

ARAB REPUBLIC OF EGYPT

FEASIBILITY STUDY

FOR

NEW ALEXANDRIA INTERNATIONAL AIRPORT

CONSTRUCTION PROJECT

ARAB REPUBLIC OF EGYPT
FEASIBILITY STUDY FOR NEW ALEXANDRIA
INTERNATIONAL AIRPORT
CONSTRUCTION PROJECT
SUMMARY

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JULY 1985

JAPAN INTERNATIONAL COOPERATION AGENCY

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CONSTRUCTION PROJECT**

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JULY 1985

JAPAN INTERNATIONAL COOPERATION AGENCY

国際協力事業団	
受入 月日 '85.11.28	405
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PREFACE

In response to the request of the Government of Arab Republic of Egypt, the Government of Japan decided to conduct the Feasibility Study on the New Alexandria International Airport Construction Project, and entrusted the study to the Japan International Cooperation Agency (JICA).

The JICA sent to Egypt a study team headed by Mr. Makoto TANAKA, Pacific Consultants International in July 1984, under the guidance of the advisory committee chaired by Mr. Koichi MASE, Deputy Director of the Construction Division, Aerodrome Department, Civil Aviation Bureau, Ministry of Transport.

The team held discussions with the authorities concerned of the Government of Egypt on the project and conducted the field survey in the country. 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 authorities concerned of the Government of the Arab Republic of Egypt for their close cooperation extended to the team.

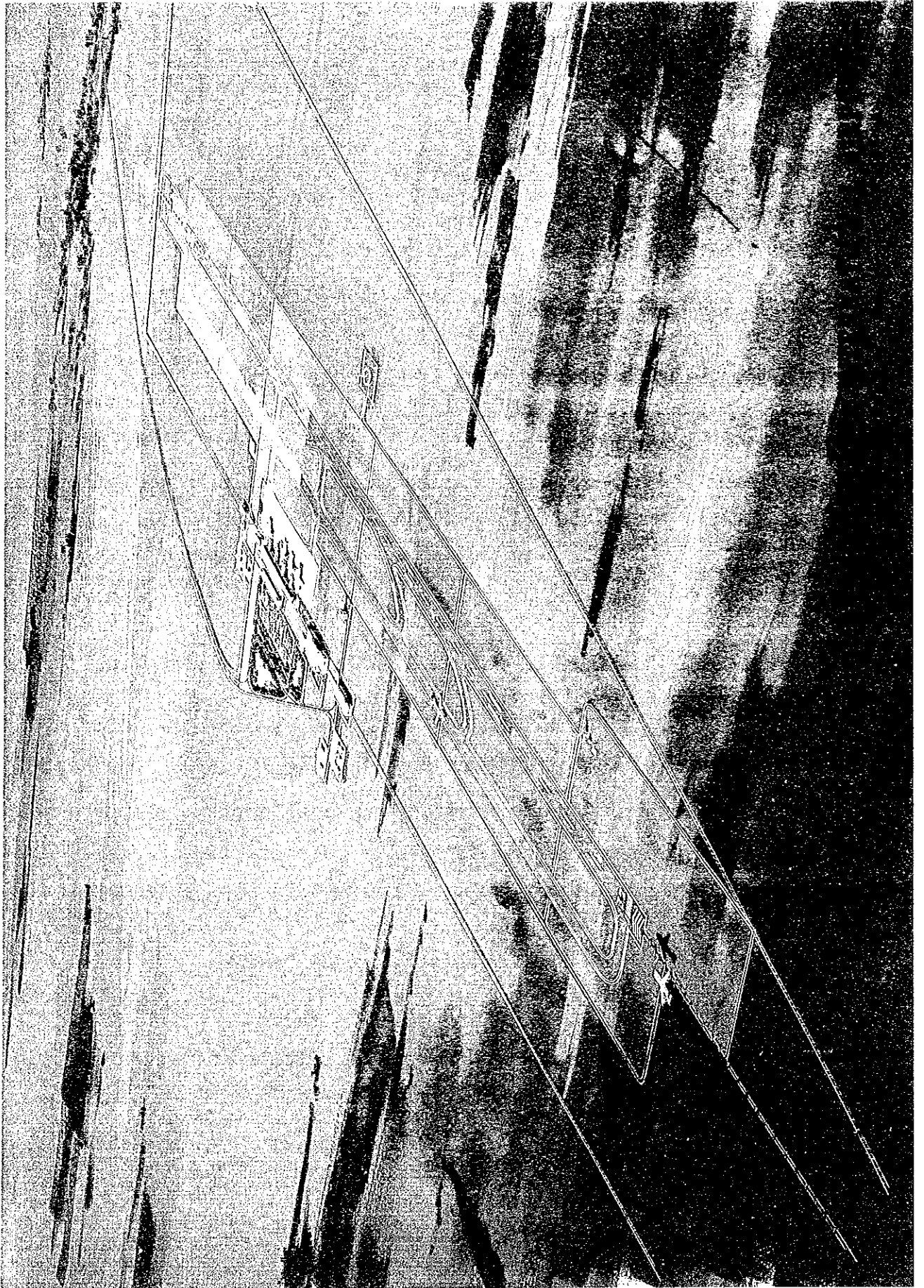
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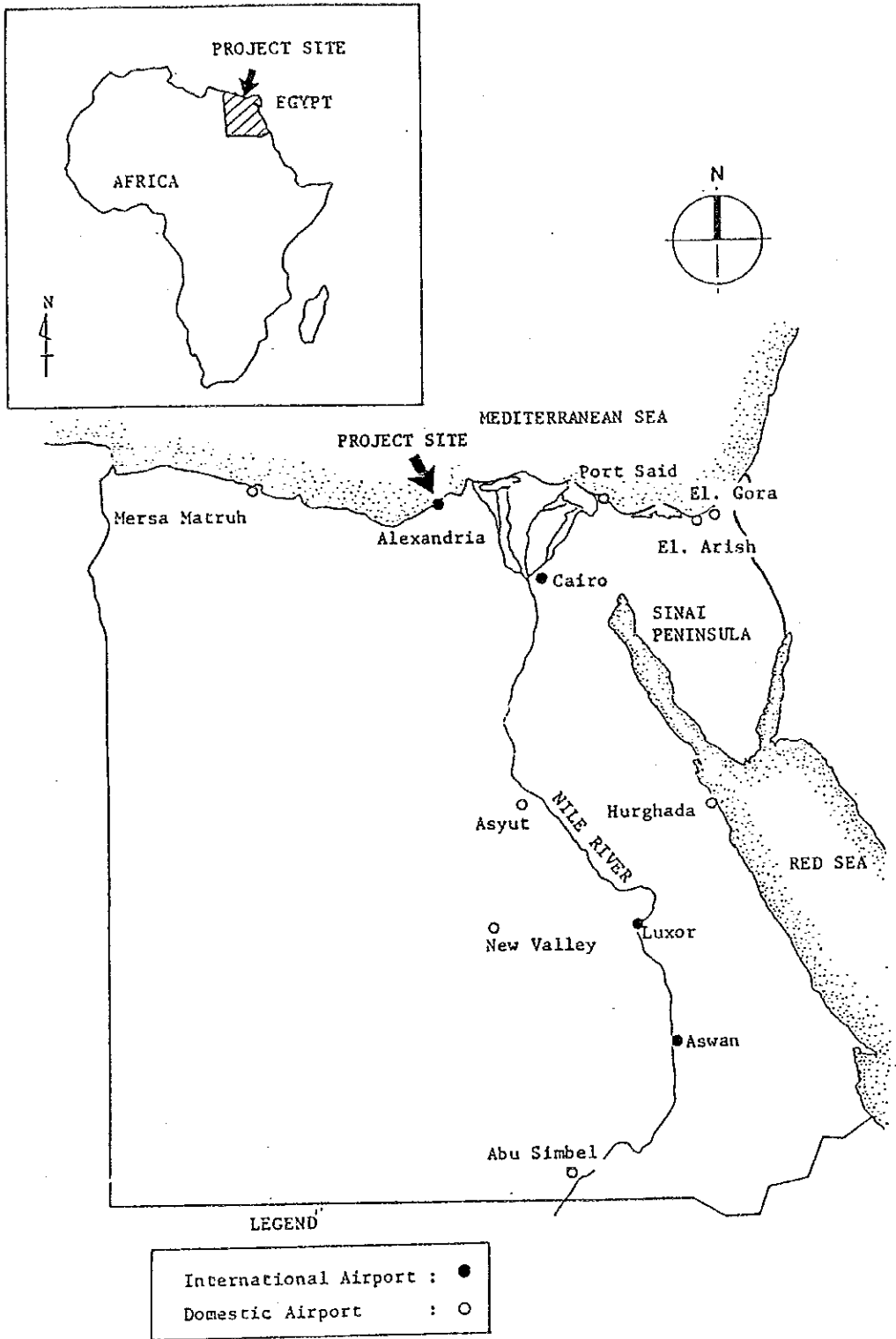


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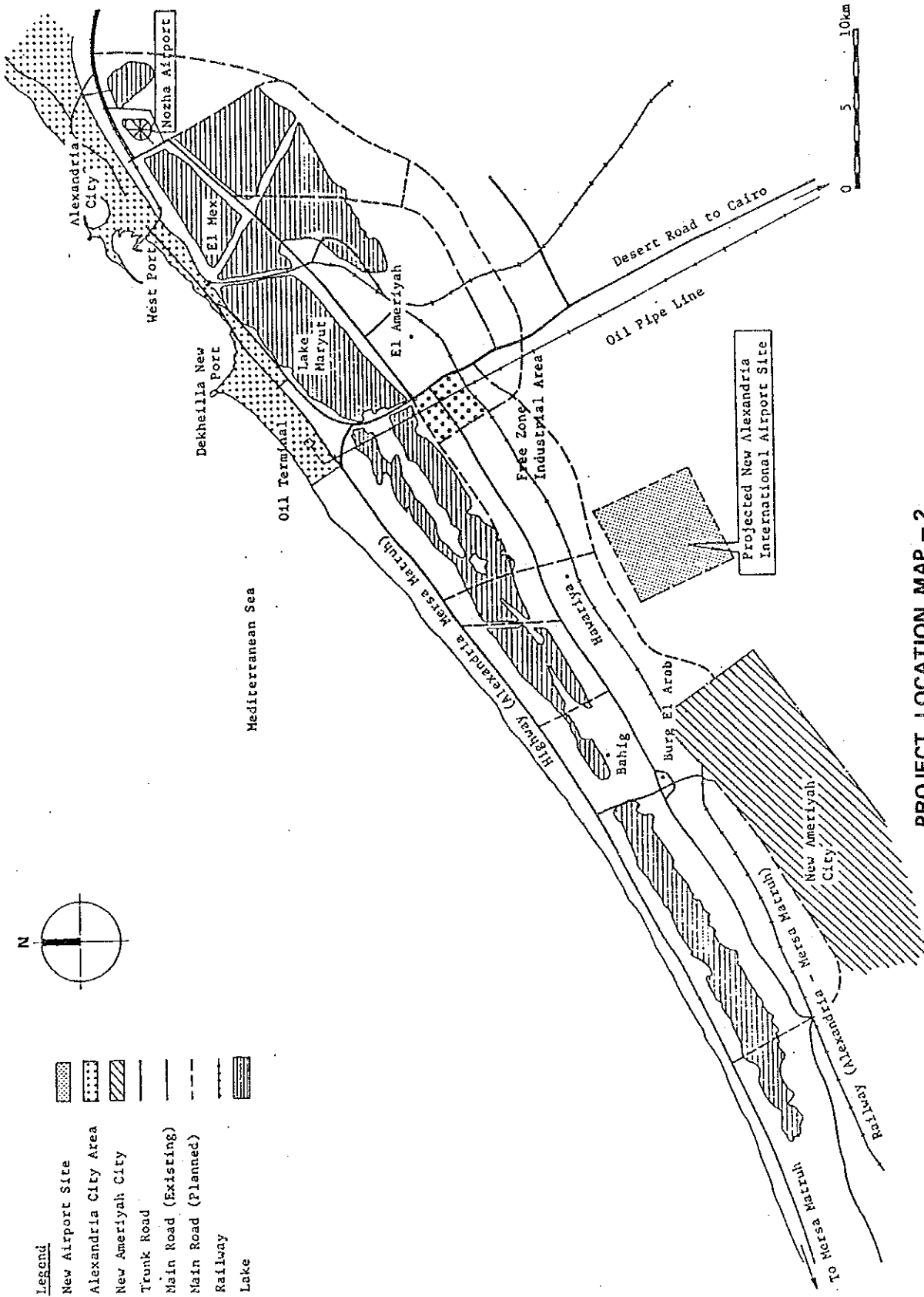
President

Japan International Cooperation Agency

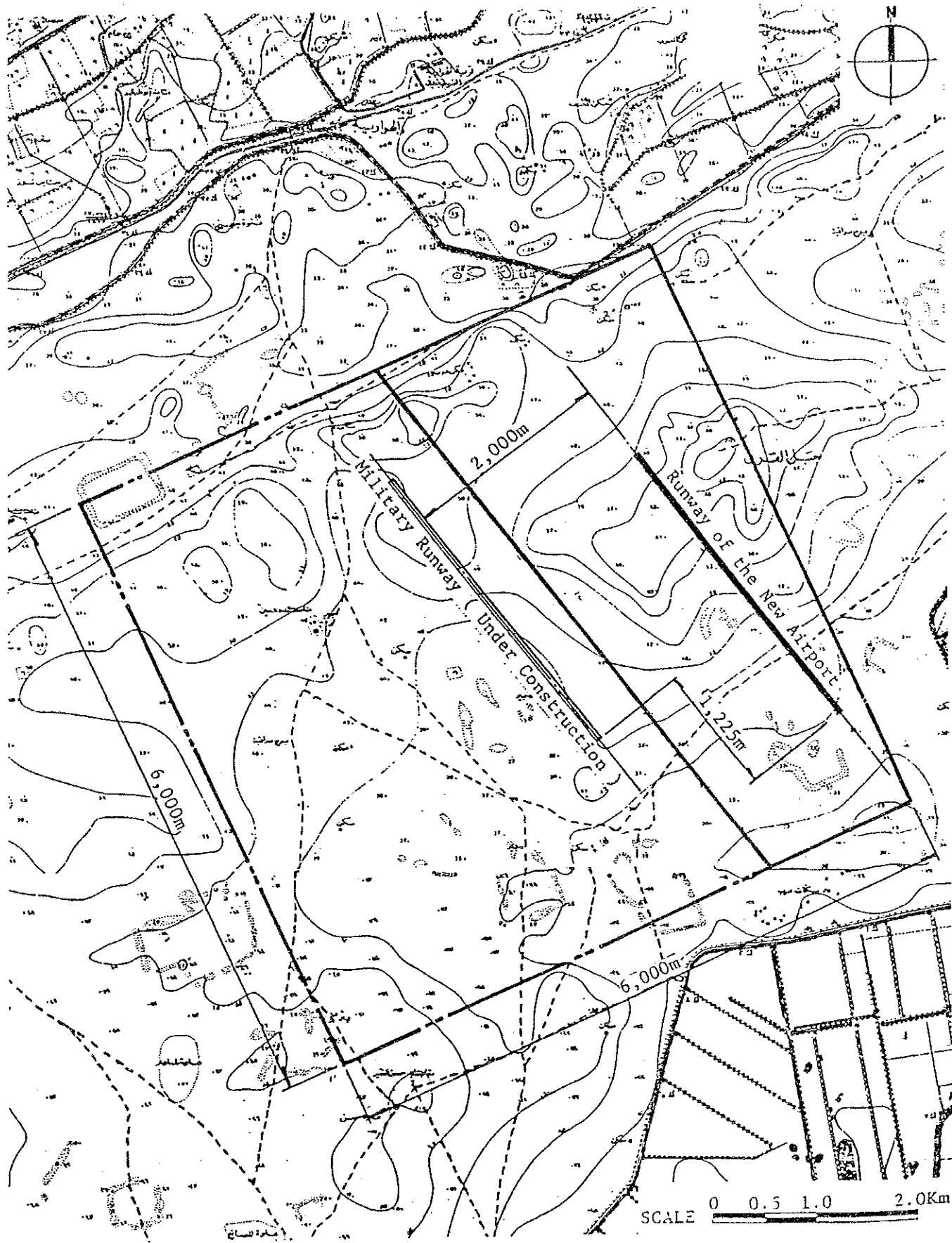




PROJECT LOCATION MAP - 1



PROJECT LOCATION MAP - 2



PROJECT LOCATION MAP - 3

SUMMARY

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Chapter 1 SUMMARY OF THE STUDY

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1.1 Background of the Project

Alexandria city which is the second largest city in Egypt with a population of approx. 2.6 million is located on the Mediterranean Sea approx. 200 km northwest of the Egyptian Capital, Cairo. Alexandria has the largest seaport in the country and it is mainly noted for trade, commerce, educational institutions and tourism. The Alexandria region enjoys a moderate Mediterranean climate.

Various regional development projects such as Northwest coast development, New Ameriyah City development, free economic zone development, etc., are positively underway in this area as an area offering the highest potential for large-scale development. The existing inadequate transportation infrastructure is, however, one of the main factors which is delaying the promotion or implementation of the regional development project. It is of vital and urgent necessity to establish a rapid mass transportation system for close links with European countries, and other countries in the Middle East.

Although sea transportation is developing at Alexandria port, development of air transportation has been delayed. The urgent construction of a new international airport in the Alexandria region is indispensable for the smooth promotion and implementation of the regional development projects.

The existing Nozha airport, which has two runways (2,200m x 45m and 1,440m x 30m) and was built on reclaimed land (below sea level) on Lake Maryut, will require expansion and development works on a large scale, and a large amount of investment in order to cope with the increasing air traffic demand and the introduction of wide-bodied jet aircraft. The Government has decided to construct a new international airport at a location approx. 45 km south west of Alexandria city and included the project in the Five Year Plan for Economic and Social Development (1982/83 to 1986/87).

However, there are as yet no studies which present an overall and comparative evaluation between redevelopment of Nozha airport and development of a new international airport, or which include economic and financial analyses. Thus, coordination among the related Ministries in Egypt for the new airport construction project could not be smoothly promoted.

The Government of Japan, in response to a request from the Government of the Arab Republic of Egypt, has agreed to undertake the Feasibility Study for the New Alexandria International Airport Construction Project. Based on this decision, the Japan International Cooperation Agency, an official agency responsible for the implementation of the technical cooperation programs of the Japanese Government, was entrusted to carry out the Study.

1.2 Objective of the Feasibility Study

The objective of the Feasibility Study is to examine the technical and economical feasibility of the New Alexandria International Airport Construction Project so as to contribute to the optimum planning of the Project.

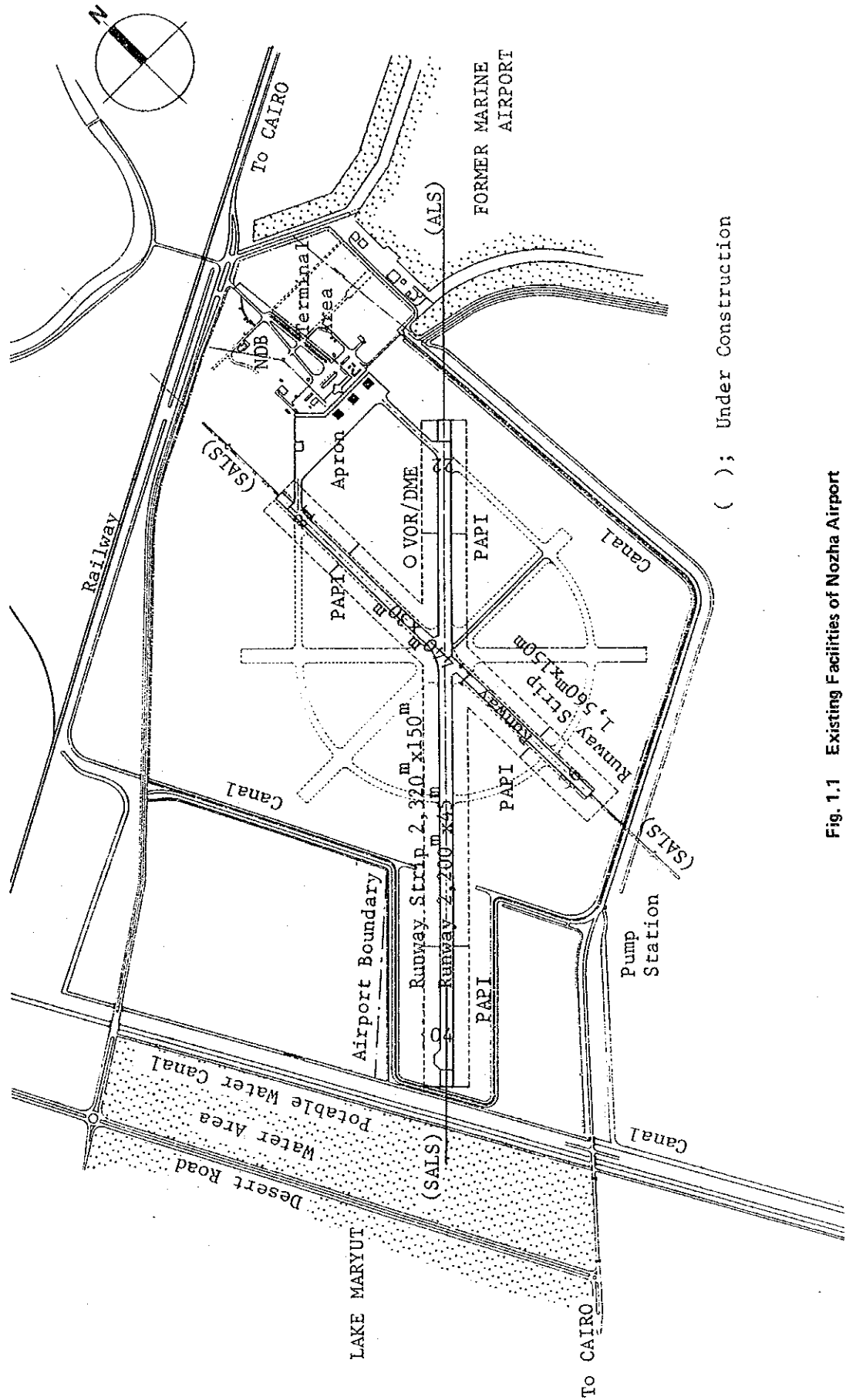
The Study is to be carried out to select the most suitable airport development scheme between the redevelopment of the existing Nozha airport, the development of a new airport and the combination of the both, and to prepare its master plan, and finally, to establish the most economically viable implementation program.

