REPUBLIC OF INDONESIA

FEASIBILITY STUDY FOR THE PADANG AIRPORT DEVELOPMENT

FINAL REPORT

VOLUME II

JANUARY 1982

JAPAN INTERNATIONAL COOPERATION AGENCY

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PREFACE

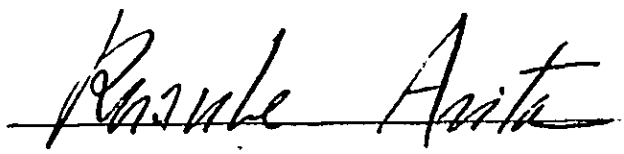
In response to the request of the Government of the Republic of Indonesia, the Japanese Government decided to conduct a feasibility study on the Padang Airport Development Project and entrusted it to the Japan International Cooperation Agency (JICA). The JICA sent to Indonesia a survey team headed by Mr. Tetsuya Shiraishi from June 1981 to December 1981, under the guidance of the Supervisory Committee headed by Mr. Yukihiko Komada of the Civil Aviation Bureau, Ministry of Transport.

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

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

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

January, 1982



Keisuke Arita
President
Japan International Cooperation Agency

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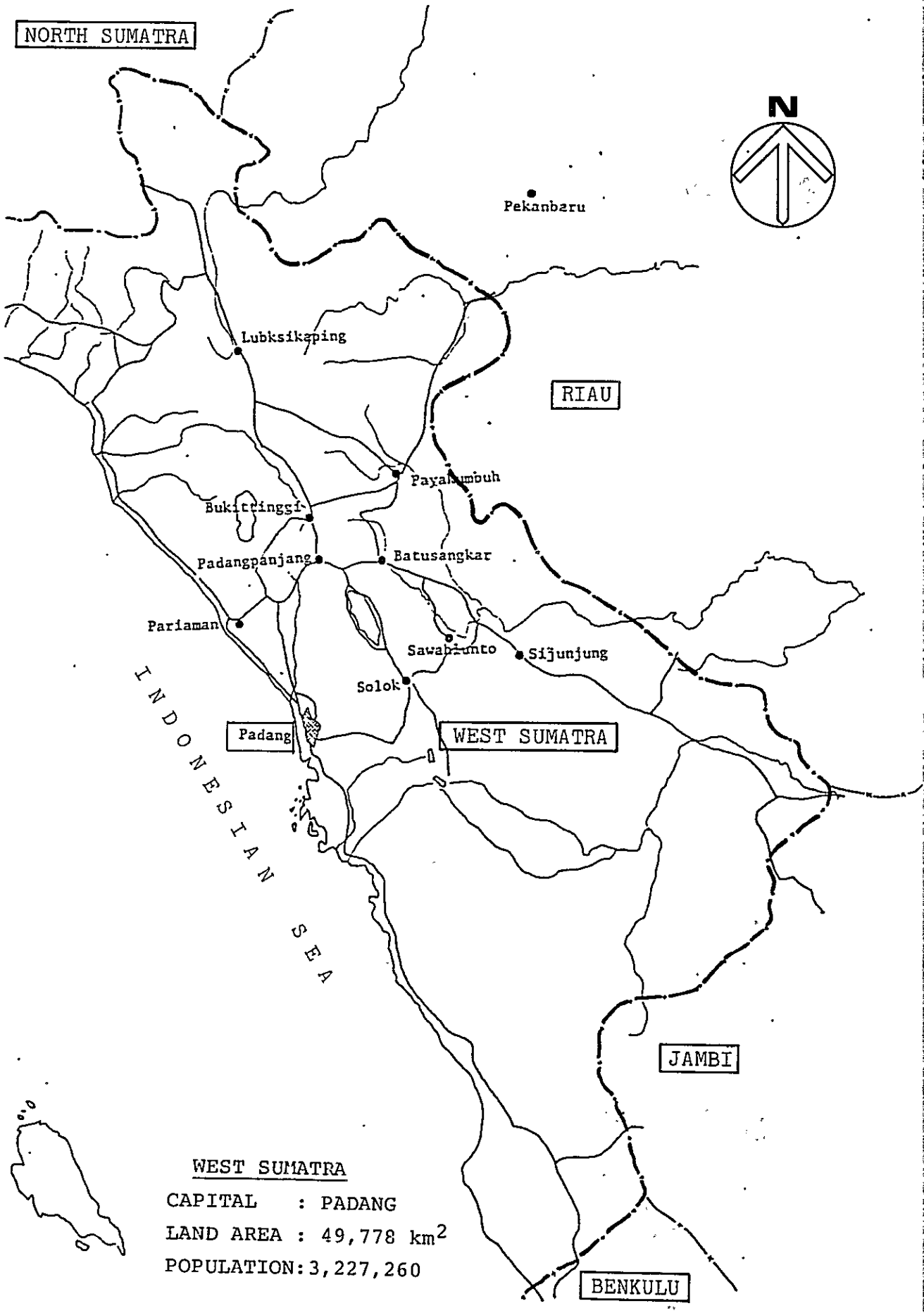
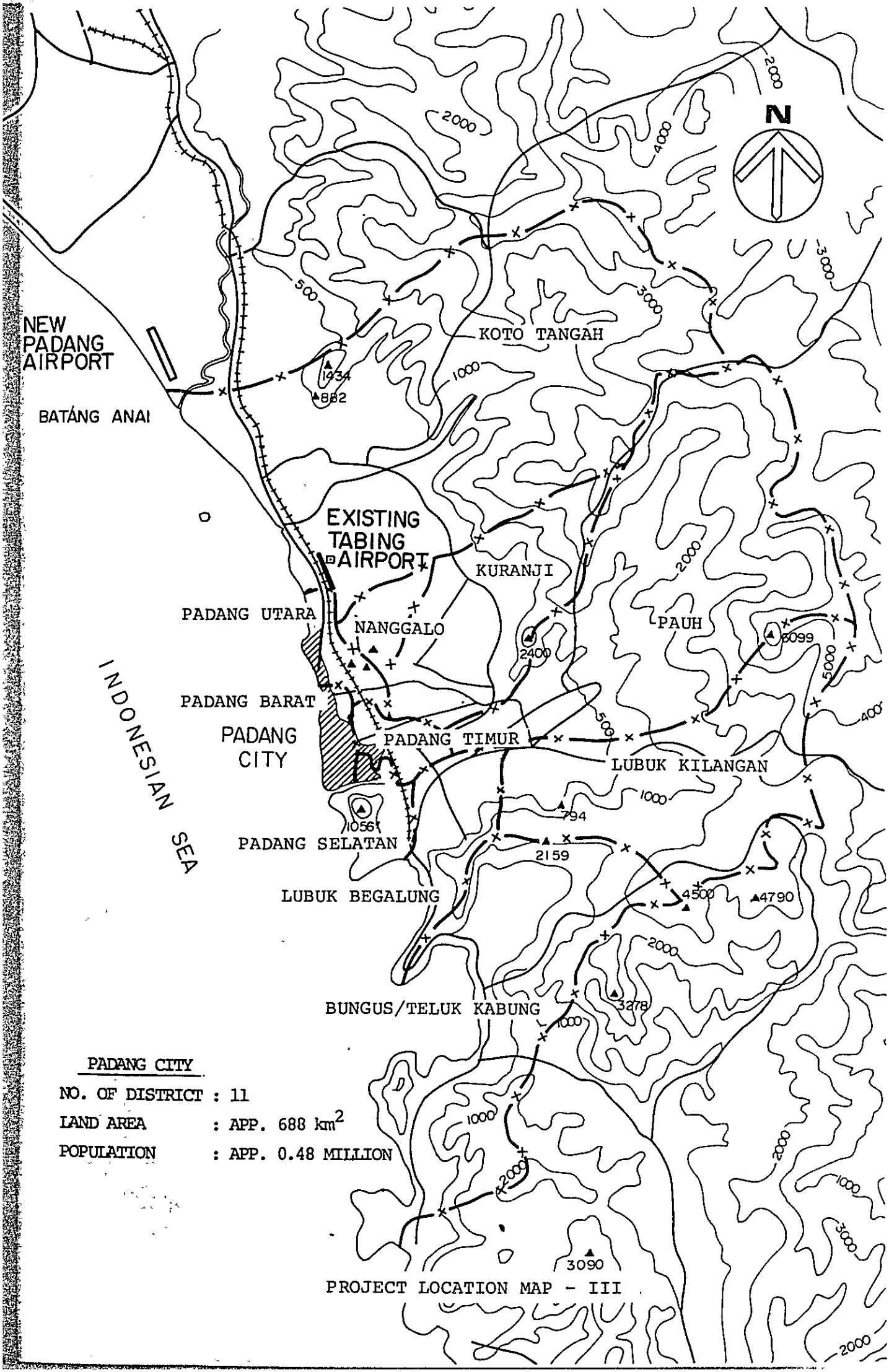


