REPUBLIC OF HONDURAS

NEW TEGUCIGALPA AIRPORT DEVELOPMENT

FEASIBILITY STUDY REPORT

AUGUST 1979

JAPAN INTERNATIONAL COOPERATION AGENCY

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FOREWORD

In response to the request of the Government of the Republic of Honduras, the Government of Japan agreed to conduct a feasibility study on the New Tegucigalpa Airport Development in the Metropolitan Tegucigalpa area, and the study has been carried out by the Japan International Cooperation Agency (JICA).

The JICA despatched to Honduras a preliminary survey mission headed by Mr. Masao Hirai of the Civil Aviation Bureau, Ministry of Transport in October 1977, and the Feasibility Study was started in December 1977. The present Final Report is based on the Interim Report on suitable airport site submitted in September 1978, the Draft Final Report submitted in June 1979, the comments thereon made by the Government of Honduras, and on the further study subsequently made in Japan.

In view of the great contributions this project will make to the aviation safety of the metropolitan airport of Honduras as well as to the development of the Republic, I hope that the present study will help expedite implementation of the project, and also contribute to furthering the mutual goodwill and friendship of our two nations.

I wish to express my heartfelt appreciation for the close cooperation accorded to our study mission by the officials concerned of the Government of Honduras.

Tokyo, August 1979

Shinsaku Hogen
President
JAPAN INTERNATIONAL COOPERATION AGENCY
Tokyo, Japan

Mr. Shinsaku Hogen
President
Japan International Cooperation Agency
Tokyo, Japan

Dear Sir,

LETTER OF TRANSMITTAL

It is our pleasure to submit to you herewith the Final Report of the New Tegucigalpa Airport Development Feasibility Study, into which have been incorporated the views of the Supervisory Committee and of the officials concerned of the Government of the Republic of Honduras as confirmed in Tegucigalpa in June 1979.

The project is to construct a new airport in the Talanga Basin to the north of Tegucigalpa, the capital, that would meet the future air transport requirements of the metropolitan area, and thereby to replace the existing Toncontín Airport which suffers from serious aviation safety problems.

It is not only possible but most recommendable to develop the airport in two stages, the first stage facilities being envisaged to become serviceable in 1986 through the year 1995, with the ultimate design year of 2005. The economic analysis based on the viewpoints of national economy has revealed an economic internal rate of return of 13.8%, indicating that the project is economically feasible in this aspect. The study also includes recommendations as regards the organizations for the project implementation as well as for the administration of the new airport after its completion.

It is the belief of the study team that the Honduran Government, recognizing the importance and the urgency of the need to develop this airport, would undertake to implement the project at an early date hereafter.

I wish to take this opportunity of expressing our deep appreciation to the officials concerned in your Agency, as well as to the Supervisory Committee, Ministry of Transport, Ministry of Foreign Affairs, Japanese Embassy in Honduras and the Government of Honduras for their valuable advice and kind assistance rendered to our team both at home and in the field.

Yours faithfully,

Tokyo, August 1979

Akira Yoshioka
Leader
New Tegucigalpa Airport Development
Feasibility Study Team
Japan Airport Consultants, Inc.

THE NEW TEGUCIGALPA AIRPORT DEVELOPMENT

FEASIBILITY STUDY

- FINAL REPORT -

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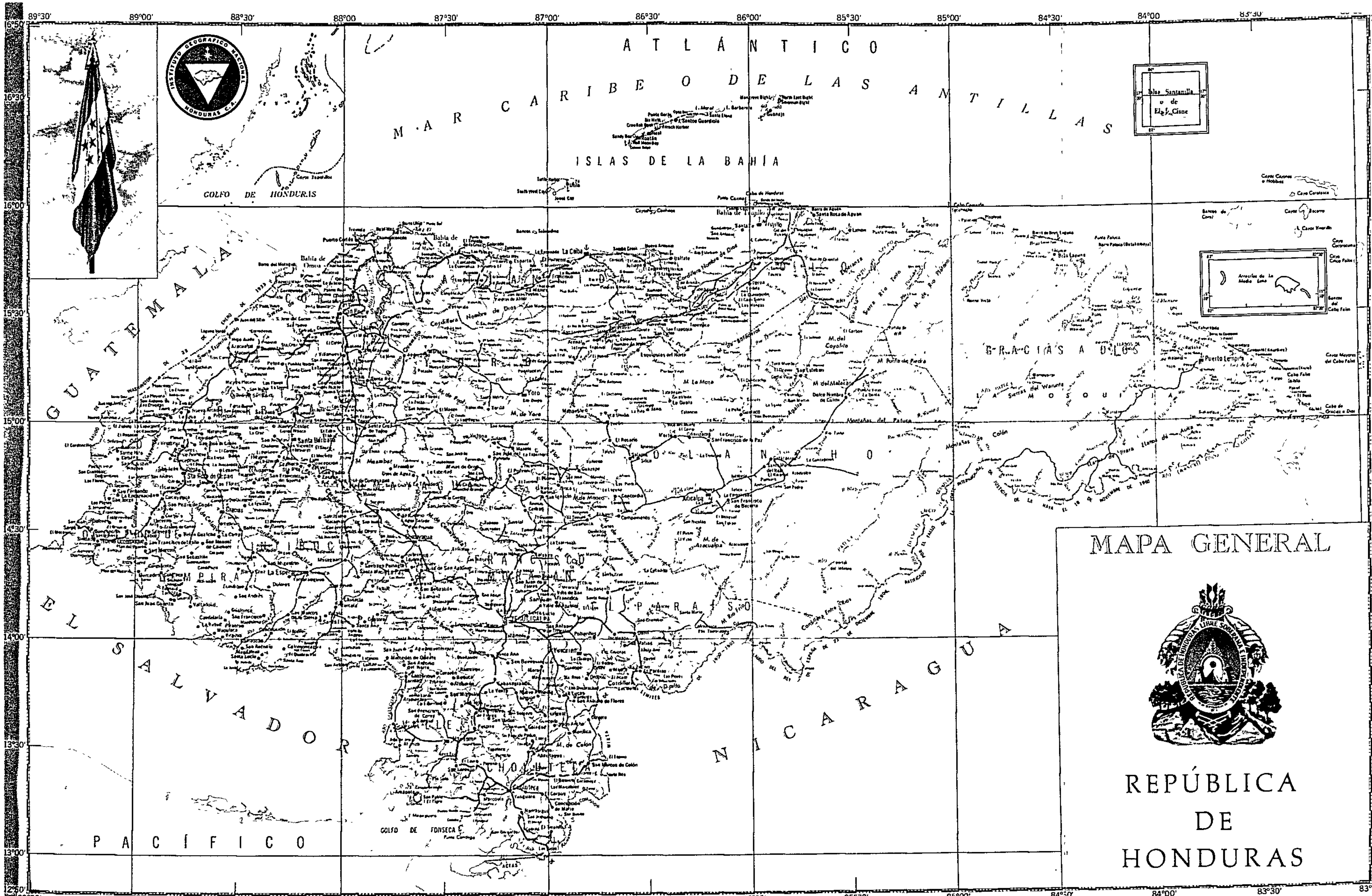


MINISTERIO DE COMUNICACIONES. OBRAS PUBLICAS Y TRANSPORTE

INSTITUTO GEOGRÁFICO NACIONAL

ESCALA 1:1,000,000

25 20 10 0 25 50 75 100 km

ELEVACIÓN EN METROS SOBRE EL NIVEL MEDIO DEL MAR

PROYECCIÓN UNIVERSAL TRANSVERSAL DE MERCATOR

DATO HORIZONTAL NORTEAMERICANO 1927

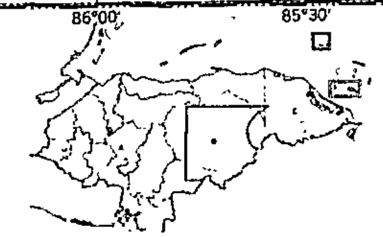


DIAGRAMA INFORMATIVO DEL GRADO DE EXACTITUD DEL MAPA POR REGIONES

A. MAPAS TOPOGRÁFICOS BÁSICOS, ESCALA 1:50,000

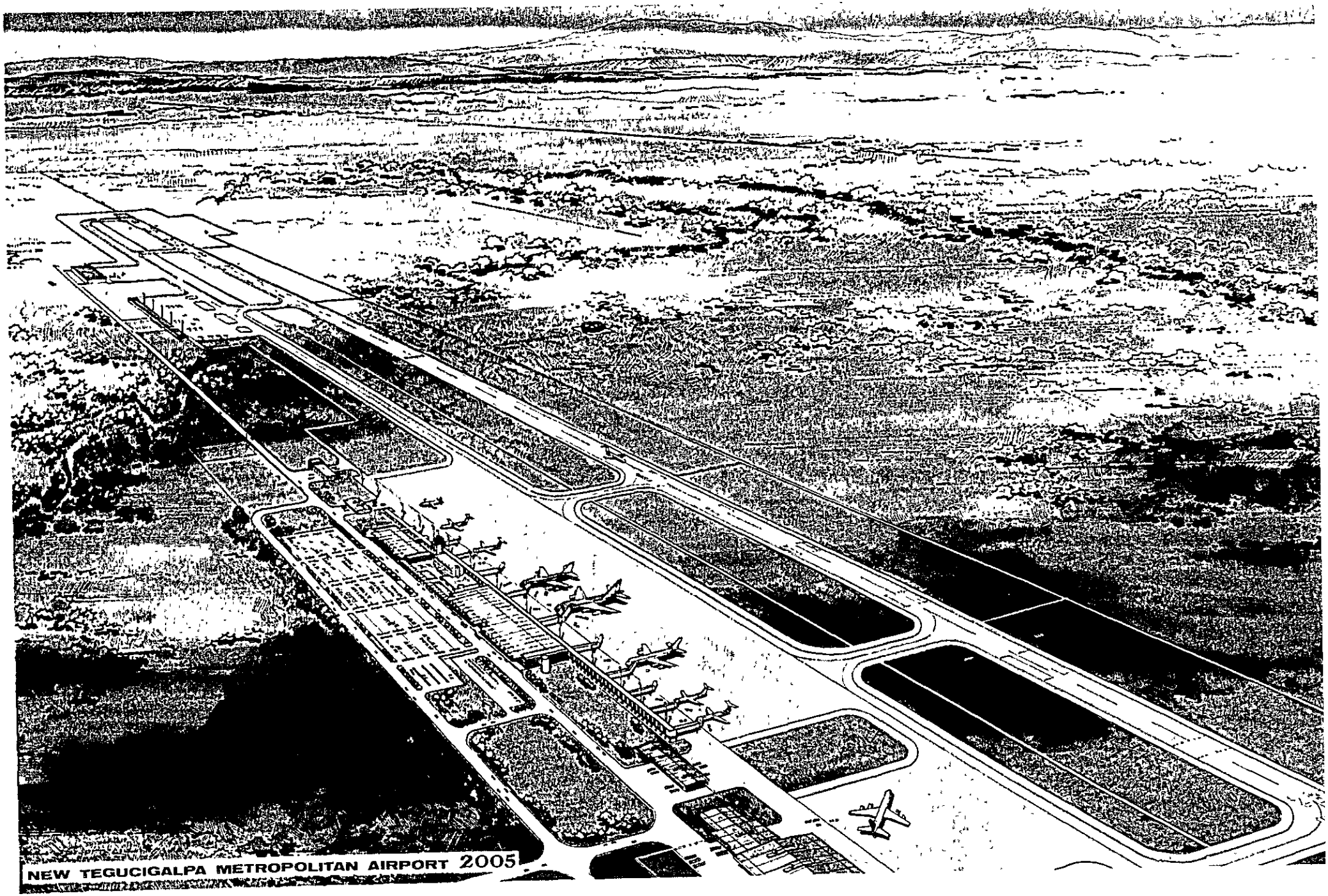
B. Y C. MOSAICOS AEROFOTOGRÁFICOS SEMI-CONTROLADOS

C. DATOS GEOGRÁFICOS CLASIFICADOS EN EL TERRENO POR MEDIO DE LAS AEROFOTOGRAFÍAS.

7ª EDICION IMPRESA EN EL INSTITUTO GEOGRÁFICO NACIONAL, TEGUCIGALPA, D. C. HONDURAS, C. A10-1978

SÍMBOLOS CONVENCIONALES

CAPITAL DE LA REPÚBLICA	⊛	CARRETERA PAVIMENTADA	━
CABECERA DEPARTAMENTAL	■	CARRETERA TRANSITABLE EN TODO TIEMPO	—
CABECERA MUNICIPAL	●	CARRETERA TRANSITABLE EN TIEMPO SECO.	—
ALDEA	○	SENDERO	—
CASERÍO	∘	FERROCARRILES	—+—
LIMITE INTERNACIONAL	— —	AEROPUERTOS, CAMPOS DE ATERRIZAJE	✈ †
LÍMITE DEPARTAMENTAL	— —	PUERTOS, EMBARCADEROS	⚓ ⚓
ELEVACIONES	168		


NEW TEGUCIGALPA METROPOLITAN AIRPORT 2005

CONCLUSION AND SUMMARY

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CONCLUSION

As a result of the study of the technical, economic, and financial feasibility of the New Tegucigalpa Airport Development Project at Talanga site selected by the Government of Honduras based on the results of the JICA site selection study, the following conclusions have been reached:

i. No significant technical difficulty in the implementation of the Project is anticipated.

ii. Since the Project is not financially feasible under the current airport tariff structure, it will be necessary to take some effective measures to increase the airport revenues, either by raising the level of the airport tariffs, or by creating a system of government subsidy on the airport, or a combination of both.

iii. The economic internal rate of return of 13.8% has resulted from the cost-benefit analysis made with the cash flow of the economic costs and the direct tangible economic benefits identified in the light of the national economy. It is, therefore, concluded that the Project is economically feasible from the national economic point of view.

iv. In order to cope with the forecast future air traffic demand in the Tegucigalpa metropolitan area, it is strongly recommended that the New Tegucigalpa Airport be constructed at Talanga for completion by 1986, to replace the existing Toncontín Airport as a metropolitan gateway, as the latter suffers from serious operational and environmental problems.

SUMMARY

1. INTRODUCTION

The primary purpose of the present feasibility study is to make a comprehensive evaluation of the New Tegucigalpa Airport Development Project from the technical, financial and economic points of view.

The method and timing of the study proposed in the Inception Report were approved by the Honduran Government in February 1978, and it was immediately followed in the same month by field survey of the potential sites and by subsequent home office analysis of the detailed site selection study, the results of which were submitted in the form of the Interim Report in September 1978 to the Honduran Government. In December 1978 the Government selected the Talanga site recommended in the JICA study for the construction of the new airport to replace the existing Toncontín Airport.

The construction site having thus been determined, a comprehensive feasibility study was made including a detailed site investigation conducted by the JICA study mission in February 1979, and the results thereof are made the contents of the present Final Report.

2. BACKGROUND OF PRODUCT

General

The Republic of Honduras is situated close to the center of Central America, and has an area of 112,000 Km^2, about 65% of which being mountainous. The country's population in 1977 is estimated at 3.3 million with the annual growth rate of 2.7%. Gross domestic product has slowly but steadily increased at 4.6% per annum in real

terms, amounting to 2,940 million lempiras in 1977, one third of which being occupied by the agricultural sector. The transportation system of Honduras comprises road, sea, railway and air.

Air Transport Demand

Aviation plays an important role both as international and domestic transport means in Honduras. The international air transport demand of the country has steadily increased for the past 10 years. At Toncontín Airport in 1977 international air passengers amounted to 112,473 and international cargo to 5,112 tons with the annual growth rate for the past 10 years of 9.2% and 7.7% respectively. On the other hand, the domestic air transport demand of the country had declined after 1970 due to the improvement of the domestic road network until in 1975 when it showed a sign of rapid recovery. Domestic passengers at Toncontín Airport reached 53,275 in 1977 with the annual growth rate of 11.4% for the preceding two years.

Problem of Existing Toncontín Airport

The existing Toncontín Airport is seriously handicapped with operational and environmental problems including the existence of obstacles in air space, insufficient runway length, requiring take-off weight restrictions and the possibilities of aircraft noise hazard and crash accident in the surrounding residential area. Furthermore, the topography and present land use around the airport are such that there is little possibility of the future expansion of the existing airport.

3. AIR TRAFFIC FORECAST

General

Forecast was made of the passenger and cargo transport demand of the existing Toncontín Airport, as well as of the two alternative sites of Pedregal and Talanga selected through preliminary site screening conducted in the initial stage of the site selection study. Forecast was made for a period of 25 years from 1980 through the ultimate design year of 2005. The existing international air route network serving Tegucigalpa was assumed to remain unchanged. In addition, two new air routes of Tegucigalpa-Houston and Tegucigalpa-San Salvador were assumed to be established.

Outline of Methodology

Air traffic forecast of the Tegucigalpa area was made in relation to the total national air transport demand of Honduras. Forecast was made first of the total Honduran air transport, and then using that as the control total, forecast was made of the traffic projected for the Toncontín Airport. Since air traffic demand of PEDREGAL and TALANGA sites is affected significantly by the differences in access conditions from those of Toncontín Airport especially in domestic air transport demand, the forecast was made by means of a gravity model into which such differences were built in.

Results of Forecast

The results of the air traffic forecast are summarized in Table S-1.

Table S-1 SUMMARY OF AIR TRAFFIC FORECAST

		1985	1995	2005
International Passengers ('000 persons)				
Toncontín Airport	Embarking & Disembarking	325	701	1,408
	Transit	146	344	702
	Total	471	1,045	2,110
Pedregal Site	Embarking & Disembarking	325	700	1,402
	Transit	146	344	702
	Total	471	1,044	2,104
Talanga Site	Embarking & Disembarking	312	677	1,356
	Transit	146	344	702
	Total	458	1,021	2,058
Domestic Passengers ('000 persons)				
Toncontín Airport	Embarking & Disembarking	147	272	416
	Transfer	31	73	151
	Total	178	345	567
Pedregal Site	Embarking & Disembarking	139	255	391
	Transfer	31	73	151
	Total	170	328	542
Talanga Site	Embarking & Disembarking	123	230	351
	Transfer	31	73	151
	Total	154	303	502
International Cargo ('000 tons)				
Toncontín Airport	Loaded & Unloaded	12.5	28.7	60.5
Pedregal Site	Loaded & Unloaded	12.8	29.5	62.3
Talanga Site	Loaded & Unloaded	12.4	28.4	59.8
Domestic Cargo ('000 tons)				
Toncontín Airport	Loaded & Unloaded	1.5	2.0	2.6
Pedregal Site	Loaded & Unloaded	1.4	1.9	2.5
Talanga Site	Loaded & Unloaded	1.3	1.7	2.2

4. AIRPORT FACILITY REQUIREMENTS

Based on the planning criteria established in conformity with the ICAO standards and/or the FAA regulations, the facility requirements to meet the air traffic forecast for the year 2005 were studied in respect of the two possible sites of Pedregal and Talanga at a road distance from Tegucigalpa of 16 Km and 60 Km respectively, with the results as shown in Table S-2.

Table S-2 FACILITY REQUIREMENTS BY SITE

		Pedregal	Talanga
Runway Strip		2,890 m x 300 m	2,770 m x 300 m
Runway	Cat-I ILS	2,770 m x 45 m	2,650 m x 45 m
	Orientation	N12°E	N73°W
Taxiway		23 m wide parallel taxiway	
Aprons	Passenger	14 parking positions, 99,800 m^2	
	Cargo	2 parking positions, 26,000 m^2	
Buildings	Passenger	19,600 m^2	17,900 m^2
	Cargo	11,700 m^2	11,200 m^2
Parking		860 cars	750 cars
Radio Navigational Aids, Telecommunications, and Meteorological Service Facilities		Cat-I ILS, VOR/DME, NDB etc.	
Airfield Lighting		Cat-I ILS*	
Others		Fire Fighting and Rescue Fuel Storage and Distribution Utilities	

* Approach Lighting System is not installed at Pedregal Site.

5. SITE SELECTION STUDY

General

Detailed site selection study was made through overall comparative evaluation of the two alternative sites of TALANGA and PEDREGAL which were selected through the preliminary screening of the 18 potential sites.

Methodology

The difference in access time and distance from Tegucigalpa to the two sites, and the consequent difference in facility requirements reflecting the corresponding traffic demand forecasts that are necessarily affected by the access distance, are both considered significant enough to affect not only the costs but also the benefits of the new airport. Evaluation of the two sites was, therefore, made not only from the physical and technical points of view but with due considerations for the economic aspects of the Project, based on the preliminary cost-benefit analysis made for the specific purpose.

Technical Evaluation

More technical difficulties and consequently a considerably longer construction period are anticipated at PEDREGAL site than at TALANGA site due mainly to the significant differences both in nature and amount of earthwork involved at the two sites.

Slightly less restrictions need to be imposed on aircraft operation procedures at PEDREGAL site where, however, the runway placed on a steeply sloped and barely large enough tableland may well cause pilots considerable uneasiness.

Basides, if the Toncontín Airport continues to operate as an air force or general aviation airport, appropriate adjustments between the control zones of the existing airport and that of the new airport will be imperative, resulting in reduced runway capacity for the new airport at PEDREGAL.

TALANGA site is free from restrictions as regards future expansion of the airport facilities, should it become necessary, while PEDREGAL site suffers from its extreme limitations in this respect.

The above considrations lead to a conclusion that from engineering points of view TALANGA site is more suitable for the new airport construction than PEDREGAL site.

Preliminary Construction Cost Estimate

Preliminary estimate of the construction cost was made for site selection purposes based on the construction schedule established for each of the two alternative sites after calculating the quantities of all works involved on the basis of the facility plans, the topographical and geological conditions of the sites and all other cost factors involved.

Preliminary construction cost estimate for PEDREGAL site amounts to about US$ 247 million, or 2.7 times that of TALANGA site, which amounts to about US$ 92 million.

Economic Evaluation

Preliminary cost-benefit analysis showed a significant difference in internal rate of return between the two sites, namely 9.1% for PEDREGAL and 14.9% for TALANGA, indicating that TALANGA site is economically more advantageous than PEDREGAL site.

Overall Evaluation

Based on the foregoing, the site selection study concludes that TALANGA site is the most desirable of all sites considered for the new airport construction in the Metropolitan Tegucigalpa area.

6. AIRPORT FACILITY AND AIRSPACE USE PLAN

General

Planning of the airport facility and of the airspace use was made for the new airport at the Talanga site which was officially selected by the Government in December 1978, taking duly into account the results of the discussions with the officials concerned of the Government that took place in Honduras in February 1979.

