Table 4-11 CARGO TERMINAL FLOOR AREA REQUIREMENTS

(m^2)

Service Category	Pedregal	Talanga
International	11,500	11,000
Domestic	190	185
Total	11,700	11,200

4.3 Access Road and Car Parking

4.3.1 Access Road

Access road traffic of passengers and well-wishers to and from the airport occurs with certain time difference in relation to the corresponding flight schedule. Taking this time difference into consideration, the hourly distribution of passengers and well-wishers passing through the airport entrance and exit was estimated, and the results were converted into hourly distribution of road traffic volume in terms of the number of cars, to which is added the commuter traffic of airport employees in order to obtain the total access road traffic to be expected.

The peak hour road traffic volume thus obtained is summarized as shown in Table 4-12.

The number of lanes of the access road shall be one for each direction.

Table 4-12 PEAK HOUR ROAD TRAFFIC VOLUME

(cars/hour)

Traffic Categories		Pedregal	Talanga
Private Car	Passengers & Wellwishers	325	267
	Employees	237	231
Taxi		199	0
Bus	Passengers	3	8
	Employees	17	16
Total		781	522

4.3.2 Car Parking

Number of cars expected to stay within the airport premises at any given point in time is obtainable from the cumulative differences of the incoming and outgoing access traffic. In this study, the number of cars existing on airport during every half-hour period was calculated from the half-hourly distribution of the peak day incoming and outgoing car traffic already projected above, and the figure has been adopted as the car parking capacity required at the new airport.

Table 4-13 CAR PARKING SPACES AND AREA REQUIEMENTS

Parking Requirements		Pedregal	Talanga
		Cars	Cars
Parking Spaces	Passenger & Well-wishers	500	400
	Employees	360	350
	Total	860	750
Total Area of Parking Lots		30,100m²	26,250m²

4.4 Fire Fighting and Rescue Facilities

Having determined the number of fire fighting vehicles required for the new airport in conformity with the requirements of the ICAO recommendations for Aerodrome Category 7, the total area needed to accommodate the facilities were estimated as shown in Table 4-14.

Table 4-14 FIRE FIGHTING AND RESCUE FACILITY REQUIREMENTS

		Pedregal	Talanga	Remarks
Vehicles	Rapid Intervention Vehicle	1	1	
	Crash Fire & Rescue Truck	3	3	1,890 lit/min/tank
	Water Supply Truck	1	1	6,000 liters
Total Area Required		550 m^2	550 m^2	

4.5 Fuel Storage Facilities

The amount of aviation fuel supply required per day having been estimated on the basis of the projected daily flight schedule, the fuel storage requirements of the new airport were calculated as shown in Table 4-15 based on the understanding that the new airport be provided with a 7-day supply capacity.

Table 4-15 FUEL STORAGE REQUIREMENTS

Item	Pedregal	Talanga
Amount of Daily Fuel Consumption	540 kl	540 kl
7-day Storing Capacity	3,800 kl	3,800 kl
Area Required	7,500 m^2	7,500 m^2

4.6 Radio Navigational Aids, Telecommunications and Meteorological Service Facilities

In order to ensure safe and efficient operation of aircraft landing and taking off at the proposed new airport, the facility requirements of the radio navigational aids, telecommunications and meteorological service facilities were determined on the assumption to provide a dual equipment system, or a system with standby units as far as the principal equipment of the facilities are concerned, and in conformity with the ICAO Air Navigation Plan.

4.7 Airfield Lighting System

Airfield lighting system shall be provided at the new airport to satisfy the requirements of precision approach runway CAT-I as specified in Annex 14 of ICAO.

CHAPTER 5 SITE SELECTION STUDY

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 following 18 potential sites (Fig. 5-2) initially chosen from among those analysed in previous studies and other relevant documents, through analyses of the conditions of each site in terms of aircraft operation and construction as per procedures illustrated in Fig. 5-1, based on the topographical maps (1:50,000) and meteorological data available.

a. VALLE DE TALANGA - A
b. VALLE DE TALANGA - B
c. VALLE DE ILAMAPA - A
d. VALLE DE ILAMAPA - B
e. VALLE DE AMARATECA - A
f. VALLE DE AMARATECA - B
g. SOROGUARA
h. EL HATILLO
i. LAGUNA EL PEDREGAL - A
j. LAGUNA EL PEDREGAL - B
k. TONCONTIN (Existing airport site)
l. LA JOYA
m. LAS SABANAS
n. CERRO QUEMADO
o. VALLE DE ZAMORANO
p. CERRO DE HULE - A
q. CERRO DE HULE - B
r. COMAYAGUA

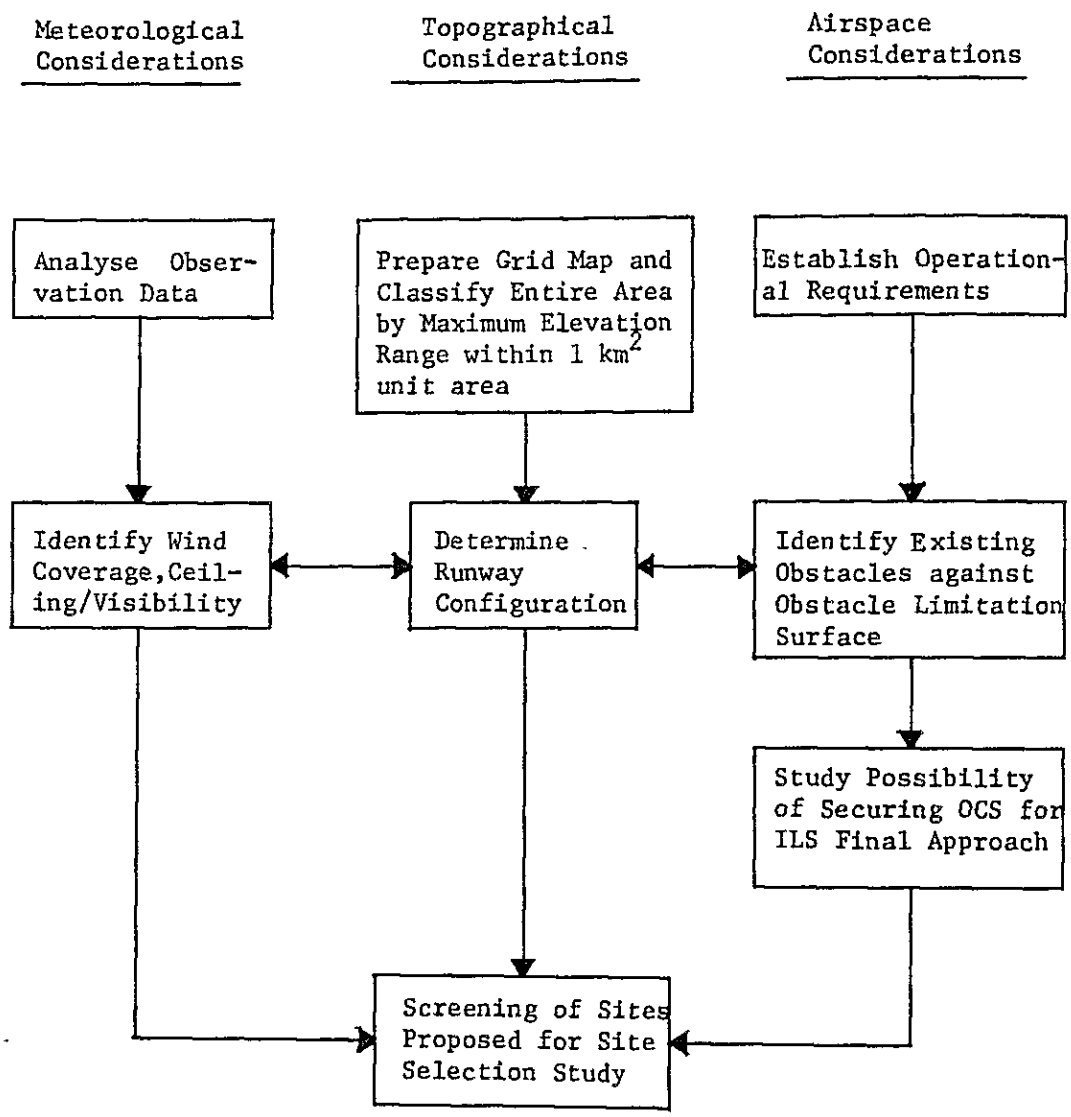
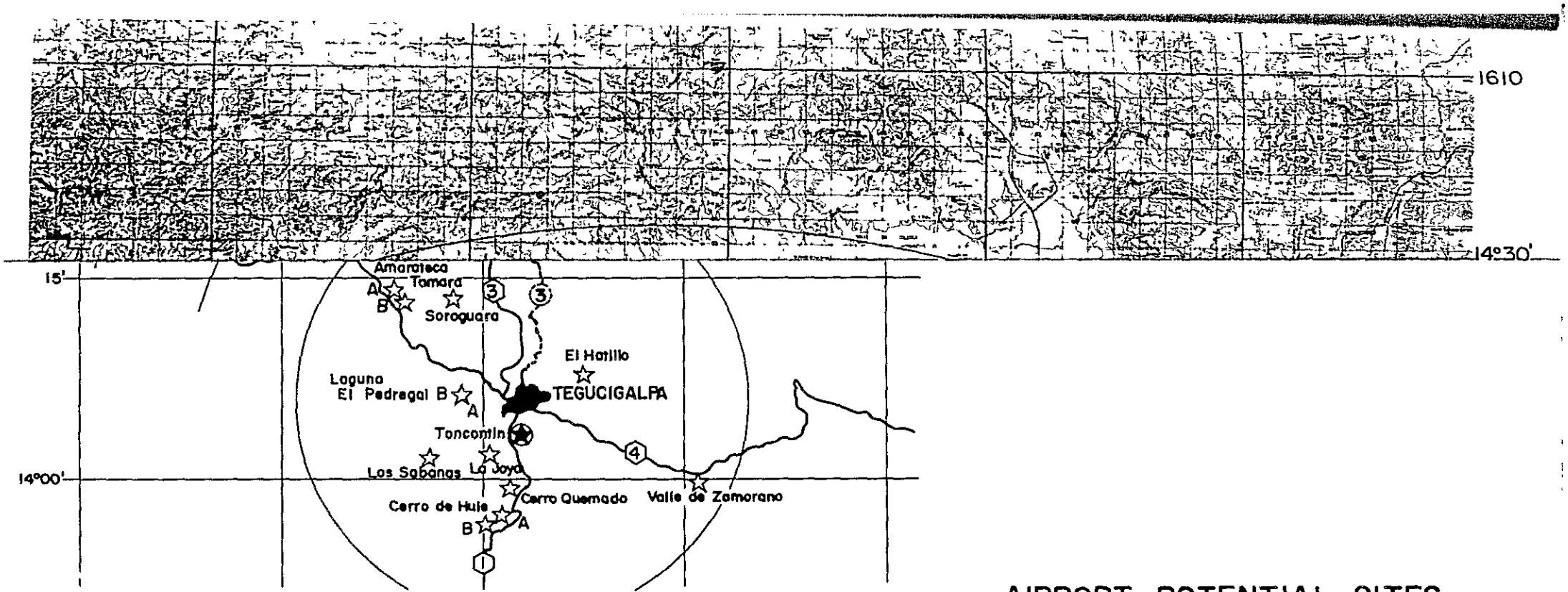