PROJECT LOCATION MAP - II



PADANG CITY

NO. OF DISTRICT : 11

LAND AREA : APP. 688 km^2

POPULATION : APP. 0.48 MILLION

PROJECT LOCATION MAP - III


NEW PADANG AIRPORT

PART I BACKGROUND

CHAPTER 1 INTRODUCTION

1.1 General

The Indonesian archipelago consists of more than 3,000 inhabited islands which are spread over some 5,100 km from west to east with a 2 hour time difference and some 1,900 km distance from north to south. Due to the spread out geographical area, air transport plays an important role in promoting economic activities, national integration, regional balance in economy, etc. For those areas particularly without much surface transportation which form an isolated island on the land such as Padang, West Sumatra, which faces the Indonesian sea on the west and is surrounded by the mountains on the other three sides, air transport is indispensable for inter-regional communication.

Air passengers at the gateway airport, Tabing, in Padang, the capital of West Sumatra with a population of about 480,000, have increased at a high growth rate of 15 percent from 1970 to 1980 and the number reached about 220,000 in 1980. The air freight volume also grew at a rate of 36 percent per annum for the same time period and reached 2,890 tons in 1980. It is forecast that this increased traffic tendency will continue and the number of passengers will be over one million per annum 10 years from now.

Tabing airport, however, is not sufficient to accommodate even the present air traffic needs, in terms not only of size and system of facilities, but also air space availability.

