

THE REPUBLIC OF COSTA RICA

THE STUDY ON THE DEVELOPMENT
OF
THREE INTERNATIONAL AIRPORTS
IN
THE REPUBLIC OF COSTA RICA

FINAL REPORT

VOLUME 1 : SUMMARY

NOVEMBER 1992

JAPAN INTERNATIONAL COOPERATION AGENCY
(JICA)

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国際協力事業団

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PREFACE

In response to a request from the Government of the Republic of Costa Rica, the Government of Japan decided to conduct the study on the Development of Three International Airports in the Republic of Costa Rica and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Costa Rica a study team headed by Messrs. Naonori Takahata and Keikichi Yoshida of the Pacific Consultants International three times between August 1991 and September 1992.

The team held discussions with the officials concerned of the Government of Costa Rica, and conducted field surveys at the study area. After the team returned to Japan, further studies were made and the present report was prepared.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of the Republic of Costa Rica for their close cooperation extended to the team.

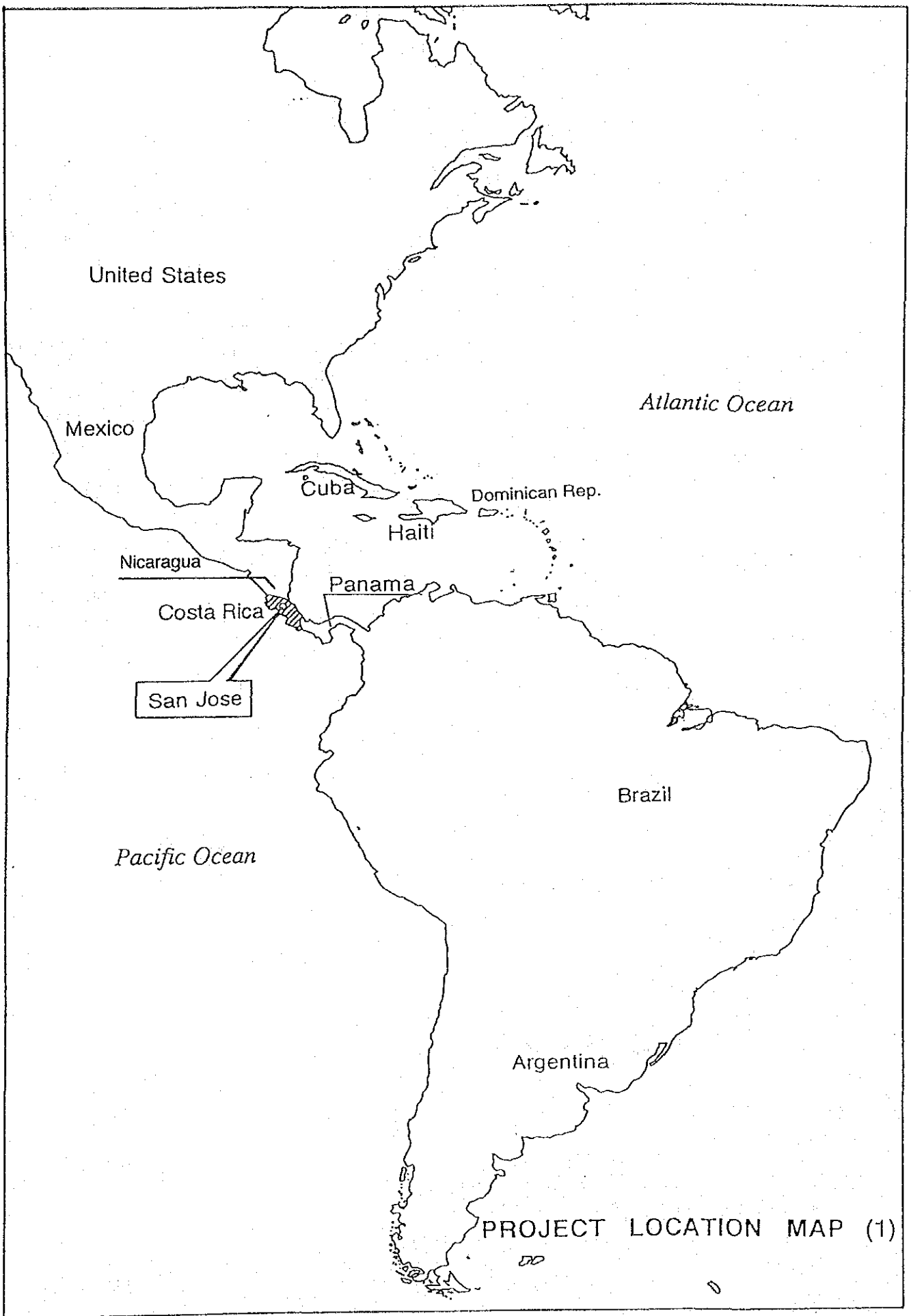
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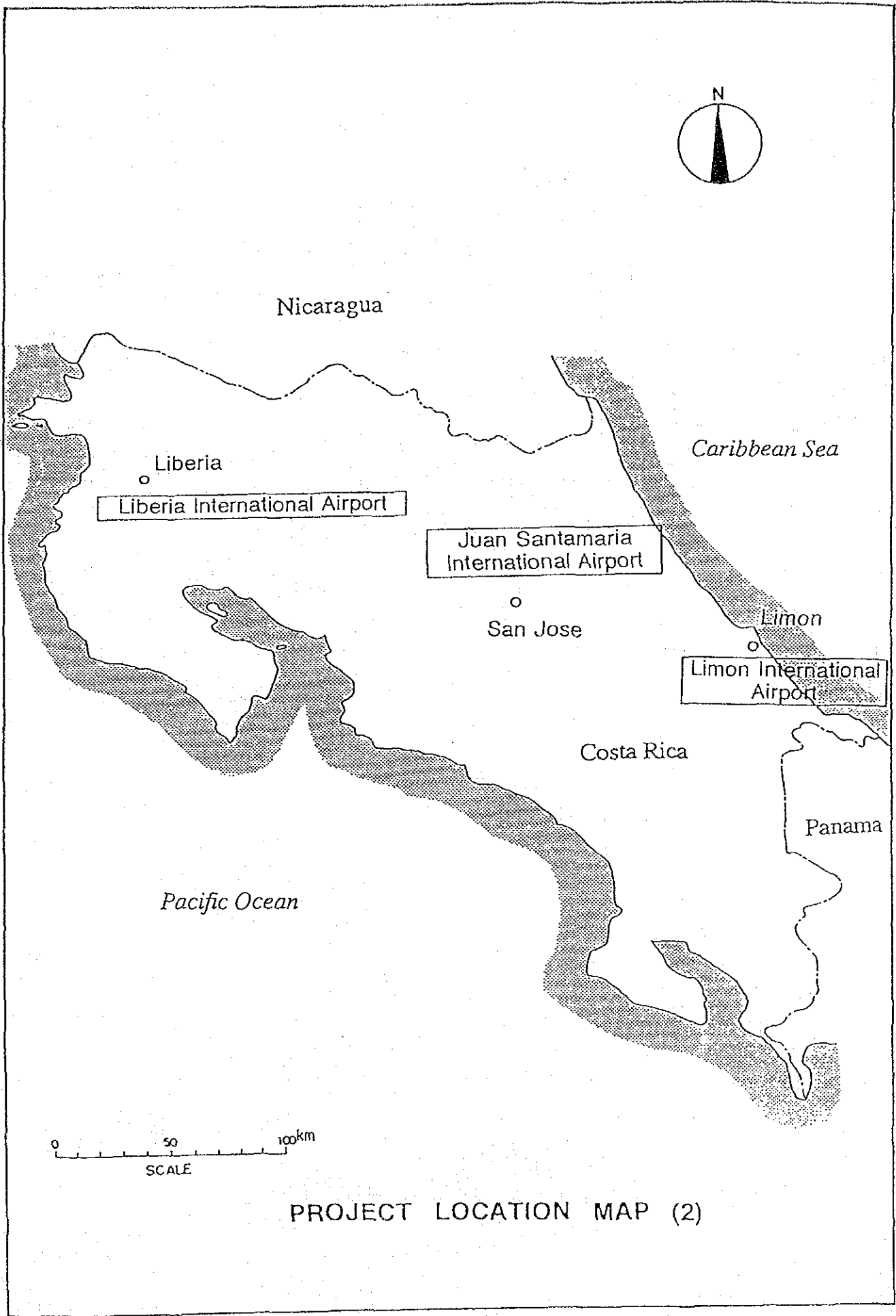


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Kensuke Yanagiya

President

Japan International Cooperation Agency





PROJECT LOCATION MAP (2)

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CHAPTER 1 INTRODUCTION

The Republic of Costa Rica is located in the southern part of Central America between the Caribbean Sea and the Pacific Ocean with a total area of 51,000sq. km. Its total population was 3.0million in 1990, of which approximately 60% reside in the urban areas including major cities such as San Jose, Cartago and Alajuela in the Central Valley.

The gross domestic product (GDP) was US\$5.67 billion in 1990, and the socio-economic sector is mainly based on agriculture. The GDP has shown an increasing trend since 1983 due to the promotion of government policies to encourage foreign trade, to develop the tourism industry and to introduce foreign investment.

An appropriate air transport system is very important for this resource poor country in order to promote its economic development. Air traffic demands in Costa Rica are increasing at a rapid pace, reflecting the economic growth of the country. However, the three major international airports, viz., Juan Santamaria, Liberia and Limon which could not be developed due to stringent government physical management policies are now facing various problems.

Recognizing the necessity of urgent improvement of the existing international airport system in an effective and efficient manner, the Government of the Republic of Costa Rica requested the Government of Japan to assist in developing these airports. In response to this request, the Government of Japan decided to implement the Study on the Development of the Three International Airports in the Republic of Costa Rica (hereinafter referred to as "the Study"). Based on this decision, the Japan International Cooperation Agency (JICA), the official agency responsible for the implementation of technical cooperation programs of the Government of Japan, was entrusted to undertake the Study in close coordination with the Government of Costa Rica.

The objectives of the Study are as follows:

- 1) To prepare long-term master plans for Juan Santamaria, Liberia, and Limon International Airports up to the year 2010, and to identify priority project(s) to be implemented urgently; and
- 2) To assess the technical, economic and financial feasibility of the short-term development plan of the priority project(s) within the framework of the long-term master plans.

CHAPTER 2 NEED FOR THE DEVELOPMENT

2.1 Outline of the Existing Airports

2.1.1 Juan Santamaria International Airport

The existing airport layout and facilities are outlined in Figure 2.1.1 and Table 2.1.1.

Juan Santamaria International Airport, located about 17 km to the northwest of San Jose, is the sole airport which accommodates international scheduled flights among the four Costa Rican international airports. The role of Juan Santamaria International Airport is very crucial not only for domestic and international air communications but also for the enhancement of trade and tourism which are emphasized in the national development plan.

In the last five years, this airport recorded a rapid increase in air traffic volume, viz. annual growth rate of 9 % for passenger traffic and 20 % for cargo traffic. However, many airport facilities do not have adequate capacity in size and function to handle present air traffic demands because no major developments have been carried out due to the financial constraints of the Government.

2.1.2 Liberia International Airport

The existing airport layout and facilities are outlined in Figure 2.1.2 and Table 2.1.2.

The development work of Liberia International Airport including runway extension and overlay as well as the new construction of the apron, taxiway and terminal areas were partially completed and inaugurated in February, 1992. This airport is expected to function as an alternate airport to Juan Santamaria Airport since the climatic conditions of the Liberia area are superior to that of San Jose.

2.1.3 Limon International Airport

The existing airport layout and facilities are outlined in Figure 2.1.3 and Table 2.1.3.

