

REPUBLIC OF INDONESIA

FEASIBILITY STUDY

FOR

THE BALI INTERNATIONAL AIRPORT

DEVELOPMENT

FINAL REPORT

JUNE 1982

Japan International Cooperation Agency

SDF

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DEVELOPMENT

FINAL REPORT

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Japan International Cooperation Agency

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No. 13947

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PREFACE

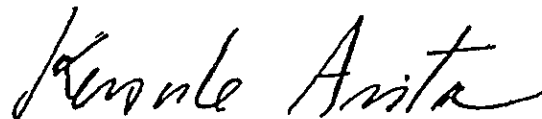
In response to the request of the Government of the Republic of Indonesia, the Government of Japan decided to conduct a feasibility study on the Bali International Airport Development Project, and entrusted the study to the Japan International Cooperation Agency (JICA). The JICA sent to Indonesia a survey team headed by Mr. Masaaki KAMIMURA, Director of the Construction Division, Aerodrome Department, Civil Aviation Bureau, Ministry of Transport, from December 2, 1981 to January 19, 1982.

The team had discussions with the officials concerned of the Directorate General of Air Communications, 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.

June, 1982



Keisuke Arita
President

Japan International Cooperation Agency
(JICA)

ABBREVIATION LIST

AAGR	Average Annual Growth Rate
ACC	Area Control Center
A/C	Aircraft
ADB	Asia Development Bank
ADF	Automatic Direction Finding
ADM	Administration
AFL	Airfield Lighting
AIP	Aeronautical Information Publication
AIR COND	Air Condition
A/L	Airline
ALS	Standard Approach Lighting System
ALT	Altitude
APCH	Approach
APP	Approach Control (Office)
APPROX	Approximate
ARCH	Architect (Architectural)
ARR	Arrival
ASR	Airport Surveillance Radar (= PSR)
ATC	Air Traffic Control
ATIS	Automatic Terminal Information Service
AVBL	Available
BIA	Bali International Airport
BLDG	Building
BM	Bench Mark
CAFE	Cafeteria
CAT	Category
CBR	California Bearing Ratio
CH	Channel
C.I.Q.	Custom Immigration and Quarantine
CM	Centimeter
CONC	Concrete
CONS	Concession
D	Distance
DEP	Departure
DGAC	Directorate General of Air Communications of Indonesia
DH	Decision Height
DIV	Division
DME	Distance Measuring Equipment
DN	Down
DOM	Domestic
DPS	Denpasar
D/VOR	Doppler type VOR
DWG	Drawing
EA	Each
ELEC	Electric
ELEV	Elevation
EPNL	Effective Perceived Noise Level
ESCA	Escalator
FAA	Federal Aviation Administration
FIG	Figure
FL.	Floor

GDP	the Gross Domestic Product
GIA	Garuda Indonesian Airways
GNP	Gross National Product
GP	Glide Path
GSE	Ground Service Equipment
HNL	Honolulu
HR	Hour
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
ILS	Instrument Landing System
INFO	Information
INTL	International
JCAB	Civil Aviation Bureau of Japan
JICA	Japan International Cooperation Agency
JKT	Jakarta
JOG	Jogyakarta
KOE	Kupang
LCN	Load Classification Number
LLZ	Localizer
LP	Light Propeller Aircraft
MAP	Missed Approach Point
MAX	Maximum
MDA	Minimum Descent Altitude
MECH	Mechanic (Mechanical)
MES	Medan
MHA	Minimum Holding Altitude
MJ	Medium Jet
MM	Middle Marker
MNA	Merpati Nusantara Airline
MNM	Minimum
NAV	Navigation Aids
NDB	Non Directional Beacon
NM	Nautical Mile
NMJ	New Medium Jet
OFF	Office
OM	Outer Marker
PAX	Passenger
PBB	Pax. Boarding Bridge
PDG	Padang
PKU	Pakanbaru
PLM	Palembang
PLN	Perusahaan Listrik Negara
PNL	Perceived Noise Level
POL	Petroleum Oil and Lubricants
PSR	Primary Surveillance Radar
QF	Quantas Airline
R	Radial
REPELITA	National Development Plan
REV	Revision(s), Revised
RFL	Roof Floor
RM	Room
RWY (R/W RW)	Runway
RVR	Runway Visual Range
SECT	Sector