1.3 Existing Nozha Airport

Nozha airport is located about 7.5 km southeast of Alexandria city. Fig. 1.1 and Table 1.1 outline the conditions of Nozha airport as of August 1984. Nozha airport was constructed on reclaimed area on Lake Maryut and its ground height is about 1.0 m lower than the water levels of Lake Maryut and the former marine airport which are located on either side of the extended line of runway 04/22.

In addition to these external water and settlement prevention, the obstacles which might protrude upon approach surfaces and other surfaces and the aircraft noise problem should be clarified and evaluated on the redevelopment plan of Nozha airport in contrast with the development plan of the new airport.

ALEXANDRIA CITY



() ; Under Construction

Fig. 1.1 Existing Facilities of Nozha Airport

Table 1.1 Outline of the Existing Alexandria Airport

"O" indicates "plan or under construction"
 "X" indicates "implemented or services provide"

Country	Name of Airport	INT./DOM.		Commencement of Services	Airport Total Area	Aerodrome Ref. Point	Runway Orientation	Aerodrome Ref. Temp.	Operation Hours	Seasonal Availability	Note: Control Agency: Egyptian Civil Aviation Authority																																																																														
		ICAO CODE	INT./DOM.																																																																																						
Arab Republic of Egypt	Alexandria (Nozha)		4C	1945	354 ha.	31°11'00"N 29°56'45"E	N43°30'E(WN) N176°10'E(MN)	30.6° C	0500(GMT)^ Sunset	All Seasons																																																																															
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1.4 Basic Policy on Master Planning of New Alexandria International Airport

1.4.1 Purpose and Policy of Planning

The establishment of a Master Plan for New Alexandria International Airport aims at constructing a safe and user-oriented airport facility functional and attractive enough to be one of the gate way for Egypt, providing safe operation for 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 air transport for Egypt.

To achieve this goal, the proposal for the Master 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 restrict the weight limitation for wide-bodied aircraft take-offs.
- (3) Based on the role of New Alexandria Airport as an international airport and a convenience to aircraft pilots, it is planned to operate the runway with CAT-1 ILS.
- (4) The terminal facilities including the apron, the passenger and cargo terminal buildings, are to be planned to provide adequate scale of transport demand for each target year. The facilities will be effectively laid out to offer advantages to users.
- (5) Much consideration has been given to utilization of the existing facilities so that they will also be useful in the future and will be economically efficient.
- (6) To prepare for the future expansion of the facilities, a certain flexibility is 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 up to the target year is divided into three phases: the Immediate Development Plan (Short Term) targetting the year 1991 for the existing Nozha airport taking into account the completion year for Phase I development work of new airport, Phase I Development Plan (Middle Term Plan) targetting the year 2000, and the Phase II Development Plan (Long Term Plan) targetting the year 2010.

1.5 **Conclusion of the Feasibility Study**

As to the details of the Study is summarized in the following chapters, and the conclusion of the Study is as follows.

Based on the airport development concept which is to continue using Nozha airport for domestic service by maintaining its serviceability through short-term development works and to construct a new airport for international service including a limited domestic service for New Ameriyah city and the North west coast regional development area, the airport master plan is prepared for the target years 2000 (Phase I) and 2010 (Phase II).

The feasibility of the project based on the airport master plan is studied and assessed. As a result, the cost necessary for the project is estimated to be 68.2 million and 34.5 million Egyptian Pounds in Phases I and II, respectively, and the economic internal rate of return (EIRR) is 14.2 percent in Phases I and II, and 13.0 percent in Phase I. Hence, the project is feasible from the viewpoint of the optimum allocation of resources in the national economy.

It is, accordingly, recommended that a new airport for international service including a limited domestic service be constructed at the reserved site approx. 45 km south west of Alexandria city, and Nozha airport should be operated for domestic service after the necessary but minimum short-term and Phase I development.

The implementation of the project shall have impact on:

- Contribution to the national economy and achievement of the priority themes of the "Five Year Plan for Economic and Social Development",

- Contribution to the increase of opportunity of trade and business as a basic infrastructure through the promotion and implementation of the various regional development projects such as North west coast development, New Ameriyah city development, free economic zone, etc.;
- Contribution to the increase of employment opportunities,
- Stimulation of tourism development,
- Contribution to the safety of air transport,
- Convenience for both Alexandria and New Ameriyah city,
- Flexibility in an emergency, maintenance work, etc., which require closure of one airport,
- Alleviation of the congestion at Cairo airport especially for international services;
- Provision of better alternate to Cairo airport;
- Contribution to the airlines' profitability by means of introduction of wide bodied jet aircraft.

1.6 Executing Method and Reporting System

The Study was carried out from July 1984, and for the first three months period the JICA Study Team stayed in Egypt and performed the study and prepared the Progress Report with the close cooperation and participation of the Egyptian counterpart officials. The Interim Report, which recommended the most suitable airport development scheme for further study, was prepared in December 1984. After reaching agreement on the general approach and based on the result of the Interim Report, the Study Team proceed with the preparation of the airport master plan on the selected scheme and the study results were included in the Draft Final Report which was prepared in March 1985. The Final Report was prepared June 1985 taking into consideration of the comments on the Draft Final Report presented in May 1985 by the Egyptian Government.

The Final Report consists of three volumes, i.e., Summary, Main Report and Appendix.

Chapter 2 BASIC ASSUMPTIONS

Chapter 2 BASIC ASSUMPTIONS

2.1 Planning

(1) Phase I Development Plan (Middle Term Plan)

Phase I development plan covers the traffic demand forecast up to the year 2000 without additional large-scale development or improvement works after its completion from the end of 1991 in consideration of optimizing budgeting for new projects and maintenance and operation works in Egypt.

In the study, Phase I development plan for Alexandria International Airport is based on the following three alternatives:

- Alt-A: Redevelopment of Nozha airport (for international and domestic services)
- Alt-B: Construction of new airport (for international and domestic services)
- Alt-C: Redevelopment of Nozha airport (for domestic service) and construction of new airport (for international and limited domestic services)

(2) Phase II Development Plan (Long Term Plan)

Phase II development plan covers the demand forecast up to the year 2010 as a framework for projects beyond the year 2000.

(3) Immediate Development Plan (Short Term Plan)

The immediate development plan for the existing Nozha airport is to improve and develop it to meet the demand by the end of 1991, which is the completion year for Phase I development work.

2.2 Demand Forecast and Airport Facility Requirements

The target air traffic demands of Alexandria International Airport are estimated as shown in Table 2.1.

The airport facility requirements aim to cope with air traffic demand for each of the target years as shown in Table 2.2.

The airport facility requirements for Alt-C, which is to redevelop Nozha airport for domestic use and also at the same time to construct a new airport for international and limited domestic use in order to separate the domestic and international services are as shown in Tables 2.3 and 2.4.

Table 2.1 Target Air Traffic Demand

Period	Traffic Type	Planning Stage of Project	Target Year				
			1983 (Actual)	1990	1995	2000 Phase I	2010 Phase II
Annual	Passengers (thousand)	Int'l	1.7	640 (25)	1,300 (45)	1,600 (55)	2,300 (80)
		Domestic	81.4	230	320	420	730
		Total	83.1	870	1,620	2,020	3,030
	Freight (ton)		68	18,000	37,000	51,000	88,000
Planning Peak Hour	Passengers* ²	Int'l (One way)	100* ¹	290 (20)	510 (40)	620 (50)	860 (70)
		Domestic (One way)	167* ¹	120	170	200	340
		Total Airport * ³ (Two ways)	167* ¹	540 (40)	950 (60)	1,160 (80)	1,650 (110)
Planning Peak Hour	Aircraft Movements	Int'l (One way)	1	3.7	5.3	6.0	6.8
		Domestic (One way)	2	2.4	2.4	2.8	3.3
		Total Airport * ³ (Two ways)	4	4.8	6.3	7.1	8.4

- Note: 1. *¹ Indicates Estimated Value
 2. Figures in () Indicate Number of Transit Passengers
 3. *² Excludes transit passengers
 4. *³ Not mathematical sum of domestic and international, but overall figure of the total airport

**Table 2.2 Air Traffic Demand vs. Airport Facility Requirements
(International and Domestic; for Alt--A or Alt--B)**

Item	Year		Present Conditions as of 1984	1995	Phase 1 2000	2005	Phase 2 2010	
	Dom.	Int'l						
Air Traffic Forecast	1. Annual Passenger	Dom. Int'l Total	81,436 (1983) 1,705 (1983) 83,141 (1983)	320,000 1,300,000 1,620,000	420,000 1,600,000 2,020,000	560,000 1,900,000 2,460,000	730,000 2,300,000 3,030,000	
	2. Annual Cargo (ton)	Dom. Int'l Total	13 (1983) 68 (1983) 81 (1983)	420 37,000 37,420	670 50,000 51,670	1,000 66,000 67,000	1,400 87,000 88,400	
	3. Annual Aircraft Movement (operation)	Dom. Int'l Total	5,526 (1983)	3,160 8,720 11,880	3,660 10,080 13,740	4,020 10,610 14,630	4,930 12,160 17,090	
	4. Peak Hour Passenger	Dom. Int'l Total	200 ^a	280 860 950	340 1,030 1,160	450 1,240 1,400	560 1,440 1,650	
	5. Peak Hour Aircraft Movement (operation)	Dom. Int'l Total	4 ^a	2.4 5.3 6.3	2.8 6.0 7.1	2.9 6.1 7.4	3.3 6.8 8.4	
	6. Largest Aircraft		B737-ADV	B747 class	B747 class	B747 class	B747 class	
	7. Longest Design Route		Jeddah	London	London	London	London	
Facility Requirements	8. Runway (m x m)		R/W 04/22 2,200 x 45 R/W 18/36 1,440 x 30	3,000 x 45 (3,250 x 45) ^c	3,000 x 45 (3,250 x 45) ^c	3,000 x 45 (3,250 x 45) ^c	3,000 x 45 (3,250 x 45) ^c	
	9. Runway Strip (m x m)		2,320 x 150 1,560 x 150	3,120 x 300 (3,370 x 300) ^c	3,120 x 300 (3,370 x 300) ^c	3,120 x 300 (3,370 x 300) ^c	3,120 x 300 (3,370 x 300) ^c	
	10. Taxiway (m x m)		370 x 23		Parallel Taxiway Justified			
	11. Passenger Terminal Apron (Gate position)		B737 class: 3	B747 class : 2 DC10 class : 4 F27 class : 1 7	B747 class : 2 DC10 class : 4 MD80 class : 1 F27 class : 1 8	B747 class : 2 DC10 class : 5 F27 class : 1 8	B747 class : 3 DC10 class : 5 F27 class : 1 9	
	12. Passenger Terminal Building (sq. meter)	Dom. Int'l Total	2,400	2,800 21,500 24,300	3,400 25,800 29,200	4,500 31,000 35,500	5,600 36,000 41,600	
	13. Cargo Terminal Building (sq. meter)		No Facility	5,600	7,500	10,100	13,200	
	14. Administration Building (sq. meter)		1,500	2,700	2,700	2,700	2,700	
	15. Air Navigation Systems		Instrument, Non-Precision	Instrument, Precision Approach Category - I				
	16. Car Parks (cars) (sq. meter)		170 cars 3,000	770 25,000	930 31,000	1,120 37,000	1,330 44,000	
	17. Access Road (lane)		1 lane for each direction	1 lane for each direction	2 lanes for each direction			
	18. Fuel Supply (kl) (sq. meter)		JET A1 51 Kl 2,100	2,300 8,500	2,800 8,500	3,400 11,000	4,200 11,000	
	19. Rescue and Fire-fighting (category) (cars) (sq. meter)		CAT. 5 4 cars 590	CAT. 8 4 cars 400	CAT. 8 4 cars 400	CAT. 8 4 cars 400	CAT. 8 4 cars 400	
	20. Utilities	Electricity (KVA)		400	2,500	2,900	3,400	4,000
		Water (ton/month) Waste Deposit (ton/month)		5,000 As of July, 1984 N.A.	18,800 80	22,300 100	27,000 120	31,000 150
21. Airport Staff (ECAA)		168	230	270	310	360		

Note : a. Estimated figure
b. Not mathematical sum of domestic and international, but overall figure of the total airport
c. New airport site
d. Excluding Transit
e. Excluding Other Flight

**Table 2.3 Air Traffic Demand vs. Airport Facility Requirements
(International and Limited Domestic; for Alt-C "New Airport")**

Item		Year	Present Conditions as of 1984	1995	Phase 1 2000	2005	Phase 2 2010	
		Dom. Int'l Total						
Air Traffic Forecasts	1. Annual Passenger	Dom. Int'l Total	81,436 (1983) 1,705 (1983) 83,141 (1983)	30,000 1,300,000 1,330,000	40,000 1,600,000 1,640,000	60,000 1,900,000 1,960,000	70,000 2,300,000 2,370,000	
	2. Annual Cargo(ton)	Dom. Int'l Total	13 (1983) 68 (1983) 81 (1983)	40 37,000 37,040	70 50,000 50,070	100 66,000 66,100	140 87,000 87,140	
	3. Annual Aircraft Movement (operation)	Dom. Int'l Total	5,526 (1983)	710 8,720 9,430	950 10,080 11,030	540 10,610 11,150	630 12,160 12,790	
	4. Peak Hour Passenger	Dom. Int'l Total	200 ^a	810	990	1,190	1,380	
	5. Peak Hour Aircraft Movement (operation)	Dom. Int'l Total	4 ^a	5.2	5.9	6.0	6.6	
	6. Largest Aircraft		B737-ADV	B747 class	B747 class	B747 class	B747 class	
	7. Longest Design Route		Jeddah	London	London	London	London	
Facility Requirements	8. Runway (m x m)		R/W 04/22 2,200 x 45 R/W 18/36 1,440 x 30	3,250 x 45	3,250 x 45	3,250 x 45	3,250 x 45	
	9. Runway Strip (m x m)		2,320 x 150 1,560 x 150	3,370 x 300	3,370 x 300	3,370 x 300	3,370 x 300	
	10. Taxiway (m x m)		370 x 23	Only Exit Taxiways Required			Parallel Taxiway Justified	
	11. Passenger Terminal Apron (gate position)		B737 class: 3	B747 class : 2 DC10 class : 4 F27 class : 1 7	B747 class : 2 DC10 class : 4 F27 class : 1 7	B747 class : 2 DC10 class : 5 MD80 class : 1 8	B747 class : 3 DC10 class : 5 8	
	12. Passenger Terminal Building (sq. meter)	Dom. Int'l Total	2,400	500 21,500 22,000	500 25,800 26,300	1,300 31,000 32,300	1,300 36,000 37,300	
	13. Cargo Terminal Building (sq. meter)		No Facility	5,600	7,500	9,900	13,000	
	14. Administration Building (sq. meter)		1,500	2,700	2,700	2,700	2,700	
	15. Air Navigation Systems		Instrument, Non-Precision	Instrument, Precision Approach Category - I				
	16. Car Parks (cars) (sq. meter)		170 cars 3,000	650 22,000	790 26,000	950 32,000	1,110 37,000	
	17. Access Road (lane)		1 lane for each direction	1 lane for each direction		2 lanes for each direction		
	18. Fuel Supply (kl) (sq. meter)		JET A1 51 Kl 2,100	2,300 8,500	2,900 8,500	3,100 8,500	3,900 11,000	
	19. Rescue and Fire-fighting (category) (cars) (sq. meter)		CAT. 5 4 cars 590	CAT. 8 4 cars 400	CAT. 8 4 cars 400	CAT. 8 4 cars 400	CAT. 8 4 cars 400	
	20. Utilities	Electricity (KVA)		400	2,300	2,600	3,200	3,700
		Water (ton/month) Waste Deposit (ton/month)		5,000 As of July, 1984 N.A.	17,200 70	20,300 90	24,700 120	28,400 140
21. Airport Staff (ECAA)		168	200	230	270	300		

Note : a. Estimated figure
b. Excluding transit
c. Excluding other flight

**Table 2.4 Air Traffic Demand vs. Airport Facility Requirements
(Domestic; for Alt-C "Nozha Airport")**

Item		Year	Present Conditions as of 1984	1995	Phase 1 2000	2005	Phase 2 2010	
Air Traffic Forecast	1. Annual Passenger	Dom. Int'l Total	81,436 (1983) 1,705 (1983) 83,141 (1983)	290,000	380,000	500,000	660,000	
	2. Annual Cargo(ton)	Dom. Int'l Total	13 (1983) 68 (1983) 81 (1983)	380	600	900	1,300	
	3. Annual Aircraft Movement (operation)	Dom. Int'l Total	5,526 (1983)	2,900	3,450	3,730	4,590	
	4. Peak Hour Passenger	Dom. Int'l Total	200 ^a	270	330	430	510	
	5. Peak Hour Aircraft Movement (operation)	Dom. Int'l Total	4 ^a	2.4	2.6	2.8	3.1	
	6. Largest Aircraft		B737-ADV	B767 class	B767 class	A300 class	A300 class	
	7. Longest Design Route		Cairo	Aswan	Aswan	Aswan	Aswan	
Facility Requirements	8. Runway (m x m)		R/W 04/22 2,200 x 45 R/W 18/36 1,440 x 30	2,200 x 45 1,440 x 30	2,200 x 45 1,440 x 30	2,200 x 45 1,440 x 30	2,200 x 45 1,440 x 30	
	9. Runway Strip (m x m)		2,320 x 150 1,560 x 150	2,320 x 150 1,560 x 150	2,320 x 150 1,560 x 150	2,320 x 150 1,560 x 150	2,320 x 150 1,560 x 150	
	10. Taxiway (m x m)		370 x 23	Only Exit Taxiways Required				
	11. Passenger Terminal Apron (Gate position)		B737 class: 3	B767 class : 2 2	B767 class : 2 F27 class : 1 3	DC10 class : 2 F27 class : 1 3	DC10 class : 2 F27 class : 1 3	
	12. Passenger Terminal Building (sq. meter)	Dom. Int'l Total	2,400	2,700	3,300	4,300	5,100	
	13. Cargo Terminal Building (sq. meter)		No Facility	30	50	80	110	
	14. Administration Building (sq. meter)		1,500	1,500	1,500	1,500	1,500	
	15. Air Navigation Systems		Instrument, Non-Precision	Instrument, Non-precision				
	16. Car Parks (cars) (sq. meter)		170 cars 3,000	220 7,300	260 8,700	340 11,000	410 14,000	
	17. Access Road (lane)		1 lane for each direction	1 lane for each direction				
	18. Fuel Supply (kl) (sq. meter)		JET A1 51 Kl 2,100	100 2,800	130 2,800	150 2,800	240 3,200	
	19. Rescue and Fire-fighting (category) (cars) (sq. meter)		CAT. 5 4 cars 590	CAT. 6 4 cars 400	CAT. 6 4 cars 400	CAT. 6 4 cars 400	CAT. 6 4 cars 400	
	20. Utilities	Electricity (KVA)		400	400	500	500	600
		Water (ton/month) Waste Deposit (ton/month)		5,000 As of July, 1984 N.A.	2,500 10	2,900 10	3,600 10	4,100 10
21. Airport Staff (ECAA)		168	100	100	100	100		

Note : a. Estimated figure

Chapter 3 SELECTION OF ALTERNATIVE PLANS

Chapter 3 SELECTION OF ALTERNATIVE PLANS


3.1 Evaluation of Nozha Airport and Immediate Plan

3.1.1 Existing Facilities

Table 3.1 shows the anticipated time when the demand exceeds the capacity of the existing facilities, which varies depending upon the capacity of each facility. The existing passenger terminal has the smallest capacity of all and demand has already exceeded the present capacity. Expansion of passenger terminal building and apron, and extension of the runway to 3,000 m in length are required by 1989 in order to accommodate anticipated demand without any restraints as indicated in Table 3.1. The terminal area including passenger terminal building, apron, control tower, etc. will require completely new facilities for the demand anticipated after 1990 because of the limited sizes and obsolete systems of the existing terminal facilities. Therefore, the expansion of the existing terminal facilities is not considered to be economical. It is considered from the necessary budgeting and design, etc that the redevelopment work including the above facilities, i.e., runway and new terminal facilities shall start after 1988, the last year of the Five Year Plan and shall be completed in 1991 at the earliest, 6 years from now. Therefore, these substantial construction works are planned as Phase I development for the year 2000 and Nozha airport shall cope with the increasing demand with some limitation before the completion of the new airport construction project.