Fig. 5-1 SEQUENCE OF SCREENING OF SITES PROPOSED FOR SITE SELECTION STUDY



AIRPORT POTENTIAL SITES

NEW TEGUCIGALPA AIRPORT DEVELOPMENT
HONDURAS, C.A.

Fig. 5-2 LOCATION OF POTENTIAL SITES

VALLE DE TALANGA

B

A

75 KM

ROUTE NO. 1

30 KM

B

A

(MH)/B2

VALLE DE LAMAPA

VALLE DE AMARATECA

A

B

75 KM

SOROGUARA

ROUTE NO. 1

EL HATILLO

B

A

LAGUNA EL PEDREGAL

(MH)/B3

TONCONTIN

(MH)/B4

LA JOYA

LAS SABANAS

VALLE DE ZAMORANO

CERRO QUEMADO

B

A

CERRO DE HULE

ROUTE NO. 1

N

1610

14°30'

1600

1590

14°20

1580

1570

14°10

1560

1550

14°0

1540

153

87°20'

460

470

87°10'

480

490

87°00'

500

45'

30'

30'

15'

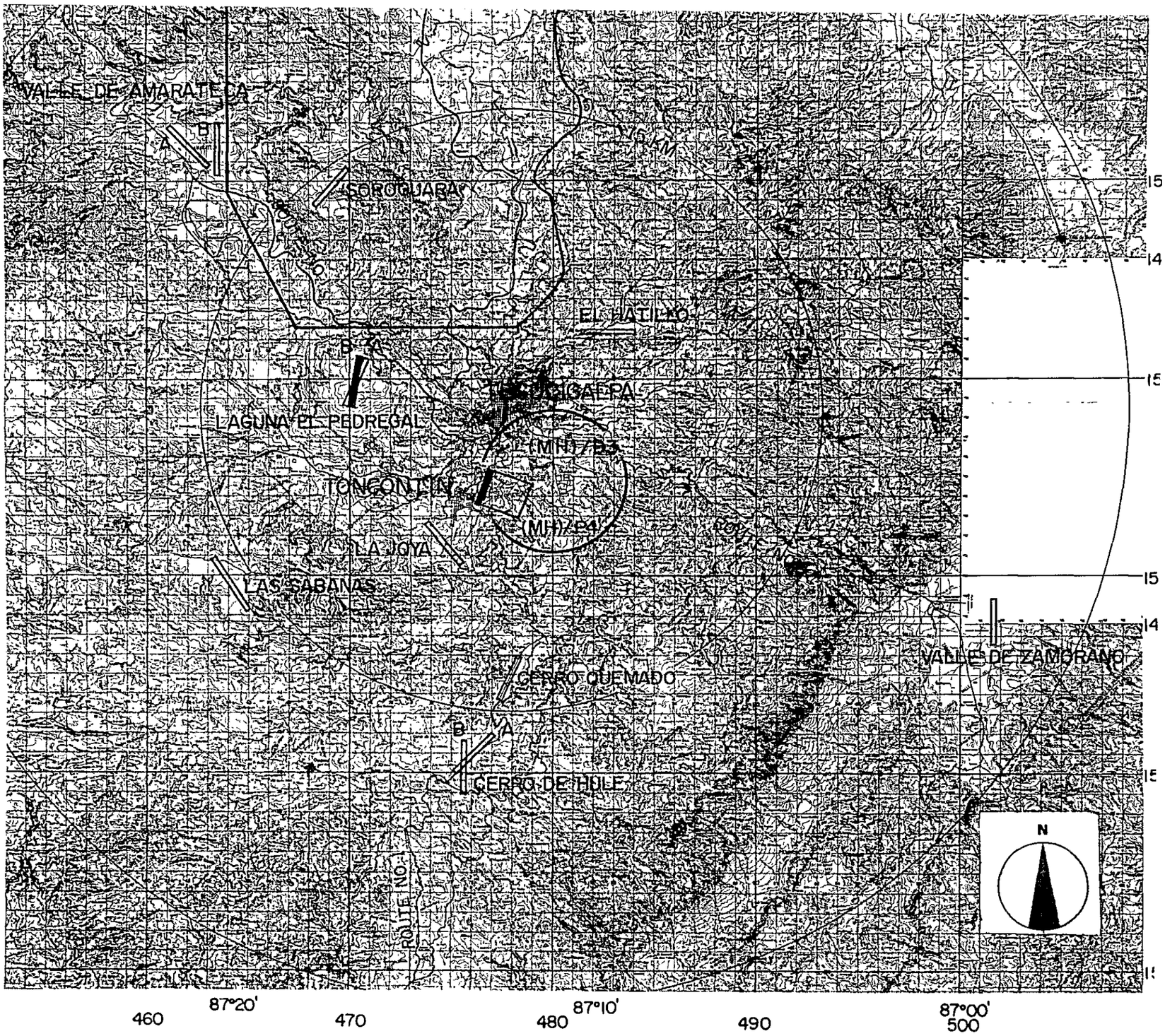
87°00'

86°45'

NOTE : COMAYAGUA-SITE IS NOT SHOWN

SCALE : 1 : 200,000

LEGEND :

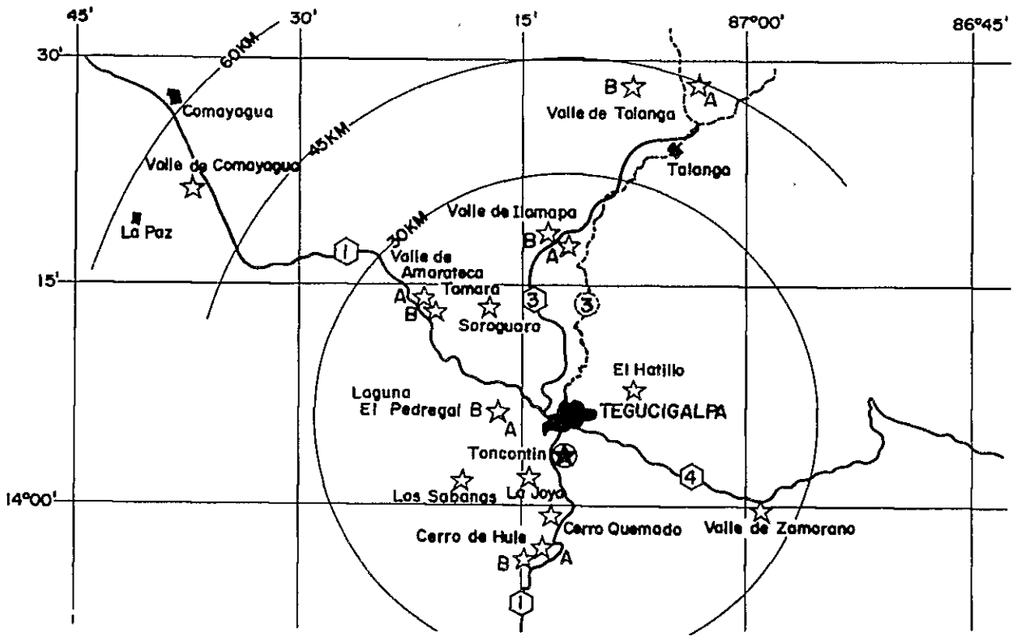


NOTE : COMAYAGUA-SITE IS NOT SHOWN
SCALE : 1 : 200,000

LEGEND :

POTENTIAL SITE (RUNWAY LOCATION)

(MH)/D or P — DANGER RESTRICTED OR WARNING AREA OR PROHIBITED AREAS



AIRPORT POTENTIAL SITES

NEW TEGUCIGALPA AIRPORT DEVELOPMENT HONDURAS, C.A.

Fig. 5-2 LOCATION OF POTENTIAL SITES

5.1 Preliminary Screening of Sites

5.1.1 Screening Criteria

1) Topographical Criteria

Based on the 1:50,000 topographical map of Tegucigalpa and its surrounding areas, comparison of the 18 sites was made in terms of the availability of the necessary land area to accommodate the basic facility requirements of the proposed new airport as discussed in Chapter 4 hereinabove, as well as in terms of the amount of earthwork involved, taking into consideration at the same time such fundamental factors as apparent interference with the existing communities or rivers, etc.

In order to obtain a rough, general idea of the amount of earthwork involved in the grading work of the potential sites, 1 Km-grids were drawn on the topographical map in scale of 1:50,000, each grid unit showing the elevation of the highest point and the difference between the highest and the lowest points existing within the 1 Km^2 unit area. Grids were then classified into the following three categories according to the magnitude of the maximum elevation range, indicating different degrees of earthwork practicability (Appendix 5D).

