

REPUBLIC OF INDONESIA

FEASIBILITY STUDY
FOR
THE BALI INTERNATIONAL AIRPORT
DEVELOPMENT

FINAL REPORT
SUMMARY

JUNE 1982

Japan International Cooperation Agency

SDF

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**FINAL REPORT
SUMMARY**

JUNE 1982

Japan International Cooperation Agency

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PREFACE

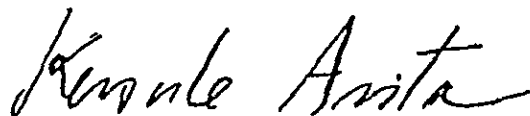
In response to the request of the Government of the Republic of Indonesia, the Government of Japan decided to conduct a feasibility study on the Bali International Airport Development Project, and entrusted the study to the Japan International Cooperation Agency (JICA). The JICA sent to Indonesia a survey 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.

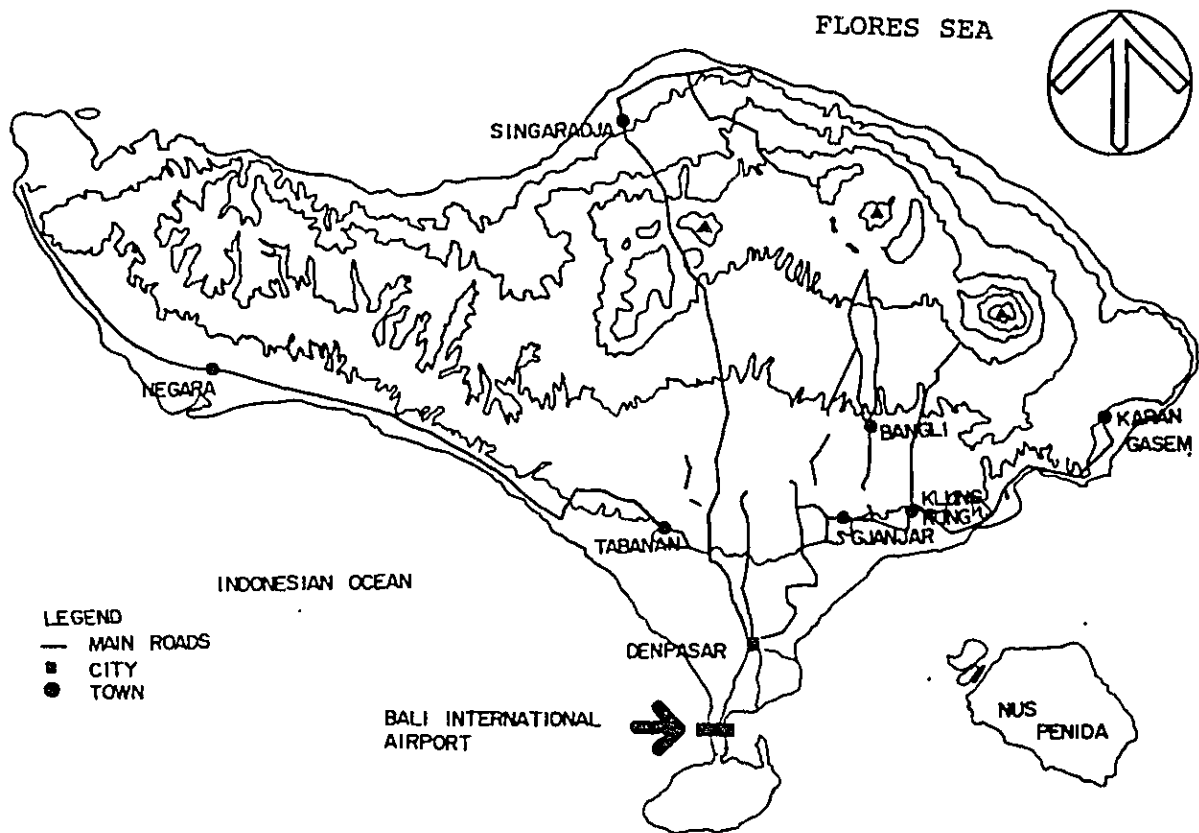
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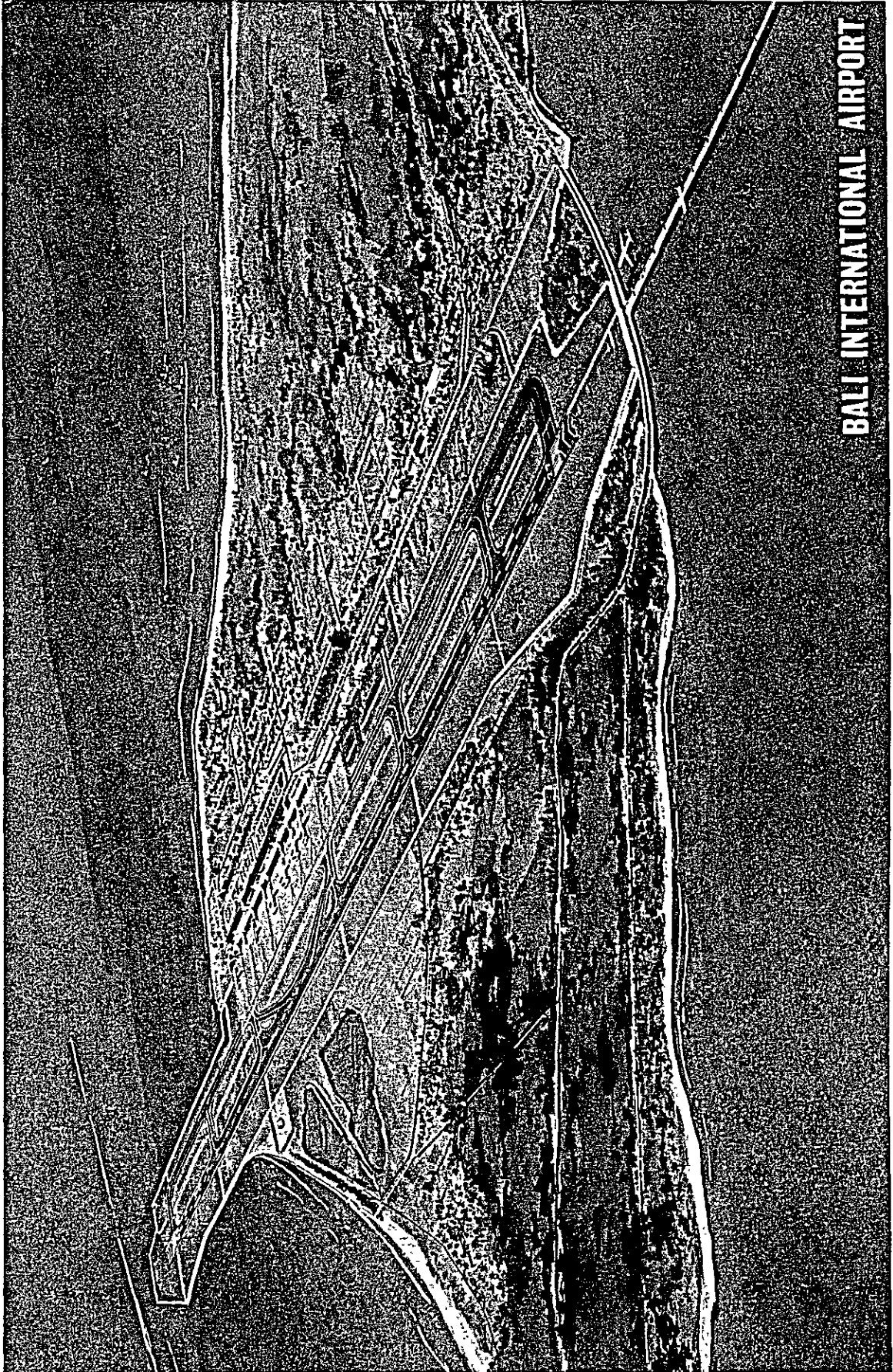
Keisuke Arita
President
Japan International Cooperation Agency
(JICA)

