracks have appeared on the overlaid asphalt concrete, especially in a longitudinal direction.

Detailed layout of cracks at the selected area are shown in Appendix - 3.9.1

b) Surface Condition of Existing Taxiway and Apron

At the area passed over by aircraft wheels, many cracks appear in the existing cement concrete slabs at the taxiway and apron as shown in Appendix - 3.9.2.

c) Surface Condition of Existing Road and Car Park

There are many wide/long cracks in the existing cement concrete slab at the road and car park as shown in Appendix - 3.9.3.

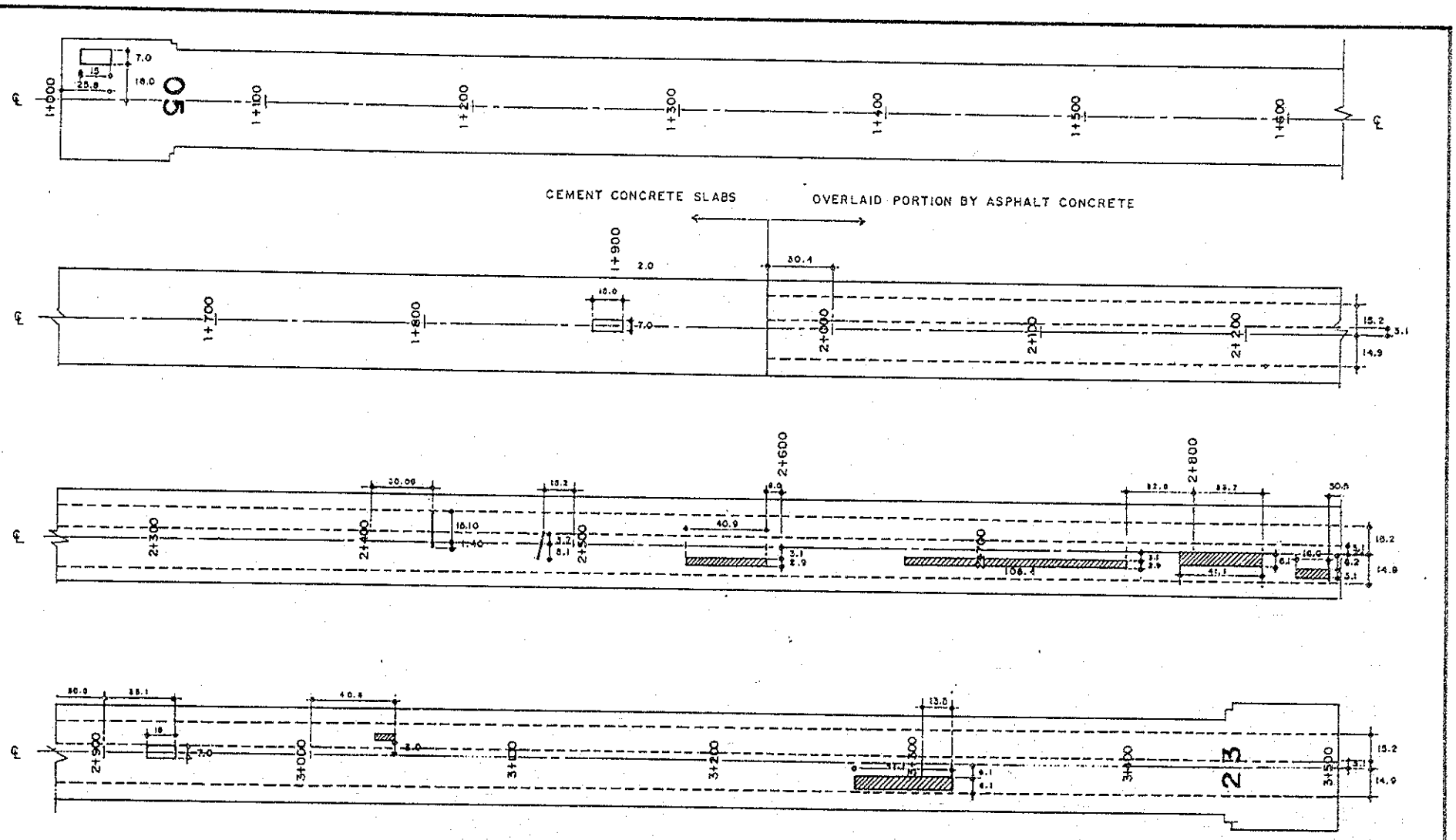


Figure 3.9.1 Surface Condition of Existing Runway Pavement

3.10 Airport Management

3.10.1 Organization

The airport offices in the Republic of the Philippines are administrated by the ATO (Air Transportation Office). ATO belongs to the DOTC (Department of Transportation and Communications).

Figure 3.10.1 shows the organization chart of ATO.

The existing organization of Davao International Airport is shown in Figure 3.10.2.

The airport manager of this airport has the responsibility for the management of the local airports, such as Allah Valley, Bislig, General Santos, Mati, Tandag and Barobo.

At present, this airport is operated by a staff of 147 as shown in Table 3.10.1.

Table 3.10.1 Details of the Airport Staff at Davao International Airport

Section or Position	No. of Staff	Section or Position	No. of Staff
Airport Manager	1	Civil Security Unit	9
Administrative Services	1	Building and Ground Unit	10
Personnel Administration Unit	2	Air Traffic Services	3
Financial Management Unit	7	Aerodrome/Approach Station	11
Cashier Unit	3	Flight Service Station	12
General Services Unit	1	Airways Navigation Services	4
Terminal Building Janitorial Services	12	Control Station	11
Special Services Staff	2	VOR/DME/ILS/LLZ Receiver Station	11
Concession and Statistic	3	Transmitter Station	8
Fire Rescue Unit	33	Electrical/Airfield Lighting	3
		Total	147