Maximum Elevation Range	Earthwork Practicability
0 m - 60 m	No problem
60 m - 120 m	Difficult
120 m and over	Not practical

2) Meteorological Criteria

a. Wind coverage

The sites were evaluated in the light of the possibility of obtaining the wind coverage of no less than 95% under the maximum cross-wind components of 15 KTS.

b. Ceiling-visibility

Evaluation criteria on minimum ceiling-visibility are 200 ft - 800 m, which are the operating minima (DH-VIS) required by ICAO for Precision Approach Runway CAT-I.

3) Airspace Criteria

Airspace was analysed on the basis of the operational requirements of Instrument Approach ILS CAT-I Operation.

a. Obstacles

Examination was made on the maps in scale of 1:50,000 to identify the location and nature of objects constituting obstruction within the airspace defined by the obstacle limitation surfaces (see Fig. 5-3) required of an instrument approach runway or a precision approach runway Category I. (Ref. Annex 14 to the Convention on International Civil Aviation, Chapter 4, ICAO, and Airport Service Manual - Doc. 9137-AN/8981 - Part 6, ICAO).

b. Operational limitations

After identifying the possible obstacles within the said airspace, the possibility of

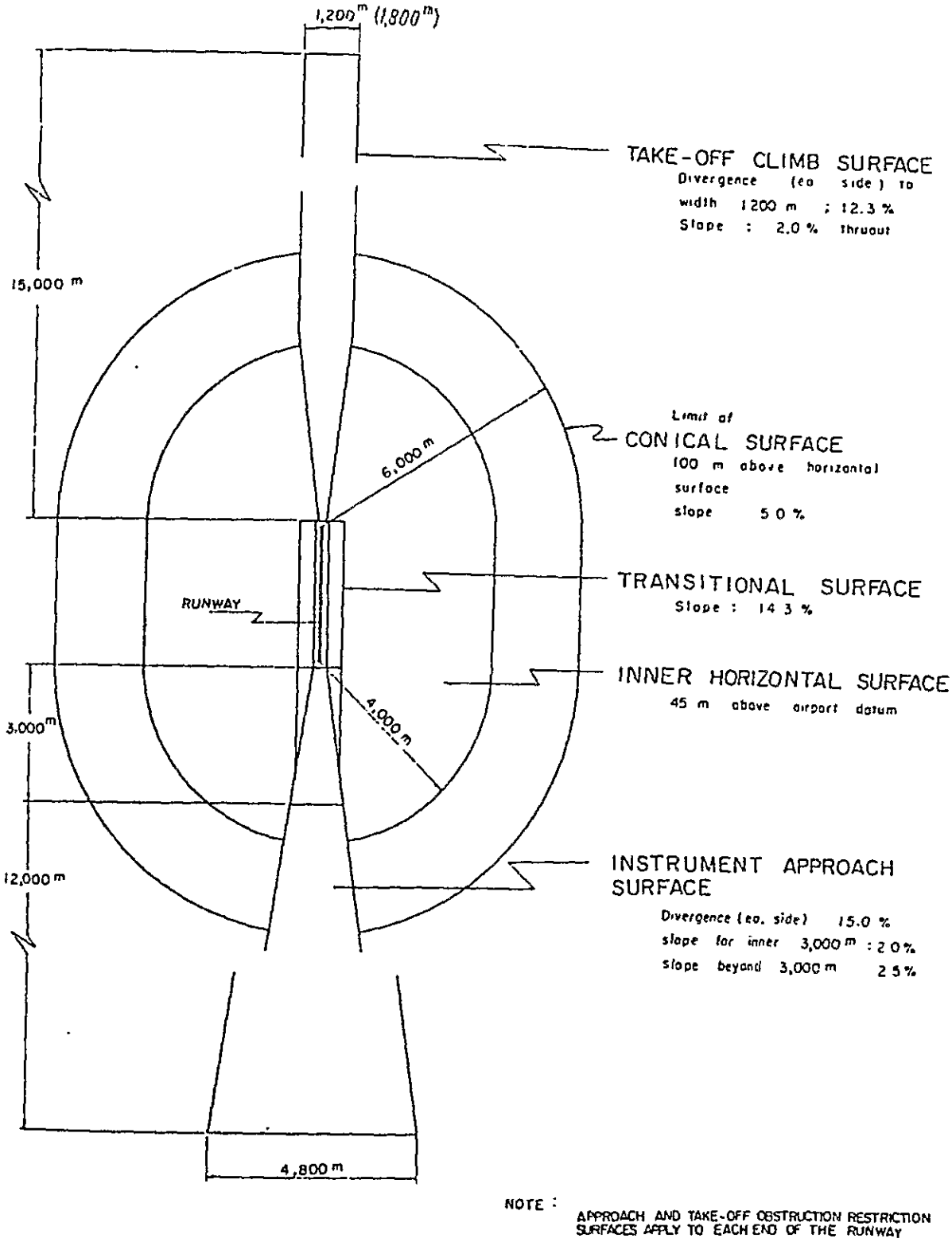


Fig. 5-3 I.C.A.O. OBSTACLE LIMITATION SURFACES

securing the obstacle clearance surfaces in the ILS final approach area (Ref. Procedures for Air Navigation Services - Doc. 8168-OPS/611/3, ICAO) was examined to determine the degree of limitations to be imposed in establishing the intended aircraft operation procedures.

4) Airport Accessibility Criteria

Screening of sites in terms of accessibility was based on the criteria of 60 Km road distance and 60 minutes travel time from downtown Tegucigalpa.

5.1.2 Evaluation of Sites

Evaluation of the 18 potential sites was made on the basis of the foregoing screening criteria, and the results are summarized in Table 5-1. Back-up data and analytical drawings of the screening are shown in Appendices 5A, 5B, 5C.

Some of the decisive defects of the sites found unsuitable for the new airport construction are as follows:

1) TONCONTIN (the existing airport site): Whichever direction the runway may be oriented, the mountains around the site project either into the obstacle limitation surfaces or the obstacle clearance surface for ILS final approach (Appendix 5C). Possible alternatives of the runway orientation would only reduce the wind coverage under the maximum cross-wind components of 10 KTS to less than 90%, seriously affecting the operation of small aircraft (Appendix 5B). The present surrounding land use is incompatible with the future expansion possibilities of the airport (Appendix 5C).

2) VALLE DE TALANGA-A, VALLE DE ILAMAPA-A, and -B: Whichever the orientation of the runway may be, the mountains around the site interfere with the airspace required.

3) SOROGUARA, EL HATILLO, LA JOYA, LAS SABANAS and CERRO QUEMADO: Each of these sites suffers from impracticability of earthwork, and the airspace, furthermore, is obstructed by the surrounding mountains.

4) VALLE DE AMARATECA-A, and -B and VALLE DE ZAMORANO: The necessary airspace cannot be secured, and the existing land use is incompatible with the airport.

5) LAGUNA EL PEDREGAL-A: The obstacle clearance surface for ILS final approach is projected into by the mountains existing on the south of the site.

6) CERRO DE HULE-A, and -B: The weather conditions are not satisfactory (Appendix 5B). Furthermore, the National Road Route No. 1 passes through the site.

7) COMAYAGUA: The access road distance from downtown Tegucigalpa is around 90 Km, which is considered too long for an airport to serve the national capital.

5.1.3 Alternative Sites

As a result of the overall comparative evaluation of the 18 potential sites, following two sites were selected for the detailed site selection study hereinafter presented.

a. VALLE DE TALANGA-B (hereinafter simply called TALANGA)

b. LAGUNA EL PEDREGAL-B (hereinafter simply called PEDREGAL)

Table 5-1 SUMMARY OF SITE PRELIMINARY EVALUATION FACTORS

EVALUATION CRITERIA / POTENTIAL SITES		LOCATION	ACCESSIBILITY	RUNWAY		TERRAIN CONDITIONS				OBSTACLES		METEOROLOGICAL CONDITIONS
		From Tegucigalpa	Road Distance And Travel Time From Tegucigalpa	Orientation	Elevation	Topographical Conditions	Maximum Elevation Range	Geological Conditions	Present Conditions Of Land Use	Obstacle Limitation Surfaces Projected into by Mountains	Objects Projecting into Obstacle Clearance Surface for ILS Final Approach	
VALLE DE TALANGA	A	42km to NNE	60km 60 minutes	N04W	760m	Flat	10m or less	Alluvium	Cultivated fields	Approach surface (N,S) Horizontal surface (E) Conical surface (E,SW)	1100m high mountain 11km to south 1100m high mountain 10km to north	Under observation
	B			N73W	750m	Flat	10m or less		Wild land & Stock farms	Horizontal surface (S) Conical surface (S)		
VALLE DE ILAMAPA	A	25km to N	35km 40 minutes	N20E	910m	Hilly	50m to 60m	Gravel Terrace	Wild land	Approach surface (N,S) ▲		No data available
	B			N55E	950m	Hilly	40m to 60m		Wild land	Approach surface (N,S) ▲		
VALLE DE AMARATECA	A	20km to NE	30km 35mminutes	N45W	950m	Hilly	10m to 70m	Alluvial sandy loam	Center of Special Industrial & Recreation ▲	Approach surface (NW,SE) ▲		No data available
	B			N00	1070m	Hilly	50m to 120m ▲			Approach surface (N,S) ▲		
SOROGUARA		15km to NE	25km	N45E	1360m	Mountainous	120m to 180m ▲	Andesite, Volcanic rock	Forests, Wild land	Approach surface (SW) ▲		No data available
EL HATILLO		6km to NE	10km 15 minutes	N90E	1450m	Mountainous	180m to 230m ▲	Tuff		Approach surface (E) ▲		No data available
LAGUNA EL PEDREGAL	A	8km to W	16km 30 minutes	N28E	1500m	Isolated mountain partially with flat area	110m to 130m ▲	Andesite	Stock farms	Horizontal surface (E,W)	1776m high mountain 8km ▲ to south	Wind coverage; 99 %
	B			N12E	1500m		110m to 130m ▲					
TONCONTIN		4km to S	7km 15 minutes	N20E	1000m	Tableland	0m to 80m	Hard clay, Tuff	Existing airport	Approach surface (N,S) ▲ Horizontal surface (E,W) Conical surface (N,S,E,W)	ILS is not applicable ▲	Wind coverage; 99%
LA JOYA		7km to S	15km	N45W	1150m	Mountainous	80m to 170m ▲	Tuff	Forests, Wild land	Approach surface (SE,NW) ▲ Horizontal surface (N,W)		Prevailing wind; N
LAS SABANAS		17km to SW		N35W	1550m	Mountainous	70m to 190m ▲	Tuff, Andesite	Forests, Wild land	Approach surface (N) ▲ Horizontal surface(N,S,E,W)		No data available
CERRO QUEMADO		13km to S	18km 30 minutes	N20E	1300m	Mountainous	100m to 200m ▲	Andesite	Forests	Approach surface (S) ▲ Horizontal surface(E,W,S)		Prevailing wind; N
VALLE DE ZAMORANO		26km to SE	37km 45 minutes	N00	750m	Flat	40m or less		Farms, Technical Institute of Agriculture ▲	Approach surface (S) ▲ Horizontal surface (E,W)		No data available
CERRO DE HULE	A	18km to S	27km 40 minutes	N45E	1540m	Tableland	30m to 80m	Andesite	Cultivated fields, Wild land, Residential area,	Horizontal surface (W)		Low Ceil./Visibility Strong north wind Wind coverage 90%
	B			N00	1500m	Tableland	30m to 80m			Horizontal surface (E,W)		Low Ceil./Visibility Strong north wind Wind coverage 99%
COMAYAGUA		58km to NE	90km 90 minutes	N17W	620m	Flat	10m or less	Alluvial terrace	Wild land, Military airport	Horizontal surface (E)		No data available