Airport Facilities by Development Stage

Development of the new airport facilities was planned in two stages, namely Stage I to be serviceable from 1986 to 1995, and Stage II intended to accommodate the traffic requirements through the year 2005. Table S-3 presents an outline of the new airport facilities for each of the two development stages. The airport layout plan is shown in Fig. S-1.

Airport Premises

A total area of about 300 hectares was calculated to be necessary for the airport premises to accommodate the planned facilities including the 2,700 meter runway, with due consideration for the necessary surface clearances as well as for future terminal expansion.

City Air Terminal

In view of the distance and access time required between the new airport and downtown Tegucigalpa, construction of a city air terminal with airport limousine bus services is considered to contribute greatly to the economy and convenience of airport users, provided that such be planned in good coordination with the urban development plan of the metropolitan area.

Airspace Use Plan

Instrument approach and departure procedures at the new airport were planned in accordance with the criteria contained in ICAO PANSOPS, Doc. 8168/611/3.

Runway usability of the new airport, calculated on the basis of the weather minima for each procedure, amounted to 97 percent or more.

Surrounding Land Use

Early implementation of an appropriate surrounding land use plan based on the expected noise contours is recommended for the sake of continued, trouble-free functioning of the new airport as the national gateway long into the future.

Table S-3 OUTLINE OF NEW TEGUCIGALPA INTERNATIONAL AIRPORT AT TALANGA

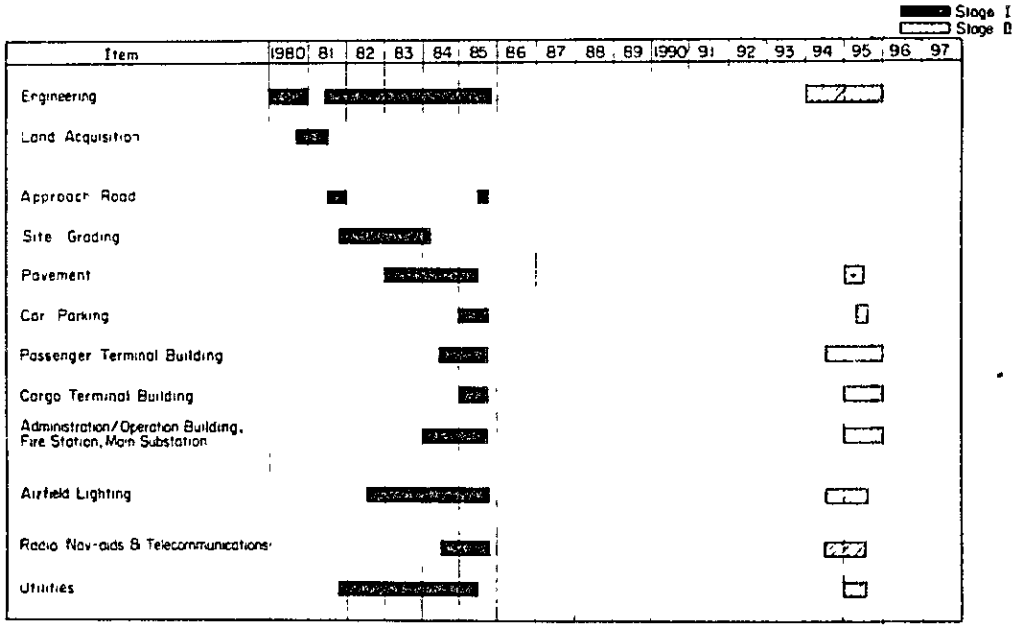
ITEMS	DEVELOPMENT STAGES	STAGE I 1995	STAGE II 2005	REMARKS
AIRPORT BASIC DATA	Location:	Valle de Talanga, 60 Km from Tegucigalpa		60 minutes by car
	ARP: Elevation	754 m,		Runway Center
	Coordinate	N 014°27', W 087°07'		
	Runway: Orientation	107° - 287° (True North)		
	Airport Area	3,060,000 sq.m		
AIR TRAFFIC DEMAND FORECASTS (ANNUAL)	Passengers			
	International	1,021,000	2,058,000	
	Domestic	303,000	502,000	
	Total	1,324,000	2,560,000	
	Cargo, Tones			
	International	28,350	59,800	
	Domestic	1,700	2,220	
	Total	30,050	62,020	
	A/C Movements			
	Scheduled	16,600	31,400	
	General Aviation	7,000	11,100	
AIRFIELD FACILITIES	Runway Strip	2,820 x 300 m		
	Runway	2,700 x 45 m		Flexible Pavement
	Shoulder	7.5 m Width		
	Taxiways			Flexible Pavement
	Parallel	2,700 x 23 m		
	Exit	161 x 23 m x 6 ea.		
	Shoulder	10.5 m Width		
	Aprons			
	Passenger	69,075 sq.m.	99,775 sq.m.	Rigid Pavement
	Cargo	-	26,095 "	Flexible Pavement
	A/C Maintenance	18,420 "	18,420 "	"
	General Aviation	29,165 "	46,050 "	"
	Clearance between Runway and Taxiway Centerlines: 195 m			
AERONAUTICAL TELECOMMUNICATIONS AND RADIO NAVIGATIONAL AIDS		1 - Set Cat.I ILS MLS VOR/DME, NDB		Stage I
METEOROLOGICAL SERVICES FACILITY		1 - Set		Stage I
AIRFIELD LIGHTING FACILITY		1 - Set		to meet Cat I. ILS
BUILDINGS	Passenger	12,000 sq.m	19,200 sq.m	
	Import Cargo	5,500 "	11,000 "	
	Administ./Operation	2,900 "	3,400 "	
	Fire Station	850 "	850 "	With Vehicle housing
	Main Substation	910 "	910 "	
	Others	Export & Domestic Cargo Bldgs, Hangar		by Airline
CAR PARKING (Number of Car)		510	750	
UTILITIES		Power, Water, Sewage Treatment, Telephone		
AIRCRAFT FUEL SUPPLY SYSTEM		Hydrant System		by Fuel supplier
COCESNA FACILITY				by COCESNA

7. CONSTRUCTION SCHEDULE AND COST ESTIMATE

Construction Schedule

Construction schedule of the new airport was planned as shown in Table S-4, based on an assumption that the detailed design and land acquisition will have been completed by June 1981.

Table S-4 CONSTRUCTION PROGRAM FOR NEW AIRPORT



Construction Cost

Construction cost of the new airport including the cost of construction works, engineering, land acquisition and contingencies was estimated for each development stage in foreign and local currency portions as follows:

Stage I (Initial construction - 1980-1985)

Foreign Currency Portion	US$ 48,652,000
Local Currency Portion	US$ 23,610,000
Stage I Total	US$ 72,262,000

Stage II (Expansion work - 1994-1995)

Foreign Currency Portion	US$ 11,350,000
Local Currency Portion	US$ 5,437,000
Stage II Total	US$ 16,787,000

Conversion rate between US Dollar, Lempira and Yen was based on the exchange rates as of February 1979 of US$1.0 = L2.0 = ¥200.00.

8. FINANCIAL ANALYSIS

Purpose of Financial Analysis

Financial analysis was made to examine the financial profitability of the New Tegucigalpa Airport Development Project based on the assumption that the new airport will be administered on a self-supporting accounting principle.

Financial Costs

The annual construction cost of the project calculated based on 1979 market prices was used as the financial cost of the airport construction.

Estimate of the annual maintenance and operation costs of the proposed new airport was made at percentages of the construction cost of the respective facilities including repair works and replacement cost, plus estimate of the personnel cost based on the manning program of the new airport, and overhead.

Financial Benefits

The financial benefits of the New Tegucigalpa Airport Development Project comprise the airport revenues to be collected based on the airport tariff strcture to be revised shortly, such as landing charges, parking charges, lighting charges, land rental, terminal rental, car parking charges, aircraft fuel tax and cargo tax.

Results of Financial Cost-Benefit Analysis

The financial cost-benefit analysis based on the cash flow of the financial costs and financial benefits has revealed a financial internal rate of return (FIRR) in negative value for the Project. In the event the New Airport Development Project is financed by foreign loans, it will, therefore, be necessary to take some effective measures to increase the airport revenues, either by raising the level of the airport tariffs, or by creating a system of government subsidy on the airport, or combination of both.

9. ECONOMIC ANALYSIS

Purpose of Economic Analysis

The economic analysis was made to evaluate the economic worth brought about in the Republic of Honduras by the New Tegucigalpa Airport Development Project.

The Base Case

As generally practiced, the cost-benefit analysis was made on the principle of "with and without test", the case "without project" being defined as the Base Case in which utilization of the existing Toncontín Airport is continued at the present facility level without any new investment made thereon.

Economic Costs

The economic costs to be used in the economic analysis were obtained by deducting the customs duties and indirect taxes from the finaicial costs, and by applying the shadow prices.

Economic Benefits

The economic benefits considered attributable to the New Tegucigalpa Airport Development Project from the view point of the national economy are identified through comparative analysis of the relevant elements in the Base Case and the project case. These benefits comprise the direct and the indirect benefits, each of which consisting of the tangibles and intangibles.

Results of Economic Cost-Benefit Analysis

The cost-benefit analysis based on the cash flow of the economic costs and the direct tangibles of the economic benefits identified from the view point of national economy indicates an economic internal rate of return of 13.8% for the Project. It is, therefore, concluded that the New Tegucigalpa Airport Development Project is economically feasible from the viewpoint of the the national economy of Honduras, since the social discount rate of the country is understood to be 12%.

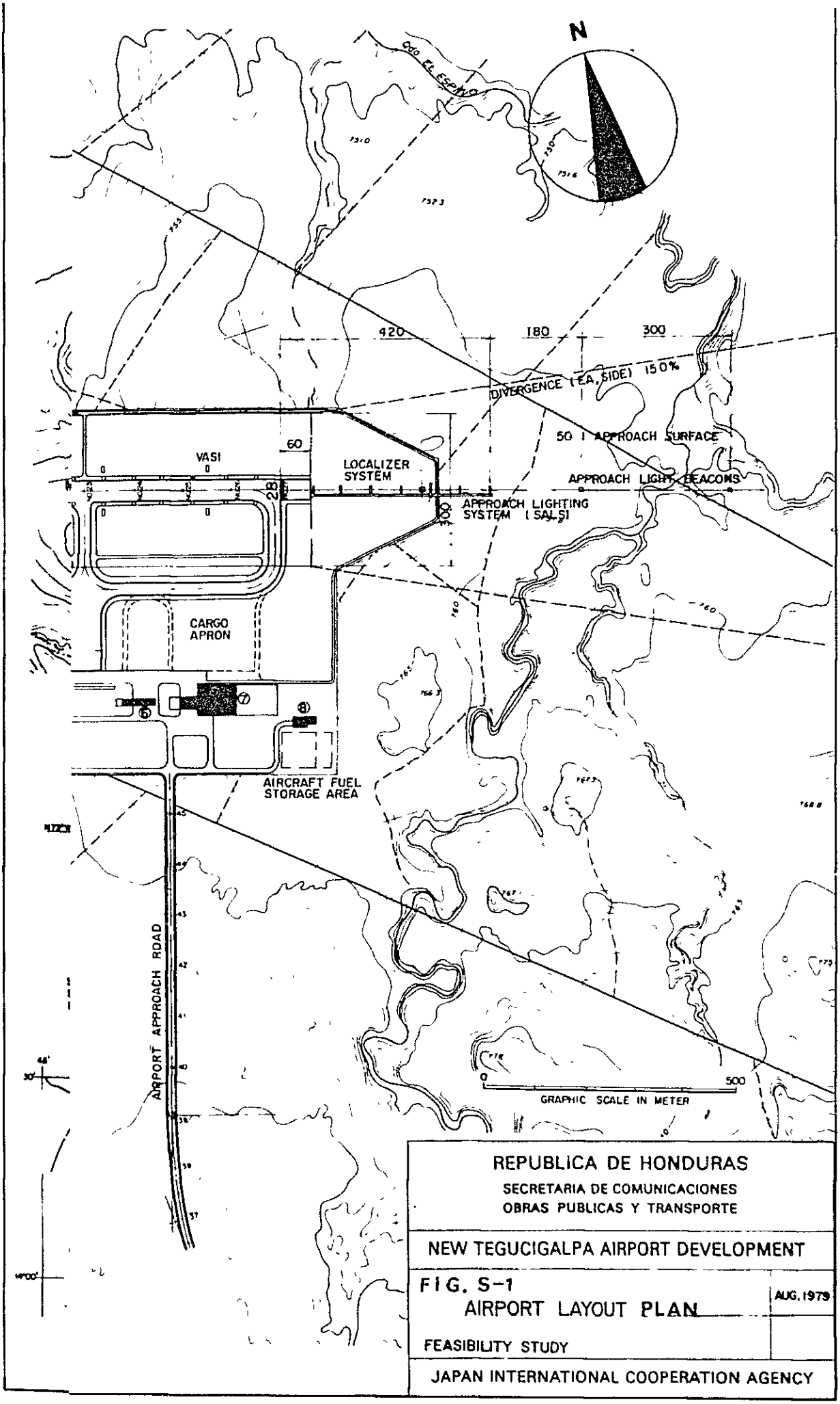
10. PROJECT IMPLEMENTATION ORGANIZATION AND NEW TEGUCIGALPA AIRPORT ADMINISTRATION

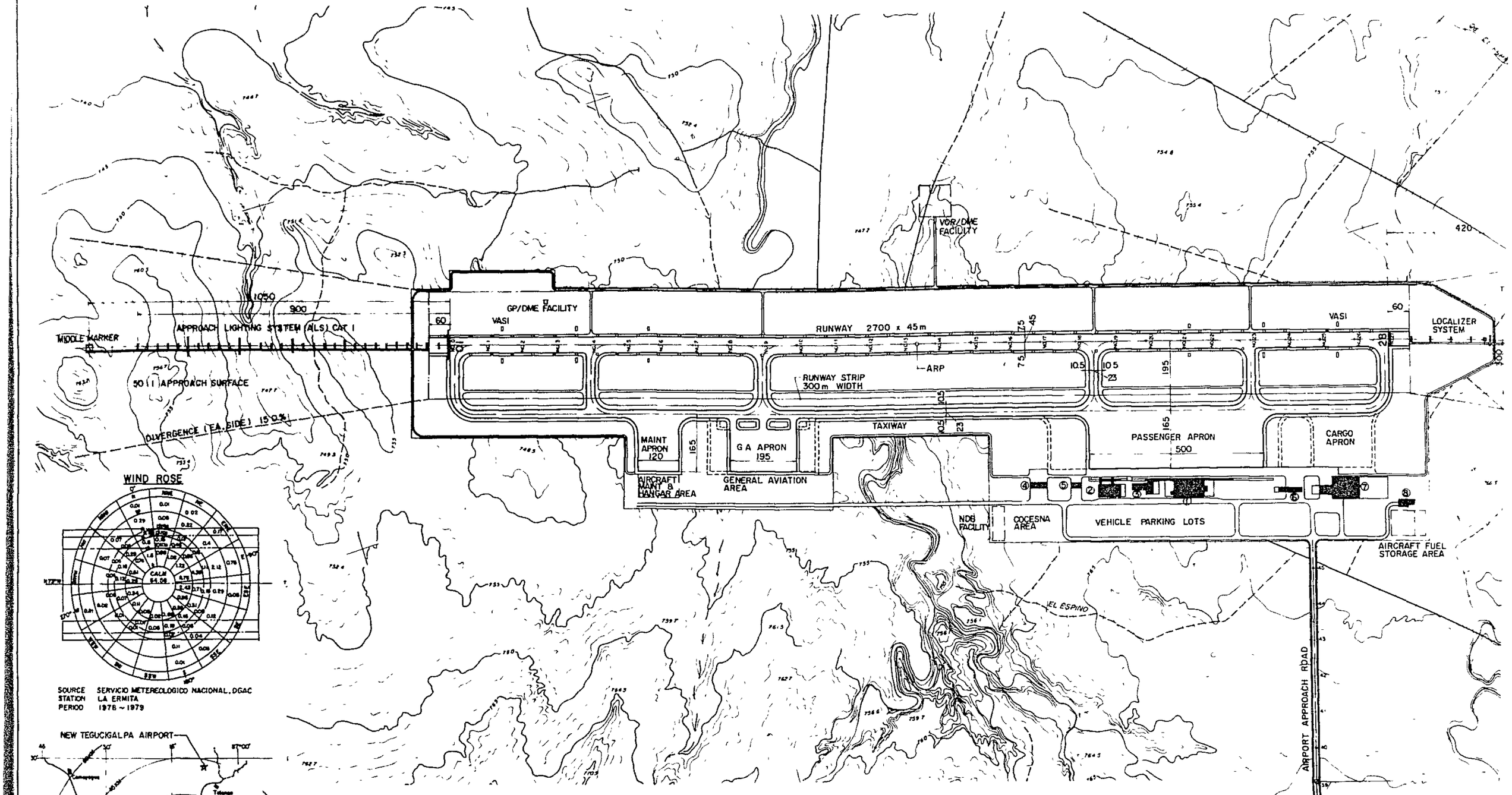
Project Implementation Organization

The existing project office with 5 staff members established within the DGOC to promote implementation of the New Tegucigalpa Airport Development Project will need to be reinforced in order to be able to cope with the various matters anticipated in the course of the implementation of the new airport.

New Airport Administration Organization

No separate organization exists for the administration of the present Toncontín Airport. It will, however, be absolutely necessary to have an independent administrative organization established for the new airport for the sake of its effective management and operation.


N
420
180
300
DIVERGENCE (EA. SIDE) 150%
50 : 1 APPROACH SURFACE
VASI
60
LOCALIZER SYSTEM
APPROACH LIGHT BEACONS
APPROACH LIGHTING SYSTEM (SALS)
CARGO APRON
AIRCRAFT FUEL STORAGE AREA
AIRPORT APPROACH ROAD
0
500
GRAPHIC SCALE IN METER
REPUBLICA DE HONDURAS
SECRETARIA DE COMUNICACIONES
OBRAS PUBLICAS Y TRANSPORTE
NEW TEGUCIGALPA AIRPORT DEVELOPMENT
FIG. S-1
AIRPORT LAYOUT PLAN
AUG. 1979
FEASIBILITY STUDY
JAPAN INTERNATIONAL COOPERATION AGENCY



AIRPORT DATA

AIRPORT ELEVATION	750m
AIRPORT REFERENCE POINT (ARP) COORDINATES	N014°27' W087°07'
AIRPORT & TERMINAL NAV AIDS	VOR
MEAN MAX. TEMP OF HOTTEST MONTH	31°C

RUNWAY DATA

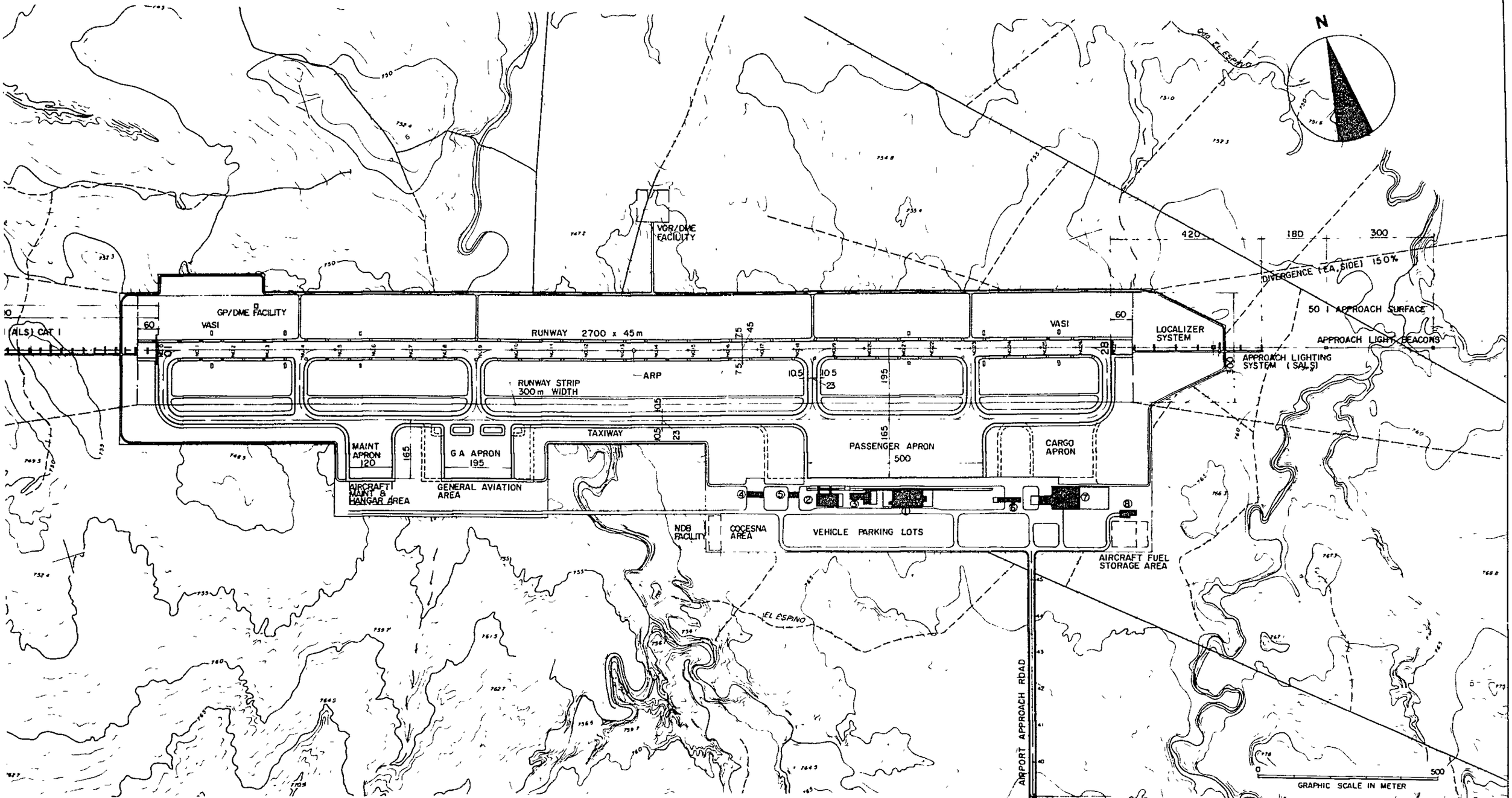
EFFECTIVE RUNWAY GRADIENT (IN %)	0 17
% WIND COVERAGE 15 KNOTS	99.3
13 KNOTS	98 8
10 KNOTS	96 7
PRECISION APPROACH RUNWAY CAT I	RUNWAY-10
PAVEMENT STRENGTH	B747, L-1011, DC-8 CLASS
APPROACH SLOPES	50 1
LIGHTING	HIRL
MARKING	ICAO STANDARDS
NAVIGATIONAL AIDS	ILS, ALS, VASI

LEGEND
STAGE I
STAGE II

BUILDINGS

1. INTERNATIONAL PASSENGER TERMINAL BUILDING
2. DOMESTIC PASSENGER TERMINAL BUILDING
3. AIRPORT ADMINISTRATION / OPERATION BUILDING
4. FIRE STATION / MAINT. VEHICLES GARAGE
5. DOMESTIC CARGO BUILDING
6. EXPORT CARGO BUILDING
7. IMPORT CARGO BUILDING
8. MAIN POWER SUB-STATION

LEGEND
STAGE I
STAGE II



AIRPORT DATA

AIRPORT ELEVATION	750m
AIRPORT REFERENCE POINT (ARP)	N014°27'
COORDINATES	W087°07'
AIRPORT & TERMINAL NAV AIDS	VOR
MEAN MAX. TEMP OF HOTTEST MONTH	31°C

RUNWAY DATA

EFFECTIVE RUNWAY GRADIENT (IN %)		0 17
% WIND COVERAGE	15 KNOTS	99 3
	13 KNOTS	98 8
	10 KNOTS	96 7
PRECISION APPROACH RUNWAY CAT I		RUNWAY-10
PAVEMENT STRENGTH		B747, L-1011, DC-8 CLASS
APPROACH SLOPES		50 1
LIGHTING		HIRL
MARKING		ICAO STANDARDS
NAVIGATIONAL AIDS		ILS, ALS, VASI

LEGEND — STAGE I; STAGE II

BUILDINGS

1. INTERNATIONAL PASSENGER TERMINAL BUILDING
2. DOMESTIC PASSENGER TERMINAL BUILDING
3. AIRPORT ADMINISTRATION / OPERATION BUILDING
4. FIRE STATION / MAINT VEHICLES GARAGE
5. DOMESTIC CARGO BUILDING
6. EXPORT CARGO BUILDING
7. IMPORT CARGO BUILDING
8. MAIN POWER SUB-STATION

LEGEND — STAGE I; STAGE II

REPUBLICA DE HONDURAS
SECRETARIA DE COMUNICACIONES
OBRAS PUBLICAS Y TRANSPORTE

NEW TEGUCIGALPA AIRPORT DEVELOPMENT

FIG. S-1 AIRPORT LAYOUT PLAN — AUG. 1979

FEASIBILITY STUDY

JAPAN INTERNATIONAL COOPERATION AGENCY

CHAPTER 1 INTRODUCTION

1.1 History of Study

The Government of the Republic of Honduras, since as far back as early '60s, has felt the need to develop some adequate airport facilities that would be worthy of serving the capital city of Tegucigalpa, and to that end has had several studies conducted to date, including one made in 1968 by the US Government, one by Mexican Government in 1969 and another made by the Spanish Government in 1974, all of which invariably concluded that construction of a new airport at a site other than that of the existing Toncontín Airport was recommendable. None of these studies, however, led to actual implementation of the project for some reason or other.

