REPUBLIC OF INDONESIA

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

PART II VOL. 2

FEASIBILITY STUDY FOR SURAKARTA AIRPORT DEVELOPMENT PROJECT

NOVEMBER 1986

JAPAN INTERNATIONAL COOPERATION AGENCY

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PREFACE

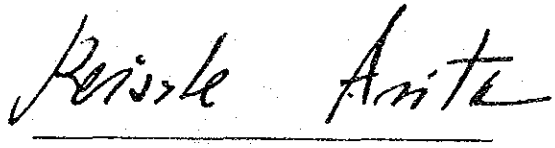
In response to the request of the Government of the Republic of Indonesia, the Japanese Government has decided to conduct feasibility studies on the Development of Airports in Central Java and Yogyakarta, and entrusted the studies to the Japan International Cooperation Agency. J.I.C.A. sent to Indonesia 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.

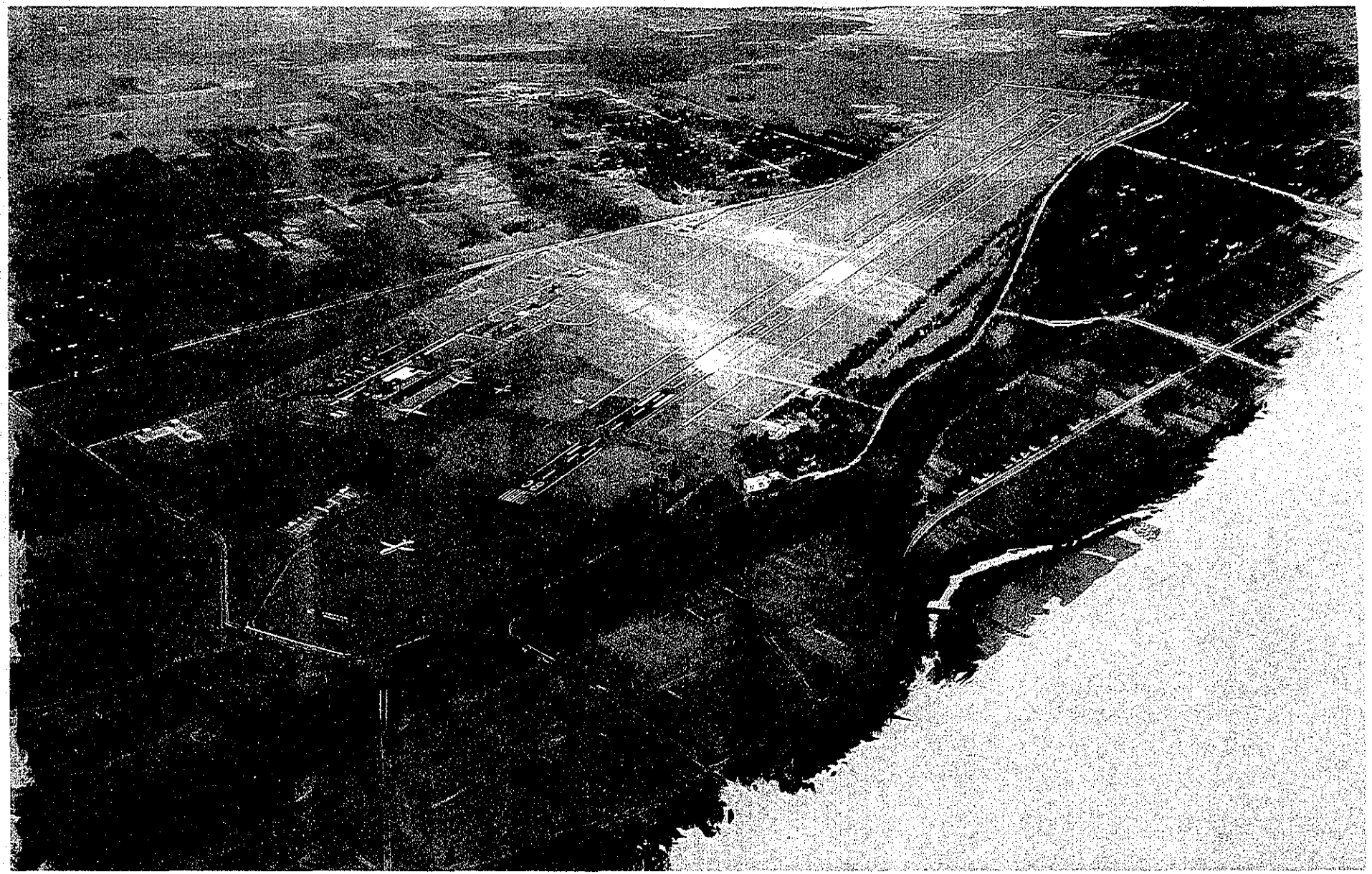
I wish to express my deep appreciation to the officials concerned of the Government of the Republic of Indonesia for their close cooperation extended to the team.