SID	Standard Instrument Departure
SJ	Small Jet
SP	Small Propeller Aircraft
SRG	Semarang
STA	Straight in Approach
STAR	Standard Terminal Arrival Route
STOL	Short Take-Off Landing Aircraft
SUB	Surabaya
TDZ	Touch Down Zone
TECH	Technical
TRANS	Transition
TV	Television
TYP	Typical
TWR	Aerodrome Control Tower
TWY (T/W TW)	Taxiway
TX	Transmitter
UPG	Ujung Pandang
VAR	Magnetic Variation
VASIS	Visual Approach Slope Indicator System
VIS	Visibility
VOL	Volume
VOR	Very High Frequency Omni Directional Range
WB	Wide Body Jet
WHO	World Health Organization
WECPNL	Weighted Equivalent Continuous Perceived Noise Level
WK	Week
&	And
£	Centerline
#	Number

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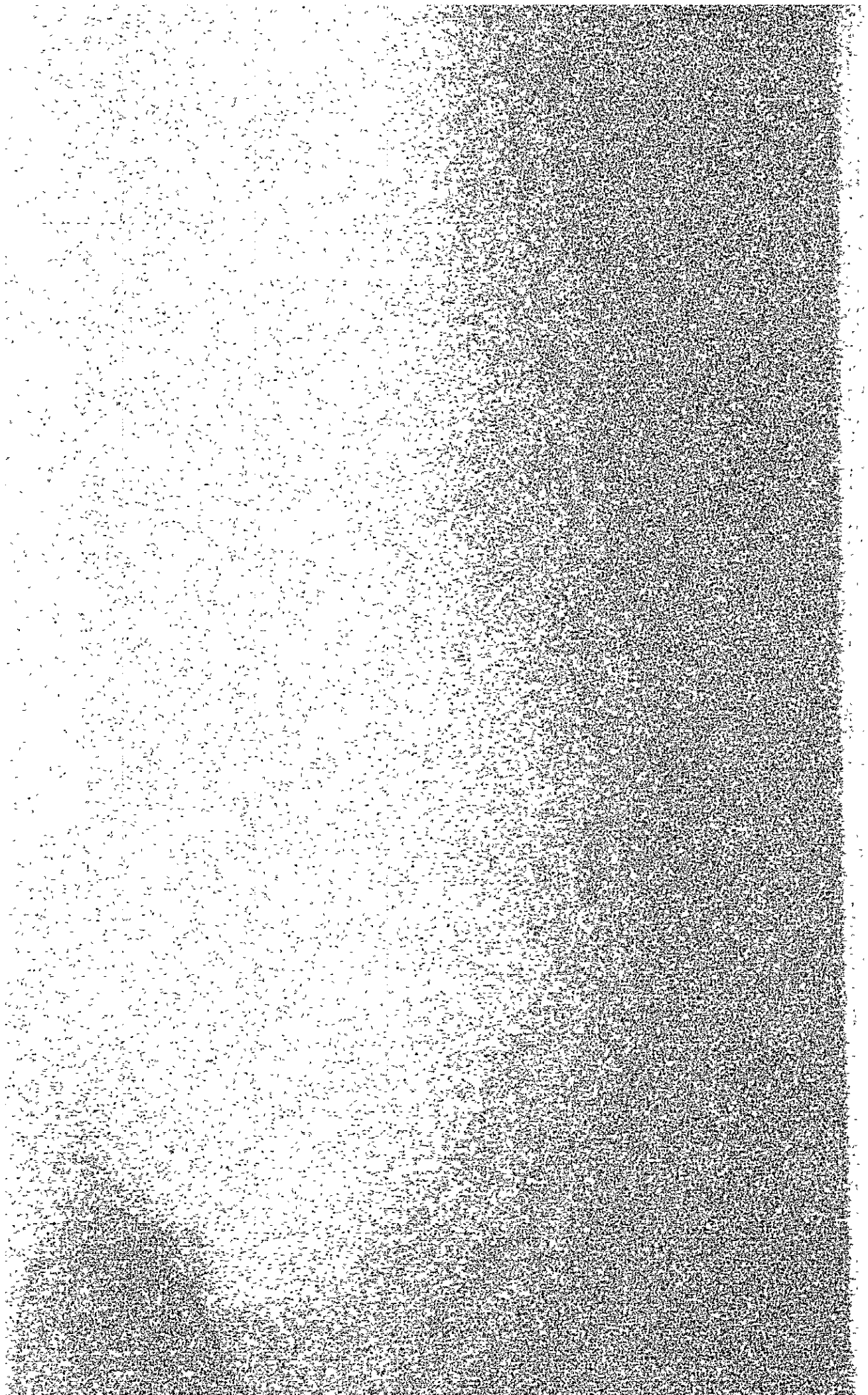