The capacity of the existing airport will be economically expanded by means of the temporary expansion of the existing passenger terminal building to increase its capacity to the existing apron level and the pavement overlay to serve the demand during the transitional period until the completion of Phase I development work.

Table 3.1 Anticipated Time for Demand to Exceed the Capacity of the Existing Facilities

X = Already out of capacity
 Existing capacity

Facilities	Year	A300 Introduction *1										Descriptions		
		A300 Alex-London					1990							
		84	85	86	87	88	89	90	91	92	93	94	95	
Main Runway 04/22	Length						a							a. Runway extension to 3,000m to be necessary when Alexandria - London flight by A300-84 be inaugurated.
	Pavement						b							b. Aircraft movement will exceed the repetition of design load for the existing pavement.
Cross Wind Runway 18/36	Pavement						c							c. A part of runway 18/36 to be used as an exit taxiway from the main runway. Overlay to be required by 1989.
Runway Strip							d							d. Runway strip to be expanded when runway be extended to 3,000m and precision approach category-I be adopted.
Exit Taxiway	Pavement						e							e. Aircraft movements will exceed the repetition of design load for the pavement.
Apron	Gate positions						f							f. Apron expansion to be required when 3 gate positions for L/J/H become necessary.
	Pavement						g							g. Aircraft movements will exceed the repetition of design load for the existing pavement.
Passenger Terminal Building	Int'l	X	h											h. The passenger terminal building is not sufficient for the present needs. Check-in lobby, departure hall, domestic gate lounge etc. are to be expanded.
	Domestic	X	h											
Cargo Terminal Building		X	i											i. No facility at present.
Administration Building							j							j. Renovation to be necessary to accommodate equipment for precision approach category-I.
Control Tower		X	k											k. Control tower does not meet the siting requirements.
Car Parking							l							l. Expansion to be necessary for the increasing demand.
Access Road														m. Saturation depends on traffic other than airport users
Air Navigation Systems	Nav aids						n							n. Additional nav aids (ILS, etc.) to be required for category-I operation.
	ATC/COM MET						o							o. Additional equipment to be required for category-I operation.
	Lights						q							p. Equipment renovation to be required. q. Relocation of ALS/SALS and extension of runway edge lights to be required.
Public Utilities							r							r. Utilities demands will exceed the existing capacity.

Note. *1: Based on the demand forecast in Chapter 3, it is estimated that A-300 will be introduced for domestic service in 1988 and Alexandria-London route will be inaugurated by A300 in 1989. Precision approach Category-I is considered to be a standard requirement for the international service.

3.1.2 Immediate Work Plan

Fig. 3.1 and Table 3.3 shows the immediate development plan to improve and expand the existing airport facility of Nozha to cope with the demand during the transition period by the completion of Phase I development work. The cost for the work is estimated at 3.7 million Egyptian Pounds (based on 1984 price).

This will meet the unrestrained domestic demand of 250,000 passengers and 400,000 international passengers on limited routes including Jeddah, Amman, Kuwait, Athens and Baghdad as shown in Table 3.2.

Table 3.2 Anticipated Demand during the Transitional Period

Unit: Passengers (x1,000)

Item	Embarked and Disembarked			
	Domestic	International	Total	Transit
1985	140	40	180	1
1986	160	80	240	3
1987	180	130	310	5
1988	200	190	390	8
1989	215	250	465	10
1990	230	320	550	13
1991	250	400	650	15

The anticipated aircraft is assumed to be A-300 class for Jeddah (including the route demand of Riyadh), Amman, Kuwait routes, and B737 class for Athens and Baghdad routes. (A-300 class aircraft is assumed where the route demand exceeds the passenger volume of one daily flight by B737 class aircraft.)

The existing airport with the above immediate improvement is termed Without Project Case (WOP) in this Study.

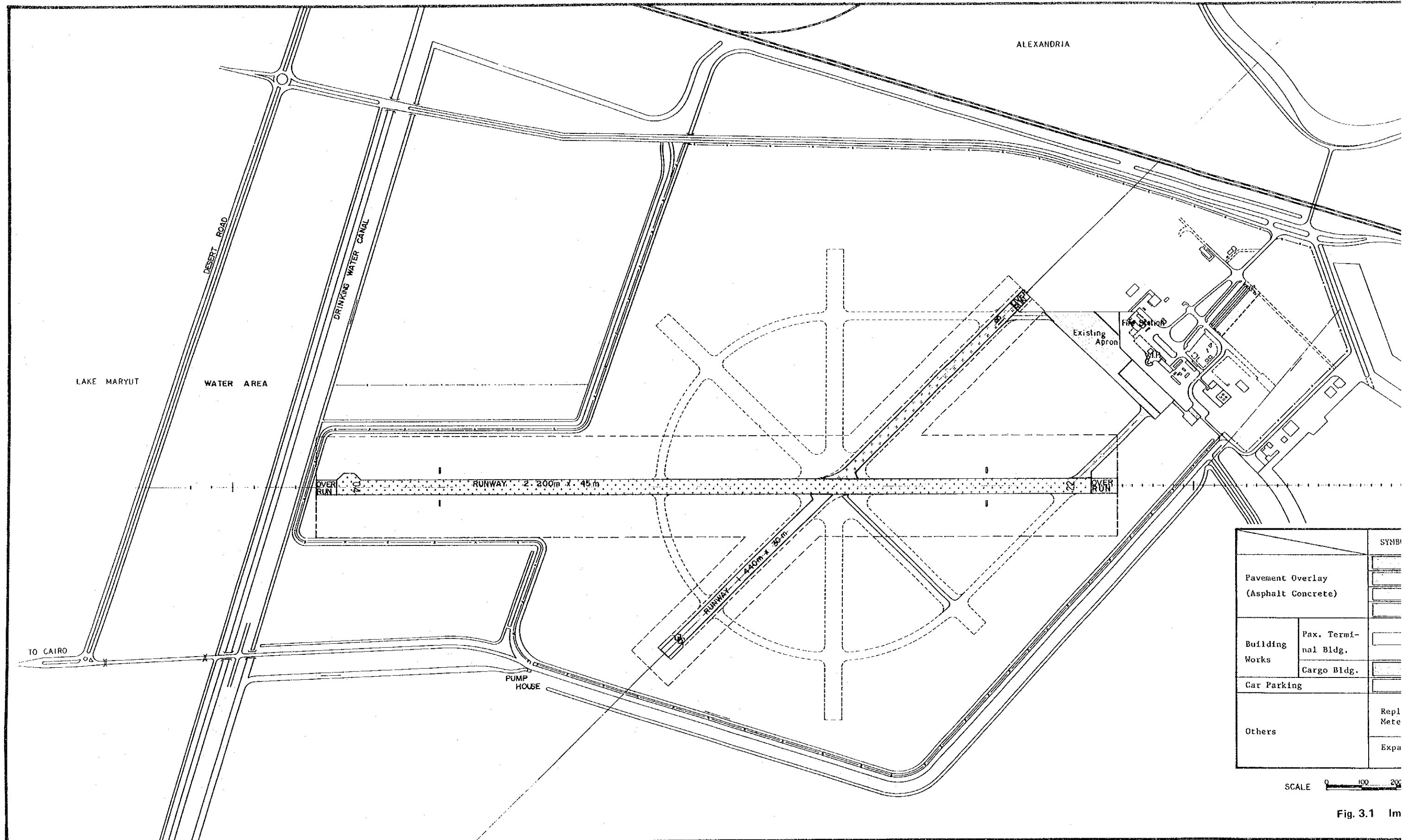


Fig. 3.1 Im

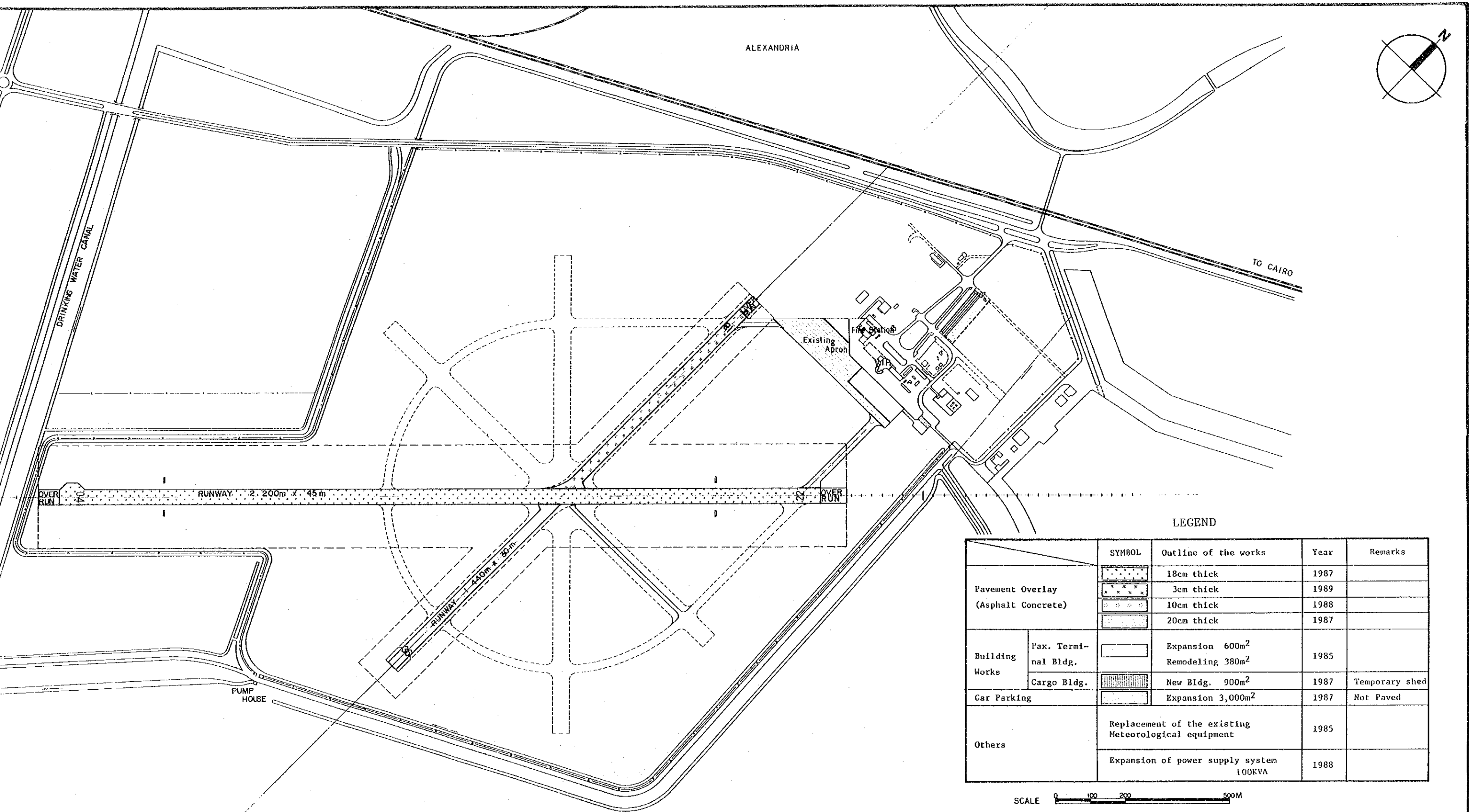


Fig. 3.1 Immediate Work Plan of Nozha Airport

Table 3.3 Necessary Immediate Improvement Works of Nozha Airport during the Transition Period

Year		A300 Introduction A-300 Alex-London										Descriptions			
		84	85	86	87	88	89	90	91	92	93		94	95	
Main Runway 04/22	Length	[Solid bar from 84 to 92]										a	a. No runway extension to be required by postponing the long-hauled international flights (London, Paris, Khartoum, etc.)		
	Pavement	[Solid bar from 84 to 88, hatched bar from 88 to 92]										b	b. Overlay (18cm) on the existing pavement to be required.		
	Cross Wind Runway 18/36	Pavement	[Solid bar from 84 to 89, hatched bar from 89 to 92]										c	c. A part of runway 18/ 36 is used as an exit taxiway. Overlay (at least 3cm) on the existing pavement to be required.	
		Drainage pipe	[Solid bar from 86 to 87]												
Runway Strip		[Solid bar from 84 to 92]										d	d. Runway strip to be expanded when runway be extended to 3,000m and precision approach category-1 be adopted.		
Exit Taxiway		[Solid bar from 84 to 88, hatched bar from 88 to 92]										e	e. Overlay (10cm) on a part of the existing taxiway to be required.		
Apron	Gate positions	[Solid bar from 84 to 92]										f	f. No expansion of the apron to be required by controlling international demand.		
	Pavement	[Solid bar from 84 to 88, hatched bar from 88 to 92]										g	g. Overlay (20cm) on the existing pavement to be required.		
Passenger Terminal Building	Int'l	X	[hatched]	[hatched]	[hatched]	[hatched]	[hatched]	[hatched]	[hatched]	[hatched]	[hatched]	[hatched]	[hatched]	h	h. Expansion of the existing terminal building to be made to accommodate the traffic until the end of 1991.
	Domestic	X	[hatched]	[hatched]	[hatched]	[hatched]	[hatched]	[hatched]	[hatched]	[hatched]	[hatched]	[hatched]	[hatched]	h	
Cargo Terminal Building		X	[hatched]	[hatched]	[hatched]	[hatched]	[hatched]	[hatched]	[hatched]	[hatched]	[hatched]	[hatched]	[hatched]	i	i. Construction of a temporary shed at the existing terminal area to be required.
Administration Building		[Solid bar from 84 to 92]										j	j. As long as the present instrument and non-precision operations are continued, the renovation of the building is not required.		
Control Tower		X	[hatched]	[hatched]	[hatched]	[hatched]	[hatched]	[hatched]	[hatched]	[hatched]	[hatched]	[hatched]	[hatched]	k	k. New control tower to be constructed when Phase-1 development is carried out, if this airport is continuously utilized for the future.
Car Parking		[Solid bar from 84 to 88, hatched bar from 88 to 92]										l	l. Expansion of the existing car park for a temporary use (not paved) to be required.		
Access Road		[Solid bar from 84 to 92]										m	m. Saturation depends on traffic other than airport users.		
Air Navigation Systems	Nav aids	[Solid bar from 84 to 92]										n	n. The existing nav aids meet the operational category: instrument, non-precision.		
	ATC/COM	[Solid bar from 84 to 92]										o	o. The existing ATC/COM equipment meet the operation category of the above:n.		
	MET	X	[hatched]	[hatched]	[hatched]	[hatched]	[hatched]	[hatched]	[hatched]	[hatched]	[hatched]	[hatched]	[hatched]	p	p. Equipment renovation to be required.
	Lights	[Solid bar from 84 to 92]										q	q. The existing lighting system meet the operational category of the above:n.		
Public Utilities		[Solid bar from 84 to 88, hatched bar from 88 to 92]										r	r. Expansion of the existing facilities to be required.		

Note #1: Taking into account period required for budgeting, designs, constructions, etc. for the substantial development which is required to accommodate the anticipated international demands without any restraint, an accommodation of Alex-London flight is planned to be postponed to 1992 and accommodation of international demands is limited to major routes until 1992 which is the earliest possible inauguration time of the above major development.

The required immediate development works for the provisional period are as follows:

(1) Runway

Aircraft movement in 1988 of the controlled demand will exceed the repetition of the design load for the existing pavement.

Overlay of 18 cm thickness will be required for the main runway (04/22) in 1987 in order to cope with the aircraft movements up to the end of 1991. A part of cross-wind runway 18/36 will be used as an exit taxiway from the main runway. Pavement overlay of at least 3 cm will be required for part of the cross-wind runway in 1989.

(2) Exit Taxiway

The aircraft movements in 1989 will exceed the repetition of design load for the exit taxiway on the end of runway 22, thus overlay of 10 cm thick will be required.

(3) Apron

Two gate positions will be required in 1991 for A-300 class (LJ) aircraft and 1 position for MD-80 or B-737 class (NJ/SJ) aircraft. These 3 gate positions can be obtained by re-arranging the existing apron use as shown in Fig. 3.2.

The existing heliport and the equipment yard (on the right edge in Fig. 3.2) could re-located to the vacant area in the east side (on the left side in Fig. 3.2).

The apron area does not have a good connection with the terminal building, but it is acceptable during the transition period.

A pavement overlay of 20 cm thick on the apron will be required in 1987 in order to cope with the aircraft movement up to the end of 1991.

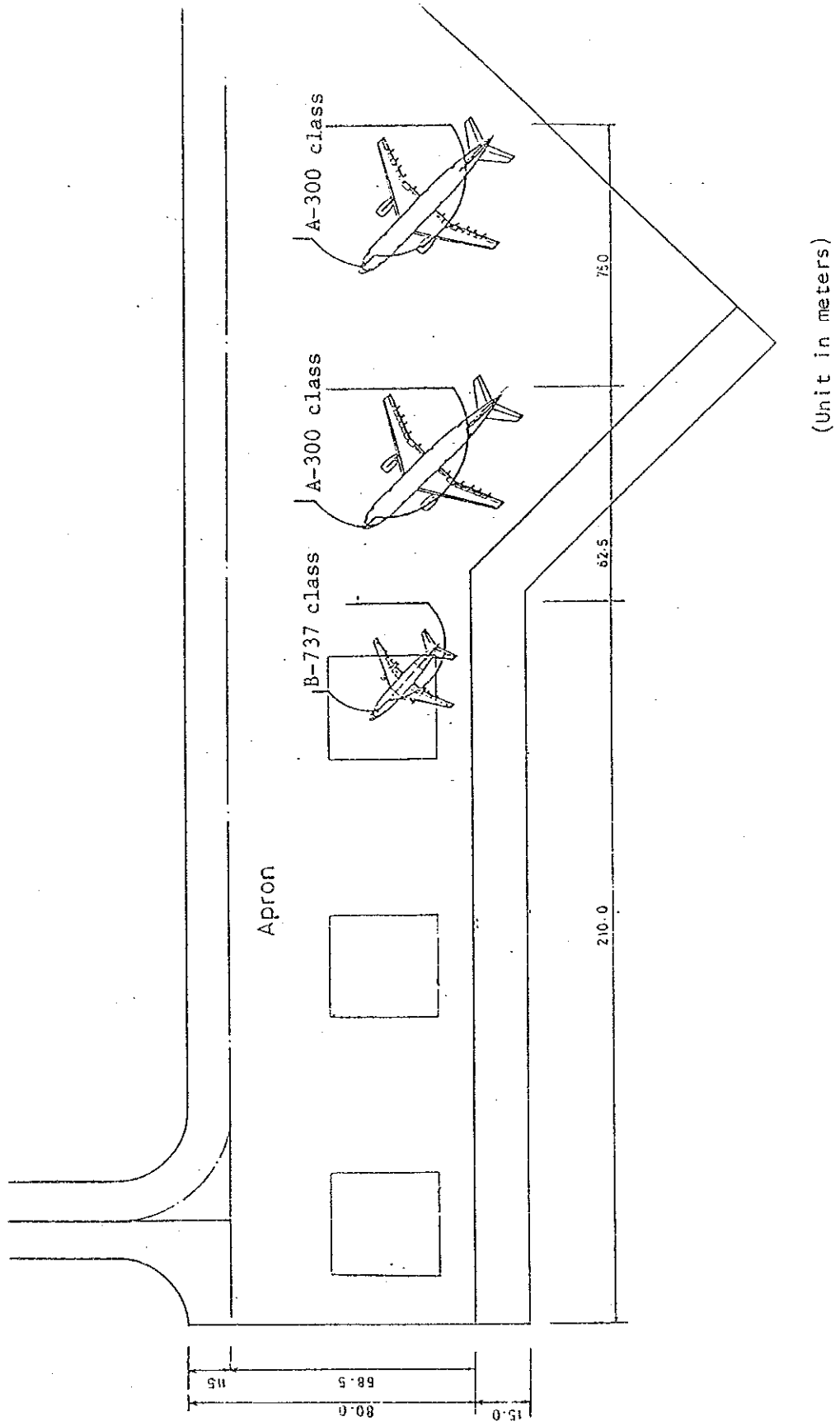


Fig. 3.2 Apron Use Plan during Transitional Period

(4) Passenger Terminal Building

The existing passenger terminal building is not sufficient for the present needs. Improvement works especially for the narrow spaces in the passenger terminal building need to be implemented in order to expand the building capacity equivalent to the apron and to ensure cost-effectiveness.

The remodeling area and expansion area will be 380 sq.m and 600 sq.m respectively.

(5) Cargo Terminal Building

A temporary shed of 900 sq.m for cargo handling will be newly constructed.

(6) Car Parking

The existing car parking area (3,000 sq.m) will be expanded to 6,000 sq.m for a temporary use (not-paved).

(7) Meteorological Equipment

Replacement of the existing meteorological equipment (radio teletypewriters and facsimile) by new ones is required.

(8) Drainage System

Stone filled ditch with open-jointed drain pipes is to be laid down along the runway, taxiways and apron in order to lower the ground water table.

3.1.3 Preliminary Cost Estimates for the Improvement Works

The cost required for the improvement works is preliminarily estimated to be 3.7 million Egyptian Pounds as shown in Table 3.4. Approx. 60 percent of the cost (2.2 million Egyptian Pounds) is required for the pavement overlay works.