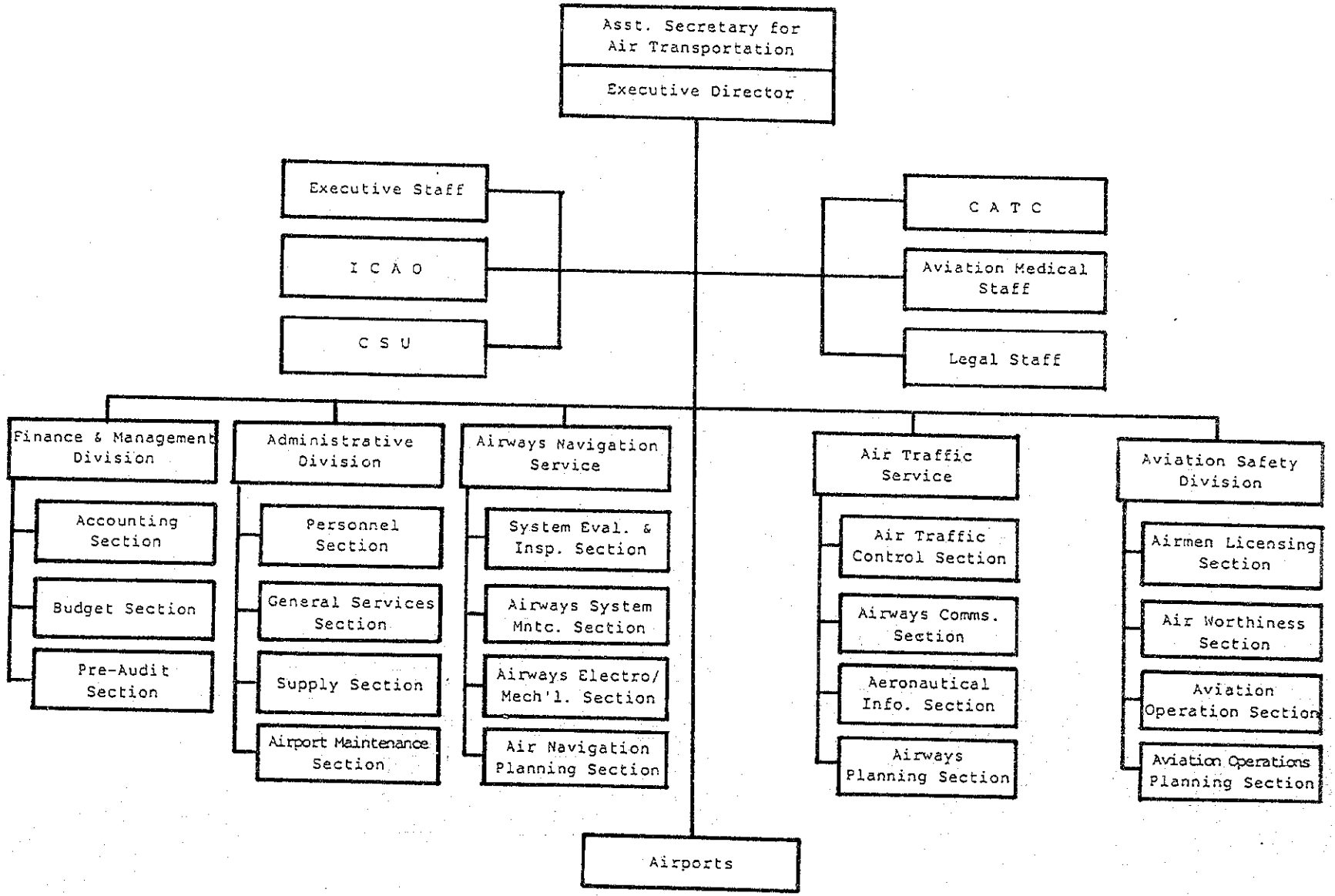
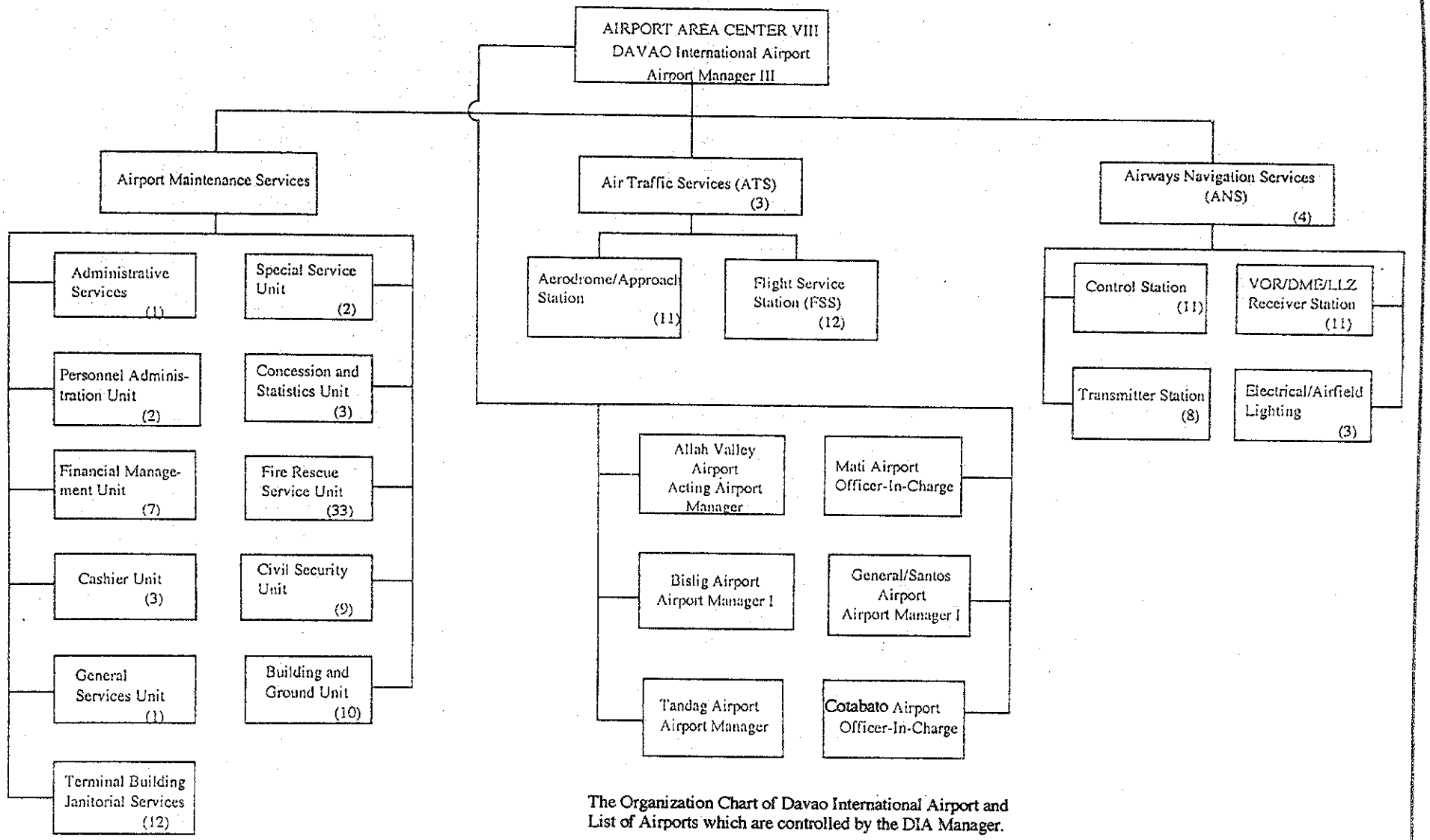


Figure 3.10.1 The ORganization Chart of Air Transportation Office



The Organization Chart of Davao International Airport and List of Airports which are controlled by the DIA Manager.

Figure 3.10.2 Present Organization Chart of Davao International Airport

3.11 Security

3.11.1 Agent of Security

The security services at the airport are carried out by the following agents:

a) Security of Philippine National Police (PAPICON)

- Passenger screening at passenger terminal building
- Guard to control tower

b) Air Transportation Office (ATO)

- Observing the administration building and the arrival area of the passenger terminal building and gates

c) Private security services being hired by ATO

- Observing pedestrians at the airside

3.11.2 Airport Security Facilities

Following are airport security facilities:

a) Security and boundary fences along the airport boundary.

b) X-ray detector for passengers' cabin baggage screening at the gate to the waiting lounge in the passenger terminal building.

Handy type metal detectors are not available for inspecting passenger.

3.11.3 Security Check Procedure

(1) Domestic Passengers

Departing passengers' luggage are checked by the inspector manually at the entrance of the check-in-lobby of the passenger terminal building.

The separation between passengers' and well-wishers is done at the entrance of the check-in lobby, but, after being checked-in, passengers' must go out once from the check-in lobby so as to proceed to the "Pre-Departure Gates" across the public lobby.

Departing passengers' cabin baggage is checked by an X-ray detector at the entrance of the waiting lounge located on the second floor of the passenger terminal building.

(2) International Passenger

The security check for international departing passengers is done through the following procedure:

a) Passengers must proceed to the tentative CIQ and check-in at the tentative airline counter on the 2nd floor of the passenger terminal building.

b) Then, prior to entering the waiting lounge, passengers must undergo the X-ray cabin baggage inspection and body inspection, which are commonly used for domestic passengers. After these inspections, passengers proceed to the waiting lounge which is separated from the domestic lounge by the tentative partition.

This temporary type of international passenger security procedure is required only twice per week for the schedule flight between Manado and Davao, and occasionally for chartered flights.

However, it is deemed necessary to introduce independent and permanent facilities for the international flights since CX and Qantas also intend to operate after completion of the airport development.

(3) Cargo

At present security checks for cargo is done by manual inspection. No equipment is available for the security check. As cargo volume to be handled increases in the future, it may be beneficial to install a security check equipment for efficiency purposes.

3.11.4 Boundary/Security Fence

(1) Current Condition

The boundary or security fence at the airport are in very poor condition. Fences at many locations have either been broken by trespassers or are non-existent.

As a result, access to airside and facilities by public and domestic animals is quite easy and frequent. In fact, there are two pedestrian ways across the runway that are used by people living in the surrounding area.

In order to live with these facts, there are signal lamps to notify pedestrians of aircraft operations.

The current condition of the fencing does not comply with the ICAO recommendations described in Chapter 8 of Annex 14 and presents a hazardous situation for safe and regular airport operations.

(2) Current Problems

The above-mentioned problems should be corrected immediately so as to maintain the safety of airport operations, particularly on the airside facility and for parking aircraft. The following action should be taken immediately:

a) Provide a complete and tight boundary/security fence around the airport;

b) Introduce stringent legal action to prohibit trespassing on airport property and to prevent the intrusion of domestic animals.

c) Provide a gate and gate-check post at the entrance of the access way to the general aviation area.

3.12 Land Use

3.12.1 Present Land Use Condition

The present land use condition surrounding Davao International Airport is shown in Figure 3.12.1.

The areas on the southern, eastern and western sides of the airport are residential areas. Although most of the northern side of the airport consist of coconut/banana farms and open areas, a residential subdivision is being constructed near the end of RWY 05.

In particular, around the end of RWY 23 there are four (4) residential clusters along the airport property line. The adverse impact of aircraft noise to those areas is deemed to be a serious problem even at the present time. In this regard, a legal land use measure should be taken as soon as possible in order to carry out the airport development in harmony with the communities in areas surrounding the airport.

3.12.2 Davao City Comprehensive Development Plan

The 1982 zoning map surrounding the airport is shown in Figure 3.12.2.

The comprehensive development plan for Davao City 1979 - 2000, including the zoning ordinance, was authorized in 1982. The administration and enforcement of the zoning ordinance is deputized by the Housing and Land Use Regulatory Board (HLURB) of the Davao City.

In accordance with the ordinance, mixed land use of residential zones are allowed in commercial and industrial zones, however, the reverse should not be allowed.

Zoning around the airport, an open space zone that is about 500 m wide and 5,000 m long, is designated to evolve at the airport in the future. The light industrial zones are designated on the northeast and the southeast areas of the airport. Residential zones are developed on the northwest and the southwest sides of the airport as seen in the Figure 3.12.2.

In 1992 Davao City council approved the official zoning map which was amended from the above comprehensive development plan based on the tentative proposed airport master plan Alternative-M3 (refer to Figure 7.6.7) in order to secure the future airport development. It was issued as a city ordinance, in which the area for the airport expansion is indicated to be 72 to 80ha.