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PROJECT LOCATION MAP



BALI INTERNATIONAL AIRPORT

CHAPTER 1

DESCRIPTION OF THE PROJECT AND ITS CONCLUSIONS



CHAPTER 1 DESCRIPTION OF THE PROJECT AND ITS CONCLUSIONS

1.1 Background of The Project

Civil air transportation plays an important role in the national integration, promoting economic activities, regional economic balance, etc. in Indonesia.

The major role which the Bali International Airport located on Bali Island, a well-known tourist resort at the middle of the Indonesian archipelago, plays in Indonesian aviation activities is summarized as follows:

- (1) Eastern air gateway of Indonesia connecting with Japan and Australia.
- (2) The most advanced center for establishing solidarity among the eastern islands of Indonesia to provide the basis for transferring and connecting domestic air routes which will accelerate migration and economic exchange to both undeveloped and developing regions.

The growth of air traffic at the Bali International Airport has increased at the high average rate of 15 percent per annum during the period from 1972 to 1980 reaching a total of about one million passengers in the year 1981. It is forecast that this growth tendency will continue and passenger traffic will surpass 2.1 million per annum by 1990.

As a matter of fact, the existing airport facilities of BIA have various serious problems such as inadequate facility requirements, airport system, safety, etc. which are influenced by the rapid growth of traffic demand and wide-bodied aircraft.

Consequently, the Government of Indonesia recognized the importance of the establishment of a fundamental development plan for Bali International Airport in order to solve present problems and to adequately meet the

future air traffic demand.

In response to a request from the Government of Indonesia, the Government of Japan agreed to conduct a feasibility study for a Development Plan for Bali International Airport. Based on this agreement, the Government of Japan assigned Japan International Cooperation Agency (JICA) to carry out this study.

1.2 Existing Airport Facilities of BIA

The Bali International Airport is situated about 13 km south of Denpasar city, which is the capital of the Bali Province. The airport has a 2700 m long runway with CAT-I operation. The existing airport facilities are summarized in Table 1.1 and shown in Fig. 1.1.

1.3 Necessity of Development of BIA

The existing airport facilities of BIA have been developed in accordance with the 1975 Master Plan established. The design-type of aircraft such as DC-8 and DC-10 class were considered in the Master Plan.

However, jumbo jet aircraft B-747 have been in service internationally since 1980 at BIA and therefore, various problems related with the safe operation of jumbo aircraft have arisen such as insufficiency of runway length and runway strip width, layout of facilities, etc.

The problems are summarized as follows:

(1) Runway

The existing runway length of 2,700 meters is not sufficient for the take-off of DC-10 from Bali to Tokyo. In addition, about 25 percent weight reduction from the maximum payload is required.

(2) Runway Strip

Although the width of the runway strip is expressed as 200 meters in the AIP, it is

LEGEND

- ① INT'L TERMINAL BLDG.
- ② DOM. TERMINAL BLDG.
- ③ CARGO TERMINAL BLDG.
- ④ HANGAR
- ⑤ CAR PARKING
- ⑥ INT'L APRON
- ⑦ DOM. APRON
- ⑧ FUEL STORAGE

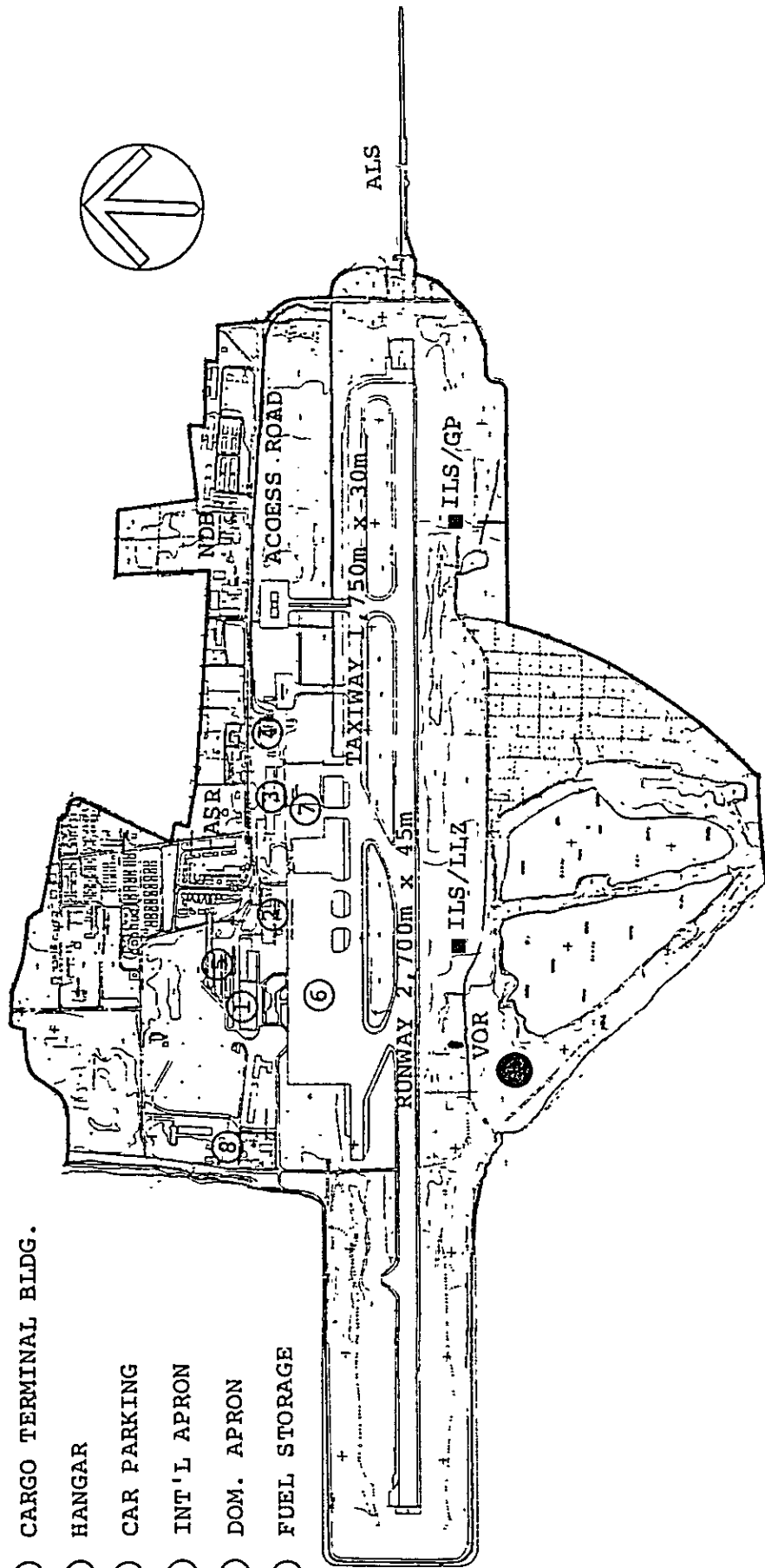


Fig. 1.1 General Layout Plan of Existing Airport Facilities (1981)