November, 1986

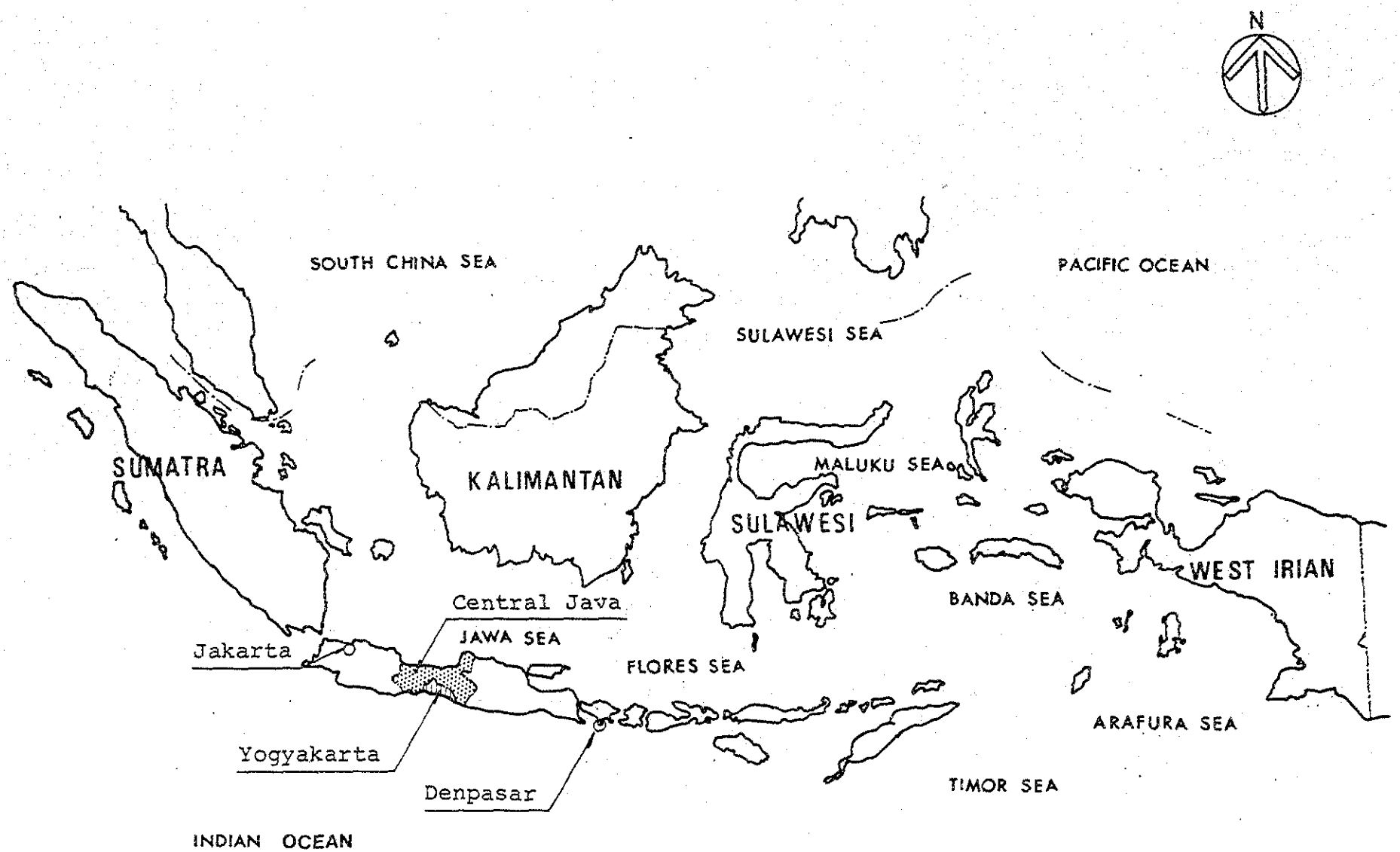


Keisuke Arita
President

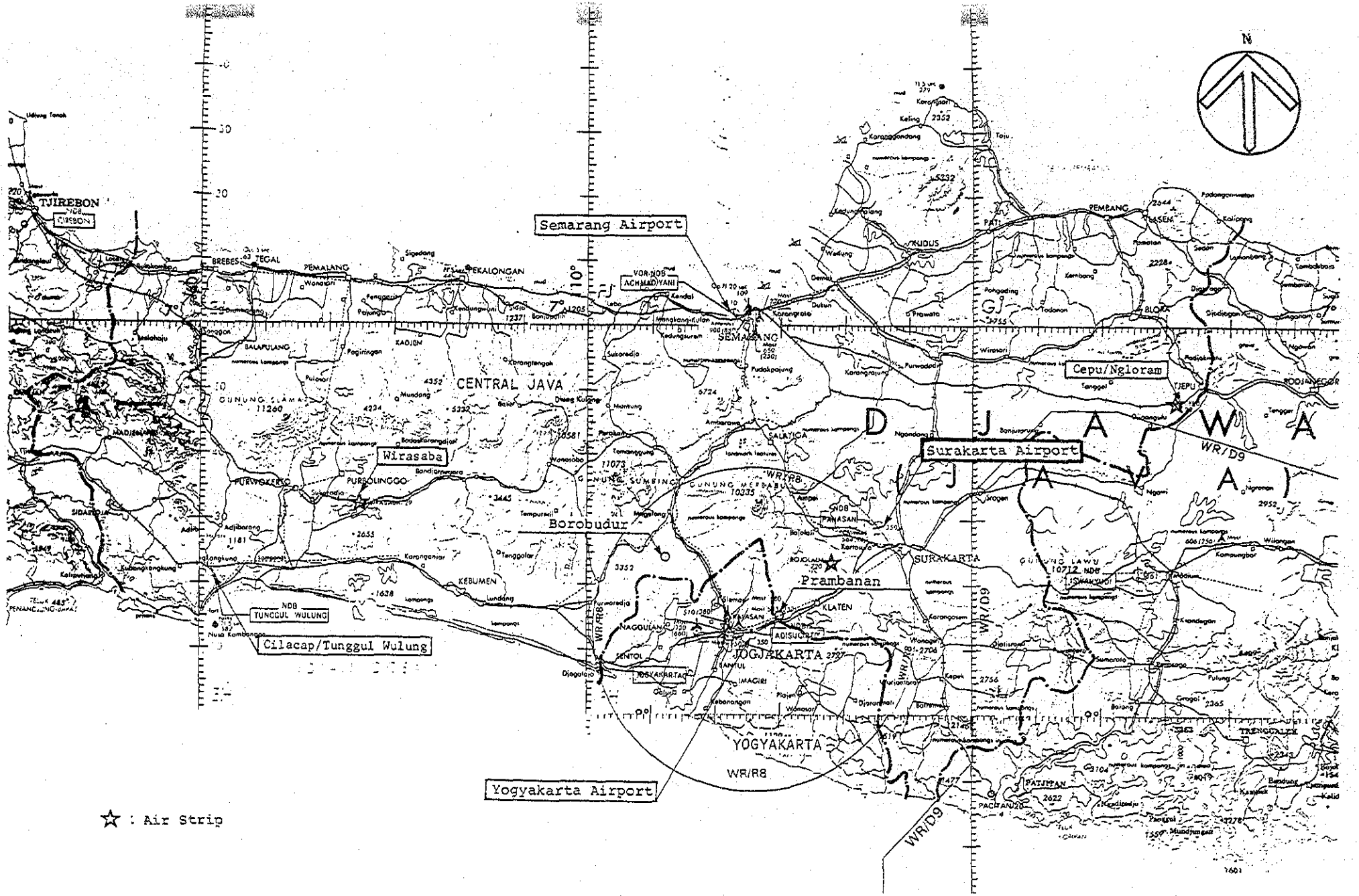
Japan International Cooperation Agency



SURAKARTA AIRPORT REDEVELOPMENT PLAN



PROJECT LOCATION MAP - 1



PROJECT LOCATION MAP - 2

0 10 50 km

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SURAKARTA AIRPORT DEVELOPMENT PROJECT

CHAPTER 1 GENERAL

CHAPTER 1 GENERAL

1.1 General

In Part II, the results of the Feasibility Study of the Surakarta airport Development Project are described.

