

REPUBLIC OF INDONESIA

THE STUDY
ON
THE AIRPORT DEVELOPMENT PROJECT
IN
CENTRAL JAVA AND YOGYAKARTA

PART I
FORMATION OF THE AIRPORTS DEVELOPMENT CONCEPT

NOVEMBER 1986

JAPAN INTERNATIONAL COOPERATION AGENCY

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NOVEMBER 1986

JAPAN INTERNATIONAL COOPERATION AGENCY

国際協力事業団		
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PREFACE

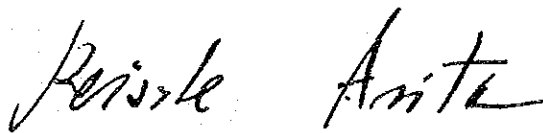
In response to the request of the Government of the Republic of Indonesia, the Japanese Government has decided to conduct feasibility studies on the Development of Airports in Central Java and Yogyakarta, and entrusted the studies to the Japan International Cooperation Agency. J.I.C.A. sent to Indonesia a study team headed by Mr. Makoto TANAKA of Pacific Consultants International between August 1985 and September 1986.

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

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

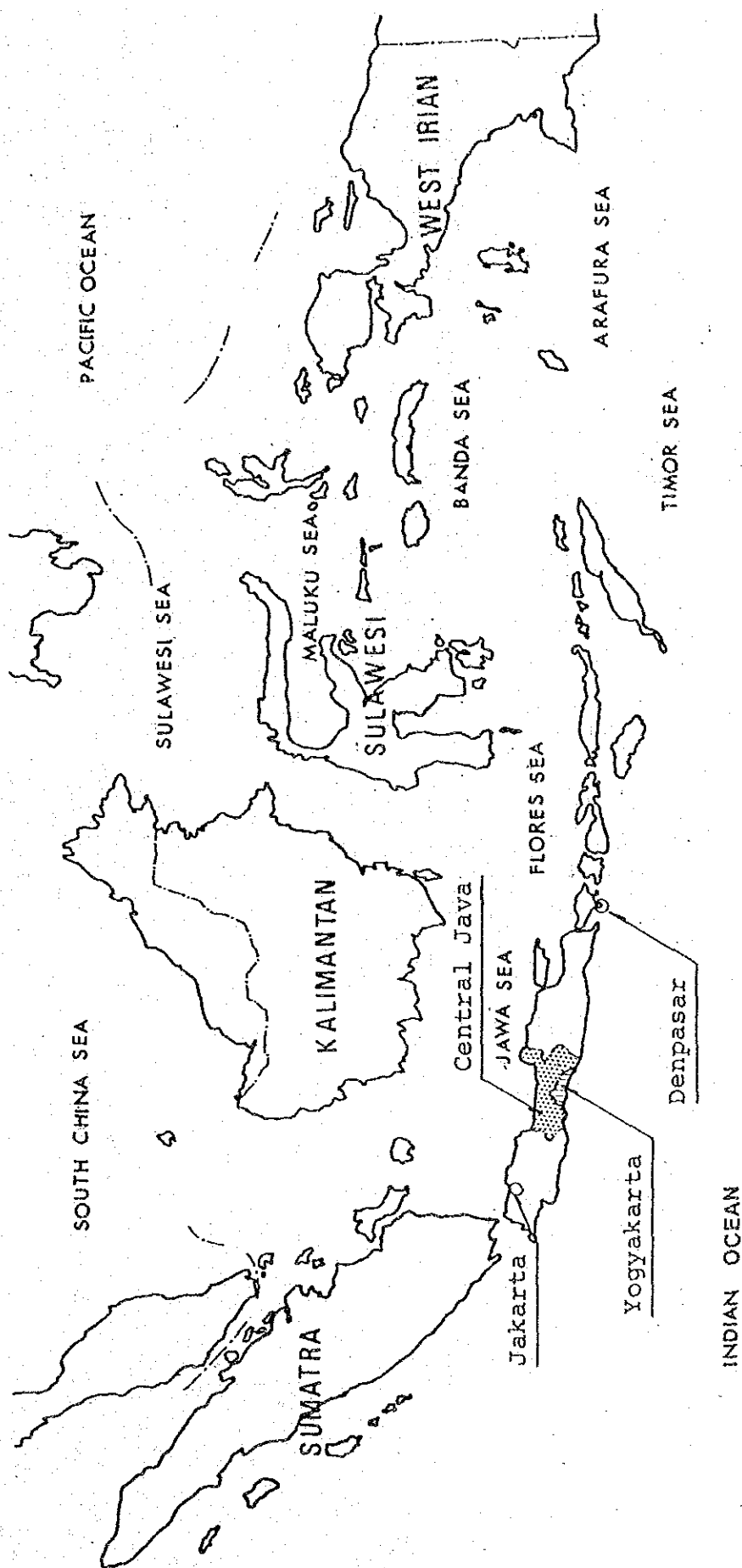
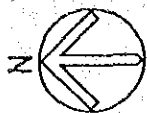
I wish to express my deep appreciation to the officials concerned of the Government of the Republic of Indonesia for their close cooperation extended to the team.

November, 1986

A handwritten signature in black ink, appearing to read "Keisuke Arita", written in a cursive style.

Keisuke Arita
President

Japan International Cooperation Agency



PROJECT LOCATION MAP - 1

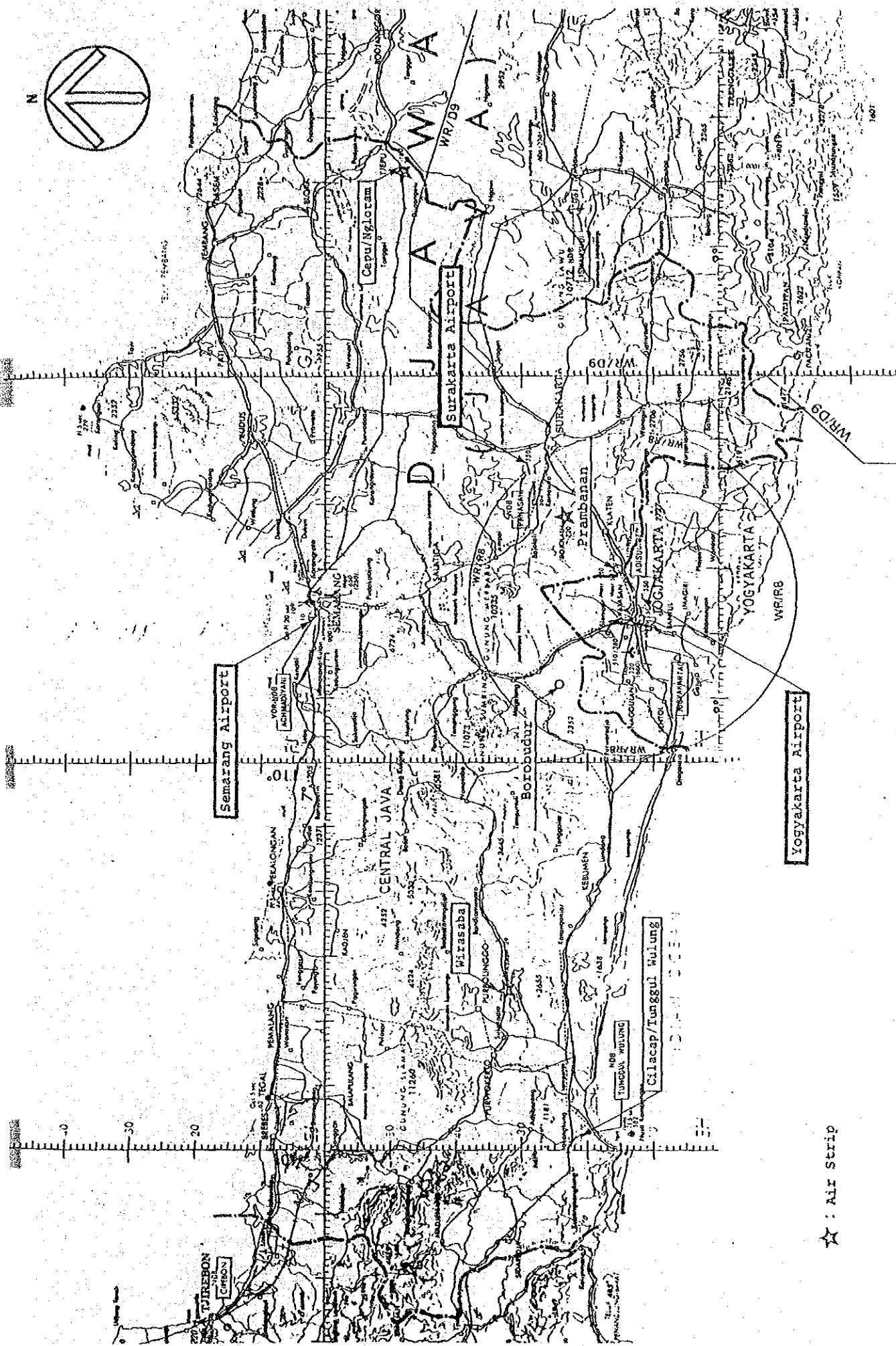


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CONCLUSIONS AND RECOMMENDATIONS

CHAPTER 1 INTRODUCTION

CHAPTER 1 INTRODUCTION

1.1 General

Indonesia is the largest archipelago in the world consisting of 13,677 islands, of which about 6,000 are inhabited and are spread over some 5,100 km from east to west and some 1,900 km from north to south. Consequently, air transportation in Indonesia plays an important role in promoting national integration, economic activities and regional economic balance.

In REPELITA IV (The Fourth Five Year National Development Plan, 1984/85 - 1989/90), the Government of Indonesia declared its intention to continue its effort in the development of air transportation facilities to be able to cope with the increasing air traffic demand.

The Central Java and Yogyakarta areas are the second most densely populated area other than the metropolis Jakarta, but the GRDP per capita of the area is only about one-half of the national average.

In these areas, there are three main commercial airports (Yogyakarta, Surakarta and Semarang), and due to the insufficient length of the existing runways, even small size jetliners such as the currently operating DC-9 or F-28 are subject to weight restriction.

Unrestrained civil air transport service is very essential in Central Java and Yogyakarta in order to promote the economic activities and lessen such disparity of per capita income. Improved quality transport service will also help the promotion of cultural and educational activities in Yogyakarta and Central Java.

In REPELITA IV, the Government of Indonesia sets forth a plan to introduce DC-10/A300s in Semarang airport, and DC-9s in Yogyakarta and Surakarta airports. But, as these airports are located so close to each other, it is considered necessary to establish safe, efficient and economical airport development master plans within the framework of the possible future airport system in the region.

The Government of Indonesia and the Government of Japan agreed that the Japanese Government would render technical assistance for the study on the airport development project in Central Java and Yogyakarta (hereinafter referred to as the Study). The scope of work was agreed upon between both Governments February, 1985.

Based on this agreement, the Japan International Cooperation Agency (hereinafter referred to as JICA), an official agency responsible for the implementation of the technical cooperation programs of the Japanese Government, was entrusted to carry out the Study.

JICA organized the Study Team and officially commenced the Study in August, 1985.

1.2 Objectives and Scope of Work

The objectives of the Study are to form a long-term airports development concept in Central Java and D.I. Yogyakarta and to examine the technical and economic feasibility of the airport development project within the framework of the long-term development concept.

The Study was carried out in the following two stages.

Stage I : Formation of the airports development concept in Central Java and D.I. Yogyakarta

Stage II : Feasibility study on the selected airport development project

The Study is comprised of the following twenty six major items.

Stage I:

- (1) Collection of the relevant data and information
- (2) Review and evaluation of the previous study reports
- (3) Reconnaissance of Central Java and Yogyakarta region, and airports
- (4) Passenger traffic flow survey
- (5) Preliminary topographic survey

- (6) Air traffic analysis and demand forecast
- (7) Airport facility requirements analysis
- (8) Evaluation of the existing airports, airstrips and airspace utilization
- (9) Redevelopment plans of the existing airports
- (10) Site selection of the new airport
- (11) Establishment of alternative airports development concepts
- (12) Preliminary planning for the airports development concepts
- (13) Construction schedule and preliminary cost estimates
- (14) Economic analysis
- (15) Comparative evaluation of the alternative airports development concepts
- (16) Selection of the airports development concept

Stage II:

- (17) Collection of additional data and information
- (18) Topographical survey (New Yogyakarta Airport)
- (19) Soil investigation (New Yogyakarta Airport)
- (20) Facility requirement analysis
- (21) Airport facilities planning of New Yogyakarta Airport
- (22) Airport facilities planning of Surakarta Airport
- (23) Airspace use planning
- (24) Subsidiary considerations
- (25) Construction schedule and cost estimates

(26) Economic and financial analyses

1.3 Executing Method and Reporting System

The Stage I study was executed in accordance with the procedures outlined in the Inception Report submitted in August, 1985.