Limon International Airport is situated in 2km southeast of Limon City on the south coast facing the Caribbean Sea. The airport has not served scheduled flights since the completion of the highway connecting San Jose and Limon City. Presently, only general aviation utilizes this airport.

2.2 Air Traffic Demand Forecasts

Future air traffic demands, which are the principal planning factors for all airport facilities, are forecasted up to the year 2010. The analysis is based on the air traffic records of Costa Rica and each airport. Economic models are employed utilizing various economic indices as explanatory variables for the forecasts. The annual number of passengers and volume of cargo are estimated for international and domestic traffic as shown in Figures through 2.2.1 to 2.2.3. The results of the forecasts, including the peak hour forecasts, are detailed in Table 2.2.1.

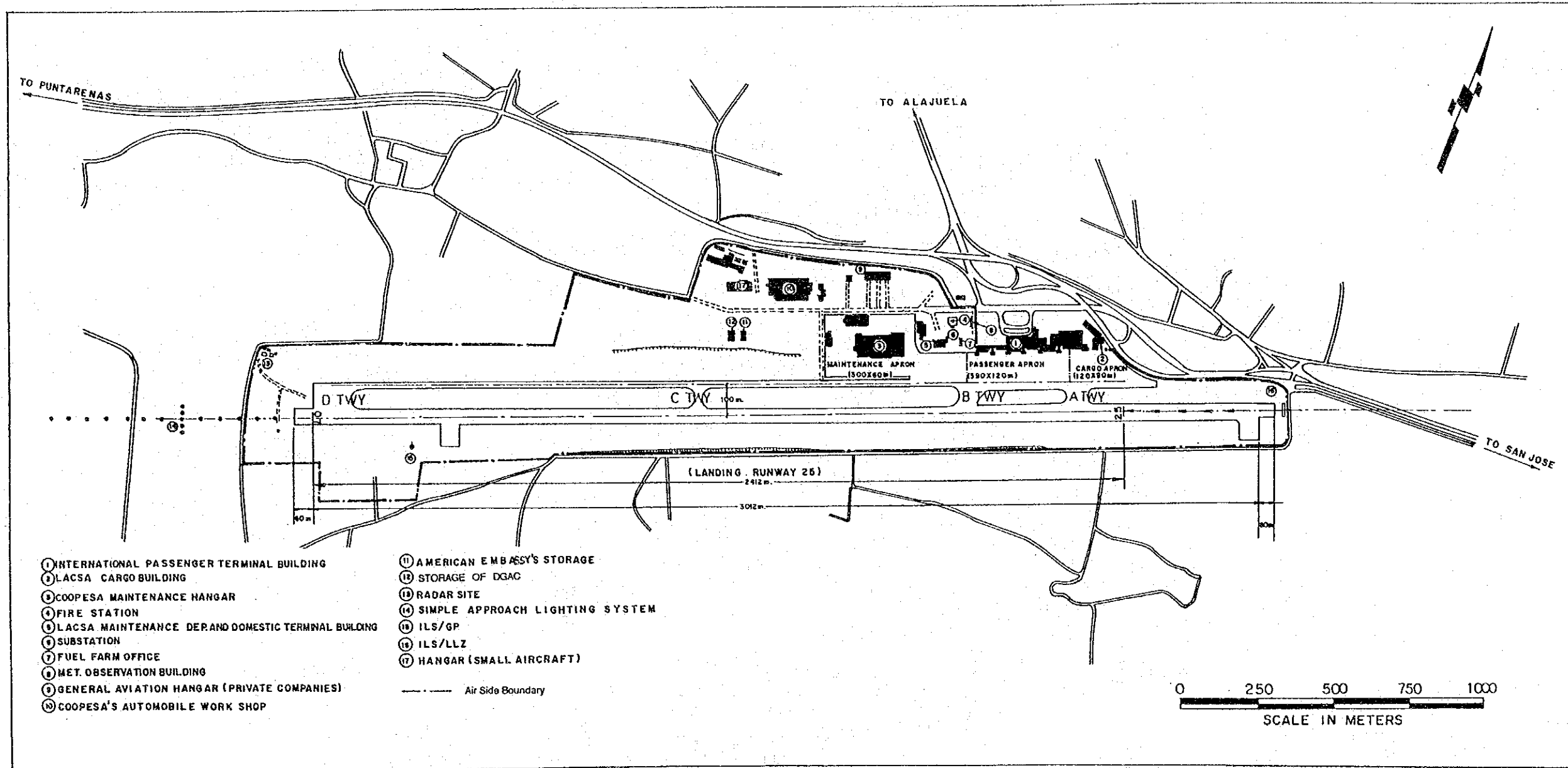



Figure 2.1.1 Layout Plan of Existing Juan Santamaria Airport

Table 2.1.1 General Profile of Juan Santamaria International Airport

Item	Description		
City/Aerodrome	Alajuela/Juan Santamaria		
Coordinates	09° 59'N, 84° 12'W		
ICAO Reference Code	4D		
Distance and Direction from City	2.3km south of Alajuela City		
Elevation	920m		
Magnetic Variation	3° 00' east (1990)		
Operational Hours	24hours		
Aerodrome Operator	DGAC/MOPT		
Runway	3,012m x 45m		
Taxiway	A-Taxiway	45m x 52m	
	B-Taxiway	65m x 52m	
	C-Taxiway	19m x 52m	
	D-Taxiway	18m x 1,850m	
	E-Taxiway	12m x 230m	
	F-Taxiway	12m x 500m	
Apron	International	7/A320	(350m x 125m)
	Domestic	2/C-212	(70m x 125m)
	Cargo	2/A320	(160m x 125m)
	Maintenance	6/A320	(230m x 195m)
Apron Surface	Asphalt Concrete		
Passenger Terminal Building	International	15,730sq. m	
	Domestic	324sq. m	
Cargo Terminal Building	3,470sq. m		
Carpark	8,000sq. m (324 cars and 31 taxis)		
Air Navigation Systems	a. Radio Navigation System	ASR/SSR, VOR/DME,NDB ILS/LLZ, GP, MM	
	b. Telecommunication System	Air to Ground VHF Communications Air to Ground HF Communications AFTN Message Exchange and Teletypewriters	
	c. Aeronautical Ground Lights	Approach Lights (RWY07) VASIS (RWY07/25) Runway Threshold/End Lights Runway Edge Lights Taxiway Edge Lights Apron Floodlights Aerodrome Beacon Obstruction Lights	
	d. Meteorological System	Observation Sensors Weather Facilities Receiver of NOAA Ground/Ground HF Radiosonde	
	e. Emergency Power Supply System	Emergency Generators (375KVA)	
Airport Utilities	a. Power Supply System	500KVA capacity	
	b. Water Supply System	170ton/day supplied by 15cm main pipe from city	
	c. Sewerage Disposal System	Septic tank	
	d. Telephone System	400 lines without exchange	
	e. Solid Waste Treatment	Incinerator	
Annual Passenger Volume	International	922,969	(1990)
	Domestic	64,778	(1990)
Annual Cargo Volume	International	66,903	(1990)
	Domestic	279	(1990)
Annual Aircraft Movements	International Pax.	14,532	(1990)
	Domestic Pax.	3,190	(1990)
	International Freighters	2,198	(1990)
	General Aviation	15,649	(1990)
Fire Fighting	Category 8		
Ground Services	155,000 gallons of Jet-A1		
	35,800gallons of Avgas		

LEGEND	
①	PASSENGER TERMINAL BUILDING
②	CONTROL TOWER
③	FIRE STATION
④	POWER HOUSE
⑤	MECHANICAL ROOM
⑥	WATER TANK
	PREVIOUS AIRPORT FACILITIES

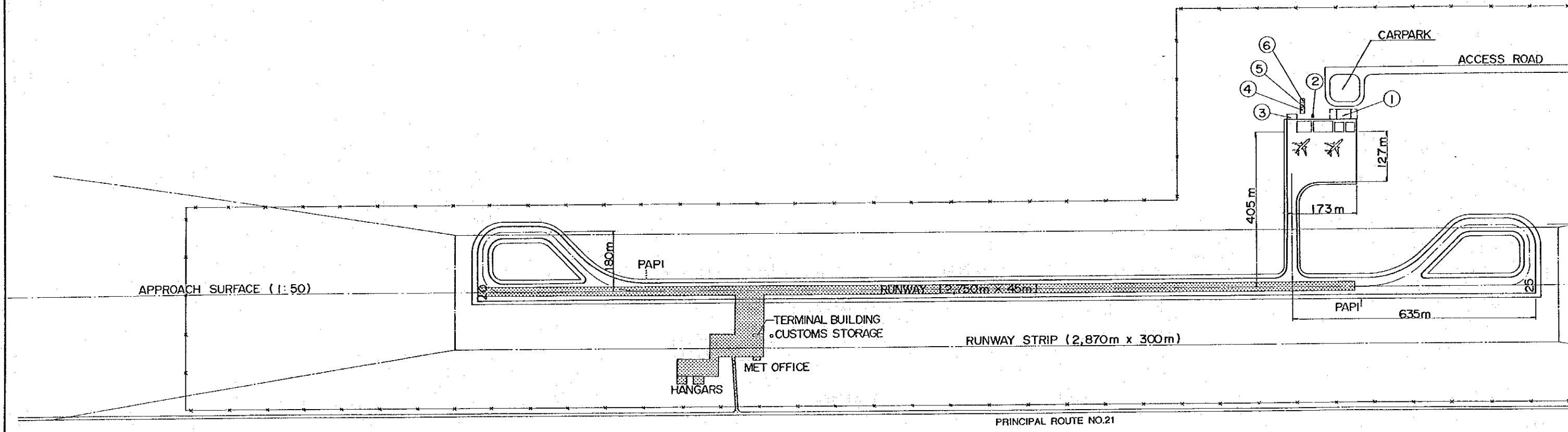


Figure 2.1.1

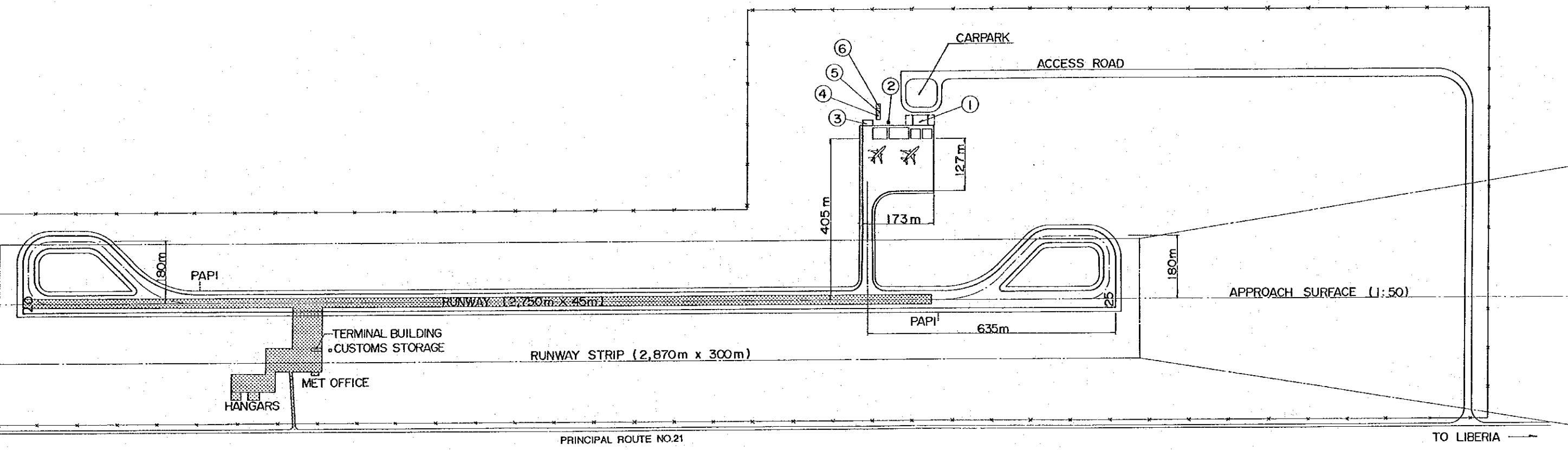
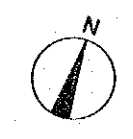