Table 3.4 Estimated Construction Cost for Immediate Work of Nozha Airport

(based on 1984 price)

(Unit: 1,000 £E)

Phase of Construction		1986-1991
Work Item		
Land Acquisition and Compensation	Land Acquisition	-
	Compensation	-
	Sub Total	-
Civil Works	Site Preparation	-
	Pavement Works	2,172
	Miscellaneous (Drainage Works)	180
	Access Road	-
	Sub Total	2,352
Building and Equipment Works	Passenger Terminal Building	194
	Cargo Terminal Building	480
	Administration/Tower and Other Buildings	-
	Sub Total	674
Navaid Works	Radio Navaid, Telecommunications, Air-Traffic Control, Meteorological and Lighting Works	140
Utilities Works	Power Supply, Water Supply	200
	Sewage and Incinerator	
Special Services Facility Works	Boarding Bridge	-
Total of Construction Works		3,366
Contingency (10%)		337
GRAND TOTAL		3,703

3.2 Redevelopment Plan of Nozha Airport (Alt--A)

The existing Nozha airport facility will face substantial difficulty in serving the future air traffic demand, and large-scale redevelopment works are required in order to serve even the growing civil air transportation demand (international and domestic) without restrictions.

The Phase I development plan consists of extension of runway, construction of parallel taxiway, installation of navigation aids such as ILS etc. for the Cat-I operation, and construction of passenger terminal building and control tower in order to meet the traffic demand forecast for the year 2000. In Phase II development plan, facilities are to be improved and developed to serve traffic demand forecast for the year 2010. The layout of the redevelopment plan is shown in Fig. 3.3.

Nozha airport was completed in 1945 with reclamation of Lake Maryut, and its airport reference point is 3.35 meters below sea level.

Results of soil investigation on the airport property show that it consists of soft soil of less than N-value: 5 between surface of reclamation and 9 meter below, and sandy soil of more than N-value: 35 below that. At the lake area, there is a 6-7 meter layer of very soft cohesive soil of N-value of 0 to 2 below the lake bottom and stiff soil of N-value of 15 to 30 below that. The existing airport has problems such as settlement, need for pumping facility and removal of weeds occurring with abovementioned topographical and geological conditions.

In Phase I development plan, works such as extension of runway with reclamation of the former marine airport, construction of apron, parallel taxiway and passenger terminal building shall be implemented.

For these purposes, careful consideration of countermeasures for settlement are required as follows:

- Backfill with sand below the pavement
- Application of sand drain method for newly constructed pavement works in existing reclamation area
- Application of pile foundation method for building works

Also, an additional pumping facility, and compensation for removal of the existing houses around the old marine airport and on the northwest side of runway 04 will be required due to the expansion of the airport property.

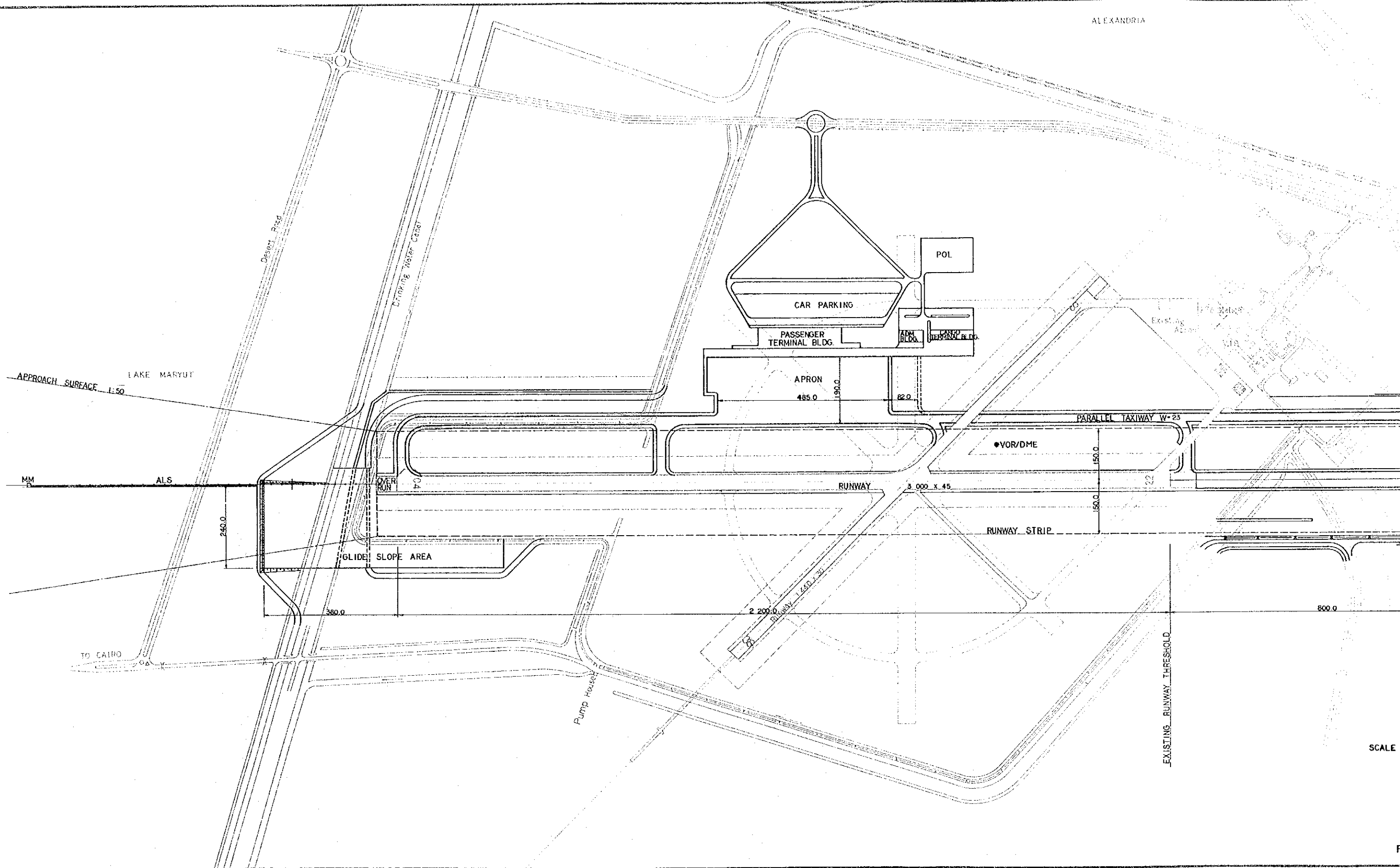
Phase I development work including the above-mentioned works is preliminary estimated to cost approximately 75.9 million Egyptian Pounds. The total cost including Phase II development work is approximately 98.9 million Egyptian Pounds.

This Phase I development cost is approximately 13.3 million Egyptian Pounds more than the construction cost of a new airport (Alt-B) by the end of Phase I development work.

The increase is due to the abovementioned additional works as compared with the construction of a new airport.

Construction work in the restricted area of the airport property will require night-time work to avoid the interruption of airport operations. The night-time work will cost 1.5 times more than day-time work. This factor, however, is not considered in this study.

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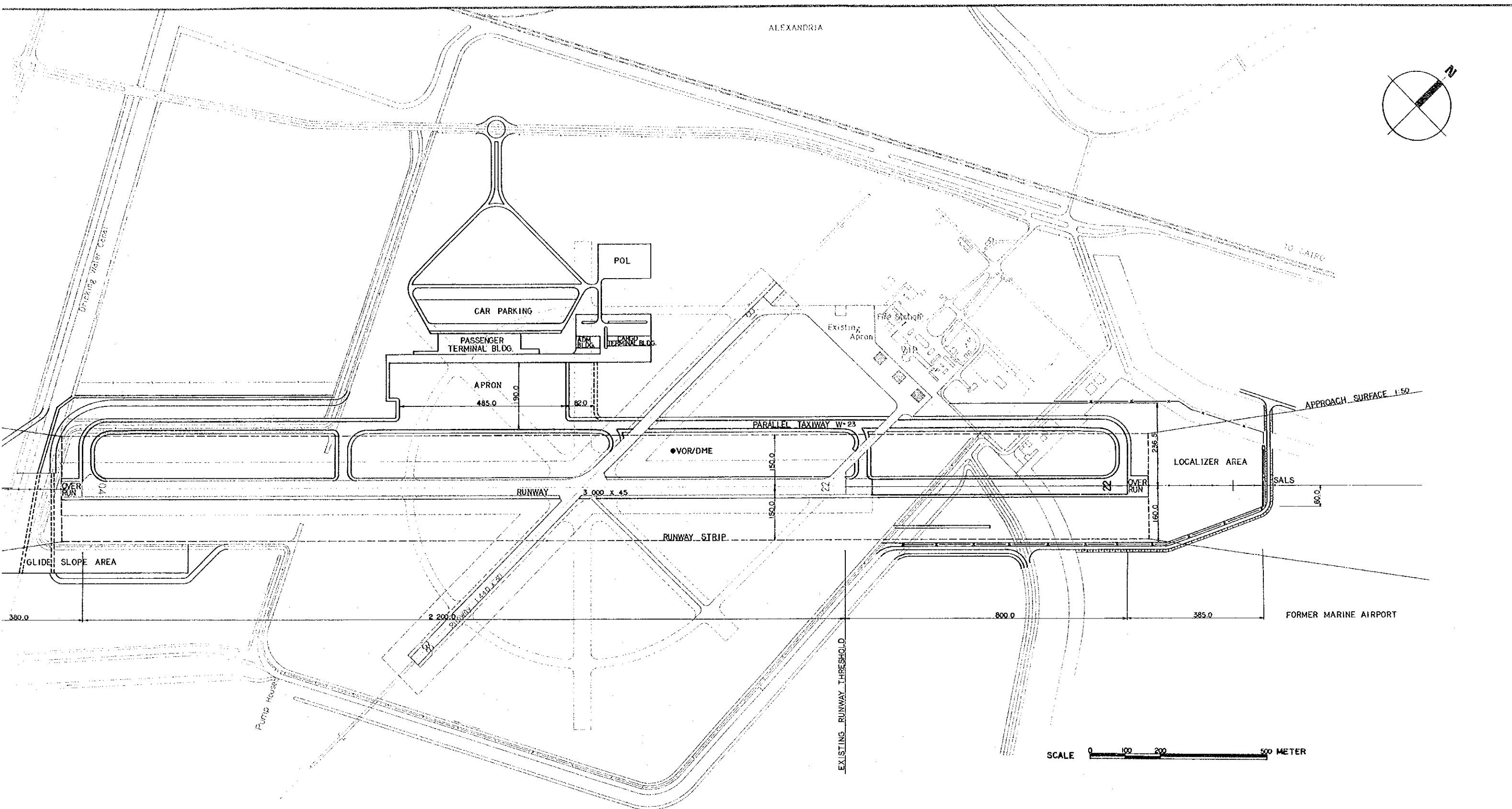


Fig. 3.3 Layout Plan of Nozha Airport Development (Alt-A)

3.3 Development Plan of New Airport (Alt-B and Alt-C)

The scheduled construction site for the new airport is limited to an area of 36 km² (6 km x 6 km) about 45 kilometers south west of Alexandria City, and adjacent to New Ameriyah City.

It was confirmed by the field survey that the western two-thirds of the site are already occupied by the military airport which is under construction.

The new airport will, therefore, be constructed in the remaining eastern one-third of the site which is considered to be sufficient for future needs.

The runway direction of the new airport is N142°W which is parallel with the military runway with 1,900 meter clearance. (to be changed to 2,000 m at Master Planning)

The terrain undulates with an average of 50 meters above sea level.

The geological features consist of limestone and mudstone on which consolidated silty and clayey soil with N-value of 20 to 80 is piled up. Silty clay with CBR value of 5 percent is piled up on the surface.

In case of the construction of the new airport, the following two alternative plans are considered:

- Alt-B: Replacement of Nozha airport (for international and domestic services)
- Alt-C: Redevelopment of Nozha airport for domestic service only and construction of the new airport for an international service, with limited domestic service.

The new airport layout plan (Alt-B) based upon this condition is planned as shown in Fig. 3.4.

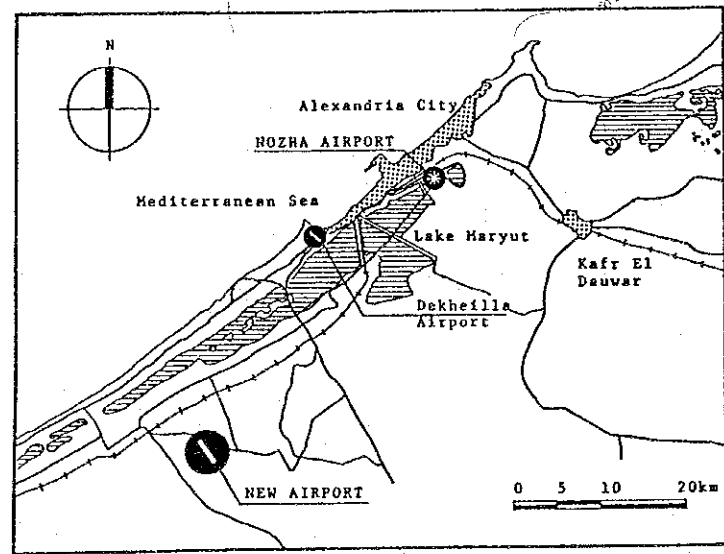
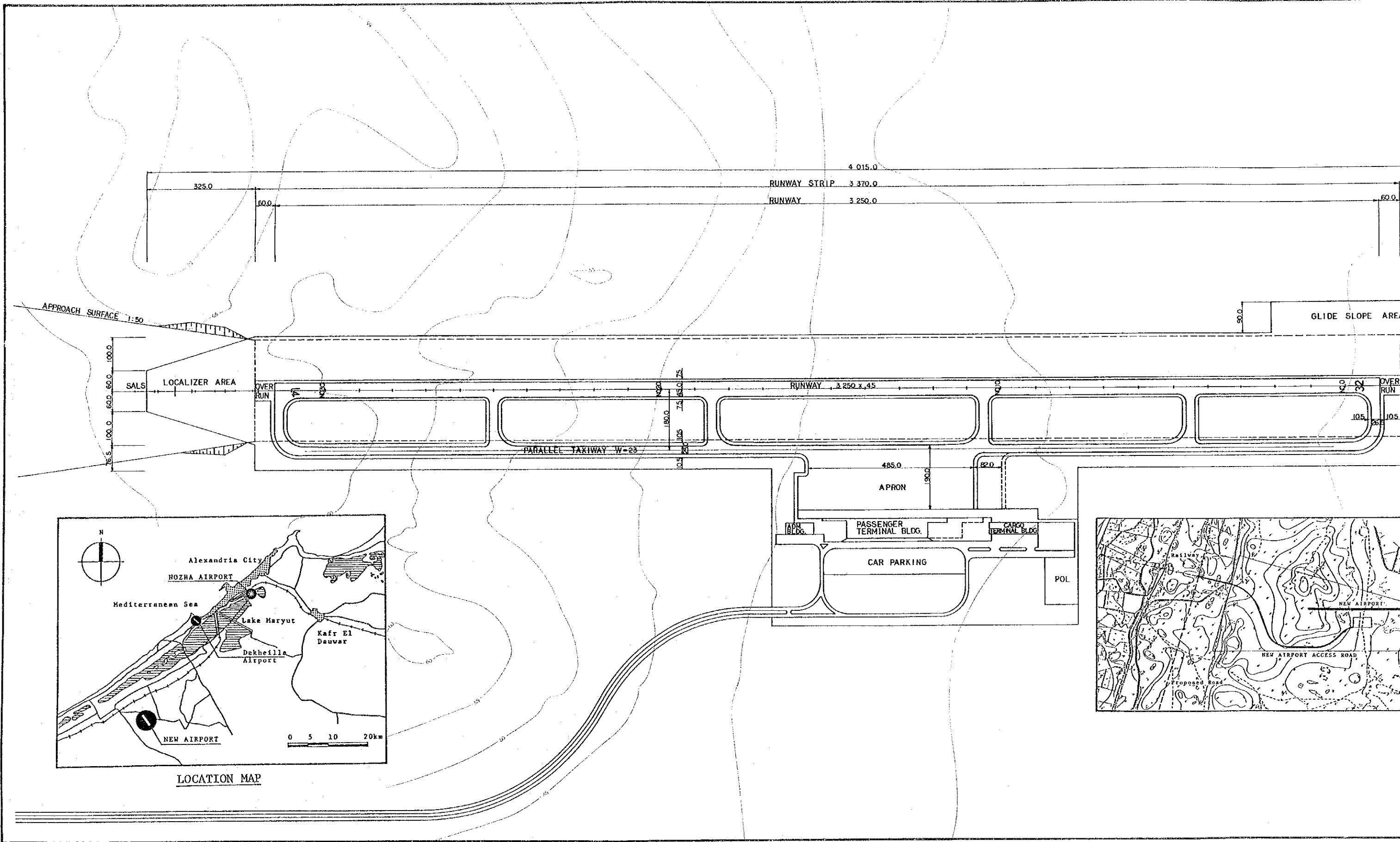
Alt-C is planned taking into account the capability of Nozha airport to serve the domestic air traffic demand anticipated during the forthcoming 25 years with small renovation works on the system and facility of the airport after the immediate improvement work.

Alt-C can reduce the initial cost of the construction of the new airport and continue the activities including domestic air transport, VIP transport, general aviation, etc. of the existing airport, and provide the shortest access time to the airport for domestic passengers.

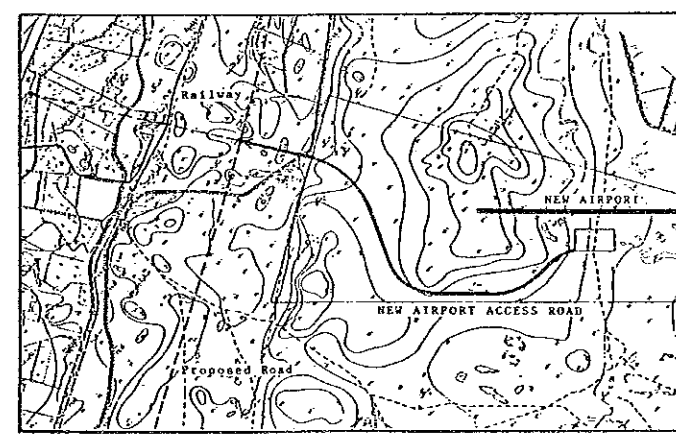
Total construction costs required by the year 2010 are estimated as 85.3 and 88.4 million Egyptian Pounds for Alt-B and Alt-C, respectively. Alt-C plan, however, can postpone the construction of the parallel taxiway in Phase II development plan as shown in Fig. 3.5 and also can reduce the terminal facility requirements. By these modifications, the construction cost of Phase I development work is estimated as 57.4 million Egyptian Pounds. In consequence, this plan can save 5.2 million Egyptian Pounds over the construction cost of Alt-B of 62.6 million Egyptian Pounds. On the other hand, Alt-C requires larger airport operation cost as compared with Alt-B.

These demerits are not considered serious as compared with following advantage points;

- Increased employment opportunities
- Convenience for both Alexandria and New Ameriyah City
- Flexibility in an emergency, maintenance work, etc. which require closure of one airport
- Flexibility in determination and timing of maintenance or abolition of Nozha airport depending on actual demand, social changes, progress of the regional development, etc.