The long-term development plan for the Surakarta airport, which will be performed by expansion and extension of the existing airport facilities, has been established based on the conclusions of Part I, "Formation of the Airport Development Concept".

The process of the studies and discussions concerning airport development concepts have been stated in Part I.

The airport master plan is based on the following demand forecasts, which have been explained in detail in Part I.

Table 1.1.1 Summary of Demand Forecast

	Actual Record as of 1984	2000	2010
Passengers (x 1,000)	98	408	776
Cargo (ton)	409	2,570	4,850

The largest aircraft anticipated will be the MD-82/A320 class with 150 seats in the year 2000 and the new medium jet aircraft of the B-767/A310 class in 2010; accordingly, the runway will be 2,150 m long so as to provide a more precision approach runway of the Category-1 type.

The location of the Surakarta airport is shown in Fig. 1.1.1.

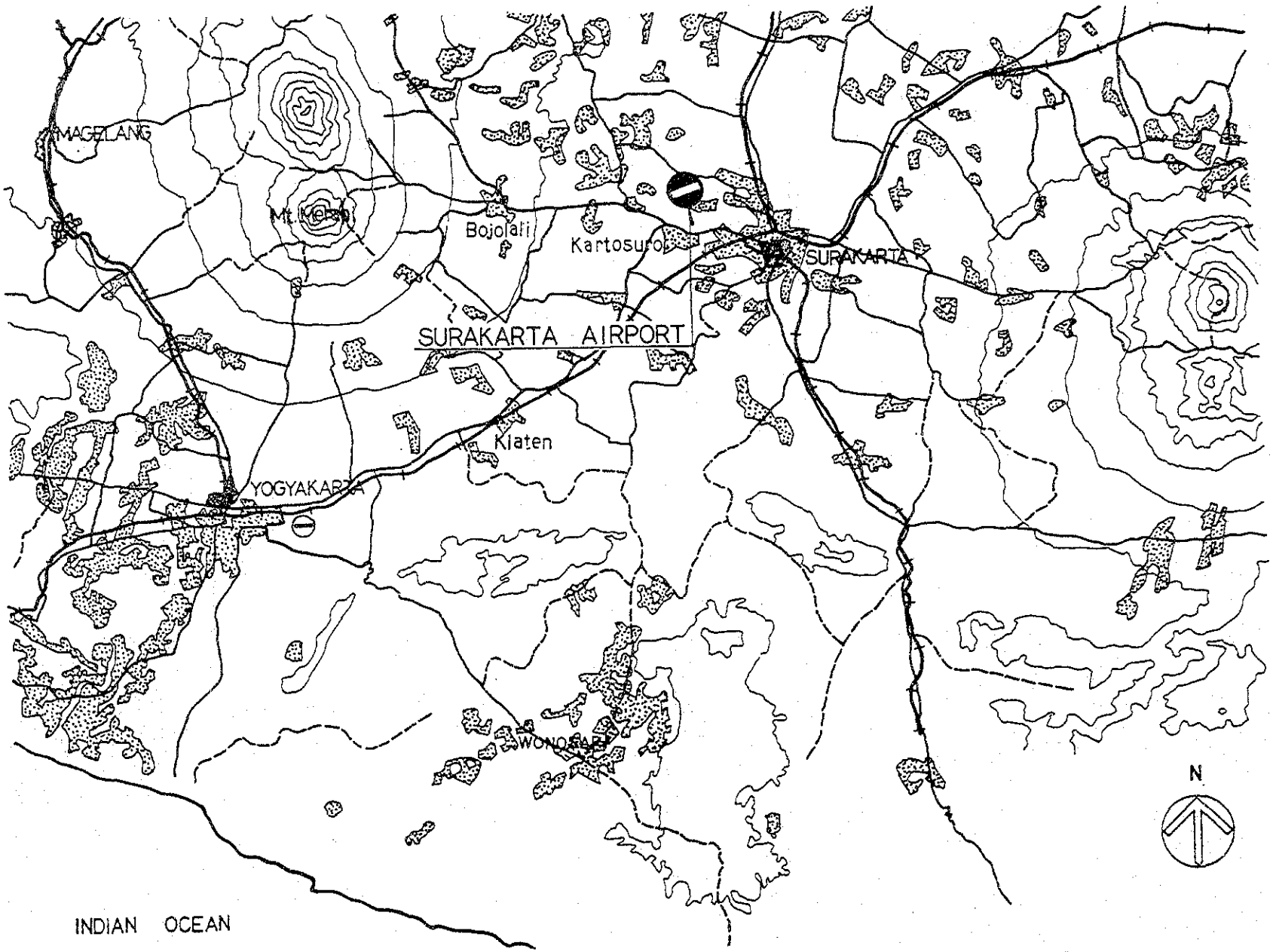

Fig. 1.1.1 Location of Surakarta Airport

1.2 Phases of Airport Development

The final target year is to be the year 2010.

It is proper that the airport development will be implemented in two phases, taking into consideration the general situations of project implementation and successive improvement in Indonesia.

a) Phase I Project

Indonesian Government has performed such expansion and extension work on the Surakarta airport as the extension of the existing runway, construction of the new civil apron north of the runway, etc., and all of the passenger terminal facilities are intended to be removed north from now on.

On the basis of the above present situation of airport improvement, it is desiable that the existing facilities be utilized as it is without any expansion and rebuilding until completion of the new terminal.

On the other hand, in terms of the development concept, the existing airport facilities are estimated to reach its capacity limit as has already been studied in Part I.

Therefore, the Phase I Project is scheduled to be completed by the end of 1993. The target year of the Phase I Project is the year 2000, seven years after the completion.

b) Phase II Project