Table 1.1 GENERAL PROFILE OF BALI INTERNATIONAL AIRPORT

Item	Description
City/Aerodrome	Denpasar/BALI INTL-Ngurah Rai
Coordinates	08.45.09S 115.10E
Distance and direction from City	7.1 NM SSW
Elevation	4.33 m
Magnetic Variation	1°
Operation hours	23.00 ~ 19.00
Aerodrome operator	D.G.A.C.
Runway	2700m x 45m
Stop way	100 m
Clear way	100 m
Runway slope	
Runway surface	Asphalt
Runway strength	LCN 60
Taxiway	1750m x 30m
Apron (spot)	A: 4/DC-9 (180m x 100m) B: 2/B-747 1/DC-10 (439m x 112m) 4/DC-9
Apron surface	Concrete
Apron strength	LCN 60
Passenger Terminal Bldg	Int: 6070m ²
Cargo Terminal Bldg	Dom: 5,800m ² Including 1800m ² ADM. Area(2,350m ²)
Annual Passenger volume	Int: 316000 (1981) Dom: 554000 (1981)
Annual Cargo volume	Int: 704 ton (1981) Dom: 2294 ton (1981)
Annual Aircraft Movements	Int: 1518 (1981) Dom: 17764 (1981)
Ground Service	Avigas 100/130 Avtur 650
Fire Fighting	Category 7
Lighting aids	Approach lighting: Cat I (R/W27) VASIS 3-Bar (R/W.09&27) Runway edge light Runway Threshold light Taxiway edge light
Nav aids	C/VOR-DME D/VOR ILS - LLZ (LLZ: off-set) GP-DME ASR/SSR

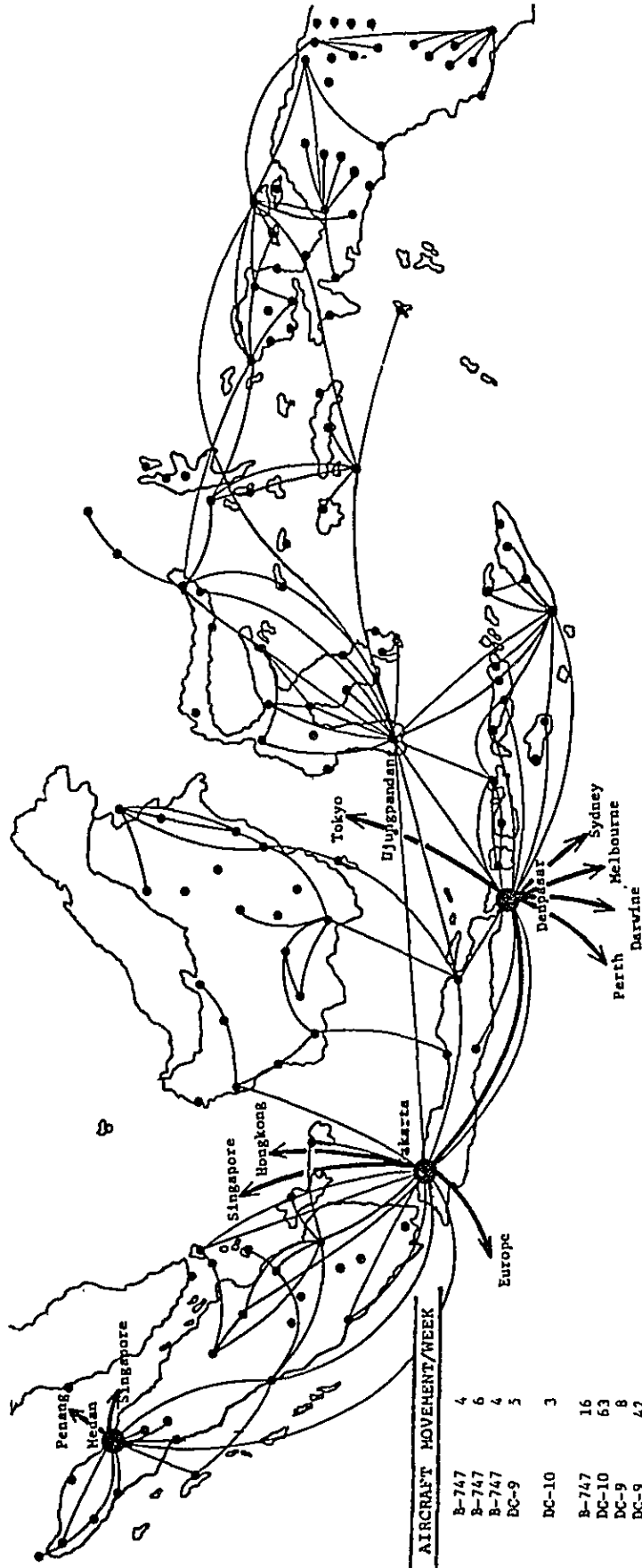
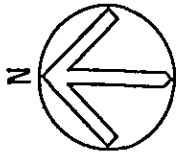


Fig. 1.2 AIR ROUTE NETWORK OF INDONESIA
 SHOWING ROLE OF BIA
 AS THE EASTERN AIR GATEWAY TO INDONESIA

1
5
1

ROUT	AIRCRAFT	MOVEMENT/WEEK
DPS - MEL*	B-747	4
SYD*	B-747	6
PER*	B-747	4
DRH*	DC-9	5
NRT*	DC-10	3
JKT	B-747	16
	DC-10	63
JOG	DC-9	8
UPG	DC-9	42
	F-28	26
	HS-748	7
SUB	F-28	41
	HS-748	12
KOE	F-28	27
AMI	DHC-6	95
BHU	DHC-6	15
DIL	F-28	1
WCP	HS-748	1
MOF	HS-748	4

* International Route

actually less 200 meters. In either case, it does not comply with the ICAO standard which is 300 meters.

(3) Taxiway

The distance between the center line of the runway and parallel taxiway, and between both pavement edges, are 125 meters and 87.5 meters, respectively. These values also do not comply with the ICAO standard of 180 and 150 meters which are expected to be adopted in 1983.