LOCATION MAP



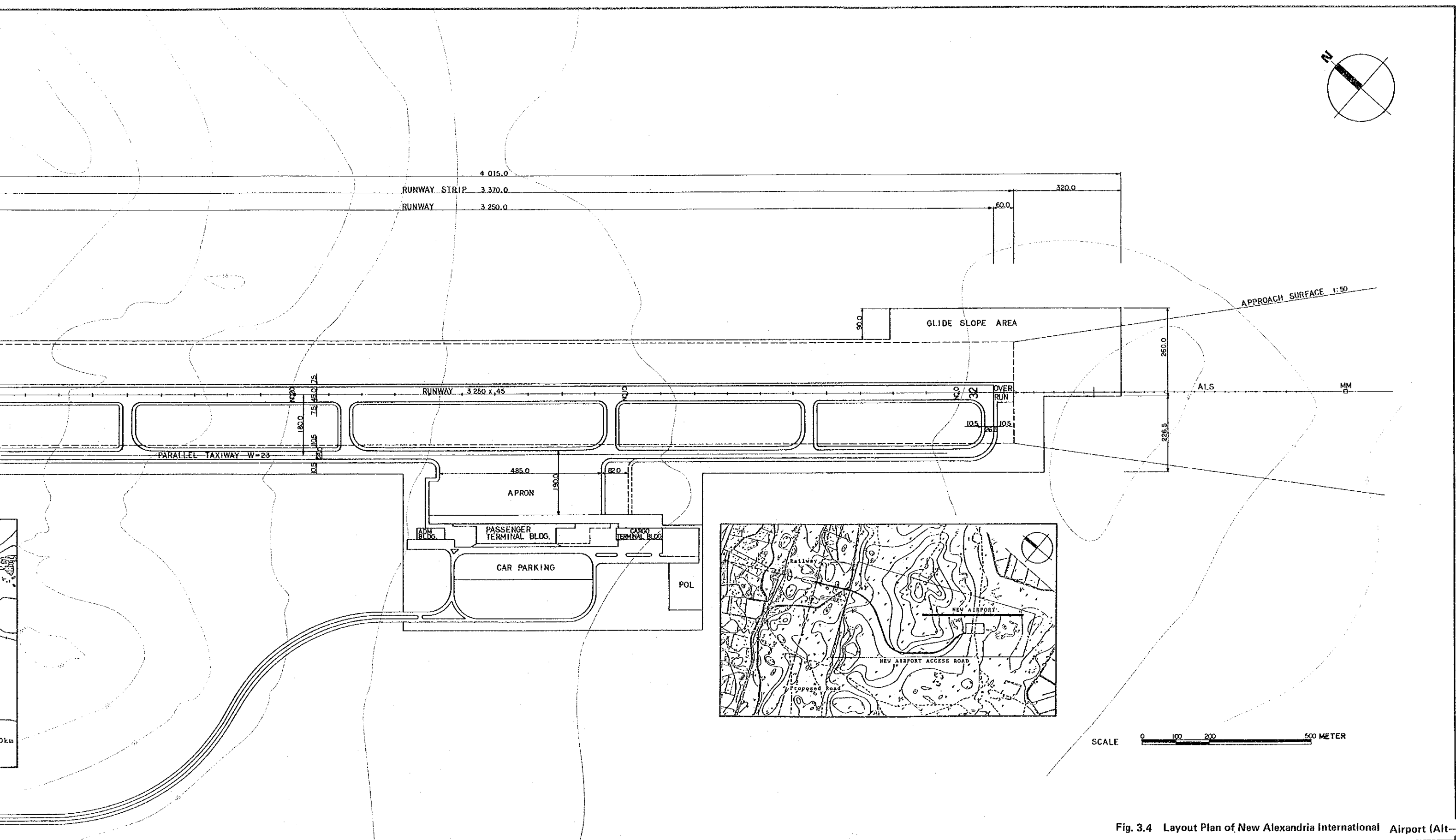


Fig. 3.4 Layout Plan of New Alexandria International Airport (Alt-B)

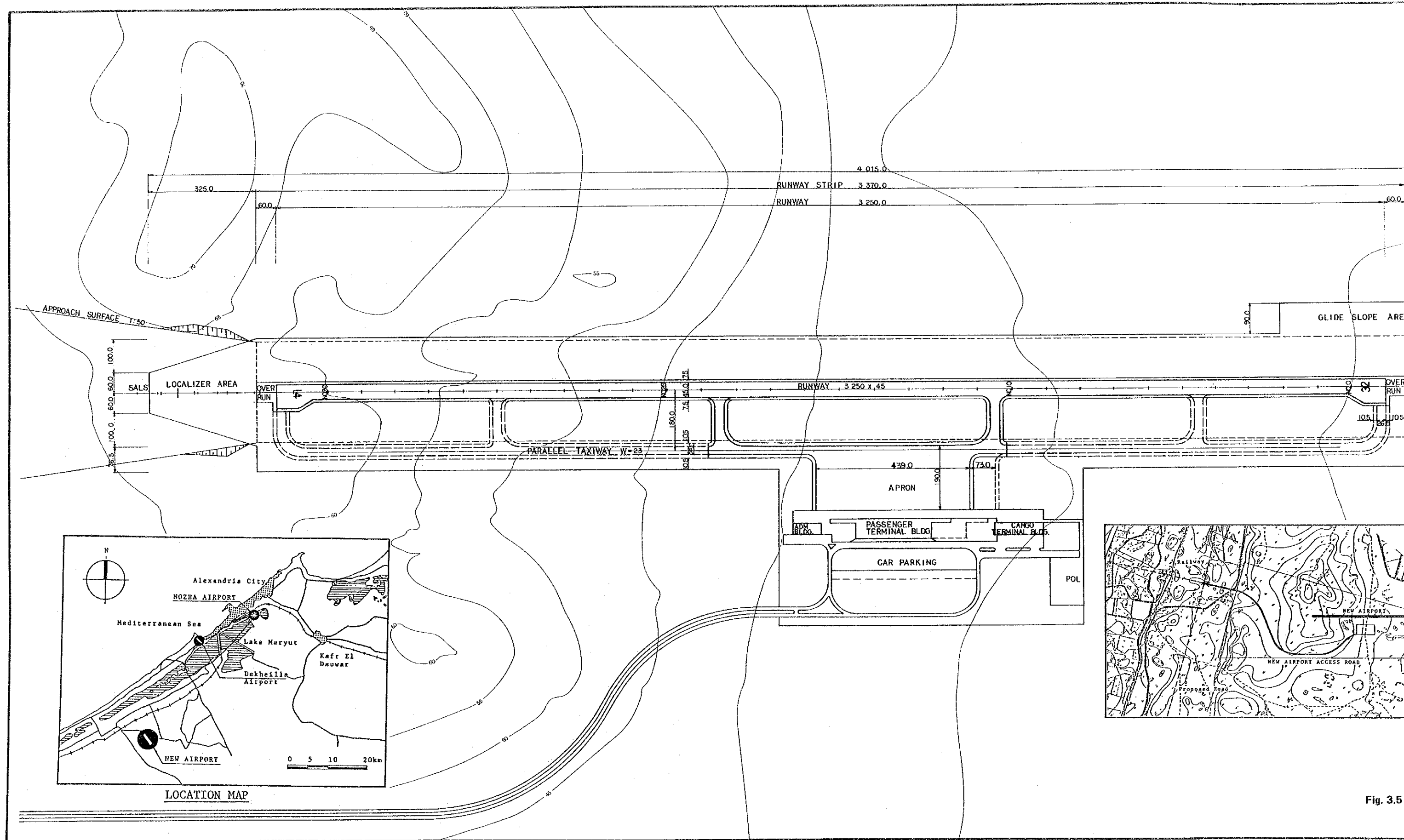


Fig. 3.5

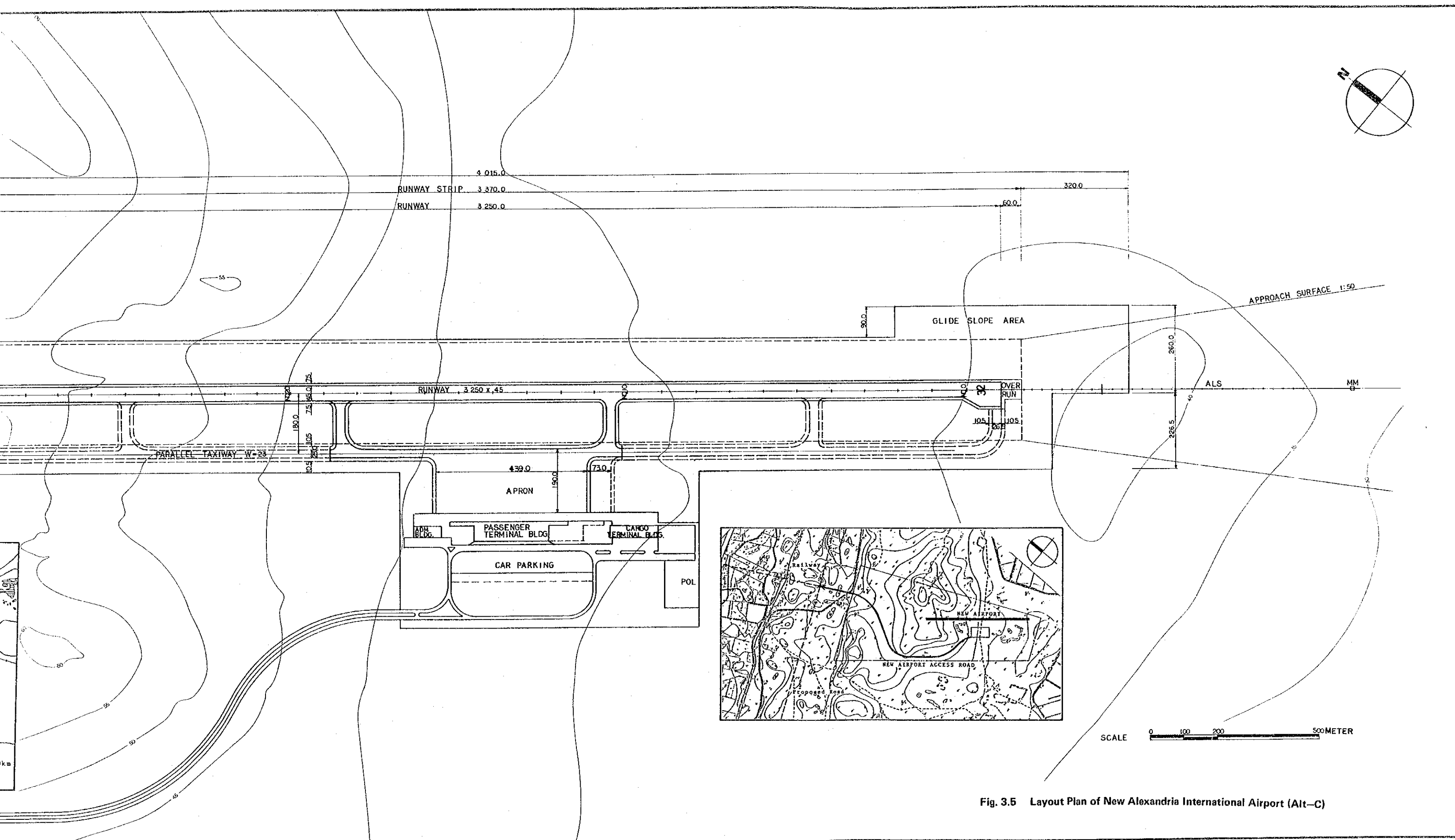


Fig. 3.5 Layout Plan of New Alexandria International Airport (Alt-C)

3.4 Economic and Financial Analyses for the Selection of Alternatives

The preliminary economic and financial analyses are carried out to select the most economically and financially feasible scheme from the following alternatives.

- Alt-A: Redevelopment of Nozha airport
- Alt-B: Construction of a new airport to replace Nozha airport
- Alt-C: Redevelopment of Nozha airport for domestic service and construction of a new airport for international service.

3.4.1 Economic Analysis

The costs in the preliminary economic analysis cover construction, operation and maintenance of the project.

The benefits include the following:

- Accommodation of overflow demand over Without Project Case
- Time saving at the airport
- Reduction of the operation cost by the introduction of wide body aircraft

Economic feasibility is preliminarily assessed based on the financial prices.

The result of the preliminary economic analysis indicates that the economic internal rate of return (EIRR) of Alt-C is 12.3%, which is the highest EIRR among all the alternatives and that this alternative is economically feasible. Although the total construction cost of Alt-B is lower than that of Alt-C, the higher initial cost gives Alt-B a lower EIRR of 12.0%. Alt-A is clearly inferior to the other alternatives since it has an EIRR of only 11.0%.

The detailed financial analysis will be recalculated on the master plan and the economic feasibility will be assessed based on the economic prices. It is, therefore, the EIRR on the selected alternative will be changed, but this change will not affect the rank of alternatives.

3.4.2 Financial Analysis

The financial analysis is also carried out in order to compare Alt-B and Alt-C in terms of the present value of total expenditure for the project because Alt-C will require duplication of airport operations which is not required by Alt-B. All costs are discounted at the prime rate of 13% in Egypt and compared at the present value.

Although Alt-C requires operation and maintenance costs of about 0.4 million Egyptian Pounds more than Alt-B, Alt-C requires 1.5 million Egyptian Pounds less in total expenditure including construction, operation and maintenance costs for Phases I and II. It is considered that the higher operation and maintenance costs in Alt-C are offset by the lower present value of the construction cost.

3.4.3 Conclusion

- a) Alt-C is the most economically favourable alternative among the alternatives and also an economically feasible alternative because the EIRR of Alt-C is greater than the opportunity cost of capital in Egypt.
- b) Alt-C requires higher operation and maintenance costs, but is financially superior to other alternatives in terms of total project cost throughout the entire project period.
- c) Alt-A is inferior to other alternatives in all the economic evaluation items.

3.5 Comparative Evaluation of Alternative Plans

The comparative evaluation results of alternative plans are summarized in Table 3.5 based on the site survey and study results on Nozha airport and construction of a new airport.

Alt-C, which is to continue Nozha airport for domestic service by maintaining its serviceability through short-term development works, and to construct a new airport for international service including a limited domestic service for New Ameriyah City and the North-West Coast regional development area, is selected for the following reasons.

- (1) The construction cost for Phase I development work in Alt-C totals 57.4 million Egyptian Pounds covering 54.4 and 3 million Egyptian Pounds for the new airport and Nozha airport respectively. The cost is 5.2 million Egyptian Pounds cheaper than Alt-B of new airport construction only. Alt-C is 3.1 million Egyptian Pounds greater than Alt-B in terms of total construction cost including Phase II development work. However, Alt-C (costing 36 million Egyptian Pounds) is 2 million Egyptian Pounds cheaper than Alt-B in terms of present value.
- (2) Nozha airport has disadvantages in terms of social, geological and topographical conditions in its ability to cope with future demand or any unexpected change in demand.

The compensation for the removal of the existing houses around old marine airport and on the northwest side of runway 04 is a prerequisite for Phase I development work of Nozha airport (Alt-A).

At present, considerably high maintenance cost in comparison with the size of the airport is required for mechanical drainage system with a pumping facility, periodical pavement overlay work to combat land settlement and removal of weeds in the reclamation area.

Almost all the existing airport facilities are old and are insufficient for any increase in future demand including international flights. Therefore, Alt-A will require large-scale redevelopment work almost as large as the construction of a new airport and countermeasures to overcome the abovementioned geological and topographical conditions.

These works shall be carried out without interruption of airport operation, and therefore night-time work or airport closure will be necessary.

- (3) The adjacent area of about 600 ha. including the residential area of 60 ha. will be affected by aircraft noise because Nozha airport is located in Alexandria City.

This will possibly cause some problems such as compensation for noise pollution, no-night operation and demands for the airport replacement.

In order to alleviate the above-mentioned problems as much as possible and to ensure aircraft operation, land use regulation in the airport neighboring area and height restriction of structures must be strictly enforced.

- (4) In case of the construction of a new airport, coordination can be made with land use in the airport vicinity from now. Effort can be made to harmonize the airport with the surrounding area within the framework of the regional development of New Ameriyah City and North-West Coast area, and to establish a regional plan that is mutually convenient to both sides.

The construction of a new airport is cheaper than the redevelopment of Nozha airport and involves none of the difficulties which may occur in the redevelopment of Nozha airport during its construction.

- (5) At the existing Nozha airport, the renovation work of the existing passenger terminal building, construction of a new control tower and overlay work for the pavement area only are required in order to cope with 400,000 to 700,000 domestic air traffic passenger demand in the future. The simultaneous operation of two airports is very convenient for domestic passengers from the viewpoint of accessibility and time-distance to the airport. They are also complementary to each other in terms of airport operation without any disruption. The new airport will also benefit Egypt as an alternate international airport with 24 hour operation.

If it is considered Nozha airport should be replaced for any reason, the new airport will accommodate all the functions of Nozha airport without difficulty.

Alt-C therefore, has many advantages for flexibly coping with the changes of air traffic demand and social situation.

Table 3.5 Comparison Table of Alternative Airport Development Concepts

Alternative Airport Development Scheme Comparison Item	ALT. - A Nozha Airport (International and Domestic)		ALT. - B New Airport (International and Domestic)		ALT. - C Nozha Airport and New Airport	
	Nozha Airport (Domestic)		New Airport (International and Domestic)		Nozha Airport (Domestic)	
1. Aerodrome Data	NOZHA AIRPORT	NEW ALEXANDRIA INTERNATIONAL AIRPORT	NOZHA AIRPORT	NEW ALEXANDRIA INTERNATIONAL AIRPORT	NOZHA AIRPORT	NEW ALEXANDRIA INTERNATIONAL AIRPORT
1. Airport Name (Tentative)						
2. Airport location	31° 11' 00" N 29° 56' 45" E	30° 55' 00" N 29° 43' 00" E	31° 11' 00" N 29° 56' 45" E	30° 55' 00" N 29° 43' 00" E	31° 11' 00" N 29° 56' 45" E	30° 55' 00" N 29° 43' 00" E
3. Airport elevation	- 3.35m (-11ft)	42.0m (138ft)	- 3.35m (-11ft)	42.0m (138ft)	- 3.35m (-11ft)	42.0m (138ft)
4. Airport reference temperature	30.6°C	30.6°C	30.6°C	30.6°C	30.6°C	30.6°C
5. Aerodrome reference code	4 E	4 E	4 E	4 E	4 D	4 E
6. Runway designation number	Runway 04/22 Runway 18/36	Runway 14/32	Runway 04/22 Runway 18/36	Runway 14/32	Runway 04/22 Runway 18/36	Runway 14/32
7. ILS Category	Category I	Category I	Category I	Category I	Non precision	Category I
8. Runway dimension	1,440m x 30m 3,000m x 45m	3,250m x 45m	1,440m x 30m 3,000m x 45m	3,250m x 45m	1,440m x 30m 2,200m x 45m	3,250m x 45m
9. Airport property area	1,300 ha	200 ha	1,300 ha	200 ha	350 ha	1,300 ha
II. Aircraft Operational Considerations						
1. Obstacles	x	None	x	None		None
	- RWY 04 Approach Surface: Trees and lighting poles to be removed - Inner Horizontal Surface: Chimneys and antenna - RWY 18 Approach Surface: Many buildings, trees, mosque, for instrument approach.				- RWY 04 Approach Surface: Trees and lighting poles to be removed - RWY 18 Approach Surface: Many buildings, Trees, mosque, for instrument approach.	

Table 3.5 Cont'd

Alternative Airport Development Scheme Comparison Item	ALT. - A Nozha Airport (International and Domestic)		ALT. - B New Airport (International and Domestic)		ALT. - C Nozha Airport and New Airport	
	Nozha Airport (Domestic)		New Airport (International and Limited Domestic)		Nozha Airport (Domestic)	
2. Aircraft operations procedures	X	- Establishment of aircraft operations procedures will be limited to southern side due to the town-ship on the north side. - Establishment of ILS RWY 22 approach is difficult due to danger area HE/D12. - Danger Area HE/D12	- No restriction, except circling area to be limited to the east side.	- No restriction, except circling area to be limited to the east side.	- Establishment of aircraft operations procedures will be limited to southern side due to the town-ship on the north side.	- No restriction, except circling area to be limited to the east side.
3. Air space utilization	X	- Danger Area HE/D12	- Close coordination with Air Force to be necessary for air space use.	- Close coordination with Air Force to be necessary for air space use.	- Danger Area HE/D12	- Close coordination with Air Force to be necessary for air space use.
4. Cross-wind coverage		- Small aircraft requires both two runways. RWY 04/22 13kt 20kt 92.6% 99.7% RWY 18/36 94.5 99.4 Total 97.2 99.9	RWY 14/32 13kt 20kt 96.3% 99.4%	Same as ALT.-A	Same as ALT.-A	Same as ALT.-B
5. Main approach and take-off runway		Runway 04	Runway 32	Runway 04	Runway 04	Runway 32
Main Disadvantages	X	- Strict control of obstacles (Height restrictions) to be mandatory. - Danger area HE/D12 and township limit aircraft operations procedures	- No problem	- No problem	- Strict control of obstacles (Height restrictions) to be mandatory	- No problem
III. Airport Development Considerations		- 7km from Alexandria station - About 50km from North West Coast	- 45km from Alexandria station - About 10km from North West Coast Development Area - Near from the center of industrial business area	- Same as ALT.-A (7km from Alexandria city, where is major market for domestic flight.)	- Same as ALT.-A (7km from Alexandria city, where is major market for domestic flight.)	- Same as ALT.-B

Table 3.5 Cont'd

Alternative Airport Development Scheme Comparison Item	ALT. - A Nozha Airport (International and Domestic)		ALT. - B New Airport (International and Domestic)		ALT. - C Nozha Airport and New Airport	
	Nozha Airport (International and Domestic)		New Airport (International and Domestic)		Nozha Airport (Domestic)	New Airport (International and Limited Domestic)
2. Airport accessibility from/to Alexandria from/to Northwest Coast	x	- Good - Further for both International and Domestic Passengers	x	- Further for both International and Domestic Passengers - Good	- Good - Further, but for a part of dom. pax from/to NW coast	- Further for International Passengers - Good
3. Expansibility	x	- Terminal area is limited to accommodate unexpected demand. - Further extension of the runway requires relocation of desert road, drinking water canal, and reclamation.	x	- No restrictions - Close coordination between ECAA and military to be necessary for airport development.	- No problem (No large-scale expansion of terminal area and no runway extension to be required for the domestic demand.) - Possible to replace the new airport when large-scale development is required.	- No restrictions - Close coordination between ECAA and military to be necessary for airport development.
4. Others	x	- Longer access distance from North Coast Development Area. - Lesser expansibility for unexpected future demands.	x	- Longer access distance from Alexandria city.	- The best airport accessibility due to short distance to demand center: Nozha (Alexandria city) New Airport (New Ameriyah city, Northwest Coast Development area)	
Main Disadvantages						
IV. Operation and Maintenance of Airport	x	- No alternate airport in the vicinity.	x	- Same as ALT.-A		
1. Countermeasure for the airport closure.	x	- Phase I: 270 Phase II: 360		- Phase I: 270 Phase II: 360		Phase I: 230 Phase II: 300
2. Staff required for airport operation and maintenance (persons)	x	- Weak foundation and airport elevation below sea level require higher operation and maintenance cost.				
3. Others						- Operation of two airports requires duplication of airport facilities, staffs, cost for operation and maintenance, etc.
V. Social Considerations						
1. Aircraft noise influence	x	- Area influenced by aircraft noise (more than WECNL 70): 600 ha. including 60 ha. of residential area.		- None.		- Less aircraft noise influence compared to ALT.-A due to small domestic air traffic.
	x					- None.