▲ Indicates the impracticability of the site in terms of the particular evaluation criterion.

5.2 Methodology of Detailed Site Selection Study

The difference in access time and distance from Tegucigalpa to the two sites, and the consequent difference in facility requirements based on 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. For this purpose a preliminary cost-benefit analysis was made of the new airport construction with facilities planned on the basis of the facility requirements established in the previous chapter. Both facility plan and construction cost estimate were made for the site selection purposes based on an assumption that the airport be developed in one stage to meet the requirements of up to the year 2005.

5.3 Preliminary Airport Facility Plan

5.3.1 Airport Layout

1) PEDREGAL Site

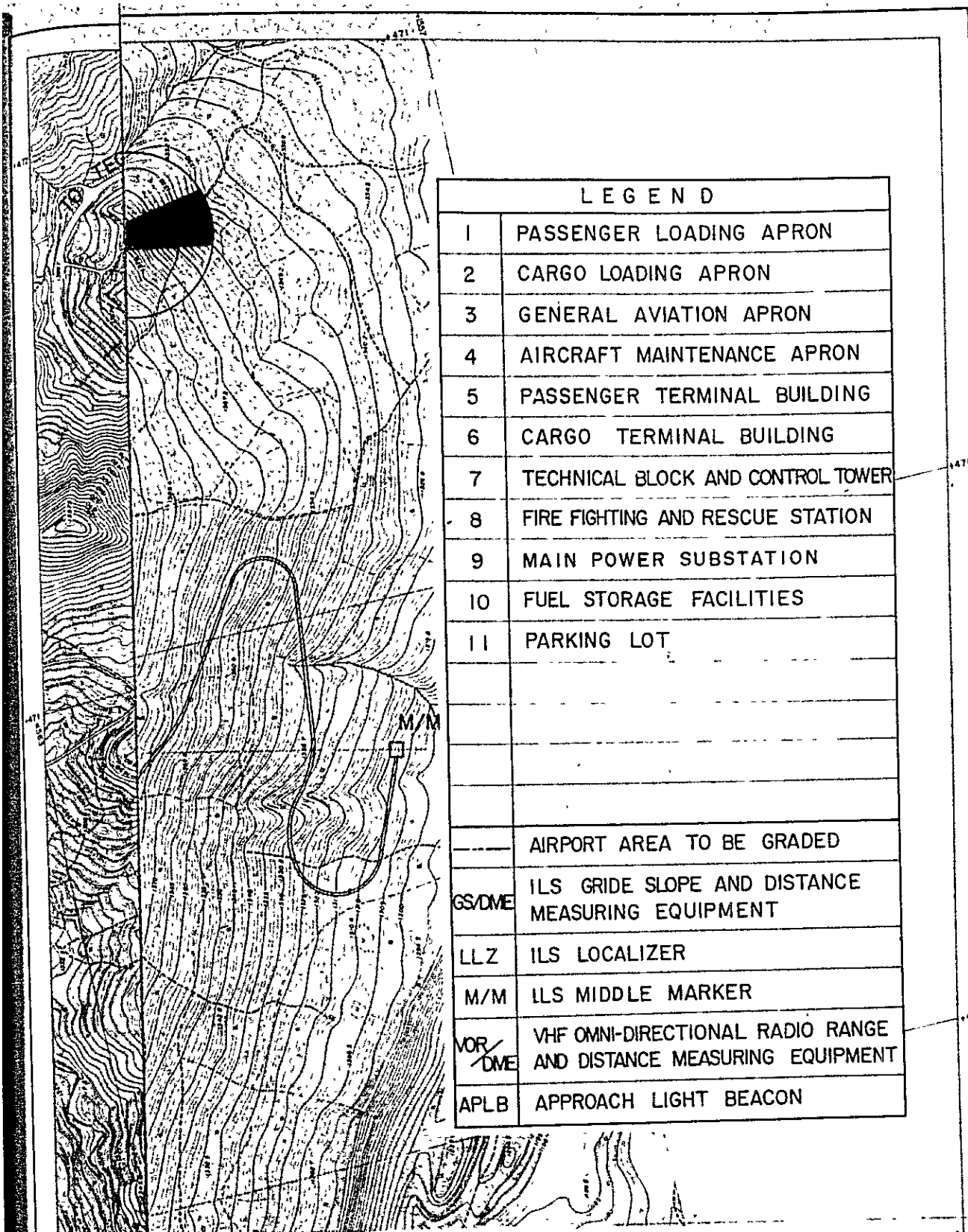
The runway at PEDREGAL site is to be oriented N12°E, duly taking into consideration the meteorological and airspace conditions. The only area found suitable for siting of the runway is a small tableland which, however, is not quite large enough and which is extremely steep-sloped on the northern end and relatively moderately graded on the southern end. The runway, therefore, was placed as close to the northern edge of the tableland as possible, so that any embankment work possibly needed to acquire sufficient land area for accommodating the planned length of the runway may be concentrated on the southern end of the tableland which would require less amount of earthwork. Facilities such as

passenger terminal building, cargo terminal building, general aviation facilities, etc. were concentrated on the west side of the runway for the sake of better functional coordination among these facilities. Aircraft maintenance area was located on the east side of the runway, where again there was just barely large enough space for isolated siting of this facility. This arrangement contributes to minimizing the amount of earthwork involved, and is also acceptable from the operational point of view since functionally the maintenance facility is relatively more independent from the others than any other facility. The proposed layout plan is illustrated in Fig. 5-4.

2) TALANGA Site

Since weather observation at this site was started in March 1978, there hardly was sufficient wind data to constitute a design factor of runway orientation at the time of the site selection study which was completed in September 1978. The topographical conditions of this area, however, suggested high probability of winds blowing from the east or from the west, and the limited observation data on hand at that time also endorsed such assumption. The runway is, therefore, to be oriented N73°W with due consideration also for the topographical and airspace requirements of the site.

Topography of TALANGA site is less rugged than that of PEDREGAL site, but it is covered with entangling network of rivers and small water veins. Most of the airport facilities such as passenger terminal building, cargo terminal building, aircraft maintenance facility, etc. are located on the south side of the runway in an area clear of the river crossing the runway near the approach road. The proposed layout plan is illustrated in Fig. 5-5.



LEGEND	
1	PASSENGER LOADING APRON
2	CARGO LOADING APRON
3	GENERAL AVIATION APRON
4	AIRCRAFT MAINTENANCE APRON
5	PASSENGER TERMINAL BUILDING
6	CARGO TERMINAL BUILDING
7	TECHNICAL BLOCK AND CONTROL TOWER
8	FIRE FIGHTING AND RESCUE STATION
9	MAIN POWER SUBSTATION
10	FUEL STORAGE FACILITIES
11	PARKING LOT
-----	AIRPORT AREA TO BE GRADED
GS/DME	ILS GRIDE SLOPE AND DISTANCE MEASURING EQUIPMENT
LLZ	ILS LOCALIZER
M/M	ILS MIDDLE MARKER
VOR/DME	VHF OMNI-DIRECTIONAL RADIO RANGE AND DISTANCE MEASURING EQUIPMENT
APLB	APPROACH LIGHT BEACON

Fig.5.4 Preliminary Airport Layout Plan (Pedregal Site)