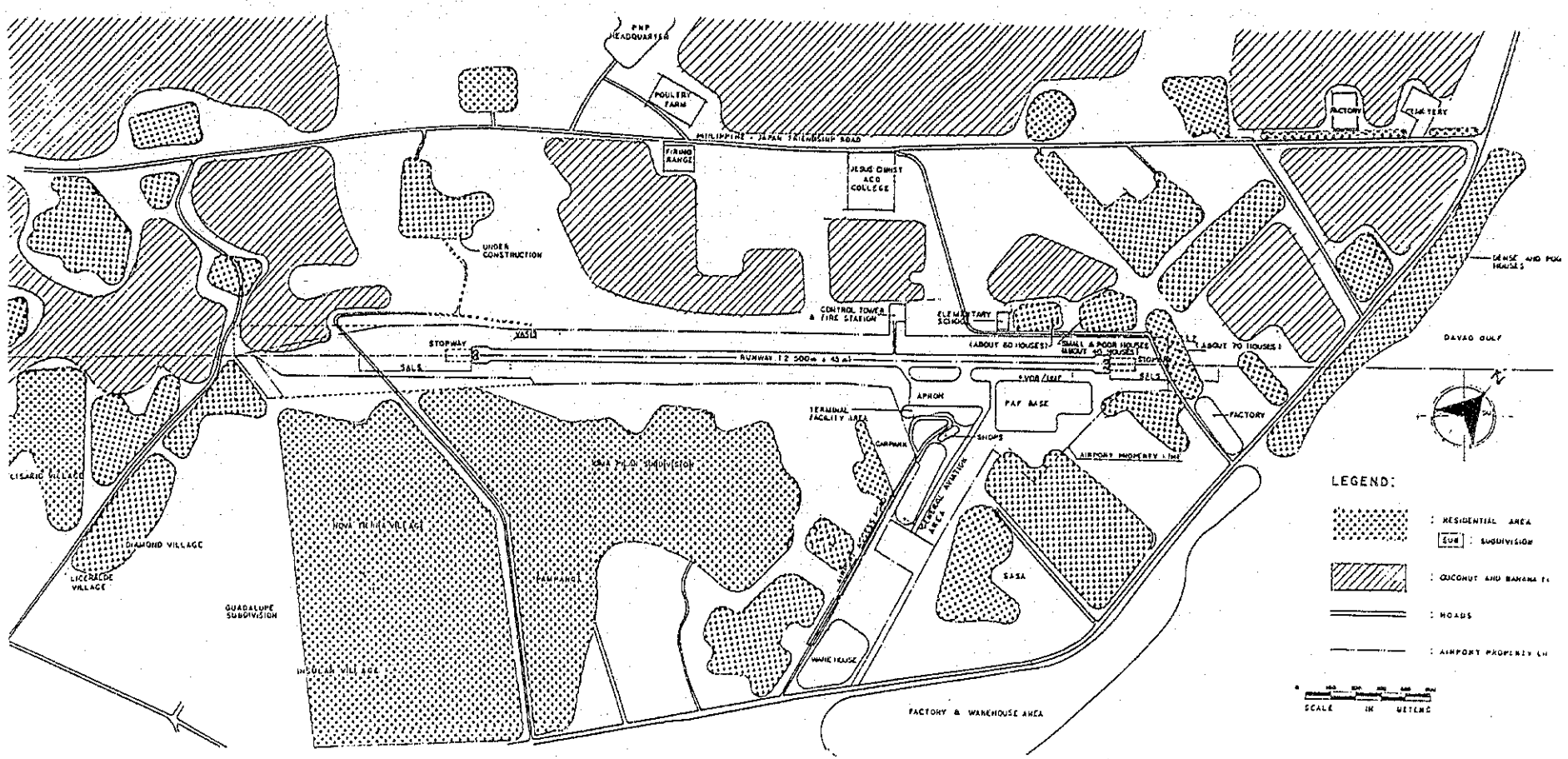


Figure 3.12.1 Present Land Use around Davao International Airport

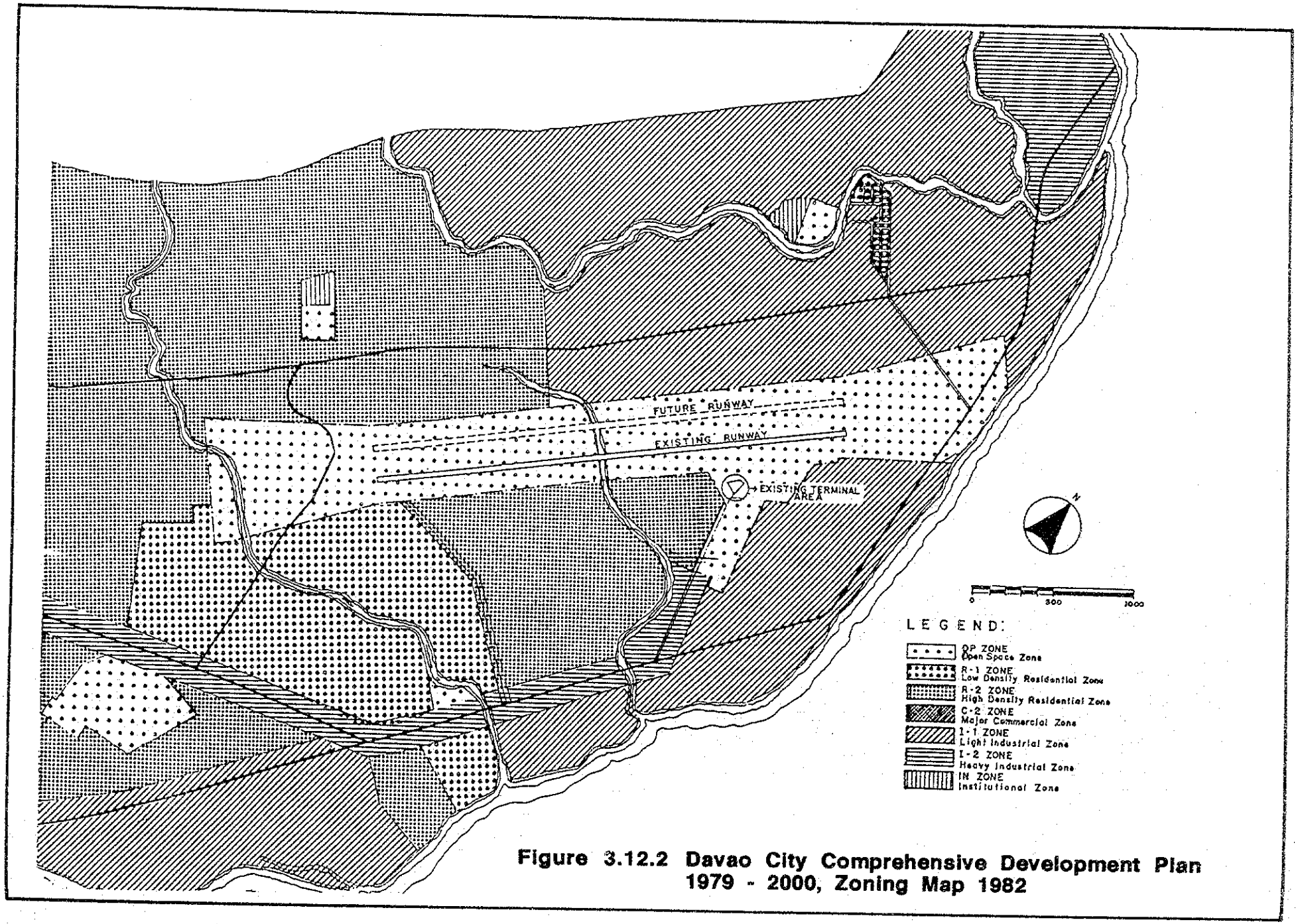


Figure 3.12.2 Davao City Comprehensive Development Plan 1979 - 2000, Zoning Map 1982

CHAPTER 4 AIR TRAFFIC DEMAND FORECASTS

CHAPTER 4 AIR TRAFFIC DEMAND FORECASTS

4.1 General

Air traffic demands, which are the principal planning factors for all airport facilities, are forecast up to the year 2010 at five year intervals covering the following categories:

a) Domestic Air Passengers
b) International Air Passengers
c) Domestic Air Cargo
d) International Air Cargo

Low and high projection of the traffic demand on each of the items (a) ~ (d) above are also forecast. From the annual passenger demand, annual aircraft movements are estimated. Annual demands are further broken down to the demands on design day and peak hour.

4.2 Annual Domestic Air Passenger Forecast

4.2.1 Procedure of Annual Domestic Air Passenger Forecast

The annual domestic air passenger forecast is made by the procedures shown in Figure 4.2.1.

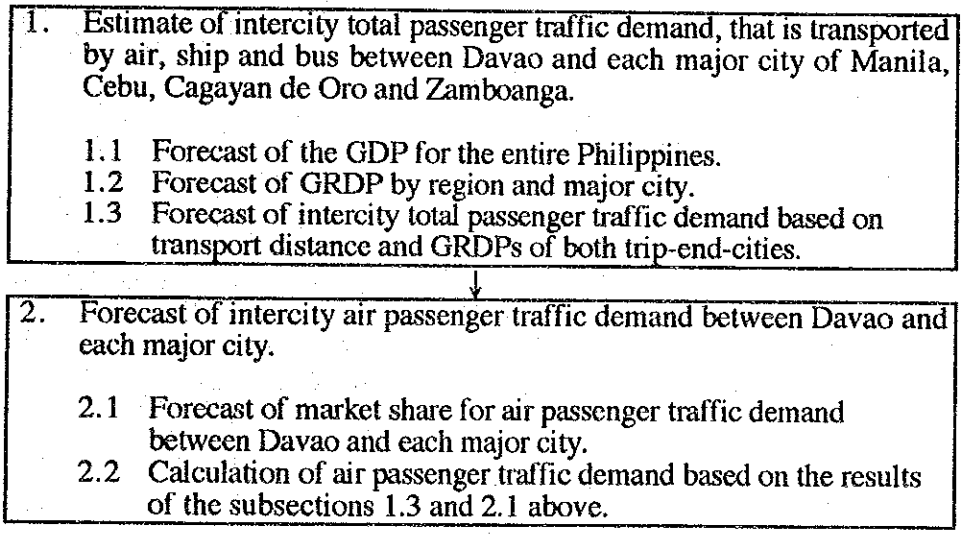


Figure 4.2.1 Procedure of Annual Domestic Air Passenger Forecast

Methodology and estimations for the forecast of the above items are described below.