Table 3.5 Cont'd

Alternative Airport Development Scheme Comparison Item	ALT. - A Nozha Airport (International and Domestic)	ALT. - B New Airport (International and Domestic)	ALT. - C Nozha Airport and New Airport (International and Limited Domestic)	
			Nozha Airport (Domestic)	New Airport (International and Limited Domestic)
2. Land use	<ul style="list-style-type: none"> - Many houses and small buildings exist within contour line of WEPNL 70 and sound proof construction or relocation might be required in the future. - Restrictions of height and smoke to be given to the industrial development area. - Strict land use regulation being compatible with the airport surrounding area to be planned. 	<ul style="list-style-type: none"> - Coordination with other projects to be necessary. - Land use regulation to be established. - Possible to sell the existing airport property (Nozha) area for other land uses. 	- Same as ALT	- Same as ALT-B
3. Compensations	<ul style="list-style-type: none"> - Marine club, boat house, fish farm, road, drinking water canal, lighting poles, house to be compensated. 	- None.	- None. (No runway extension)	- None.
Main Disadvantages	<ul style="list-style-type: none"> - High compensation cost to be necessary for aircraft noise measures. - More facilities to be compensated. - Restriction of building height, land use regulation and its execution are first priority. 	- No problem	- Compensation for aircraft noise might be required in the future. Possible to move to the new airport when serious noise problem arises.	- No problem.
VI. Constructional Considerations	<ul style="list-style-type: none"> - Runway extension involves reclamation from the former marine airport (24 ha) and soil improvement (replacement and sand drain). 	<ul style="list-style-type: none"> - Longer runway length to be required. - Maximum runway slope of 1.2% is applied for central portion due to the existing terrain. 	- No runway extension	- Same as ALT.-B
i. Topographical and geological conditions				

Table 3.5 Cont'd

Alternative Airport Development Scheme	ALT. - A Nozha Airport (International and Domestic)		ALT. - B New Airport (International and Domestic)		ALT. - C Nozha Airport and New Airport	
	Nozha Airport (Domestic)		New Airport (International and Domestic)		Nozha Airport (International and Domestic)	
Comparison Item						
2. Special measures to be taken	<ul style="list-style-type: none"> - Additional pump station to be required. - Approach lighting system to be installed in the lake. - Land acquisition of 5.2 ha to be required. - Establishment of obstacle limitation surfaces and adjustment of land use in adjacent area to be required, prior to the runway extension. - Diversion of the drinking water canal. 	<ul style="list-style-type: none"> - Existing terrain call for large scale of earth work. (1 million cu. m. of cut) - Expansion of the airport property area presently reserved to be necessary. 	<ul style="list-style-type: none"> - None. 	<ul style="list-style-type: none"> - Same as ALT. - B 		
Main Disadvantages	<ul style="list-style-type: none"> x Reclamation and soil improvement to be necessary for RWY extension. x Longer construction period will be required to avoid a conflict with the existing air traffic. 	<ul style="list-style-type: none"> x Existing terrain calls for large scale earth work and steep gradient but less than the allowable maximum slope. x Longer runway length to be required. 	<ul style="list-style-type: none"> x Existing terrain calls for large scale earth work and steep gradient but less than the allowable maximum slope. x Longer runway length to be required. 	<ul style="list-style-type: none"> - No problem. 	<ul style="list-style-type: none"> - Same as ALT.-B. 	

(Unit: Million Egyptian Pounds)

Table 3.5 Cont'd

Alternative Airport Development Scheme Comparison Item	ALT. - A Nozha Airport (International and Domestic)		ALT. - B New Airport (International and Domestic)		ALT. - C Nozha Airport and New Airport New Airport (International and Limited Domestic)					
	Phase-I	Phase-II	Phase-I	Phase-II	Phase-I	Phase-II	Total			
	Total		Total		Phase-I	Phase-II	Total			
3. Construction Cost (Preliminary estimate)										
(1) Land Acquisition and Compensation Cost	4.6	-	4.6	-	-	-	-			
(2) Civil Works	31.2	5.1	36.3	20.9	3.1	8.5	25.3			
(3) Building and Equipment Works	21.9	9.1	31.0	21.4	8.9	8.7	29.3			
(4) Navais Works	6.1	3.8	9.9	9.1	5.6	7.7	17.1			
(5) Utilities Works	3.4	2.6	6.0	3.8	2.6	2.9	6.5			
(6) Special Service Facility Works	1.8	0.3	2.1	1.7	0.4	0.4	2.1			
Total of Construction Works	69.0	20.9	89.9	56.9	20.6	28.2	80.3			
Contingency (10%)	6.9	2.1	9.0	5.7	2.1	2.8	8.1			
GRAND TOTAL (excludes administration and engineering service cost)	x	75.9	23.0	98.9	62.6	22.7	85.3	57.4	31.0	88.4
4. Economic Internal Rate of Return (EIRR)	x		Low		Middle		High			

Chapter 4 AIRPORT MASTER PLAN FOR THE SELECTED SCHEME

Chapter 4 AIRPORT MASTER PLAN FOR THE SELECTED SCHEME

4.1 Airport Facilities

The airport master plan for the selected scheme, which is to continue Nozha airport for domestic service and to construct a new airport for international service including a limited domestic service for North-West Coast regional development area, New Ameriyah city, etc., is prepared for the target years 2000 (Phase I) and 2010 (Phase II).

The new airport is aimed to handle international and limited domestic passengers numbering 1.6 million and 2.4 million annually in Phases I and II, respectively. The largest aircraft anticipated is B-747 class and the longest route is Alexandria to London. The runway is 3,250 m long (Code 4 E) and precision approach category I is available.

Nozha airport is aimed to handle domestic passengers numbering 0.4 million and 0.7 million annually in Phases I and II, respectively. The largest aircraft anticipated is B-767 class and A-300 class in Phases I and II, respectively, and the longest route is Alexandria to Aswan. The runway is 2,200 m long (Code 4 D) and non-precision, instrument approach is available.

4.1.1 New Airport

The new airport is located at one-third area of 36 km² (6 km x 6 km) which has been reserved in desert area approx. 45 km south west of Alexandria city and is completely separated from the adjacent military airport which is now under construction.

The layout plan of the new airport and the summary of airport facilities are shown in Fig. 4.1 and Table 4.1 respectively.

Supplemental explanations are as follows:

(1) Runway Location

The runway of 3,250 m length is located at 30° 55' 15" N and 29° 42' 55" E, and oriented N 142° E considering the following factors:

- Maximum utilization of air space for both the new and military airports
- Construction of all the airport facilities within the reserved area
- Construction economy (less earth work volume)
- Compatibility with the land use plan in the surrounding area

The runway is located in parallel and 2,000 m apart from the adjacent military runway and the southern threshold is staggered 1,225 m south of the southern threshold of the military runway.

(2) Runway Longitudinal Slope and Earth Work Volume

The existing terrain on the runway is gently undulated with an average elevation of approx. 50 m above mean sea level. The runway elevation and the longitudinal slope are planned in order to carry out the earth work as economically as possible. The runway elevation at northern and southern thresholds are 61.5 m and 37.0 m, respectively and the longitudinal slope is 0.75 percent down toward the south. The cut volume of the earth work is estimated to be about 2.1 million cu.m in Phase I development.

(3) Terminal Area

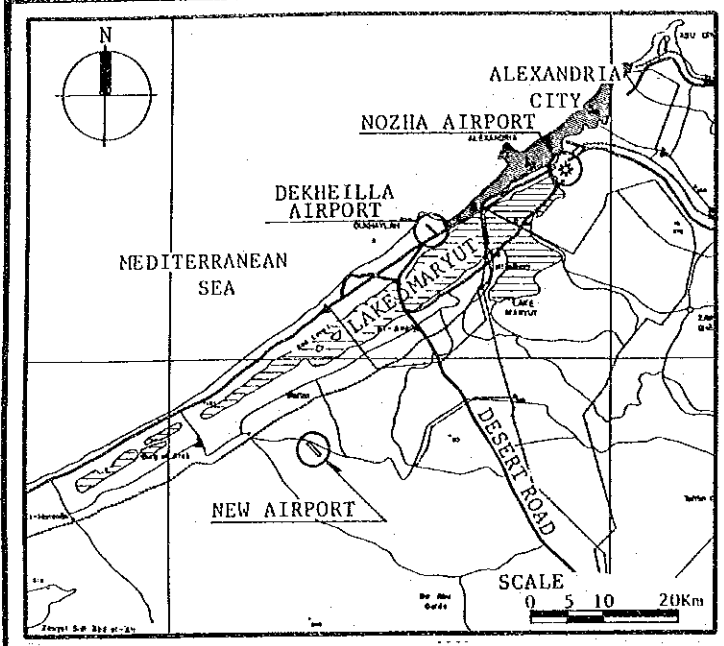
The terminal area which is located at the center and to the west of the runway where the minimum earth work volume is expected will be linked to the already planned road between the desert road and New Ameriyah city by a 4.3 km long access road. The terminal area which will accommodate passenger service and cargo handling facilities, airport operation and administration facilities, and ancillary service facilities for civil air transport will be capable of orderly expansion at least up to the year 2010 even if the domestic demand at Nozha airport is transferred to the new airport.

(4) Public Utilities

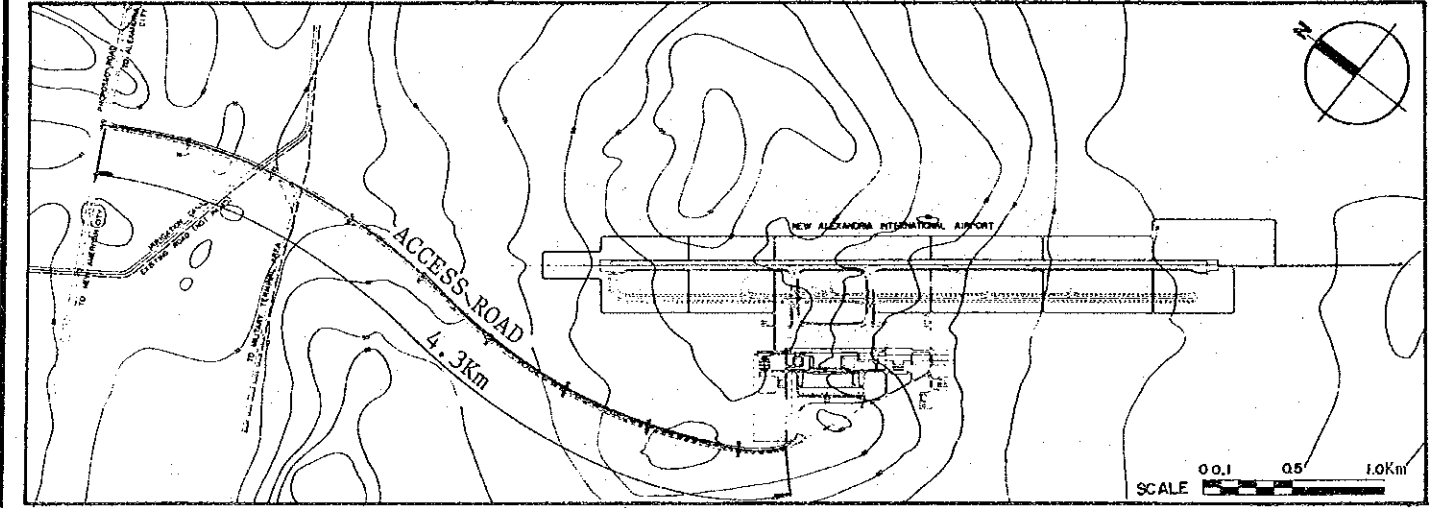
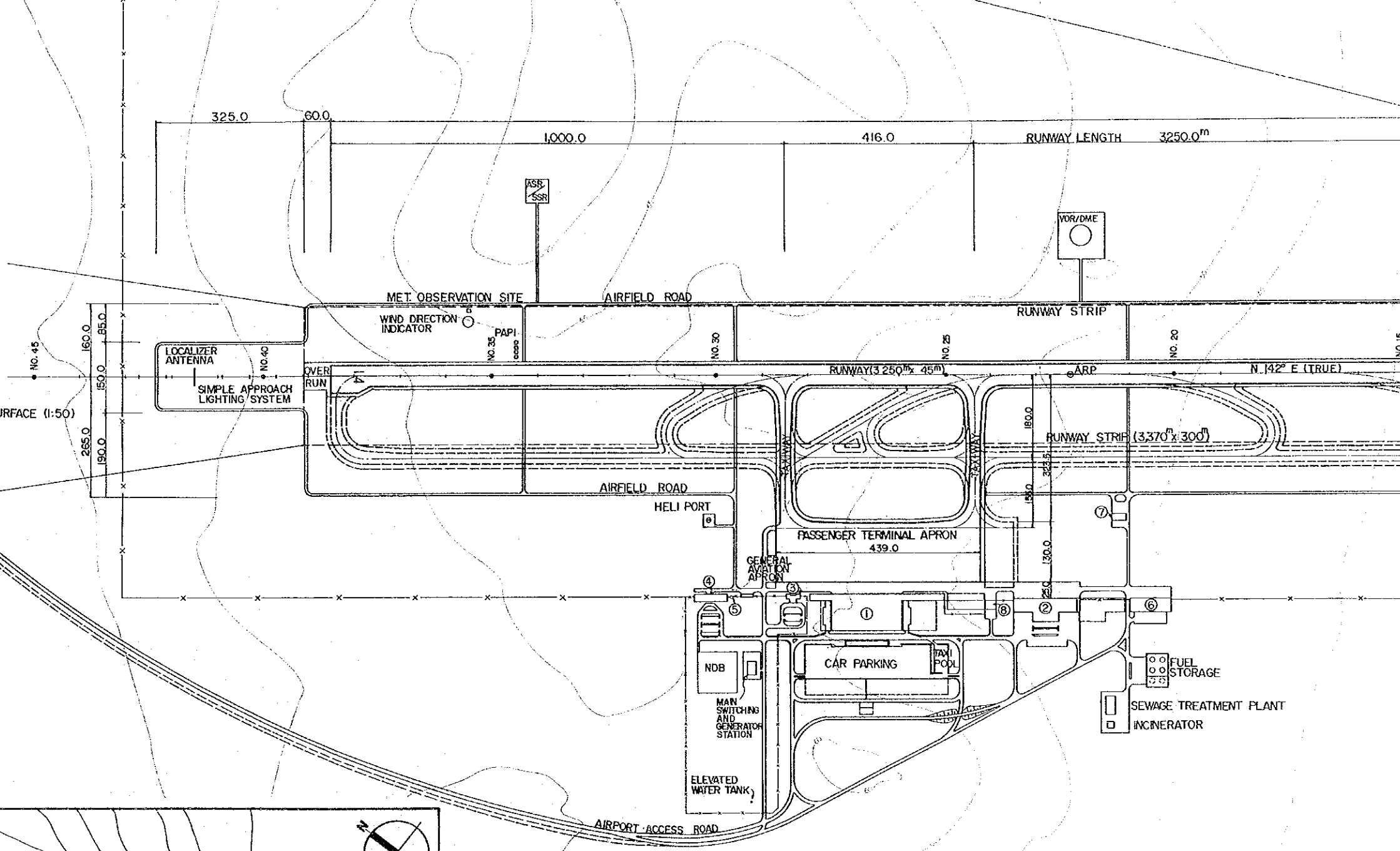
The facilities for the public utilities are separately located from the public access area in order to ensure security. The elevated water tank and the main switching/generator station are planned near the airport access road for easier connection to the national network. The sewage treatment plant and incinerator are located down the prevailing wind. The interface point for power and water lines is established at the airport boundary beside the airport access road.

(5) Air Navigation Systems

Air navigation systems necessary for the precision approach Category I are planned in the airport except for an ILS outer marker station and a collocated compass locator for final approach guidance, which are unavoidably located outside the airport.

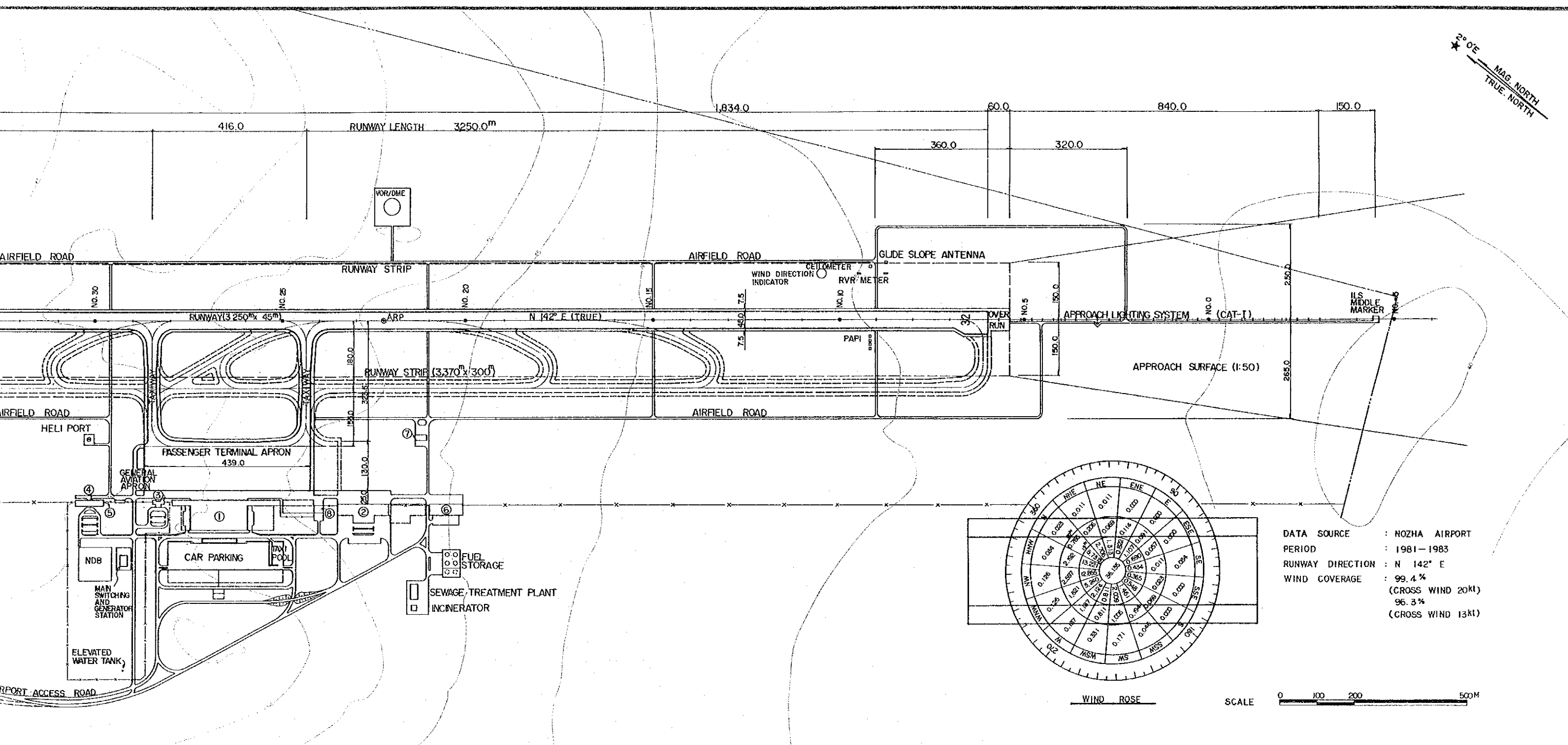


LOCATION MAP APPROACH SURFACE (1:50)

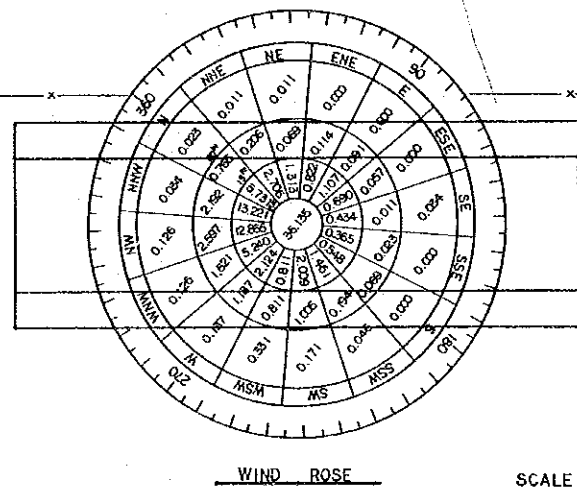


BASIC DATA TABLE	
RUNWAY DATA	
EFFECTIVE RUNWAY GRADIENT	0.75 %
WIND COVERAGE	20KNOT 99.4 % 13KNOT 96.3 %
INSTRUMENT RUNWAY	✓
PAVEMENT STRENGTH	B-747 AND DC-10
APPROACH SURFACE	1/50
RUNWAY LIGHTING	HIRL
RUNWAY MARKING	ALL WEATHER
NAVIGATIONAL AIDS	ILS, ALS, PAPI