(4) Apron

Since the clearance between wing tips of parked aircraft, especially at night, is below the recommended values in the ICAO Aerodrome Design Manual, Part II, it is one of the serious problems of BIA.

In addition, if the ICAO standards mentioned in Para. (2) and (3) above are applied to BIA, wide-body jumbo aircraft parked on the apron would be in contravention of the obstacle limitation for transitional surfaces.

(5) International/Domestic Terminal Buildings

The fundamental problem is that the system and sizes of the existing terminal facilities are not appropriate for recent mass air transportation services brought about by wide-body jumbo jet aircraft.

The existing INT'L and DOM Passenger terminal buildings are respectively about half and two-third of the required floor areas based on the present peak hour volume of passengers.

Presently, expansion works of the international and domestic terminal buildings are

under construction as a temporary expediency for solving the problems; however, it is considered that the new capacities will accommodate the traffic demand only for the short-term (2 - 3 years) based on the results of air traffic demand projection.

Sooner or later, sever congestion will occur in the buildings, the same as the present congestion.

(6) Cargo Terminal Building

The present cargo terminal building was constructed 30 years ago for use as a passenger terminal. The building is now in superannuated condition and its capacity has now reached its ultimate limit due to the dense use of building space.

Without the construction of a new cargo building to permit the containerization of air cargo, there is no possibility for the existing building to be able to cope with increasing cargo volumes.

(7) Air Navigation System

Due to geographical conditions, the existing localizer is abnormally located on the offset of the runway contrary to the requirement that it must be located on the prolonged center line of the runway. Hence, the missed approach point is ambiguous for an aircraft approaching under ILS (Instrument Landing System).

In addition to the above, the main approach direction based on the wind coverage is considered as the west side of BIA, contrary to the existing usage of east direction for such approaches.

1.4 Basic Policy on Development of BIA

1.4.1 Purpose and Policy of Planning

The establishment of a Development Plan for Bali International Airport Improvement and Expansion, aims at constructing a safe and pleasant user-oriented airport facility functional and attractive enough to be the main eastern gateway for Indonesia, providing safe operation of aircraft and the efficient utilization of the airport facilities. It is also designed to provide for expanding the scale of the facilities to meet the growing demand in Indonesia for air transportation.

To achieve this goal, the proposal for the Development Plan is outlined as follows:

- (1) The location and the structure of the runway, the runway strip, the taxiway and the apron, the plan must be made to satisfy ICAO standards established for providing safe operation of aircraft and to achieve operational efficiency.
- (2) The runway, should be constructed with sufficient length so as not to over restrict the weight limitation for wide-bodied aircraft take-offs.
- (3) Based on the role of BIA as an international airport and the meteorological conditions surrounding the airport, it is planned to equip the runway with CAT-I specifications for precision landings.
- (4) The terminal facilities including the apron and the passenger and cargo terminal buildings, are to be planned to provide adequate scale of facilities based on an assessment

of the air transportation demand for each target year. The facilities will be effectively laid out to offer advantages to users.

- (5) Much consideration has been given in utilization of the existing facilities so that they will also be useful in the future and will attain economical efficiency.
- (6) To prepare for the future expansion of the facilities, a certain flexibility must be maintained in the plan.

1.4.2 Target Year

The target year is set for the year 2010, considering the limited accuracy of the forecast and the life-span for a project of this kind. The period of time up to the target year is divided into three phases: the Short Term Plan targetting the year 1990 (taking into account the planned years for Repelita into account, the Development Plan for which is compiled and will be implemented), the Middle Term Plan targetting the year 2000, and the Long Term Plan targetting the year 2010. All these phases will consider the necessary improvements which may arise in the Short Term, in the Middle Term and in the Long Term.

As mentioned earlier, since Bali International Airport currently has various problems including the limited length of the runway, insufficient of the runway strip to qualify under ICAO standards, and the limited capacity of the terminal buildings, the Short Term Plan targetting the year 1990 focuses on the solution of these immediate problems.

1.5 Conclusions of Feasibility Study

It is the conclusion of this comprehensive feasibility study that the existing Bali International Airport should be urgently developed in accordance with ICAO Standards. The Short Term Plan should be completed within the fiscal year 1985.

The major reasons leading to this conclusion are as follows:

- The construction of improvement and development works of the Bali International Airport for the target year 2010 is economically feasible based on the high project internal rate of return (IRR) of 20.8 percent.
- The improvement and development of Bali International Airport as the transferring node and base airport in the national airway system is indispensable to eastern regional development and the unity of Indonesia.
- The airport facilities required to serve the air traffic demand of targeted year 2010 can be developed within the existing premises of the Bali International Airport.

1.6 Study Method and Reporting System

This study was commenced in December 1981, and the Interim and Draft Final Report was prepared for the two and half months period including one and half months for Field Work in Indonesia. The Field Work was conducted in close cooperation with Indonesian Counterparts to have data collection and to interview various related organizations.

Based on the DGAC comments on the Interim and Draft Final Report submitted in March and April, 1982, this Final Report was prepared in June, 1982.

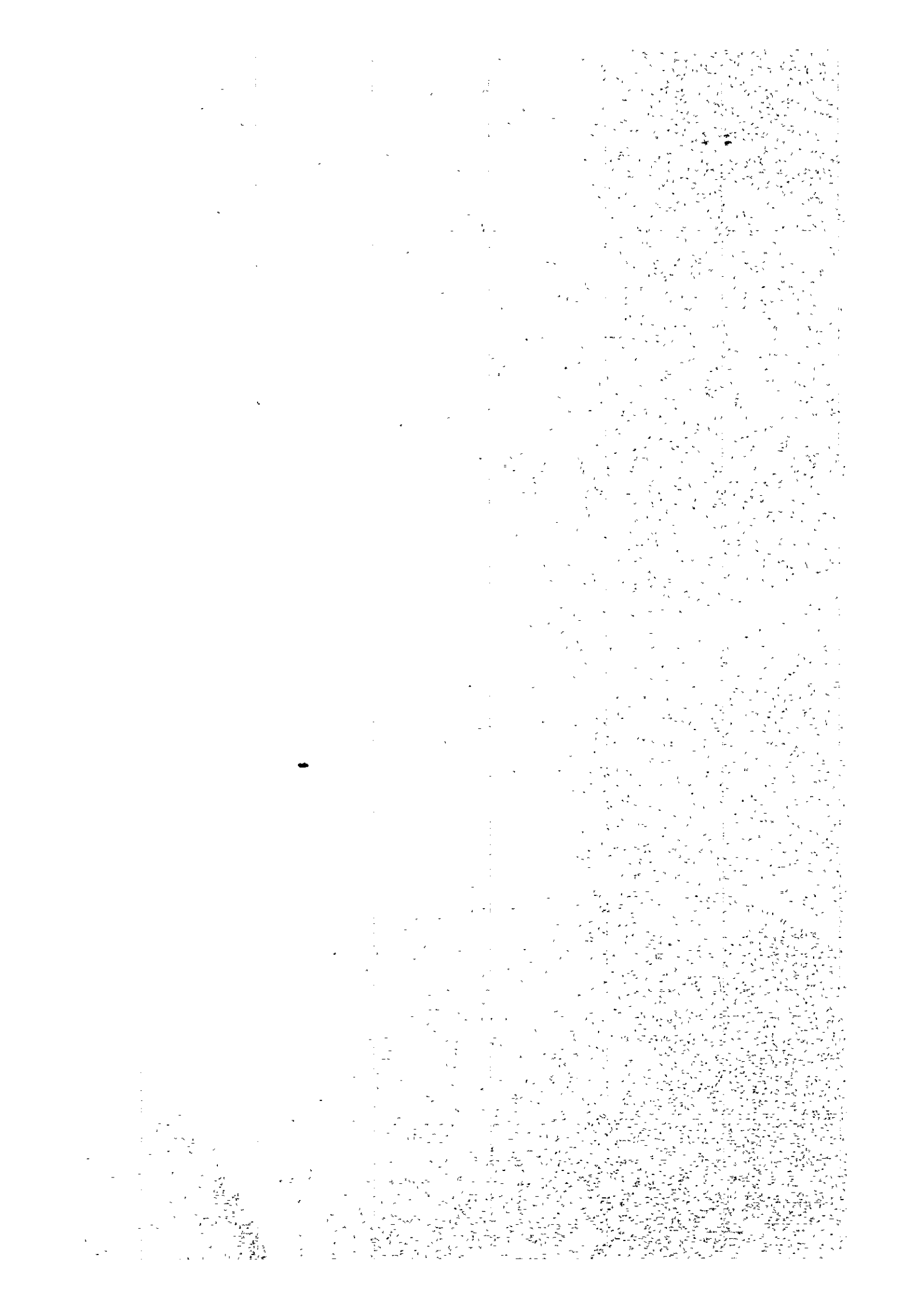
The Final Report consists of three volumes as follows:

- Summary
- Final Report (Main Report)
- Appendixes

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CHAPTER 2
BASIC ASSUMPTIONS



CHAPTER 2 BASIC ASSUMPTIONS

2.1 Air Transport Demand Forecast

The total traffic volume and its breakdown at BIA were forecast for 5 year intervals upto 2010.

2.1.1 Annual Traffic Forecast

For the forecast of the total traffic volume at BIA, various factors were taken into consideration. First of all, the air traffic volume for all Indonesia was forecast for the same base period. It was done by assessing the future air traffic growth based on past trends, economic calculations, international comparisons, and qualitative analysis of future economic development.

Second, the traffic at BIA was forecast within the overall framework of the national traffic forecasts. Many factors were taken into consideration such as past trends, the relationship with national economic and air traffic growth, and the regional development prospects.

The annual air traffic volume at BIA is forecast as shown in Table 2.1 and Figs. 2.1 and 2.2 based on the said analyses.

Table 2.1 Air Transport Demand Forecast

Traffic		Year	1985	1990	1995	2000	2005	2010
Passenger (1,000)	Int'l		343	574	886	1,261	1,727	2,200
	Dom		1,233	2,021	2,833	3,962	4,960	5,960
	Total		1,576	2,595	3,724	5,223	6,687	8,160
Cargo (ton)	Int'l		1,412	2,214	3,015	3,812	4,606	5,400
	Dom		4,043	7,125	11,475	18,480	28,430	43,740
	Total		5,455	9,339	14,490	22,292	33,036	49,140

Note: Mixed-flights between JKT and DPS is included in DOM.