In the following traffic demand forecasting, "regression analysis" are repeatedly applied through the study. The regression analysis are usually applied through trial and error to get the most pertinent model with the explanatory variables and parameters which are consistent and statistically verified in light of significances of variables, plus (minus) sign, coefficient of correlation, etc. However, for the sake of simplicity so as to avoid confusion, this study will describe only the finally obtained formulas with the respective coefficient of correlation, omitting all of the progress in the above analyses. Here it should be emphasized that, for example, on the building

of the international air passenger model employing GDP as an explanatory variable mentioned below, the analyses using population or GDP per capita instead of GDP and other necessary analyses have been implemented to the best extent possible.

4.2.2 Forecast of GDP and GRDP

(1) Forecast of the GDP for the Entire Philippines

Forecast of the GDP for the entire Philippines is made based on the assumed annual growth rate for the each five year intervals up to 2010. The results of the estimation are shown in Table 4.2.1.

Table 4.2.1 Projection of the GDP for the Entire Philippines (in million pesos at 1972 constant prices)

Year	1985	1991	1995	2000	2005	2010
	Actual		Projection			
Gross Domestic Product	89,900	110,000	134,000	163,000	193,000	229,000
Annual Growth Rate (%)	-	4.1	4.0	4.0	3.5	3.5

(2) Forecast of GRDP by Region and Major City

a) Projection of GRDP by Region

The future GRDPs of the related regions are estimated by applying the following equation (4.2.1):

$$Gi(t) = \frac{G(t)}{G(t\text{-}1)} Gi(t\text{-}1) \quad \text{----------} \quad (4.2.1)$$

where, Gi(t) : Growth rate of the GRDP of Region (i) during the period (t)

G(t) : Growth rate of the GDP for the entire Philippines during the period (t)

Gi(t-1) : Initial value of "Gi(t-1)" is applied with the growth rate of Region (i) during the years 1985 to 1989

t : Period (t = 1 (1990-1995), 2 (1995-2000), ------)

b) Projection of GRDP by Major City

Basically, the same type of the equation (4.2.1) as above is applied for the projection of the GRDPs in major cities (See equation (4.2.2)).

$$Gj(t) = \frac{Gi(t)}{Gi(t\text{-}1)} Gj(t\text{-}1) \quad \text{----------} \quad (4.2.2)$$

where, Gj(t) : Growth rate of the GRDP of Region (j) during the period (t)

Gj(t-1) : Initial value of "Gj(t-1)" is applied with the growth rate of the city (j) during the years 1985 to 1989

Due to the lack of the related statistical data, GRDPs of the cities in 1985 to 1989 are estimated based on the population ratio to the respective region (See equation 4.2.3).

$$GVj(T) = GVi(T) \frac{PNj(T)}{PNi(T)} \quad \text{----------(4.2.3)}$$

where, GVj(T) : The amount of GRDP of the city (j) for the year (T)
GVi(T) : The amount of GRDP of the Region (i) for the year (T)
PNj(T) : Population of the city (j) for the year (T)
PNi(T) : Population of the Region (i) for the year (T)
T : T denotes year (1985 to 1989)

c) Projected GRDPs by Region and City

Projected GRDPs of major regions and cities are shown in Table 4.2.2. The projections of GRDPs, including those of other regions and cities, are shown in Appendix 4.2.1.

Table 4.2.2 GRDP in Future by Region and Main City (In million pesos at 1972 constant prices)

Year	1985	1990	1995	2000	2005	2010
NCR (Metro Manila)	26,700	34,300	43,700	55,400	67,900	83,000
Annual Growth Rate (%)	-	5.2	4.9	4.9	4.2	4.1
REGION VII (Central Visayas)	6,280	8,380	11,100	14,500	18,400	23,200
Annual Growth Rate (%)	-	5.9	5.7	5.6	4.8	4.8
REGION X (Northern Mindanao)	4,819	6,120	7,680	9,610	11,600	14,100
Annual Growth Rate (%)	4,820	4.9	4.7	4.6	3.9	3.8
REGION XI (Southern Mindanao)	6,420	7,850	9,510	11,500	13,500	15,700
Annual Growth Rate (%)	-	4.1	3.9	3.8	3.3	3.2
REGION IX (Western Mindanao)	3,259	4,300	5,210	6,280	7,380	8,640
Annual Growth Rate (%)	-	4.1	3.9	3.8	3.3	3.2
DAVAO	1,197	1,497	1,845	2,256	2,680	3,173
Annual Growth Rate (%)	-	4.6	4.3	4.1	3.5	3.4
CEBU	823	1,114	1,484	1,965	2,505	3,181
Annual Growth Rate (%)	-	6.2	5.9	5.8	5.0	4.9
CAGAYAN DE ORO	430	592	793	1,041	1,317	1,659
Annual Growth Rate (%)	-	6.6	6.0	5.6	4.8	4.7
ZAMBOANGA	450	542	719	897	1,085	1,308
Annual Growth Rate (%)	-	4.9	4.7	4.5	3.9	3.8

Note : 1990 values are estimated.

4.2.3 Forecast of Intercity Total Passenger Traffic Demand

Intercity passenger traffic demand forecast by route is implemented through a model building and its application.

(1) Total Passenger Traffic Demand Forecast Model

The total traffic demand forecast model is a "gravity model", which is formulated by regression analyses using total passenger traffic volume between Davao and other major cities in the latest year and the transport distances of Davao from/to other cities.

The formulated model is shown in equation (4.2.4). Contents of regression analyses, including input data, are shown in Appendix-4.2.2.

$$TDij = Exp\ (14.752050) \cdot (GDPi \cdot GDPj)^{0.3222623} \cdot DISTij^{-0.983938} : Qij$$
$$R = 0.973 \text{ ----------} (4.2.4)$$

where, i denotes Davao city
j denotes other city
TD : Total passenger traffic volume (person)
GDP : Gross Regional Domestic Product (in million PHP at 1972 constant prices)
DIST : Distance (km)
Qij : Regional factor:
R : Correlation coefficient

Intercity	Regional Factor
Davao - Manila	1.000
Davao - Cebu	1.064
Davao - Cagayan de Oro	0.904
Davao - Zamboanga	0.188

It must be noted that the applied traffic data of ships and buses for the above-mentioned analyses are those as roughly estimated based on the accommodation capacities (See Appendix 4.2.3).

(2) Total Passenger Traffic Demand Forecasting

The estimation of the future passenger traffic demand between Davao and each major city is obtained by applying the model (4.2.4) as above and inputting the estimated future GRDPs and distances at the respective major cities. Results of the estimation are shown, together with the following estimation results of market share and air passenger traffic volume, in Table 4.2.3.

Table 4.2.3 Domestic Air Passenger Traffic Demand (Medium Projection)

to/from Davao	1990	1995	2000	2005	2010
Metro Manila					
Total Demand	604,000	698,000	804,000	908,000	1,023,000
Air Share	0.466	0.526	0.578	0.622	0.645
Air Passengers	281,000	367,000	465,000	565,000	660,000
Cebu					
Total Demand	411,000	482,000	563,000	644,000	735,000
Air Share	0.292	0.346	0.395	0.440	0.486
Air Passengers	120,000	167,000	223,000	283,000	357,000
Cagayan de Oro					
Total Demand	435,000	512,000	596,000	680,000	773,000
Air Share	0.073	0.101	0.126	0.151	0.179
Air Passengers	31,600	52,000	75,000	103,000	138,000
Zamboanga					
Total Demand	59,000	68,000	78,000	87,000	98,000
Air Share	0.364	0.417	0.468	0.513	0.558
Air Passengers	21,400	28,000	36,000	45,000	55,000
Total Air Passengers	454,000	614,000	799,000	996,000	1,210,000

4.2.4 Estimation of Share for Air Transport Mode

(1) Modal Share Estimation Model

The market share of the air passenger traffic and its competitive mode are estimated by applying "modal demand model (MD Model)". The basic concept of the MD model is that the traffic demand for each of the competitive modes is generated as the result of the rational modal selection by individual passengers after their due comparison and weighing so that each of the passenger's total cost (the aggregation of his trip time and trip cost) may be minimum. A rough concept of the MD Model is shown in Appendix - 4.2.4.

This model is composed of two independent logarithmic normal distributions concerning time value and total cost of a trip. The parameters of the distributions for the forecasting in this study are shown in Appendix - 4.2.5.

(2) Results of the Estimation of Market Share for Air Transportation

The market shares for the air transport mode in the future estimated by the application of MD Model are shown in Table 4.2.3.

4.2.5 Future Domestic Air Passenger Demand by Route

The air passenger demand between Davao and each major city is calculated simply by multiplying the respective share of air passenger traffic by the respective total passenger traffic volume. The calculated results are shown in Table 4.2.3.