Figure 2.1.2 Layout Plan of Liberia Airport

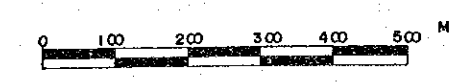


Table 2.1.2 General Profile of Liberia International Airport

Item	Description																		
City/Aerodrome Coordinates ICAO Reference Code Distance and Direction from City Elevation Magnetic Variation Operational Hours Aerodrome Operator Runway Taxiway Apron Apron Surface	Liberia/Thomas Guardia International 10° 36'N, 85° 33'W 4C(4D) 13km west of Liberia City 80m 3° 30' east (1990) Airport closed for expansion from Feb. 1990. Scheduled to be reopened in April 1992. DGAC/MOPT 2,240m x 45m None 3/BAC1-11 (80m x 70m) Asphalt Concrete																		
Passenger Terminal Building Cargo Terminal Building Carpark	320 sq. m None 2,000sq. m (30 cars)																		
Air Navigation Systems Airport Utilities	<table border="0"> <tr> <td>a. Radio Navigation System</td> <td>VOR/DME</td> </tr> <tr> <td>b. Telecommunication System</td> <td>AFIS</td> </tr> <tr> <td>c. Aeronautical Ground Lights</td> <td>VASIS</td> </tr> <tr> <td>d. Meteorological System</td> <td>None</td> </tr> <tr> <td>e. Emergency Power Supply System</td> <td>Emergency Generators (50KVA)</td> </tr> <tr> <td>a. Power Supply System</td> <td>25KVA capacity</td> </tr> <tr> <td>b. Water Supply System</td> <td>Supply from well</td> </tr> <tr> <td>c. Sewerage Disposal System</td> <td>Septic tank</td> </tr> <tr> <td>d. Telephone System</td> <td>Direct lines</td> </tr> </table>	a. Radio Navigation System	VOR/DME	b. Telecommunication System	AFIS	c. Aeronautical Ground Lights	VASIS	d. Meteorological System	None	e. Emergency Power Supply System	Emergency Generators (50KVA)	a. Power Supply System	25KVA capacity	b. Water Supply System	Supply from well	c. Sewerage Disposal System	Septic tank	d. Telephone System	Direct lines
a. Radio Navigation System	VOR/DME																		
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c. Sewerage Disposal System	Septic tank																		
d. Telephone System	Direct lines																		
Annual Passenger Volume Annual Cargo Volume Annual Aircraft Movements	<table border="0"> <tr> <td>International</td> <td>-</td> </tr> <tr> <td>Domestic</td> <td>2,296 (1990)</td> </tr> <tr> <td>International</td> <td>-</td> </tr> <tr> <td>Domestic</td> <td>-</td> </tr> <tr> <td>International Pax.</td> <td>-</td> </tr> <tr> <td>Domestic Pax.</td> <td>-</td> </tr> <tr> <td>International Freighters</td> <td>-</td> </tr> <tr> <td>General Aviation</td> <td>3,450 (1990)</td> </tr> </table>	International	-	Domestic	2,296 (1990)	International	-	Domestic	-	International Pax.	-	Domestic Pax.	-	International Freighters	-	General Aviation	3,450 (1990)		
International	-																		
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Domestic Pax.	-																		
International Freighters	-																		
General Aviation	3,450 (1990)																		



LEDGENO	
①	PASSENGER TERMINAL BUILDING
②	CUSTOMS STORAGE
③	HANGAR
④	HANGAR
⑤	GENERATOR ROOM
⑥	WATER TANK
⑦	FUEL TANK

CARIBBEAN SEA

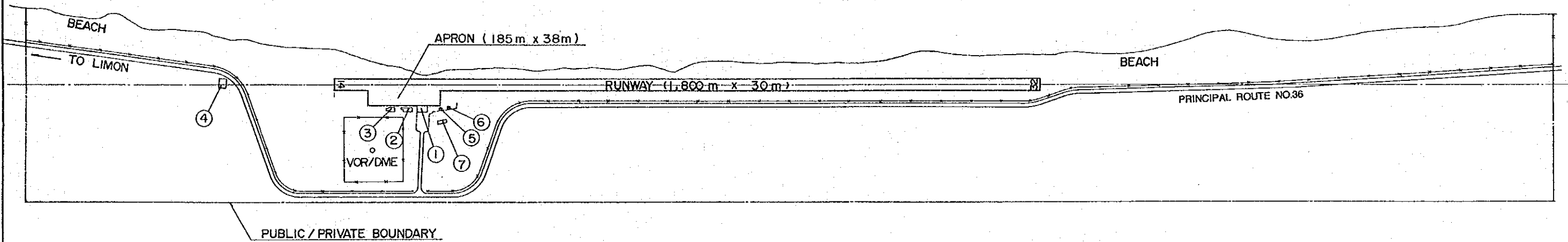


Figure 2.13 Layout Plan of Existing Limon International Airport



Table 2.13 General Profile of Limon Airport

Item	Description
City/Aerodrome Coordinates ICAO Reference Code Distance and Direction from City Elevation Magnetic Variation Operational Hours Aerodrome Operator Runway Taxiway Apron Apron Surface	Limon/Limon 09° 58'N, 83° 02'W 4C 2km southwest of Limon City 2.0m 2° 30' east (1990) Day time DGAC/MOPT 1,800m x 30m None BAC1-11 (196m x 35m) Asphalt Concrete
Passenger Terminal Building Cargo Terminal Building Carpark	450sq. m None 150sq. m (10 cars)
Air Navigation Systems Airport Utilities	a. Radio Navigation System D-VOR/DME b. Telecommunication System AFIS c. Aeronautical Ground Lights RWYTIL Runway Edge Lights Apron Floodlights Aerodrome Beacon d. Meteorological System Observation Sensors Weather Teletypewriter Ground/Ground HF e. Emergency Power supply System Emergency Generators (50KVA) a. Power Supply System 15KVA capacity b. Water Supply System Supplied by main pipe from city c. Sewerage Disposal System Septic tank d. Telephone System Direct lines
Annual Passenger Volume Annual Cargo Volume Annual Aircraft Movements	International - Domestic - International - Domestic - International Pax. - Domestic Pax. - International Freighters - General Aviation 1,326 (1990)
Ground Service	Aviation fuel is supplied by drums (11kl tank available)

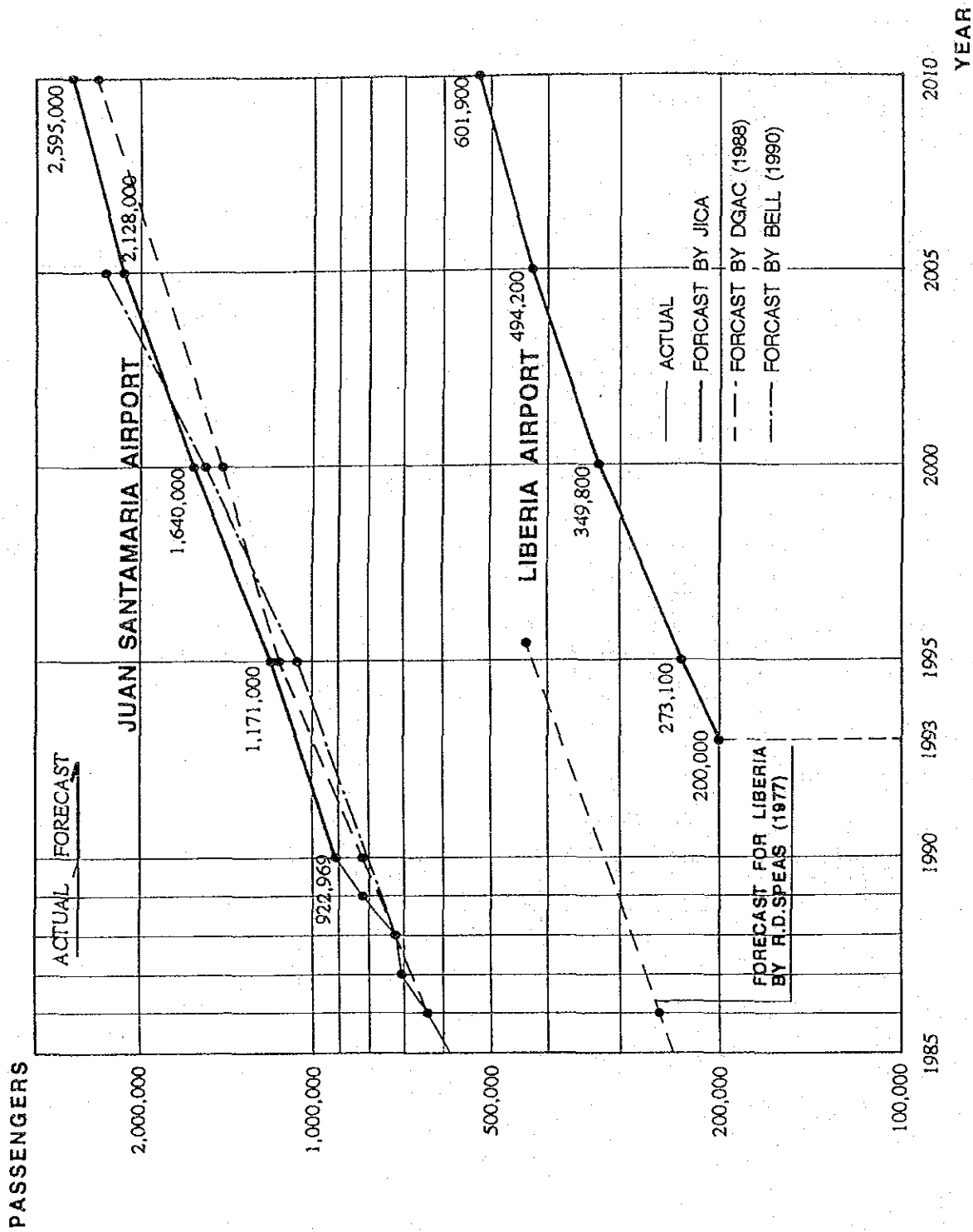


Figure 2.2.1 Forecast of Annual International Passenger Demands at Juan Santamaria and Liberia Airport