BASIC DATA TABLE	
AIRPORT DATA	
AIRPORT ELEVATION	50.5m
AIRPORT REFERENCE POINT (ARP) COORDINATES	LAT. 30° 55' 15" LONG. 29° 42' 55"
AIRPORT AND TERMINAL NAV AIDS	ASR/SSR, NDB, VOR/DME
AIRPORT REFERENCE TEMPERATURE	30.6°C



2° 0'E
MAG NORTH
TRUE NORTH



DATA SOURCE : NOZHA AIRPORT
 PERIOD : 1981-1983
 RUNWAY DIRECTION : N 142° E
 WIND COVERAGE : 99.4%
 (CROSS WIND 20kt)
 96.3%
 (CROSS WIND 13kt)

SCALE 0 100 200 500M

BASIC DATA TABLE	
RUNWAY DATA	
EFFECTIVE RUNWAY GRADIANT	0.75%
WIND COVERAGE	20KNOT 99.4% 13KNOT 96.3%
INSTRUMENT RUNWAY	✓
PAVEMENT STRENGTH	B-747 AND DC-10
APPROACH SURFACE	1/50
RUNWAY LIGHTING	HIRL
RUNWAY MARKING	ALL WEATHER
NAVIGATIONAL AIDS	ILS, ALS, PAPI

BASIC DATA TABLE	
AIRPORT DATA	
AIRPORT ELEVATION	50.5m
AIRPORT REFERENCE POINT (ARP) COORDINATES	LAT. 30° 55' 15" LNG 29° 42' 56"
AIRPORT AND TERMINAL NAV AIDS	ASR/SSR, NDB, VOR/DME
AIRPORT REFERENCE TEMPERATURE	30.6°C

LEGEND	
	AIRPORT BOUNDARY FENCE
	SECURITY FENCE
	GROUND CONTOURS
	PHASE I DEVELOPMENT
	PHASE II DEVELOPMENT

BUILDINGS	
①	PASSENGER TERMINAL BUILDING
②	CARGO TERMINAL BUILDING
③	V.V.I.P. TERMINAL BUILDING
④	ADMINISTRATION BUILDING
⑤	CONTROL TOWER
⑥	CATERING BUILDING
⑦	FIRE STATION
⑧	GSE MAINTENANCE SHOP

Fig. 4.1 Airport Layout Plan (New Airport)

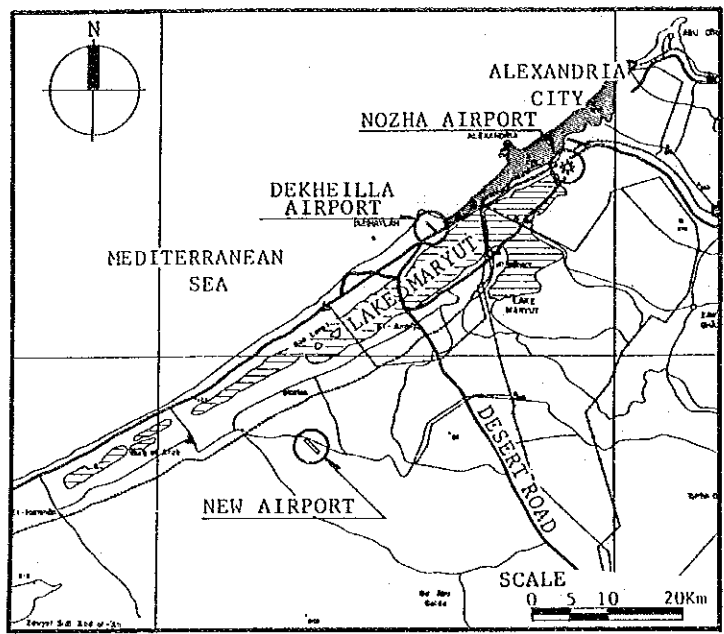
Table 4.1 Outline of New Airport in Phase I

"X" indicates services available

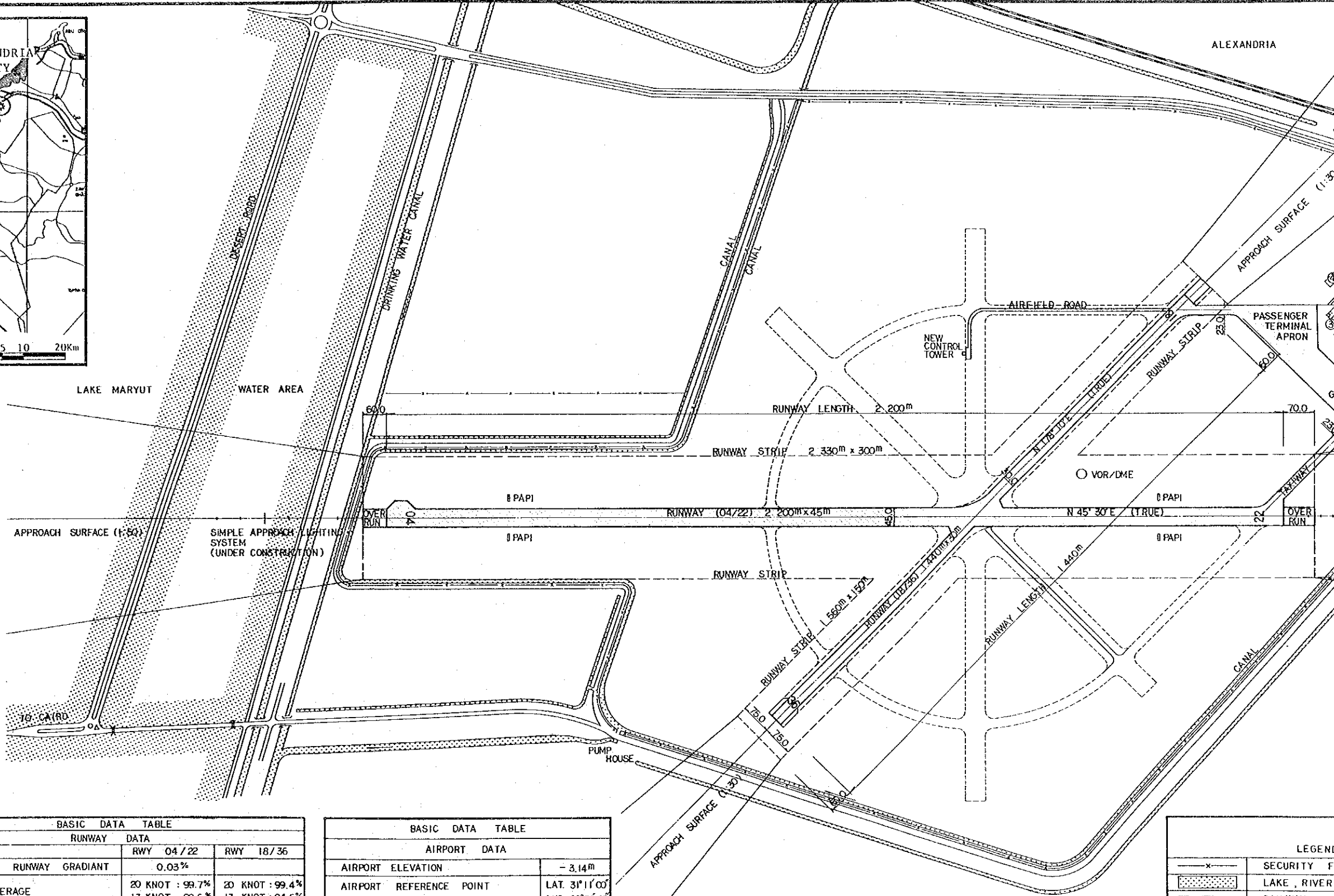
Country	Name of Airport	INT./DOM. ICAO CODE		Commenccment of Services	Airport Total Area			Aerodrome Ref. Point	Airport Elevation	Runway Orientation	Aerodrome Ref. Temp.	Operation Hours	Seasonal Availability	Notes: Control Agency; Egyptian Civil Aviation Authority						
		INT./DOM.	4E		1,300 ha	1,300 ha	50.5 m (166 ft)								N142°E (TN)	30.6°C	24 hours	All Seasons		
Name	City/Town	Population	Distance to Airport			Railway	Transportation		Wind Coverage	Operational Minimum	Approach Category; Instrument, Precision Approach									
			24 NM by Road (1982)	Railway	Taxi		Bus	Runway Procedure				OCL								
Arab Republic of Egypt	Alexandria (Ameriyah)	2.6 Million (1982)	24 NM by Road	N.A.	X	X	96.3% (13kt) 99.4% (20kt)	14 32	VOR ILS VOR	583/583 CAT-C 294/173 583/464										
		NDB	VOR	DME	TACAN	ILS		LOCATOR	VHF D.F.											
		X	X	X	-	X		X												
		ASR	SSR	PAR	ASDE	ARTS		VHF A/G	AFS	TTY										
		X	X	-	-	-		X	X	X										
		ALS	SFL	SALS	ALB	CGL	RWL	RWTL	ORL	TDZL	REIL	DML	PAPI	TWL	TWCL	TGS	ABN	IWDI	AFL	O.L.
		X	-	X	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		RWY Surface Sensors			RVR	Ceillometer	WX-FAX	APT-RX	Radioonde	WX Radar	WX-TTY									
		X	X	X	X	X	X	X	X	X	X	X	X							
Note: Phase I: MLS																				
Note: Completion of Phase I development: End of 1991																				
Note: Drawn by JICA As of 1985																				
Annual Passengers (x 1,000)																				
Runway Strip	Size		Pavement		Note		2,500													
Runway	3,370m x 300m		-		-		2,000													
Taxiway	3,250m x 45m		Asphalt		-		1,500													
	600m x 23m		Asphalt		-		1,000													
Apron	Design Aircraft	Pavement		Area		57,100 m²														
		No. of Stands		Area		Self-manoeuvring														
		B747 class		2		Nose-in														
DC10 class		4		Concrete		Height: 31 m														
F27 class		1		-		CAT-8														
Basic Facilities																				
Passenger Bldg.	Size		Structure		RC															
Cargo Building	26,300 m²		RC		-															
Administration Bldg.	7,500 m²		S & RC		-															
Control Tower	2,700 m²		RC		-															
Fire Station	60 m²		RC		-															
P.O.L.	400 m²		2 Air Crash Tenders		CAT-8															
Hangar	790 cars		2 Fire Engines		-															
Carparking Lot	(Jet A1 2,900 kK)		-		-															
Other Facilities																				
Traffic Demand								1992	1995	2000	2005	2010								
LDG and TOF								-	9,430	11,030	11,150	12,790								
Annual Freight (ton)								-	37,040	50,070	66,100	87,140								
Annual DOM. Passengers INT.								-	30,000	40,000	60,000	70,000								
Annual INT. Passengers INT.								-	1,300,000	1,600,000	1,900,000	2,300,000								
Year								1983	1995	2000	2005	2010								

4.1.2 Nozha Airport

Nozha airport is planned to be utilized for domestic purposes only by the small-scale development in Phase I, provided that the necessary immediate works with the minimum investment to the existing facilities are implemented in order to cope with the increase in demand up to the beginning of year 1992, i.e., start of new airport operation. Hence, the basic dimensions of runways, taxiways and apron will be maintained as they are. Phase I development works will include pavement overlay works for runways, taxiways and apron, construction of a new control tower and its related equipment, and expansion of the car parking area. The airport layout plan and the summary of airport facilities of Nozha airport are shown in Fig. 4.2 and Table 4.2 respectively.



LOCATION MAP



BASIC DATA TABLE		
RUNWAY DATA		
	RWY 04/22	RWY 18/36
EFFECTIVE RUNWAY GRADIENT	0.03%	
WIND COVERAGE	20 KNOT : 99.7% 13 KNOT : 92.6%	20 KNOT : 99.4% 13 KNOT : 94.5%
INSTRUMENT RUNWAY	✓	×
PAVEMENT STRENGTH	A 300 CLASS	F 27 CLASS
APPROACH SURFACE	1:50	1:30
RUNWAY LIGHTING	HIRL	
RUNWAY MARKING	ALL WEATHER	
NAVIGATIONAL AIDS	ALS, PAPI	

BASIC DATA TABLE	
AIRPORT DATA	
AIRPORT ELEVATION	- 3.14 m
AIRPORT REFERENCE POINT (ARP) COORDINATES	LAT. 31° 11' 00" LNG. 29° 56' 45"
AIRPORT AND TERMINAL NAVAID	VOR/DME, NDB
AIRPORT REFERENCE TEMPERATURE	30.6°C

LEGEND	
	SECURITY FENCE
	LAKE, RIVER, CANAL
	RAILWAY
	PHASE I DEVELOPMENT
	PHASE II DEVELOPMENT

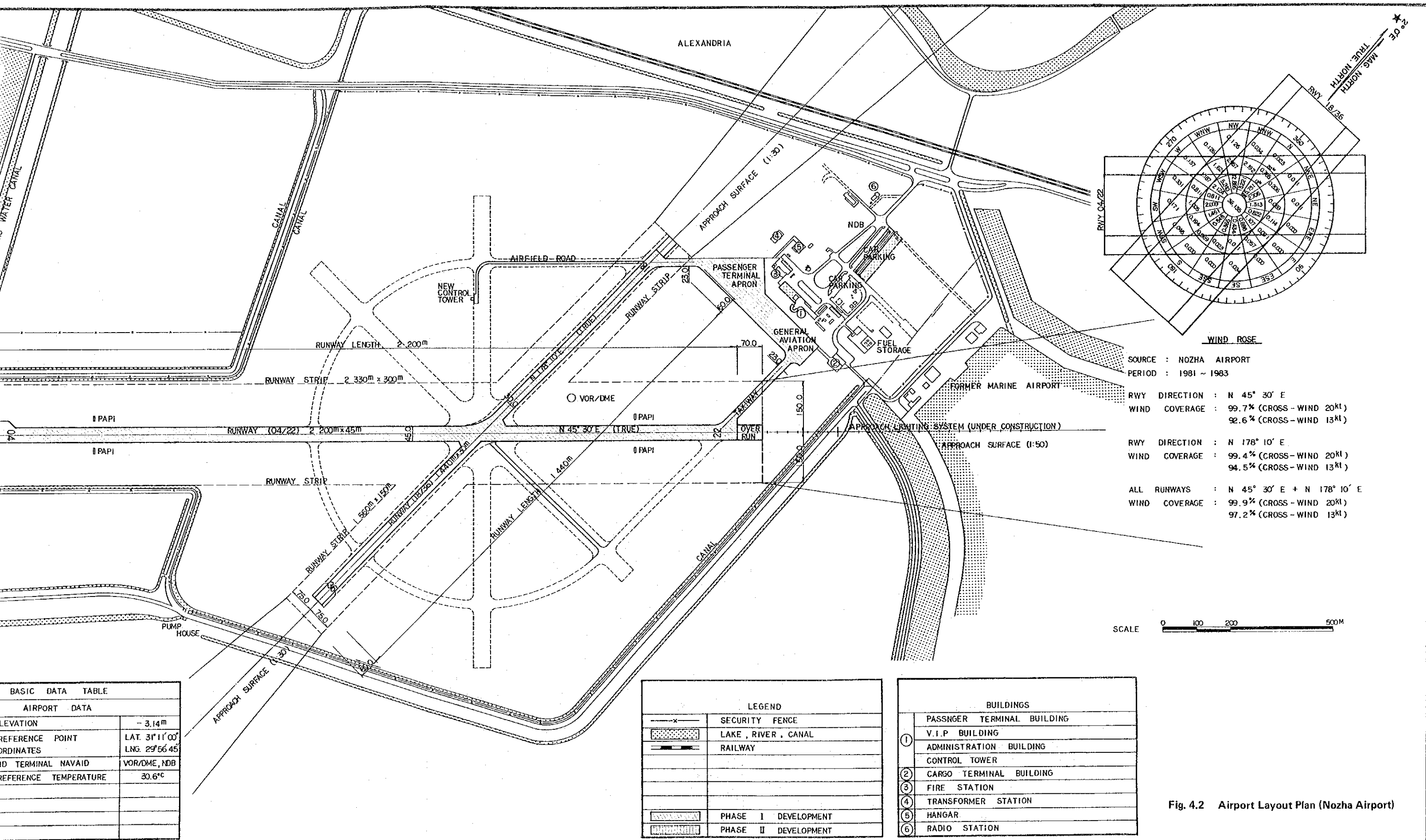


Fig. 4.2 Airport Layout Plan (Nozha Airport)

Fig. 4.2 Outline of Nozha Airport in Phase I

Country	Name of Airport	INT./DOM. ICAO CODE	Commemencement of Services	Airport Total Area			Aerodrome Ref. Point	Airport Elevation	Runway Orientation	Aerodrome Ref. Temp.	Operation Hours	Seasonal Availability	Note: Control Agency; Egyptian Civil Aviation Authority	
				Dom.	4D	354 ha								
Name	City/Town	Distance to Airport	Transportation			Wind Coverage		Operational Minimum					Note: Approach Category; Instrument, Non precision	
			Distance to Airport	Railway	Taxi	Bus	Runway	Procedure	OCL	Procedure	TY	TY		MICROWAVE
Arab Republic of Egypt	Alexandria (Nozha)	DOM. 4D	1945	354 ha			30°11'00"N 29°56'45"E	-3.35 m (-11 ft)	N43°30'E(MN) N176°10'E(MN)	30.6°C	-	All Seasons		
Alexandria	Population 2.6 Million (1982)	4 NM by Road	N.A.	X	Airline Transport	RWY 04/22 92.6% (13kt) 99.7% (20kt)	04/22 22 18/36	04 22	VOR	525/536				
Nav aids	NDB X ASR	VOR X SSR	DME X PAR	TACAN ASDE		ILS ARTS	LOCATOR VHF A/G 4 freq.	VHF D.F. AFS (VHF LINK, SSB) X	TY X	TY	MICROWAVE X	ATIS		
ATC/COM	ALS SFL RWY 22 X	SALS ALB RWY 04 X	CGL X	RWL X	RWCL RWTL	ORL TDZL X	REIL DML -	PAPI TWL X	TWCL TG -	IG ABN IWDI X	AFI O.L.			
Lights	RWY Surface Sensors X	RVR			Cellometer	WX-FAX X	AFT-RX -	Radiosonde -	WX-Radar -	WX-TTY X				
MET														
Air Navigation														
Runway Strip													Annual Passengers (x 1,000)	
Runway													800	
Taxiway													600	
Apron													400	
Fire Station													200	
P.O.L.													100	
Hangar													80	
Carparking Lot													1983 1985 1990 1995 2000 2005 2010	
Basic Facilities													Inauguration of the new airport	
													-	
Passenger Bldg.													1983 1985 1990 1995 2000 2005 2010	
Cargo Bldg.													5,526	
Administration Bldg.													3,450	
Control Tower													2,900	
Fire Station													380	
P.O.L.													600	
Hangar													900	
Carparking Lot													1,300	
Other Facilities													2 Air Crash Tenders 2 Fire Engines	
CAT-6													LDG and TOF	
JET A1 130 kL													81	
Fox Cilders													Annual Freight (ton)	
260 cars													81,436	
													Annual Passengers INT.	
													1,705	
													1983 1985 1990 1995 2000 2005 2010	
													2000	
													2005	
													2010	

"X" indicates services available

Note: Completion of Phase I development: End of 1991

Drawn by JICA As of 1985

4.2 Airspace Use

There is no obstruction which protrudes upon the obstacle limitation surfaces of the new airport.

A new air route can be established between Cairo and the new airport avoiding Danger and Prohibited areas to the west of Cairo airport.

Since there is no constraint which limits the establishment of aircraft operations procedures, very free procedures can be established for the new airport and ILS straight-in approach is possible for south approach. It is, however, noted that close coordination with the military will be required before the procedure establishment in order to effectively utilize the air space with the adjacent military runway.

At Nozha airport, however, lamp posts along the desert road and trees near runway threshold 22 infringe on the approach surfaces. These obstructions should be removed as soon as possible. Runway 18/36 is recommended to be used only as a non-instrument runway. This is because many houses, trees, a mosque, etc., infringe on the obstacle limitation surfaces for instrument approach and removal of those is considered to be impractical.

No problem is found in the existing air route connecting Cairo and Nozha airport, even after the new airport operation. It is possible to establish a VOR/DME straight-in approach for runway 04 at Nozha airport.

4.3 Aircraft Noise

The aircraft noise contours of the new airport are estimated for year 2000 and are shown in Fig. 4.3.

The new airport is located in a desert area dotted with only a few Bedouin houses and agricultural lands. Within an area covered by the noise contour of WECPNL 70, there are only a few dozen houses near Hawariya railway station and along the paved road.

It is judged that the new airport can be developed compatible with the existing land use in the area surrounding the airport.

The noise contour is based on the assumptions that 90 percent of landing and take-off operations will be made from the south and 10 percent from the north.