4.2.6 Low and High Projection of Domestic Air Passenger Traffic Demand

In consideration of future uncertainties, low and high projections are made based on the low and high levels of economic activities in terms of GDP growth rate shown in Table 4.2.4. Results of the estimation are shown in Table 4.2.5, Table 4.2.6 and Figure 4.2.2.

Table 4.2.4 Presumed Annual Growth Rate of GDP

(%)

Year	1990 - 1995	1995 - 2000	2000 - 2005	2005 - 2010
Low Projection	3.0	3.0	2.5	2.5
High Projection	5.0	5.0	4.5	4.5

Table 4.2.5 Domestic Air Passenger Traffic Demand (Low Projection)

to/from Davao	1990	1995	2000	2005	2010
Metro Manila					
Total Demand	604,000	677,000	756,000	827,000	903,000
Air Share	0.466	0.513	0.553	0.585	0.617
Air Passengers	281,000	348,000	418,000	484,000	557,000
Cebu					
Total Demand	411,000	468,000	529,000	587,000	648,000
Air Share	0.292	0.334	0.371	0.402	0.434
Air Passengers	120,000	156,000	196,000	236,000	282,000
Cagayan de Oro					
Total Demand	435,000	496,000	560,000	619,000	682,000
Air Share	0.073	0.096	0.113	0.130	0.148
Air Passengers	32,000	47,000	63,000	80,000	101,000
Zamboanga					
Total Demand	59,000	66,000	73,000	49,000	86,000
Air Share	0.364	0.405	0.443	0.475	0.508
Air Passengers	21,000	27,000	32,000	38,000	44,000
Total Air Passengers	454,000	578,000	709,000	838,000	984,000

Table 4.2.6 Domestic Air Passenger Traffic Demand (High Projection)

to/from Davao	1990	1995	2000	2005	2010
Metro Manila					
Total Demand	604,000	720,000	856,000	996,000	1,158,000
Air Share	0.466	0.539	0.603	0.652	0.699
Air Passengers	281,000	388,000	515,000	649,000	809,000
Cebu					
Total Demand	411,000	497,000	599,000	707,000	831,000
Air Share	0.292	0.358	0.420	0.472	0.524
Air Passengers	120,000	178,000	252,000	333,000	436,000
Cagayan de Oro					
Total Demand	435,000	528,000	634,000	746,000	875,000
Air Share	0.073	0.107	0.140	0.171	0.206
Air Passengers	32,000	56,000	88,000	127,000	180,000
Zamboanga					
Total Demand	59,000	70,000	83,000	96,000	111,000
Air Share	0.364	0.429	0.493	0.545	0.596
Air Passengers	21,000	30,000	41,000	52,000	66,000
Total Air Passengers	454,000	652,000	896,000	1,161,000	1,491,000

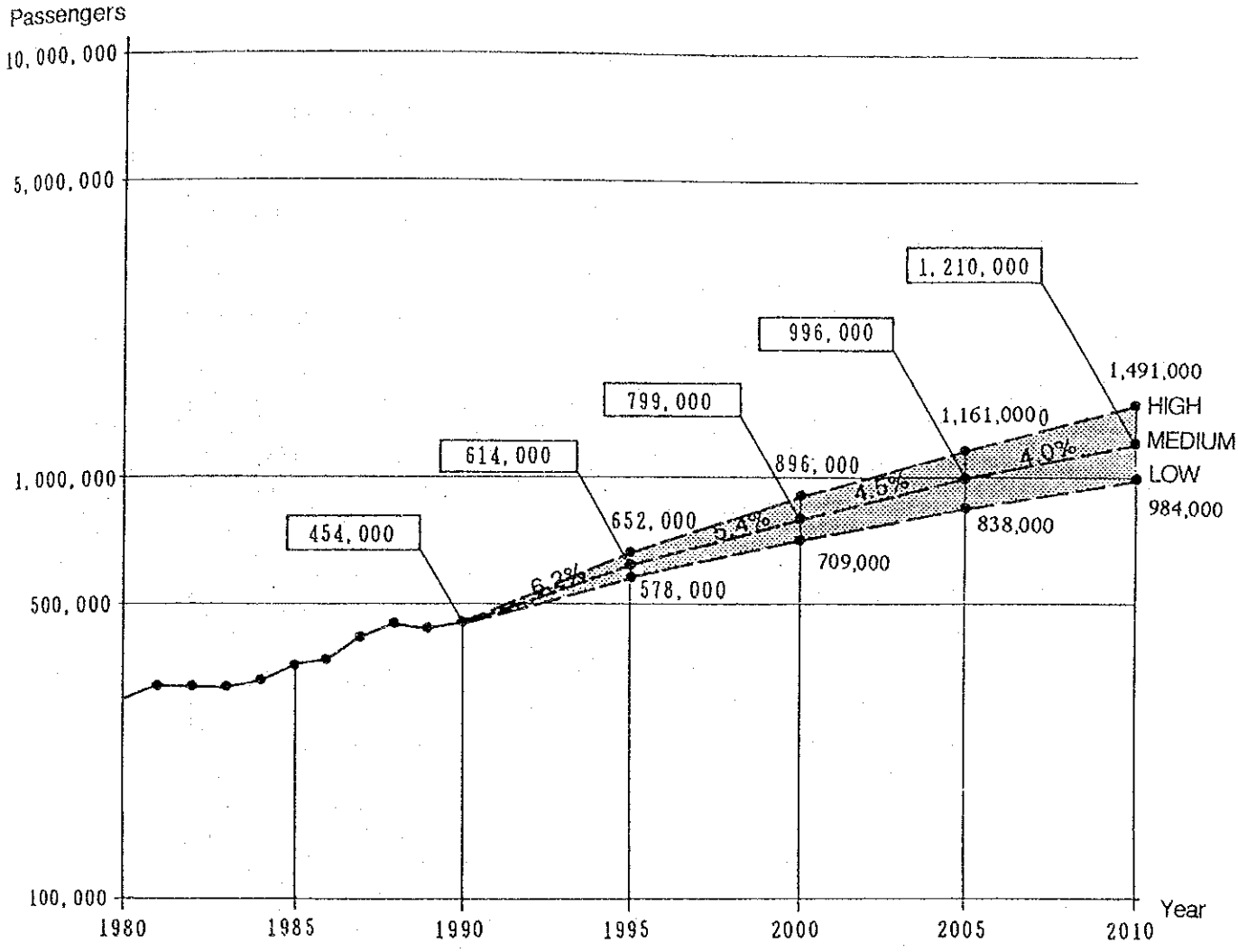


Figure 4.2.2 PROJECTION OF DOMESTIC AIR PASSENGERS

4.3 Annual International Air Passenger Forecast

4.3.1 Procedure of Annual International Air Passenger Forecast

The annual international air passenger forecast is made by the procedure shown in Figure 4.3.1.