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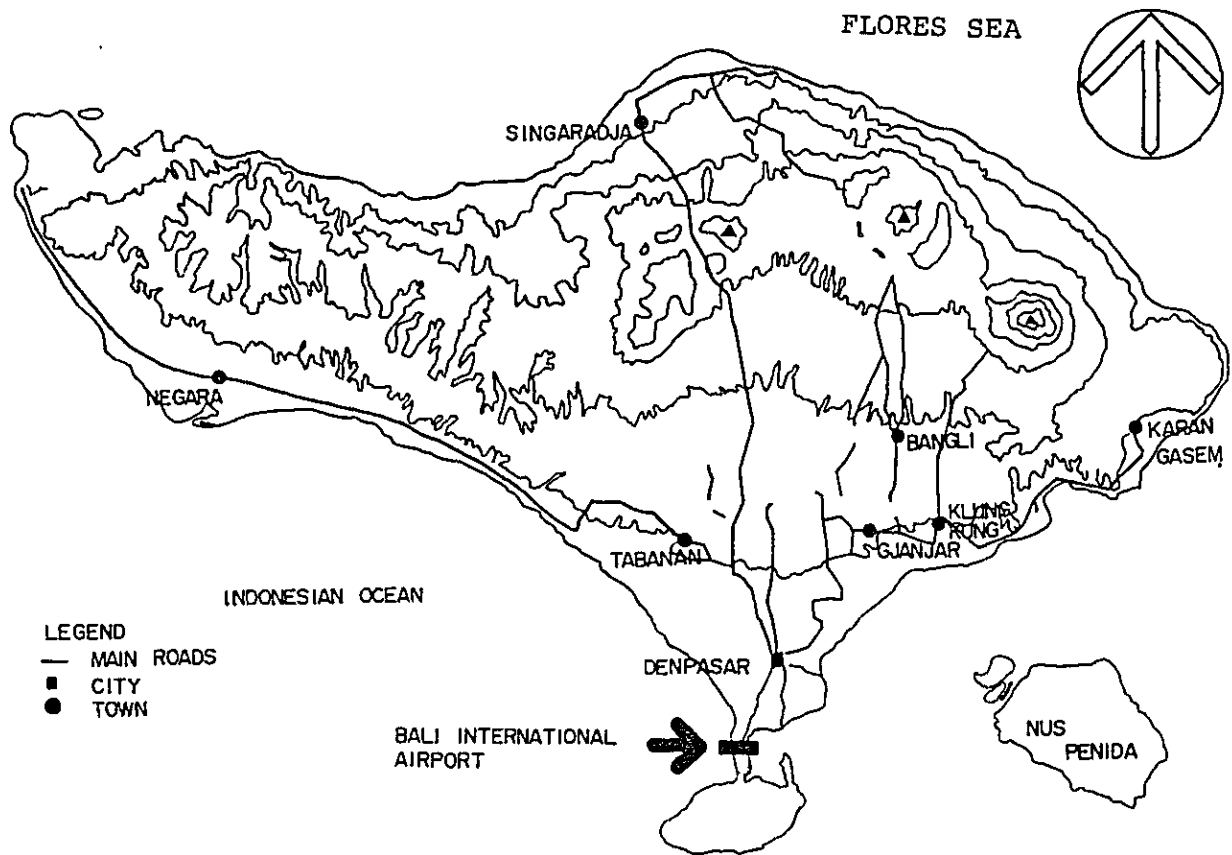
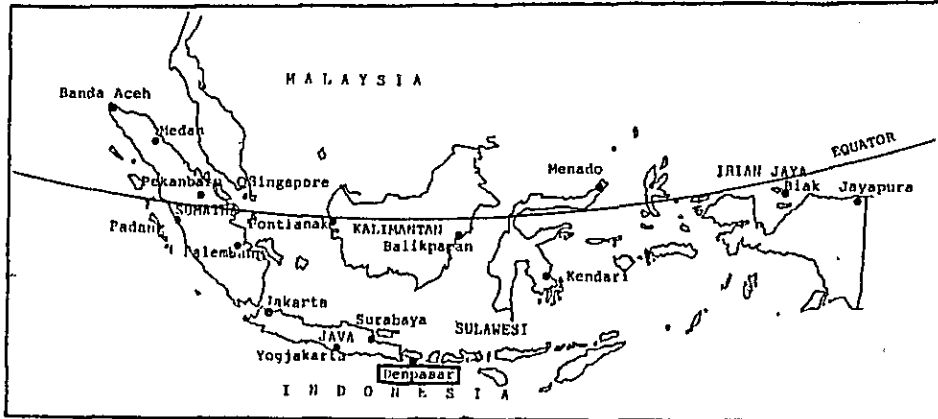