Phase II Project is to start in the year 2001 and the capacities of the relevant facilities will correspond to the air traffic demand for 10 years after completion of Phase II Project in the year 2010.

The Phase II plan is roughly described for the purpose of making clear the final target of this project.

CHAPTER 2 FACILITY REQUIREMENTS ANALYSIS

CHAPTER 2 FACILITY REQUIREMENTS ANALYSIS

2.1 Summary

This chapter discusses the airport facility requirements which are estimated based on the air traffic demand forecast in Part I and also in compliance with the relevant standards, recommended practices, and/or regulations of International Civil Aviation Organization (ICAO), Civil Aviation Bureau of Japan (JCAB) and Federal Aviation Administration of the United States (FAA).

The facility requirements are established for Phases I and II, respectively, and the results are summarized in Table 2.1.1.

Table 2.1.1 Air Traffic Demand and Facility Requirements

	Item \ Year		Present Conditions (as of 1984)	2000	2010
Air Traffic Demand	1. Annual Passengers		97,746	408,000	776,000
	2. Annual Cargo (ton)		409	2,570	4,850
	3. Annual Aircraft Movements		3,193	4,500	6,400
	4. Peak Hour Passengers		180*	510	810
	5. Peak Hour Aircraft Movements		2	3.1	3.7
	6. Largest Aircraft in Service		F28-4000	MD-82, A320	B-767, A310
Facility Requirements	7. Runway (m x m)		1,810 x 45	2,150 x 45	
	8. Runway Strip (m x m)		1,930 x 150	2,270 x 300	
	9. Taxiway		-	-	
	10. Passenger Terminal Apron		F28 : 4	MJ : 3 SJ : 1	NMJ : 4 SJ : 2
	11. Passenger Terminal Building (sq.m)		670	7,700	12,200
	12. Cargo Terminal Building (sq.m)		-	800	1,500
	13. Administration Building (sq.m)		50	1,200	1,600
	14. Car Parking (cars)		50	190	300
	15. Access Road (lane)		2	2	
	16. Air Navigation Systems		Instrument, Non-Precision	Precision Approach Category-I	
	17. Utilities Works	Electricity (KVA)		1,400	2,100
		Water (ton/day)		200	300
		Sewage (ton/day)		100	200
		Waste (kg/day)		700	1,100
	18. Rescue and Fire Fighting Services			Cat-7	
	19. Aviation Fuel Storage (kℓ)		-	540	660

* Estimated Figure

2.2 Airside Facilities

2.2.1 General

Airside facility requirements are summarized as follows. The methods for determination of facility size, etc., are the same as those used in Chapter 4 of Part I, and further studies are carried out in this section.