The Study Team mobilized into Indonesia, and immediately proceeded with data collection, site reconnaissance and passenger traffic flow survey in accordance with the work flow shown in Fig. 1.3.1, after acceptance of the Inception Report by Directorate General of Air Communications (hereinafter referred to as DGAC). Passenger traffic flow survey to grasp the nature of passengers was executed at Yogyakarta, Surakarta and Semarang airports, with the full cooperation of DGAC, in four days from August 29 to September 1, 1985.

The Study Team, then, carried out the Study up to work item 11 "Establishment of alternative airports development concepts" of work flow shown in Fig. 1.3.1 in Indonesia, and the results of these studies were summarized in a Progress Report and submitted to DGAC in November, 1985.

After return of the Study Team to Japan, preliminary planning, construction schedule and cost estimates, and economic analysis were studied, and were reflected in the comparative study to select the most appropriate concept for this Study area.

In December, 1985, the Study Team explained and discussed the result of comparative study with DGAC, and after incorporating the DGAC's comment thereon, Interim Report (I) was submitted to DGAC in February, 1986 as the summary of Stage I study. The contents of Interim Report (I) remain as Part I of this report.

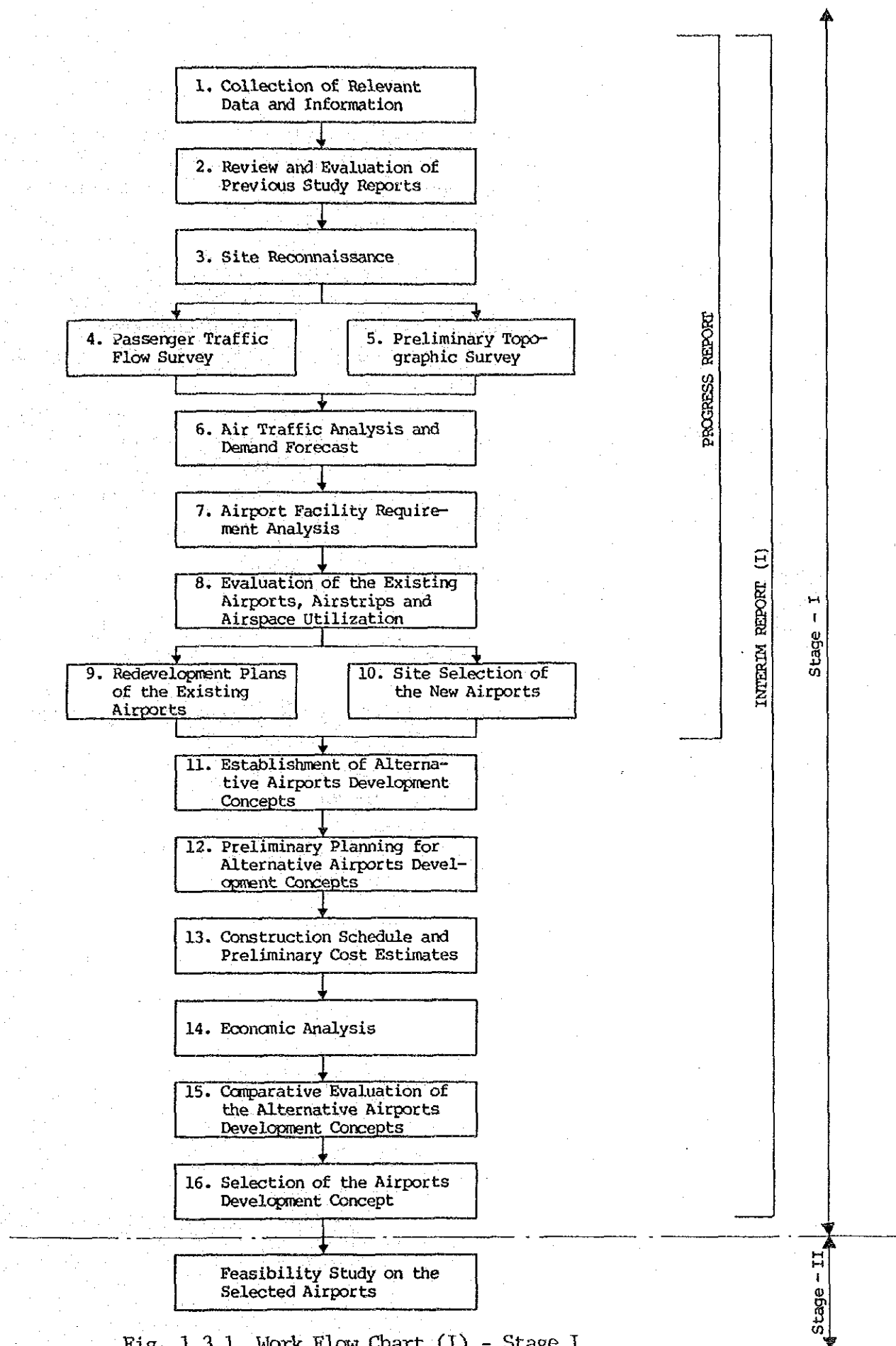


Fig. 1.3.1 Work Flow Chart (I) - Stage I

The Stage II study was systematically carried out. Additional data collection, site reconnaissance, topographic survey and soil investigation for new Yogyakarta Airport site were executed in March, 1986 according to the work flow shown in Fig. 1.3.2.

The Study Team, after return to Japan, proceeded with facility requirements analysis, facility planning and airspace use planning both for new Yogyakarta airport and Surakarta airport. These study results were submitted in the Interim Report (II) to DGAC in June, 1986. The contents of the report remain as Part II of this report.

The Draft Final Report, containing the comprehensive results of the Study, was prepared by adding final results of feasibility study to the Interim Report (I) and (II). The Draft Final Report was submitted to DGAC in September, 1986, and was accepted.

This Final Report is prepared incorporating DGAC's comments, and consists of the following 5 parts.

1. Summary
2. Part I : Formation of the Airports Development Concept
3. Part II, Vol. 1 : Feasibility Study for New Yogyakarta Airport Development Project
4. Part II, Vol. 2 : Feasibility Study for Surakarta Airport Development Project
5. Appendix

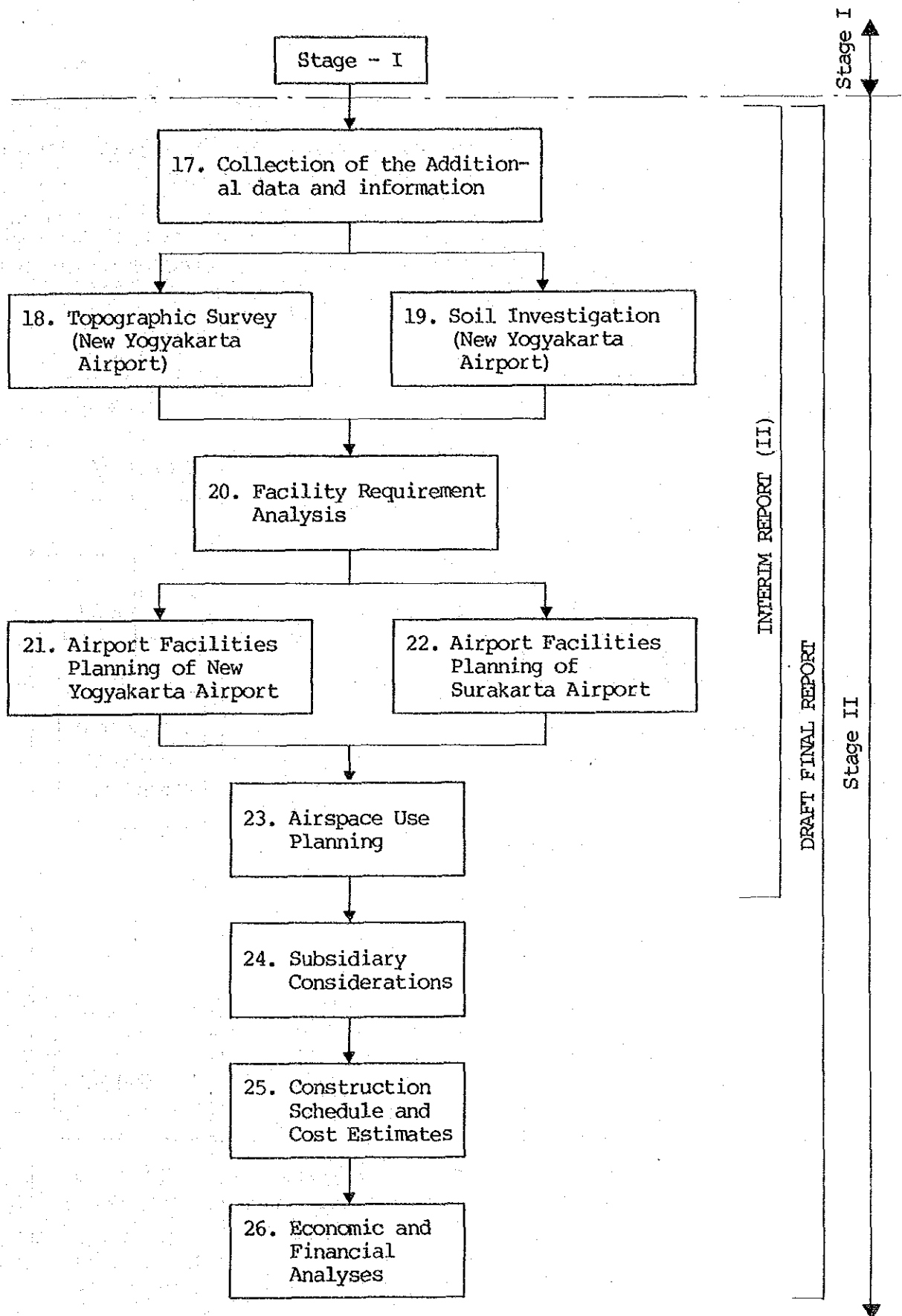


Fig. 1.3.2 Work Flow Chart (II) - Stage II

1.4 Study Organization

The Study was performed by the Study Team under the supervision of the Advisory Committee, both of which were organized by JICA.

The organization chart is shown in Fig. 1.4.1 and the members of the Advisory Committee, the Study Team, Indonesian Steering Committee and Counterparts are presented in the following lists.