GRAPHIC SCALE

100 200 300 400 500M

SCALE 1 : 5000

REPUBLICA DE HONDURAS
SECRETARIA DE COMUNICACIONES
OBRAS PUBLICAS Y TRANSPORTE

NEW TEGUCIGALPA AIRPORT DEVELOPMENT

PEDREGAL SITE
AIRPORT LAYOUT PLAN
SITE SELECTION STUDY

SEP.1978

P — 1

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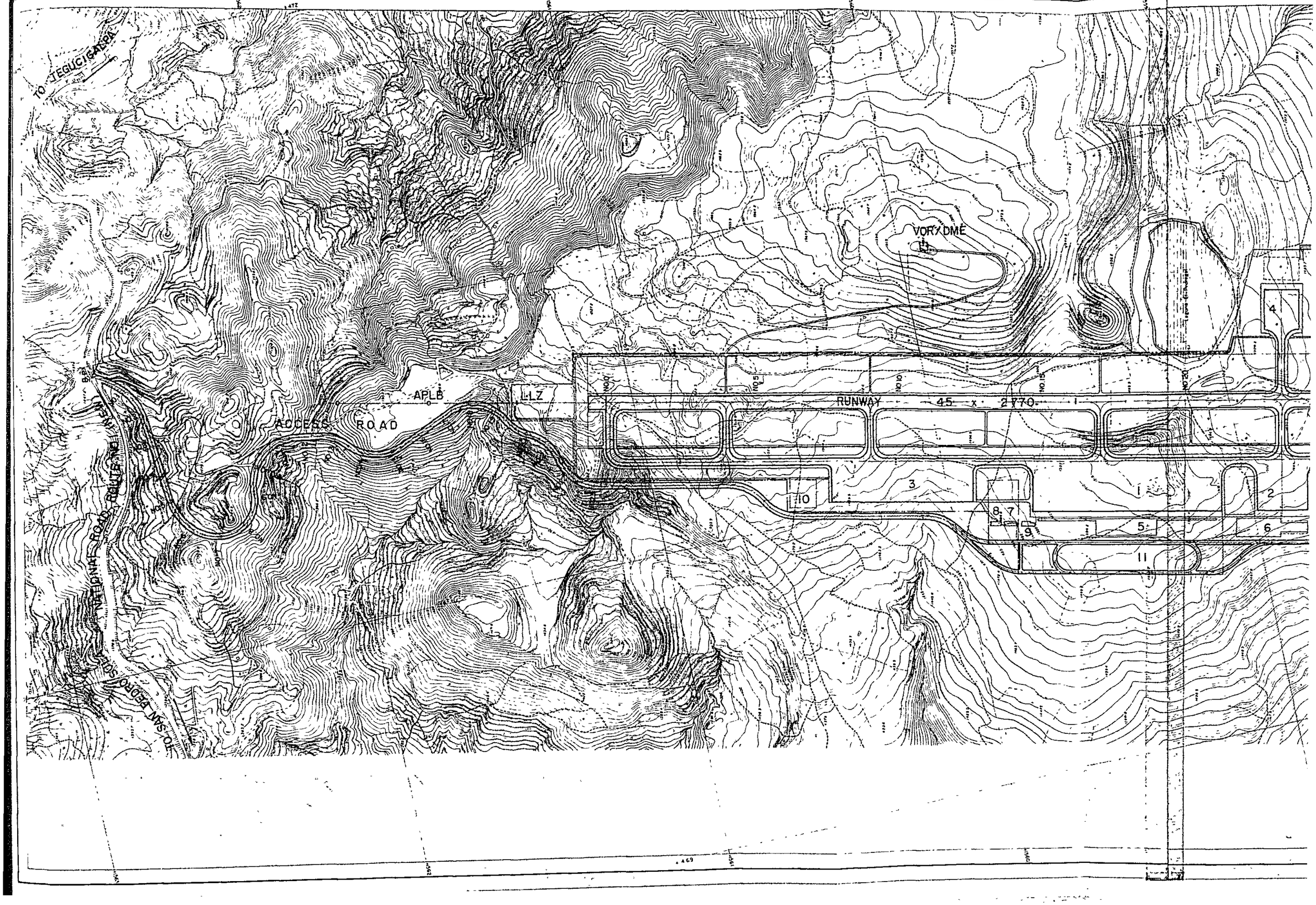
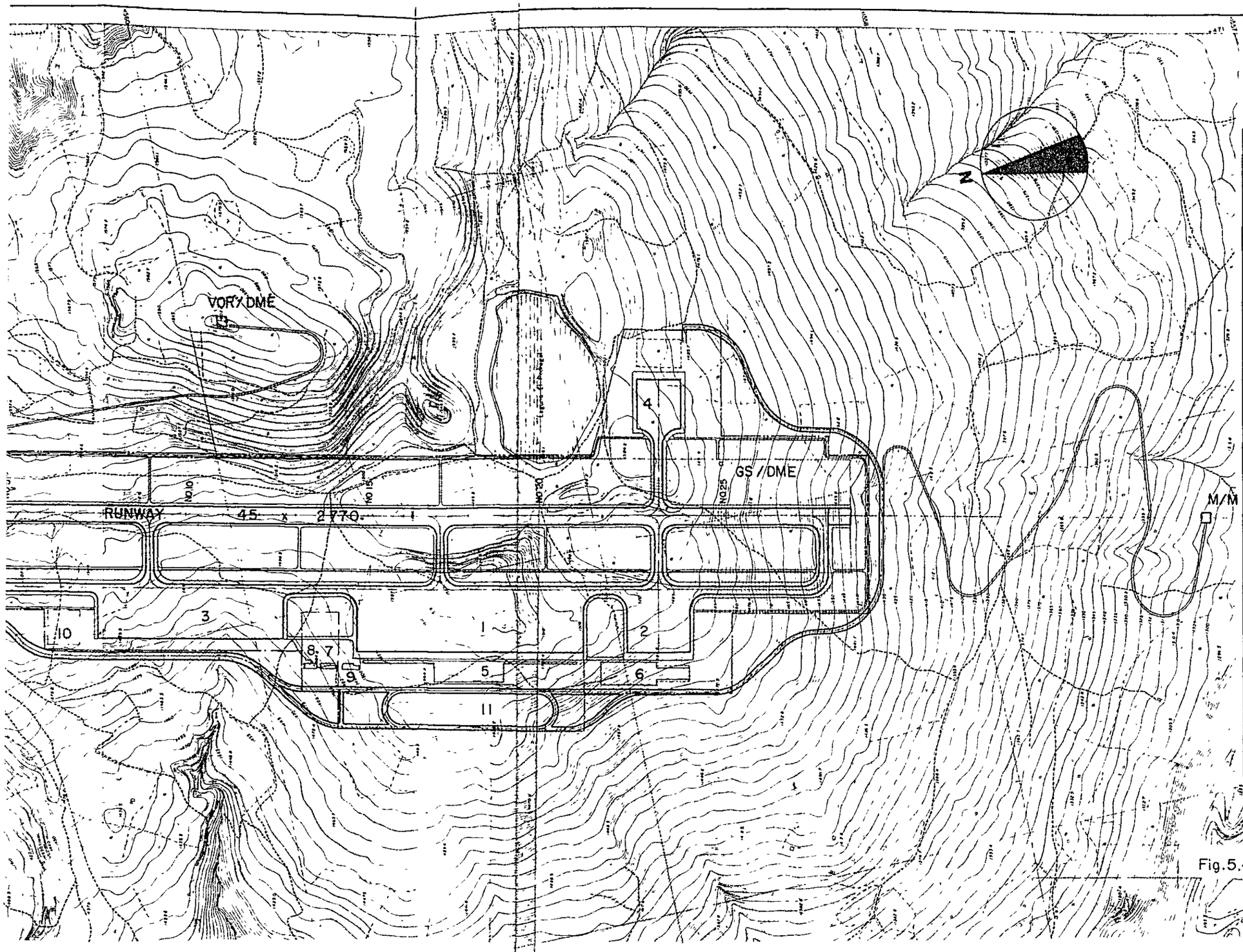

TO TEGUCIGALPA
VOR/DME
APLB
LLZ
ACCESS ROAD
RUNWAY 45 x 2770
TO SAN PEDRO SULA
1
2
3
4
5
6
7
8
9
10
11



LEGEND	
1	PASSENGER LOADING APRON
2	CARGO LOADING APRON
3	GENERAL AVIATION APRON
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9	MAIN POWER SUBSTATION
10	FUEL STORAGE FACILITIES
11	PARKING LOT
———	AIRPORT AREA TO BE GRADED
GS/DME	ILS GRIDE SLOPE AND DISTANCE MEASURING EQUIPMENT
LLZ	ILS LOCALIZER
M/M	ILS MIDDLE MARKER
VOR/DME	VHF OMNI-DIRECTIONAL RADIO RANGE AND DISTANCE MEASURING EQUIPMENT
APLB	APPROACH LIGHT BEACON

Fig.5.4 Preliminary Airport Layout Plan (Pedregal Site)