In 1977 the Government of Japan received an official request of the Honduran Government to render assistance in connection with the development of the metropolitan airport, which was responded by the former's decision to undertake the Feasibility Study for the New Tegucigalpa Airport Development Project on a grant basis as technical assistance under the official development aid program of Japan. Actual implementation of the study was entrusted to the Japan International Cooperation Agency (JICA), a government agency specializing in matters related to international cooperation and assistance.

In October 1977 JICA sent a preliminary survey mission to Honduras to identify the general requirements of the Project and to determine the Scope of Work (Appendix 1A) of the Feasibility Study through discussions with the officials concerned of the Honduran Government. Upon approval of the Scope of Work, the Feasibility Study was officially started in December 1977.

The method and timing of the study proposed in the Inception Report were approved by the Honduran Government

in February 1978 which was immediately followed in the same month by the field survey of the potential sites, and subsequent home office analysis of the detailed site selection study, the results of which were submitted in the form of the Interim Report in September 1978 to the Honduran Government. In December 1978 the Government officially selected the Talanga site recommended in the JICA study for the construction of the new airport to replace the existing Toncontín Airport.

The construction site having thus been determined, a comprehensive feasibility study was made, including a detailed site investigation conducted by the JICA study mission in February 1979. The Draft Final Report containing the study results was submitted and explained to the Government of the project country in June 1979, and with minor adjustments having duly been made to incorporate the views of the officials concerned, it has been finalized into the present Final Report to mark the completion of the feasibility study.

1.2 Purpose and Scope of Study

The primary purpose of the present feasibility study is to make a comprehensive evaluation of the new Tegucigalpa Airport Development Project from the technical, financial and economic points of views.

The scope of the feasibility study made for the said purpose includes identification of future air transport requirements of the Republic's capital of Tegucigalpa, establishing the basic facility requirements to meet the forecast traffic demand, recommending to the Honduran Government an optimum site for the contemplated airport development, basic planning of the total airport facilities by recommended stage of development, followed by cost estimation

and construction scheduling, all the foregoing comprising the technical and physical elements of the feasibility study. This is followed by a detailed financial analysis and an economic analysis of the Project, thus providing a comprehensive set of materials for the subsequent overall evaluation of the Project. In addition, the present study also includes recommendations on the Project implementation organization and the new airport adminstration organization.

1.3 Supervisory Committee

The Supervisory Committee was established as an advisory body to the president of JICA for the purpose of the implementation of the present feasibility study. The member list of the Committee is presented in Appendix 1B.

CHAPTER 2 BACKGROUND OF PROJECT

To identify the general background of the Project, analysis was made of the population, gross domestic product, exports and imports, as well as tourism of Honduras, which constitute the principal factors of air transport demand of the country, followed by an analysis of the present situation and roles of highways, railways, ports and aviation, which comprise the transportation system of the country.

Having established the national background of the Project, hinterland of the Toncontín Airport, its air transport demand and existing facilities were analysed, and the problems of the existing airport were then studied from various aspects to draw a comprehensive picture of the Project's environment.

2.1 Economic Development of Honduras

2.1.1 Geographical Situation of the Country

The Republic of Honduras with an area of 112,000 Km^2 is situated close to the center of Central America. The Central American Mountain System runs through the country in the northwest-southeast direction, and many branch mountain systems stretch over the country mainly towards the south, the mountainous area occupying about 65% of the total area of the country. Fortunately, however, Honduras is the only country in Central America that has not experienced any earthquakes. Plains spread out along the Caribbean coast in the north and along the Pacific coast in the south of the country. The climate in the coastal plains is tropical with high temperature and humidity, while that of the plateau area enjoys a comfortable climate with the mean temperature of 20°C. Throughout the country, the rainy season is from June to November, and the dry season is from December to May.

2.1.2 Population

The population of Honduras in 1977 is estimated by the Government at 3.3 million. (Appendix Table 2A-1). The annual growth rate of population between the census years of 1961 and 1974 was 2.7%, which was slightly below the average rate of 3.1% of the 5 Central American countries for the same period.

The labor force accounts for 28.4% of the total population, with 60% of the working population belonging to the agricultural sector, 15% to the industrial sector, and 25% to the services sector. According to the 1974 census, 65.8% of the total population live in rural areas (Appendix Table 2A-2), while the population in urban areas has remarkably increased with an average annual growth rate of 5.8% between 1961 and 1974. This shows that people have emigrated from rural areas into urban areas, seeking jobs and better conditions of living. Of the principal cities of the country, only two cities, namely Tegucigalpa, the capital, and San Pedro Sula, the industrial center, have population of more than 100 thousand (Appendix Table 2A-3). According to the estimation of the Government, the annual growth rate of the national population is expected to be 3.5% for the next 10 years.

2.1.3 Gross Domestic Product

Gross domestic product of Honduras has slowly but steadily increased with an annual growth rate of 4.6% in real terms during the 17-year period between 1960 and 1977. Real GDP per capita has grown by 1.4% per year during the same period (Appendix Table 2A-1). This trend can be explained by the fact that Honduran economy has remained predominantly an agricultural economy, and the slow development of the Republic's economy has been a reflection of slow agricultural growth. The agricultural sector, though its share has been on a decline, still accounted for one-third of GDP in 1977 (Appendix Table 2A-4 and 2A-5). Banana production has been the major determinant of the Republic's economic growth in the past. During

the 2-year period of 1973 - 1975, real GDP stagnated due to the reduction of banana production caused by the hurricane in 1974. However, real GDP growth has recovered since 1976, and in 1976 and 1977 showed increases by 6.6% and 7.9% respectively. This can be attributed to the recovery of banana production and to the doubling of coffee export prices. Nominal GDP in 1977 prices amounted to 2,940 million lempiras and GDP per capita to 886 lempiras.

The National Development Plan (1974 - 1978) has set a goal of 6% annual growth in real GDP during the plan period, which is to be achieved by diversification of domestic products, modernization of domestic industries and increase in value added, with the agricultural sector and the manufacturing sector being named as the two strategic industries.

2.1.4 Exports and Imports

The primary industry products account for about 75% of the total export value of the country (Appendix Table 2A-6). Banana is still one of the main export items, accounting for 27% of the total export value in 1976, though it suffered a decline in 1974 due to the hurricane. Coffee has gained an important position in exports with a 26% share in 1976, second only to banana, due to the high international prices in recent years.

Exported commodities whose production is expected to grow in the future are shrimps, lobsters, cotton and wooden products.

The country for the large part depends on imports for the supply of consumer goods and intermediate products (Appendix Table 2A-7). The import, therefore, is expected to increase in future commensurate with the increase of GDP, because of its close relationship with the level of investments and the standard of living of the country.

2.1.5 Tourism

Tourism industry plays an important role in foreign exchange earnings of the country, and the total income in tourism industry in 1976 amounted to 23,000 thousand lempiras, accounting, however, for only 1% of GDP. The main tourism attractions in Honduras are the natural beauty of the Caribbean coastline and the Bahía Islands, the Maya Ruins of Copán and the cultural properties existing around Tegucigalpa City, etc.

The total number of visitors to Honduras in 1976 amounted to 183 thousand persons, 46% of which is transit passengers and 45% tourists (Table 2-1). As for the mode of transport used by the visitors, road transport accounted for 73% in 1976, but its share is declining. Air transport, on the other hand, accounted for 26% and its share is increasing (Table 2-2). As for the region of origin of visitors, Central America accounts for 63%, but its share is on a decline. Shares of North America, South America and Europe are steadily growing (Table 2-3), and the increase in the use of air transport can be attributed to the increase in the visitors from those regions.

The number of hotels in Honduras in 1977 amounted to 97, with a total of 2,511 rooms and 4,666 beds, but as far as the level of accommodation is concerned, only 20% of the total are up to the international standard. In order to cope with the expected increase of visitors to the country in future, it will, therefore, be necessary to promote considerable improvement of hotel accommodations.

Table 2-1 VISITORS TO HONDURAS BY PURPOSE OF TRIP

Purpose	1972	1973	1974	1975	1976
	(%)	(%)	(%)	(%)	(%)
Transit	84,195(58)	90,909(55)	60,679(40)	83,612(51)	84,231(46)
Tourism	43,345(30)	55,218(33)	77,059(51)	62,413(38)	81,798(45)
Business	13,697(9)	14,816(9)	9,826(6)	13,601(8)	11,809(6)
Others	4,881(3)	4,823(3)	3,930(3)	4,836(3)	5,299(3)
Total	146,118(100)	165,765(100)	151,494(100)	164,462(100)	183,137(100)

Source: INSTITUTO HONDUREÑO DE TURISMO

Table 2-2 VISITORS TO HONDURAS BY MODE OF TRANSPORT

Mode	1972	1973	1974	1975	1976
	(%)	(%)	(%)	(%)	(%)
Air	31,225(21)	36,618(22)	41,343(27)	41,329(25)	48,000(26)
Road	114,104(78)	128,469(77)	108,864(72)	122,146(74)	134,093(73)
Marine	789(1)	679(1)	1,287(1)	987(1)	1,044(1)
Total	146,118(100)	165,766(100)	151,494(100)	164,462(100)	183,137(100)

Source: INSTITUTO HONDUREÑO DE TURISMO

Table 2-3 VISITORS TO HONDURAS BY REGION OF ORIGIN

Region	1972	1973	1974	1975	1976
	(%)	(%)	(%)	(%)	(%)
North America	37,031(25)	42,475(26)	42,302(28)	43,237(26)	47,286(26)
Central America	96,038(66)	109,182(66)	93,917(62)	106,127(65)	114,755(63)
South America	4,632(3)	5,004(3)	5,757(4)	5,477(3)	7,623(4)
Europe	6,554(5)	7,087(4)	7,134(5)	7,384(5)	9,847(5)
Others	1,863(1)	2,018(1)	2,384(1)	2,237(1)	3,626(2)
Total	146,118(100)	165,766(100)	151,494(100)	164,462(100)	183,137(100)

Source: INSTITUTO HONDUREÑO DE TURISMO

2.2 Transportation System of Honduras

2.2.1 Highways

Road is a very important transport mode in the country. It amounts to a total of 7,244 Km as of 1976, only 20% of which being paved (Appendix Table 2A-8). The most important trunk road is the one running through the country from Jicaro Galán on the Pacific coast to Puerto Cortés on the Caribbean coast via Tegucigalpa and San Pedro Sula. Since its completion late in 1969, the travel time by road between Tegucigalpa and San Pedro Sula has been considerably reduced, and the road has now become the main artery of the economic activities of Honduras.

It is estimated that road transport accounts for 85% of total tonnage of domestic cargo movements and 95% of domestic passenger movements in the country.

With the development of roads and increase in the national income, the number of registered cars is increasing year after year, amounting to a total of 43,337 cars in 1976 (Appendix Table 2A-9). The number of cars per thousand people, however, still remain at only 15.

2.2.2 Railways

The existing railway system was initially established by private companies for transporting bananas, but since 1958 it has been operated by the government as the national railway. A total of 204 Km of the railway runs between Puerto Cortés, the largest port in the country, and the San Pedro Sula valley, the agricultural center in the country. It transports all export bananas and other exported and imported commodities. Total cargo tonnage transported by rail in 1974 was about 450 thousand tons.

The railway passenger transport is operated between San Pedro Sula and Puerto Cortés, and between San Pedro Sula and Tela, and carried a total of about 96 thousand passengers in 1974.

2.2.3 Ports

Sea port plays a vital role in exports and imports of the country. There are a total of 6 ports, of which Puerto Cortés located at the Caribbean coast is the largest in Honduras and also is one of the best ports in Central and Latin Americas. Puerto Cortés handled 718 thousand tons in exports and 779 thousand tons in imports, accounting for 70% of the total cargo handled at all 6 ports of the country in 1976.

An industrial free zone is now under construction at Puerto Cortés, and after its completion it is expected to contribute significantly to the economic development of Honduras.

2.2.4 Aviation

1) Aviation System in Central America

International air transport in Central America is operated by 6 airlines of 5 countries in the Region and 8 airlines of the countries outside the Region (Table 2-4). The airlines of the region mainly operate short/medium-haul routes with B-737 or BAC-111 class aircraft. The airlines outside the Region mainly operate long-haul routes with DC-8, B-707 or DC-10. This explains why the airlines of the Regional countries together handle only 44.1% of the total air traffic of the Region in terms of passenger-kilometers, while in terms of the number of passengers carried, it accounts for 58.0% of the total. There are 6 international airports in the Region, namely Toncontín (Tegucigalpa,

Honduras), Villeda Morales (San Pedro Sula, Honduras), La Aurora (Guatemala, Guatemala), Ilopango (San Salvador, El Salvador), Las Mercedes (Managua, Nicaragua), and Juan Santamaría (San José, Costa Rica). Historical traffic data of these airports are shown in Appendix Tables 2A-10 through 2A-13. Domestic air routes exist in 4 countries with the exception of El Salvador, and Honduras has the greatest number of airports and air routes in the Region.

Table 2-4 LIST OF INTERNATIONAL AIRLINES OPERATING IN CENTRAL AMERICAN REGION

Name	Abbreviation	Country
Airlines of the countries of the Region		
1. Servicio Aéreo de Honduras, S.A.	SAHSA	Honduras
2. Transportes Aéreos Nacionales, S.A.	TAN	Honduras
3. Empresa Guatemalteca de Aviación	AVIATECA	Guatemala
4. Transportes Aéreos Centroamericanos, S.A.	TACA	El Salvador
5. Lineas Aéreas de Nicaragua, S.A.	LANICA	Nicaragua
6. Lineas Aéreas Costarricenses, S.A.	LACSA	Costa Rica
Airlines from outside the Region		
7. Pan American World Airways	PAN AM	United States
8. Compañia Panameña de Aviación	COPA	Panama
9. Compañia Mexicana de Aviación	MEXICANA	Mexico
10. Sociedad Aeronáutica de Medellin Consolidada, S.A.	SAM	Colombia
11. Venezolana Internacional de Aviación	VIASA	Venezuela
12, Lineas Aéreas de España	IBERIA	Spain
13. Belgian World Airlines	SABENA	Belgium
14. Belize Airways Ltd.	BAL	Belize

2) Aviation System of Honduras

Aviation plays an important role both as means of international and domestic transport for Honduras. There are about 20 airports in the country, which are capable of accommodating operation of commercial aviation aircraft. Three of these, namely, Toncontín (Tegucigalpa), Villeda Morales (San Pedro Sula) and Golosón (La Ceiba) have facilities for international service. All other airports have facilities for domestic service only (Table 2-5).

International service is almost monopolized by the two Honduran airlines of TAN and SAHSA which hold each other's shares and are expected to merge in the near future. Only two foreign airlines, AVIATECA (Guatemala) and BAL (Belize), are operating international flights into Villeda Morales (San Pedro Sula). Existing international air routes serving the country are shown in Fig. 2-1.

Domestic services are provided by the four Honduran airlines of SAHSA, ANHSA, LANSA and Aeroservicios de Honduras, with SAHSA possessing an overhelming majority of the traffic share (Table 2-6). Existing domestic air routes are shown in Fig. 2-2.

The demand analysis of air transport of the country is made in Subsection 2.3.3 in conjunction with the traffic demand of Toncontín Airport.

2.3 Existing Toncontín Airport

2.3.1 Outline of Airport

Toncontín Airport is located about 7 Km south of the center of Tegucigalpa City, the capital of Honduras, and is surrounded by residential areas (Fig. 2-3). It takes about

Table 2-5 PHYSICAL CHARACTERISTICS OF AIRPORTS IN HONDURAS

(1977)

Airport	Runway Length (m)	Largest Aircraft in Service	Type of Runway Surface
Toncontín	1,800	Boeing 737	Asphalt pavement
Villeda Morales	2,900	Boeing 707	Asphalt pavement
Golosón	3,000	Boeing 707	Asphalt pavement
Tela	1,370	Convair 440	Asphalt pavement
Roatán	940	DC-3	Earth
Utila	640	DC-3	Earth
Guanaja	750	DC-3	Earth
Trujillo	750	DC-3	Earth
Tocoa	675	DC-3	Earth
Victoria	700	DC-3	Earth
La Unión	830	DC-3	Earth
Olanchito	780	DC-3	Earth
Juticalpa	760	DC-3	Earth
Ruinas de Copán	840	DC-3	Earth
Cata Camas	850	DC-3	Earth
Choluteca	850	DC-3	Earth
San Esteban	750	DC-3	Earth
Comayagua	750	DC-3	Earth
Puerto Lempira	1,200	DC-3	Earth

Source: DIRECCION GENERAL DE AERONAUTICA CIVIL

Table 2-6 NUMBER OF AIRCRAFT POSSESSED BY HONDURANEAN AIRLINES

Aircraft Type \ Airline	TAN	SAHSA	ANHSA	LANSA	AEROSER-VICIOS	Total
Boeing B-737-200	1	1	-	-	....	2
Lockheed L-188	2	2	-	-	....	4
Convair CV-580	-	1	1	-	....	2
Douglas DC-6B	1	-	-	-	....	1
Douglas DC-4	-	-	-	1	....	1
Douglas DC-3	-	5	1	4	....	10
Total	4	9	2	5	....	20