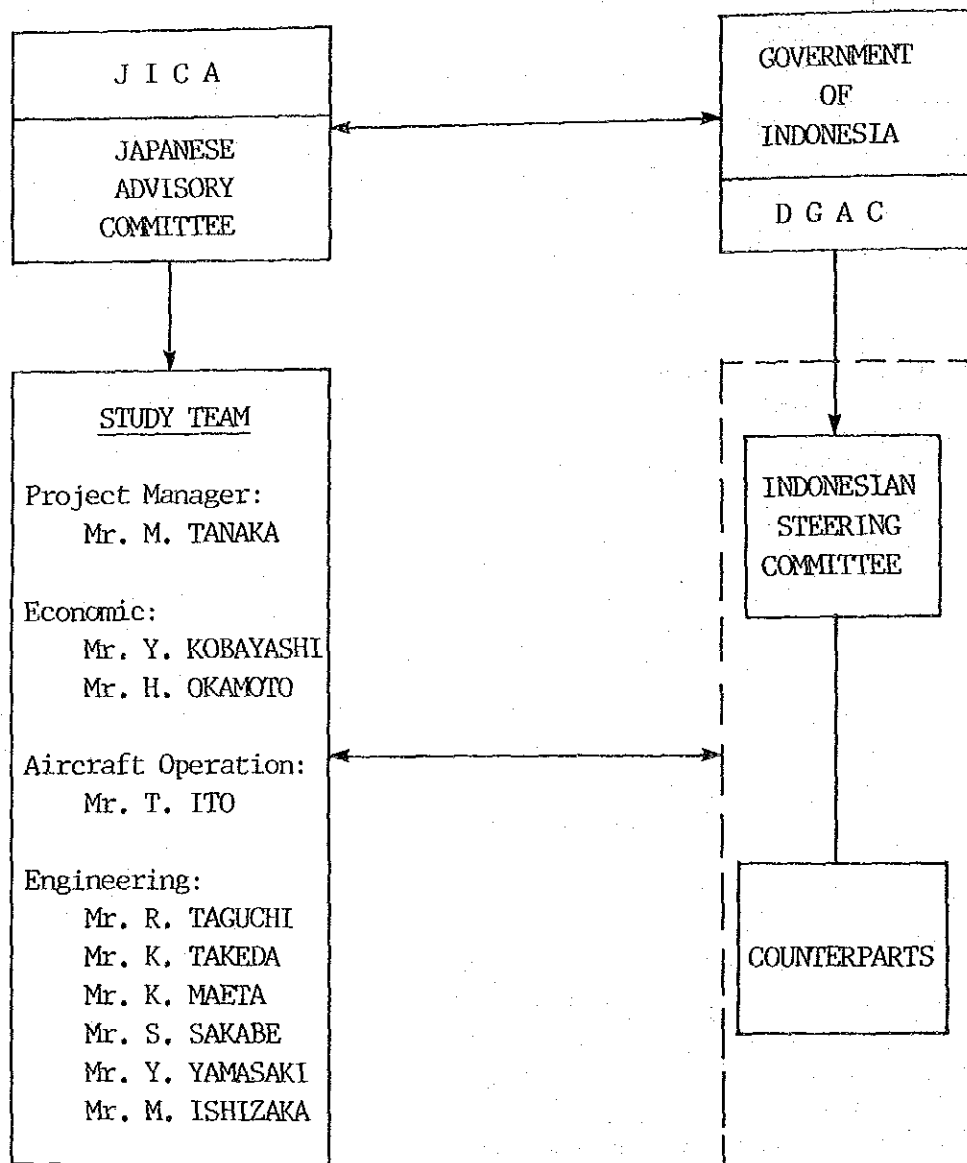


Fig. 1.4.1 Organization Chart

Members of the Advisory Committee

Mr. Yukihiro KOMADA (Chairman)	Director Construction Division Aerodrome Department Civil Aviation Bureau Ministry of Transport
Mr. Hikoshiro MATSUMOTO	Deputy Director International Air Transport Division International Transport and Tourism Bureau Ministry of Transport
Mr. Yuuji KITANI	Deputy Director Construction Division Aerodrome Department Civil Aviation Bureau Ministry of Transport
Mr. Takeshi TAZAKI	Special Assistant to the Director Flight Standards Division Civil Aviation Bureau Ministry of Transport

Members of the Study Team

Mr. Makoto TANAKA	Project Manager/General Management
Mr. Ryuji TAGUCHI	Airport Planner
Mr. Keiichi TAKEDA	Airport Planner/NavAids Planner
Mr. Kimihiro MAETA	Airport Civil Engineer
Mr. Tadamitsu ITO	Aircraft Operation Planner
Mr. Yaichi KOBAYASHI	Traffic Forecast and Economic/Financial Analyst
Mr. Shinichi SAKABE	Traffic Analyst
Mr. Hisashi OKAMOTO	Economic/Financial Analyst
Mr. Yutaka YAMASAKI	Natural Condition Surveyor
Mr. Masashi ISHIZAKA	Airport Building Facility Planner

Indonesian Steering Committee

Mr. Iman Hertoto (Chairman)	Secretary of DGAC
Mr. A.S. Sunandie (Secretary)	Planning Branch, DGAC
Mr. Sumardjono	Director of Airport Engineering, DGAC
Mr. Suwardi SH	Director of Air Transport, DGAC
Mr. Madiyono	Director of Air Safety, DGAC
Mr. Djohan S.A.	Director of Airnav. Telecom. and Electricity
Mr. Hary Subagyo	Regional Director of Region III, DGAC
Mr. Sudjarwo	Head, Development and Research Board, Ministry of Communications
Mr. Sunaryo	Head of Planning Bureau, Ministry of Communications
Mr. P.P. Simatupang	Head of Communication and Tourism Bureau, BAPPENAS
Mr. M. Abduh	Directorate General of Budget, Ministry of Finance
Mr. F. A. Rubiyanto	Ministry of Public Works
Mr. Warsito Rasman MA	Directorate of Local Development, Ministry of Home Affairs
Mr. Kol. Pnb. Rachmat Scmadinata	Indonesian Air Force
Mr. Letkol Siswoyo	Indonesian Army

Indonesian Counterparts

Mr. Purwanto (Chairman)	Head of Administration Branch, Directorate of Airport Engineering, DGAC
Mr. Muso Sunhadji (Secretary)	Directorate of Air Safety, DGAC
Mr. Capt. M. Yusuf	Directorate of Air Safety, DGAC
Mr. Hary Parwanto	Staff Member, Directorate of Airport Engineering
Ms. Sri Unon S.	Staff Member, Directorate of Airport Engineering
Mr. Arjani	Staff Member, Directorate of Telecommunication, Airnavigation and Electricity, DGAC
Mr. Basuki M. SH	Directorate of Air Transport, DGAC
Mr. Hendarmin	Planning Branch, DGAC
Mr. Moh. Rosyid	Staff Member, Planning Branch, DGAC
Mr. R. Sunarhadi SH	Staff Member, Development and Research Board, Ministry of Communication
Mr. Soegito	Staff Member, Regional Director, Region III
Mr. Harianto	Staff Member, Regional Director, Region III

Mr. Kusbini
Mr. Let. Kol. PNB
Djadja S.
Mr. Nazarudin

Planning Bureau, Ministry of Communications
Indonesian Air Force

Directorate of Local Development,
Ministry of Home Affairs

CHAPTER 2 BACKGROUND OF THE PROJECT

CHAPTER 2 BACKGROUND OF THE PROJECT

2.1 Socio-Economic Conditions in Indonesia

2.1.1 General Situation

Indonesia consists of 5 main islands: Sumatra, Java, Kalimantan, Sulawesi and West Irian.

Indonesia's climate and weather are characterized by an equatorial rainy season. The climate changes every six months. The dry season lasts from June to September, and the rainy season from December to March. Tropical areas have rainy seasons almost the whole year.

Indonesia's land area is generally covered by thick tropical rain forest whose fertile soil is continuously replenished by volcanic eruptions.

2.1.2 Population

The total population of Indonesia was estimated to be about 158 million as of the end of 1983. This places the nation between the USA (230 million) and Japan (119 million). The average annual growth rate was 2.3 % and 2.2 % in the 1970's and the period from 1980 to 1983, respectively. It is estimated that the growth rate during REPELITA IV will be 2% and the total population will reach about 175.6 million at the end of REPELITA IV.

2.1.3 Economy

The actual GNP and GNP per capita in Indonesia were respectively estimated to be US\$ 81 billion and US\$ 514 in 1983 at 1980 constant price.

The average growth rates of GNP and GNP per capita during the period from 1980 to 1984 were 5.5 % and 3.2 % respectively.

Annual average growth rate of GNP in Indonesia is targetted to be 5 % during REPELITA IV.

2.2 Socio-Economic Conditions in Central Java and D.I. Yogyakarta

2.2.1 Geographical Features

The Study area is located in the center of Java island and consists of two provinces: Central Java province and D.I. Yogyakarta.

Central Java province stretches from longitude $108^{\circ} 30'$ to $111^{\circ} 30'$ east, and from latitude $6^{\circ} 30'$ to $8^{\circ} 30'$ south. It extends 263 km from east to west and 226 km from north to south. The land area is 34,862 sq.km, and is divided into northern and southern part by mountainous terrains with volcanoes higher than 3,000 m ranging from east to west in the center of the province.

D.I. Yogyakarta stretches from longitude $115^{\circ} 05'$ to $110^{\circ} 48'$ east and from latitude $7^{\circ} 53'$ to $8^{\circ} 15'$ south. It has an area of 3,143 sq.km and adjoins the Central Java province except for the southern part which faces the Indian Ocean. The highest point in D.I. Yogyakarta is Mt. Merapi (2,911 m), an active volcano, which is located on the northern boundary of Central Java province and D.I. Yogyakarta.

There are two main rivers in D.I. Yogyakarta, the Progo and Opak rivers, which flow from the northern mountains into the Indian Ocean.

2.2.2 Population

(1) Population

The population in Central Java Province and D.I. Yogyakarta was estimated to be about 26.3 million and 2.9 million respectively as of the end of 1983.

The ratio of the population in these areas to total Indonesia was about 16.6 % and 1.8 %, respectively.

The growth rate of population in Central Java province and D.I. Yogyakarta has been relatively low compared with other provinces. Average growth rate for past few years has been 1.2% and 1.1% in Central Java province and D.I. Yogyakarta.

Total population in Central Java province and D.I. Yogyakarta is forecast to reach 28.5 million and 3.0 million, respectively, at the end of REPELITA IV. An annual growth rate of 1.0 % is projected in this period.

(2) Population Density

Java is one of the most populated islands in Indonesia. Java also has much higher population density than other islands. The population density was estimated to be 769 person/sq.km and 900 person/sq.km in Central Java Province and D.I. Yogyakarta at the end of 1983, respectively. The former was 9.4 times greater than the average density of Indonesia, and the latter 11.0 times.

Fig. 2.2.1 shows the population density distribution by region in 1983.