If the airport is not expanded immediately so as to meet the increasing traffic demand, it will constitute a serious barrier to regional economic development. Therefore, the Government of Indonesia recognized the importance of the airport development in Padang, the gateway to West Sumatra, in view of the necessity of unrestrained growth of civil aviation especially in a region which fully depends on civil air transport due to geographical reasons.

The Government of Indonesia and the Government of Japan agreed that the Japanese Government would render technical assistance for a Feasibility Study for the Padang Airport development. The Scope of Work was agreed upon between both Governments on February 9, 1981.

According to this agreement, the Government of Japan has assigned Japan International Cooperation Agency (JICA) to carry out the Study.

JICA organized the Study Team and officially commenced the Study in June 1981.

1.2 Objective and Scope of Work

The objective of this Study was to carry out a comprehensive engineering and economical evaluation regarding the airport development for Padang, the capital of West Sumatra. The Study consisted of the selection of the most feasible scheme between development of a new airport or redevelopment of the existing Tabing airport, and included the master-planning for the selected development plan.

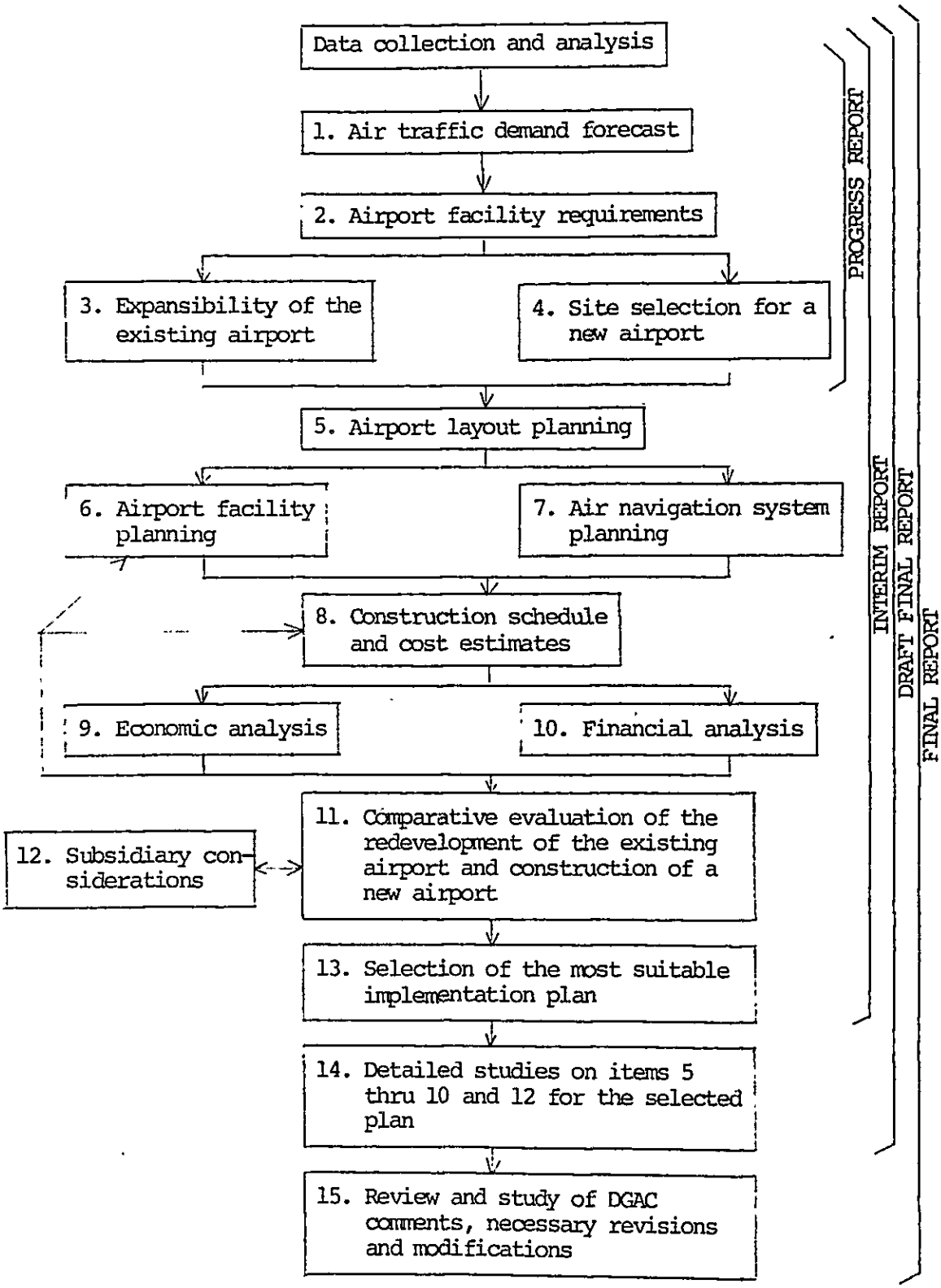
The Study included the following twelve major areas of work which were performed in accordance with the work flow chart indicated in Figure 1.2.1.