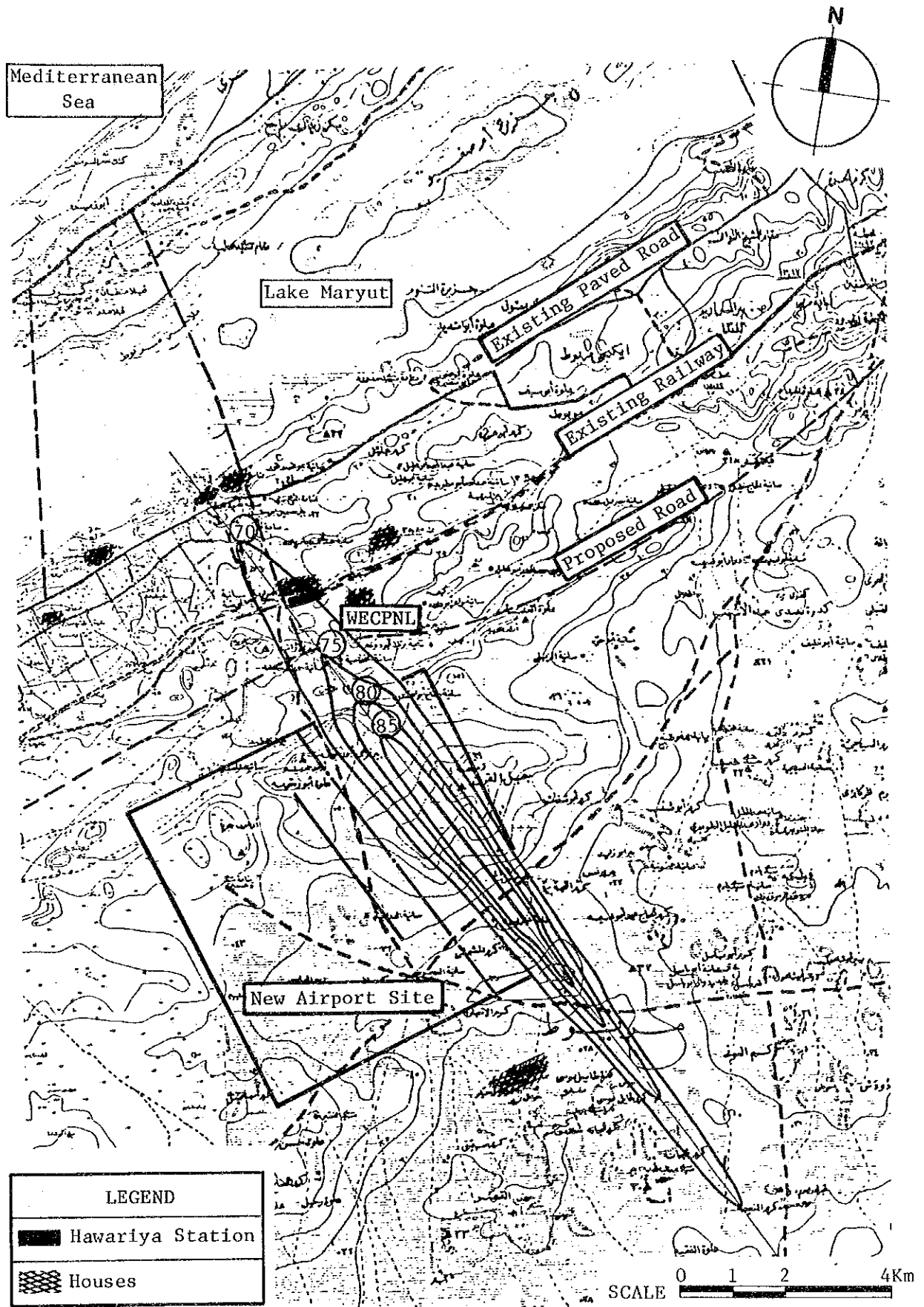


Fig. 4.3 Aircraft Noise Contours (Year 2000)

4.4 Land Use Planning of the Area Surrounding the Airport

The land use controls required for the area surrounding the new airport are classified into 4 categories and proposed as follows:

(1) Land Use Zoning

According to the land use plan "Comprehensive Plan Alexandria 2005", issued by the Alexandria Governorate, a part of the residential area and tourist villages which have been planned between the National railway and Mediterranean sea will be exposed to an estimated noise level of more than WECPNL 70. The modification of the future land use is proposed as shown in Fig. 4.4 based on the following criteria which are proposed taking into account the current land use controls for aircraft noise in Japan, France, etc.

- Proposed Criteria -

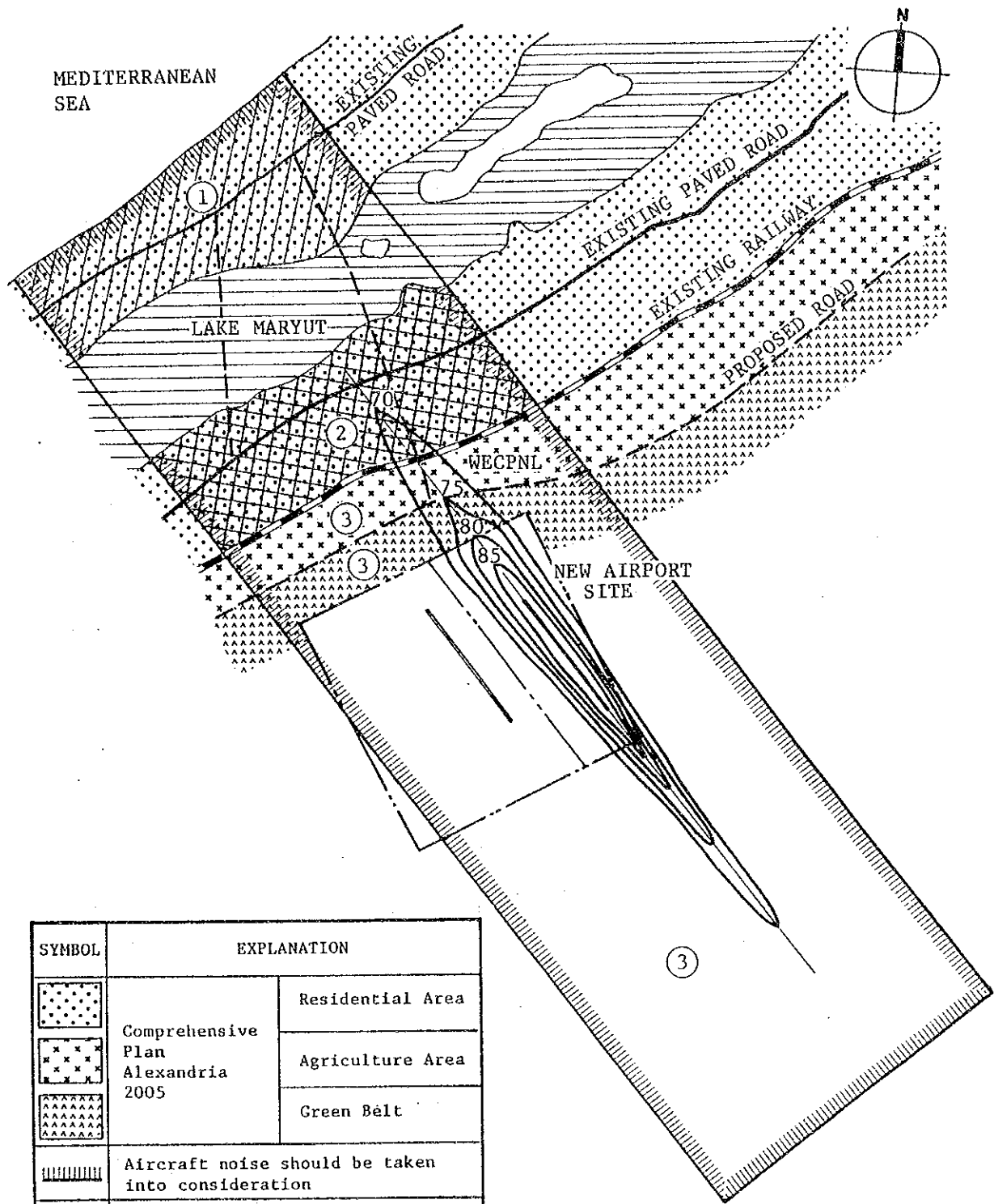
WECPNL 70 \geq : No school, hospital, mosque, church etc., is permitted.








75 \geq : No new residence is basically permitted.

Agricultural, commercial and industrial land use only is recommended.

85 \geq : Prohibited area for new residences.

Agricultural, outdoor recreational, commercial and industrial land use are recommended.



SYMBOL		EXPLANATION
  	Comprehensive Plan Alexandria 2005	Residential Area
		Agriculture Area
		Green Belt
		Aircraft noise should be taken into consideration
		Residential use not recommended Suggest green belt or agricultural use
		Residential use prohibited Suggest green belt or agricultural use
		Existing land use should be maintained

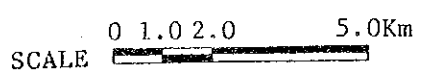


Fig. 4.4 Proposed Modification of Land Use Plan

(2) Height Limitation

Construction of new buildings or structures and planting of trees, which will protrude upon the established obstacle limitation surfaces, are strictly prohibited. Height limitation to prevent protrusion upon the assumed obstacle limitation surfaces for the parallel taxiway is required for emergency landing and take-off operations on the taxiway. The height restriction may be enforced to allow for future limitation surfaces in case of extension of the runway to 4,300 m toward the south.

(3) Obstacle Clearance

Construction of structures or plantation of trees, etc., constituting obstacles to aircraft operations, navigation aids and visibility from the tower shall be prohibited in the area indicated in Fig. 4.5.

(4) Others

It may be advisable to negotiate with the related organization to reserve the land necessary for future expansion of the runway as shown in Fig. 4.5.

At Nozha airport, no positive control of the existing and future land use, which will require relocation of houses and soundproof construction, will be justified since Nozha airport is for domestic demand effectively utilizing the existing facilities without substantial development or large-scale investment. The environment impact by aircraft noise will be contemplated and Nozha airport will be replaced by the new airport if serious noise problems arise from the airport neighbourhood.

As a minimum countermeasure, the existing obstructions which protrude upon the obstacle limitation surfaces for runway 04/22 should be removed and strict control over future construction of buildings/structures should be enforced for aircraft safety.

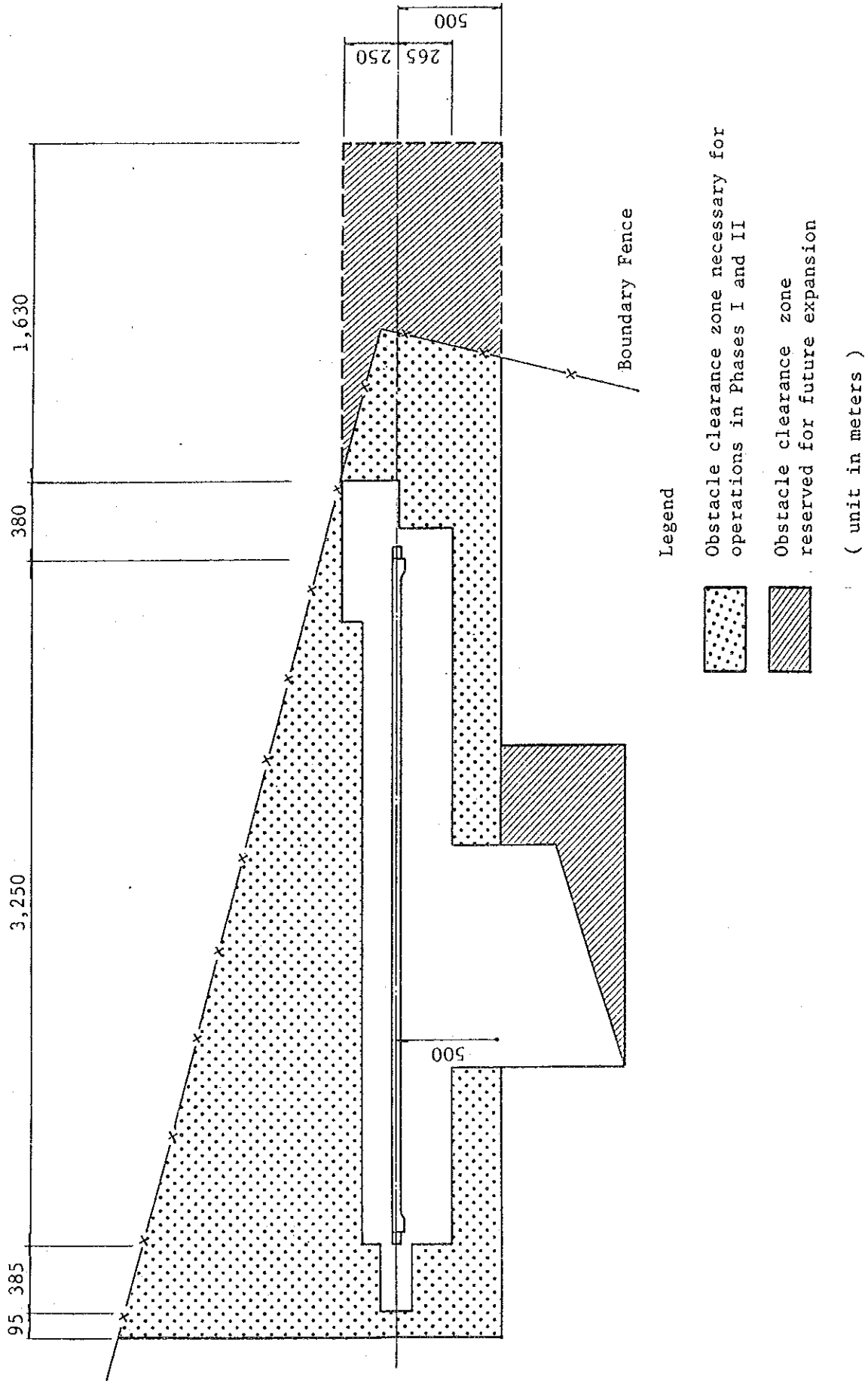


Fig. 4.5 Obstacle Clearance Zone

4.5 Airport Organization

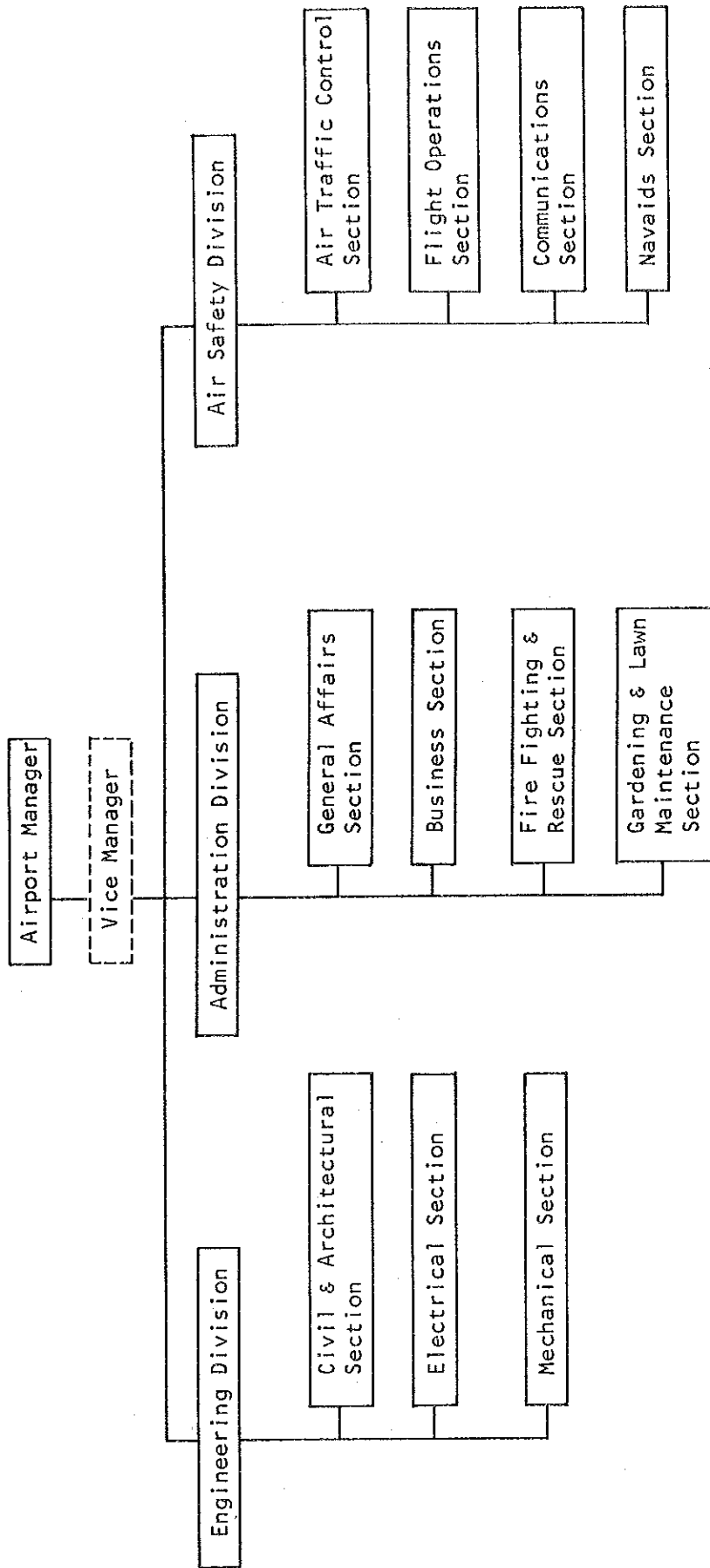
The airport organization of ECAA is assumed for the new airport and Nozha airport as shown in Figs. 4.6 and 4.7, respectively.

Nozha airport in Phases I and II will be operated in 10 sections under the direct control of an airport manager as at present. The new airport, however, will require more staff, and establishment of three divisions under the direction of an airport manager will be justified for smooth and efficient functioning.

The present staff members of ECAA number 168 at Nozha airport. The required number of staff at the new airport and at Nozha airport are estimated to be 230 and 100 in the year 2000, and 300 and 100 in the year 2010, respectively.

In this estimation, it is assumed that efficient functioning of the organization will cover a traffic increase to 0.4 and 0.7 million passengers in the years 2000 and 2010, respectively.

The total number of airport employees including the above ECAA staff members in years 2000 and 2010 are estimated at 580 and 700 at the new airport, and 200 and 290 at Nozha airport, respectively.



Note. [] Phase II

Fig. 4.6 Organization Chart of New Airport

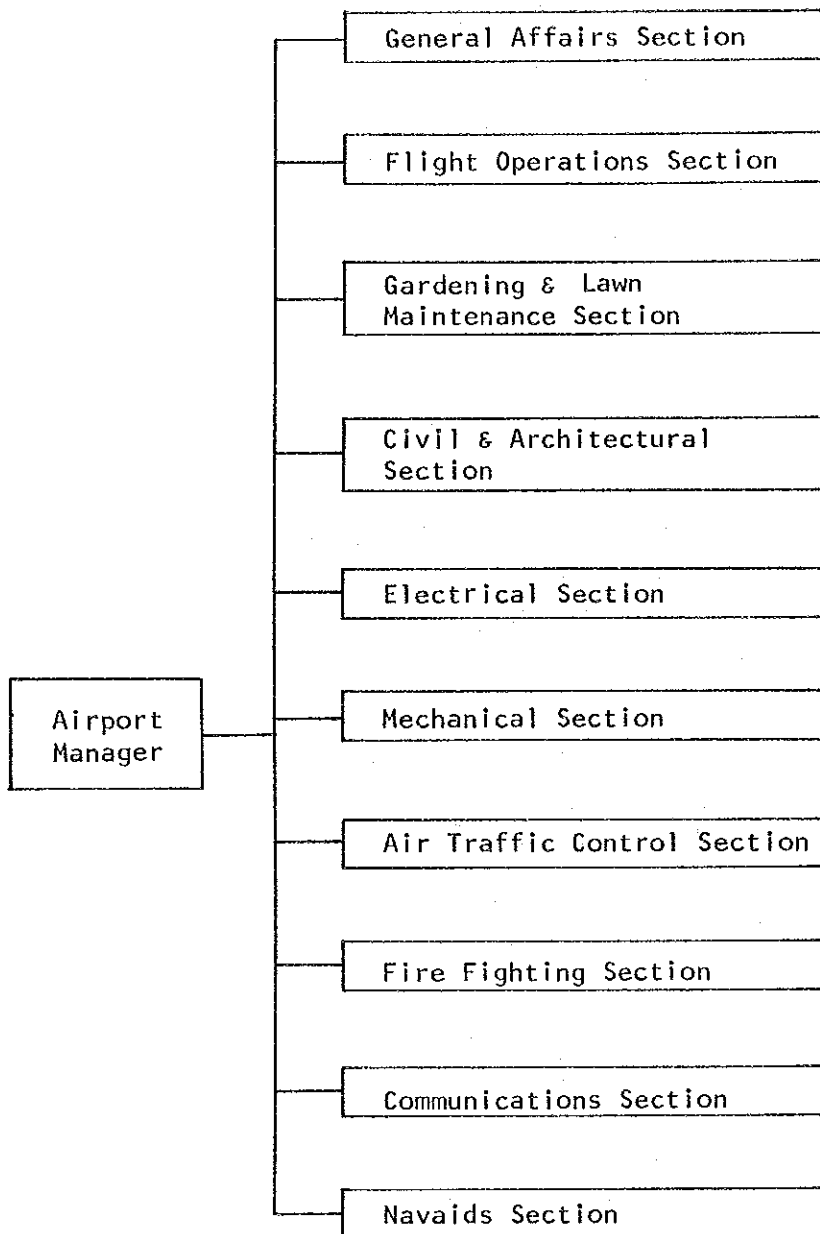


Fig. 4.7 Organization Chart of Nozha Airport