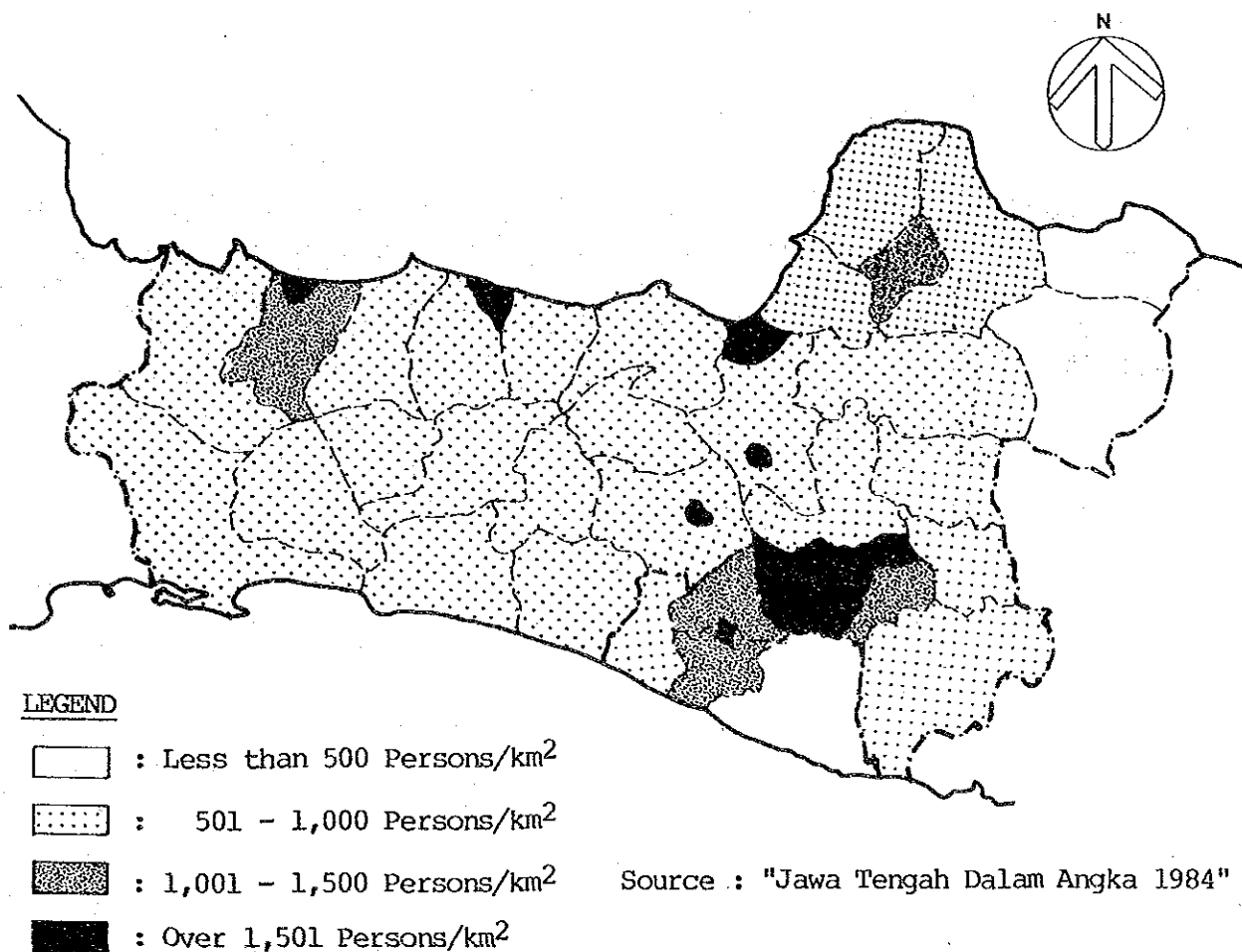


Fig. 2.2.1 Population Density in Central Java and D.I. Yogyakarta - 1983

2.2.3 Economic Situation

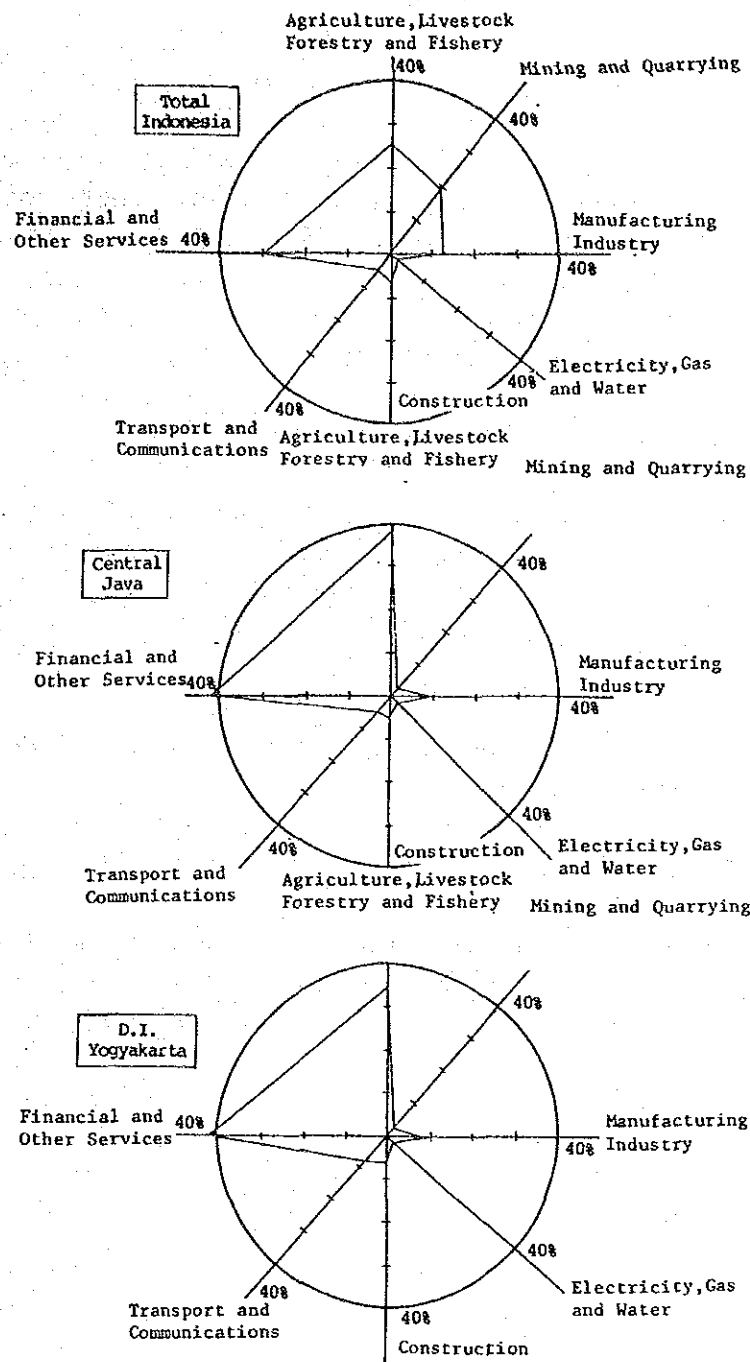
Regional gross domestic product (GRDP) of Central Java province and D.I. Yogyakarta in 1982 was estimated to be Rp. 5,726.7 billion and Rp. 586.3 billion respectively. The national GDP was Rp. 59,632.6 billion for the same year.

Per capita GRDP in 1982 was Rp. 220,000 and Rp. 208,000 in Central Java and D.I. Yogyakarta, respectively. Since Rp. 386,000 is the national average, the Study area is judged to be a considerably impoverished area.

The GRDP growth target of REPELITA IV was set at 4 % and 3.5 % in the Central Java and D.I. Yogyakarta respectively, which is 1.0 - 1.5 % lower than the Indonesian national growth rate.

2.2.4 Industries

Fig. 2.2.2 shows the components of GRDP by each industrial sector in 1982. Compared with the national economic structure, agricultural and financial sectors occupy a larger portion of the economic activities in both provinces. The reason for this is that both provinces do not have gas, oil and mining resources.



Source : "Statistical Year Book of Indonesia 1983"
 "Jawa Tengah Angka 1984"
 "Statistical year book Daerah Istimewa Yogyakarta 1983"

Fig. 2.2.2 Industrial Structure of Indonesia, Central Java and D.I. Yogyakarta
 (Components of GDP and GRDP as of 1982)

2.2.5 Tourism

(1) Major Tourist Resorts

Tourism resources play an important role in promoting economic activity in Central Java and Yogyakarta region as there are many ancient cultural relics and spectacular natural sites. Fig. 2.2.3 shows the major tourism resources in this region.

The tourism resources can be classified into 3 groups as follows:

a) Archaeological and Historical Resources

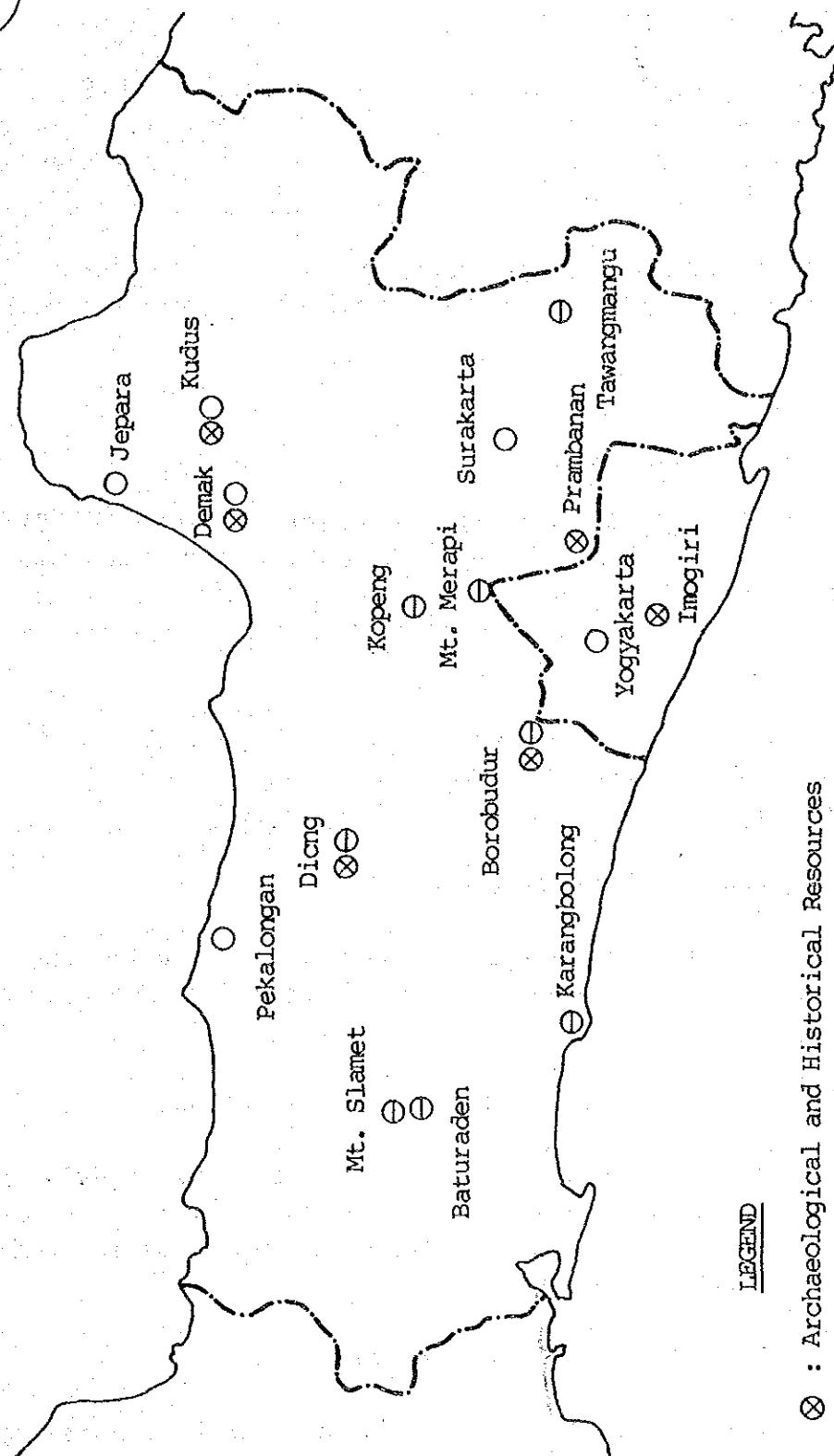
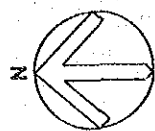
Many beautiful Buddhist and Hindu temples, historical buildings, archaeological remains, etc. The Borobudur temple and Prambanan ruins are the most well known tourist attractions.

b) Natural Resources

Many wonderful sights such as volcanoes (Mr. Merapi etc.), lakes, etc., scattered throughout the region.

c) Cultural Resources

The region also has many cultural resources such as textile arts (Batik), arts and crafts especially silver works, traditional entertainment (Wayang Kulit - shadow picture play) and so on.



LEGEND

⊗ : Archaeological and Historical Resources

⊖ : Natural Resources

○ : Cultural Resources

Fig. 2.2.3 Major Tourism Resources in Central Java and Yogyakarta

(2) Trend of Foreign Visitors

As many as 640,000 foreign visitors came to Indonesia in 1983. Visitors from Australia were the largest group, estimated to be 14.2 % of the total foreign visitors, Singaporeans were the second with 13.3 %, and Japanese stood third with 11.7 %.

Foreign visitors to D.I. Yogyakarta accounted for 11 % of the total visitors to Indonesia, and those to Central Java province were 4 % of the total.

2.2.6 Regional Development Plan

According to the development policy described in REPELITA IV, the Government of Indonesia will provide Central Java province with 5 development promotion areas and D.I. Yogyakarta with 3 development promotion areas, taking local features into consideration as shown in Fig. 2.2.4.

The industrial and service activities to be emphasized to these 8 development promotion areas are briefly explained below.

1) Semarang and Surrounding Area

The principal potentials which can be developed are industry, trading, and tourism. The other sectors are education, government and various service activities.

2) Pekalongan - Western Part of the Northern Coast

Brebes-Kendal-Pekalongan area constitutes the most rapidly developing industrial zone in Central Java. The major industries developed are metal and textile industries. Food crop agriculture and fishing will also be promoted.

3) Kudus - Eastern Part of the Northern Coast

Cigarette, metal and handicraft industries will be promoted in this area.

4) Surakarta and Surrounding Area

The major industries to be developed are textile industry, metal casting, plantations and tourism.

5) Cilacap - Western Part of the Southern Coast

Large scale industry, plantations, food crop agriculture and tourism will be promoted in this area.

6) Yogyakarta and Surrounding Area

The development policy for this area is to support Yogyakarta as an educational center, cultural center, tourist resort, trading service center as well as the development center of large and small industries.