1) Air traffic demand forecast
2) Airport facility requirements
3) Expansibility of the existing airport
4) Site selection for a new airport
5) Airport layout planning
6) Airport facility planning
7) Air navigation system planning
8) Construction schedule and Cost estimates
9) Economic analysis
10) Financial analysis

11) Comparative evaluation of the redevelopment of the existing airport and construction of a new airport

12) Subsidiary consideration (environmental considerations, man power planning, etc.)

Figure 1.2.1 WORK FLOW CHART



1.3 Execution Method and Reporting System

The Study was conducted in accordance with the procedures outlined in the Inception Report accepted in June 1981.

The Study Team organized by JICA immediately proceeded with data collection, interviews with various related organizations after the acceptance of the Inception Report by the Directrate General of Air Communications of Indonesia (DGAC), and carried out the air traffic demand forecast, study of facility requirements, study on the expansibility of the existing airport and site selection of a new airport.

The results of these studies were intermediately submitted in the Progress Report in August 1981.

After concluding these studies, airport layout planning, air navigation system planning, construction schedule and cost estimates, economic analysis and financial analysis were carried out in order to select the most suitable implementation plan between both the redevelopment of the existing airport or the development of a new airport. All these studies were performed in Indonesia by the JICA Study Team with the close cooperation of Indonesian counterpart members, in such a way that the counterpart members could participate in the Study. The cooperation continued for three months until the selection of the new airport development resulting from the submission of the Interim Report was accepted for further study by the Indonesian Steering Committee in September, 1981. The contents of the Interim Report remain as PARTs II and III of this Report.

The master planning for the new airport scheme, PART IV, was carried out based on the factors discussed in PART III and based on the various basic assumptions after the return of the Study Team to Japan.

The Draft Final Report, containing the comprehensive results of the Study, which was made by adding PART IV to the Interim Report was submitted to DGAC and accepted in December 1981.

This Final Report was prepared for the completion of the Study by incorporating the DGAC comments on the Draft Final Report.

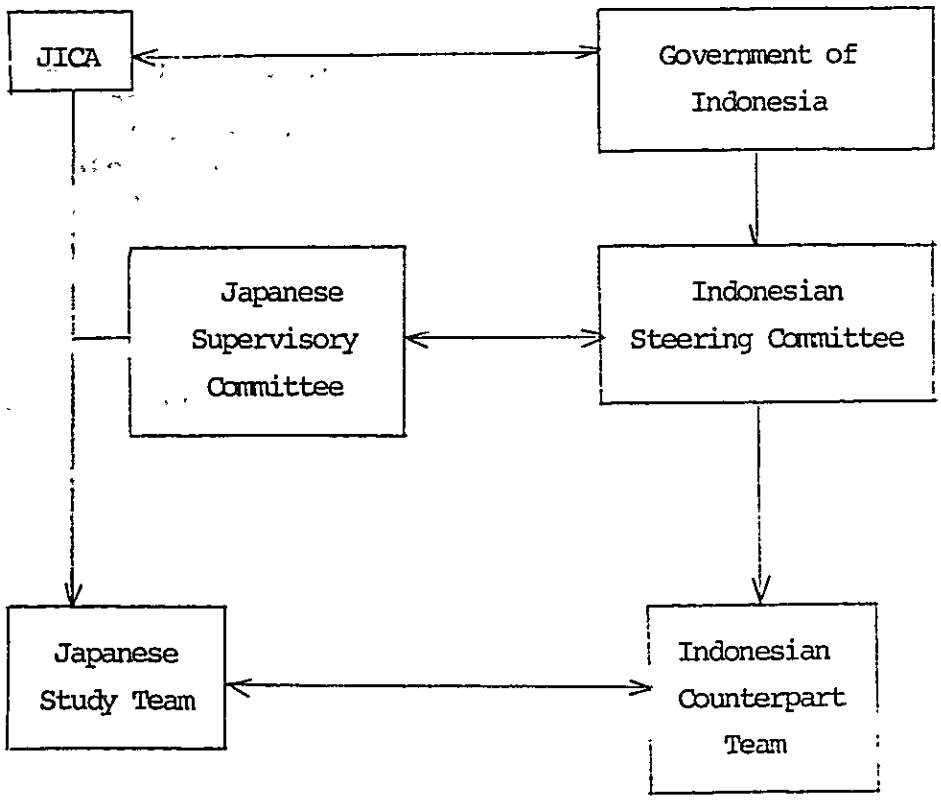
Although some descriptions about the new airport in PART III do not always meet the corresponding descriptions in PART IV (the master planning), they have no influence on the contents or the conclusions of the Study and are simply derived from the difference in the necessary accuracies between scheme selection and master plan.

1.4 Study Organization

The Study was carried out by the Study Team organized by JICA under the supervision of the Japanese Supervisory Committee and with the close cooperation of the Indonesian Counterpart Team which was the substructure of the Indonesian Steering Committee. The relationship of these committees and teams is shown in Figure 1.4.1.

The members of both committees are presented hereinafter while the Counterpart and Study Teams are presented in APPENDIX 1.4.1.