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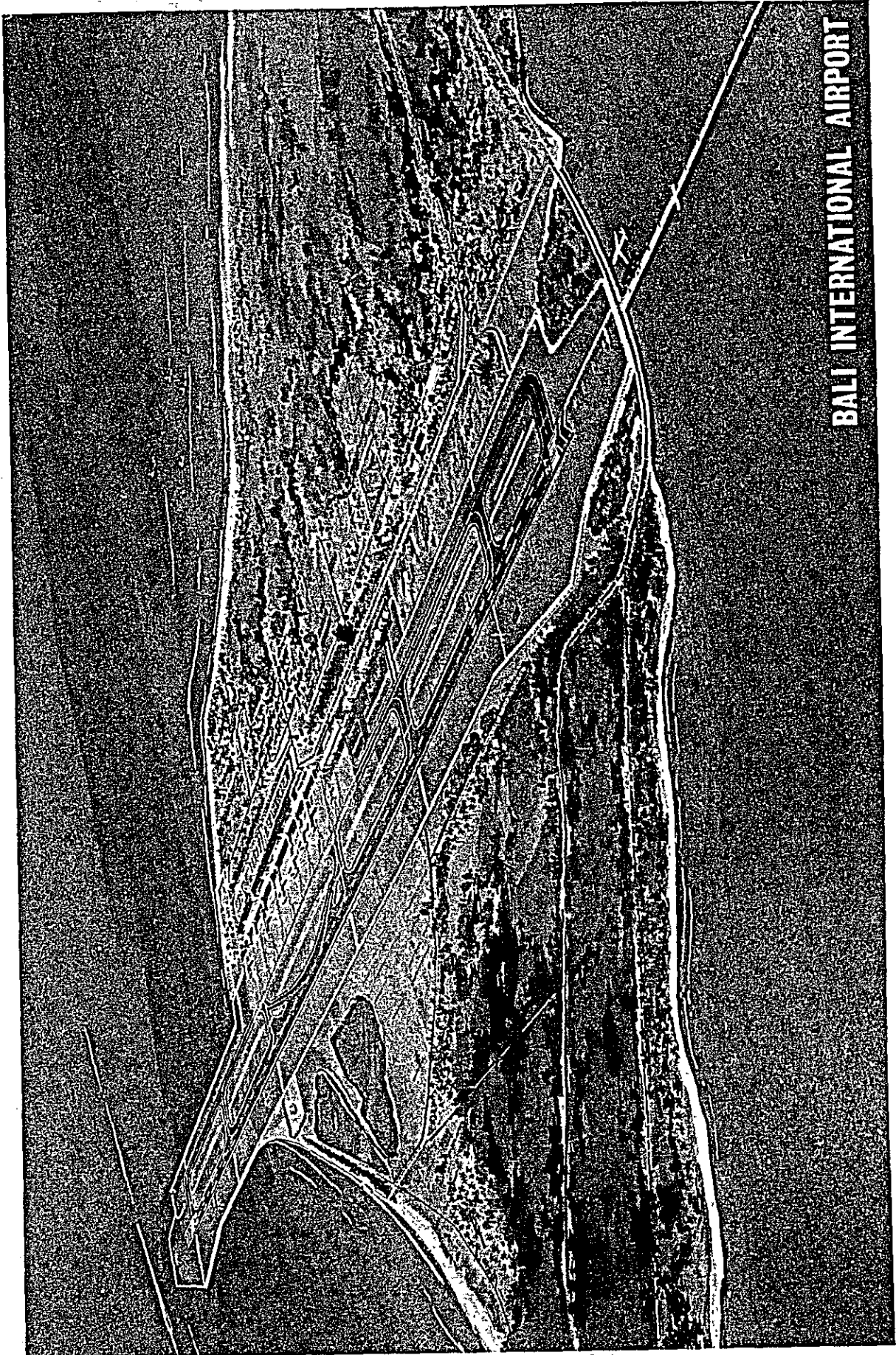
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PROJECT LOCATION MAP