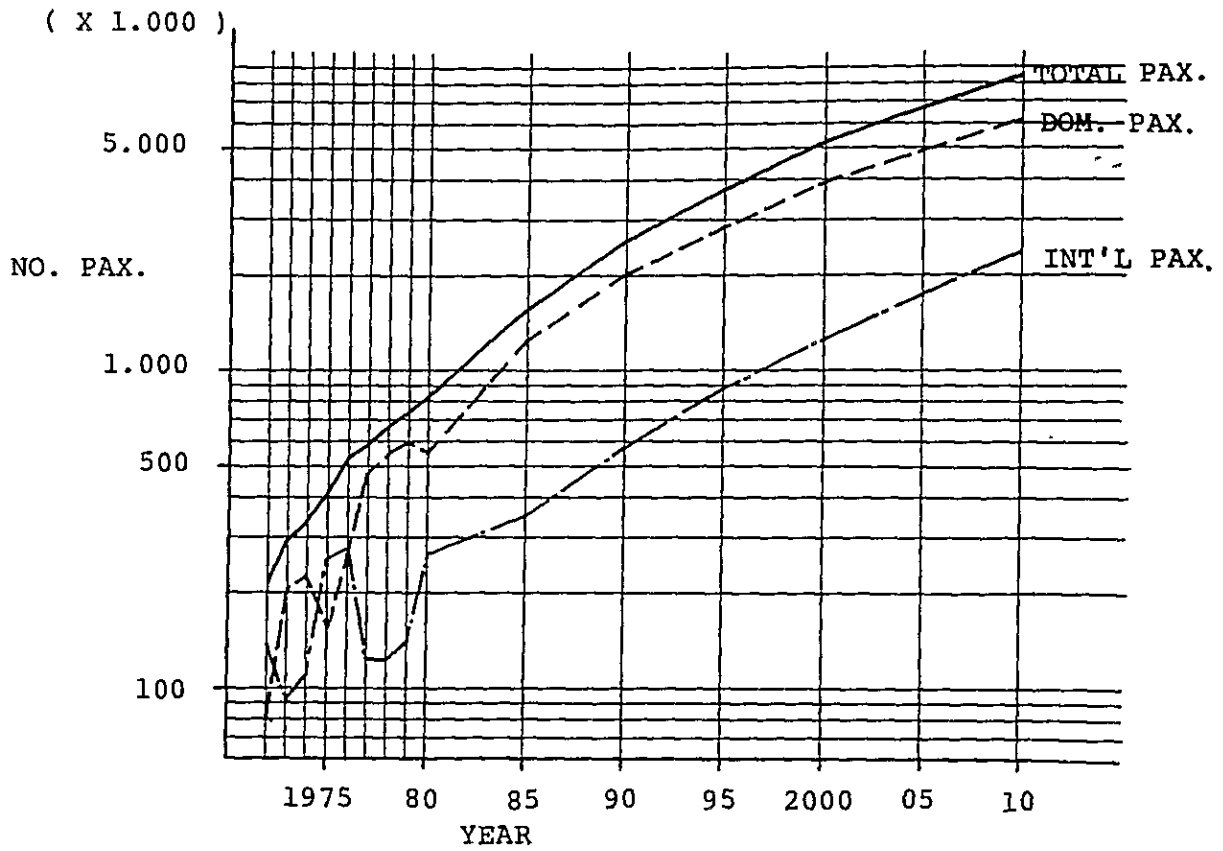


Fig. 2.1 ACTUAL AND FORECAST PAX. VOLUME

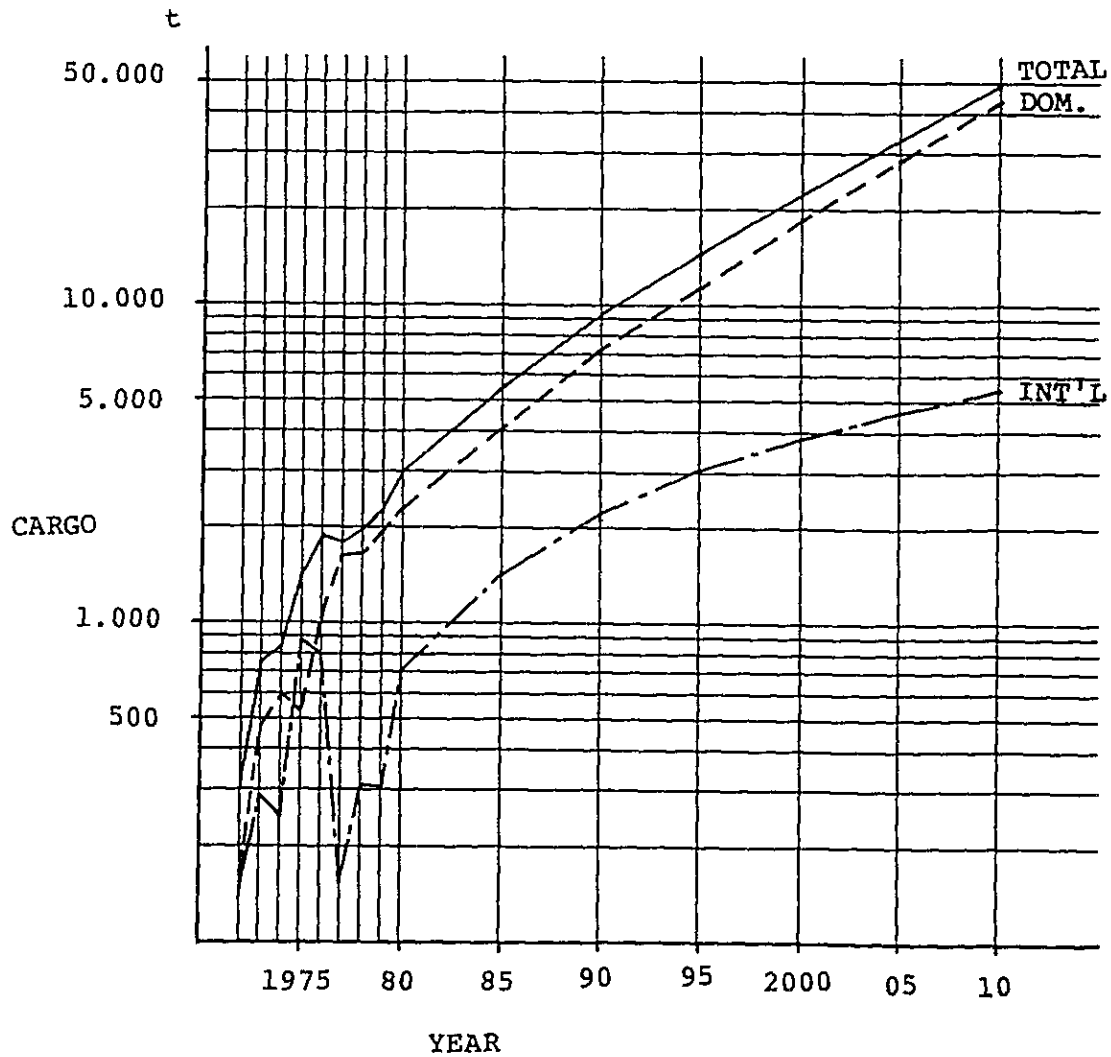


Fig. 2.2 ACTUAL AND FORECAST CARGO VOLUME

2.1.2 Air Traffic Breakdown for the Design Bases

The target annual traffic volumes for the above mentioned years until the year 2010, were broken-down into the various traffic demands for shorter time periods such as daily and hourly traffic. These are summarized in Table 2.2. In this study, peak hour traffic demands for an average day of the peak month of the year, were calculated by analysing the local traffic characteristics, and were used for airport facility requirements.

Table 2.2 SUMMARY OF AIR TRAFFIC DEMAND

YEAR	ITEM	PASSENGER			CARGO (Ton)	AIRCRAFT MOVEMENT						
		DOM	INTL	TOTAL		J	WB	NMJ	MJ/SJ	SP	STOL	TOTAL
1985	Annual	1,233,000	343,000	1,576,000	5,500	2,293	3,573		7,184	1,805	7,232	22,077
	Peak Month	127,000	37,700	164,000	570	248	372		744	248	744	2,356
	Design Day	4,100	1,220	5,320	18	8.0	12.0		24.0	8.0	24.0	76.0
	Peak Hour	570	270	840		1.6	1.8		3.5	1.1	3.4	11.4
	Heavy Direction Peak Hour	320	150	470		0.9	1.0		1.9	0.6	1.9	6.3
1990	Annual	2,021,000	574,000	2,595,000	9,300	3,497	4,175		12,000	1,204	4,213	25,089
	Peak Month	208,200	63,100	271,300	960	372	434		1,240	124	434	2,604
	Design Day	6,720	2,040	8,760	31	12.0	14.0		40.0	4.0	14.0	84.0
	Peak Hour	940	450	1,390		2.2	2.1		5.8	0.6	2.0	12.7
	Heavy Direction Peak Hour	520	250	770		1.2	1.2		3.2	0.3	1.1	7.0
1995	Annual	2,838,000	886,000	3,724,000	14,500	5,432	3,608	1,240	11,130	620	3,720	25,750
	Peak Month	283,000	93,000	376,800	1,450	558	372	124	1,116	62	372	2,604
	Design Day	9,160	3,000	12,160	47	18.0	12.0	4.0	36.0	2.0	12.0	84.0
	Peak Hour	1,280	600	1,880		3.1	1.7	0.6	5.2	0.6	2.0	13.2
	Heavy Direction Peak Hour	700	330	1,030		1.7	0.9	0.3	2.9	0.3	1.1	7.2
2000	Annual	3,962,000	1,261,000	5,223,000	22,300	9,684	4,960	1,240	9,890	1,860	3,100	30,734
	Peak Month	396,200	132,400	528,600	2,230	992	496	124	992	186	310	3,100
	Design Day	12,780	4,270	17,050	72	32.0	16.0	4.0	32.0	6.0	10.0	100.0
	Peak Hour	1,660	640	2,300		4.5	2.1	0.5	4.2	0.8	1.3	13.4
	Heavy Direction Peak Hour	910	350	1,260		2.5	1.1	0.3	2.3	0.4	0.7	7.3
2005	Annual	4,960,000	1,727,000	6,687,000	33,000	12,725	7,830	5,873	4,535	653	3,915	35,531
	Peak Month	471,000	172,700	643,900	3,140	1,240	744	558	434	62	372	3,410
	Design Day	15,200	5,570	20,770	101	40.0	24.0	18.0	14.0	2.0	12.0	110.0
	Peak Hour	1,980	780	2,760		5.4	3.1	2.3	1.6	0.3	1.6	14.3
	Heavy Direction Peak Hour	1,090	430	1,520		3.0	1.7	1.3	0.9	0.1	0.9	7.9
2010	Annual	6,145,000	2,320,000	8,465,000	49,100	16,510	9,788	8,450	3,263	1,305	3,263	42,579
	Peak Month	583,800	232,000	815,800	4,660	1,612	930	806	310	124	310	4,092
	Design Day	18,800	7,480	26,280	150	52.0	30.0	26.0	10.0	4.0	10.0	132.0
	Peak Hour	2,450	970	3,420		7.8	3.9	3.4	1.3	0.5	1.3	18.2
	Heavy Direction Peak Hour	1,350	540	1,890		3.7	2.1	1.9	0.7	0.3	0.7	9.4

Note: Mixed-flight between JKT-DPS is included in "DOM."