Figure 1.4.1 ORGANIZATION RELATIONSHIP



List of Japanese Supervisory Committee

Mr. Yukihiko Komada	Director of Tokyo International Airport Development Planning Division, Aerodrome Department, Civil Aviation Bureau, Ministry of Transport
Mr. Hideo Nakano	Special Assistant to the Director, International Affairs Division, Secretariat to the Minister, Ministry of Transport
Mr. Yoshihiko Iwashita	Special Assistant to the Director, Flight Standard Division, Technical Department, Civil Aviation Bureau, Ministry of Transport
Mr. Norio Sanaka	Special Assistant to the Director, Construction Division, Aerodrome Department, Civil Aviation Bureau, Ministry of Transport

JICA Co-ordinater

Mr. Kazuo Notake	First Development Survey Division, Social Development Cooperation Department

List of Indonesian Steering Committee

Mr. Wasito	Secretary of the Directorate General of Air Communications	Chairman
Mr. Kusno Wagiman	Head of Systems and Procedures Sub-branch	Secretary
Mr. Supartolo	Head of Directorate of Aviation Safety, DGAC	Member
Mr. Subadio Wiryowiguno	Head of Directorate of Telecommunications, Navigational Aid and Electrical Facilities, DGAC	Member
Mr. Iman Hertoto	Head of Directorate of Airport Engineering, DGAC	Member
Mr. G. Rissakota	Head of Directorate of Air Transport	Member
Mr. S. Abdulrachman	Head of Bureau of Planning Department of Communications	Member
Mr. H. Subrata	Head of Research and Development Center	Member
Mr. Arif Boediman	Head of Planning Branch, DGAC	Member
Mr. Basuki	Staff member of Indonesian Air Force	Member
Mr. Arsyad Idrus	Bureau of National Development Planning Agency	Member
Mr. Sugiarto Sumobroto	Staff of Directorate General of Budgeting Department of Finance	Member

CHAPTER 2 BACKGROUND OF THE PROJECT

2.1 Economic Situation in Indonesia and West Sumatra

In this section, the economic situation in Indonesia and West Sumatra is reviewed.

2.1.1 Indonesia

1) Setting

The archipelago of Indonesia, straddling the equator, consists of some 13,600 islands. It extends 5,110 kilometers from west to east, and 1,888 kilometer from north to south. Its land area is 1,919 thousand square kilometers. The country is endowed with abundant natural resources including petroleum, natural gas, coal, basic minerals including iron, tin, nickel, bauxite, and copper. It also produces a wide variety of agricultural products: rice, the country's staple food, rubber, palm oil, sugar, coffee, tea, etc.

According to the most recent census (conducted in 1980), the population of Indonesia was estimated to be 147 million. Population growth rate between 1971, when the previous census was conducted, and 1980 was estimated to be 2.3 percent per annum. Population density is 76.7 persons per square kilometer. About 62 percent of the peole however live in Java and Madura; and 19 percent in Sumatra. This places the population density of Java and Madura at 690 people per square kilometer. About 40 percent of the population is under 15 years of age. The size of the labor force is about 52 million, of which some 32 million people are engaged in agriculture.

2) Production and Expenditure

The gross domestic product (GDP) of Indonesia in 1979 was estimated to be 30,660 billion Rupiah. At the current exchange rate (US$ 1.00 = Rp. 625), this is equivalent to some US$ 49 billion.

On this basis, the per capita GDP is about US$ 340. GDP of Indonesia grew rapidly, by 6.7 percent per year on average during the period 1973 - 79. During this period, agriculture output grew by 2.8 percent per annum, mining production by 3.9 percent, and manufacturing by 12.0 percent.

Table 2.1.1 GDP GROWTH 1973 - 1979
(Annual Percentage Grow Rate)

GDP	6.7
Agriculture	2.8
Mining	3.9
Manufacturing	12.0
Other	9.4

Private and public consumption expenditures accounted for 70.5 percent of GDP, and domestic investment for 2.6 percent, with the resource balance in surplus by 6.9 percent in 1979.
During 1973 - 79, private expenditures grew by 7.5 percent annually, government consumption expenditures, 8.8 percent; and investment by 12.6 percent. The fast growth of investment which was made possible by the expansion of resource availability was one of the factors which supported the rapid economic development.

The government budget also expanded fast. In fact, the rapid investment growth was mainly due to the expansion of public investment which accounted for about two thirds of the domestic investment during 1975 - 79. As a result, the budgetary deficit increased from 489 billion Rupiah in 1975/76 to 1379 billion in 1979/80, or 4 - 5 percent of GDP.

Table 2.1.2 GOVERNMENT RECEIPTS & EXPENDITURES
(in billion of Rupiahs)

	1975/76	1976/77	1977/78	1978/79	1979/80
Revenues	2,242	2,906	2,535	4,266	6,697
Expenditures					
Current	1,333	1,630	2,149	2,744	4,062
Capital	1,398	2,055	2,159	2,556	4,014
Financing	492	784	773	1,036	1,381

Source: BPS

3) Prices

Because of the rapid expansion of economic activities, in particular, of expenditures, the general price level in Indonesia also increased fast. Based on the cost of living index, the annual inflation rate in Jakarta between 1974 - 78 was 9.5 percent on an average, although it decreased considerably compared with the early 1970s when the index increased over 70 percent per year (between 1969 - 74). The wholesale price index shows a significantly higher growth of 18 percent between 1974 - 79, which reflected mostly the rapid rise in petroleum price.