BALI INTERNATIONAL AIRPORT

CHAPTER 1
INTRODUCTION



CHAPTER 1 INTRODUCTION

1.1 General

The Indonesian archipelago consists of more than 3,000 inhabited islands which are spread over an area of 9 million square kilometers: 5,100 kilometers from west to east and 1,800 kilometers from south to north covering an area larger than United States.

The mountainous terrain of the archipelago consisting of many volcanos obstructs the development of surface transportation. Therefore, air transport performs a major role in promoting economic activities, national communication and unity, regional development and economic balance, etc. The growth of air traffic at the Bali International Airport on Bali island, a well-known tourist resort, has increased at the high average rate of 15 percent per annum during the period 1972 to 1980. In 1981, passenger traffic reached a total of about one million passengers. It is forecast that this growth trend will continue and passenger traffic will surpass 2.4 million per annum by 1990. The existing Bali International Airport, however, has many serious problems even for the present air traffic volume in terms of size and system of facilities, especially in the service of jumbo aircraft.

Bali International Airport also plays an important role in Indonesian aviation as the eastern gateway for international air traffic and as the most advanced base for domestic air routes to solitary eastern islands.

If the development works of the airport are not implemented immediately to meet the increasing air traffic demand, the airport will constitute a serious barrier to the economic development of the eastern region of Indonesia and expansion of international trade and cultural exchange. Therefore, the Government of Indonesia recognizes the importance of the development

of the Bali International Airport in order to solve its present problems and to meet the growth in aviation activities.

The Government of Indonesia requested and the Government of Japan agreed that the Japanese Government would render technical assistance for a Feasibility Study for the development of the Bali International Airport.

The purpose of Bali International Airport Development Plan is to secure the safe operation of wide-bodied large aircraft and to provide comfortable services for passengers as an international airport and the eastern gateway of Indonesia, with development of suitable and efficient airport facilities to be utilized to cope with the rapidly growing air traffic demand.