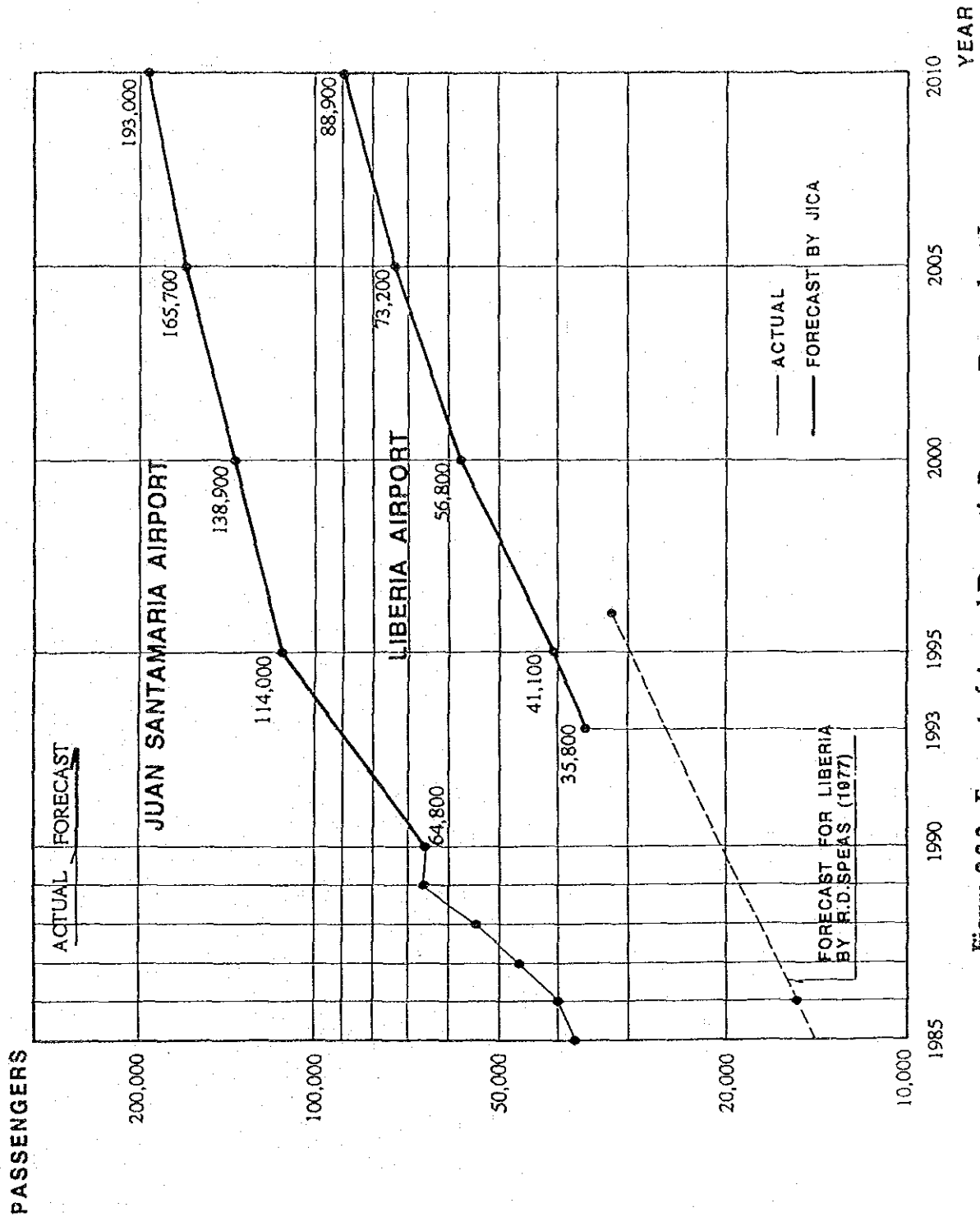


Figure 2.2.2 Forecast of Annual Domestic Passenger Demands at Juan Santamaria and Liberia Airports

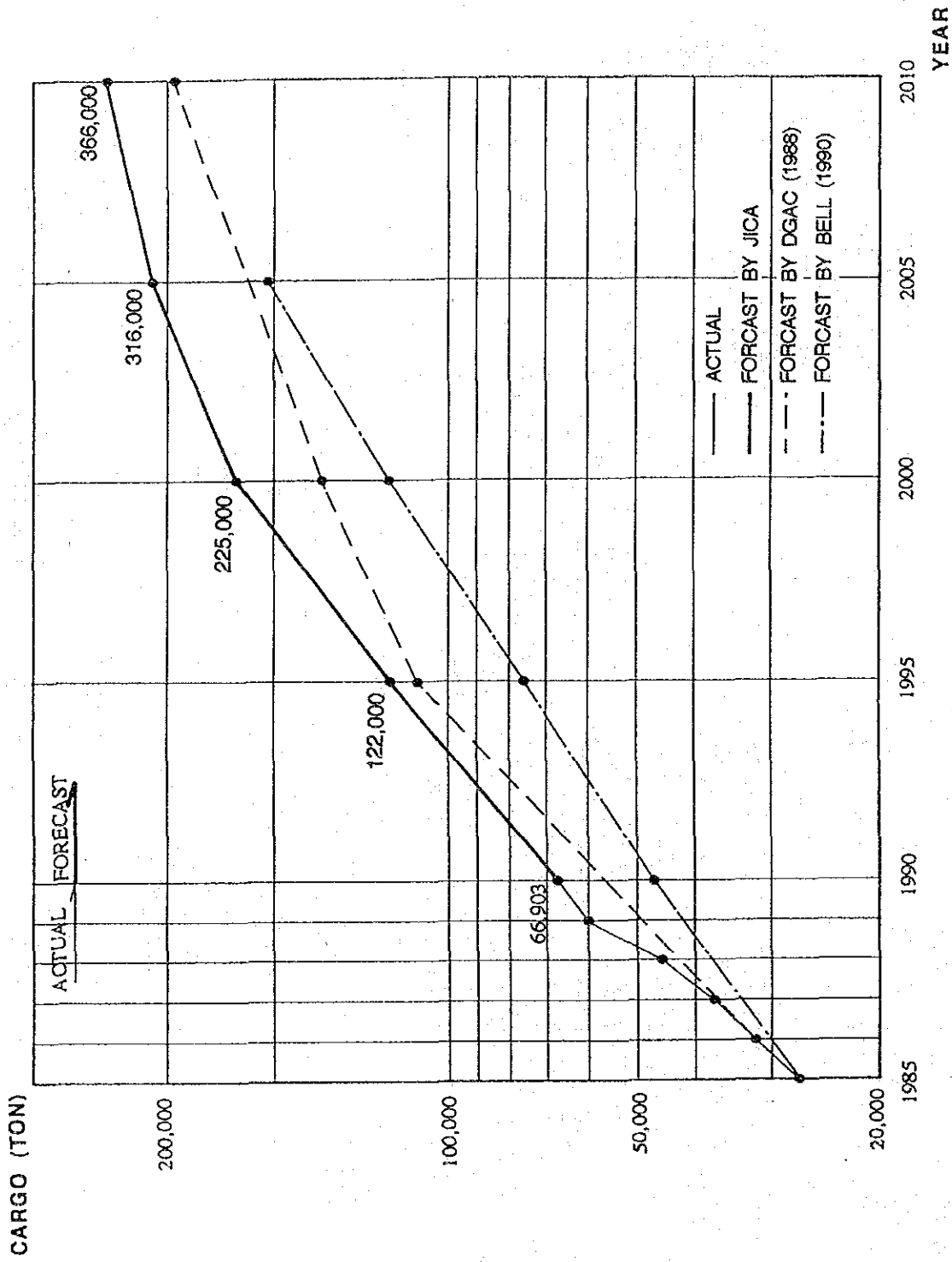


Figure 2.2.3 Forecast of Annual International Cargo Demand at Juan Santamaria Airport

Table 2.2.1 Summary of Air Traffic Demand Forecasts

Item	Juan Santamaria Airport					Liberia Airport					Limon Airport				
	1990 (Actual)	1995	2000	2005	2010	1990 (Actual)	1995	2000	2005	2010	1990 (Actual)	1995	2000	2005	2010
1. Annual Passengers															
a) International	922,969	1,171,000	1,640,000	2,128,000	2,595,000	-	232,000	324,000	421,000	513,000	-	-	-	-	-
b) Domestic	64,778	114,000	138,900	165,700	193,000	2,296	41,100	56,800	73,200	88,900	-	-	-	-	-
c) Total	987,747	1,285,000	1,778,900	2,293,700	2,788,000	2,296	273,100	349,800	494,200	601,900	-	-	-	-	-
2. Annual Cargo															
a) International	66,903	122,131	225,172	316,140	365,619	-	6,838	11,758	15,947	18,207	-	-	-	-	-
b) Domestic	279 ^(*)	582	709	845	984	-	210	290	373	453	-	-	-	-	-
c) Total	67,182	122,713	225,881	316,985	366,603	-	7,048	12,048	16,320	18,660	-	-	-	-	-
3. Annual Aircraft Movements															
a) International Passenger Aircraft	14,532	17,000	22,100	26,600	30,100	-	2,200	3,000	3,900	4,700	-	-	-	-	-
b) Domestic Passenger Aircraft	3,190	5,700	6,900	8,300	9,700	-	2,100	2,800	3,700	4,400	-	-	-	-	-
c) International Freighters	2,198	4,000	8,100	10,800	10,800	-	-	-	-	-	-	-	-	-	-
d) General Aviation	15,649	17,900	20,400	23,300	26,700	3,450	3,900	4,500	5,100	5,900	1,326	1,500	1,700	2,000	2,300
e) Total	35,569	44,800	57,800	69,400	77,700	3,450	8,200	10,300	12,700	15,000	1,326	1,500	1,700	2,000	2,300
4. Peak Hour Passengers (2-way)															
a) International	560	760	840	1,120	1,520	-	310	310	420	420	-	-	-	-	-
b) Domestic	60	80	80	100	100	-	40	40	60	60	-	-	-	-	-
c) Total	620	840	920	1,220	1,620	-	350	350	480	480	-	-	-	-	-
5. Peak Hour Aircraft Movements (2-way)															
a) International	7	8	9	11	13	-	2	2	3	3	-	-	-	-	-
b) Domestic	3	4	4	5	5	-	2	2	3	3	-	-	-	-	-
c) General Aviation	7	8	9	10	11	-	2	2	2	3	-	-	-	-	-
e) Total	17	20	22	26	29	-	6	7	8	9	-	-	-	-	-
6. Peak Hour Passengers (1-way)															
a) International	400	480	600	760	1,080	-	200	200	310	310	-	-	-	-	-
b) Domestic	40	60	60	60	60	-	20	20	40	40	-	-	-	-	-
c) Total	440	540	660	820	1,140	-	220	220	350	350	-	-	-	-	-
7. Peak Hour Aircraft Movements (1-way)															
a) International	5	6	6	8	9	-	1	1	2	2	-	-	-	-	-
b) Domestic	2	3	3	3	3	-	1	2	2	2	-	-	-	-	-
c) General Aviation	5	5	6	7	8	-	2	2	2	2	-	-	-	-	-
e) Total	12	14	15	18	20	-	4	5	6	6	-	-	-	-	-

Note (*): Figure in 1988

2.3 Airport Facility Requirements

Facility requirements for Juan Santamaria and Liberia Airports are estimated based on the traffic demand forecasts as shown in Table 2.3.1. These requirements are based on and refer to the standards and recommended practices of the International Civil Aviation Organization (ICAO), the Federal Aviation Administration (FAA), the International Air Transport Association (IATA) and the Japan Civil Aviation Bureau (JCAB).

2.4 Evaluation of the Existing Airport Facilities

The present conditions and capacities of airport facilities are compared to future facility requirements to identify problem areas. The results of the evaluation for existing facilities are summarized in Figures 2.4.1 through 2.4.3.