2.2.2 Runway and Runway Strip

(1) Aerodrome Reference Code

An aerodrome reference code - code number and code letter - is established in accordance with the runway length and the maximum aircraft anticipated based on Annex 14, Aerodromes, ICAO, as shown in Table 2.2.1.

Table 2.2.1 Aerodrome Reference Code

Items \ Phase	I (Year 2000)	II (Year 2010)
Code Number	4	4
Code Letter	C	D

(2) Runway Length and Width

The runway length was calculated for the longest route between Surakarta and Jakarta and for the maximum payloads of the critical aircraft anticipated. The results of the calculation are summarized in Table 2.2.2.

Table 2.2.2 Runway Length and Width

Items \ Phase	I	II
Runway Length (m)	2,150	2,150
Runway Width (m)	45	45
Shoulder Width (m)	7.5	7.5

(3) Runway Strip

The runway strip should be 2,270 m x 300 m in both Phases I and II to be in compliance with the ICAO standards based on the runway length of 2,150 m and precision approach Category-I.

(4) Obstacle Limitation Requirements

The operational category for the runway is established as precision approach Category-I. The dimensions and slopes of the obstacle limitation surfaces are the same as the study in Part I as shown in Figs. 2.2.1 and 2.2.2

2.2.3 Taxiway

A complete parallel taxiway is not required in light of the Airport Planning Manual, ICAO. The detailed study is indicated in APPENDIX II-2-3.

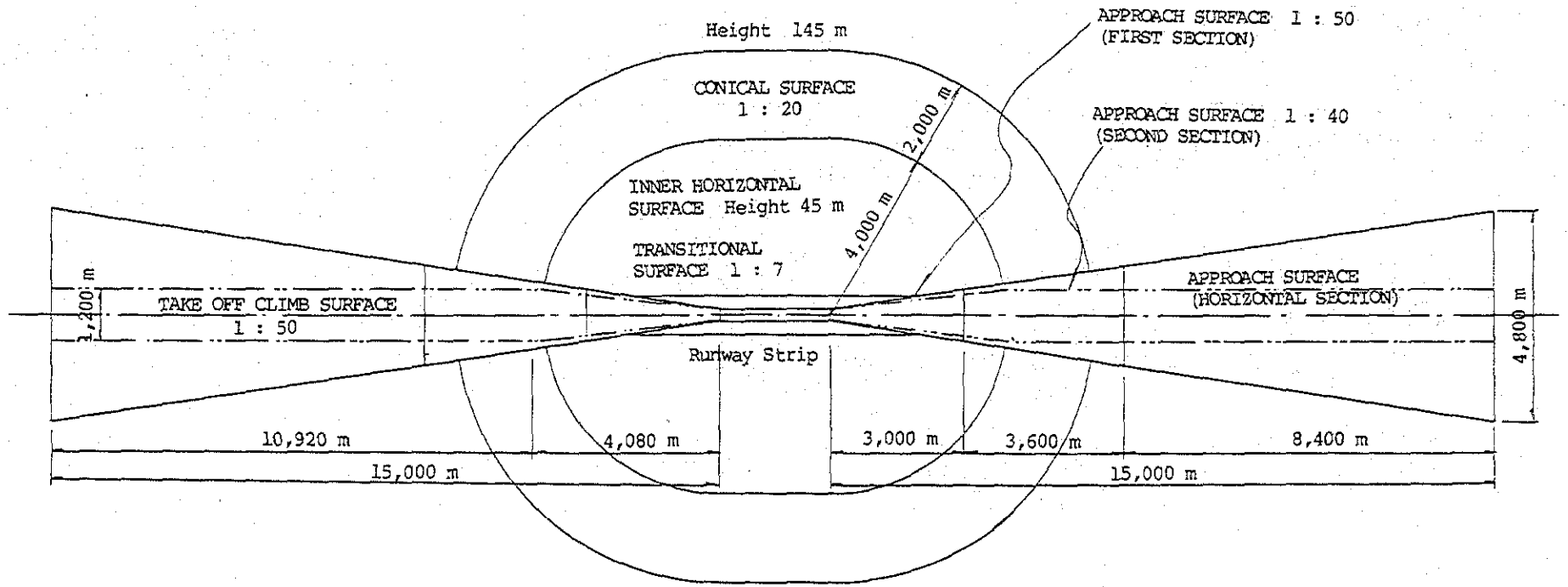

Fig. 2.2.1 Obstacle Limitation Surfaces (1)