2.2 Airport Facility Requirements

On the basis of the future demand, facility requirements were planned in key project years in accordance with ICAO, FAA, JCAB and other practical standards for installation, units etc. to meet optimum development plan of BIA.

In addition, the amendment of ICAO ANNEX 14 which is to be effective in 1983 was used for the development plan. Facility requirements and their dimensions for BIA development plan until 2010 are summarized in Table 2.3.

Table 2.3 FORECAST OF AIRPORT FACILITY REQUIREMENTS

Facility	Present Condition as of 1981	1990	2000	2010	Evaluation
RUNWAY	2,700 ^m x45 ^m	3,000 ^m x45 ^m	3,000 ^m x45 ^m	3,000 ^m x45 ^m	The length of 3000m is required for DC-10 and B-747 type aircrafts to take-off without weight restriction on the longest non-stop routes.
RUNWAY STRIP	200 ^m x2,900 ^m	300 ^m x3,120 ^m	300 ^m x3,120 ^m	300 ^m x3,120 ^m	In line with ICAO precision landing standards the present width of 200m must be expanded to 300m.
TAXIWAY	P.T/W 1,750 ^m x30 ^m	P.T/W 2,050 ^m x23 ^m	P.T/W (3,000 ^m x23 ^m)		In line with ICAO precision landing standards, it is necessary to expand the distance between R/W center line and pavement edge from the existing 125m to 180m.
APRON	DOM 2:DC-9 7:F-28 6:SP/STOL INT'L 1:B-747 2:DC-10	DOM 2:B-747 1:DC-10 8:DC-9 1:SP 3:STOL INT'L 1:B-747 1:DC-10	DOM 3:B-747 2:DC-10 9:DC-9 5:SP INT'L 3:B-747	DOM 3:B-747 5:DC-10 2:DC-9 2:SP INT'L 4:B-747	The area must be expanded because of the currently insufficient clearances and the future increase of aircraft movement.
DOMESTIC PASSENGER TERMINAL B.L.D.G	3,350	13,200	24,700	38,000	The renovation is necessary to convert the present facility into the terminal exclusively for departing passenger in the short-term plan. It will be replaced by new terminal in the mid-term plan.
INTERNATIONAL PASSENGER TERMINAL B.L.D.G	6,070	18,400	25,400	35,000	The terminal expansion is necessary in short-term plan to be able to offer normal level of passenger services.
CARGO TERMINAL B.L.D.G	1,800	2,800	4,400	7,500	The building is so obsolete that it must be replaced by a new terminal
ADMINISTRATION B.L.D.G	2,300	3,530	3,530	3,530	The control tower and the administrative BLDG are co-housed in the existing domestic passenger terminal. A new administrative building will be required in the mid-term plan due to anticipated congestion.
NAVIGATION AIDS		DME G/P M/M	-	ADD ILS at 09	The existing facilities are sufficient to meet the long-term plan requirements.
CAR PARKING	180	325	540	800	Within a few years expansion will be required.
ACCESS ROAD	2 lanes	1 lane	1 lane	1 lane	The existing four-lane two-way road is sufficient for the demand in the long-term plan.

CHAPTER 3
DEVELOPMENT PLAN OF BIA



CHAPTER 3 DEVELOPMENT PLAN OF BIA

3.1 General

On the basis of the scale of the required facilities and on the evaluation made of the existing facilities, the development plan for improvement of Bali International Airport targetting the final completion in 2010 was compiled.

The implementation plan is outlined in three phases; e.g. the Short Term Plan aimed at the year 1990, the Middle Term Plan for the year 2000 and the Long Term Plan targetting the year 2010, assessing the urgent needs, the demand trends and other factors. Airport Development Plans and Terminal Development Plans for targetting the year 1990, 2000 and 2010 are shown in Figs. 3.2 - 3.5.

The following Table 3.1 summarizes the planned improvement flows.

3.2 Airside Infrastructure

(1) Runway

It is confirmed that the direction and location of the existing runway 2700 m long can be used in the future.

In the Short Term Plan however, the extension of 300 m long to the east side is planned based on geographic conditions and release of take-off weight restrictions. Overlay for the increase of ICAO Class II is also planned.

(2) Runway Strip

Temples (Pura) as obstructions to the runway strip area will be relocated and the runway

Table 3.1 SUMMARY OF DEVELOPMENT PLAN

Target Year Facility	Required Scheme of Facility at 2010	Existing Facility can Utilize in Future	Development Plan		
			Short-Term (1990)	Mid-Term (2000)	Long-Term (2010)
Runway	3,000m x 45m	2,700m x 45m (90%)	Extension: 300m	-	-
Runway Strip	3,120m x 300m	2,900m x 200m (62%)	Extension: 300m Widening : 100m	-	-
Taxiway	3,000m	-	New Construction: 2,050m	Extension: 950m	-
Apron	132,000m ²	62,000m ² (47%)	Expansion: 44,000m ²	Expansion: 26,000m ² (Improvement: 35,000m ²)	
International Terminal Building	35,000m ²	6,000m ² (17%)	Construction: New Dept. Bld., Renova- tion & Expansion: Total 12,500m ²	Expansion: 7,000m ²	Expansion: 10,500m ²
Domestic Terminal Building	38,000m ²	3,300m ² (9%)	Renovation and Expansion: 10,000m ²	New Construction: 2 15,000m ²	Expansion: 13,000m ²
Cargo Terminal Building	7,500m ²	-	New Construction: 2 2,800m ²	Expansion: 1,500m ²	Expansion: 3,500m ²
Administration Building	3,500m ²	2,300m ² (by 1990)	Construction of Control Tower	New Construction: 2 3,500m ²	-
Air Navigation Aids	CAT-1 ILS VOR/DME	ILZ, G/P VOR	Installation: M/M RELOCATION : G/P COLOCATION : DME	-	Installation: ILS at 09 side
Airfield Lighting			Ancillary Works related R/W and T/W	Ancillary Works related T/W	
Access Road	One side One lane	One side Two lanes	-	-	-
Car Parking	800 lots	-	Construction: 350 lots	Expansion: 200 lots	Expansion: 250 lots

gradation and sodding works will also be carried out so that the runway strip is planned to be developed from 200 m to 300 m in width in the Short Term Plan in order to meet CAT-I ILS approach.