The necessity for the development at each airport is based on the identification of the following major problems:

(1) Juan Santamaria International Airport

- It is difficult to prepare 300m wide runway strip, which is required by the ICAO, FAA and JCAB for the precision instrument runway because most of the existing terminal facilities are too close to the runway. Even if applying a 150m wide strip for the non-precision instrument runway, a lot of facilities such as aircraft standing on the apron, passenger terminal building, COOPESA hangar and Pan-American Highway infringe the 1:7 transitional surface.
- The existing runway 25 threshold is displaced 600m to the west since there are many obstacles which protrude upon the ICAO's 2% approach surface.
- The existing separation distance between the runway and parallel taxiway centerlines is 101m and is not adequate for instrument operations of DC-10 and other wide-body jet aircraft.
- The DGAC, in February, 1992, announced the construction of two additional aircraft stands, however the capacity of aircraft stands will reach their limit by 1995 soon after these two stands are completed.
- The strength of the existing runway presently suitable for B727 aircraft is not sufficient to accommodate the future traffic increase.
- Arriving passengers mix with departing passengers in the concourse of international passenger terminal building due to the common use of concourse on the first floor. This mixture should be avoided from the viewpoints of security.
- The number of counters at the check-in departure immigration, security inspection, customs of international terminal building are not sufficient even to handle the present traffic.
- The floor area is not adequate for both the international and domestic terminal buildings

Table 2.3.1 Summary of Airport Facility Requirements

Item	Juan Santamaria Airport					Liberia Airport					
	1991 (Present)	1995	2000	2005	2010	1991 (Planned)	1995	2000	2005	2010	
1. ICAO Aerodrome Reference Code		4D	4D	4D	4E	4E	4D	4D	4D	4D	4D
2. Runway	- Length	m	3,012	3,000	3,000	3,000	2,750	2,750	2,750	2,750	2,750
	- Width	m	45	45	45	45	45	45	45	45	45
3. Runway Strip	- Length	m	3,120	3,120	3,120	3,120	2,870	2,870	2,870	2,870	2,870
	- Width	m	150	300	300	300	300	300	300	300	300
4. Taxiway	- System		Partial Parallel Taxiway	Partial Parallel Taxiway	Partial Parallel Taxiway	Complete Parallel Taxiway	Complete Parallel Taxiway	One Right Angle Exit	One Right Angle Exit	One Right Angle Exit	One Right Angle Exit
	- Width	m	18	23	23	23	23	23	23	23	23
5. Apron	- Aircraft Stands	no.		JJ/WB: 2 NB:13 Cargo: 3 SP: 3 Total:21	JJ/WB: 2 NB:14 Cargo: 5 SP: 3 Total:24	JJ/WB: 3 NB:15 Cargo: 6 SP: 3 Total:27	JJ/WB: 4 NB:16 Cargo: 6 SP: 3 Total:29	DC-10:2 JJ/WB:2 NB:1 SP:2 Total:5	JJ/WB:2 NB:1 SP:2 Total:5	JJ/WB:2 NB:2 SP:2 Total:6	JJ/WB:2 NB:2 SP:2 Total:6
	- International	m ²	9,060	8,900	11,200	14,100	20,100	-	3,700	3,700	5,800
	- Domestic	m ²	324	600	600	600	600	-	200	200	400
	- Total	m ²	9,384	9,500	11,800	14,700	20,700	1,600	3,900	3,900	6,200
	- International	m ²	3,740	8,700	16,100	22,600	26,100	-	700	1,200	1,600
7. Cargo Terminal Building	- Domestic	m ²	-	60	70	80	100	-	20	30	40
	- Total	m ²	3,740	8,260	16,170	22,680	26,200	-	720	1,230	1,640
	- International	m ²	3,740	8,700	16,100	22,600	26,100	-	700	1,200	1,600
8. Administration/Operations Building		m ²	1,300	1,800	1,800	1,800	1,800	-	300	300	300
9. Carpark	- Parking Slots	no.	324	500	550	730	970	100	210	210	290
	- Area	m ²	8,000	17,500	19,300	25,600	34,000	5,000	7,400	7,400	10,200
10. Passenger Building Curb	- Curb Length	m	120	240	260	350	460	36	105	105	140
11. Air Navigation Systems	- Operational Category		Precision (ILS, VOR/DME, NDB)	Precision (ILS, VOR/DME, NDB)	Precision (ILS, VOR/DME, NDB)	Precision (MLS, VOR/DME, NDB)	Precision (MLS, VOR/DME, NDB)	Non-precision (VOR/DME)	Precision (ILS, VOR/DME)	Precision (ILS, VOR/DME)	Precision (MLS, VOR/DME)
12. Rescue and Fire Fighting	- Level of Protection		Category-8	Category-8	Category-8	Category-8	Category-8	-	Category-7	Category-7	Category-7
	- Fire Station	m ²	600	450	450	450	450	-	400	400	400
13. Airport Utilities	- Power Supply	KVA	750	900	1,200	1,500	1,900	-	300	300	400
	- Water Supply	ton/day	170	280	360	450	610	-	100	100	150
	- Sewage Disposal	ton/day	-	280	360	450	610	-	100	100	150
	- Solid Waste Disposal	kg/day	-	1,300	2,200	2,900	3,500	-	250	250	350
14. Fuel Supply Facility	- Tank Capacity (JETAI)	KL	600	850	1,300	1,700	2,000	-	90	120	150
	- Fuel Depot Area	m ²	1,400	6,000	9,000	12,000	14,000	-	1,500	2,000	2,500
15. Aircraft Maintenance Hangar	- Hangar Space	no.	B-727:2	NB:3	NB:3	NB:3	NB:3	-	-	-	-

Figure 2.4.1 Summary of Evaluation of Existing Facilities at Juan Santamaria Airport

No.	Facilities	Year					Remarks
		1990	1995	2000	2005	2010	
1.	Runway - Capacity						- The runway will reach its maximum capacity during its preferential use (landing and take-off from/to the west) before 2005. An obstacle-free 3,000m long runway will be required to fundamentally solve the capacity problem and to handle traffic increase beyond 2010.
	- Length						- Non-stop operations of DC-10 and B-747 to Los Angeles are possible with the existing runway length.
	- Width						- A 45m wide runway is adequate for aircrafts up to B-747.
2.	Runway Strip	x					- A 300m wide strip is required for precision instrument operations.
3.	Obstacle Limitation Surfaces - Approach	x					- The landing to runway 25 is obstructed due to existence of obstacles.
	- Transitional	x					- There are many obstacles protruding upon the transitional surface from the 150m wide strip.
4.	Taxiway - System						- The existing taxiway system will become inadequate in terms of runway capacity before 2005.
	- Separation Distance	x					- The separation between the centerlines of runway and parallel taxiway is not sufficient. - The separation from the centerline of parallel taxiway to parked aircraft is sufficient except for B-747 aircraft.
5.	Apron - Int'l Loading	x					- The existing seven aircraft stands in front of the terminal building (six with boarding bridge) are fully occupied during peak hours.
	- Int'l Overnight Stay	x					- Overnight stay aircraft floods out of the passenger loading apron, and are parked in front of maintenance hangar.
	- Cargo	x					- Aircraft stands for freighter aircraft are completely saturated.
	- Domestic						- An additional aircraft stand is required around 1995.
6.	Aircraft Pavement - Strength						- The existing pavement is adequate for aircrafts up to B-727. Overload operations of DC-10 is acceptable, but should be limited within 5% of the total operations of jet aircraft
7.	Passenger Terminal Building - International	x					- Check-in counters, check-in lobby, departure immigration counters, security inspection counters, baggage claim area, customs counters, and the queuing space are insufficient even for the present traffic.
	- Domestic	x					- The terminal building is too small for the present traffic. It is of substandard quality in many aspects.
8.	Cargo Terminal Building	x					- The shortage of capacity of the customs building is very serious. Most imported cargo is handled in the customs branches in San Jose. LACSA constructed their own building for temporary storage to wait for customs clearance.
9.	Administration/Operations Office	x					- The office space is too small for standard requirement of 24-hour operations airport.
10.	Carpark - Passenger						- The carparks are adequate for the present traffic, but will become insufficient before 1995.
	- Cargo	x					- Truck yard of the cargo area is too small to enable smooth flows of vehicle traffic.
11.	Passenger Building Curb	x					- The length of the terminal building curb is too short. Parked cars are always in double rows in front of the terminal building during peak hours.
12.	Air Navigation Systems - Radio Nav aids						- Most radio navigation aids will need to be replaced around 2000 due to the expiration of operational life.
	- Radar						- The new radar is planned to be installed by the COCESNA to replace the existing old one.
	- Communications						- Most aeronautical telecommunication equipment will need to be replaced around 2000 due to expiration of operational life.
	- Ground Lights						- The lighting system can be used until around 2010 by the renewal plan under consideration of the DGAC
	- Meteorological						- The existing meteorological system covers the requirements for the airport operations. However, the replacement of equipment may be considered before 2000. RVR and ceilometer are desired to be added.
13.	Rescue and Fire Fighting service						- The existing fire vehicles are old, and will need to be replaced after 2000.
14.	Airport Utilities - Power Supply						- Capacity of the power supply system should be increased to cope with increase of demand.
	- Water Supply						- Water is supplied by a water main from the city. No problem is observed for the capacity.
	- Sewage Disposal	x					- The existing septic tank faces over-capacity problem, and most sewage is disposed directly to a nearby river.
	- Telephone						- Quality of signals and reliability of services are very low.
15.	Aviation Fuel Supply System						- Storage capacity of fuel tanks will be reduced to two day consumption level in 2000 from the present three day consumption level.

Note: "x" indicates facility reached its capacity or is not adequate.

Figure 2.4.2 Summary of Evaluation of Existing Facilities at Liberia Airport

No.	Facilities	Year					Remarks
		1990	1995	2000	2005	2010	
1.	Runway - Capacity - Length - Width						- The runway has sufficient capacity up to 2010. - Non-stop operations of DC-10 to Los Angeles are possible with the planned runway length. - A 45m wide runway is adequate for aircraft up to B-747.
2.	Runway Strip						- A 300m wide strip is adequate for the instrument runway.
3.	Obstacle Limitation Surfaces - Approach - Transitional						- There are no obstacles to the approach surfaces. - The new terminal area is planned to be free from transitional surface. - It is necessary to demolish the old terminal building.
4.	Taxiway						- One right angle exit taxiway for the new terminal area is sufficient for aircraft movements up to 2010.
5.	Apron						- The increase of air traffic will require extension of the apron
6.	Aircraft Pavement						- Existing pavement strengthening and new pavement for the runway extension are adequate to accommodate DC-10 aircraft.
7.	Passenger Terminal Building						- The size of the planned passenger terminal building is insufficient to handle peak hour passengers from a single movement of DC-10.
8.	Cargo Terminal Building		x				- It is necessary to construct a cargo terminal building to meet with air cargo demand.
9.	Administration/Operations Office						- Administration office in the terminal building and control tower are planned in the development work.
10.	Carpark						- The expansion of the carpark will be required along with the expansion of the terminal building.
11.	Air Navigation Systems - Radio Nav aids - Communications - Ground Lights - Meteorological		x				- It is desirable to introduce an ILS to the Runway 07 to ensure safe aircraft operations. - The upgrading plan of the system is adequate up to 2010. - The planned lighting system is insufficient. It is desirable to install an ALS for runway 07 and a SALS for Runway 25. - The planned meteorological system covers minimum requirement for the airport operations.
12.	Rescue and Fire Fighting Service		x				- It is necessary to provide the facilities in compliance with the ICAO category -7 for the introduction of DC-10.
13.	Aviation Fuel Supply System		x				- Appropriate provision should be considered as soon as possible.

Note: "x" indicates facility reached its capacity or is not adequate.

Figure 2.4.3 Summary of Evaluation of Existing Facilities at Limon Airport

No.	Facilities	Year					Remarks
		1990	1995	2000	2005	2010	
1.	Runway - Capacity - Length - Width						- The runway has sufficient capacity up to 2010. - A 1,800m long runway is far sufficient for general aviation activities. - A 30m wide runway is adequate for general aviation activity. - Apron, terminal building, etc. are located inside the runway strip.
2.	Runway Strip	x					
3.	Obstacle Limitation Surfaces - Approach - Transitional	x					- Principal Route No.36 is an obstacle to Runway 32 approach surface. - No transitional surface exists because of the fact that all the terminal facilities are located inside the runway strip.
4.	Taxiway	x					- No taxiway is provided.
5.	Apron - Size - Location		x				- The size of the apron is sufficient for the present traffic. - The existing apron is located directly adjacent to the runway without taxiway.
6.	Aircraft Pavement						- The pavement has sufficient strength to accommodate general aviation aircraft after the emergency rehabilitation work in September 1992.
7.	Passenger Terminal Building - Size - Location		x				- No expansion of the terminal size is foreseen to be required due to low traffic level. - The location of the terminal building should be changed to secure safe aircraft operations.
8.	Carpark						- The present capacity is sufficient for future traffic.
9.	Air Navigation Systems - Radio Nav aids - Communications - Ground Lights - Meteorological						- The existing VOR/DME will need to be replaced around 1995 due to the expiration of operational life. - The existing equipment for AFIS will need to be replaced around 2000 due to the expiration of operational life. - The existing aeronautical ground lights will need to be replaced around 1995 due to the expiration of operational life. - The existing meteorological system covers minimum requirements for the airport operations. However, the replacement of equipment may be considered before 2000.
10.	Rescue and Fire Fighting Service	x					- No service is available at the airport.
11.	Aviation Fuel Supply System						- Supply by drums can be continued due to low traffic level.