Agricultural activities are also to be promoted in the areas surrounding Yogyakarta city.

7) Wates - Kulonprogo

Various industrial sectors will be developed taking mining resources into account. Food crop agriculture, plantations, etc., will also be promoted.

8) Wonosari

The main problem in this area is water supply for agriculture and social life. The activities are directed towards the utilization of ground water potential to increase the quality of life and food crop production.

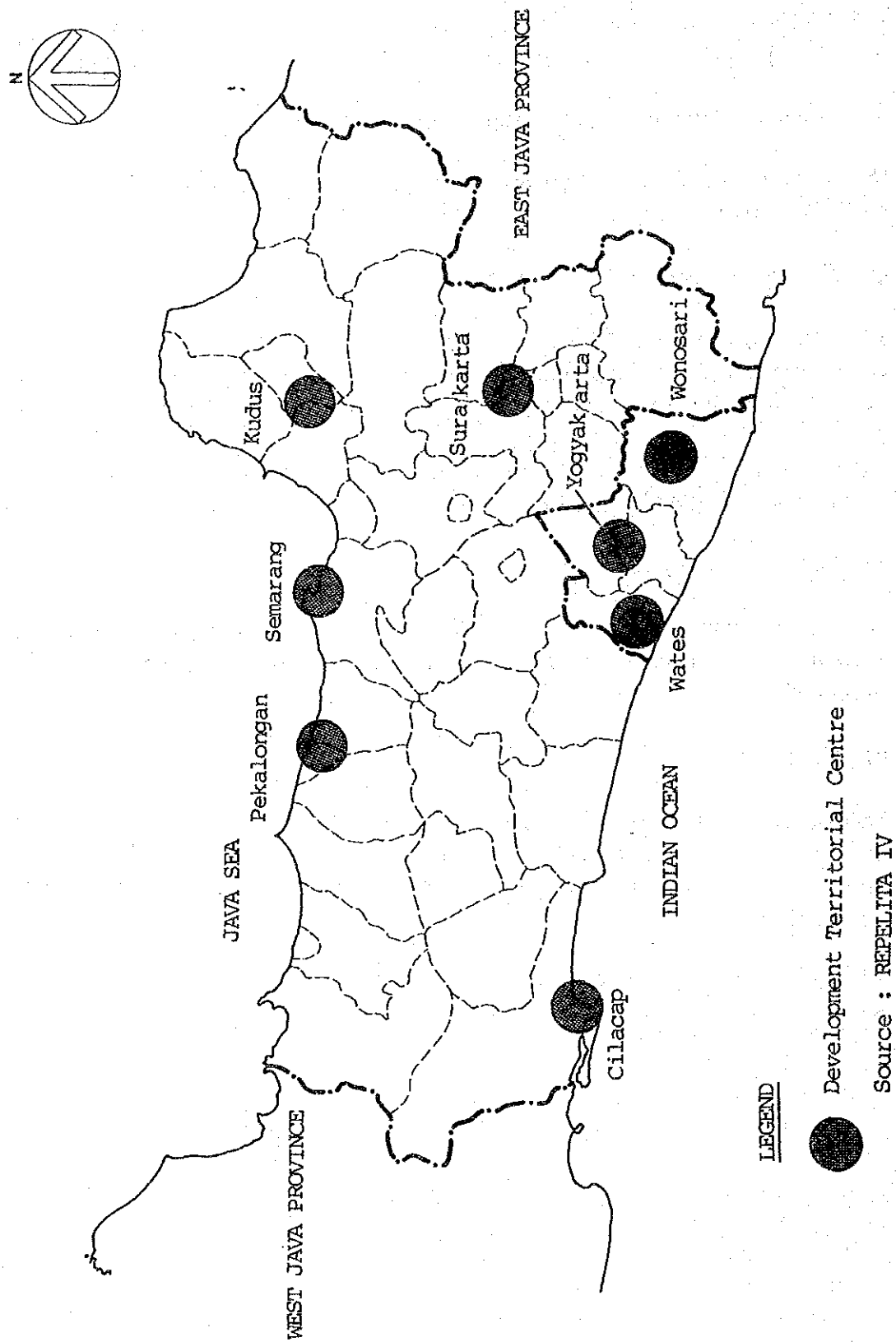


Fig. 2.2.4 Development Territories in Central Java and D.I. Yogyakarta

2.3 Air Transportation

2.3.1 Airports

(1) Airports in Indonesia

There are more than 300 airports in Indonesia, of which 146 airports are administrated by DGAC. DGAC classifies these airports into the following 5 classes according to their functions.

- Class I : International Airports
- Class II : Domestic Trunk Line Airports
- Class III : Domestic Feeder Airports
- Class IV and V : Pioneer Airports and Airstrips

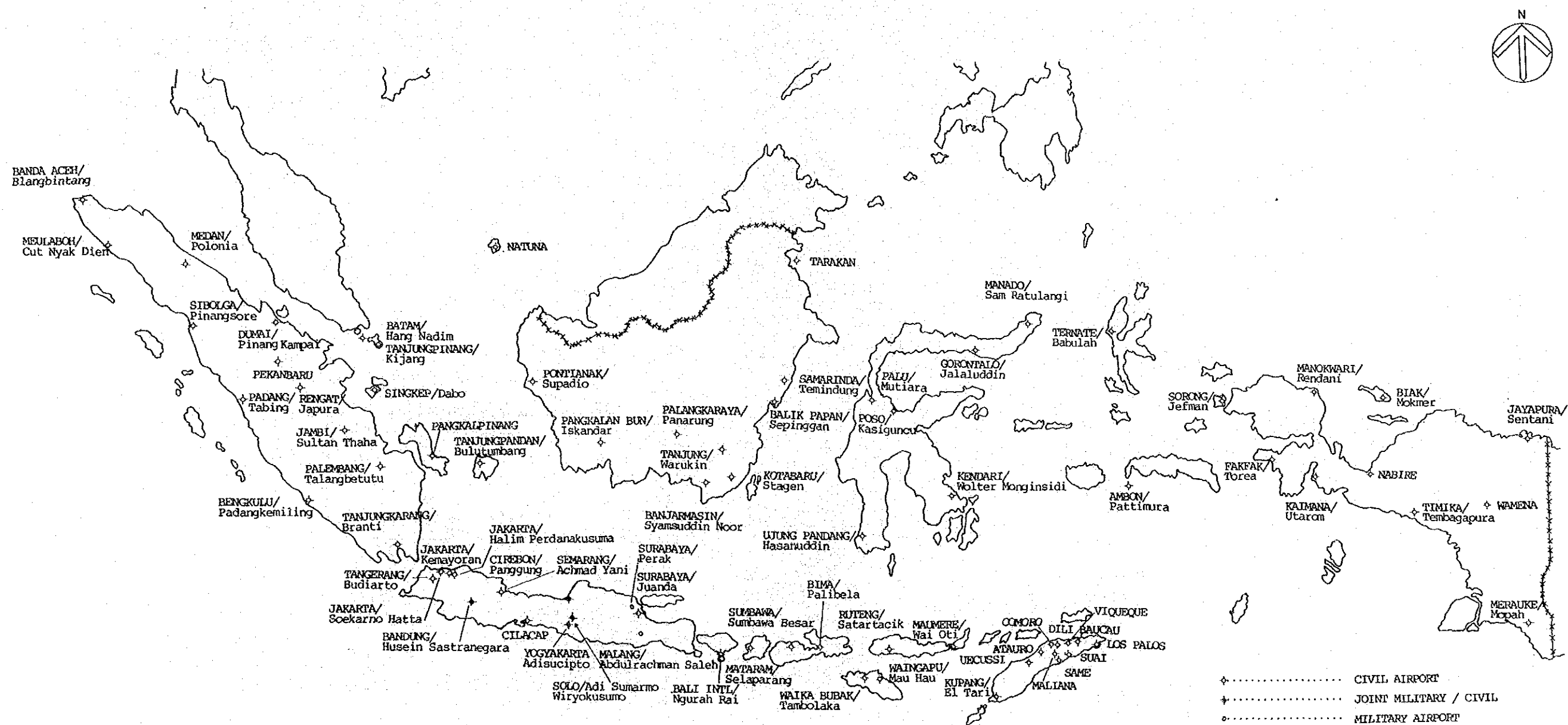


Fig. 2.3.1 Airports in Indonesia (Source: AIP)

Table 2.3.1 Summary of Airports in Indonesia by class

Classification	Total Number of Airports	Name of Airport
Class I	11	TALANG BETUTU/PALEMBANG SUPADIO/PONTIANAK SOEKARNO HATTA/JAKARTA HALIM PERDANAKUSUMA/JAKARTA JUANDA/SURABAYA SYAMSUDIN NOOR/BANJARMASIN POLONTIA/MEDAN SEPIINGGAN/BALIKAPAPAN HASANUDIN/UJUNG PANDANG SAM RATULANGI/MENADO NGURAH RAI/DENPASAR/BALI
Class II	19	BLANG BINTANG/BANDA ACEH TABING/PADANG SIDANG TIGA/PAKANBARU PANGKAL PINANG/BANGKA BRANTI/TANJUNG KARANG SULTAN THAHA/JAMBI HUSEIN SASTRANEGARA/BANDUNG BUDIARTO/CURUG/TANGERANG AHMAD YANI/SEMARANG ADI SUCIPTO/YOGYAKARTA PANARUNG/PALANGKARAYA PATIMURA/AMBON MUTIARA/PALU MOKMER/BIAK MOPAH/MERAUKE SENTANI/JAYAPURA TIMIKA/TEMAGA PURA ELTARI/KUPANG
Class III	23	JAPURA/RENGAT KLIJANG/TANJUNG PINANG DABO/SINGKEP BULU TIMBANG/TANJUNGPANDAN PADANG KEMILING/BENGKULU TARAKAN/TARAKAN PANGKALAN BUN/KALIMANTAN TENGAH PANASAN/ADI SUMARMO/SOLO/SURAKARTA TEMINDUNG/SAMARINDA STAGEN/KOTA BARU/PULAU LAUT JALALUDIN/GORONTALO WOLTER MONGINSIDE/KENDARI BABULLAH/TERNATE JEFMAN/SORONG RENDANI/MANOKWARI WAMENA/JAYAWIJAYA NABIRE/IRIAN JAYA SELAPARANG/AMPENAN/AMBON WAI OTI/MAUMERE MAU HAU/MAINGAPU PALIBELO/BIMA BAUCAU/TIMOR TIMUR
Class IV	52	
Class V	41	
Total	146	

(2) Airports in Central Java and D.I. Yogyakarta

There are three main airports in the study area, i.e., Yogyakarta airport in D.I. Yogyakarta, and Surakarta and Semarang airports in Central Java province. In addition, two airstrips, i.e., Cilacap and Cepu operated by PERTAMINA are located in Central Java province.

Although detailed descriptions of existing facilities at each airport are discussed in Chapter 5 of this report, brief explanations are made for each airport below.

a) Yogyakarta/Adi Sucipto Airport

Layout plan and outline of the existing Yogyakarta airport are shown in Fig. 2.3.2 and Table 2.3.2, respectively.

Yogyakarta airport, situated 7.5 km east of the Yogyakarta city, is jointly used by the military and civil sectors. The management and air traffic control of the airport are performed by the Indonesian Air Force (IAF).

Yogyakarta airport, situated close to well known tourism resources (i.e., Borobudur and Prambanan) is an indispensable gateway not only for Indonesian passengers but also for foreign tourists.

The largest aircraft presently in service is the DC-9-32. The runway length of 1,850 m is inadequate for take-off operations with full passenger payloads.

b) Surakarta/Adi Sumarmo Airport

Surakarta airport, 14 km northwest of Surakarta city, is also a joint-use airport for military and civil sectors, and managed and controlled by the IAF.

Layout plan and outline of the existing Surakarta airport are shown in Fig. 2.3.3 and Table 2.3.3, respectively.

In REPELITA IV, Surakarta airport is to be upgraded to accommodate the DC-9 class aircraft. Runway extension work was completed in accordance with the target of REPELITA IV in 1986, by adding 210 m with a provision of 60 m overrun to the original runway length of 1,800 m.