GRAPHIC SCALE

0 100 200 300 400 500M

SCALE 1 5000

REPUBLICA DE HONDURAS
SECRETARIA DE COMUNICACIONES
OBRAS PUBLICAS Y TRANSPORTE

NEW TEGUCIGALPA AIRPORT DEVELOPMENT

PEDREGAL SITE
AIRPORT LAYOUT PLAN
SITE SELECTION STUDY

SEP 1978

P — 1

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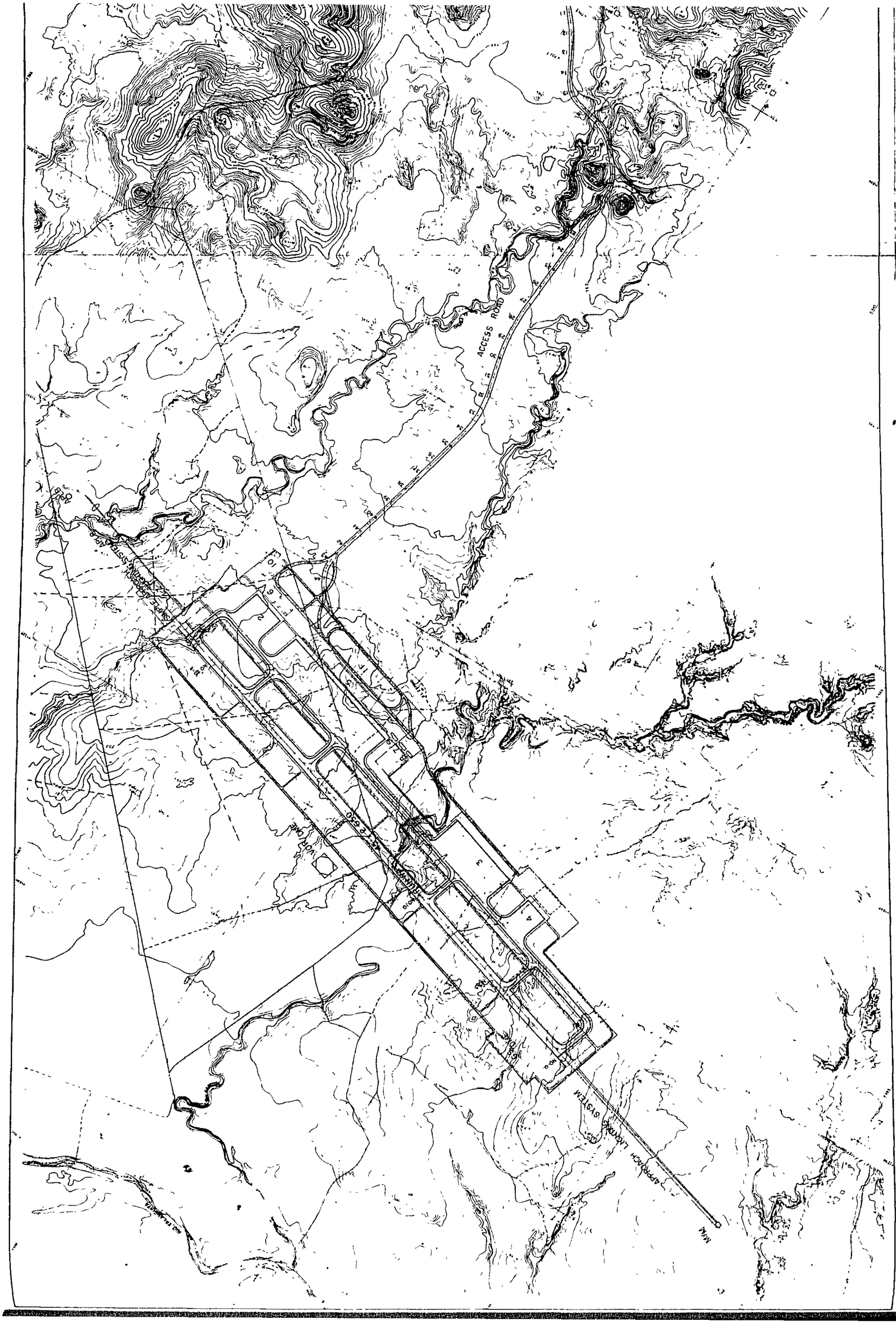
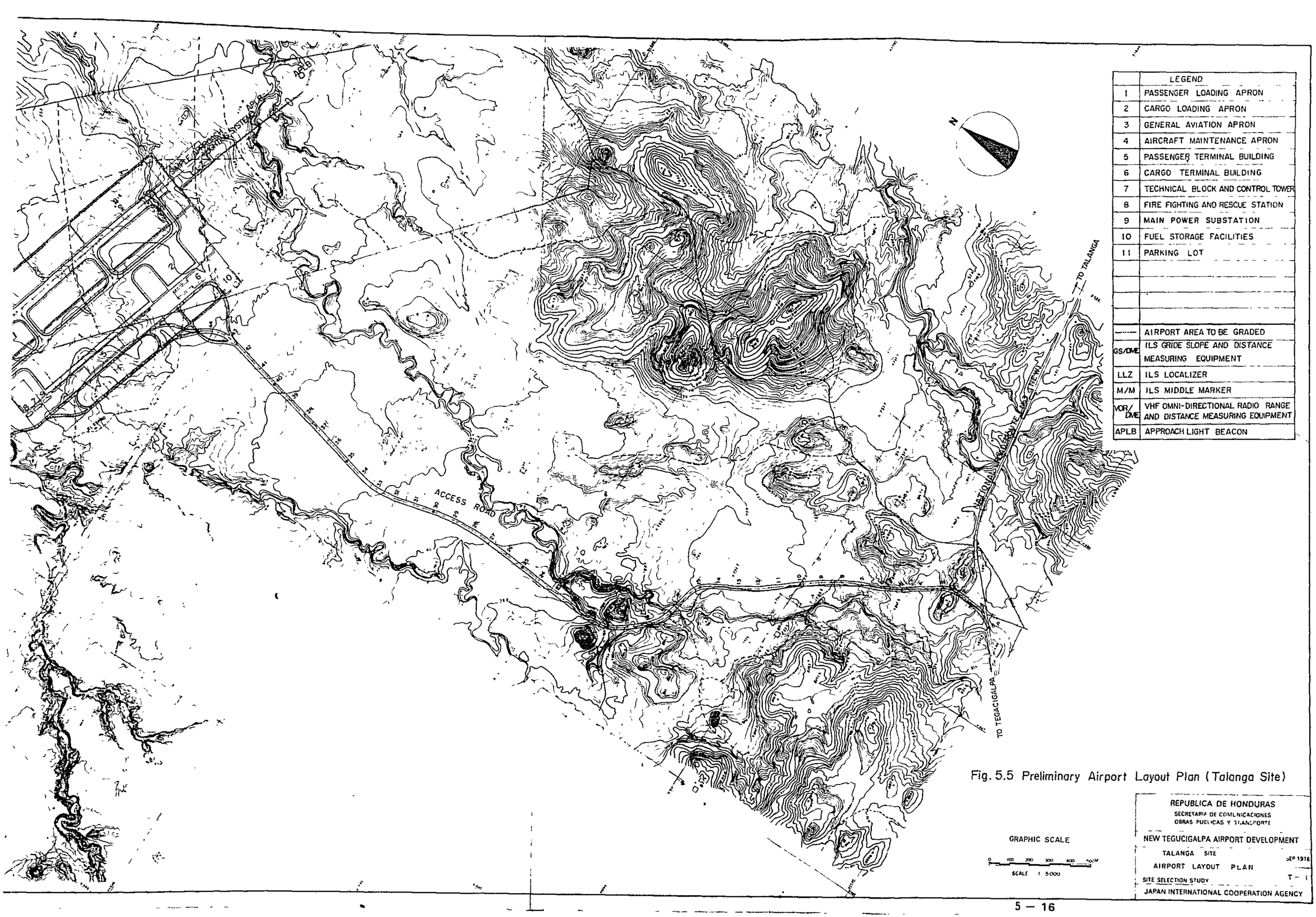

ACCESS ROAD
APPROACH LIGHTING SYSTEM



	LEGEND
1	PASSENGER LOADING APRON
2	CARGO LOADING APRON
3	GENERAL AVIATION APRON
4	AIRCRAFT MAINTENANCE APRON
5	PASSENGER TERMINAL BUILDING
6	CARGO TERMINAL BUILDING
7	TECHNICAL BLOCK AND CONTROL TOWER
8	FIRE FIGHTING AND RESCUE STATION
9	MAIN POWER SUBSTATION
10	FUEL STORAGE FACILITIES
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GS/DME	ILS GRIDE SLOPE AND DISTANCE MEASURING EQUIPMENT
LLZ	ILS LOCALIZER
M/M	ILS MIDDLE MARKER
VOR/DME	VHF OMNI-DIRECTIONAL RADIO RANGE AND DISTANCE MEASURING EQUIPMENT
APLB	APPROACH LIGHT BEACON

Fig. 5.5 Preliminary Airport Layout Plan (Talanga Site)

REPUBLICA DE HONDURAS
SECRETARIA DE COMUNICACIONES
OBRAS PUBLICAS Y TRANSPORTE
NEW TEGUCIGALPA AIRPORT DEVELOPMENT
TALANGA SITE
AIRPORT LAYOUT PLAN
SEP 1978
SITE SELECTION STUDY
T - 1
JAPAN INTERNATIONAL COOPERATION AGENCY

5.3.2 Airport Facilities

The major airport facilities planned for each of the two alternative sites for site selection purposes are illustrated in the drawings under Appendix 5E. Table 5-2 below presents a listing of these drawings.

Table 5-2 LIST OF FACILITY PLAN DRAWINGS

Title of Drawings	Pedregal Site	Talanga Site
BASIC AREA REQUIREMENTS	Appendix 5E-1	Appendix 5E-10
GRADING PLAN	" 5E-2	" 5E-11
RUNWAY PROFILE	" 5E-3	" 5E-12
RUNWAY STRIP TYPICAL CROSS SECTION	" 5E-4	" 5E-13
AIRPORT DRAINAGE PLAN	" 5E-5	" 5E-14
AIRFIELD PAVEMENTS PLAN	" 5E-6	" 5E-15
ACCESS ROAD PLAN	" 5E-7	" 5E-16
AIRPORT NAVIGATIONAL AIDS FACILITY PLAN	" 5E-8	" 5E-17
TERMINAL AREA LAYOUT PLAN AND PROFILE	" 5E-9	" 5E-18

5.4 Airspace Availability

5.4.1 Basic Conditions

To analyse the availability of airspace for instrument approach and departure at the two sites, a preliminary planning of the procedures was made for site selection purposes based on the basic conditions assumed for the purpose as tabulated in Table 5-3.

As for the TALANGA site, due to lack of the necessary wind data available at the time of the site selection study, both Runway 10 and Runway 28 were assumed to be the approach runway, and precision approach by ILS CAT-I operation was studied for site selection purposes for both approach runways based on the assumed prevailing wind directions of east and west as mentioned in 5.3.1-2) above.

Table 5-3 BASIC CONDITIONS OF INSTRUMENT APPROACH/ DEPARTURE PROCEDURES

Description	Pedregal Site	Talanga Site
Runway Orientation	N 12° E	N 73° W
Designation	01 - 19	10 - 28
Precision Approach Runway	Runway 01	Runway 10 or 28
Touchdown Zone Elevation (TZE)	Runway 01 : 4,920 ft (1,500m) " 19 : 4,953 ft (1,510m)	Runway 10 : 2,480 ft (756m) " 28 : 2,480 ft (756m)
Radio Navaids Installed	ILS, VOR/DME, NDB	

5.4.2 Instrument Approach/Departure Procedures

Table 5-4 presents listing of the instrument approach and departure charts prepared for PEDREGAL and TALANGA sites for the purpose of the site selection study.

It is to be noted that since the PEDREGAL site is surrounded by the control zone and the "prohibited/danger area" around the existing Toncontin Airport as shown in Appendix Fig. 5F-11, appropriate coordination with the authorities concerned will be necessary to establish safe and efficient airspace utilization at the site.

Table 5-4 LIST OF INSTRUMENT APPROACH/DEPARTURE PROCEDURE CHARTS

Procedures		Pedregal Site	Talanga Site
Instrument Approach	ILS	Appendix Fig. 5F-1 and 5F-2	Appendix Fig. 5F-12 through 5F-15
	VOR	Appendix Fig. 5F-3 through 5F-5	Appendix Fig. 5F-16
	NDB	Appendix Fig. 5F-6 through 5F-9	Appendix Fig. 5F-19
Instrument Departure		Appendix Fig. 5F-10	Appendix Fig. 5F-18

5.4.3 Weather Minima

The weather minima for landing and take-off at the two sites are shown in Table 5-5 and 5-6 respectively.