Note: "x" indicates facility reached its capacity or is not adequate.

- The existing cargo terminal building is too small to accommodate the present traffic volume and there is no provision for expansion in the vicinity of the present terminal. The truck yard of the cargo area is also too small to enable smooth flows of vehicle traffic.
- Almost all sewerages discharge untreated water directly into the Ciruelas river since the existing sewerage mains are deteriorated and cannot process the sewage due to limited capacity.

(2) Liberia International Airport

- No cargo terminal building is available.
- It is desirable to introduce an ILS to runway 07 to ensure safe aircraft operations.
- The planned lighting system is insufficient. It is desirable to install an ALS for runway 07 and a SALS for the runway 25.

(3) Limon International Airport

- The width of the runway strip is insufficient for aircraft operating with non-instrument procedures.
- Principal Route No.36 is an obstacle to the runway 32 approach surface and virtually no transitional surface exists because all the terminal facilities are located inside the runway strip.
- The existing apron located directly adjacent to the runway without taxiway should be relocated to secure safe aircraft operations.
- No rescue and fire fighting service is available in the airport.

CHAPTER 3 AIRPORT MASTER PLANS

3.1 Establishment of Long-Term Development Policy

3.1.1 Juan Santamaria Airport

Juan Santamaria Airport is the national gateway and a hub of domestic air transport, however, this airport has a fundamental deficiency in its obstacle clearance in light of international standards. This problem will inevitably require the construction of a new runway as has been recommended by this Study. However, it is obvious that new runway construction at the airport will be a huge investment due to topographic conditions. Nevertheless, other unsolvable problems related to aircraft noise and poor meteorological conditions will remain as they are even if the new runway is constructed.

These problems of aircraft noise and meteorological conditions at Juan Santamaria Airport suggest that a new airport be considered. However, the idea of new airport construction is still in its initial stages and has not yet been thoroughly studied. It is expected that considerable time will be required to conduct these various studies.

The immediate improvement of the airport to comply with international standards is not a suitable response because it would be a wasteful investment if the above mentioned new airport is feasible and its implementation becomes imminent.

It is thus practical, as a short-term development policy, that the existing airport will be used and upgraded with minimum investment by the maximum utilization of existing facilities.

As for the long-term development policy, it is assumed that the airport will be improved to comply with international standards.

The long-term development of Juan Santamaria Airport assumes the continuous operations of Tobias Bolaños Airport. This is because the runway capacity of Juan Santamaria Airport is too small to involve aircraft movements due to the closure of Tobias Bolaños Airport.

Based on the above conditions, the long-term development policy of Juan Santamaria Airport is summarized as follows:

Short-term Policy:	Increase airport capacity by maximum use of the existing facilities
Long-term Policy: (Assumption)	Improvement of the airport to comply with international standards

3.1.2 Liberia International Airport

Liberia airport will function as the second air gateway and also as an alternate airport of Juan Santamaria Airport. Since the basic concept of the ongoing development work at Liberia Airport by the DGAC is adequate, the long-term development policy of the airport will focus on the expansion of the facilities in accordance with the increase of air traffic demands.

3.1.3 Limon International Airport

Limon airport maintains its role as a general aviation airport. It is not practical to develop this airport only to accommodate diverted flights of jet aircraft such as A-320 and DC-10.

3.2 **Airport Master Plans**

3.2.1 Phases of the Airport Development

The developments of the three airports are planned to be implemented in two phases for cost-effective development. The phases of the airport development are set forth as follows.

Short-term Development Plan	:	Design Target Year 2000
Long-term Development Plan	:	Design Target Year 2010

3.2.2 Juan Santamaria Airport

The airport master plan for Juan Santamaria Airport was produced through an extensive alternative study. The layout plan indicating the phased development of the airport up to 2010 is shown in Figure 3.2.1.

(1) Development Policy



Various problems which have been clarified for Juan Santamaria Airport in previous sections are summarized by categorizing them into three groups as follows:

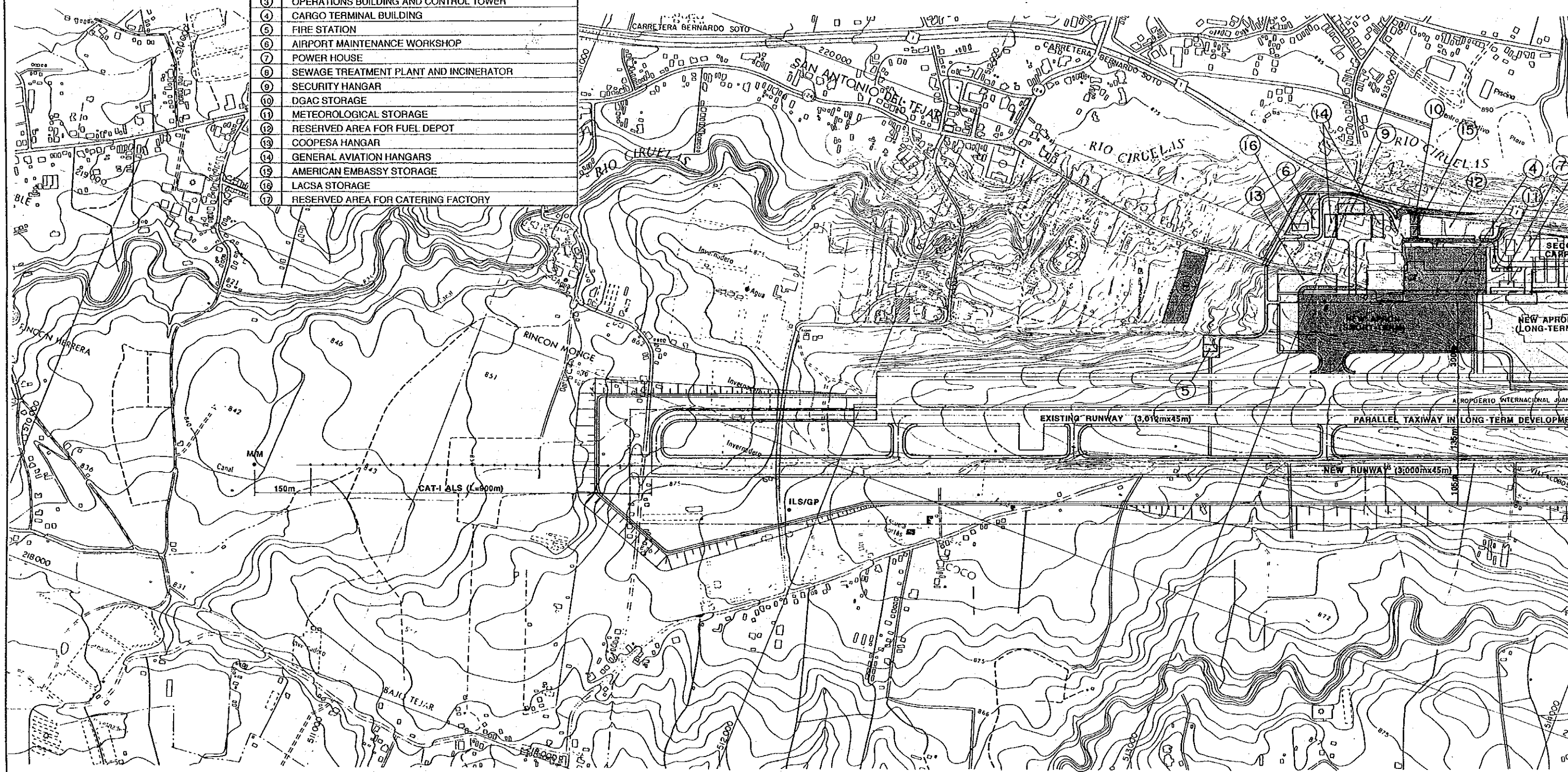
A. Problems of not conforming to international standards

- Insufficient width of the runway strip
- Existence of obstacles protruding upon the runway 07 take-off climb surface
- Insufficient separation distance between centerlines of the runway and parallel taxiway

B. Problems of not complying with the growth of air traffic demands

- Low runway capacity
- Insufficient number of aircraft stands
- Inadequate space and nonfunctional layout of the international passenger terminal building

LEGEND	
	SHORT-TERM DEVELOPMENT PLAN (2000)
	LONG-TERM DEVELOPMENT PLAN (2010)
(1a)	EXISTING INTERNATIONAL PASSENGER TERMINAL BUILDING
(1b)	SECOND INTERNATIONAL PASSENGER TERMINAL BUILDING
(2)	DOMESTIC PASSENGER TERMINAL BUILDING
(3)	OPERATIONS BUILDING AND CONTROL TOWER
(4)	CARGO TERMINAL BUILDING
(5)	FIRE STATION
(6)	AIRPORT MAINTENANCE WORKSHOP
(7)	POWER HOUSE
(8)	SEWAGE TREATMENT PLANT AND INCINERATOR
(9)	SECURITY HANGAR
(10)	DGAC STORAGE
(11)	METEOROLOGICAL STORAGE
(12)	RESERVED AREA FOR FUEL DEPOT
(13)	COOPESA HANGAR
(14)	GENERAL AVIATION HANGARS
(15)	AMERICAN EMBASSY STORAGE
(16)	LACSA STORAGE
(17)	RESERVED AREA FOR CATERING FACTORY