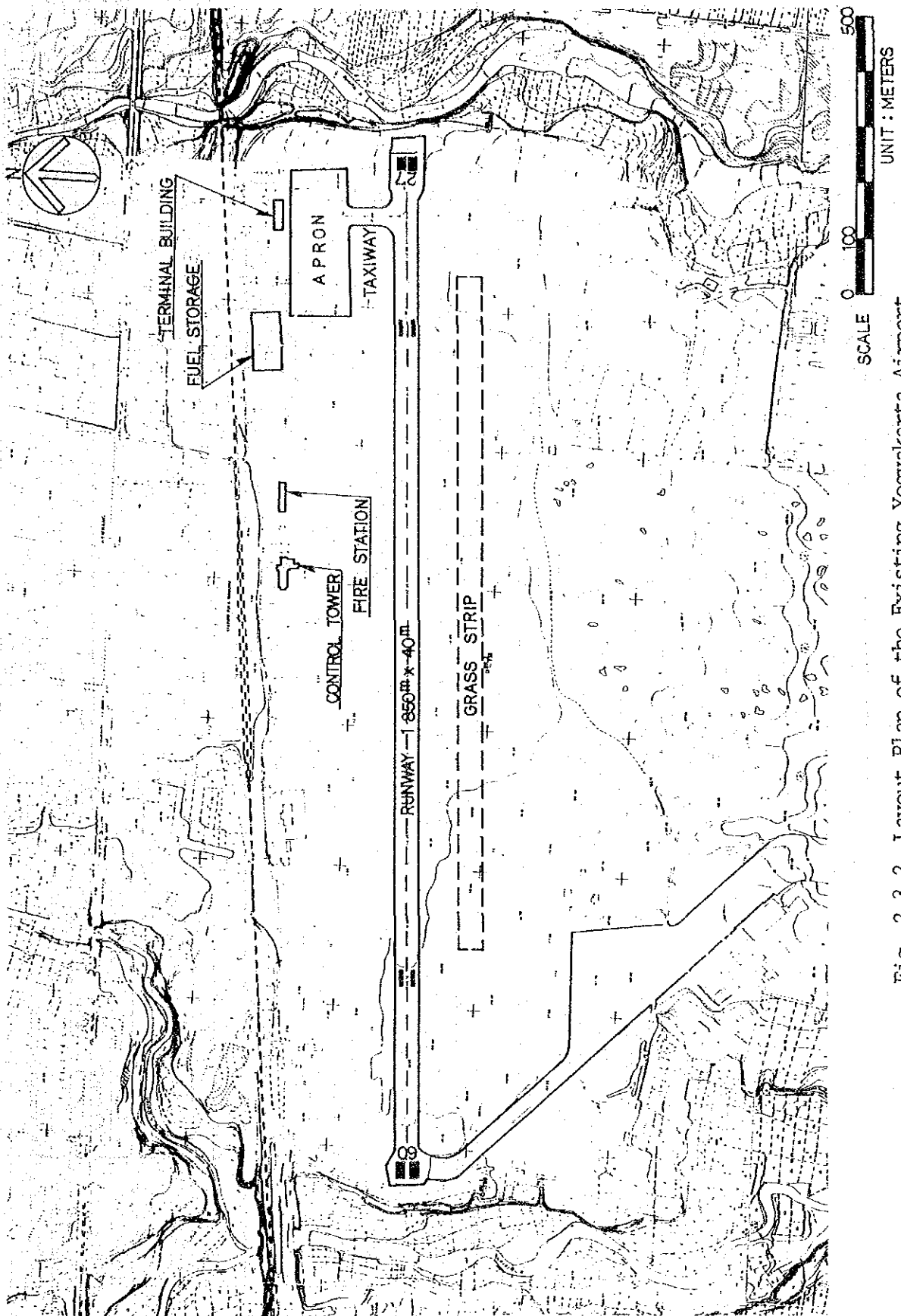


Fig. 2.3.2 Layout Plan of the Existing Yogyakarta Airport

Table 2.3.2 Outline of the Existing Yogyakarta Airport

Country	Name of Airport	INT'L/DOM	ICAO CODE	Commencement of Services	Total Area of A/P	Aerodrome Ref. Point	A/P Elevation	R/W Bearing	Aerodrome Temperature	Operation Hours	Seasonal Availability	Note:							
Indonesia	Adisutjipto	DOM	4C	1952	-	07° 47' S 110° 26' E	350' (107m)	09-27	33.1°C	6-17 Local	All Seasons	Control Agency : IAF							
City/Term																			
Name	Population	Distance	57p	Railway	Taxi	Bus	Kind Coverage	Minimum Meteorological Conditions (GIA)					Standard						
Yogyakarta	Yogya 404,000 DIY 2,900,000 as of 1983	7.5 km	-	Yes	Yes	Yes	98.0% (13 kt)												
Navigation Aids																			
Radio	Existing	NDB	VOR	DME	TACAN	ILS	ASR	PAR	SSR	ACTS	ASDE	HF	VHF	UNF	ITS	DF	ITV	ITV	AFN
	Plan	Yes	Yes	Yes								Yes	Yes						Yes
Aircraft Lighting	Existing	ALS	STL	SALS	ALB	AGL	COL	VASIS	RAIL	RWL	REIL	REIL	REIL	REIL	REIL	REIL	REIL	REIL	REIL
	Plan	Yes								Yes	RY 27	09							Yes
Existing	Existing	RCLL	RTAL	OL	RDIL	TL	ICLL	TGL	AB	WDIL	AFL	AFL	AFL	AFL	AFL	AFL	AFL	AFL	AFL
	Plan								Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Basic Facilities																			
Runway Strip	Size	Pavement	Note																
	1875m x 150m	Grass	Only 25m at Rwy 27																
Runway	Size	Pavement	Note																
	1850m x 40m	PCN 30	Rwy extension completed in 1976																
Taxiway	Size	Pavement	Note																
	80m x 30m	PCN 30																	
Apron	Design	No. of Air-Strands	Pave-ment	Area (m ²)	Parting Configuration														
	DC-9	6	AS	21242 m ²	Self-manuevering														
247 x 86			PCC																
Other Facilities																			
Roads	Size	Structure	Note																
Vehicle Parking	2 lane	AS																	
Pax. T. Building	50 lots	AS																	
Cargo T. Building	2,850 m ²																		
Office Building	200 m ²																		
Control Tower	14 m high	IAF																	
Fire Station	120m ²	IAF, DGAC																	
Fuel Supply	317 (new x 80Z)	Pertamina																	
Power																			
Air Traffic Statistics																			
No. of Landings & Take-offs	6106	5566	4758	5484															
Annual Freight volume (ton)	821	878	954	1320															
No. of Annual Passengers	265,368	241,164	296,196	280,079															
Year	1978	1979	1980	1981															
				REVISION															
				DATE	△	BY													
				Drawn by	Oct, 1985														
				Date	1982														