Source: DIRECCION GENERAL DE AERONAUTICA CIVIL

.... : Not Available

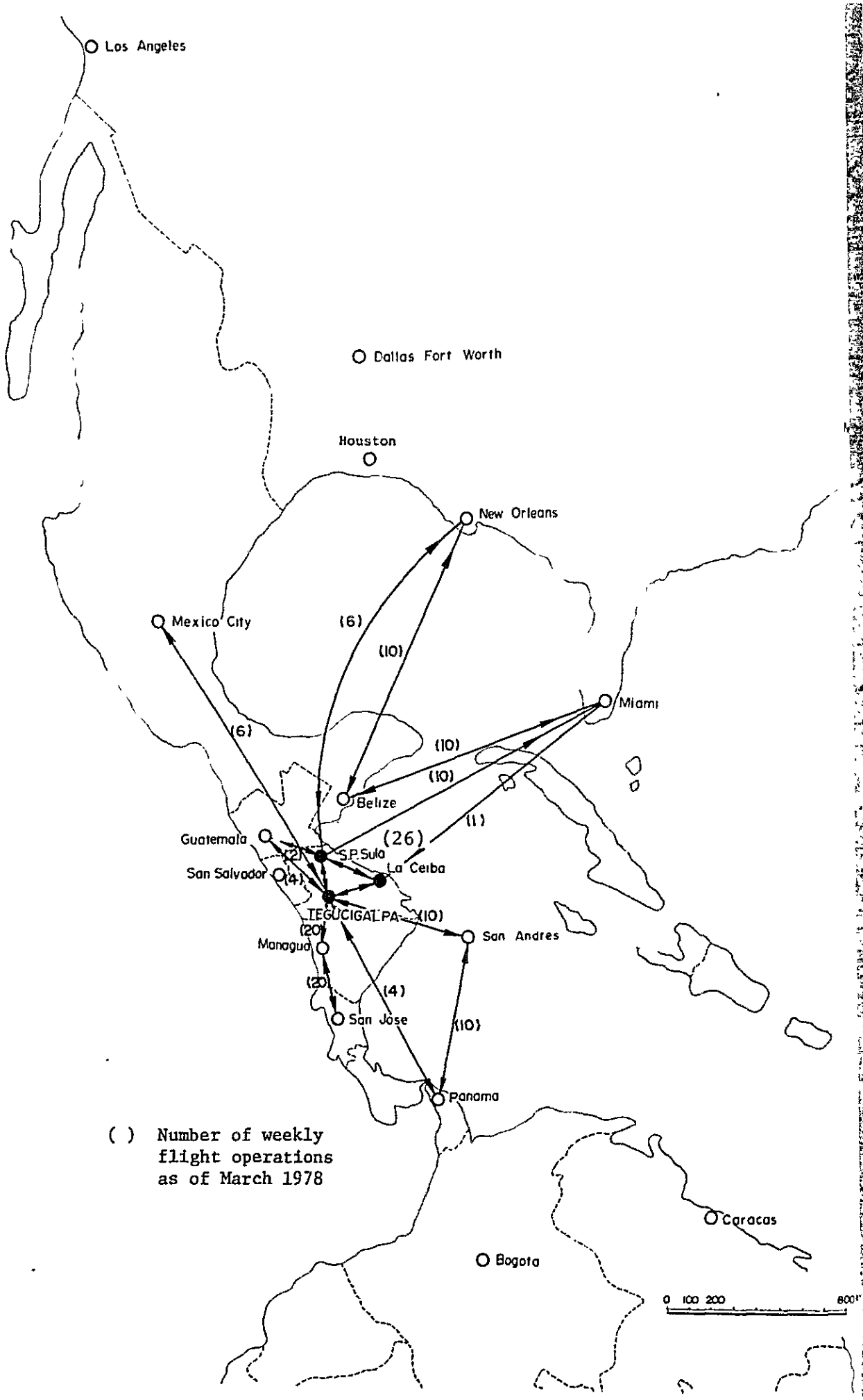


Fig. 2-1 EXISTING INTERNATIONAL AIR ROUTE NETWORK

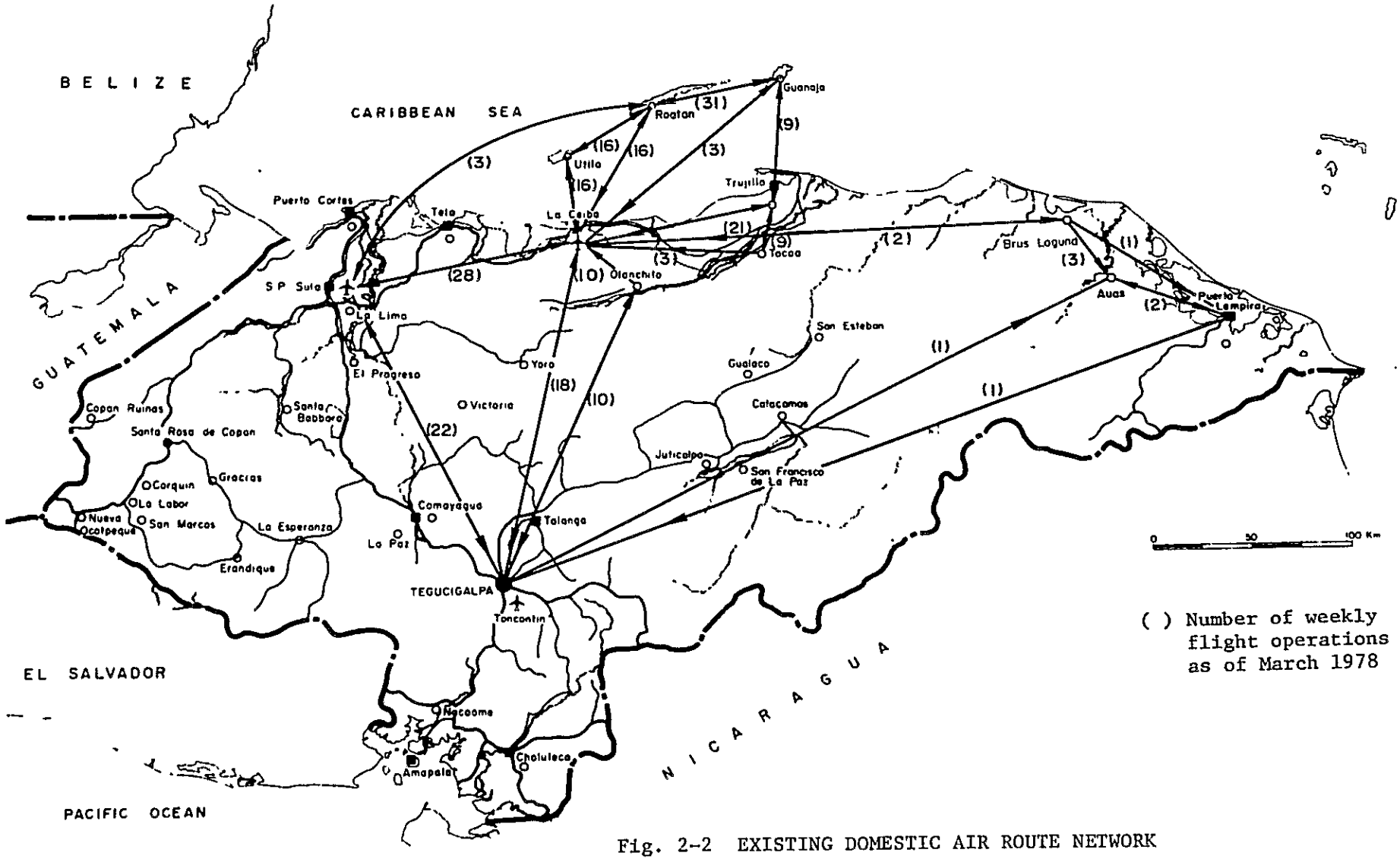


Fig. 2-2 EXISTING DOMESTIC AIR ROUTE NETWORK

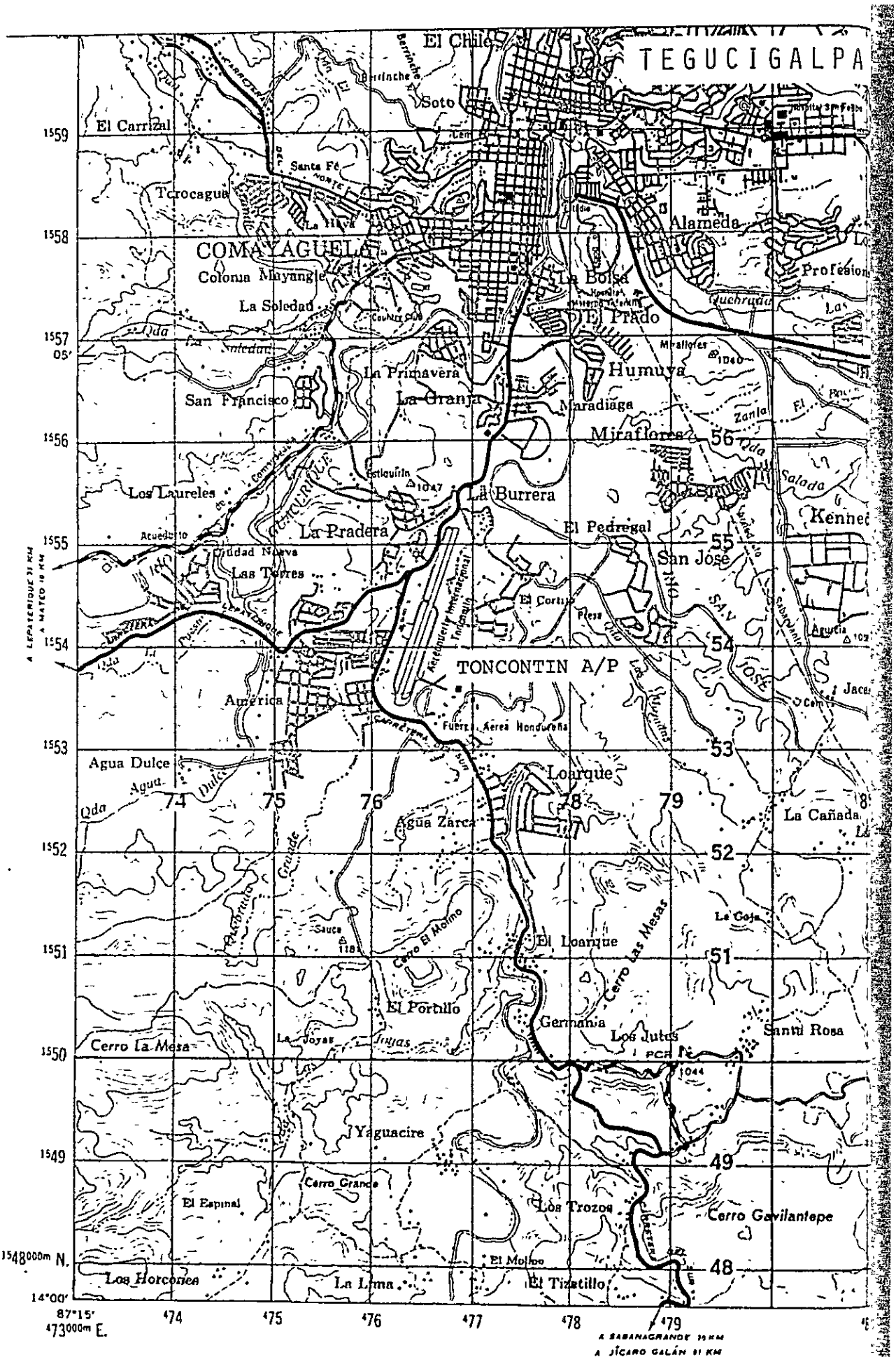


Fig. 2-3 LOCATION OF EXISTING TONCONTIN AIRPORT

15 minutes by car from downtown Tegucigalpa to the airport. The airport was inaugurated in 1948 as a civil aviation airfield, and combined international and domestic traffic of embarking and disembarking passengers in 1977 amounted to 165,748, and total cargo tonnage handled to 5,690 tons.

2.3.2 Hinterland, Tegucigalpa City

Tegucigalpa City, the capital, is the largest city in Honduras, where most of the governmental agencies are centered. The population is estimated to be about 320 thousand as of 1977, and the average annual growth rate during the 1961 - 1974 period was rather high at 5.6% (Appendix Table 2A-3), the reason being that people immigrated from rural areas to the city seeking jobs and better standard of living. It is estimated that the population of the capital city in the year 2000 will amount to about 1.1 million. As for the employment structure, the tertiary industry accounts for 60.8% of the total employment, comprising 16.1% belonging to governmental services, 17.6% to commerce, 4.3% to transport, and 22.8% to other services. The secondary industry occupies 26.6% of the total, comprising 18.1% belonging to manufacturing and 8.5% to construction. The primary industry accounts for only 12.6% of the total employment.

Tegucigalpa is a city developed on the slopes of mountains with an average elevation of 1,000 m surrounding the downtown basin. The climate is comfortable throughout the year with the mean temperature of about 20°C.

The tourism resources of the city are the beautiful old towns of Santa Lucia, Valle de Angeles and Ojojona, etc.

There are, however, very few hotels with accommodations of international standard, and considerable improvement would be needed in this respect in order to develop the tourism industry of the city.

2.3.3 Air Transport Demand Analyses

1) International Air Passenger Traffic

a. Embarking and disembarking passengers

The number of international embarking and disembarking passengers in the country has steadily increased at an annual growth rate of 9.1% during the 10-year period of 1967 - 1977, amounting to 202,950 in 1977. The growth rate of that of Toncontín Airport during the same period averaged 9.2% per annum, and the number reached 112,473 in 1977 accounting for 55.4% of the national total (Appendix Table 2A-14, Fig. 2B-1). These trends are attributable to the increase in individual income and the brisk economic activities resulting from the steady growth of GDP during the same period, and also to the tourism resources of Honduras.

According to the air passenger survey conducted in 1975, the trip purposes of international passengers at Toncontín Airport comprised 51% of business, 23% of tourism, 22% of personal and 4% of others. Along with the economic development of the country, international passenger traffic is expected to grow even faster than hitherto. The international traffic at Toncontín Airport is served only by the two Honduran airlines, TAN and SAHSA, with no foreign airlines operating (Appendix Tables 2A-27 through 2A-28).

As for the demand by route, the medium to long-haul routes, such as Tegucigalpa - Miami, Tegucigalpa - New Orleans, and Tegucigalpa - Panama have shown a tendency of a remarkable growth (Appendix Table 2A-18, Table 2A-29, Fig. 2B-5).

b. Transit Passengers

The number of international transit passengers at Toncontín Airport amounts to about 50% of the total number of embarking and disembarking passengers at the same airport. This is due to the fact that the airport is situated close to the center of Central America, and this ratio is expected to remain unchanged because of this geographical position of the airport. (Appendix Tables 2A-18, and 2A-26).

2) Domestic Air Passenger Traffic

The number of domestic embarking and disembarking passengers in the country steadily increased at an annual rate of 14.4% during the 10-year period of 1960 - 1970 (Appendix Table 2A-15, Fig. 2B-1). However, the traffic sharply declined from the year 1970 to 1975 with the decrease rate of 17% per annum.

The domestic passenger traffic at Toncontín Airport showed a similar tendency to that of the entire country, declining at a rate of 20.3% annually during the same period. This is mainly because the travel time by road was greatly reduced due to the completion of the paved highway between Tegucigalpa and San Pedro Sula late in 1969. The domestic passenger transport demand, however, has rapidly recovered since 1975. The number of embarking and disembarking passengers in the country reached 282,528 in 1977 with the annual growth rate of 18.3% during the 2-year period of 1975 - 1977. Similarly, that of Toncontín Airport reached 53,275 in 1977 with the annual growth rate of 11.4% during the same 2-year period. This can be largely attributed to the fact that the airlines, since late 1974, have been permitted to carry domestic passengers on international jet flights between Tegucigalpa and San Pedro Sula, and

also between Tegucigalpa and La Ceiba, resulting in reduced travel time between these points, as well as to the fact that GDP has escaped stagnation since 1976.

As for the demand by route of domestic traffic at Toncontín Airport, the Tegucigalpa - San Pedro Sula route accounted for 44.5% of the total, and the Tegucigalpa - La Ceiba route for 30.3%, the two routes together accounting for 74.8% of the total domestic traffic in 1977 at the airport (Appendix Table 2A-19, Fig. 2B-6).

As for the trip purposes, according to the air passenger survey conducted in 1975, personal trips accounted for 55% of the total traffic, business trips 39%, and others 6%. This means that the domestic passenger traffic demand largely depends on the level of personal income and economic activities of the country.

3) International Air Cargo Traffic

The international air cargo traffic of the country has steadily increased at an annual growth rate of 9.7% during the 10-year period of 1967 - 1977, amounting to 10,770 tons in 1977. Similarly, that of Toncontín Airport reached 5,112 tons in 1977 with the annual growth rate of 7.7% during the same period, accounting for 47.5% of the total cargo traffic of the country (Appendix Table 2A-13, Fig. 2B-3). This trend can be explained by the steady growth of exports and imports of the country during the same period. As much as 85% of the total international cargo tonnage handled at Toncontín Airport was inbound, with only 15% outbound on an average during the past 3 years (Appendix Tables 2A-21 through 22). This may be explained by the fact that while there are quite a few imported commodities that need to be airlifted

safely and fast, such as electronic products and mechanical parts, etc., exported commodities suitable for air transport are limited to only a few valuables and some perishable goods. As for the cargo traffic by route, the Tegucigalpa - Miami route accounted for 45% of the total cargo handled at Toncontín Airport in 1976 (Appendix Table 2A-20, Fig. 2B-7).

4) Domestic Air Cargo Traffic

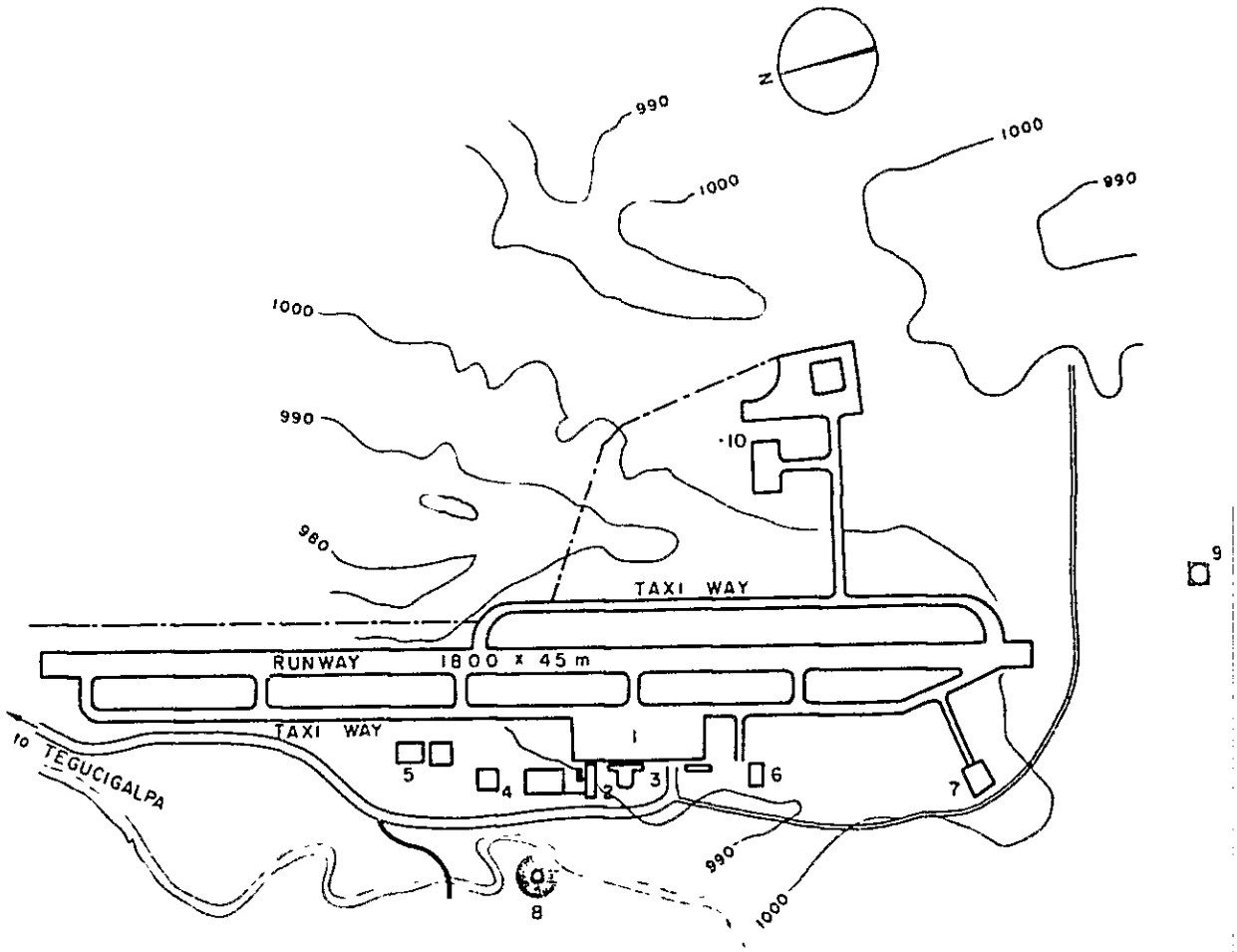
The domestic air cargo traffic of the country steadily increased during the 9-year period of 1960 - 1969, but since 1969 it has rapidly declined, registering 3,224 tons in 1977, only 14.6% of the peak traffic of 1969. Similarly, that of Toncontín Airport has declined with the annual decrease rate of 23.3% during the same period, amounting to only 578 tons in 1977 (Appendix Table 2A-17, Fig. 2B-4). This trend can be attributed to the completion of the paved road between Tegucigalpa and San Pedro Sula, as in the case of domestic passenger traffic (Appendix Table 2A-23, Fig. 2B-8). It can, however, be expected that increasing volumes of valuables and perishables with high freight-bearing capacity will be transported by air as the standard of consumption in Honduras rises in the future.

2.3.4 Existing Airport Facilities

The airport layout plan and the general description of the airport and its facilities are given in Fig. 2-4 and Table 2-7 respectively.

1) Runway

The runway 01-19 is oriented north, and has the length of 1,800 m, with the overrun of 60 m on the south and 63 m on the north end. The



SYMBOL

1. APRON (CIVIL)
2. PASSENGER TERMINAL BUILDING
3. PARKING LOTS
4. AIRLINE (SAHSA) FACILITIES
5. HANGAR (LANSA)
6. FUEL
7. HANGAR
8. NDB
9. VOR/DME
10. MILITARY AREA

Fig. 2-4 EXISTING TONCONTIN AIRPORT LAYOUT

Table 2-7 DESCRIPTION OF TONCONTIN AIRPORT AND ITS FACILITIES

Location	7km to SSW from Tegucigalpa
Reference Point Elevation	N14°02' W87°14' 1,007m (3,300 feet)
Operated by	La Direccion General de Aeronautica Civil
Daily Operation Hours	12 hours (06:00 - 18:00)

Reference Temperature 23°C

(C°)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max.	25.4	27.6	29.5	30.2	29.8	28.5	27.7	28.5	28.7	27.3	25.8	25.0
Min.	14.2	14.5	15.4	16.8	17.7	18.2	17.8	17.5	17.5	17.4	16.1	14.7

Airfield Facilities	Runway Width : 45m Length : 1,800m Pavement : Asphalt concrete Strength : AUW 18tons for single wheeled aircraft AUW 46tons for dual wheeled aircraft Shoulder : 5.25m wide of asphalt concrete pavement Parallel Taxiway Width : 15.0m Pavement : Asphalt concrete Number of exit taxiways : 6 Shoulder : Same as runway shoulder

Airfield Facilities (continued)	Apron Area : 50m x 210m Pavement : Asphalt concrete
Airfield Lighting	Runway lights, Taxiway lights, Threshold lights, Runway end lights, Apron flood lights, Aerodrome Beacon
Airfield Marking	Runway center line, Runway side stripe, Runway designation, threshold, Fixed distance, Taxiway center line, Taxiway holding position, Touch down zone, Overrun, Displaced threshold, etc.
Radio Navaids	NDB, VOR/DME
Telecommunications Facilities	Aeronautical Fixed Service facilities AFTN, ATS Aeronautical Mobile Service facilities VHF air-ground, HF air-ground
Terminal Buildings, etc.	Passenger terminal building, cargo terminal building, Administration office, Airlines' offices, hangers, Fuel storage and distribution facilities, Parking lot, etc.

southern threshold is displaced 150 m to the north, which reduces the runway length for landing from the south to 1,650 m. The runway length of 1,800 m at the elevation of 1,000 m is equivalent to only around 1,300 m of the basic sea level length, which is actually causing weight restrictions on certain types of aircraft.

The runway pavement is of asphalt concrete, and the strength after the overlay work along the entire runway length completed in 1976 is sufficient to meet the all-up weight of 18 tons for single wheeled aircraft and 46 tons for dual wheeled aircraft.

2) Taxiway

A 15-meter wide parallel taxiway with asphalt concrete pavement is provided along the entire runway length, with its center line 90 m away from that of the runway.

3) Passenger Loading Apron

The apron area of 70,000 m^2 allows simultaneous parking of two B-737 type and one L-188 type aircraft, or one B-737 type and two L-188 type aircraft on self-manoeuvering system. The apron is provided with fuel hydrant system.