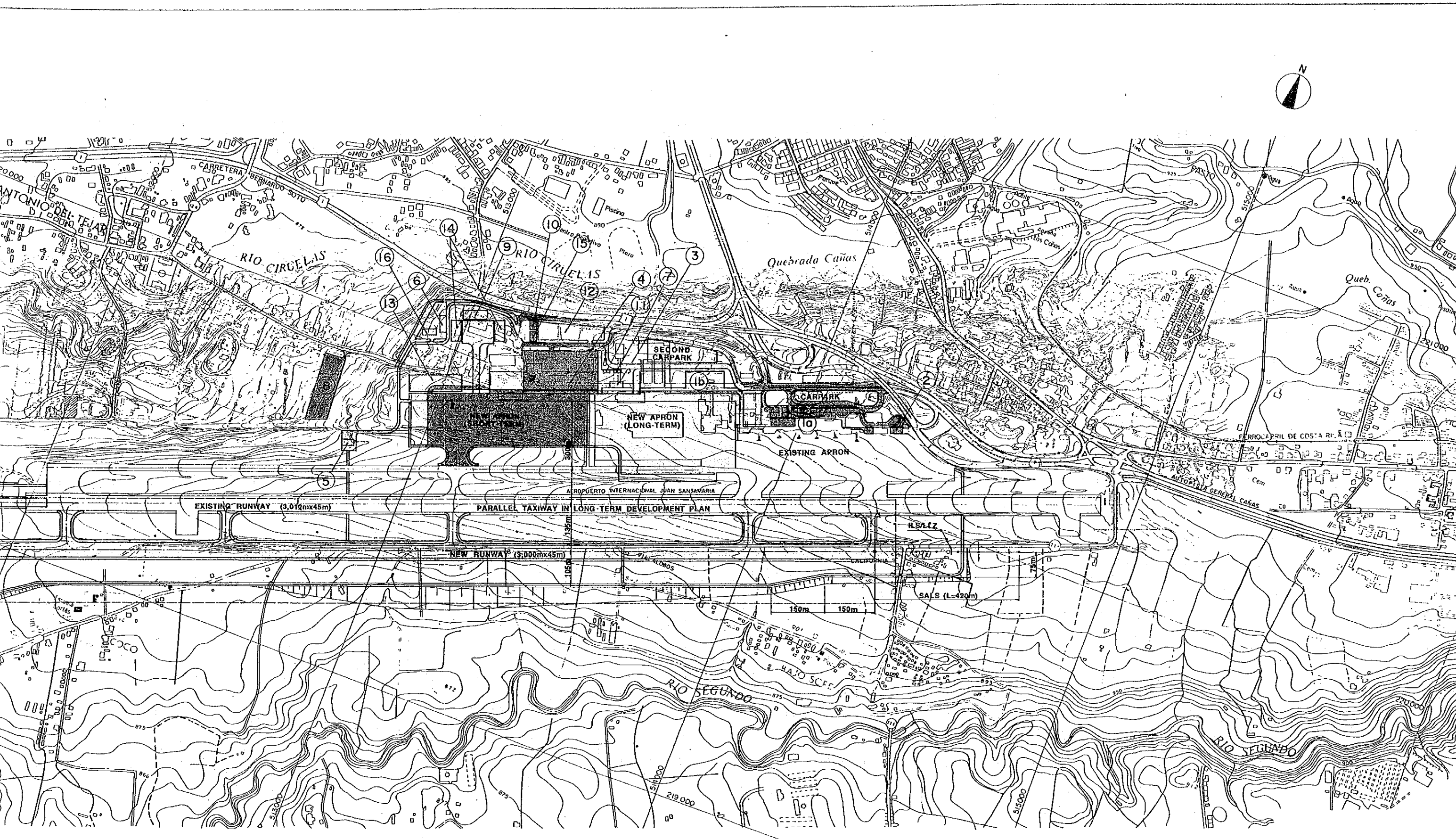


Figure 3.2.1 Masterplan of Juan Santamaria Airport

- Inadequate space of international cargo terminal building
- Insufficient carpark capacity

Group C: Other problems

- Serious aircraft noise problems
- Low runway usability due to poor meteorological conditions

Among the above group, the problems of group C are basically not solvable by means of improvement of the existing airport. Therefore, the development policy for Juan Santamaria Airport is focussed on finding solutions for group A and B problems in the following two steps:

The First Step: Layout planning of the runway and taxiway
 The Second Step: Development planning of the terminal area

(2) Layout Planning of the Runway and Taxiway

Six alternative layouts of the runway and taxiway are prepared as shown in Figures 3.2.2 through 3.2.7. Alt. R-A3 was selected for the long-term development for the following reasons:

- Safety of aircraft operations will be improved by complying with international standards.
- Least construction cost to achieve the above objective.
- The runway can be used beyond 2010 because of increased capacity.

On the other hand, Alt. R-C is recommended for the short-term development because the improvement of the terminal facilities should be completed prior to the preparation of the new runway to solve its serious capacity problem. In addition, simultaneous development of the new runway and terminal facilities is very expensive and will result in low cost-effectiveness.

As a result, the layout plan of the runway and taxiway is recommended to follow the phased implementation shown below:

Short-term Development Plan	: Alt. R-C	(Continuous use of the existing runway)
Long-term Development Plan	: Alt. R-A3	(Construction of a new runway based on FAA standards)

(3) Development Planning of Terminal Area

Three alternatives are considered for terminal area layout from the following two viewpoints and are shown in Figures 3.2.8 through 3.2.10:

- 1) Zoning of three functional areas, i.e., Passenger(P), Cargo(C) and Maintenance(M)
- 2) Utilization of the existing facilities

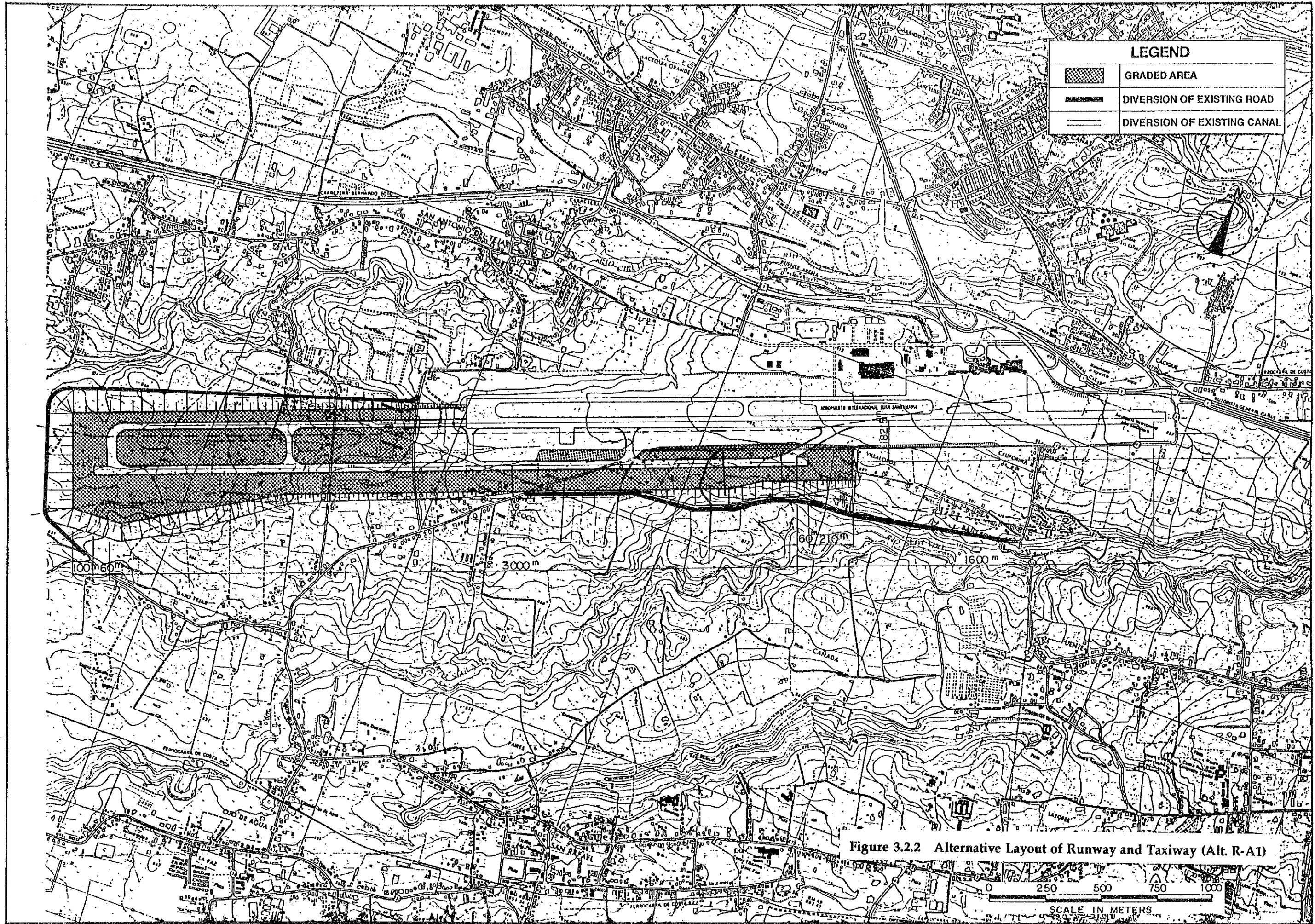
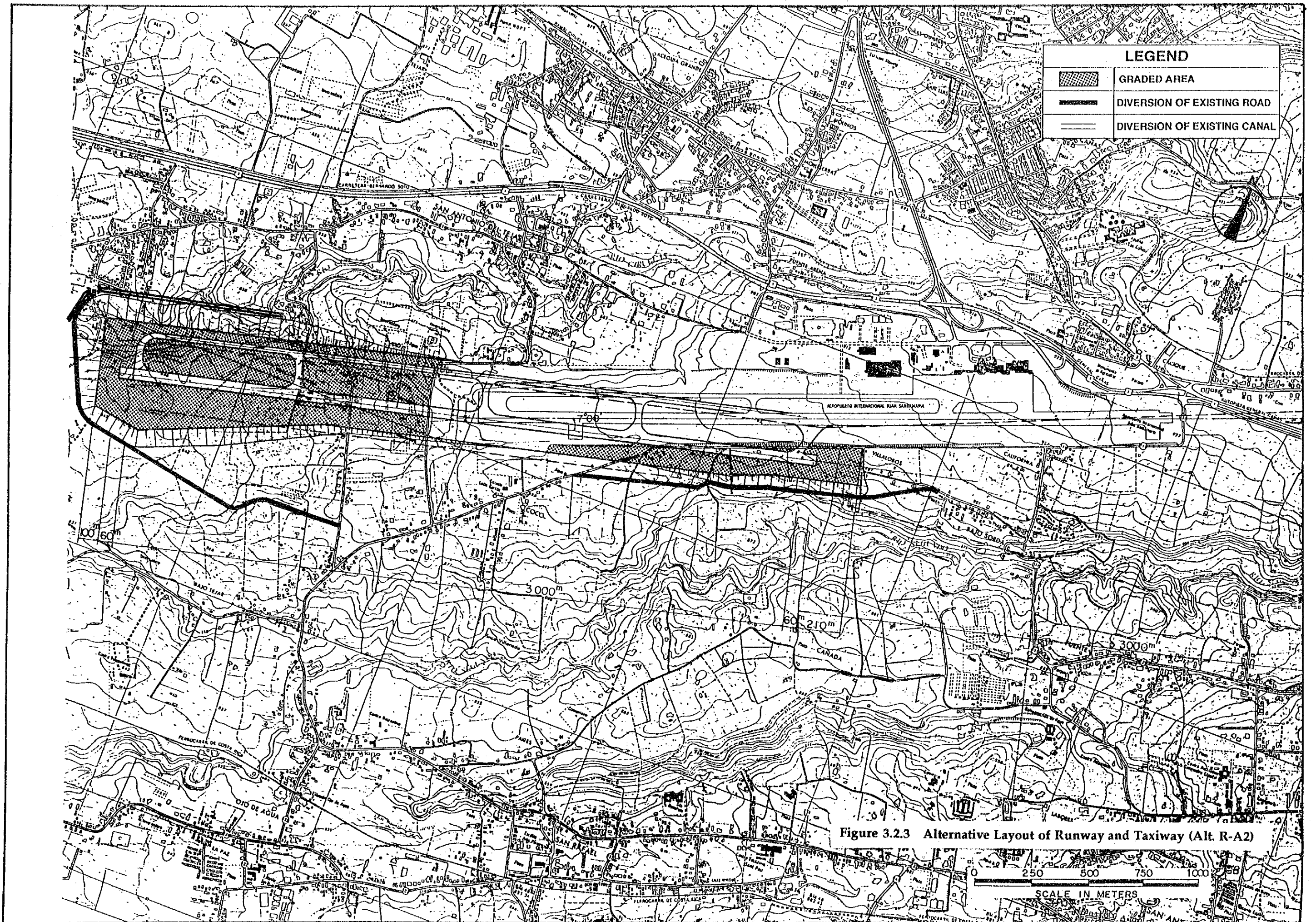
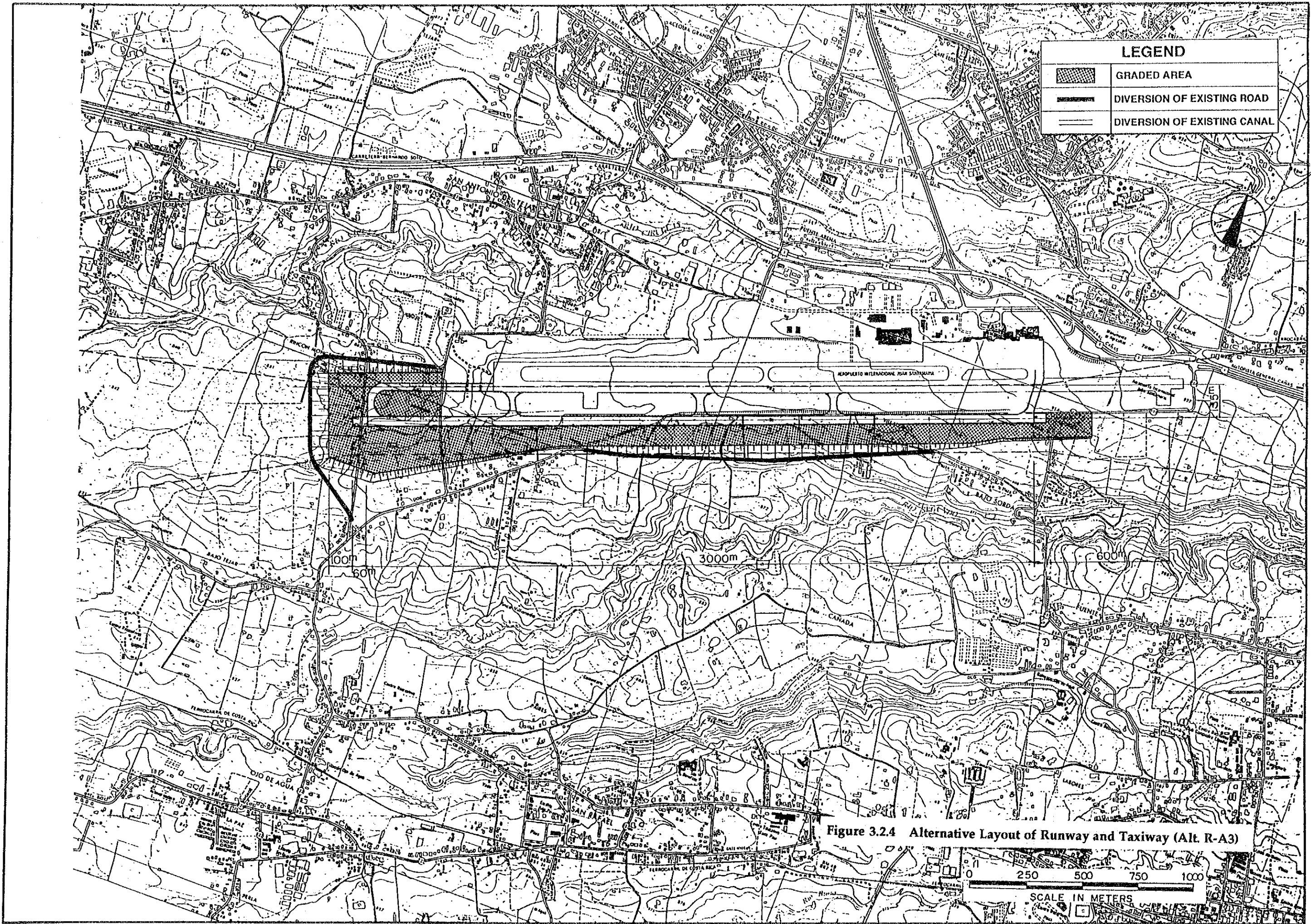