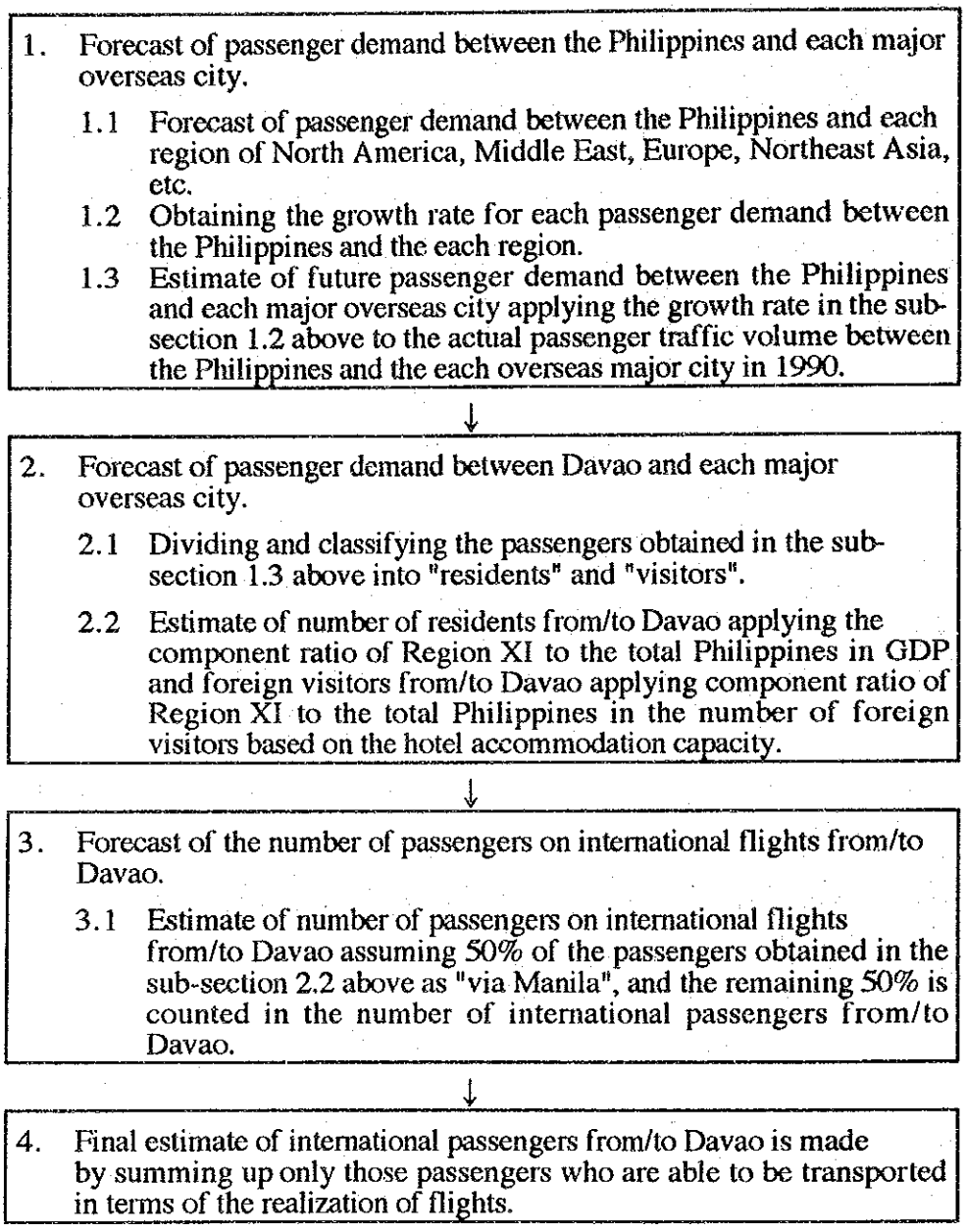


Figure 4.3.1 Procedure of Annual International Air Passenger Forecast

4.3.2 Forecasts of Air Passenger Demand between Philippines and Each of Overseas Regions

(1) Annual GDP Growth Rate by Region

Annual GDP growth rate by region applied for the estimation of the future traffic demand from/to the Philippines is shown in Table 4.3.1.

Table 4.3.1 Annual GDP Growth Rate by Region

Regions	1985-1990 (Actual)	1990-1995	1995-2000	2000-2005	2005-2010
		Projections			
1. North America	2.9	3.0	3.0	2.5	2.5
2. Middle East	-5.8	2.5	2.5	2.0	2.0
3. Europe	3.0	2.5	2.5	2.0	2.0
4. Indian Sub-Continent	5.9	5.0	5.0	4.0	4.0
5. Southeast Asia	3.2	6.0	6.0	5.0	5.0
6. Northeast Asia	4.3	3.5	3.5	3.0	3.0
7. Southwest Pacific	3.2	2.5	2.5	2.0	2.0
8. Philippines	4.2	4.0	4.0	3.5	3.5

(2) Formulation of International Air Passenger Demand Forecast Model

Forecast models for the future international air passenger traffic demand between the Philippines and each of the overseas regions are formulated by the regression analyses using achieved yearly data of passenger traffic and economic indices from 1983 to 1990. However, the above-mentioned data are applied to those of the representative country of the respective region due to the limited data of the total region. Applied data are shown in Appendices-4.3.1 and 4.3.2. Formulated models by the regression analyses are shown in Table 4.3.2. Regional factors are shown in Table 4.3.3.

Table 4.3.2 International Air Passenger Demand Forecast Models

from/to Philippines	Formulated Models (R : Correlation coefficient)
North America	ITP = Exp(-1.4716887) * (GDPi * GDPj)^0.65241656 (R = 0.809)
Middle East	ITP = Exp(3.0927742) * (GDPi * GDPj)^0.39025263 (R = 0.920)
Europe	ITP = Exp(-0.684190) * (GDPi * GDPj)^0.54618907 (R = 0.918)
Indian Sub-Continent	ITP = Exp(-2.9763339) * (GDPi * GDPj)^0.72097933 (R = 0.942)
Southeast Asia	ITP = Exp(1.9458875) * (GDPi * GDPj)^0.32506004 (R = 0.965)
Northeast Asia	ITP = Exp(1.5632525) * (GDPi * GDPj)^0.51591177 (R = 0.915)
Southwest Pacific	ITP = Exp(-1.369017) * (GDPi * GDPj)^0.65569692 (R = 0.787)

Table 4.3.3 Applied Regional Factors

Regions		Factors
No.		
1.	North America	0.875
2.	Middle East	0.910
3.	Europe	0.865
4.	Indian Sub-Continent	0.802
5.	Southeast Asia	0.967
6.	Northeast Asia	1.021
7.	Southwest Pacific	2.216

(3) Results of Estimation for International Air Passenger Demand

Results of the estimation by above-mentioned models are shown in Tables 4.3.4 and 4.3.5.

Table 4.3.4 International Air Passenger Traffic from/to the Philippines (in thousands)

Regions	1985	1990	1995	2000	2005	2010
	Actual		Forecast			
1. North America	412	646	980	1,488	2,053	2,833
2. Middle East	459	486	639	812	975	1,171
3. Europe	117	186	260	364	471	608
4. Indian Sub-Continent	27	35	61	109	164	246
5. Southeast Asia	512	641	860	1,110	1,355	1,654
6. Northeast Asia	1,245	2,048	3,032	4,270	5,578	7,286
7. Southwest Pacific	135	387	580	868	1,181	1,606
8. North Africa		15	21	30	39	51
Total	2,907	4,444	6,438	9,052	11,816	15,457

Table 4.3.5 Annual Growth Rate of International Air Passengers by Region from/to the Philippines

Regions	1985-1990	1990-1995	1995-2000	2005-2005	2005-2010
	(Actual)	Projections			
1. North America	9.4	8.7	8.7	6.7	6.7
2. Middle East	1.1	5.6	4.9	3.7	3.7
3. Europe	9.7	7.0	7.0	5.3	5.3
4. Indian Sub-Continent	5.6	13.0	11.2	8.5	8.5
5. Southeast Asia	4.6	6.1	5.2	4.1	4.1
6. Northeast Asia	10.5	8.2	7.1	5.5	5.5
7. Southwest Pacific	23.5	8.4	8.4	6.3	6.3
8. North Africa		7.7	7.1	5.5	5.5
Total	8.9	7.7	7.1	5.5	5.5

4.3.3 Estimation of Air Passenger Demand between the Philippines and Major Overseas City

Future passenger demand between the Philippines and each major overseas city is estimated by applying the growth rate in Table 4.3.5 to the actual passenger traffic volume between the Philippines and the each major overseas city in 1990 as shown in Table 4.3.6.

Table 4.3.6 International Air Passenger Demand between the Philippines and Major Overseas Cities

from/to Manila	1990	1995	2000	2005	2010
Hong Kong	878,000	1,300,000	1,831,000	2,392,000	3,125,000
Tokyo	682,000	1,009,000	1,421,000	1,857,000	2,425,000
U.S.A.	380,000	577,000	876,000	1,209,000	1,668,000
Middle East	334,000	439,000	558,000	670,000	804,000
Singapore	283,000	379,000	489,000	597,000	729,000
Bangkok	206,000	275,000	355,000	434,000	530,000
Europe	154,000	215,000	301,000	388,000	502,000
Seoul	153,000	226,000	318,000	415,000	543,000
Taipei	139,000	205,000	289,000	377,000	493,000
Australia	113,000	152,000	196,000	239,000	292,000
Kuala Lumpur	70,000	93,000	120,000	147,000	179,000

4.3.4 Forecast of International Air Passenger Demand between Davao and Major Overseas Cities

Firstly, international passengers between the Philippines and each major overseas city are classified into "residents" and "visitors" based on the present foreign visitors ratio shown in Table 4.3.7.

Table 4.3.7 Foreign Visitors Ratio

from/to Manila	Number of Passengers	Number of Visitors	Visitors Ratio	Remarks
Hong Kong	878,000	569,000	64.8%	
Tokyo	682,000	206,000	30.2%	
U.S.A.	380,000	228,000	60.0%	Los Angeles, San Francisco,Honolulu
Middle East	334,000	268,000	80.2%	Riyadh, Dhahran, Dubai, Jeddah
Singapore	283,000	193,000	68.2%	
Bangkok	206,000	107,000	51.9%	
Europe	154,000	115,000	74.7%	Frankfurt, London, Amsterdam, Paris
Seoul	153,000	118,000	77.1%	
Taipei	139,000	111,000	79.9%	
Australia	113,000	86,000	76.1%	Sydney, Melbourne
Kuala Lumpur	70,000	49,000	70.0%	

Source: ICAO Digest of Statistics

The international air passenger demand of visitors and residents between the Philippines and each major overseas city is shown in Table 4.3.8.