4) Passenger Terminal Building

The terminal building is three storied, with a floor area of about 4,800 m^2 in total. The first floor is occupied by check-in counters, departure lobby, CIQ facilities, duty free shops, folkcraft shops, bank, etc. Restaurant, observation deck and

DGA office occupy the second floor, and COCESNA* occupies the third floor. The departure lobby and the CIQ area were expanded to the present sizes in 1976.

5) Navigational Aid Facilities

The airfield lighting facilities consist of the runway lights installed in 1976 along the entire runway length, and the taxiway lights installed in 1977 along the southern half of the taxiway leading to the apron. The lighting systems are not meant for night operations but for operations under bad weather conditions during the day. Neither approach lights nor VASIS are installed because straight-in approach can not be made due to the topographical condition of the approach area.

The VOR/DME is located about 800 m to the southeast from the southern end of the runway, and the NDB is located 400 m to the west from the runway center. No radar is installed.

6) Other Facilities

The automobile parking can accommodate only around 80 vehicles and has no space for expansion.

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* COCESNA (La Corporación Centroamericana de Servicios de Navegación Aérea) formed under agreement among the five Central American states plus Belize, is charged with the task of operation and maintenance of communication facilities as well as maintenance and management of enroute air traffic control system and radio navigational aid facilities for the entire Central America.

The aircraft maintenance area is located on the north side of the passenger terminal building, where minor maintenance work of piston engine aircraft is made. Maintenance work of jet aircraft is being done at the Miami International Airport in USA.

The apron for general aviation is mostly unpaved.

2.3.5 Problems of Existing Toncontín Airport

1) Air space

The instrument landing on Runway 01 is presently in operation by procedures either with NDB or with VOR/DME as shown in Fig. 2-5 and Fig. 2-6 respectively. Both procedures suffer from the obstruction of high mountains rising to about 5,000 feet above sea level both in the final approach area and the missed approach area, causing pilots uneasiness and requiring them to be thoroughly familiar with the surrounding topography. Fig. 2-7 shows the location of the objects projecting into the obstacle limitation surfaces specified by the ICAO standards, as well as the profile of the obstacles projecting into the take-off climb surface and the approach surface both for precision approach runway and for non-instrument approach runway specified by the ICAO standards. As these figures clearly indicate, installation of ILS to enable the airport to operate at night and in bad weather conditions is not practicable.

2) Runway

The runway length for landing from the south is limited to 1,650 m as previously mentioned, and this might well have been the cause of the overrun accident of a B-737 that took place in 1976. The length of 1,800 m often requires aircraft to reduce its take-off

weight, which affects operational efficiency of aircraft and hence airlines' payability. Besides, elevation of the road which passes by the southern end of the runway is higher than that of the runway, and it once caused an approaching aircraft to touch an automobile on the road.

3) Aircraft Noise

With the expected increase in jet aircraft movements, aircraft noise is anticipated to become a social problem in the future at this airport which is surrounded by the residential area.

4) Expansion Possibilities

The topographical conditions and the present land use around the airport are such that there is little possibility of the future expansion of the existing airport.

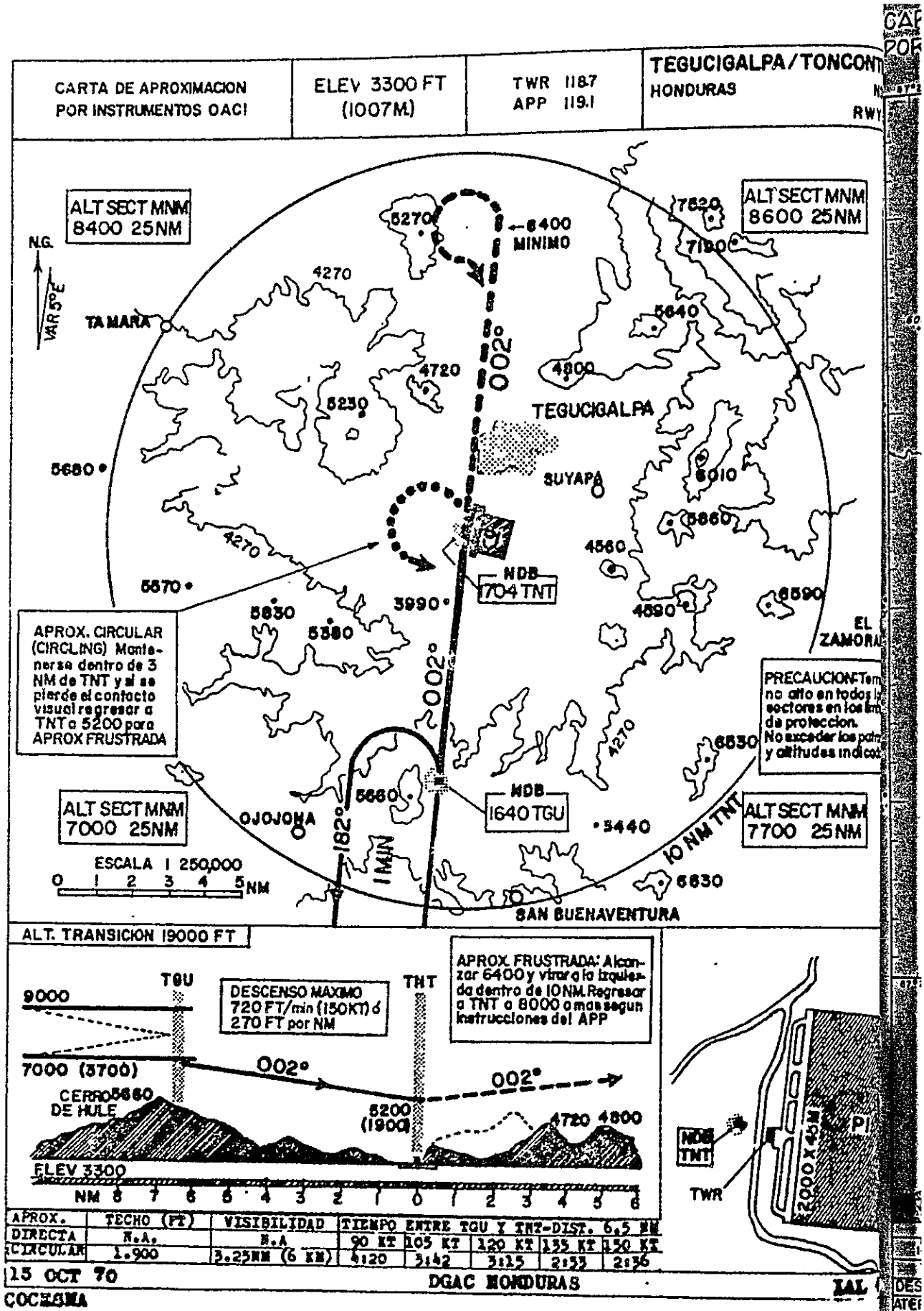


Fig. 2-5 NDB APPROACH PROCEDURE AT TONCONTIN AIRPORT

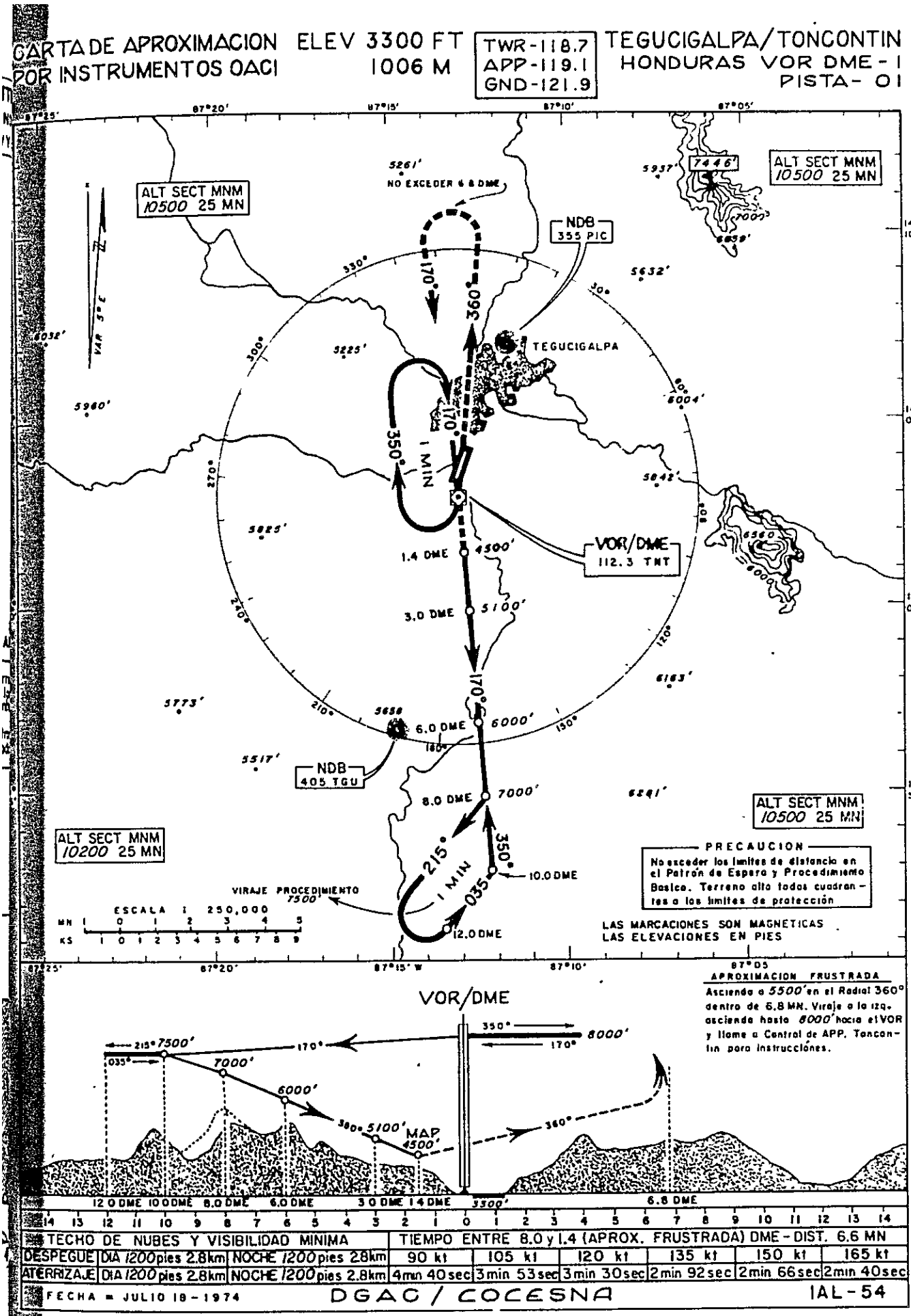


Fig. 2-6 VOR/DME APPROACH PROCEDURE AT TONCONTIN AIRPORT

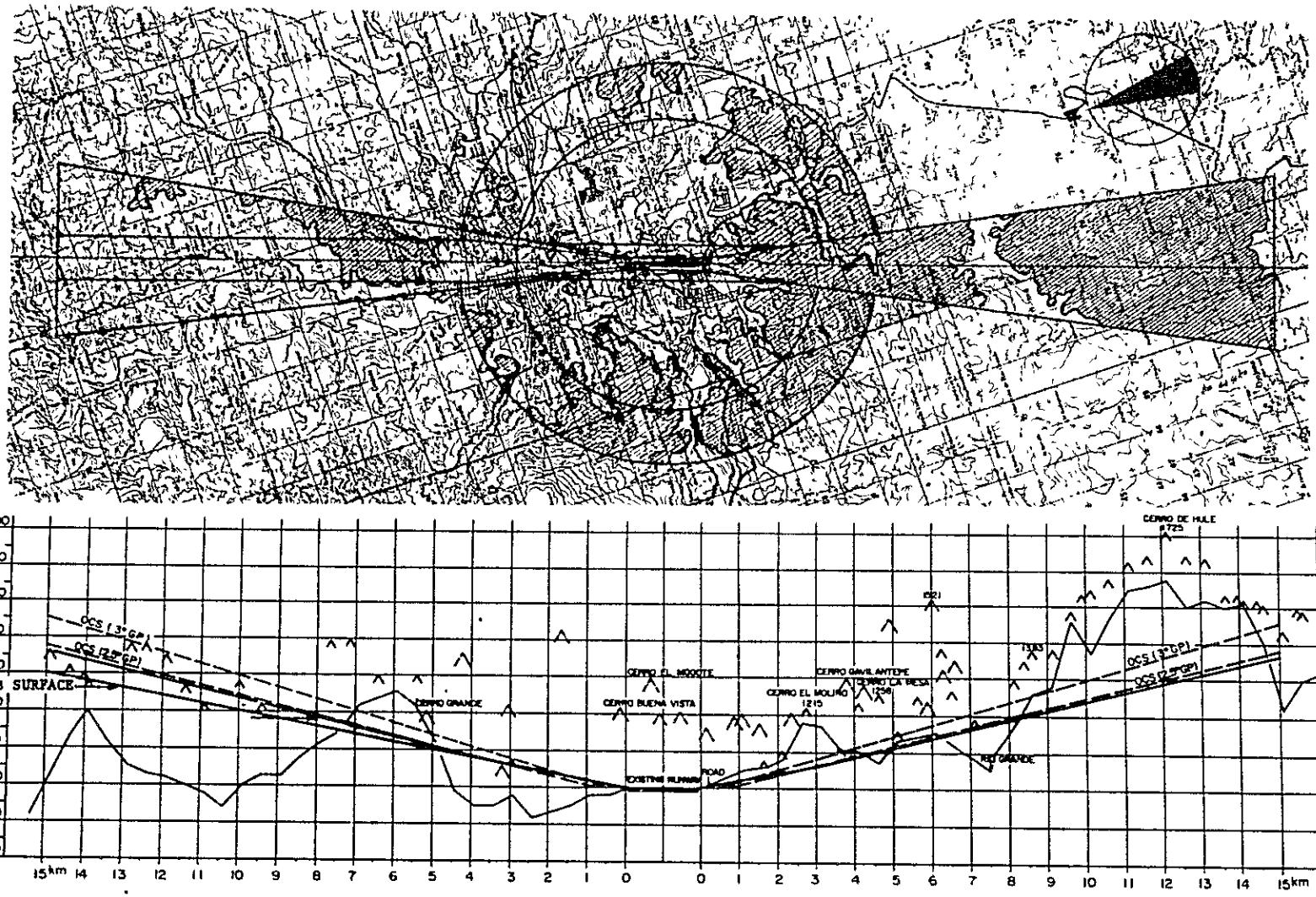


Fig. 2-7 LOCATION AND PROFILE OF EXISTING OBSTACLES AT TONCONTIN AIRPORT

CHAPTER 3 AIR TRAFFIC FORECAST

On the basis of the results of the air transport demand analysis made in the preceding chapter, and based on the various premises identified below, forecast was made of the passenger and cargo transport demand of the Republic of Honduras and of the Toncontín Airport, as well as of the two alternative sites of PEDREGAL and TALANGA screened from among the 18 potential sites examined in the initial stage of the site selection study as presented in Chapter 5 hereunder.

3.1 Methodology and Conditions of Forecast

3.1.1 General

Air transport demand both of the entire Honduras and of the Tegucigalpa area is considered to have a close relationship with the level of economic activities of the country as stated in Chapter 2. As the country develops economically, the social, economic and cultural interchange with foreign countries becomes increasingly more active, causing increasing number of foreigners visiting the country and Hondurans going abroad, hence resulting in increased international air passenger traffic. Similarly, as the level of individual income and of economic activities of the country rises, so does the time value of Hondurans, domestic inter-city passenger traffic, and the share of passenger air transport within the domestic transport system by virtue of its great time saving effect in preference to road transport which is virtually the only alternative means of passenger transport available within the domestic transport system of Honduras. Along with the economic growth of the country, increase in imports of consumer goods resulting from improved consumption standards, and of capital goods necessary for the industrialization of the country, as well as increase in exports of manufactured Honduran products, altogether results in greater utilization of air transport for

commodities that can bear higher freight charges. By the same token, share of air transport within the domestic cargo transport system is also expected to increase.

3.1.2 Outline of Methodology

Gross domestic product of Honduras was used as an independent variable in regression models of air traffic forecasting in this study, since it is regarded as one of the best economic indeces of the levels of economic activities of the country. Air traffic forecast of the Tegucigalpa area was made in relation to the total national air transport demand of Honduras. As a first step, forecast was made of the normal traffic of the total Honduran air transport, which is the traffic to be expected when there are no capacity limits at all airports of the country. Then, using that as the control total, forecast was made of the normal traffic projected for the Toncontín Airport.

Air traffic demand of PEDREGAL and TALANGA sites is considered to be affected significantly by the differences in access conditions from those of Toncontín Airport especially in domestic air transport demand, and the forecast, therefore, was made by means of a gravity model into which such differences were built in. Sequence of the forecasting procedures is shown in Fig. 3-1.

3.1.3 Basic Conditions of Forecast

Basic conditions of forecast were established as follow through discussions with the officials concerned of the Government and based on the results of the study made in Chapter 2.

1) Period of Forecast

The period of forecast shall be for 25 years starting from 1980 through the ultimate design year of 2005 established for the purpose of the present study.

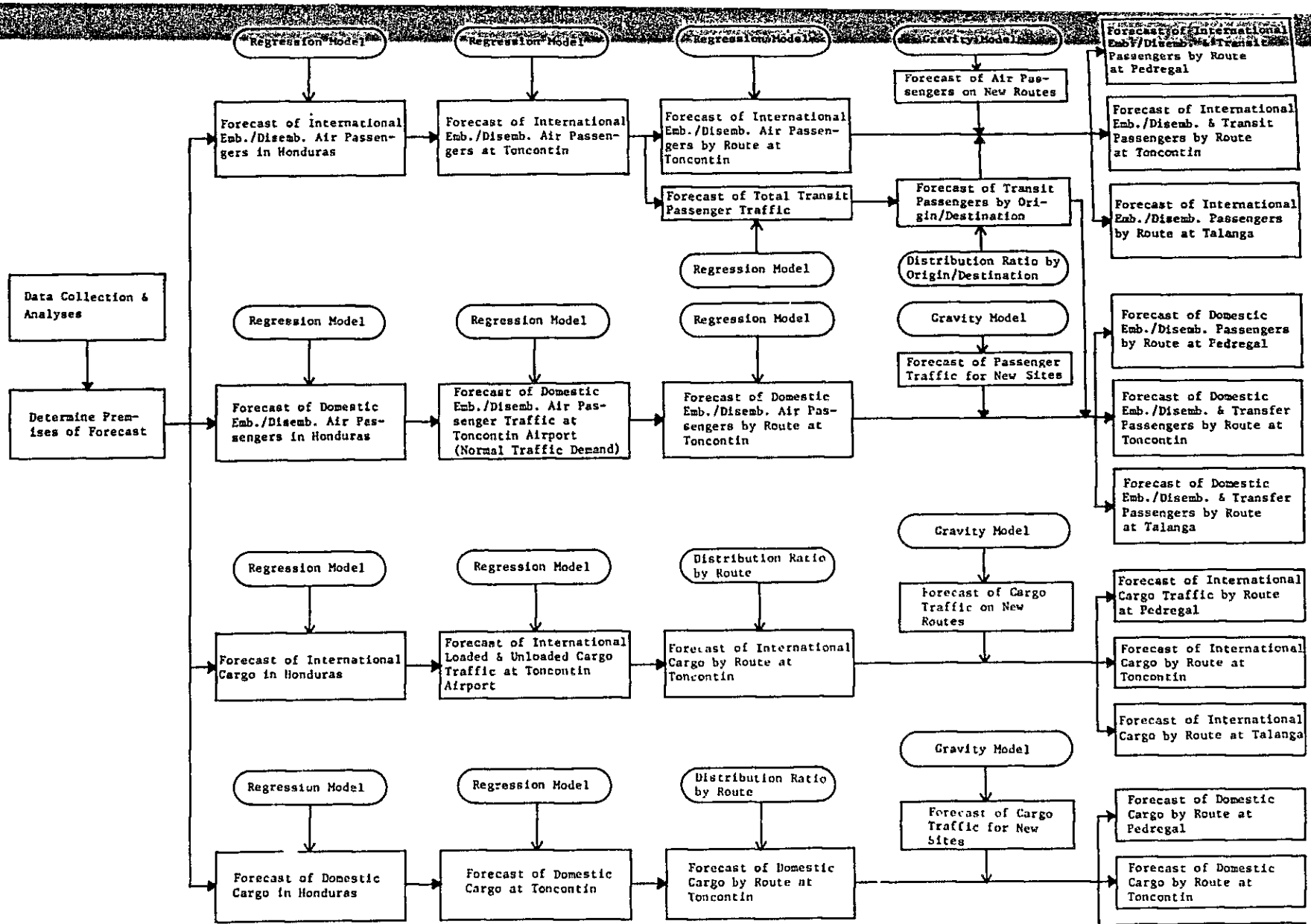


Fig. 3-1 SEQUENCE OF AIR TRAFFIC FORECAST PROCEDURES

2) Air Route Network

a. International air routes

The existing international air route network serving Tegucigalpa is assumed to remain unchanged. In addition, two new air routes are assumed to be established, namely one between Tegucigalpa and Houston presently contemplated by TAN and SAHSA, and another between Tegucigalpa and San Salvador which is likely to be operated when the diplomatic relations between Honduras and El Salvador are normalized. International air routes considered in the forecast are as follows:

Existing routes

Tegucigalpa [TGU]	- Miami	[MIA]
"	- Mexico	[MEX]
"	- Panama	[PTY]
"	- San Andres	[ADZ]
"	- San José	[SJO]
"	- Managua	[MGA]
"	- Guatemala	[GUA]
"	- Belize	[BZE]
"	- New Orleans	[MSY]

New routes

Tegucigalpa	- Houston	[IAH]
"	- San Salvador	[SAL]

b. Domestic air routes

The existing domestic air routes serving Tegucigalpa are assumed to remain unchanged. Due to the insufficiency of data available, however, the domestic routes to be considered in the forecast are limited to the following:

Tegucigalpa	[TGU]	- San Pedro Sula	[SAP]
"		- La Ceiba	[LCE]
"		- Roatán (Including Utila and Guanaja)	[ROA]
"		- Trujillo (Including Tocoa)	[TJI]
"		- Olanchito (Including Coyoles)	[OAN]
"		- Puerto Lempira (Including Ahuas and Brus Laguna)	[PLP]

3) Population

Population of Honduras in 1985 is estimated by the Bureau of Statistics and Census of Honduras to be 4,373 thousand with an average annual growth rate of 3.5% during the 10-year period between 1975 and 1985, and this growth rate is used in the present study for that period. A slightly lower annual growth rate of 3.0% is assumed for the ensuing 10-year period of 1985 - 1995, and a lower still rate of 2.5% for the last 10-year period of 1995 - 2005, these lower rates being assumed on the perspective of a relatively slower growth tendency in the future. The estimates of the population of the country obtained on the above assumptions are shown in Table 3-1.