Figure 3.2.2 Alternative Layout of Runway and Taxiway (Alt. R-A1)








LEGEND	
	GRADED AREA
	DIVERSION OF EXISTING ROAD
	DIVERSION OF EXISTING CANAL

Figure 3.2.4 Alternative Layout of Runway and Taxiway (Alt. R-A3)

0 250 500 750 1000
SCALE IN METERS

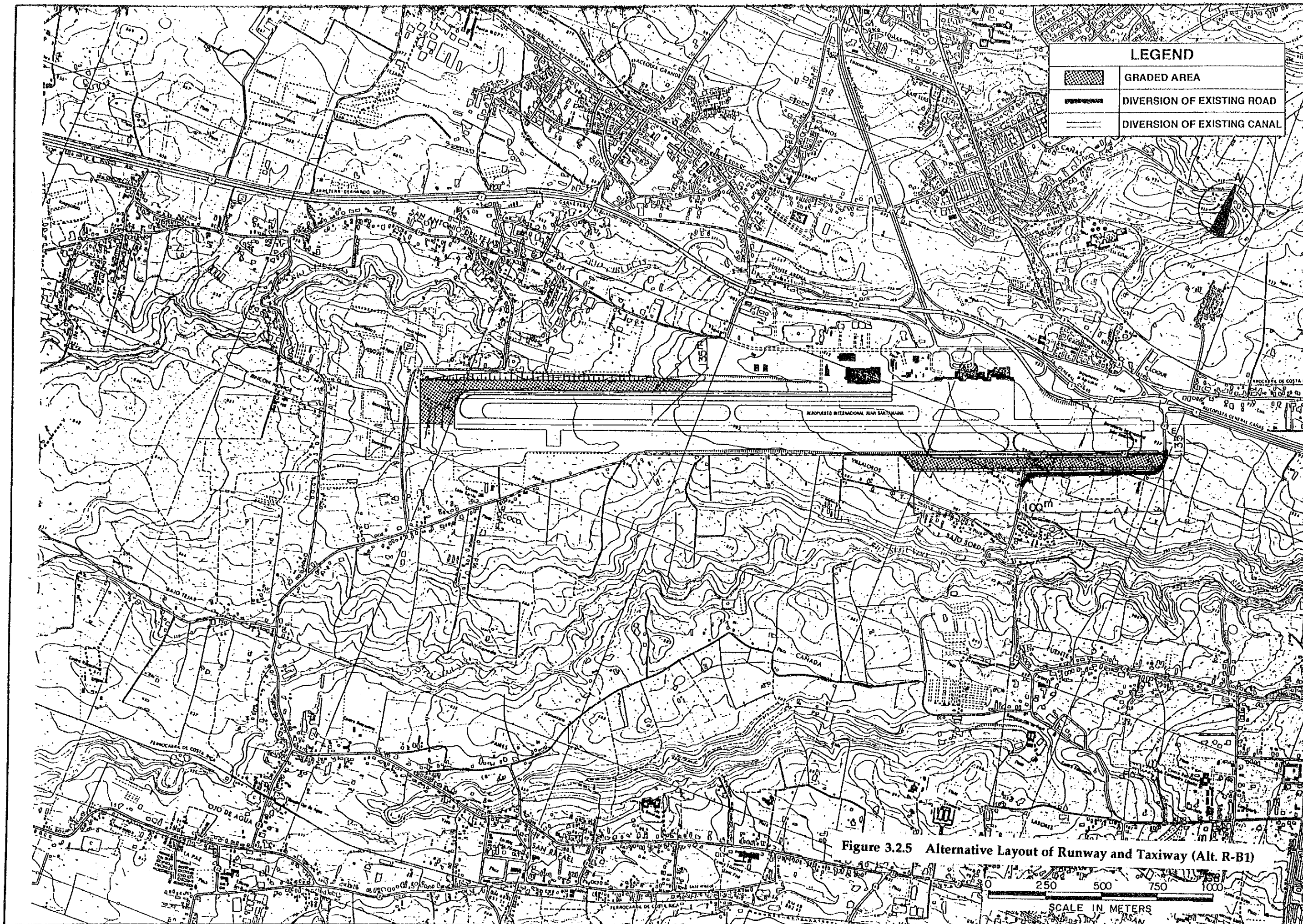
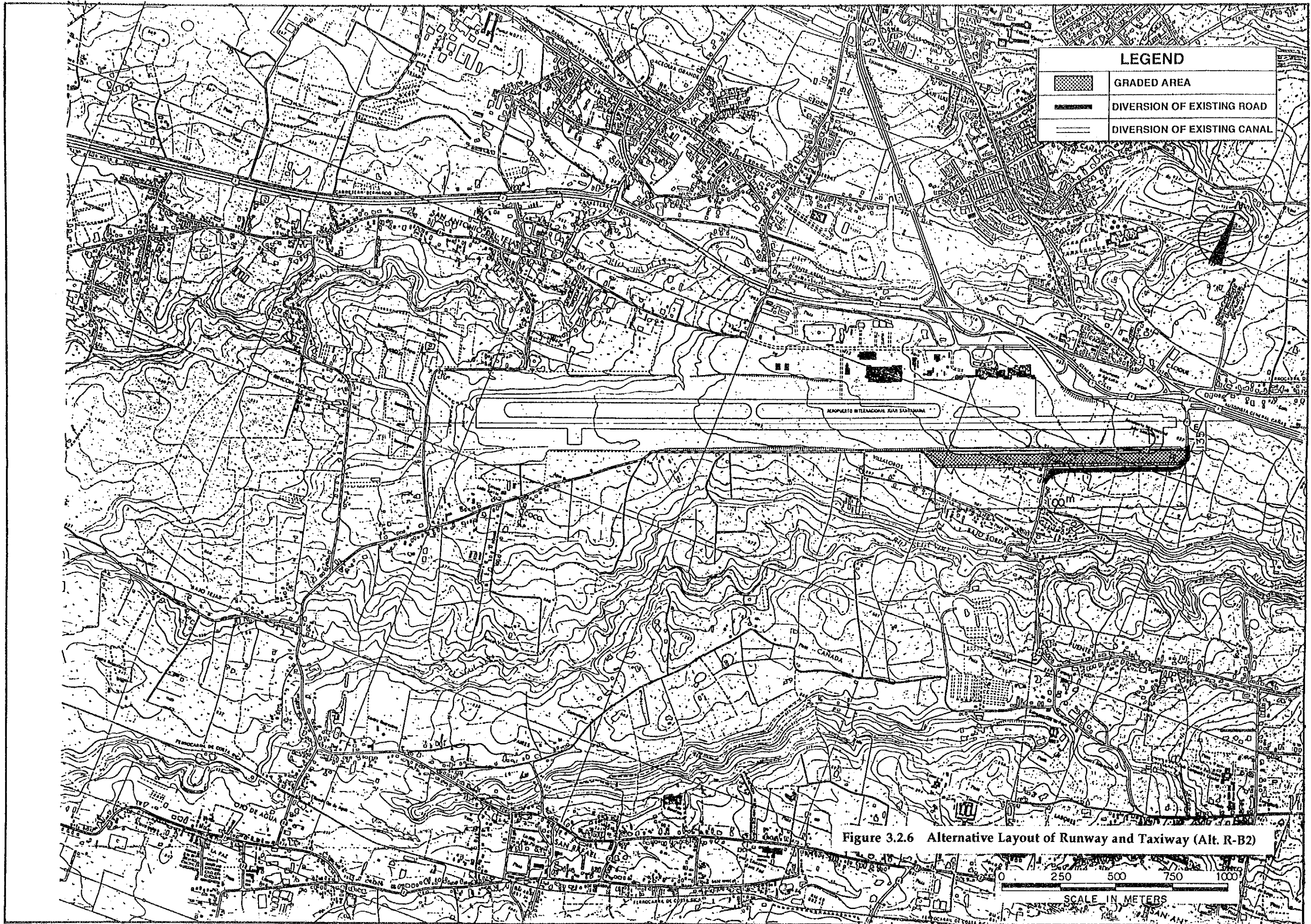


Figure 3.25 Alternative Layout of Runway and Taxiway (Alt. R-B1)




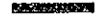
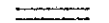
LEGEND	
	GRADED AREA
	DIVERSION OF EXISTING ROAD
	DIVERSION OF EXISTING CANAL

Figure 3.2.6 Alternative Layout of Runway and Taxiway (Alt. R-B2)

0 250 500 750 1000
SCALE IN METERS