4) Economic Development Plan

Since 1969/70, the government has directed economic development through the three successive five year development plans (REPELITA, REncana PEmbangunan LIma TAhun). REPELITA I covered the years 1969/70 - 1973/74; REPELITA II 1974/75 - 1979/80; and REPELITA III, 1979/80 - 1983/84).

The objectives of REPELITA III are to attain three major goals of equity, growth, and national stability. These goals will be

pursued by a variety of means; the generation and distribution of job opportunities; balanced regional development; and social development in education, health and housing. The anticipated structural transformation implies that an increased share of production should come from the industrial, in particular the manufacturing sector. The strategy for agriculture includes a greater emphasis on secondary food crops to help achieve food security, and increased efforts for expanding the cultivated areas. The major instrument for this strategy is to invest in irrigation facilities. The strategy for manufacturing is built around the development of strategic industries (steel, metal, chemicals), consumer goods industries (food processing, textiles, household goods, and pharmaceuticals), and small scale industries. Financial and technical assistance for marketing, management, and production planning are envisaged as instruments to support the strategy.

The GDP growth target of Repelita III was initially put at 6.5 percent per annum for the five years. However, the resource constraints which were perceived at the time of plan preparation have since been significantly reduced as the price of petroleum increased sharply. It is considered, therefore, that the GDP growth should attain a 7.5 percent increase per year.

5) Prospects

The development prospects for the Indonesian economy remain bright, despite many foreseeable difficulties, from the declining rate of petroleum production and exports, to the food supply. Based on the abundant natural resources, and a climate suitable for agricultural production, the Indonesian economy should exhibit a basic strength during the coming decades.

Based on the last decades' achievement, the endowment of natural resources, and improved economic management, the GDP is expected to continue to grow 7 - 8 percent a year during the next few decades.

2.1.2 West Sumatra

1) Setting

Located on the western sea board of Sumatra, the province of West Sumatra is protected by the Bukit Barisan (The High Mountains) on the east, and faces the Indonesian Sea (Indian Ocean) on the west. It extends about 540 kilometers from north to south and 375 kilometers from east to west. The land area is 42,300 square kilometers, and most of the land is covered by high mountains. The highest point is Mt. Talaman, elevation 2,912 meters. Some 70 percent of West Sumatra covered by forests and about 12 percent is agricultural land for paddy, tree crops and estates.

The population of West Sumatra was some 3,400,000 in 1980 based on the 1980 population census. Population growth rate between 1971 and 1980 was 2.2 percent and population density was 80 people per square kilometer. About 39 percent of the population was under 15 years of age.

2) Economy

West Sumatra is endowed with coal; forest areas for rubber and tree crops; and fertile paddy field. Production of major products is presented in Table 2.1.3.

Table 2.1.3 WEST SUMATRA: MAJOR PRODUCTS

Item	Unit	1976	1977	1978	1979
Paddy	1000 MT	954	968	993	956
Fish	ton	5,155	5,418	5,904	6,188
Rubber	1000 MT	18.1	17.9	18.2	19.3
Coconut	"	34.1	35.4	40.3	42.5
Sugar cane	"	15.4	16.8	16.6	15.3
Coffee	"	3.7	3.8	3.8	4.9

Item	Unit	1976	1977	1978	1979
Spices	1000 MT	3.8	3.5	5.2	5.0
Logs	1000 cub.m.	359.9	426.9	384.5	445.9
Coal	1000 MT	60.1	81.0	87.1	93.4
Cement	Ton	308	-	340	361
Electricity	1000 KWH	43,418	51,165	58,744	69,575

Source: West Sumatra in Figures 1979, Bappeda

Regional gross domestic product of West Sumatra was estimated in 1977 to be Rp. 285.7 billion, compared with the national GDP of Rp. 19,010 billion for the same year. Agriculture production accounted for 44 percent of GDP; manufacturing 6 percent; wholesale and retail trade 17 percent; public administration 11 percent. Compared with the national economic structure, the portions of agriculture and trade are very high. The reasons for this are first, West Sumatra does not have a large mining industry, notably petroleum and large scale industries, and second, West Sumatra has been traditionally a region of paddy farmers and merchants.

West Sumatra is a surplus rice producer. In 1980, West Sumatra produced 281 kg of paddy per capita, compared with 178 kilograms for the national average. An average Indonesian consumes about 195 kg of rice in paddy equivalent. This implies a substantial surplus produced by West Sumatra farmers.

Per capita regional GDP in 1977 was Rp. 91,300, compared with Rp. 138,967 of the national average. Between 1970 - 77, GDP of West Sumatra grew by 7.5 percent per annum on average.