As to the population of Tegucigalpa, the estimate made in the Metropolitan Development Plan is adopted in this study for the 20-year period of 1980 - 2000, and for the remaining 5 years of the forecast period, estimate is made by extrapolation using the average annual growth rate derived from the estimated annual population given in the said Plan (Table 3-1).

4) Gross Domestic Product

The National Development Plan of Honduras (1974 - 1978) envisaged a 6.0% annual growth rate of GDP in real terms. The actual growth rate of GDP during the 1974 - 1977 period, however, averaged 5% per year. The World Bank estimate shows the rate of 5.0% for the 4-year period of 1978 - 1982, while the Inter-American Development Bank gives a figure of 4.92% for the 13-year period of 1977 - 1990. Taking all these into account, the annual growth rate in real terms of GDP is assumed in this study at 5.0% for the 13-year period of 1977 - 1990, and 4.0% for the rest of the forecast period in expectation of a slower growth tendency. The estimates of GDP based on these assumptions are shown in Table 3-1.

5) Gross Domestic Product per Capita

The estimates of per capita GDP based on the estimates made in Subsections 3) and 4) above are shown in Table 3-1 along with the estimates of future population and of GDP.

Table 3-1 ESTIMATED FUTURE POPULATION AND GDP OF HONDURAS

Year	Population		Gross Domestic Product (Millions of Constant 1966 Lempiras)	Per Capita GDP (Constant 1966 Lempiras)
	Honduras ('000)	Tegucigalpa ('000)		
1980	3,691 *1	400	1,978	536
1985	4,373 *1	500	2,524	577
1990	5,070	650	3,221	635
1995	5,877	800	3,919	667
2000	6,649	1,100	4,768	717
2005	7,523	1,400 *2	5,801	771

Note: *1 Estimated by Dirección General Estadistica y Censos.

*2 Based on average annual growth rate of 5.2% over the year 2000.

3.2 International Air Passenger Traffic Forecast

3.2.1 International Embarking and Disembarking Passengers of Honduras

As a result of regression analyses of international passengers in Honduras and of the GDP and the per capita GDP, the regression model as per Formula 1 (Appendix 3A) was found to have a higher reliability than any other alternatives used in the analysis, with the correlation coefficient of 0.989 and the Durbin-Watson ratio of 2.272 (n = 18). Based on the assumption that the model structure remains unchanged throughout the period of forecast, the international embarking and disembarking passenger traffic of Honduras was forecast by the said regression model, with the results as shown in Fig. 3-2. It should be noted, however, that the forecast was made only of the normal traffic and does not include the generated traffic to be expected on new routes.

3.2.2 International Embarking and Disembarking Passengers at Toncontín Airport

Through similar process as employed in the case of national total demand as explained above, the regression model as per Formula 2 (Appendix 3A) was found to have the highest reliability, and was likewise used for forecasting the international embarking and disembarking passenger traffic at Toncontín Airport. The results shown in Fig. 3-2, however, are again of the normal traffic alone.

3.2.3 International Embarking, Disembarking and Transit Passenger Traffic by Route and by Site

Forecast was made of the international embarking, disembarking and transit passenger traffic by route for each airport site by the following procedures, with the results

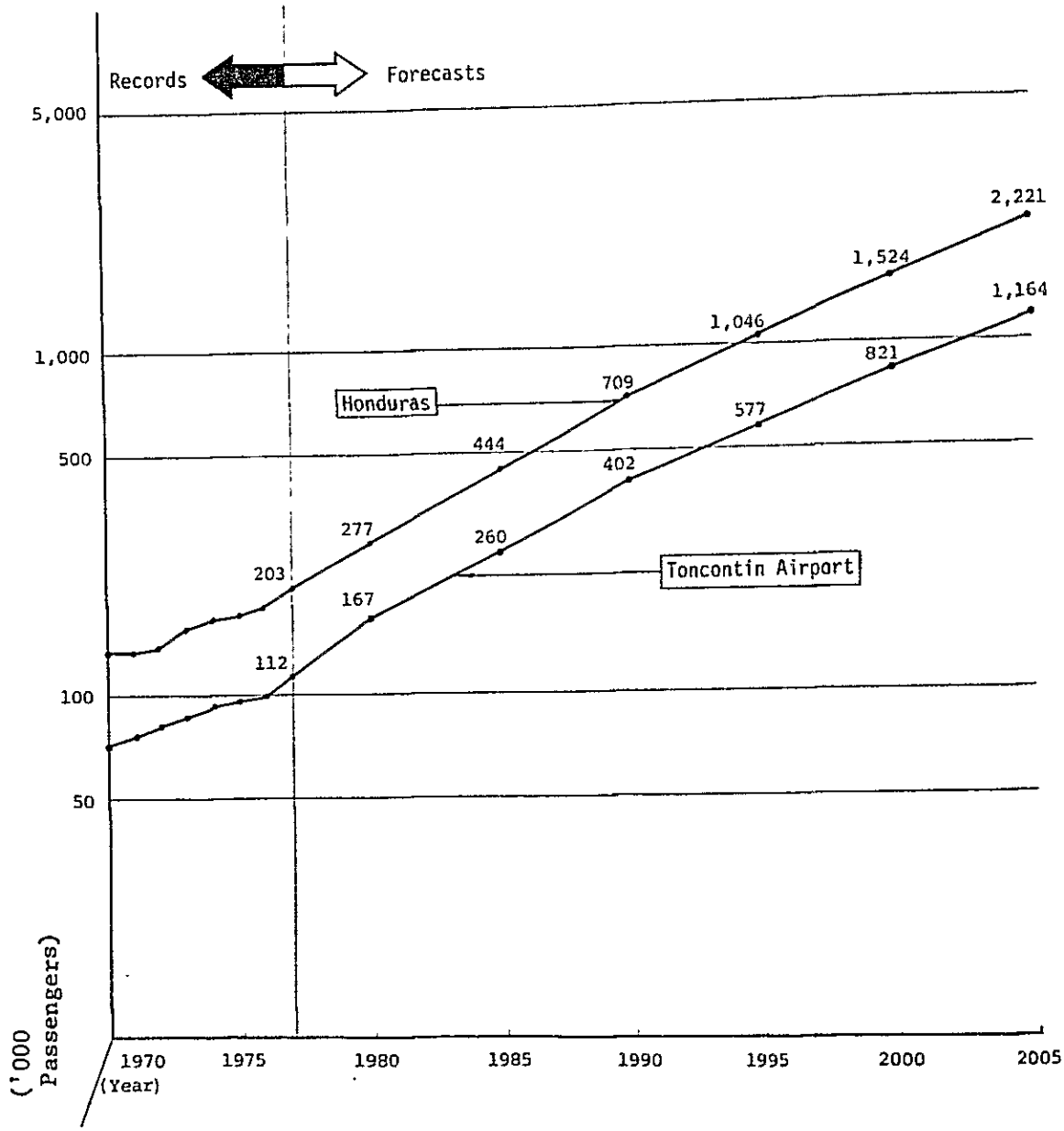


Fig. 3-2 FORECASTS OF INTERNATIONAL EMBARKING & DISEMBARKING AIR PASSENGERS OF NORMAL TRAFFIC

as shown in Tables 3-2, 3-3 and 3-4 respectively for Toncontín Airport, PEDREGAL site and TALANGA site.

1) Embarking and Disembarking Passenger Traffic by Existing Route

Assuming that the international passenger traffic on the existing routes would not be affected by the differences in access conditions between one another of the airport sites, the demand by route of the normal traffic was calculated by distributing the results obtained in Subsection 3.2.2 above to each route with the regression models as per Formulae 3 through 11 (Appendix 3A), and the results by route thus obtained were adjusted so that the sum of the distributed traffic of all routes would equal the original total figure.

2) Embarking and Disembarking Passenger Traffic by New Route

The international passenger traffic generated by the establishment of the two new routes of Tegucigalpa-Houston and Tegucigalpa-San Salvador was forecast by the gravity model as per Formula 12 (Appendix 3A).

3) Transit Passenger Traffic

International transit passenger traffic was assumed to be identical at all sites. The total transit passengers calculated by the regression model as per Formula 13 (Appendix 3A) were distributed to each route according to the shares by origin/destination of the 1977 records (Appendix Table 2A-26).

Table 3-2 FORECASTS OF INTERNATIONAL EMBARKING, DISEMBARKING AND TRANSIT PASSENGER TRAFFIC BY ROUTE AT TONCONTIN AIRPORT

(In thousand persons)

Route		1980	1985	1990	1995	2000	2005
TGU-MIA	Emb. & Disemb.	34	58	94	139	201	289
	Transit	14	22	35	52	74	106
	Total	48	80	129	191	275	395
TGU-MEX	Emb. & Disemb.	14	21	31	43	59	83
	Transit	1	2	2	4	5	8
	Total	15	23	33	47	64	91
TGU-PTY	Emb. & Disemb.	22	41	69	104	153	222
	Transit	1	1	2	4	5	8
	Total	23	42	71	108	158	230
TGU-ADZ	Emb. & Disemb.	9	14	24	35	51	74
	Transit	3	6	9	14	19	28
	Total	12	20	33	49	70	102
TGU-SJO	Emb. & Disemb.	19	25	35	48	65	89
	Transit	18	29	47	67	98	139
	Total	37	54	82	115	163	228
TGU-MGA	Emb. & Disemb.	13	17	22	28	38	50
	Transit	11	18	28	42	59	85
	Total	24	35	50	70	97	135
TGU-GUA	Emb. & Disemb.	30	38	49	63	83	110
	Transit	5	8	13	19	27	40
	Total	35	46	62	82	110	150
TGU-BZE	Emb. & Disemb.	2	2	3	4	5	7
	Transit	2	2	4	6	8	12
	Total	4	4	7	10	13	19
TGU-MSY	Emb. & Disemb.	24	44	75	113	166	240
	Transit	14	22	35	52	74	106
	Total	38	66	110	165	240	346
TGU-IAH	Emb. & Disemb.	27	36	47	63	84	113
	Transit	11	18	28	42	59	85
	Total	38	54	75	105	143	198
TGU-SAL	Emb. & Disemb.	19	29	42	61	89	131
	Transit	11	18	28	42	59	85
	Total	30	47	70	103	148	216
TOTAL	Emb. & Disemb.	213	325	491	701	994	1,408
	Transit	91	146	231	344	487	702
	Total	304	471	722	1,045	1,481	2,110

Table 3-3 FORECASTS OF INTERNATIONAL EMBARKING, DISEMBARKING AND TRANSIT PASSENGER TRAFFIC BY ROUTE AT PEDREGAL SITE

(In thousand persons)

Route		1980	1985	1990	1995	2000	2005
TGU-MIA	Emb. & Disemb.	34	58	94	139	201	289
	Transit	14	22	35	52	74	106
	Total	48	80	129	191	275	395
TGU-MEX	Emb. & Disemb.	14	21	31	43	59	83
	Transit	1	2	2	4	5	8
	Total	15	23	33	47	64	91
TGU-PTY	Emb. & Disemb.	22	41	69	104	153	222
	Transit	1	1	2	4	5	8
	Total	23	42	71	108	158	230
TGU-ADZ	Emb. & Disemb.	9	14	24	35	51	74
	Transit	3	6	9	14	19	28
	Total	12	20	33	49	70	102
TGU-SJO	Emb. & Disemb.	19	25	35	48	65	89
	Transit	18	29	47	67	98	139
	Total	37	54	82	115	163	228
TGU-MGA	Emb. & Disemb.	13	17	22	28	38	50
	Transit	11	18	28	42	59	85
	Total	24	35	50	70	97	135
TGU-GUA	Emb. & Disemb.	30	38	49	63	83	110
	Transit	5	8	13	19	27	40
	Total	35	46	62	82	110	150
TGU-BZE	Emb. & Disemb.	2	2	3	4	5	7
	Transit	2	2	4	6	8	12
	Total	4	4	7	10	13	19
TGU-MSY	Emb. & Disemb.	24	44	75	113	166	240
	Transit	14	22	35	52	74	106
	Total	38	66	110	165	240	346
TGU-IAH	Emb. & Disemb.	31	41	54	72	96	128
	Transit	11	18	28	42	59	85
	Total	42	59	82	114	155	213
TGU-SAL	Emb. & Disemb.	16	24	35	51	75	110
	Transit	11	18	28	42	59	85
	Total	27	42	63	93	134	195
TOTAL	Emb. & Disemb.	214	325	491	700	992	1,402
	Transit	91	146	231	344	487	702
	Total	305	471	722	1,044	1,479	2,104

Table 3-4 FORECASTS OF INTERNATIONAL EMBARKING, DISEMBARKING AND TRANSIT PASSENGER TRAFFIC BY ROUTE AT TALANGA SITE

(In thousand persons)

	Route	1980	1985	1990	1995	2000	2005
TGU-MIA	Emb. & Disemb.	34	58	94	139	201	289
	Transit	14	22	35	52	74	106
	Total	48	80	129	191	275	395
TGU-MEX	Emb. & Disemb.	14	21	31	43	59	83
	Transit	1	2	2	4	5	8
	Total	15	23	33	47	64	91
TGU-PTY	Emb. & Disemb.	22	41	69	104	153	222
	Transit	1	1	2	4	5	8
	Total	23	42	71	108	158	230
TGU-ADZ	Emb. & Disemb.	9	14	24	35	51	74
	Transit	3	6	9	14	19	28
	Total	12	20	33	49	70	102
TGU-SJO	Emb. & Disemb.	19	25	35	48	65	89
	Transit	18	29	47	67	98	139
	Total	37	54	82	115	163	228
TGU-MGA	Emb. & Disemb.	13	17	22	28	38	50
	Transit	11	18	28	42	59	85
	Total	24	35	50	70	97	135
TGU-GUA	Emb. & Disemb.	30	38	49	63	83	110
	Transit	5	8	13	19	27	40
	Total	35	46	62	82	110	150
TGU-BZE	Emb. & Disemb.	2	2	3	4	5	7
	Transit	2	2	4	6	8	12
	Total	4	4	7	10	13	19
TGU-MSY	Emb. & Disemb.	24	44	75	113	166	240
	Transit	14	22	35	52	74	106
	Total	38	66	110	165	240	346
TGU-IAH	Emb. & Disemb.	27	35	47	63	84	112
	Transit	11	18	28	42	59	85
	Total	38	53	75	105	143	197
TGU-SAL	Emb. & Disemb.	12	17	25	37	55	80
	Transit	11	18	28	42	59	85
	Total	23	35	53	79	114	165
TOTAL	Emb. & Disemb.	206	312	474	677	960	1,356
	Transit	91	146	231	344	487	702
	Total	297	458	705	1,021	1,447	2,058

The transit passengers on new routes were estimated by using the shares of the comparable existing routes, namely that of TGU-New Orleans for the Houston route, and TGU-Managua for the San Salvador route.

The origin/destination table as per Appendix Table 2A-26, however, includes the traffic of passengers transferring at Tegucigalpa from international to domestic route or vice versa, for example Managua - Tegucigalpa - Sal Pedro Sula, or La Ceiba - Tegucigalpa - San José, etc., such category of passengers being called in the present study as "transfer passengers" to be distinguished from transit passengers. Regardless of the origin/destination outside of Honduras of such combination routes, the domestic portion of such routes were invariably limited to the two routes of Tegucigalpa-San Pedro Sula and Tegucigalpa-La Ceiba, and the traffic of "transfer passengers" on these domestic portions of air routes was counted as part of the domestic transfer passenger traffic discussed in Subsection 3.4.3 hereunder.

3.3 Domestic Air Passenger Traffic Forecast

3.3.1 Domestic Embarking and Disembarking Passenger Traffic in Honduras

The regression model as per Formula 14 (Appendix 3A) found to be the most reliable through a similar process as employed in the cases of international passenger forecast, was used in forecasting the normal traffic of the domestic embarking and disembarking passengers at all airports of Honduras, with the results as shown in Fig. 3-3. In this model air-road travel time ratio was used as one of the independent variables because it was best thought to explain the declining tendency

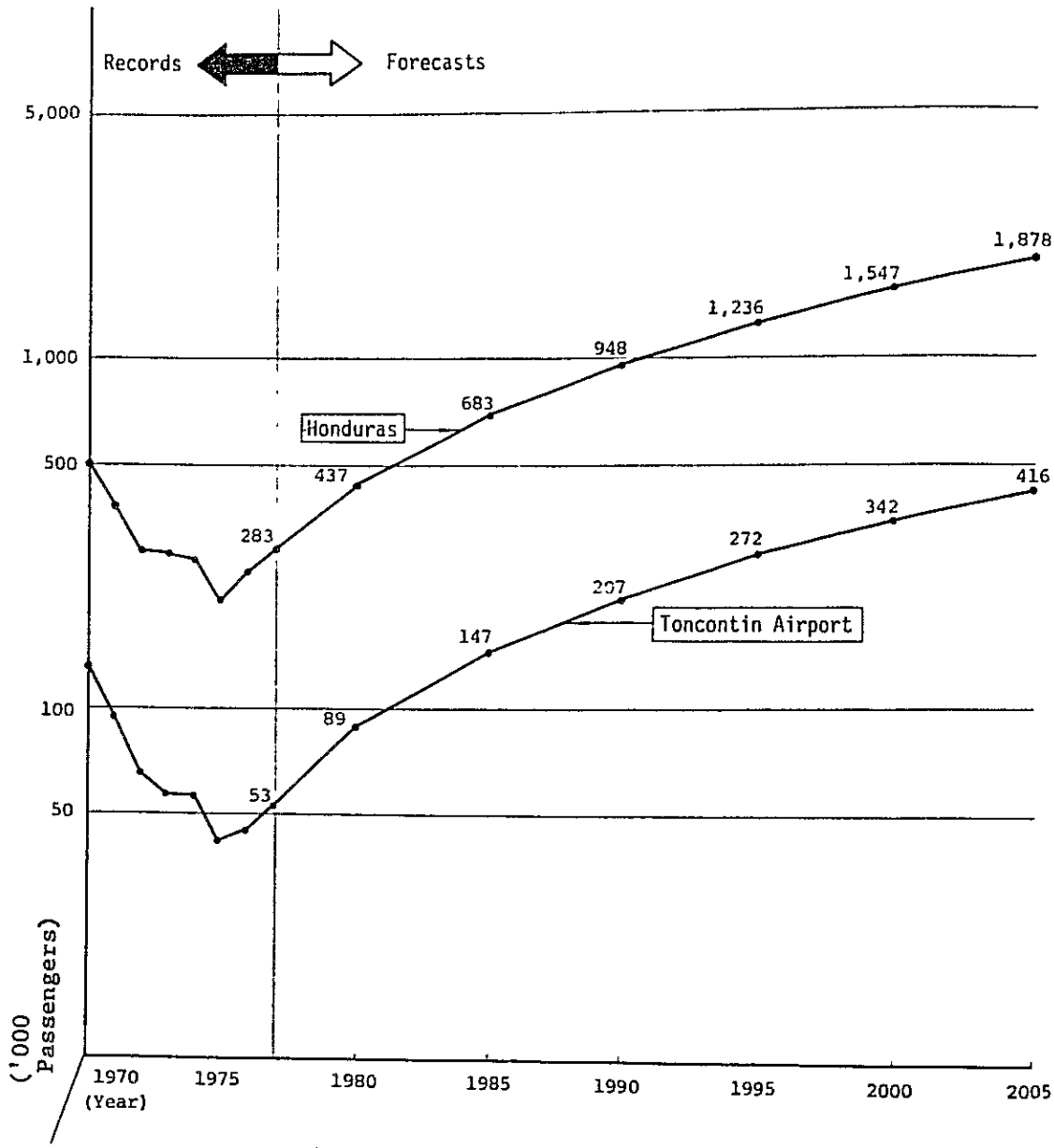


Fig. 3-3 FORECASTS OF DOMESTIC EMBARKING & DISEMBARKING AIR PASSENGERS OF NORMAL TRAFFIC

of the domestic air passenger traffic witnessed since 1970. The ratio used is that of the route between Tegucigalpa and San Pedro Sula.

3.3.2 Domestic Embarking and Disembarking Passenger Traffic at Toncontín Airport

Using the regression model of the highest reliability as per Formula 15 (Appendix 3A), forecast of the normal traffic of the domestic embarking and disembarking passengers at Toncontín Airport was calculated as shown in Fig. 3-3.

3.3.3 Domestic Embarking, Disembarking and Transit Passenger Traffic by Route and by Site

Forecast was made of the domestic embarking, disembarking and transit passenger traffic by route for the existing Toncontín Airport, PEDREGAL site, and TALANGA site, in the following procedures, with the results as shown in Table 3-6, 3-7 and 3-8 respectively.

1) Embarking and Disembarking Passenger Traffic by Route

The domestic passenger traffic either at PEDREGAL site or at TALANGA site is expected to be relatively small as compared with that of the existing Toncontín Airport because of the difference in access conditions.

By distributing the results obtained in Subsection 3.3.2 hereinabove to each route with the respective regression model as per Formulae 16 through 21 (Appendix 3A), the passenger traffic by route at Toncontín Airport was calculated, and then reduced to the demand levels projected for PEDREGAL site and TALANGA site by using the reduction coefficients obtained by the gravity model as per Formula 22 (Appendix 3A) as shown in Table 3-5.

In addition to the above, forecast was made of the passenger traffic between Tegucigalpa and Copán by using the above gravity model (Formula 22), strictly for reference purposes only, based on an assumption that a modern airport will be developed at Copán which is one of the most promising resources of tourism of Honduras.

2) "Transfer Passenger" Traffic by Route

As mentioned in Paragraph 3.2.3 - (3) above, the "transfer passenger" traffic to and from international routes expected on the two routes of between Tegucigalpa and San Pedro Sula and between Tegucigalpa and La Ceiba is included in the traffic of domestic passengers as shown in Table 3-6.