(3) Taxiway

Parallel taxiway is planned to expand from 125 m to 180 m in the distance between the center line of the runway and parallel taxiway in the Short Term Plan.

In the Short Term Plan, a new parallel taxiway is a 1,700 m long due to time consideration to solve the relocation of a cemetery located the east side of the BIA and economical consideration to execute about 5 ha of sea embankment in the west side of the BIA.

In the Middle Term Plan, a complete parallel taxiway will be carried out.

(4) Apron

It is planned to develop the apron both west and east extensions in the key project years taking into account effective use of apron and in harmony with utilization of other terminal facilities.

3.3 Terminal Facilities

(1) Alternative Terminal Area Plan

The Southern Terminal Area (South site) located near the ponds to the south of the BIA has been studied as an alternative to the existing terminal area (North site).

As a result of comparison study between the South site and the North site in the Short Term Plan, the South site was found to be

deficient in terms of maximum utilization of existing facilities, relocation of facilities, higher construction cost (about 2 times than the North site) and less economic and financial analyses.

It is therefore, recommended that the North site be adopted as the existing terminal area area to be developed.

(2) Terminal Concept and Layout

A linear terminal concept was selected for the development plan of BIA as the most suitable concept base on 7.8 million passengers annually expected in the year 2010. The one and a half processing level concept is also adopted taking into consideration the number of passenger forecast and the world-wide tendency of services to passengers.

Terminal Layout is determined as Plan B in the 1990 and Plan B-1 in the 2000 and 2010 based on effective use of the existing facilities and the airport land such as land area and shape as well as airport operational and functional viewpoints. The Terminal Layout Concept is shown in Fig. 3.1.

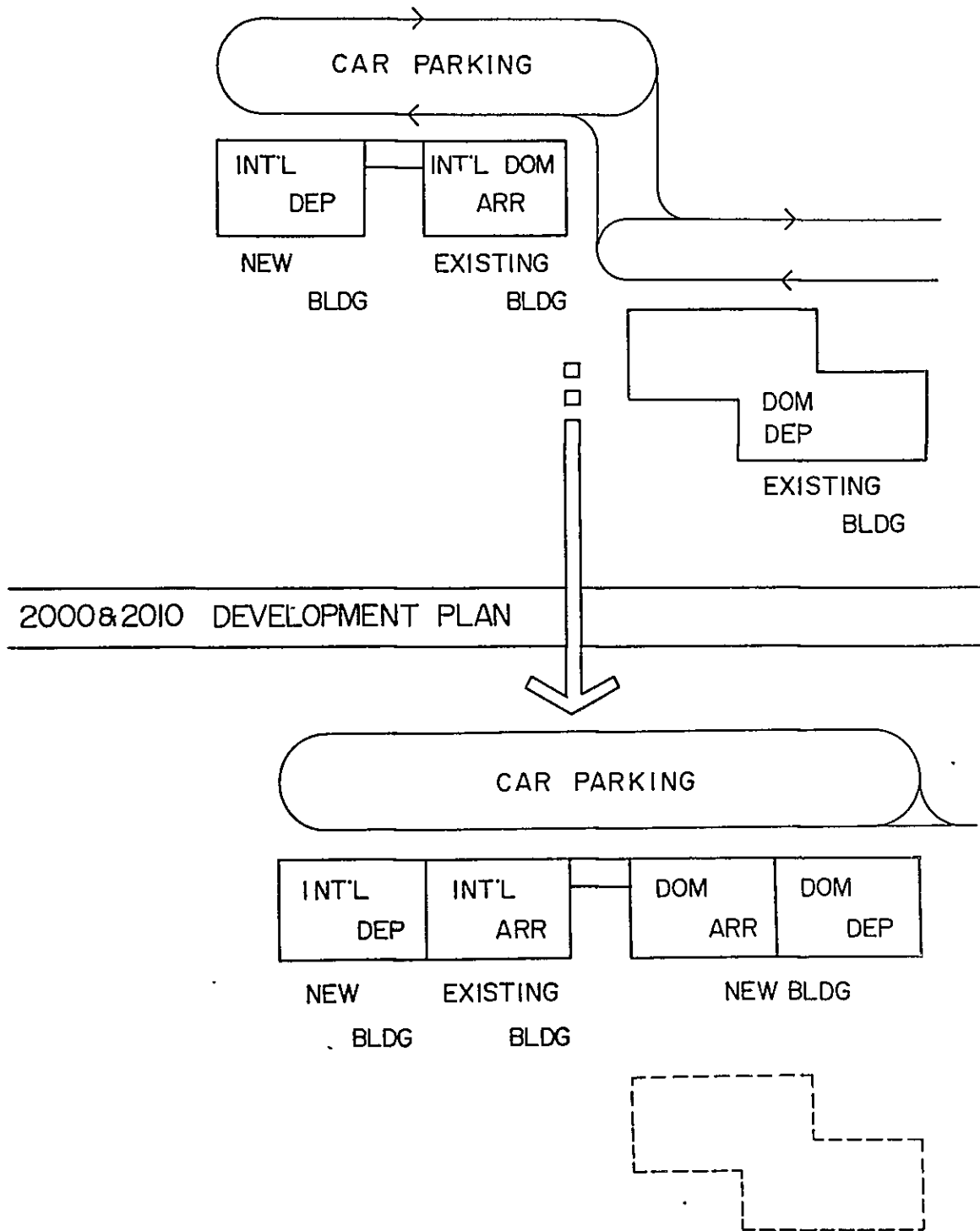
(3) International Passenger Terminal Building

As the result of study of the existing International Passenger Terminal Building, it was found that it cannot be expanded on the 2nd floor because of the design of the existing building. Therefore, the existing building is planned to accommodate both international and domestic arrival passenger functions. Moreover, mixed flights are expected to continue operating in the future.

A new International Passenger Terminal

Fig. 3.1 TERMINAL LAYOUT CONCEPT

1990 DEVELOPMENT PLAN



Building is planned to be constructed to the west of the existing building.

In the Middle and the Long Term Plan, the International Passenger Building is planned to be expanded.

International Pax. Terminal Building "Departure" and International and Domestic Pax. Terminal Building "Arrival" Plan is shown in Fig.3.6 and perspective drawing of the building for the Short Term Plan : the year 1990 is shown in this chapter.

(4) Domestic Passenger Terminal Building

For the reasons stated in item (3) above, the existing Domestic Passenger Terminal Building is planned to be utilized solely as domestic departure building in the Short Term Plan .

However, in the Middle Term Plan a new Domestic Passenger Terminal Building is planned to be constructed in east of the International Passenger Terminal Building because the existing building will be required to be relocated due to the expansion of the apron in the Middle Term Plan .

In the Long Term Plan the Domestic Passenger Building is also planned to be expanded based on future domestic passenger volumes.

(5) Cargo Terminal Building

The existing Cargo Terminal Building was built about 30 years ago and is now in superannuated condition. A new Cargo Terminal Building is planned to be constructed in the Short Term Plan. In the Middle and the Long Term Plan the Cargo Terminal Building is planned to be expanded based on future cargo volumes.