3) Regional Development Plan

Repelita III for West Sumatra, within the overall context of

development objectives and strategies of the national Repelita III, sets development priorities for agriculture, manufacturing and tourism. The agriculture sector, as a surplus sector, continues to place its emphasis on further expansion of rice production with irrigation; tree crop production for export. The manufacturing sector development will increase after further expansion of the cement plant, eventually to a total production capacity of 3.3 million ton a year; and development of consumer good industries for local consumption, such as textiles, food processing, construction materials, and wood processing. The tourism sector developments rest upon the construction of the trans Sumatra highway, and other infrastructure developments. Tourist traffic to West Sumatra, which is currently about 10,000 foreign visitors per year, is expected to grow by 15 percent a year. In addition there is a substantial traffic from domestic travellers partly because of the characteristics of West Sumatra people, who are merchants by nature, and are mobile people.

2.2 The Transportation Sector

The transportation sector of Indonesia reflects the geographical characteristics of the country: its size and many islands. Since the economic activities and hence population have been developed with heavy concentrations in Java/Madura and Sumatra, the transportation network is also concentrated in these areas, in particular those which require heavy infrastructure investments; namely roads and railways.

2.2.1 Road

The road network is well developed in Java/Madura. In Sumatra, road networks are still under developed, and are mostly concentrated around Medan, Padang, and Tanjungkarang.

In 1979, the total length of roads in Indonesia was 128,899 km of which 57,570 kilometers were asphalt paved. Road maintenance seemed to be falling behind the rapid increase in road traffic. Only one third of the existing roads were kept in satisfactory condition (See the following table).

ROADS CONDITIONS IN INDONESIA IN 1979

(km)

	Total	Condition	
		Good	Moderate to Poor
Sumatra	42,220	8,842	33,378
(West Sumatra)	(5,242)	(2,840)	(2,402)
Java	40,386	14,135	26,251
Bali	3,133	978	2,155
Kalimantan	9,787	1,665	8,122
Sulawesi	18,858	5,102	13,756
Other	14,515	6,220	8,295
Total	128,899	36,942	91,957

Source : BPS

2.2.2 Railway

As of 1981, only Java/Madura and Sumatra have railway transportation services. Railway traffic has been growing steadily : Passenger - km grew by 15 percent per year between 1976 and 80; for cargo, ton - km by 8.5 percent.

RAILWAY TRANSPORTATION
1976 - 1981

	1976	1977	1978	1979	1980
Passenger Traffic					
Java :					
In mill passengers	18.3	19.2	23.4	34.7	39.1
In mill pass - km	2999	3489	3050	5388	5191
Sumatra :					
In mill passengers	2.5	1.5	1.7	3.1	3.7
In mill pass - km	310	348	407	593	639
Freight Traffic					
Java :					
In mill tonnage	2.1	2.5	3.4	2.9	2.8
In mill ton - km	508	659	689	742	634
Sumatra :					
In mill tonnage	1.2	1.3	2.0	1.3	1.9
In mill ton - km	193	220	304	274	336

Source : Departemen Perhubungan

2.3. Existing Tabing Airport in Padang

2.3.1. General

Tabing airport is located 9 km north of Padang city which is the capital city of West Sumatra with a population of some 480,000.

The layout of the airport including the area managed by DGAC is shown in Fig. 2.3.1. The general outline of Tabing airport is summarized in Table 2.3.1.

For the construction history about the various airport facilities, the organization of the airport, and the details of the facilities, refer to APPENDIXES 2.3.1 through 2.3.4.