Table 3-5 RATES OF REDUCTION OF DOMESTIC PASSENGER TRAFFIC DEMAND BY ROUTE AT PEDREGAL AND TALANGA SITES AS COMPARED WITH DEMAND AT TONCONTIN AIRPORT

Route	Toncontin Airport	Pedregal Site	Talanga Site
TGU - SAP	1.000	0.927	0.817
- LCE	1.000	0.935	0.834
- ROA	1.000	0.970	0.918
- TJI	1.000	0.965	0.904
- OAL	1.000	0.935	0.835
- PLP	1.000	0.962	0.898

Table 3-6 FORECASTS OF DOMESTIC EMBARKING, DISEMBARKING AND TRANSFER PASSENGER TRAFFIC BY ROUTE AT TONCONTIN AIRPORT

(In thousand persons)

Route		1980	1985	1990	1995	2000	2005
TGU-SAP	Emb. & Disemb.	34	49	64	80	97	115
	Transfer	18	29	47	68	98	140
	Total	52	78	111	148	195	255
TGU-LCE	Emb. & Disemb.	29	53	76	101	131	160
	Transfer	1	2	4	5	7	11
	Total	30	55	80	106	138	171
TGU-ROA	Emb. & Disemb.	7	13	19	26	33	41
TGU-TJI	Emb. & Disemb.	5	7	11	14	17	21
TGU-OAN	Emb. & Disemb.	9	18	27	37	48	59
TGU-PLP	Emb. & Disemb.	5	7	10	14	16	20
TOTAL	Emb. & Disemb.	89	147	207	272	342	416
	Transfer	19	31	51	73	105	151
	Total	108	178	258	345	447	567
TGU-COPAN *1		1.7	2.1	2.7	3.4	4.4	5.6

*1 Forecast for reference purpose only

Table 3-7 FORECASTS OF DOMESTIC EMBARKING, DISEMBARKING AND TRANSFER PASSENGER TRAFFIC BY ROUTE AT PEDREGAL SITE

(In thousand persons)

Route		1980	1985	1990	1995	2000	2005
TGU-SAP	Emb. & Disemb.	32	45	59	74	90	107
	Transfer	18	29	47	68	98	140
	Total	50	74	106	142	188	247
TGU-LCE	Emb. & Disemb.	27	50	71	94	122	150
	Transfer	1	2	4	5	7	11
	Total	28	52	75	99	129	161
TGU-ROA	Emb. & Disemb.	7	13	18	25	32	40
TGU-TJI	Emb. & Disemb.	5	7	11	14	16	20
TGU-OAN	Emb. & Disemb.	8	17	25	35	45	55
TGU-PLP	Emb. & Disemb.	5	7	10	13	15	19
TOTAL	Emb. & Disemb.	84	139	194	255	320	391
	Transfer	19	31	51	73	105	151
	Total	103	170	245	328	425	542
TGU-COPAN *1		1.5	2.0	2.5	3.2	4.1	5.2

*1 Forecast for reference purpose only

Table 3-8 FORECASTS OF DOMESTIC EMBARKING, DISEMBARKING AND TRANSFER PASSENGER TRAFFIC BY ROUTE AT TALANGA SITE

(In thousand persons)

Route		1980	1985	1990	1995	2000	2005
TGU-SAP	Emb. & Disemb.	28	40	52	65	79	94
	Transfer	18	29	47	68	98	140
	Total	46	69	99	133	177	234
TGU-LCE	Emb. & Disemb.	24	44	63	84	109	133
	Transfer	1	2	4	5	7	11
	Total	25	46	67	89	116	144
TGU-ROA	Emb. & Disemb.	6	12	17	24	30	38
TGU-TJI	Emb. & Disemb.	5	6	10	13	15	19
TGU-OAN	Emb. & Disemb.	8	15	23	31	40	49
TGU-PLP	Emb. & Disemb.	5	6	9	13	14	18
TOTAL	Emb. & Disemb.	76	123	174	230	287	351
	Transfer	19	31	51	73	105	151
	Total	95	154	225	303	392	502
TGU-COPAN *1		1.4	1.8	2.3	2.9	3.7	4.8

*1 Forecast for reference purpose only

3.4 International Air Cargo Traffic Forecast

In all forecasting procedures of cargo traffic in this Section, regression analysis was made between the gross domestic product of Honduras and the transport demand of the cargo of different categories. As a result of the regression analysis, an optimum regression model showing the high enough correlation coefficient and Durbin-Watson ratio was selected for use in the respective forecast.

3.4.1 International Loaded and Unloaded Cargo Traffic of Honduras

Forecast of the normal traffic of the international loaded and unloaded cargo of Honduras was obtained by the regression model as per Formula 23 (Appendix 3A), and the result is shown in Fig. 3-4.

3.4.2 International Loaded and Unloaded Cargo Traffic at Toncontín Airport

The normal traffic of the international loaded and unloaded cargo at Toncontín Airport was forecast by the regression model as per Formula 24 (Appendix 3A) with the result shown in Fig. 3-4.

3.4.3 International Loaded and Unloaded Cargo Traffic by Route and by Site

Forecast was made of the international loaded and unloaded cargo traffic by route for each site by the following procedures, with the results as shown in Tables 3-10, 3-11 and 3-14 respectively for Toncontín Airport, PEDREGAL site and TALANGA site.

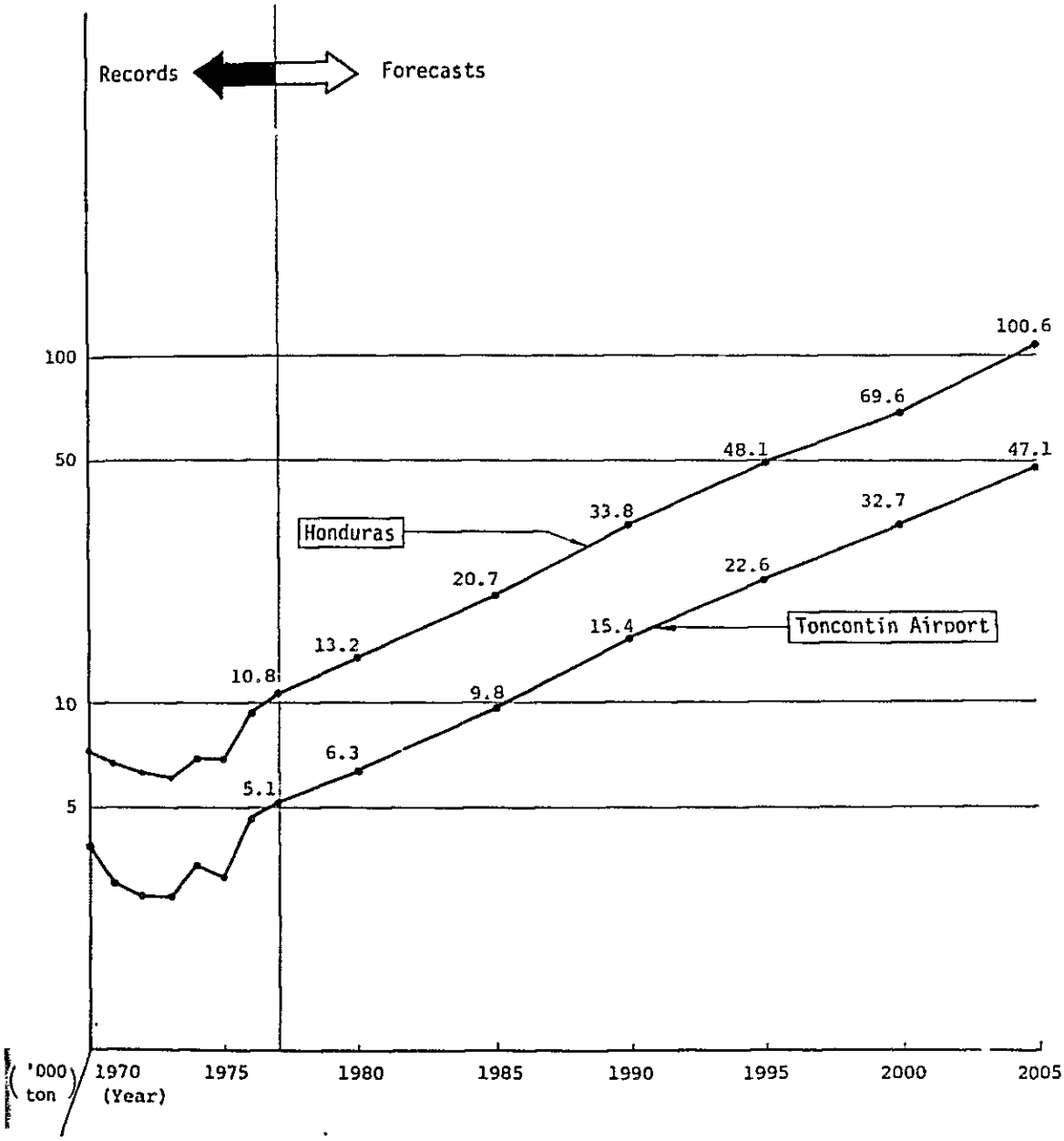


Fig. 3-4 FORECASTS OF INTERNATIONAL LOADED & UNLOADED AIR CARGO OF NORMAL TRAFFIC

1) Cargo Traffic on Existing Routes

Based on assumption that the share of international cargo traffic by route would remain unchanged throughout the forecast period, and further that the demand by site would not be affected by the differences in access conditions, the forecast of the international cargo traffic by route was calculated by distributing the results obtained in Subsection 3.4.2 to each route according to the shares by route obtained by averaging the records of the past 3 years between 1974 and 1976 (Table 3-9).

2) Cargo Traffic on New Routes

Forecast was made of the international cargo traffic on the new routes between Tegucigalpa and Houston, and between Tegucigalpa and San Salvador by the gravity model as per Formula 25 (Appendix 3A).

Table 3-9 DISTRIBUTION RATIO BY ROUTE OF INTERNATIONAL LOADED & UNLOADED CARGO AT TONCONTIN AIRPORT

(%)

Route	Ratio
TGU - MIA	48.6
- MEX	6.4
- PTY	17.3
- ADZ	0.6
- SJO	4.5
- MGA	1.4
- GUA	14.1
- BZE	0.4
- MSY	6.7
Total	100.0

Table 3-10 FORECASTS OF INTERNATIONAL LOADED & UNLOADED CARGO TRAFFIC BY ROUTE AT TONCONTIN AIRPORT

(In tons)

Route	1980	1985	1990	1995	2000	2005
TGU-MIA	3,060	4,760	7,480	10,980	15,890	22,890
-MEX	400	630	990	1,450	2,090	3,010
-PTY	1,090	1,690	2,670	3,910	5,660	8,150
-ADZ	40	60	90	130	200	280
-SJO	280	440	690	1,020	1,470	2,120
-MGA	90	140	220	320	460	660
-GUA	890	1,380	2,170	3,190	4,610	6,640
-BZE	30	40	60	90	130	190
-MSY	420	660	1,030	1,510	2,190	3,160
-IAH	1,600	2,400	3,600	5,500	8,100	12,200
-SAL	200	250	400	600	900	1,200
Total	8,100	12,450	19,400	28,700	41,700	60,500

Table 3-11 FORECASTS OF INTERNATIONAL LOADED & UNLOADED CARGO TRAFFIC BY ROUTE AT PEDREGAL SITE

(In tons)

Route	1980	1985	1990	1995	2000	2005
TGU-MIA	3,060	4,760	7,480	10,980	15,890	22,890
-MEX	400	630	990	1,450	2,090	3,010
-PTY	1,090	1,690	2,670	3,910	5,660	8,150
-ADZ	40	60	90	130	200	280
-SJO	280	440	690	1,020	1,470	2,120
-MGA	90	140	220	320	460	660
-GUA	890	1,380	2,170	3,190	4,610	6,640
-BZE	30	40	60	90	130	190
-MSY	420	660	1,030	1,510	2,190	3,160
-IAH	1,900	2,800	4,200	6,400	9,500	14,200
-SAL	150	200	300	500	700	1,000
Total	8,350	12,800	19,900	29,500	42,900	62,300

Table 3-12 FORECASTS OF INTERNATIONAL LOADED & UNLOADED CARGO TRAFFIC BY ROUTE AT TALANGA SITE

(In tons)

Route	1980	1985	1990	1995	2000	2005
TGU-MIA	3,060	4,760	7,480	10,980	15,980	22,890
-MEX	400	630	990	1,450	2,090	3,010
-PTY	1,090	1,690	2,670	3,910	5,660	8,150
-ADZ	40	60	90	130	200	280
-SJO	280	440	690	1,020	1,470	2,120
-MGA	90	140	220	320	460	660
-GUA	890	1,380	2,170	3,190	4,610	6,640
-BZE	30	40	60	90	130	190
-MSY	420	660	1,030	1,510	2,190	3,160
-IAH	1,600	2,400	3,600	5,400	8,000	12,000
-SAL	100	150	250	350	500	700
.Total	8,000	12,350	19,250	28,350	41,290	59,800

3.5 Domestic Air Cargo Traffic Forecast

3.5.1 Domestic Loaded and Unloaded Cargo Traffic of Honduras

Forecast was made of the normal traffic of the domestic loaded and unloaded cargo at all airports of Honduras by the regression model as per Formula 26 (Appendix 3A), and the result is shown in Fig. 3-5.

3.5.2 Domestic Loaded and Unloaded Cargo Traffic at Toncontín Airport

Forecast was made of the normal traffic of the domestic loaded and unloaded cargo at Toncontín Airport by the regression model as per Formula 27 (Appendix 3A), with the results as shown in Fig. 3-5.

3.5.3 Domestic Loaded and Unloaded Cargo Traffic by Route and by Site

The domestic cargo traffic at PEDREGAL and TALANGA sites is expected to be less than that of Toncontín Airport because of the relatively unfavorable access conditions. By distributing the results of Subsection 3.5.2 to each route according to the 3-year average shares by route based on the 1974 - 1976 records (Table 3-13), the cargo traffic at Toncontín Airport by route was calculated, and was thereafter reduced to the demand levels expected at PEDREGAL site and TALANGA site by applying the same reduction coefficients as shown in Table 3-5 in Subsection 3.3.3. The results of the demand forecast by route for Toncontín Airport, PEDREGAL site and TALANGA site are shown respectively in Tables 3-14, 3-15 and 3-16.

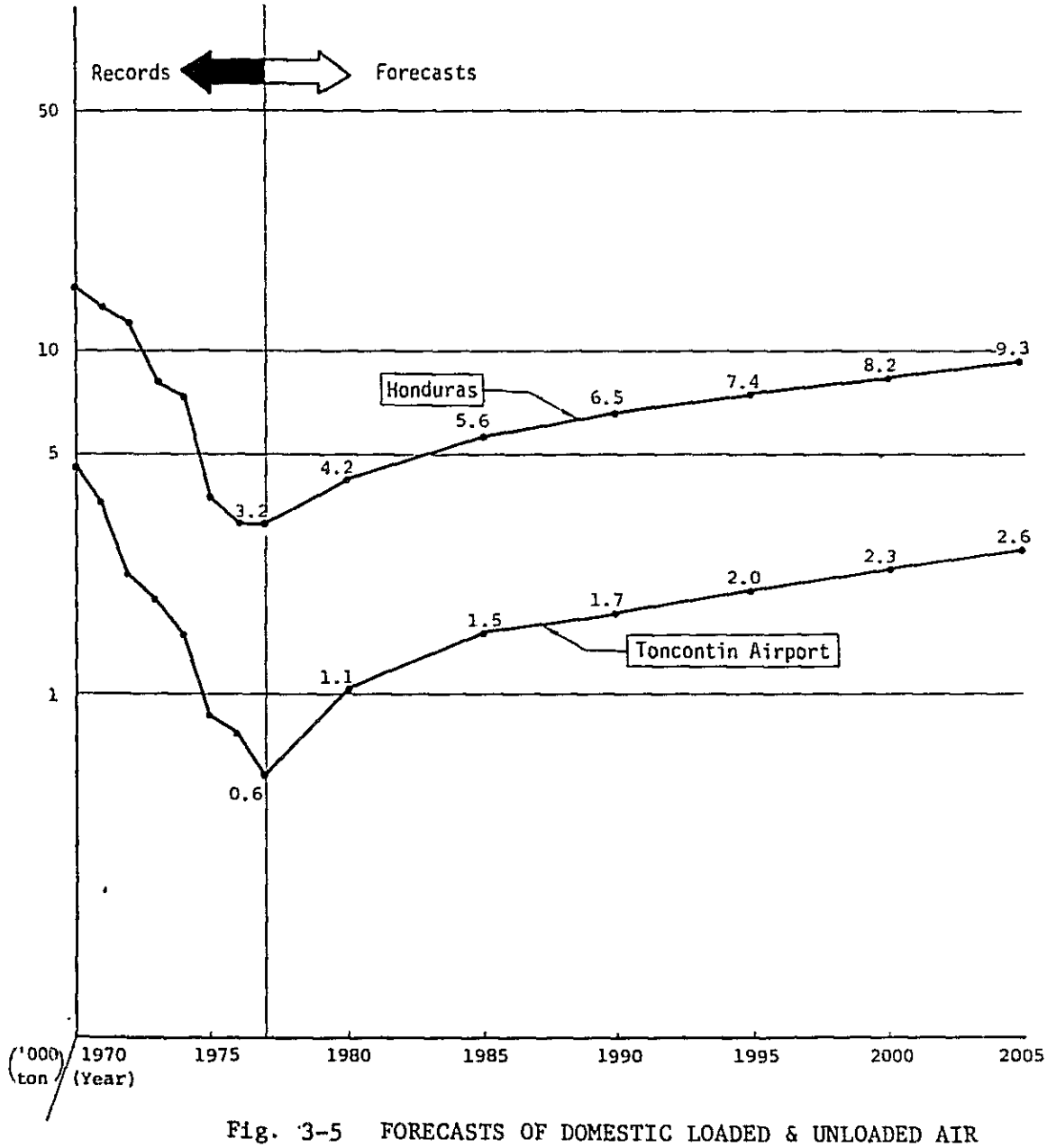


Fig. 3-5 FORECASTS OF DOMESTIC LOADED & UNLOADED AIR CARGO OF NORMAL TRAFFIC

Table 3-13 DISTRIBUTION RATIO BY ROUTE OF DOMESTIC LOADED & UNLOADED CARGO AT TONCONTIN AIRPORT

(%)

Route	Ratio
TGU - SAP	24.1
- LCE	24.8
- ROA	10.2
- TJI	8.1
- OAN	17.7
- PLP	15.1
Total	100.0

Table 3-14 FORECASTS OF DOMESTIC LOADED & UNLOADED CARGO TRAFFIC BY ROUTE AT TONCONTIN AIRPORT

(In tons)

Route	1980	1985	1990	1995	2000	2005
TGU - SAP	270	360	410	480	550	630
- LCE	270	370	420	510	570	650
- ROA	110	150	170	200	230	270
- TJI	90	120	140	160	190	210
- OAN	190	270	300	350	410	460
- PLP	170	230	260	300	350	390
Total	1,100	1,500	1,700	2,000	2,300	2,600

Table 3-15 FORECASTS OF DOMESTIC LOADED & UNLOADED CARGO TRAFFIC BY ROUTE AT PEDREGAL SITE

(In tons)

Route	1980	1985	1990	1995	2000	2005
TGU - SAP	250	330	380	440	510	580
- LCE	250	350	390	480	530	610
- ROA	110	150	160	190	220	260
- TJI	90	120	140	150	180	200
- OAN	180	250	280	330	380	430
- PLP	160	220	250	290	340	380
Total	1,040	1,420	1,600	1,880	2,160	2,460

Table 3-16 FORECASTS OF DOMESTIC LOADED & UNLOADED CARGO TRAFFIC BY ROUTE AT TALANGA SITE

(In tons)

Route	1980	1985	1990	1995	2000	2005
TGU - SAP	280	290	330	390	450	510
- LCE	230	310	350	430	480	540
- ROA	100	140	160	180	210	250
- TJI	80	110	130	140	170	190
- OAN	160	230	250	290	340	380
- PLP	150	210	230	270	310	350
Total	940	1,290	1,450	1,700	1,960	2,220

3.6 Supplementary Forecast

3.6.1 Forecast of Number of Small Aircraft Registered at Toncontín Airport

The number of small aircraft registered at Toncontín Airport was forecast by the regression model as per Formula 28 (Appendix 3A), and the result is shown in Table 3-17. The historical data is shown in Appendix Table 2A-31.

Table 3-17 FORECAST OF NUMBER OF SMALL AIRCRAFT REGISTERED AT TONCONTIN AIRPORT

Year	Number
1980	135
1985	195
1990	272
1995	349
2000	442
2005	556

3.6.2 Forecast of Number of Airport Employees at New Sites

Based on the records of the number of employees at Toncontín Airport as of March 1978 as shown in Appendix Table 2A-32, the number of employees per "traffic unit" of 1,000 passengers or 100 tons of cargo is calculated to be 1.6 persons. Taking into account the expected improvement in labor productivity in the future, the number of employees per traffic unit is assumed to decrease gradually to 1.0 person in 2005, and the results of forecast made on this basis are shown in Table 3-18.

Table 3-18 FORECAST OF NUMBER OF AIRPORT EMPLOYEES AT NEW SITES

Year	Number of Employees Per One Traffic Unit	Pedregal Site		Talanga Site	
		Total Traffic Units*	Number of Employees	Total Traffic Units*	Number of Employees
1980	1.5	502	750	481	720
1985	1.4	783	1,100	748	1,050
1990	1.3	1,182	1,540	1,137	1,480
1995	1.2	1,686	2,020	1,625	1,950
2000	1.1	2,355	2,590	2,272	2,500
2005	1.0	3,294	3,290	3,180	3,180

* One traffic unit comprising 1,000 passengers or 100 tons of cargo, the total traffic units indicated for each year are the arithmetic sum of the units of passengers and that of cargo.

CHAPTER 4 AIRPORT FACILITY REQUIREMENTS

Based on the planning criteria established in conformity with the ICAO standards and/or the FAA regulations, the facility requirements at the two possible sites to meet the air traffic forecast for the year 2005 were studied in the sequence as shown in the flowchart given in Fig. 4-1. The outline of the requirements is presented in the following.

4.1 Airfield Facilities

4.1.1 Runway Strip

The width of the strip shall be 300 m throughout its entire length so as to accommodate a precision approach runway.

4.1.2 Runway

1) Length

Lengths of the runway required for each of the two alternative sites were calculated as shown in Table 4-1 based on the assumed operating conditions of aircraft with the maximum stage length of the projected air route network shown in Figs 4-2(a) and (b).