Table 4.3.8 International Air Passenger Demand of Visitors and Residents

from/to Manila		1990	1995	2000	2005	2010
Hong Kong	Total	878,000	1,300,000	1,831,000	2,392,000	3,125,000
	Visitors Ratio	64.8%	65.0%	65.0%	65.0%	65.0%
	No.of Visitors	568,944	845,000	1,190,150	1,554,800	2,031,250
	No.of Residents	309,056	455,000	640,850	837,200	1,093,750
Tokyo	Total	682,000	1,009,000	1,421,000	1,857,000	2,425,000
	Visitors Ratio	74.2%	75.0%	75.0%	75.0%	75.0%
	No.of Visitors	506,044	756,750	1,065,750	1,392,750	1,818,750
	No.of Residents	175,956	252,250	355,250	464,250	606,250
U.S.A.	Total	380,000	577,000	876,000	1,209,000	1,668,000
	Visitors Ratio	60.0%	60.0%	60.0%	60.0%	60.0%
	No.of Visitors	228,000	346,200	525,600	725,400	1,000,800
	No.of Residents	152,000	230,800	350,400	483,600	667,200
Middle East	Total	334,000	439,000	558,000	670,000	804,000
	Visitors Ratio	80.0%	80.0%	80.0%	80.0%	80.0%
	No.of Visitors	267,200	351,200	446,400	536,000	643,200
	No.of Residents	66,800	87,800	111,600	134,000	160,800
Singapore	Total	283,000	379,000	489,000	597,000	729,000
	Visitors Ratio	68.4%	70.0%	70.0%	70.0%	70.0%
	No.of Visitors	193,572	265,300	342,300	417,900	510,300
	No.of Residents	89,428	113,700	146,700	179,100	218,700
Bangkok	Total	206,000	275,000	355,000	434,000	530,000
	Visitors Ratio	51.8%	50.0%	50.0%	50.0%	50.0%
	No.of Visitors	106,708	137,500	177,500	217,000	265,000
	No.of Residents	99,292	137,500	177,500	217,000	265,000
Europe	Total	154,000	215,000	301,000	388,000	502,000
	Visitors Ratio	75.0%	75.0%	75.0%	75.0%	75.0%
	No.of Visitors	115,500	161,250	225,750	291,000	376,500
	No.of Residents	38,500	53,750	75,250	97,000	125,500
Seoul	Total	153,000	226,000	318,000	415,000	543,000
	Visitors Ratio	77.4%	80.0%	80.0%	80.0%	80.0%
	No.of Visitors	118,422	180,800	254,400	332,000	434,400
	No.of Residents	34,578	45,200	63,600	83,000	108,600
Taipei	Total	139,000	205,000	289,000	377,000	493,000
	Visitors Ratio	80.0%	80.0%	80.0%	80.0%	80.0%
	No.of Visitors	111,200	164,000	231,200	301,600	394,400
	No.of Residents	27,800	41,000	57,800	75,400	98,600
Australia	Total	113,000	152,000	196,000	239,000	292,000
	Visitors Ratio	76.0%	75.0%	75.0%	75.0%	75.0%
	No.of Visitors	85,880	114,000	147,000	179,250	219,000
	No.of Residents	27,120	38,000	49,000	59,750	73,000
Kuala Lumpur	Total	70,000	93,000	120,000	147,000	179,000
	Visitors Ratio	70.0%	70.0%	70.0%	70.0%	70.0%
	No.of Visitors	49,000	65,100	84,000	102,900	125,300
	No.of Residents	21,000	27,900	36,000	44,100	53,700

Note: Manila-U.S.A. :Manila-Honolulu-Los Angeles-San Francisco
Manila-Middle East :Riyadh-Dharan-Dubai-Jeddah
Manila-Europe :Frankfurt-Paris-Amsterdam-London

Then, the number of residents from/to Davao is estimated applying component ratio of Region XI to the total Philippines in GDP, while the number of visitors is estimated by applying the component ratio of Region XI to the total Philippines in the number of foreign visitors (1% at present) which is presumed to grow gradually up to 3% by the year 2010, being equivalent to the present ratio (in 1992) of Region XI to the total Philippines in the hotel accommodation capacities.

The component ratios of Davao to the total Philippines are shown in Table 4.3.9.

Table 4.3.9 Presumed Ratio of Davao to Total Philippines

from/to Manila	1990	1995	2000	2005	2010
Residents	0.0714	0.0711	0.0705	0.0697	0.0686
Visitors	0.0100	0.0150	0.0200	0.0250	0.0300

The number of air passengers on international flights operating at Davao International Airport is estimated assuming 50% of the air passengers demand as via Manila and the remaining 50% is counted in the number of international air passengers from/to Davao.

Results of the estimation for the international air passengers from/to Davao by route are shown in Table 4.3.10.

Table 4.3.10 International Air Passengers by Route from/toDavao

from/to Manila		1990	1995	2000	2005	2010
Hong Kong	Residents	22,100	32,400	45,200	58,300	75,100
	Visitors	5,700	12,700	23,800	38,900	60,900
	Subtotal	27,800	45,100	69,000	97,200	136,000
Exclude. via Manila		13,900	22,600	34,500	48,600	68,000
Tokyo	Residents	12,600	17,900	25,100	32,300	41,600
	Visitors	5,000	11,400	21,300	34,800	54,600
	Subtotal	17,600	29,300	46,400	67,100	96,200
Exclude. via Manila		8,800	14,700	23,200	33,600	48,100
Honolulu	Residents	10,900	16,400	24,700	33,700	45,800
	Visitors	2,300	5,200	10,500	18,100	30,000
	Subtotal	13,200	21,600	35,200	51,800	75,800
Exclude. via Manila		6,600	10,800	17,600	25,900	37,900
Mid. East	Residents	4,770	6,250	7,870	9,300	11,000
	Visitors	2,670	5,270	8,930	13,400	19,300
	Subtotal	7,440	11,520	16,800	22,700	30,300
Exclude. via Manila		3,720	5,760	8,400	11,400	15,200
Singapore	Residents	6,380	8,090	10,300	12,500	15,000
	Visitors	1,930	3,980	6,800	10,500	15,300
	Subtotal	8,310	12,070	17,100	23,000	30,300
Exclude. via Manila		4,160	6,040	8,600	11,500	15,200
Bangkok	Residents	7,080	9,810	12,500	15,100	18,200
	Visitors	1,060	2,070	3,600	5,400	8,000
	Subtotal	8,140	11,880	16,100	20,500	26,200
Exclude. via Manila		4,070	5,940	8,050	10,300	13,100
Europe	Residents	2,750	3,830	5,300	6,770	8,600
	Visitors	1,150	2,420	4,520	7,290	11,300
	Subtotal	3,900	6,240	9,820	14,060	19,900
Exclude. via Manila		1,950	3,120	4,910	7,030	9,950
Seoul	Residents	2,460	3,220	4,490	5,800	7,400
	Visitors	1,180	2,710	5,100	8,320	13,000
	Subtotal	3,640	5,930	9,590	14,120	20,400
Exclude. via Manila		1,820	2,970	4,800	7,060	10,200
Taipei	Residents	1,980	2,920	4,080	5,270	6,800
	Visitors	1,110	2,470	4,630	7,560	11,800
	Subtotal	3,090	5,390	8,710	12,830	18,600
Exclude. via Manila		1,550	2,700	4,350	6,420	9,300
Sydney	Residents	1,940	3,010	4,470	6,010	8,060
	Visitors	860	1,910	3,810	6,470	10,570
	Subtotal	2,800	4,920	8,280	12,480	18,630
Exclude. via Manila		1,400	2,460	4,140	6,240	9,320
K. Lumpur	Residents	1,492	1,990	2,550	3,070	3,690
	Visitors	487	980	1,690	2,570	3,770
	Subtotal	1,979	2,970	4,240	5,640	7,460
Exclude. via Manila		990	1,490	2,120	2,820	3,730
Manado *		3,060	4,100	5,300	6,500	7,900

* Estimated based on present (1992) flight capacity and growth rate of the Southeast.

4.3.5 Final Estimation of International Air Passengers from/to Davao

Final estimation of international air passengers from/to Davao is made by summing up only those passengers who are able to be transported in terms of the realization of flights. The results of the estimation are shown in Table 4.3.11.

Table 4.3.11 Annual International Air Passengers from/to Davao (in terms of possible flight operation)

Route/YEAR	Present	1995	2000	2005	2010
HONG KONG					
Annual Passenger	-	8,200	34,500	48,600	68,000
Movement	*A300:2/Year	*A300:4/Month	A300:4/Week	A300:6/Week	A300:8/Week
Load Factor	-	70%	68%	64%	67%
TOKYO					
Annual Passenger	-	-	2,000	33,600	48,100
Movement	-	-	*A300:2/2Month	A300:4/Week	A300:6/Week
Load Factor	-	-	68%	66%	63%
HONOLULU					
Annual Passenger	-	-	-	-	37,900
Movement	-	-	-	-	DC-10:4/Week
Load Factor	-	-	-	-	66%
SINGAPORE					
Annual Passenger	-	2,400	2,400	2,400	2,400
Movement	*B737:2/Year	*B737:2/Month	*B737:2/Month	*B737:2/Month	*B737:2/Month
Load Factor	-	71%	71%	71%	71%
SYDNEY					
MELBOURNE					
Annual Passenger	-	-	2,300	2,300	2,300
Movement	-	-	*DC-10:2/2Month	*DC-10:2/2Month	*DC-10:2/2Month
Load Factor	-	-	70%	70%	70%
MANADO					
Annual Passenger	-	4,100	5,300	6,500	7,900
Movement	HS748:2/Week	HS748:4/Week	HS748:4/Week	HS748:4/Week	HS748:6/Week
Load Factor	-	47%	61%	74%	60%
TOTAL	-	14,700	46,500	93,400	166,600

Note, * : Non-scheduled

4.3.6 Low and High Projections of International Air Passenger Traffic Demand

Low and high projections for international air passenger traffic demand are implemented based on the low and high GDP growth rate. The annual growth rate by region is shown in Table 4.3.12.

Results of the estimation for the low and high projections are shown in Tables 4.3.13 to 4.3.18 and Figure 4.3.2.