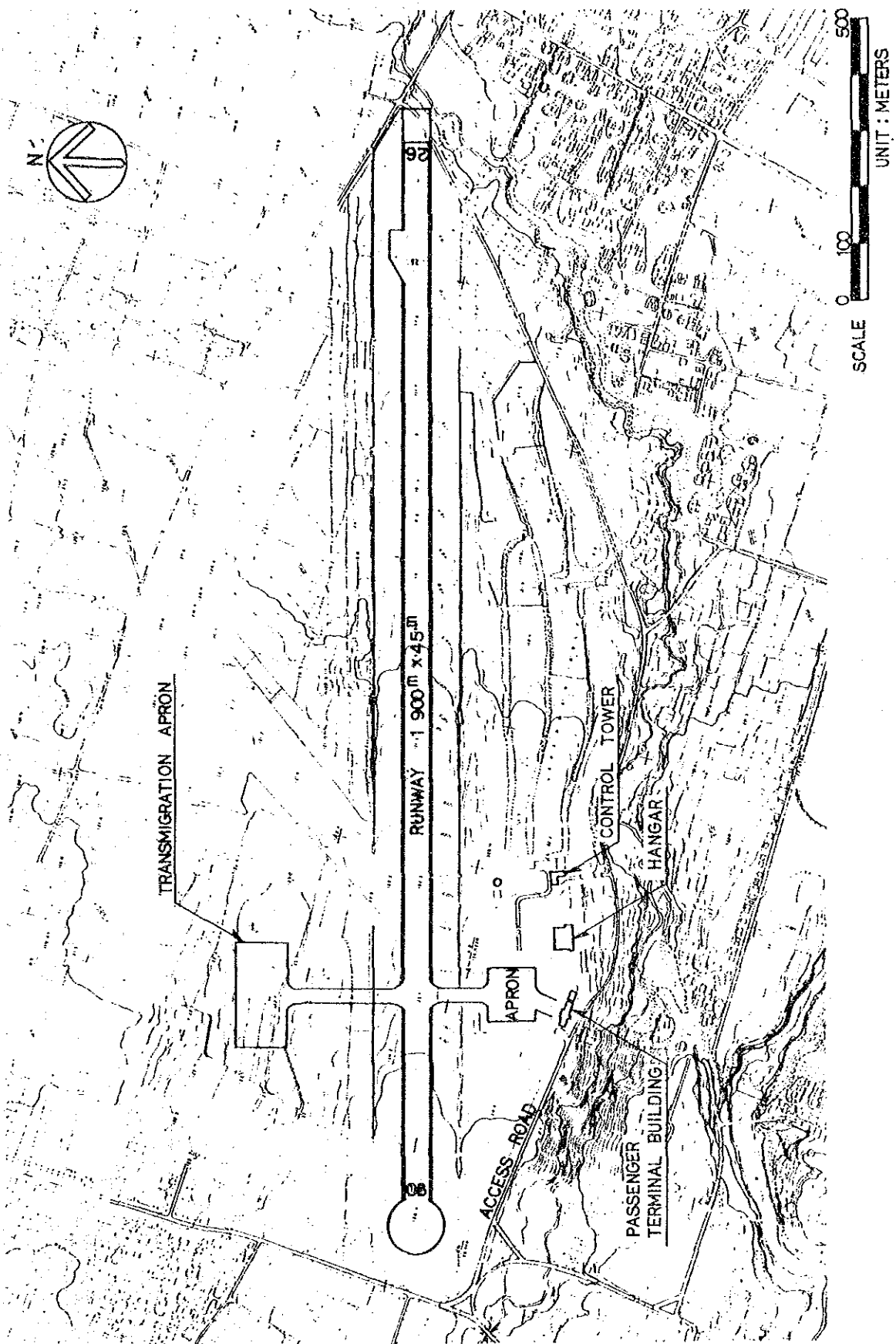


Fig. 2.3.3 Layout Plan of the Existing Surakarta Airport

Table 2.3.3 Outline of the Existing Surakarta Airport

Country	Name of Airport	INT'L/DOX ICAO CODE	Commencement of Services	Total Area of A/P	Aerodrome Ref. Point	A/P Elevation	R/W Bearing	Aerodrome Ref. Temperature	Operation Hours	Seasonal Availability	Note:													
Indonesia	Adi Sumarmo Solo	DOX 3C	1945 as IAF base 1974 as Civilian	-	07.31S 110.45E	347 Ft (106m)	08 - 26	34.7°C	7-17 Local	all seasons	Control Agency: IAF													
City/Town																								
Name	Population	Distance to A/P	Transportation	Wind Coverage	Minimum Meteorological Conditions	Runway Direction	Approach Procedure	MDA	Visual Range	Turboprop	Note:													
Surakarta	470,000 (1980)	14 km to N.W.	-	98.4% (13kt)	8.0m	Rwy 08/26	NDB	769'	2,000m															
							Circling	1,048'	3,200m															
Navigation Aids																								
Radio	NDB	VOR	DME	TACAN	ILS	ASR	PAR	SSR	ASDE	HF	VHF													
Existing	Yes	Yes	Yes							Yes	Yes													
Plan	ALS	SFL	SALS	ALB	AGL	CGL	VASIS	RAIL	RFL	RELL	RELL													
Existing			Rwy 26				Yes	Yes	Yes	Yes	Yes													
Plan	RCLL	RTAL	OL	RUIL	TL	ICLL	TGL	AB	WDIL	AFL	AFL													
Existing			Yes		Yes			Yes	Yes	Yes	Yes													
Plan																								
Basic Facilities																								
Runway Strip	Size	Pavement	Note																					
	2020 x 150	Grass																						
Runway	Size	Pavement	Note																					
	1900 x 45	AS. PCN 27																						
Taxiway	Size	Pavement	Note																					
	100 x 23	AS.																						
Apron	Design Area	No. of Pavement Stands	Area(m ²)	Parking Configuration																				
	F-28	2	AS.	8,051m ²	self-manuevering																			
	C 130	1																						
	Skyvan	1																						
Other Facilities																								
Roads	Size	Structure	Note																					
	2 lane																							
Vehicle Parking	Size	Structure	Note																					
	50 lots		estimate																					
Pax. T. Building	Size	Structure	Note																					
	670m ²		1974 & 1981																					
Cargo T. Building	Size	Structure	Note																					
	50 m ²		1979																					
Office Building	Size	Structure	Note																					
	270 m ²		Completed 1976																					
Control Tower	Size	Structure	Note																					
	200 m ²		service started 1977																					
Fire Station	Size	Structure	Note																					
	-																							
Fuel Supply	Size	Structure	Note																					
	-																							
Flight Services																								
INT'L	Major Air Route	Name of Airline	Type of Aircraft	No. of Flights/Week																				
DOM	SOC - JKT	GIA	F-28	15																				
DOM	SOC SUB -	GIA	F-28	7																				
				22 flts																				
Air Traffic Statistics																								
No. of Landings & Take-offs	Major Air Route	Name of Airline	Type of Aircraft	No. of Flights/Week																				
2,444	SOC - JKT	GIA	F-28	15																				
250	SOC SUB -	GIA	F-28	7																				
86,062				22 flts																				
No. of Annual Passengers	Major Air Route	Name of Airline	Type of Aircraft	No. of Flights/Week																				
122,221	SOC - JKT	GIA	F-28	15																				
92,745	SOC SUB -	GIA	F-28	7																				
97,746				22 flts																				
Year	Major Air Route	Name of Airline	Type of Aircraft	No. of Flights/Week																				
1980	SOC - JKT	GIA	F-28	15																				
1981	SOC SUB -	GIA	F-28	7																				
1982				22 flts																				
1983				22 flts																				
1984				22 flts																				
General Note:																								
Air Force uses this airport for primary training of pilots.																								
There is a road crossing the extended runway center, a graveyard and a depression of about 20m on runway 08 side.																								
Revision																								
DATE	BY																							
1985	BY																							
Drawn by																								
Oct. 1985	1984	1983	1982	1981	1980	1979	1978	1977	1976	1975	1974													

c) Semarang/Ahmad Yani Airport

Semarang airport, located 3 km west of Semarang city, capital of Central Java province, is also jointly used by the military and civil sectors. Its management and air traffic control is under the Indonesian Army.

The runway extension work to 1,650 m by adding 250 m to the original length was completed in 1985. F-28-4000 is the largest aircraft presently in operation.

Layout plan and outline of the existing Semarang airport are shown in Fig. 2.3.4 and Table 2.3.4, respectively.

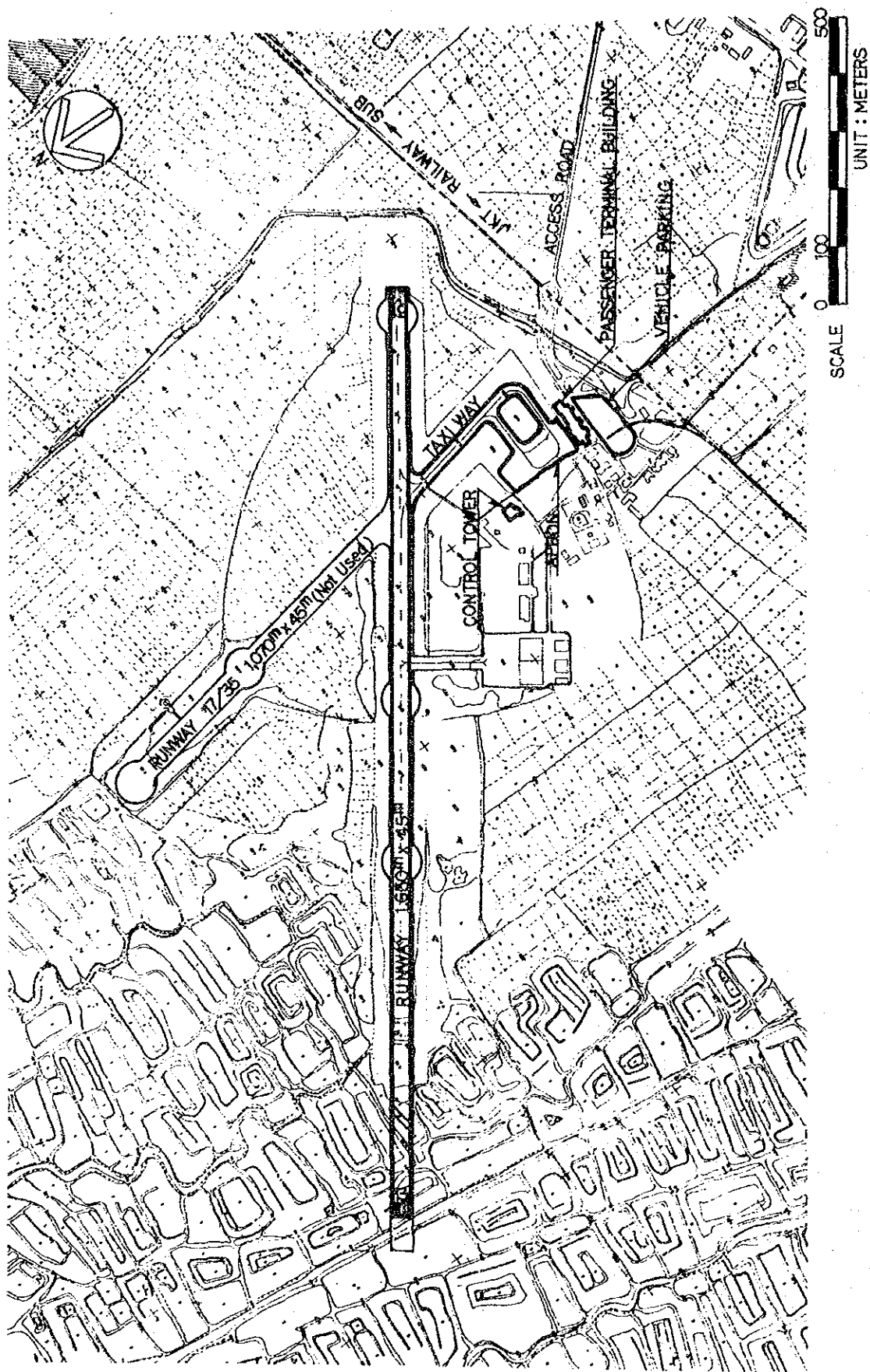


Fig. 2.3.4 Layout Plan of the Existing Semarang Airport

In REPELITA IV, Semarang airport will be upgraded to accommodate A 300/DC-10 class aircraft. DGAC has decided to develop a completely new runway and terminal area beside the existing runway in order to cope with the increasing demand. The detailed design for the redevelopment was executed under finance of Asian Development Bank in 1984. Details of this plan are referred to in Chapter 5 of this report.

d) Airstrips

There are 2 airstrips (except for military use) in Central Java province. One is Cilacap/Tunggul Wulung and the other is Cepu/Ngloram. Both are owned and operated by PERTAMINA. Cepu/Ngloram is utilized exclusively by PERTAMINA and the operation is not so active. Cilacap/Tunggul Wulung is operated by PERTAMINA, but scheduled flights between Jakarta are operated by Merpati Nusantara Airlines. There is a plan to transfer the superintendence of the airport from PERTAMINA to DGAC.

The outline of the airstrips and existing layout of Cilacap airstrip are shown in Table 2.3.5 and Fig. 2.3.5, respectively.

Table 2.3.5 Existing Airstrips in Central Java and D.I. Yogyakarta

Aerodrome Directory - Land							
City/Aerodrome	Coordinates	Elev (m)	Landing Area				Authority Supervising The Aerodrome And Remarks
			RWY NR MAG	Dimensions (m)	Runway		
					Runway	Surface	
1	2	3	4	5	6	7	8
CEPU/Ngloram	07.12 S 111.32 E	41	08- 26	900 x 30	Asphalt	Twin Otter	PERTAMINA 1. A/G : 122.1 Mhz. 2. PTP : 4485 Khz. 3. Opr. hrs: HS & O/R.
CILACAP / Tunggul Wulung	07.38 S 109.03 E	21	13- 31	660 x 23	Asphalt	30,000 lbs	PERTAMINA 1. Opr. hrs: HS & O/R 2. A/G : 122.8 Mhz. 3. Windsock available 4. Fire protection: 2 unit dry powder of 150 Kg. Fire fighting extinguisher 5. Twy : 35 x 18 M 6. Apron : 42 x 36 M 7. NDB : "CC" 235 Khz. 8. Fuel : AVTUR

Source : Directory of Aerodromes for Light Aircraft/DGAC

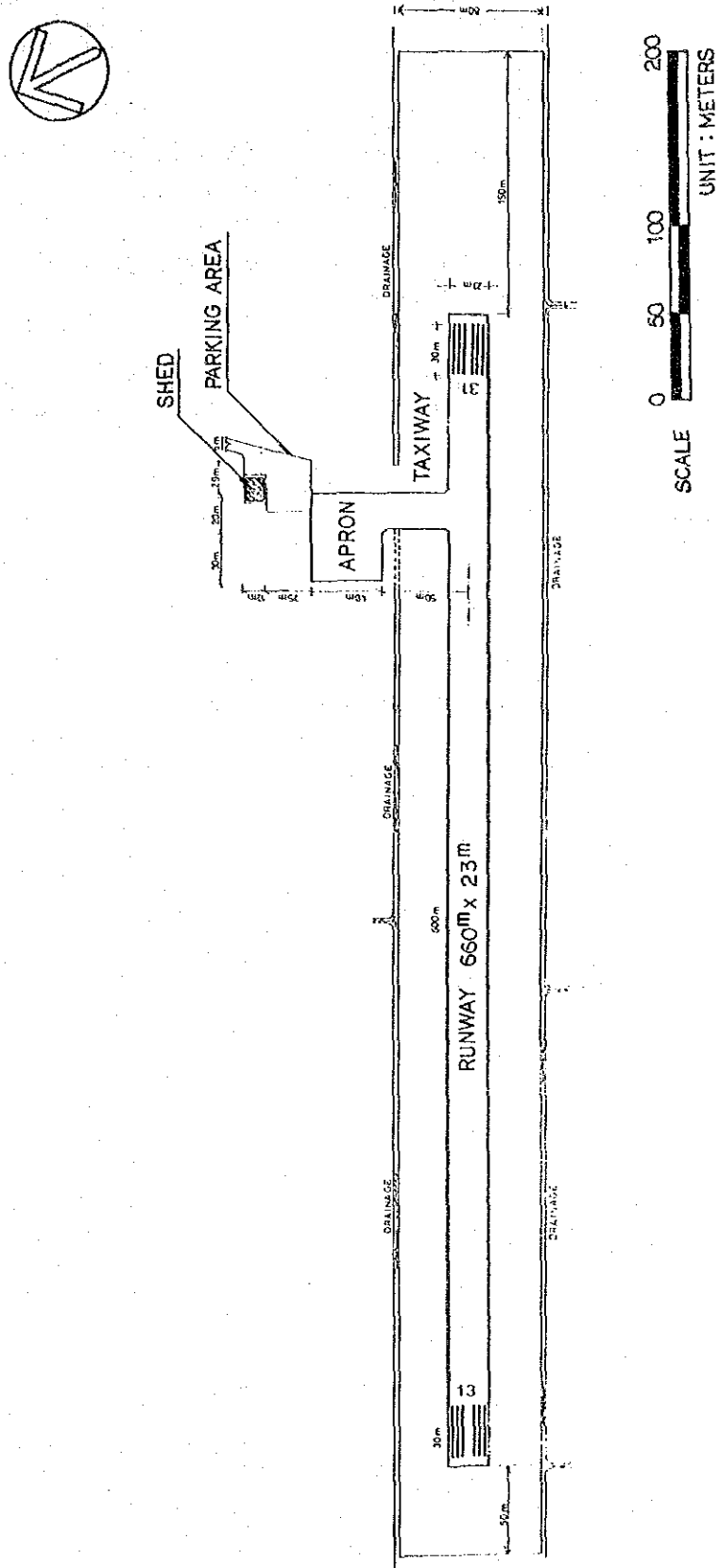


Fig. 2.3.5 Existing Layout of Cilacap Airstrip

2.3.2 Air Routes

Domestic air routes in Indonesia are shown in Fig. 2.3.6. Major cities throughout Indonesia are linked by air transport network.