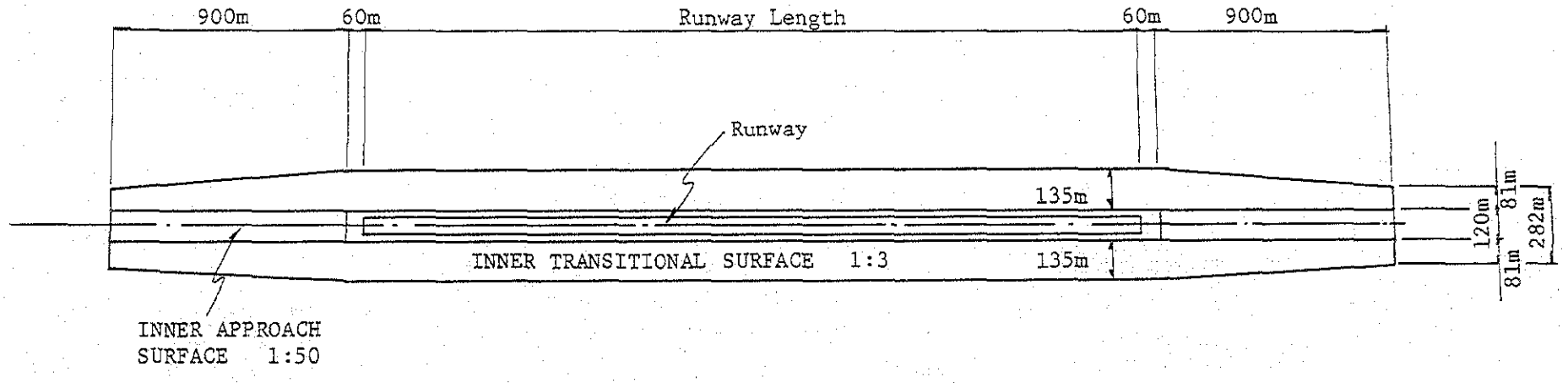

Fig. 2.2.2 Obstacle Limitation Surfaces (2)

2.2.4 Apron

The number of required aircraft stands for Phases I and II is summarized in Table 2.2.3. Calculation was made based on the following formula. Detail calculation is shown in Section 2.4, Part I.

$$S = \Sigma\left(\frac{Ti}{60} \times Ni\right) + a$$

where;

S : Required number of aircraft stands
Ti : Gate occupancy time of aircraft of Category (i) in minutes
Ni : Number of arriving aircraft of Category (i) during peak hour
a : One extra stand for the largest aircraft of the planning year for unexpected peak occasion. (1 extra for each 10 stands)

Table 2.2.3 Required Number of Aircraft Stands

Aircraft Category \ Phase	I	II
NMJ	-	4
MJ	3	-
SJ	1	2
Total	4	6

2.3 Landside Facilities

2.3.1 Passenger Terminal Building

The floor area required for the passenger terminal building is calculated by multiplying the number of hourly peak passengers by the unit floor area per peak hour passenger.

A unit floor area of 15 sq.m per peak hour passenger is adopted. Table 2.3.1 shows the required floor areas for Phases I and II.

Table 2.3.1 Floor Area Requirements for the Passenger Terminal Building

Items \ Phase	I	II
Peak Hour Passengers	510	810
Required Floor Area (m^2)	7,700	12,200

2.3.2 Cargo Terminal Building

The floor area for the cargo terminal building is calculated based on the annual cargo volume forecast established in Part I.

The unit floor area of 5 ton/sq.m is applied for calculation of the cargo handling area. The floor area of the cargo terminal building is usually required to be 1.5 times that of the cargo handling area in order to accommodate offices for airlines, cargo agents, etc.

Table 2.3.2 Floor Area Requirements for Cargo Terminal Building

Items \ Phase	I	II
Annual Cargo Volume (ton/year)	2,566	4,850
Cargo Handling Area (m^2)	510	970
Cargo Terminal Building (m^2)	800	1,500

2.3.3 Administration Building and Control Tower

An administration building with a control tower is required for airport administration, operations and maintenance, whichis planned as an independent building in order to enhance security.