The Scope of Work for the Feasibility Study was agreed upon by both Governments on 6th December 1981. The Government of Japan, according to this agreement, has assigned the Japan International Cooperation Agency (JICA) to carry out the Study. JICA organized the Study Team and officially commenced the Study in December, 1981.

1.2 Objective and Scope of Work

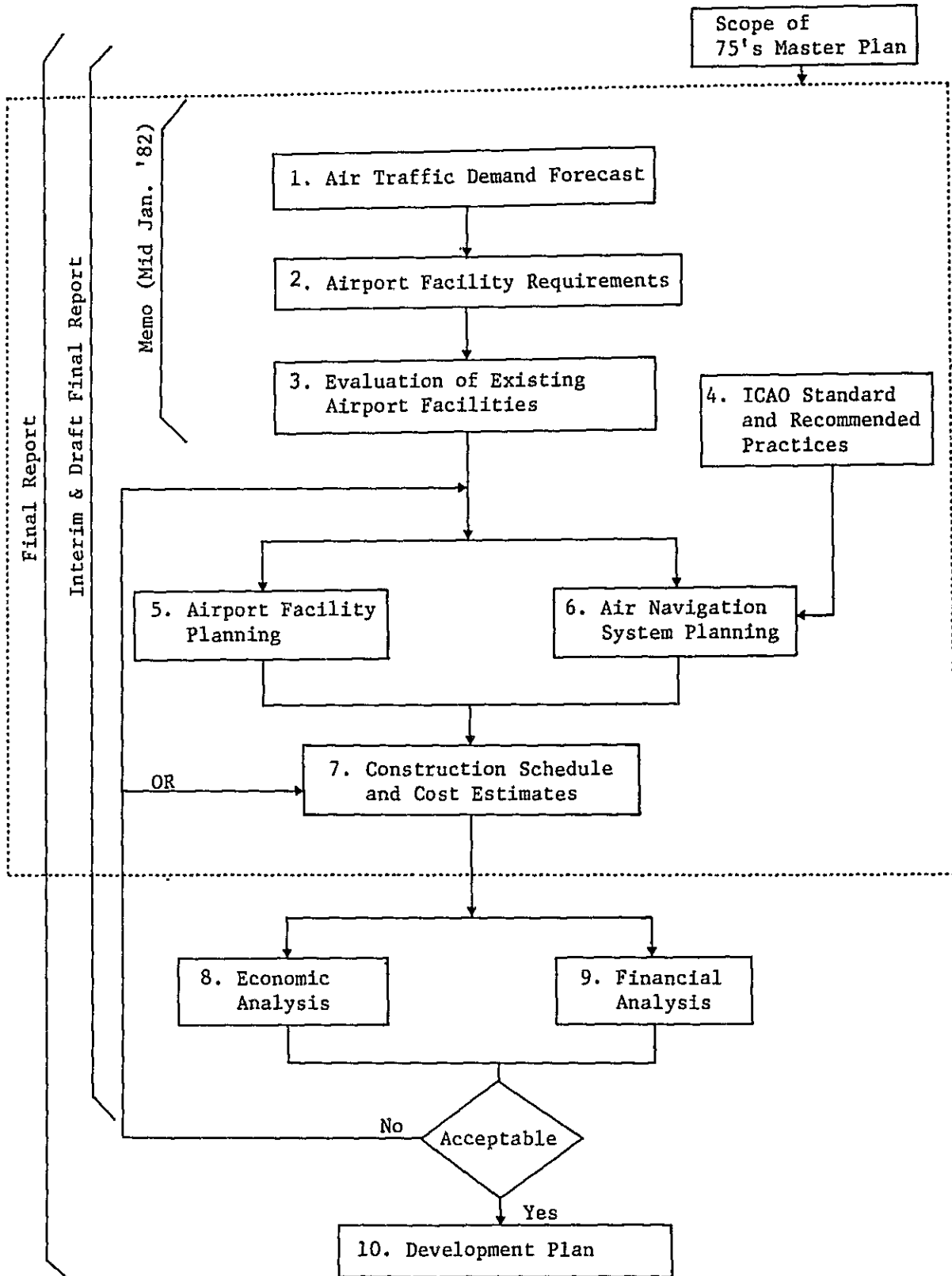
The objectives of this study are, together with a review of the works of the master plan made in 1975, to examine the technical and economical feasibility of the development plan of Bali International Airport so as to contribute to optimum airport development planning.