International routes served by Garuda Indonesian Airways form a network with 16 countries as shown in Fig. 2.3.7.

The air routes from/to the airports in Central Java and D.I. Yogyakarta are shown in Fig. 2.3.8. Table 2.3.6 shows the scheduled flights of each airport.

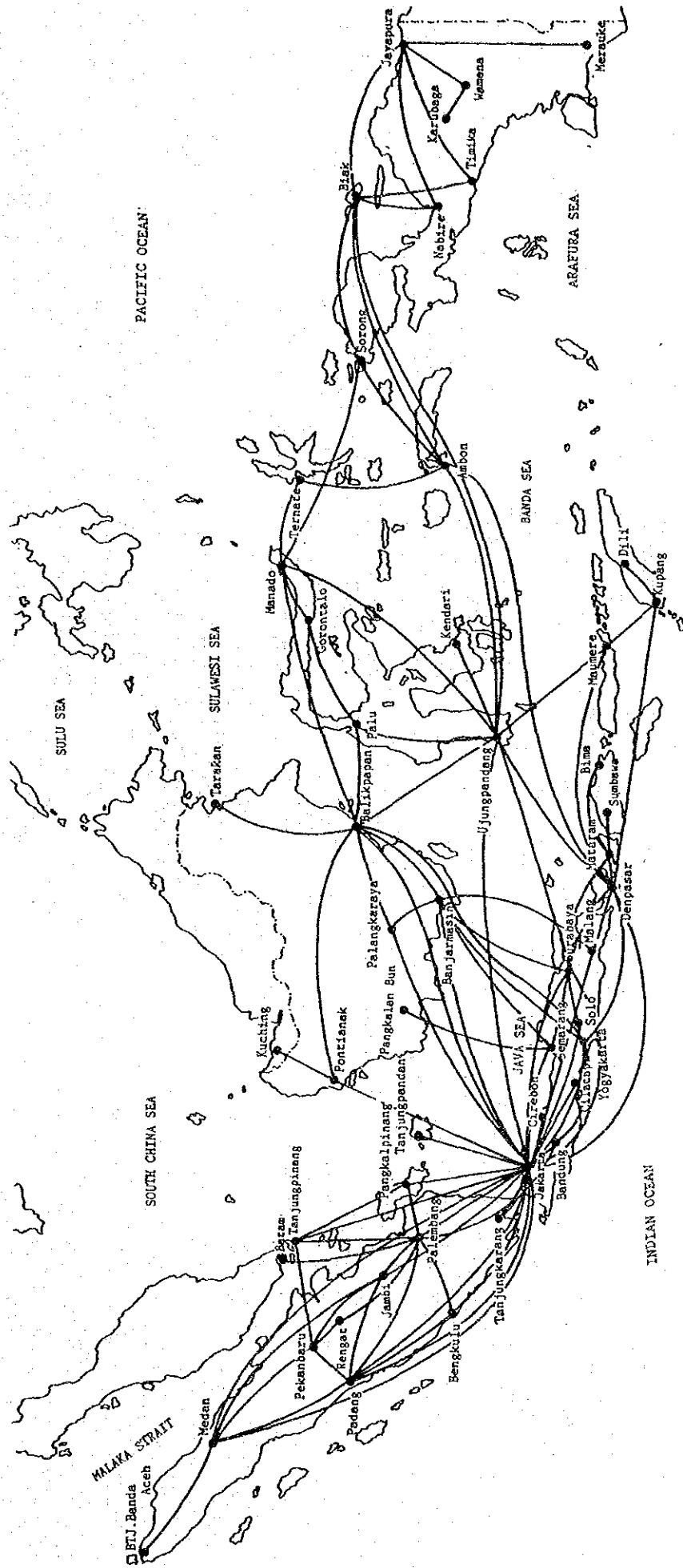
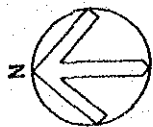


Fig. 2.3.6 Domestic Air Routes in Indonesia

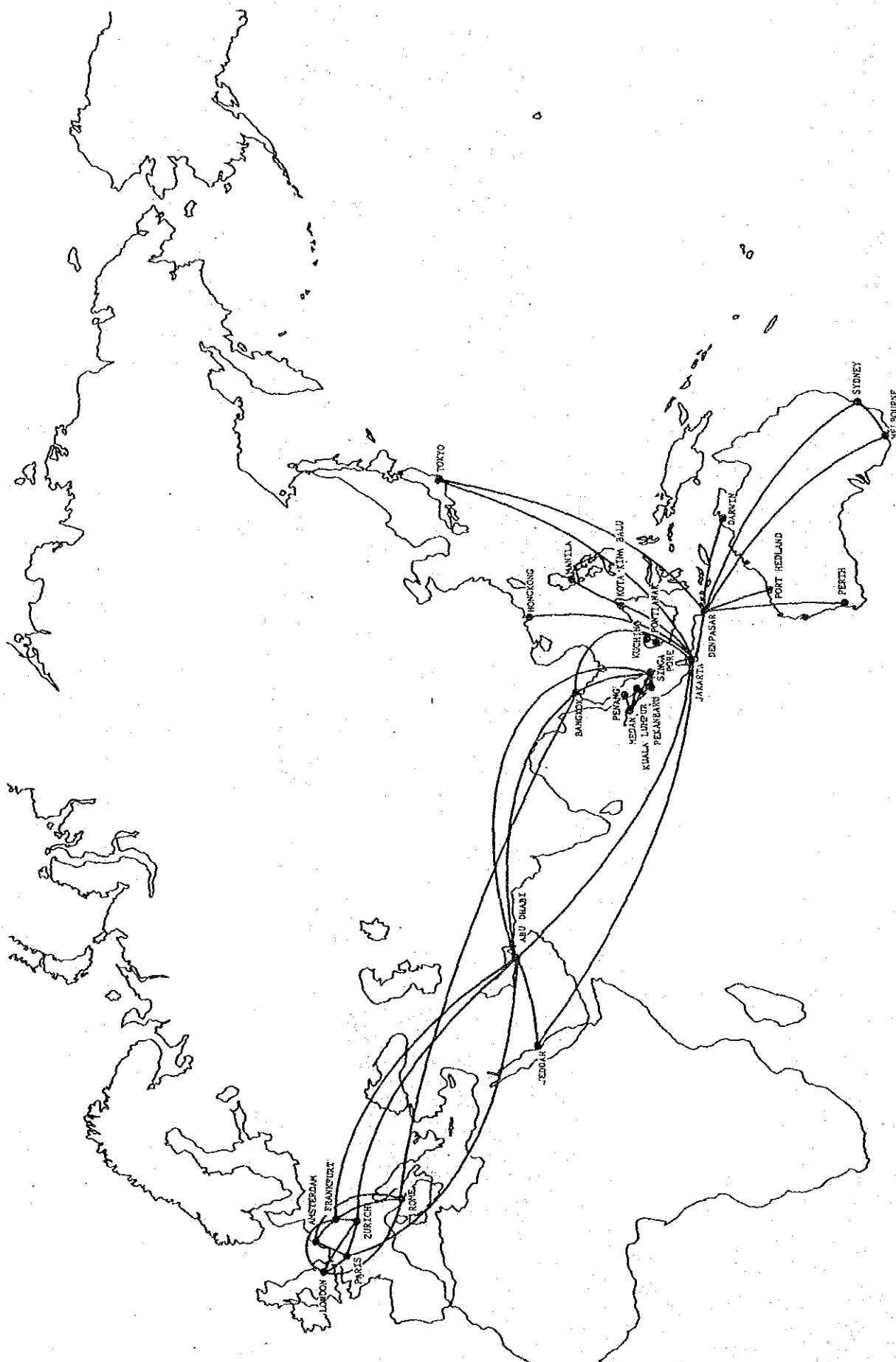


Fig. 2.3.7 International Air Routes Served by Garuda Indonesian Airways

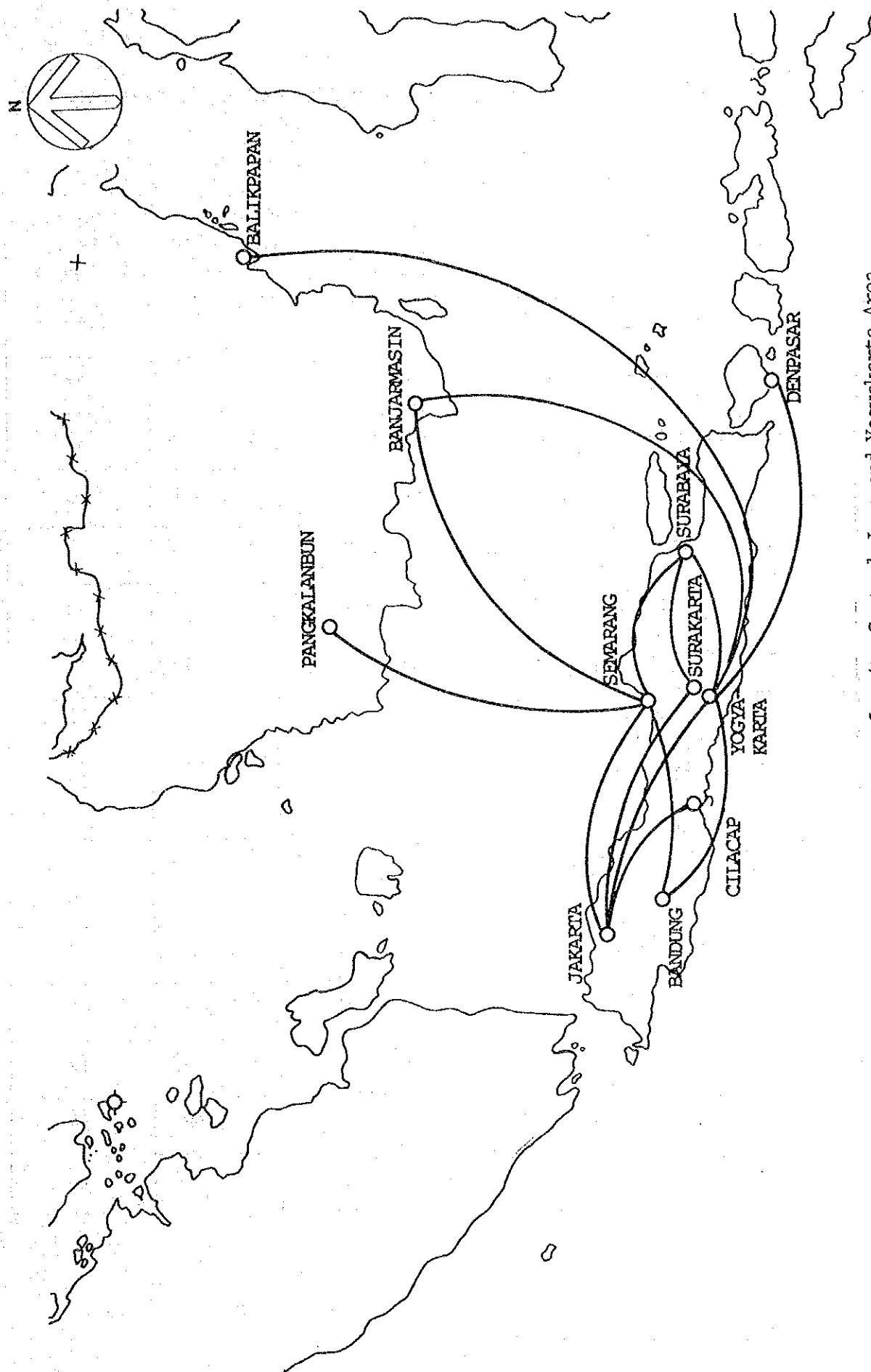


Fig. 2.3.8 Domestic Air Routes from/to Central Java and Yogyakarta Area