Table 4.3.12 Presumed Annual Growth Rate of GDP by Region

Low Projection					
Regions	1985-1990	1990-1995	1995-2000	2005-2005	2005-2010
	Actual	Projections			
1. North America	2.9	2.0	2.0	1.5	1.5
2. Middle East	-5.8	1.5	1.5	1.0	1.0
3. Europe	3.0	1.5	1.5	1.0	1.0
4. Indian Sub-Continent	5.9	4.0	4.0	3.0	3.0
5. Southeast Asia	3.2	5.0	5.0	4.0	4.0
6. Northeast Asia	4.3	2.5	2.5	2.0	2.0
7. Southwest Pacific	3.2	1.5	1.5	1.0	1.0
8. Philippines	4.2	3.0	3.0	2.5	2.5
High Projection					
Regions	1985-1990	1990-1995	1995-2000	2005-2005	2005-2010
	Actual	Projections			
1. North America	2.9	4.0	4.0	3.5	3.5
2. Middle East	-5.8	3.5	3.5	3.0	3.0
3. Europe	3.0	3.5	3.5	3.0	3.0
4. Indian Sub-Continent	5.9	6.0	6.0	5.0	5.0
5. Southeast Asia	3.2	7.0	7.0	6.0	6.0
6. Northeast Asia	4.3	4.5	4.5	4.0	4.0
7. Southwest Pacific	3.2	3.5	3.5	3.0	3.0
8. Philippines	4.2	5.0	5.0	4.5	4.5

Table 4.3.13 International Air Passenger Traffic from/to the Philippines

(Low Projection) Unit: Thousands

Regions	1985	1990	1995	2000	2005	2010
	Actual		Forecast			
1 North America	412	646	892	1,230	1,518	1,873
2 Middle East	459	485	600	721	809	909
3 Europe	117	186	240	311	365	430
4 Indian Sub-Continent	26	34	57	87	116	155
5 Southeast Asia	512	641	817	1,006	1,162	1,342
6 Northeast Asia	1245	2,048	2,792	3,647	4,362	5,216
7 Southwest Pacific	134	387	527	717	872	1,059
8 North Africa		14	20	26	31	37
Total	2,907	4,444	5,945	7,745	9,234	11,020

Table 4.3.14 Annual Growth Rate of International Air Passengers by Region from/to the Philippines

(Low Projection)

Regions	1985-1990	1990-1995	1995-2000	2000-2005	2005-2010
	Actual	Projections			
1 North America	9.4	6.7	6.7	4.3	4.3
2 Middle East	1.1	4.3	3.7	2.3	2.3
3 Europe	9.7	5.3	5.3	3.3	3.3
4 Indian Sub-Continent	5.6	10.4	8.9	5.9	5.9
5 Southeast Asia	4.6	5.0	4.2	2.9	2.9
6 Northeast Asia	10.5	6.4	5.5	3.6	3.6
7 Southwest Pacific	23.5	6.3	6.3	4.0	4.0
8 North Africa		6.0	5.4	3.6	3.6
Total	8.9	6.0	5.4	3.6	3.6

Table 4.3.15 International Air Passenger Traffic from/to the Philippines

(High Projection) Unit: Thousands

Regions	1985	1990	1995	2000	2005	2010
	Actual		Forecast			
1 North America	412	646	1,077	1,797	2,727	4,137
2 Middle East	459	485	680	915	1,163	1,478
3 Europe	117	186	282	427	597	835
4 Indian Sub-Continent	26	34	72	135	226	377
5 Southeast Asia	512	641	905	1,224	1,566	2,003
6 Northeast Asia	1245	2,048	3,291	4,993	7,030	9,898
7 Southwest Pacific	134	387	638	1,050	1,571	2,352
8 North Africa		14	23	35	50	70
Total	2,907	4,444	6,968	10,576	14,929	21,150

Table 4.3.16 Annual Growth Rate of International Air Passengers by Region from/to the Philippines

(High Projection)

Regions	1985-1990	1990-1995	1995-2000	2000-2005	2005-2010
	Actual	Projections			
1 North America	9.4	10.8	10.8	8.7	8.7
2 Middle East	1.1	7.0	6.1	4.9	4.9
3 Europe	9.7	8.7	8.7	6.9	6.9
4 Indian Sub-Continent	5.6	15.6	13.5	10.8	10.8
5 Southeast Asia	4.6	7.1	6.2	5.1	5.1
6 Northeast Asia	10.5	10.0	8.7	7.1	7.1
7 Southwest Pacific	23.5	10.5	10.5	8.4	8.4
8 North Africa		9.4	8.7	7.1	7.2
Total	8.9	9.4	8.7	7.1	7.2

Table 4.3.17 International Air Passengers by Route from/to Davao

(Low Projection)

from/to Davao	Present	1995	2000	2005	2010
Hong Kong		8,200	8,200	38,010	48,681
Tokyo			2,000	2,000	34,432
Singapore		2,400	2,400	2,400	2,400
Melbourne Sydney			2,300	2,300	2,300
Manado *	3,058	3,895	4,794	5,538	6,397
Total	3,100	14,500	19,700	50,200	94,200

* Estimated based on present (1992) flight capacity and growth rate of Southeast Asia.

Table 4.3.18 International Air Passengers by Route from/to Davao

(High Projection)

from/to Davao	Present	1995	2000	2005	2010
Hong Kong		8,200	40,338	61,262	92,376
Tokyo			2,000	42,324	65,338
Honolulu				34,416	55,364
Singapore		2,400	2,400	2,400	18,366
Melbourne Sydney			2,300	2,300	2,300
Manado *	3,058	4,317	5,834	7,465	9,551
Total	3,100	14,900	52,900	150,200	243,300

* Estimated based on present (1992) flight capacity and growth rate of Southeast Asia.

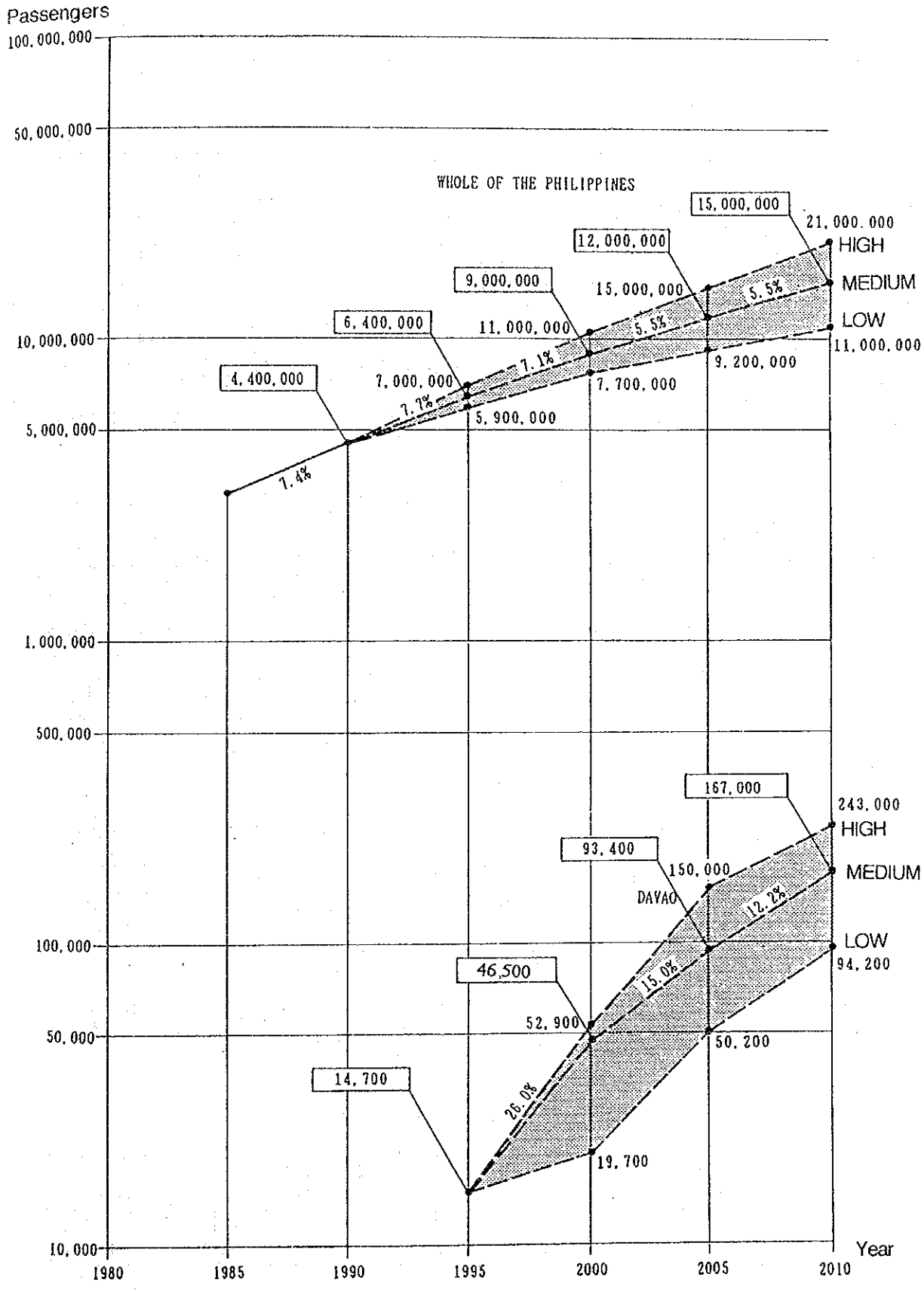


Figure 4.3.2 Projection of International Air Passengers