Table 4-1 RUNWAY LENGTH REQUIRED BY AIRCRAFT

(Unit: m)

Site	B-747-200B	DC-10-10	L-1011-385	B-707-300C	Proposed Runway Length
TALANGA	2,650	2,440	2,290	2,320	2,650
PEDREGAL	2,770	2,590	2,650	2,620	2,770

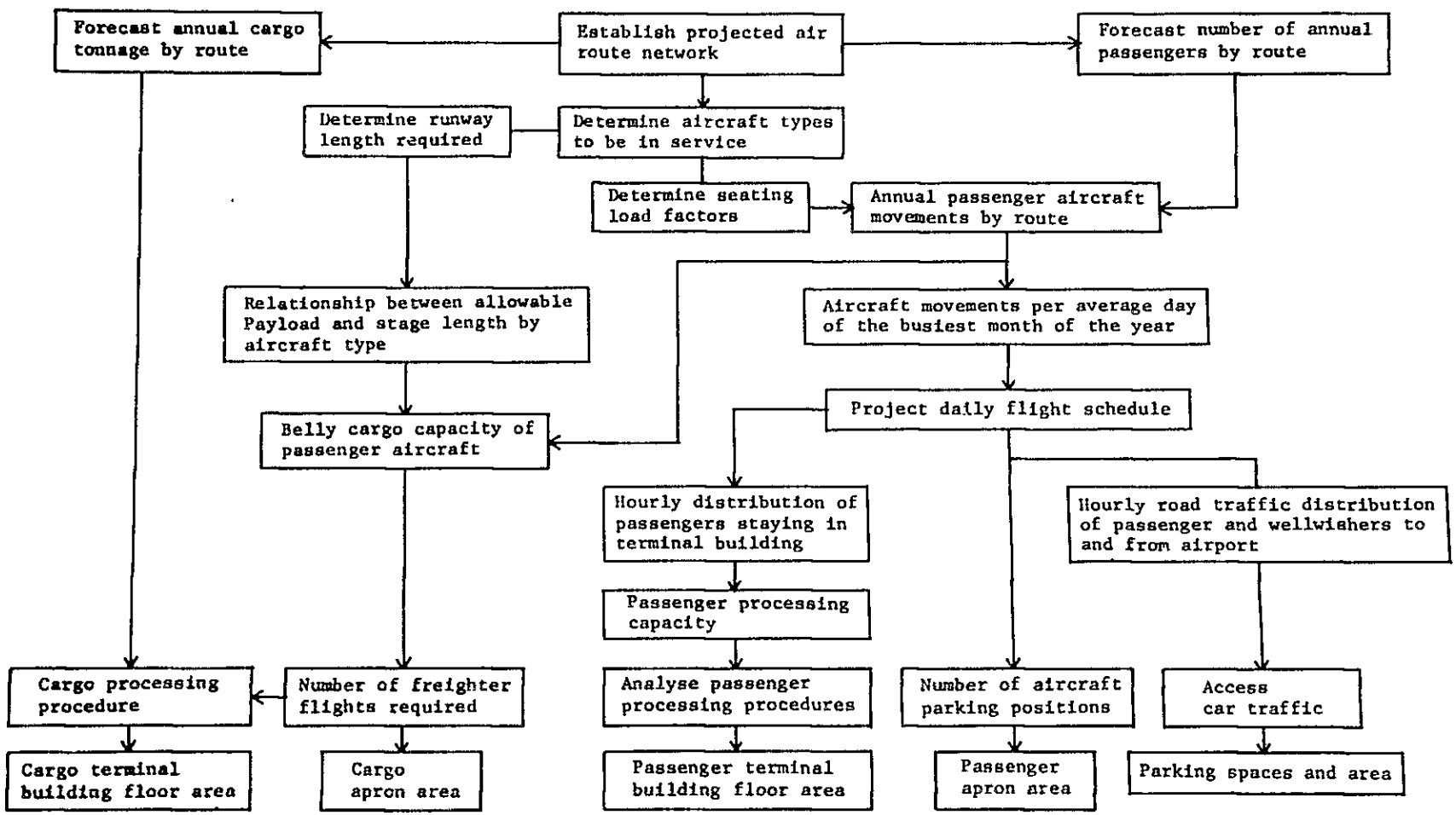


Fig. 4-1 SEQUENCE OF FACILITY REQUIREMENTS ANALYSIS

Calculation of the above runway lengths was based on the following factors:

a. Desired payload equal to the full passenger load, i.e., two hundred pounds per seat multiplied by the total number of seats available.

b. Assumed maximum stage length of 1,250 statute miles, which is that of between Tegucigalpa and Houston, Texas, U.S.A.

c. Alternate airport of Ramon Villeda Morales (San Pedro Sula) for the proposed new airport, and 4 alternate airports of Corpus Christi, Dallas/Fort Worth, New Orleans, and San Antonio for Houston International Airport.

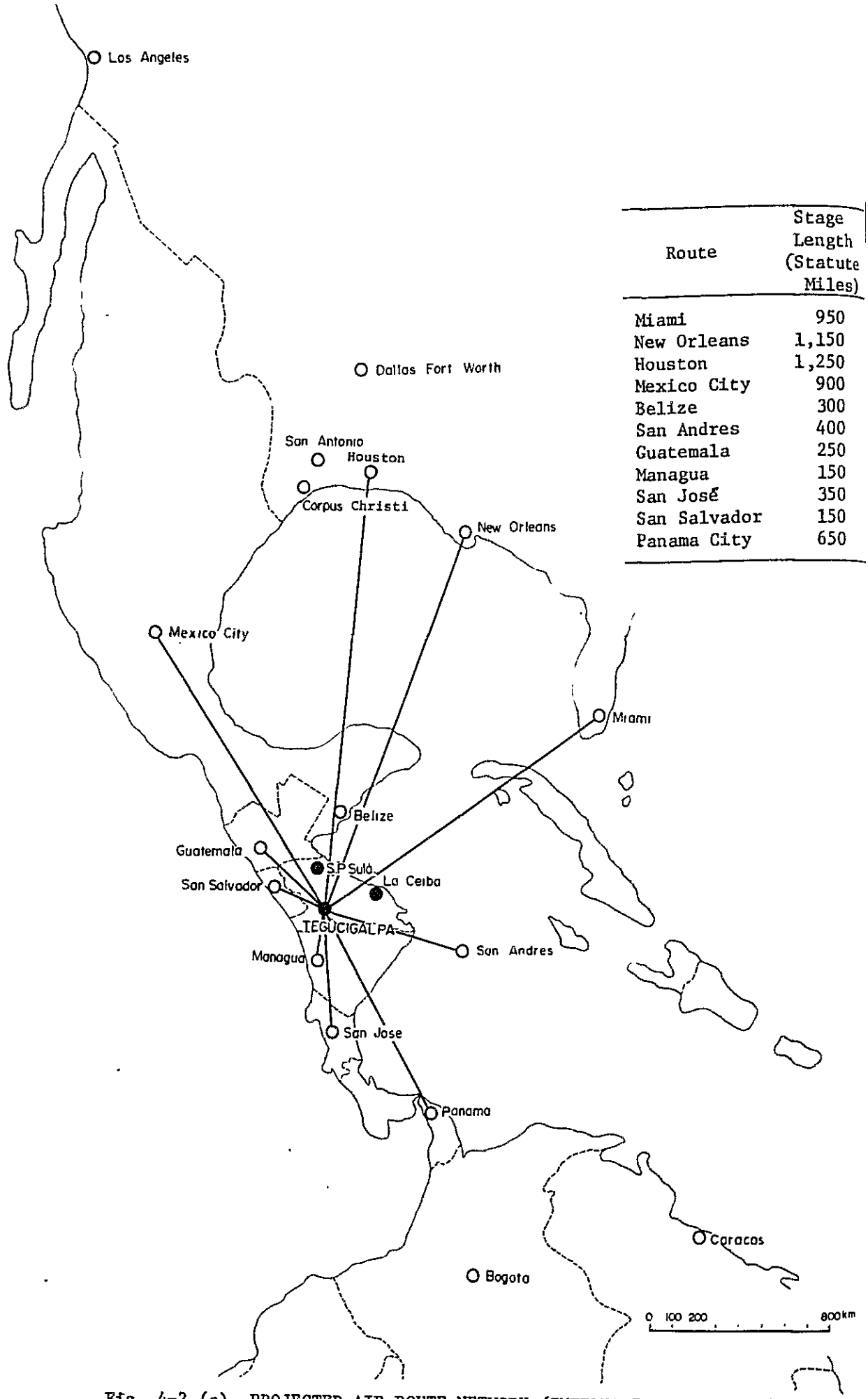
d. Reserve fuel for 1.25 hours of extra flight.

e. Assumed effective runway gradient of 0.5%.

f. Normal maximum temperature of 24.7°C and 31.0°C respectively for PEDREGAL and TALANGA sites.

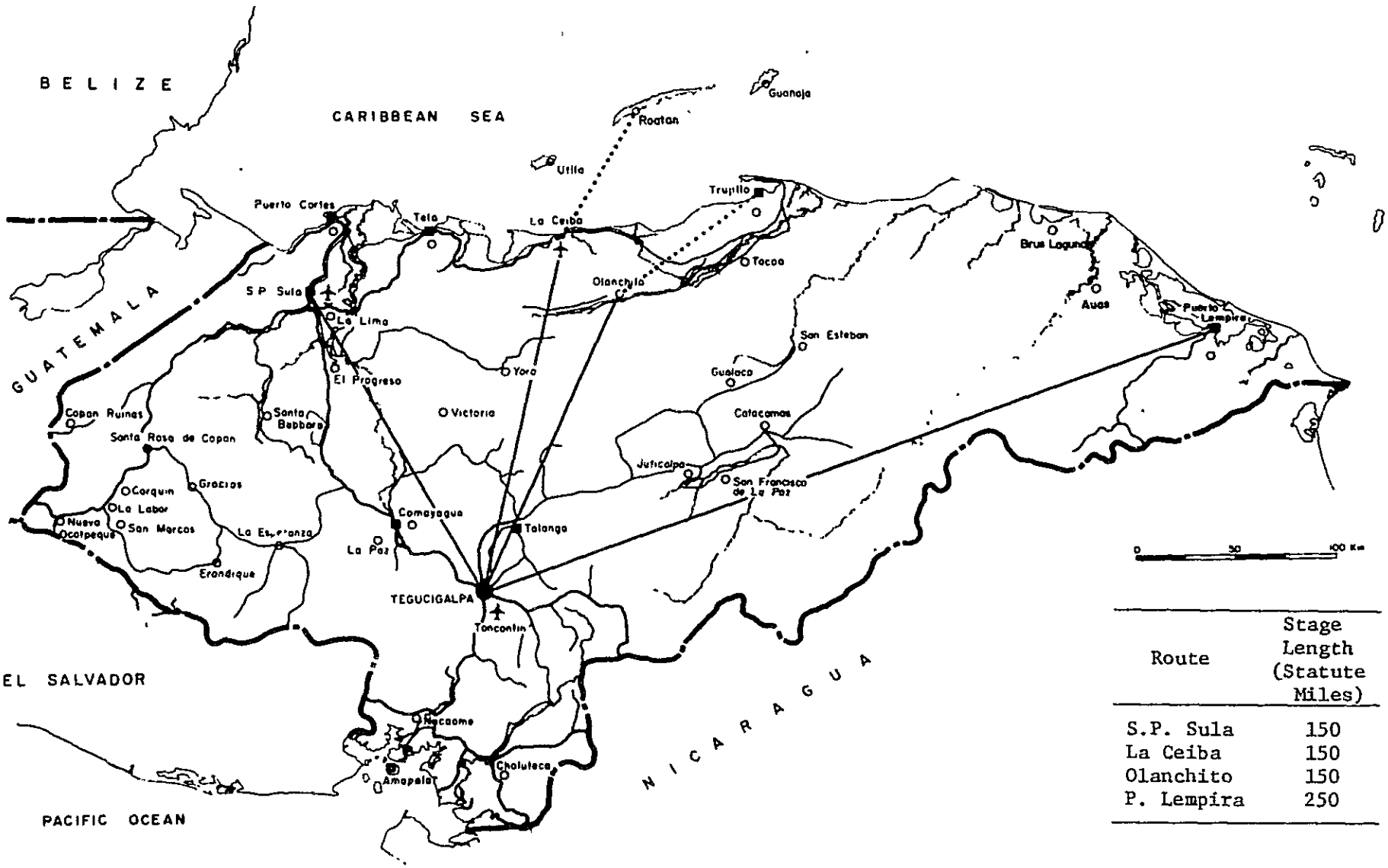
g. Airport elevation at PEDREGAL site estimated at 1,500 m above sea level, and 800 m at TALANGA site.

The relationship between the projected stage lengths and the maximum permissible payload of each aircraft type on the above calculated runway lengths is illustrated in Appendix 4A.



Route	Stage Length (Statute Miles)
Miami	950
New Orleans	1,150
Houston	1,250
Mexico City	900
Belize	300
San Andres	400
Guatemala	250
Managua	150
San José	350
San Salvador	150
Panama City	650

Fig. 4-2 (a) PROJECTED AIR ROUTE NETWORK (INTERNATIONAL SERVICE)



Route	Stage Length (Statute Miles)
S.P. Sula	150
La Ceiba	150
Olanchito	150
P. Lempira	250

Fig. 4-2 (b) PROJECTED AIR ROUTE NETWORK (DOMESTIC SERVICE)

2) Width

The width of the runway for both sites shall be 45 m in accordance with the ICAO recommendations for the corresponding runway category.

4.1.3 Taxiway

A parallel taxiway connected with the runway by exit taxiways shall be provided along the full length of the runway. The width of all taxiways shall be 23 m.

4.1.4 Passenger Loading Apron

Table 4-2 shows the number of passenger aircraft parking positions required for the new airport to meet the hourly parking requirements obtained from the daily flight schedules projected below on the basis of the factors identified in the following sequence.

Table 4-2 NUMBER OF PASSENGER AIRCRAFT PARKING POSITIONS

Aircraft Category*	International Flights	Domestic Flights	Reserve	Total
A type	4	0	1	5
B type	4	2	1	7
C type	0	2	0	2
Total	8	4	2	14

* For definitions see Table 4-3

1) Type of Aircraft to be in Service

The types of aircraft expected to be in service for different air routes projected were classified into the following three categories coded A, B, and C for the purpose of this study.

Table 4-3 AIRCRAFT CATEGORIES

	Air Route	Aircraft
International Services	TGU-MIA TGU-MSY TGU-IAH TGU-MEX TGU-PTY	A type ----- 200 seater jet
	Others	B type ----- 120 seater jet
Domestic Services	TGU-SAP TGU-LCE	B type ----- 120 seater jet
	Others	C type ----- 40 seater non-jet

2) Average Seating Load Factors

The average seating load factors for international flights and domestic flights were estimated to be 60% and 70% respectively.

3) Annual Passenger Aircraft Movements by Route

Based on the above-mentioned conditions, the annual passenger aircraft movements by route were calculated as tabulated in Tables 4-4(a) and (b).

4) Busiest Month Passenger Peaking Coefficient

The busiest month peaking coefficient for international passengers and domestic passengers was assumed to be 1.2 and 1.1 respectively.

5) Busiest Day Passenger Aircraft Movements

The businest day passenger aircraft movements by route were calculated as tabulated in Tables 4-4 (a) and (b).

6) Daily Flight Schedule

The following basic conditions were taken into account in establishing the possible flight schedules as shown in Appendix 4B.

a. The new airport shall be equipped to permit night time operation, and shall operate for 17 hours from 6:00 to 23:00.

b. The number of aircraft to serve the projected air route network shall be minimized so as to ensure the airlines' payability.

c. Aircraft parking time shall be as assumed in the following table according to the characteristics and past performances of each aircraft type.

Table 4-4 (a) PROJECTED AIRCRAFT MOVEMENTS BY ROUTE AT PEDREGAL IN THE YEAR 2005

Route	Number of Passengers (1,000)	Aircraft Movements					
		200-Seater Jet		120-Seater Jet		40-Seater Non-Jet	
		Annual	Busiest Day	Annual	Busiest Day	Annual	Busiest Day
TGU - MIA	395	3,292	11				
" - IAH	213	1,775	6				
" - MSY	346	2,883	10				
" - MEX	91	759	3				
" - PTY	230	1,917	7				
" - BZE	19			246	1		
" - GUA	150			2,084	7		
" - SAL	195			2,709	10		
" - MGA	135			1,875	7		
" - SJO	228			3,167	11		
" - ADZ	102			1,417	5		
Sub Total	2,104	10,626	37	11,516	41		
TGU - SAP	247			2,941	9		
" - LCE	201			2,393	8		
" - OAN	75					2,679	9
" - PLP	19					679	3
Sub Total	542			5,334	17	3,358	12
Total	2,646	10,626	37	16,850	58	3,358	12

Table 4-4 (b) PROJECTED AIRCRAFT MOVEMENTS BY ROUTE AT TALANGA IN THE YEAR 2005

Route	Number of Passengers (1,000)	Aircraft Movements					
		200-Seater Jet		120-Seater Jet		40-Seater Non-Jet	
		Annual	Busiest Day	Annual	Busiest Day	Annual	Busiest Day
TGU - MIA	395	3,292	11				
" - IAH	197	1,642	6				
" - MSY	346	2,884	10				
" - MEX	91	759	3				
" - PTY	230	1,917	7				
" - BZE	19			264	1		
" - GUA	150			2,084	7		
" - SAL	165			2,292	8		
" - MGA	135			1,875	7		
" - SJO	228			3,167	11		
" - ADZ	102			1,417	5		
Sub Total	2,058	10,494	37	11,099	39		
TGU - SAP	234			2,786	9		
" - LCE	182			2,167	7		
" - OAN	68					2,429	8
" - PLP	18					643	2
Sub Total	502			4,953	16	3,072	10
Total	2,560	10,494	37	16,052	55	3,072	10

Table 4-5 AIRCRAFT PARKING TIME

Aircraft Category*	Through Flights	Turn-around Flights
A type	45 minutes	90 minutes
B "	30 "	45 "
C "	30 "	30 "

* For definitions see Table 4-3

4.1.5 Cargo Loading Apron

The number of parking positions for freighter aircraft required in 2005 at the new airport is estimated to be:

1 position for B-707 class aircraft
1 position for DC-9/B-737 class aircraft

as a result of the study presented hereunder:

1) Cargo Traffic Distribution between Freighter and Passenger Aircraft

Although the analysis of projected total belly cargo capacity has shown that the entire cargo volume projected for the year 2005 can be transported in belly, international cargo traffic is assumed to be distributed 50/50 between belly and freighter for the purpose of the facility requirements analysis, in view of the expected future trend for greater increase in freighter traffic than in belly cargo traffic in international service, while for domestic service the entire tonnage projected is assumed to be transported in belly.

2) Busiest Month Cargo Tonnage Peaking Coefficient

The busiest month peaking coefficient for international cargo and domestic cargo is assumed to be 1.5 and 1.3 respectively.

3) Freighter Load Factor

The average load factor is assumed to be 70% of the maximum permissible payload.

4) Projected Freight Cargo Tonnage and Freighter Movements

The freighter cargo tonnage and freighter movements are estimated as shown in Tables 4-6(a) and (b).

5) Parking Time

The average parking time of the freighters is assumed to be 120 minutes in accordance with the aircraft characteristics published by manufacturers and past operational performances of the world's major airlines.

4.2 Terminal Buildings

4.2.1 Passenger Terminal Building

1) Passenger Processing Capacity Requirements

The number of passengers to be processed during the peak half-hour period was calculated as shown in Table 4-8 based on the hourly distribution of passengers expected to be staying in the terminal building as shown in Appendix 4C. The distribution

Table 4-6 (a) PROJECTED INTERNATIONAL FREIGHTER CARGO TONNAGE AND AIRCRAFT MOVEMENTS IN THE YEAR 2005 - PEDREGAL SITE

Traffic	Aircraft Category	Outbound			Inbound		
		Annual	Monthly	Daily	Annual	Monthly	Daily
Cargo Tonnage (t)	B-707 Class	4,224	530	17.8	21,491	2,688	89.8
	B-737 Class	1,277	162	5.6	4,170	524	17.7
	Total	5,501	692	23.4	25,661	3,212	107.5
Aircraft Movements	B-707 Class	263	35	2	1,292	165	6
	B-737 Class	162	24	1	522	68	3
	Total	425	59	3	1,814	233	9

Table 4-6 (b) PROJECTED INTERNATIONAL FREIGHTER CARGO TONNAGE AND AIRCRAFT MOVEMENTS IN THE YEAR 2005 - TALANGA SITE

Traffic	Aircraft Category	Outbound			Inbound		
		Annual	Monthly	Daily	Annual	Monthly	Daily
Cargo Tonnage (t)	B-707 Class	3,997	502	16.9	20,612	2,579	86.2
	B-737 Class	1,155	147	5.1	4,142	521	17.6
	Total	5,152	649	22.0	24,754	3,100	103.8
Aircraft Movements	B-707 Class	202	28	1	1,014	129	5
	B-737 Class	125	17	1	440	58	2
	Total	327	45	2	1,454	187	7

was projected by applying the average stay time of each passenger in the building estimated as shown in Table 4-7 to the passenger movements projected according to the daily flight schedule established in 4.1.4 above.

Table 4-7 AVERAGE STAY TIME OF PASSENGERS

Passenger Category	Stay Time per Passenger
International	
Departing	60 minutes until departure
Arriving	30 minutes after arrival
Domestic	
Departing	30 minutes until departure
Arriving	15 minutes after arrival

Table 4-8 PASSENGER PROCESSING CAPACITY REQUIREMENTS

Passenger Category		Number of Passengers	
		Pedregal	Talanga
International Passengers	Departing	250	250
	Arriving	230	230
	Transit	240	240
	Sub Total	720	720
Domestic Passengers	Departing	160	140
	Arriving	160	140
	Sub Total	320	280
Total		1,040	1,000

2) Terminal Concept

Considering the aircraft parking and passenger processing capacity requirements as established in the foregoing, the terminal design concept is based on a linear terminal configuration tailored to provide a centralized passenger processing.

3) Floor Area Required

Through analyses of all relevant factors, the following floor area of the passenger terminal building is deemed necessary.

Table 4-9 FLOOR AREA OF PASSENGER TERMINAL BUILDING

(m²)

Service Category	Pedregal	Talanga
International	15,800	14,400
Domestic	3,750	3,450
Total	19,550	17,850

4.2.2 Cargo Terminal Building

1) Cargo Processing Capacity Requirements

Daily cargo processing capacity requirements were estimated in terms of the busiest day cargo tonnage to be processed at the new airport as shown in Table 4-10 based on the projected busiest day cargo traffic.

Table 4-10 CARGO PROCESSING CAPACITY

(tons/day)

Cargo Category		Pedregal	Talanga
International Cargo	Outbound	48	44
	Inbound	216	208
	Sub Total	264	252
Domestic Cargo		10	9
Total		274	261

2) Cargo Processing Concept

Cargo processing of the proposed new airport is to be basically manual, and the processing concept is established based on the following conditions:

a. International cargo

Outbound cargo shall be processed on the same day as received. Inbound cargo shall stay for 15 days in bonded warehouse.

b. Domestic cargo

All domestic cargo both inbound and outbound shall be processed on the same day as received.

3) Floor Area Required

Following is the floor area requirements of the cargo terminal building including the bonded warehouse.