The required floor area is calculated by multiplying the number of staff members by the unit floor area per staff member. The unit floor area of 6 sq.m per staff member is adopted on the basis of the Japanese standards. The requirements for Phases I and II are shown in Table 2.3.3.

Table 2.3.3 Floor Area Requirements for Administration Building

Phase	I	II
Floor Area (m^2)	1,200	1,600

The height of the control tower is set at 23 m based on the FAA standards.

2.3.4 Vehicle Parking

The required number of vehicle parking spaces is calculated by using the following formula.

$$V = P \times C$$

Where; V : Required number of parking spaces
P : Number of peak hour passengers
C : Number of vehicles per peak hour passengers

The number of parking spaces per peak hour passenger was estimated to be 0.4 vehicles based on the results of the site survey at the existing airport. Approximately 60 % of these parking vehicles will be allocated for private cars, 30 % for taxis, and 10 % for buses.

Table 2.3.4 shows the requirements for vehicle parking spaces.

Table 2.3.4 Parking Space Requirements

Items \ Phase		I	II
Number of Parking Spaces	Private car	150	240
	Bus	10	15
	Taxi	30	45
	Total	190	300

2.3.5 Access Road

The required number of lanes for the access road is calculated by the incoming and outgoing traffic from/to the terminal area. The generated vehicle traffic is established to be 0.5 vehicles per peak hour passenger taking into consideration the study at Yogyakarta Airport.

The maximum capacity of an access road is usually considered to be approx. 1,000 vehicles/hour for 1 lane (each direction).

Table 2.3.5 shows the required number of lanes for the access road.

Table 2.3.5 Required Number of Lanes

Items \ Phase	I	II
Peak Hour Passengers	510	810
Number of Vehicles General	205	405
Number of Lanes (each direction)	1	1

2.4 Air Navigation Systems

Air navigation systems include radio navigation aids, aeronautical telecommunications, air traffic control system, aeronautical ground lights and the meteorological system.

Air navigation systems should be designed to meet the operational requirements for precision approach Category-I, and also to be sufficient to handle the forecast aircraft movements in a safe and effective manner. The detailed study on each system and required equipment will be stated in Section 3.3.6, Air Navigation Systems.

2.5 Airport Utilities

The airport utilities requirements are calculated based on the unit demand established as shown in Table 2.5.1. Table 2.5.2 shows the demand for public utilities.

Table 2.5.1 Unit Demand

Utilities / Building	Electricity (VA/m^2)	Water ($t/m^2/day$)	Sewage ($t/m^2/day$)	Waste ($kg/m^2/day$)
Passenger Terminal Building	80	0.023	0.017	0.072
Cargo Terminal Building	60	0.003	0.002	0.144
Administration Building and Others	100	0.01	0.007	0.024

Table 2.5.2 Airport Utilities Demand

Items \ Phase	I	II
Electricity (kVA)	1,400	2,100
Water (t/day)	200	300
Sewage (t/day)	100	200
Waste (kg/day)	700	1,100

2.6 General Services

2.6.1 Rescue and Fire-Fighting Services

The facility requirements for the rescue and fire-fighting services are estimated and are in compliance with the Airport Service Manual, Part 1, ICAO.

The requirements are determined and tabulated in Table 2.6.1. The airport category is determined by the largest aircraft movements for the busiest consecutive three months of the year.

Table 2.6.1 Requirements for Rescue and Fire-Fighting Services

Items \ Phase	I	II
Airport Category	7	7
Extinguishing Agents		
- Water for Aqueous Film Forming Foam Production (L)	12,100	12,100
- Dry Chemical Powders (kg)	225	225
or		
- CO_2 (kg)	450	450
Vehicles		
- Rapid Intervention Vehicle	1	1
- Major Vehicle	2	2
- Ambulance	1	1
- Command Car	1	1

2.6.2 Aviation Fuel

The daily fuel consumption is calculated by multiplying the trip fuel including that for an alternate airport, by the number of departing aircraft. The required fuel storage capacity is estimated as shown below based on the condition that the airport is provided with one week storage capacity.

Table 2.6.2 Aviation Fuel Storage Requirement

Items \ Phase	I	II
Daily Fuel Consumption (KL)	59	76
7 days Storage Capacity (KL)	520	660
Fuel Tank	300 KL x 2	300 KL x 3