The study consists of the following eleven major work items performed in accordance with the work flow chart indicated in Fig. 1.2.1.

- 1) Collection of relevant data and information
- 2) Air traffic demand forecast
- 3) Airport facility requirement analysis
- 4) Evaluation of existing airport facilities
- 5) Airport layout plan

- 6) Airport facility planning
- 7) Air navigation aids planning
- 8) Construction schedule and cost estimates
- 9) Economic analysis
- 10) Financial analysis
- 11) Social, environmental and other aspects

Fig. 1.2.1 WORK FLOW CHART



Note: Each activity includes data collection and site reconnaissance

1.3 Study Method and Reporting System

The Study was conducted in accordance with the procedures outlined in the Inception Report accepted in December 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 Directorate General of Air Communications of Indonesia (DGAC). The air traffic demand forecast, study of facility requirements, study on the expansibility of the existing airport facilities were carried out in Indonesia by the JICA Study Team with ample discussions and the close cooperation of Indonesian counterparts. The discussions and cooperation continued for one and half months until the concept of the airport development plan was accepted for further study by the Indonesian Steering Committee in January, 1982.

The master planning for the airport development scheme was carried out based on the factors discussed in Indonesia and various basic assumptions under the supervision of the Japanese supervisory Committee, after the return of the Study Team to Japan.

The Interim and Draft Final Report, containing the comprehensive results of the Study, was submitted to DGAC and accepted.

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

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 under the Indonesian Steering Committee. The relationship of these committee and teams is shown in Fig. 1.4.1.

The members of both committee , the Counterparts and Study Teams are presented in Tables 1.4.1 - 1.4.4.