Table 5-5 WEATHER MINIMA FOR LANDING

Approach Procedures		Pedregal Site				Talanga Site			
		Runway	Straight-in		Circling	Runway	Straight-in		Circling
			Ceiling - Visibility (feet) (meter)		Ceiling - Visibility (feet) (meter)		Ceiling - Visibility (feet) (meter)		Ceiling - Visibility (feet) (meter)
ILS		01	200 - 1,200		----	10 or 28	200 - 800		600 - 3,200
		19	----		600 - 3,200				
VOR		01	1,300 - 7,100		700 - 3,200	10	----		1,000 - 3,200
		19	700 - 3,700		700 - 3,200	28	----		1,000 - 3,200
NDB	Airport NDB	01	1,300 - 7,100		700 - 3,200	10	----		1,500 - 3,200
		19	700 - 3,700		700 - 3,200	28	-----		1,500 - 3,200
	Hule NDB	01	----		1,300 - 3,200		-----		------
		19	----		1,300 - 3,200				

Table 5-6 WEATHER MINIMA FOR TAKE-OFF

Pedregal Site				Talanga Site			
	Ceiling (feet)	-	Visibility (meter)		Ceiling (feet)	-	Visibility (meter)
Runway 01	0	-	600	Runway 10	300	-	800
Runway 19	300	-	800	Runway 28	300	-	800

Note: Runway Center Line Light is not to be installed.

5.5 Preliminary Construction Cost Estimate

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

5.5.1 Summary of Construction Conditions

1) PEDREGAL Site

Almost entire area of this site is covered with hard andesite, requiring major blasting work for excavation. The site also requires substantial embanking on the southern end of the runway in order to develop sufficient space for the airport facilities. Appropriate slope stabilization work is required especially on the banked portions. Coarse aggregate for the concrete works and base material for the asphalt pavement work are available at the site. The trafficability of the site under rainfall is expected to be good enough so as not to affect the construction workability. The natural topography of the site is such that no particular problems are anticipated in the drainage works. Gunite shootings will be made for stabilizing the high bank slopes. Water will be pumped up from the existing reservoir at Los Laureles.

2) TALANGA Site

This site is located on the alluvial plain of the Rio de Lajas. The earthwork will mostly be on alluvial soil and decomposed tuff. Hard tuffs are encountered in a limited area, where minor blasting work may be

required for excavation. The alluvial soil as well as the decomposed tuff are expected to turn muddy when disturbed and saturated with water. It is, therefore, imperative to execute majority of the earthwork during the dry season. Limestone deposites existing along the new national highway about 10 Km to the south of the site are considered to be a suitable source both of the coarse aggregate of concrete and of the base material of asphalt pavement. Fine aggregate of concrete can be obtained from the river beds of El Espino, El Camalotal, La Tuna and Poza Redona. It will be necessary to bore several deep wells for water supply during the dry months.

5.5.2 Construction Schedule

The construction schedules for the two alternative sites of PEDREGAL and TALANGA were established preliminarily for site selection purposes as shown in Tables 5-7 and 5-8 respectively, based on the various site conditions summarized in the foregoing, with the timing of construction set for the opening of the airport to traffic in 1986.

5.5.3 Cost Estimate

The construction costs of the new airport estimated for site selection purposes are tabulated in Table 5-9. The estimate was meant only for comparison purposes of the two alternative sites, and was based on the unit prices estimated by referring to the prices prevailing in March 1978 in construction projects in Honduras for items procured locally, or for items not available locally on the market prices prevailing in Japan.

Conversion among US Dollar, Lempira and Yen is based on the exchange rate of US$1.00 = L.2.00 = ¥240.00. Cost escalation is not included in the estimates.