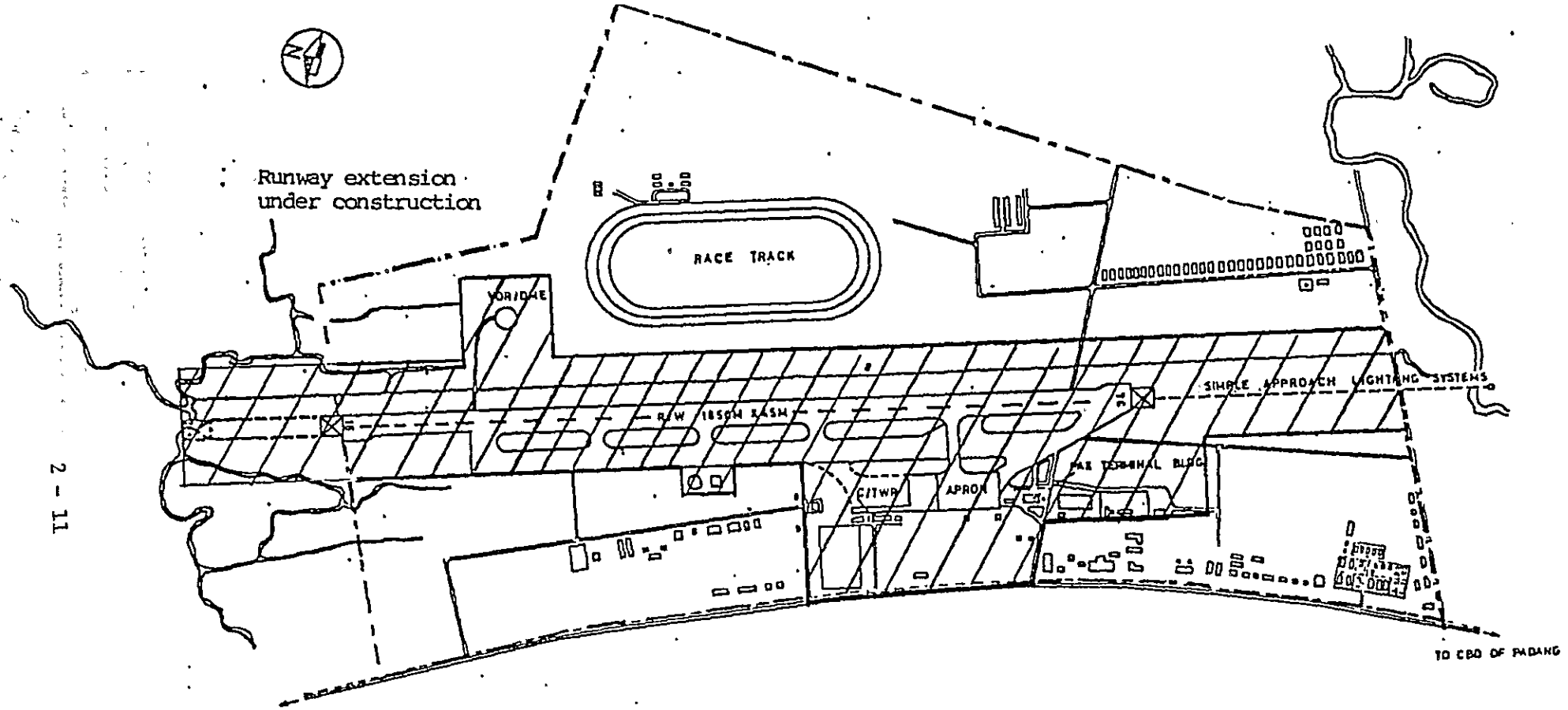


Figure 2.3.1. AIRPORT LAYOUT AND AREA MANAGED BY DGAC

Area managed by DGAC

Airport Property line

Table 2.3.1 OUTLINE OF THE EXISTING TABING AIRPORT

Country	Name of Airport	INT./DOM. / ICAO CODE	Commencement of Services	Airport Total Area	Aerodrome Ref. Point	Airport Elevation	Runway Orientation	Aerodrome Ref. Temp.	Operation Hours	Seasonal Availability	Note: Control Agency; DGAC
Indonesia	Tabing	Int./ Dom. / B	1955	280 ha	S 00°53' / E 100°21'	3m	N 160° E	33°C	0000-1100 / 11 hours	All seasons	

City/Town			Transportation			Wind Coverage	Operational Minimum					Note: GIA Standard
Name	Population	Distance to Airport	Railway	Taxi	Bus		Runway	Procedure	DH/MDA	VIS	RVR	
Padang	480 thousand	7 km	x	x	x	99% 13 knots cross wind	16 / 34	VOR/DME, CIR.	1,409	5,000		
								ADF, CIR.	1,409	5,000		

Air Navigation

Nav.	NDB		VOR		DME		TACAN		ILS		LOCATOR		D.F.								Note:
	x		x		x						x										
ATC/COM	ASR		SSR		PAR		ASDE		ARTS		AMS		AFS		TTY		UHF		ATIS		
													x		x						
LIGHT	ALS	SFL	SALS	ALB	CGL	RWL	RWCL	RWIL	ORL	TDZL	REIL	DML	VASIS	TWL	TWCL	TGL	ABN	WIDL	AFL	O.L.	
			RWY 34 x			x		x			RWY 16 x		x	x			x		x		
MET	RWY Surface Sensors				RVR		Ceilometer		WX-FAX		WX-TTY		ART-RX		Radiosonde		WX Radar				
	x								x						x		x				

Basic Facilities

	Size	Pavement	Note
Runway Strip	1,970m x 150m		
Runway	1,850m x 45m	PCC, LCN 60	
Taxiway	145m x 23m		

Apron	Design Aircraft	No. of Stand	Pavement	Area (m^2)	Parking Configuration
	DC - 9	4	PCC	235m x 90m	angle-out

Other Facilities

	Size	Structure	
Passenger Bldg.	1,530m^2	RC	
Cargo Bldg.	-		
Administration Bldg.	600m^2	RC	
Control Tower	Cab: 25m^2	RC	15m high
Fire Station	360m^2	RC	
P.O.L.			Pertamina
Carparking Lot	95		

Flight Services

INT/DOM	Major Air Route	Airline	Aircraft	Flight/week	
DOM.	PDG - JKT	GIA	DC - 9	14	As of APR., 1981
	PDG - JKT	MNA	F - 27	1	
	PDG - JKT	MDL	L - 188	7	
	JKT - PDG - MES	GIA	DC- 9	7	
	PDG - DJB - JKT	MNA	F - 27/VC8	6	
	PDG - BKS - JKT	MNA	F - 27	2	
INT./ DOM.	PLM - PDG - PKU - SIN	GIA	F - 28	7	

Traffic Statistics

LDG and TOF	4,822	4,512	4,098	4,663	4,960	
Annual Freight (ton)	1,152	1,557	1,721	3,129	2,888	
Annual Passengers	124,322	138,941	170,188	185,261	222,115	
Year	1976	1977	1978	1979	1980	

Note:
RWY extention to 2,150m is under construction.

DC - 9 operation started in 1976.

No. of airport employees: 160

No. of DGAC staffs: 109