Fig. 1.4.1 ORGANIZATION CHART

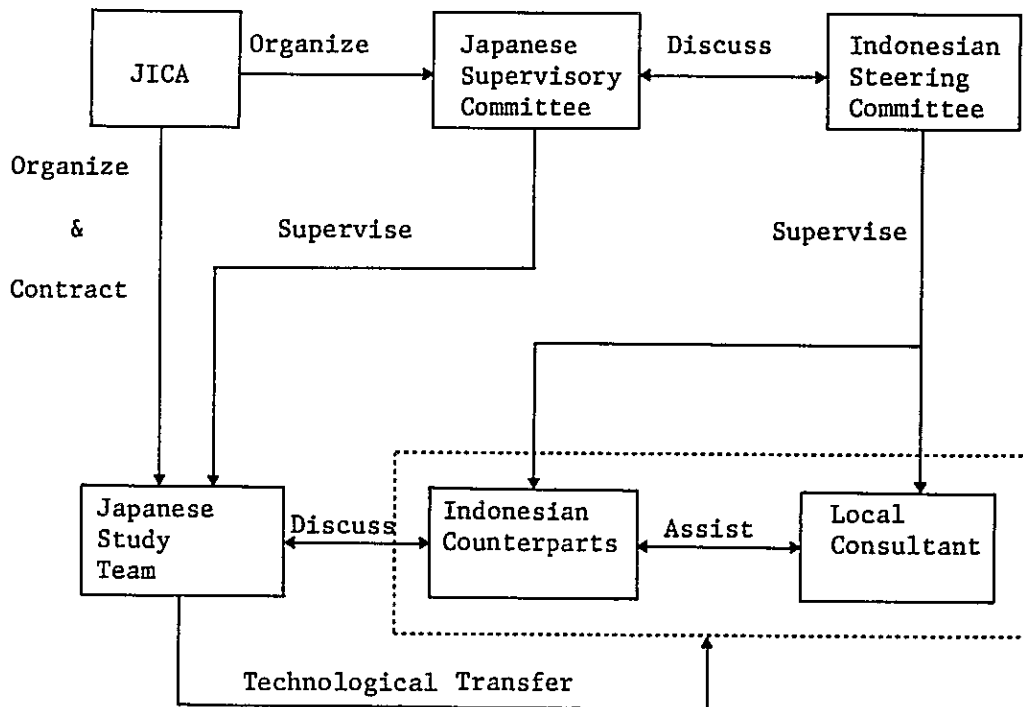


TABLE 1.4.1 LIST OF INDONESIAN COMMITTEE MEMBERS

Mr. WASITO	Secretary of the Directorate General of Air Communications
Mr. KUSNO WAGIMAN	Planning Division
Mr. SUPARTOLO	Directorate of Air Safety
Mr. SUBADIO WIRYOWIGUNO	Directorate of Telecommunication, Air Navigation & Electricity
Mr. IMAN HERTOTO	Directorate of Airport Engineering
Mr. G. RISSAKOTA	Directorate of Air Transport
Mr. PFL. MASPAITELA	Planning Bureau
Mr. H. SUBRATA	Research and Development Centre DGAC
Mr. ARIF BUDIMAN	Planning Division
Mr. WIDJOJO	Bureau of National Development Planning
Mr. SUGIARTO SUMOBROTO	Directorate General of Budgeting Department of Finance
Mr. SUDJARWO	Perum Angkasa Pura

TABLE 1.4.2 LIST OF INDONESIAN COUNTERPARTS

Mr. SAMOEDRO	Directorate of Air Engineering
Mr. R.A. NUR ROSADI	Planning Division
Mr. IBRAHIM DAHLAN	Planning Division
Mr. YAYOEN WAHYOE	Directorate of Airport Engineering
Mr. M. FUSCHAD	Directorate of Airport Engineering
Miss S. AGUSTINI	Directorate of Airport Engineering
Mr. ATE LIANDO	Directorate of Air Safety
Mr. MADIYONO	Directorate of Airport Engineering
Mr. MUCHTAR USMAN	Directorate of Air Transport
Mr. DOLY A. SIHOMBING	Research and Development Centre DGAC
Mr. DAMEN SEBAYANG	Planning Bureau
Mr. ASRUL RAPANI	Perum Angkasa Pura
Mr. FACHRI ZAINUDIN	Perum Angkasa Pura
Mr. HADI RACHIM	Directorate of Telecommunication, Air Navigation & Electricity
Mr. SUNARYO	Perum Angkasa Pura

TABLE 1.4.3 LIST OF JAPANESE SUPERVISORY COMMITTEE

Mr. MASA AKI KAMIMURA	Director of Construction Division Aerodrome Department, Civil Aviation Bureau, Ministry of Transport
Mr. SHINICHI HASEGAWA	Special Assistant to the Director, Flight Standard Division, Technical Department, Civil Aviation Bureau, Ministry of Transport
Mr. KAZUO YOKOTA	Special Assistant to the Director, Construction Division, Aerodrome Department, Civil Aviation Bureau, Ministry of Transport
Mr. SHUNICHI MIZUOCHI	Development Survey Division, Social Development Cooperation Dept.
Mr. TAKESHI NAGAI	Traffic Forecast and Economic/ Financial Analysis Specialist

TABLE 1.4.4 LIST OF JICA STUDY TEAM MEMBERS

Mr. MAKOTO TANAKA	Project Manager
Mr. RYUJI TAGUCHI	Airport Planner (General/Civil)
Mr. TADAMITSU ITO	Aircraft Operation and Navi-aids Planner
Mr. MOTOYOSHI YAMADA	Traffic Forecast and Economic/ Financial Analyst
Mr. MASASHI ISHIZAKA	Airport Planner (Architecture)
Mr. YOSHIYA NIINOMI	Airport Planner (Utilities)
Mr. HIDEO OHMORI	Airport Planner (Construction)