Table 5-7 PRELIMINARY CONSTRUCTION SCHEDULE - PEDREGAL SITE

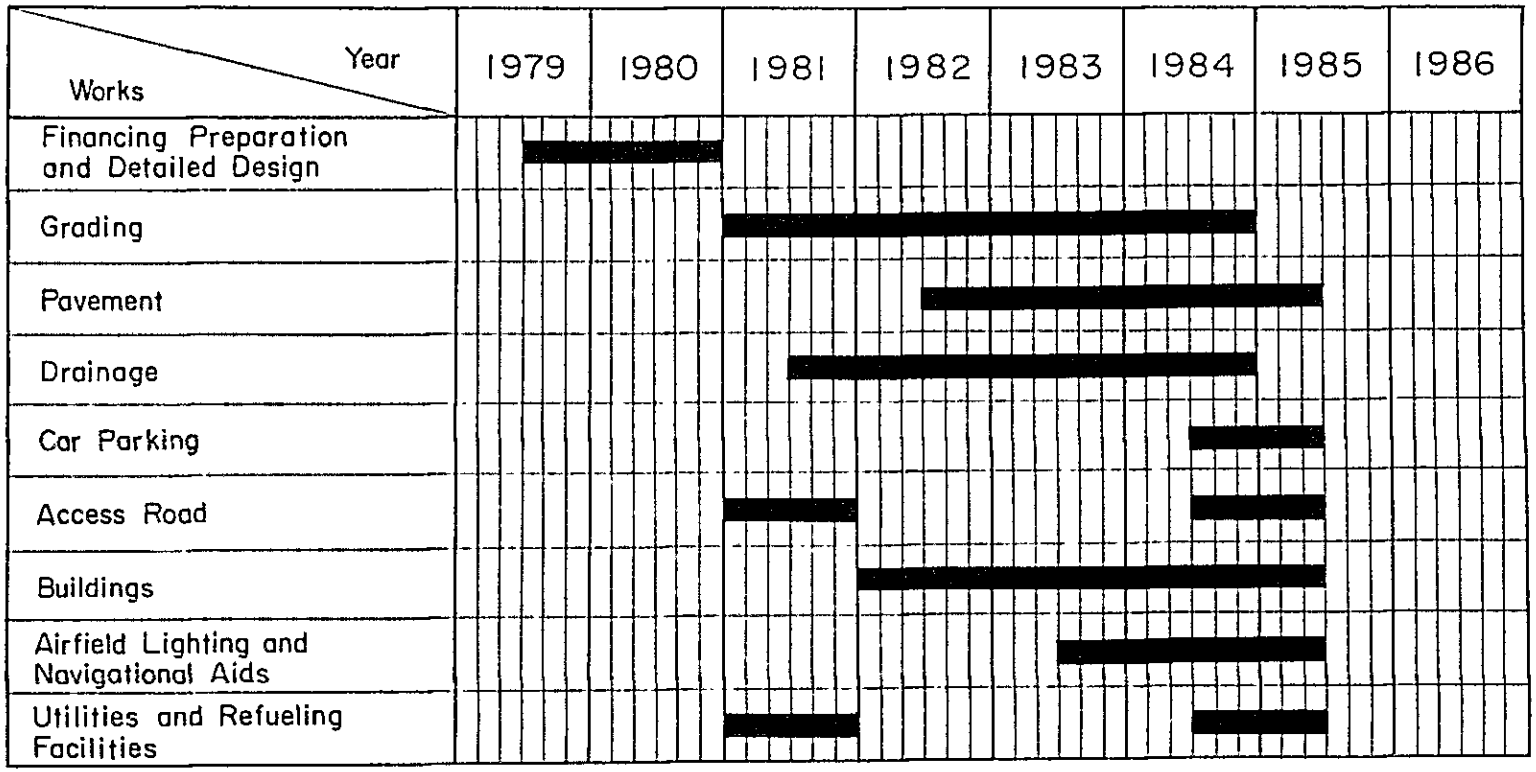

Table 5-8 PRELIMINARY CONSTRUCTION SCHEDULE - TALANGA SITE

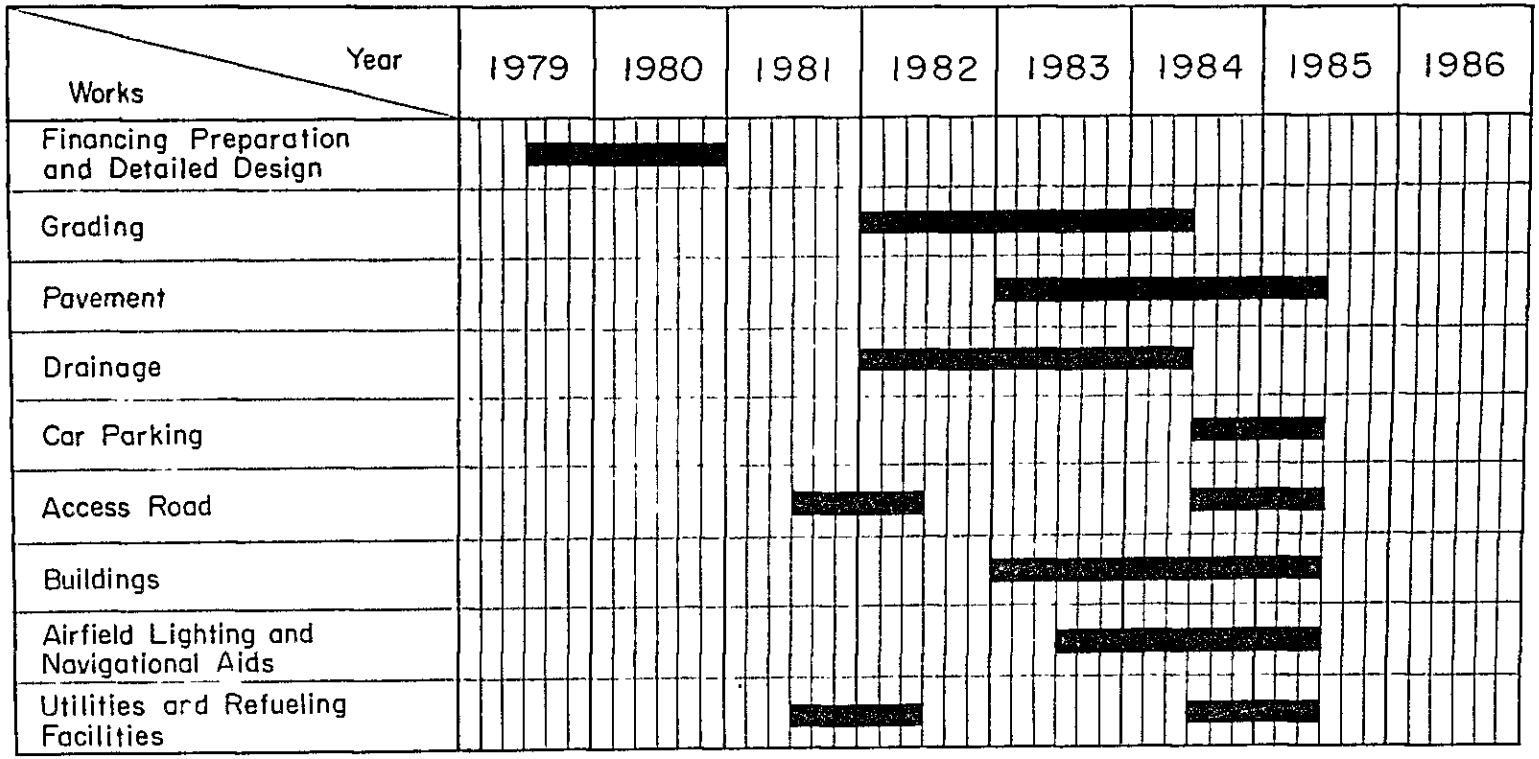

Table 5-9 PRELIMINARY CONSTRUCTION COST ESTIMATE

(Unit: Thousand US$)

Cost Item	Cost	
	Pedregal	Talanga
Civil Works	175,370	38,390
Building Works	21,050	21,040
Airfield Lighting	3,870	3,800
Radio Nav-Aids, Telecommunications and Meteorological Facilities	2,330	2,330
Utilities and Refueling Facilities	9,230	8,730
Sub Total	211,850	74,290
Engineering	12,710	7,430
Land Acquisition	120	2,000
Contingency	22,470	8,180
GRAND TOTAL	247,150	91,900

Note: 1) Costs of items available in Honduras are estimated based on the market prices in Honduras as of March 1978.

2) Costs of items not available in Honduras are estimated based on the market prices in Japan as of March 1978.

3) Conversion among US Dollar, Lempira and Yen is based on the exchange rate as of March 1978 of US$1.00 = L.2.00 = ¥240.00

5.6 Preliminary Cost-Benefit Analysis of Project

Preliminary cost-benefit analysis was made for the purpose of comparative economic evaluation of the two alternative sites of PEDREGAL and TALANGA. The benefits of the new airport were calculated in respect of each and every element in relation to the corresponding elements of the Base Case which is defined to be the case of continued utilization of the existing Toncontín Airport at the present facility level.

The method used in the preliminary cost-benefit analysis is basically the same as that of the subsequent economic analysis presented in Chapter 9 hereunder.

5.6.1 Basic Conditions of Economic Analysis

1) The project life has been set for a period of 20 years starting from the inauguration of the new airport.

2) Calculation of the costs and benefits was based on the market prices as of March 1978. No distinction was made between the foreign and the local portions of the costs, and between the wages of skilled and unskilled labor, nor was any deduction made of the indirect taxes from the costs.

3) Construction cost was estimated on condition that the facilities to meet the air traffic demand of the ultimate design year of 2005 were to be constructed initially, with no staged construction being assumed.

4) Site evaluation was made primarily by the internal rate of return (IRR), but the net present value and the cost-benefit ratio were also calculated based on the social discount rate in Honduras of 12%.

5) Sensitivity analysis was made for the cases of ±30% of the estimated cost.

5.6.2 Preliminary Estimate of Costs

1) Annual Construction Cost

The annual construction costs of the new airport at the alternative sites were estimated for site selection purposes as shown in Table 5-10 based on the respective construction schedules presented in Tables 5-7 and 5-8.

Table 5-10 PRELIMINARY ESTIMATE OF ANNUAL CONSTRUCTION COST OF NEW AIRPORT AT PEDREGAL SITE AND TALANGA SITE

(Thousand USDollars)

Year	Pedregal Site	Talanga Site
1979	2,130	1,200
1980	5,020	4,845
1981	52,865	3,660
1982	52,150	10,665
1983	56,810	26,535
1984	65,135	29,535
1985	13,040	15,460
Total	247,150	91,900

2) Annual Maintenance and Operation Cost

Estimates of the annual maintenance and operation costs of the proposed new airport were made for site selection purposes as follows:

a. Maintenance costs of the civil works excluding grading work, as well as of the building, utility and fuel supply facilities were estimated at 1% of their respective construction costs.

b. Maintenance cost of the navigational aids facilities was estimated at 5% of the construction cost.

c. As for the personnel cost of airport operation, 10% of the total employees forecast for the new airport (See Supplementary Forecast in 3.6.2 in Chapter 3) was assumed to belong to the airport authority, and the cost was estimated based on an average annual payroll cost of 3,000 US Dollars per employee.

d. Other costs to be incurred in operation of the new airport were estimated in a lump sum at 5% of the sum of the maintenance cost and the personnel cost.

5.6.3 Preliminary Estimate of Benefits

The procedure used in the estimate of the benefits was basically the same as that of the subsequent economic analysis presented in Chapter 9 hereunder. The following is the outline of the benefits calculated for the purpose of economic comparison of the two sites.

1) Benefits of Satisfied Trip Demand of Overflowing Passengers

The new airport either at PEDREGAL site or at TALANGA site would satisfy the trip demand of the passengers to overflow the existing facilities of Toncontín Airport, which the Base Case is unable to satisfy. Each overflowing passenger whose trip demand is satisfied by the new airport at either of the two alternative sites is considered to enjoy the benefits which may be quantified as being equal, at least, to the air fare payable by him, which was assumed to be US$100 and US$20 respectively per international and domestic resident passenger on a weighted average basis. Similar benefits of non-resident passengers were not accounted for in the present study.

2) Benefits of Satisfied Transport Demand of Overflowing International Cargo

The new airport, to be constructed either at PEDREGAL or at TALANGA, would satisfy the transport demand of the international cargo expected to overflow in the Base Case. Therefore, when the transport demand of the overflowing international cargo is satisfied at either of the new sites, the consignors of such cargo are considered to get the benefits that may be quantified as being equal at least to the air freight charges involved, of which the weighted average was assumed to be US$25 per assumed unit of 45 Kg.

3) Net Increase of Tourism Income

As stated above, the new airport constructed either at PEDREGAL or at TALANGA, is able to accommodate international passengers expected to

overflow the existing Toncontín Airport. About one half of such passengers being assumed to be non-residents, the tourism income of Honduras is expected to increase significantly if and when the new airport is constructed. The detailed calculation procedure of this benefit is basically the same as those presented in Chapter 9 hereunder.

4) Benefits Derived from Improved Runway Usability

Installation of the Instrument Landing System expected for the new airport at either of the alternative sites of PEDREGAL and TALANGA will result in an improved runway usability as estimated below, as compared with that of the existing Toncontín Airport.

Toncontín Airport	:	80% (Record)
PEDREGAL site	:	95% (Estimate)
TALANGA site	:	95% (Estimate)

The above figures indicate that the runway inoperability due to bad weather conditions at either of the new sites will be reduced by 15% as compared with the existing airport, meaning that the passengers whose destination is Tegucigalpa can be said to enjoy the benefits of saved time and cost of road transport all the way from the alternate airport of San Pedro Sula by not being forced to disembark there. The detailed calculation procedure of this benefit is basically the same as those presented in Chapter 9 hereunder.

5) Benefits of Saved Cost of Aircraft Noise Countermeasures

As stated in Subsection 2.4.4 of Chapter 2, in the case of continued use of the existing Toncontín Airport, aircraft noise countermeasures will become necessary, whereas such a cost will be saved at the proposed new airport constructed either at PEDREGAL or at TALANGA. The detailed procedure is the same as presented in Chapter 9 hereunder.

6) Benefits of Maintenance and Operation Cost Saved

When the new airport at PEDREGAL or at TALANGA is opened to traffic, the maintenance and operation costs of the existing Toncontín Airport will not be required, and this saving is considered to constitute benefits accruing from the construction of the new airport. The annual amount of the maintenance and operation cost so saved is conservatively estimated to be 90,000 lempiras based on the records of the last 7-year period of 1971 - 1977 at Toncontín which do not include personnel costs.

7) Additional Access Time and Cost

Calculation was made on additional access time and costs incurred by resident passenger, cargo and airport employee at the new sites compared with the case of the existing Toncontín Airport, with the following formula:

$$A_i = (C_i - C_b) + v(T_i - T_b)$$

where,

A_i = additional access time and costs at i site

C_i = Access cost between the center of Tegucigalpa and i site

C_b = Access cost between the center of Tegucigalpa and Toncontín Airport

T_i = Access time between the center of Tegucigalpa and i site

T_b = Access time between the center of Tegucigalpa and Toncontín Airport

v = Time value

Basic data used in the calculation of this benefit are shown in Table 5-11.

Table 5-11 BASIC DATA FOR CALCULATION OF ADDITIONAL ACCESS TIME & COST

Traffic Category		Time Value	Access Time & Cost											
			Toncontin Airport (15 km)				Pedregal Site (30 km)				Talanga Site (60 km)			
			Transport Mode	Share (%)	Time (min.)	Cost (US$)	Transport Mode	Share (%)	Time (min.)	Cost (US$)	Transport Mode	Share (%)	Time (min.)	Cost (US$)
Resident Passenger	International	*1	Private Car	100	15	0.99 *4	Private Car	100	30	1.88 *4	Private Car	100	60	3.75 *4
			Bus	0	-	-	Bus	0	-	-	Bus	0	-	-
	Domestic	*1	Private Car	50	15	0.99	Private Car	50	30	1.88	Private Car	50	60	3.75
			Bus	50	18	0.15 *5	Bus	50	36	0.45 *5	Bus	50	72	0.9 *5
Cargo	International	*2	Truck	100	18	1.5/ton *6	Truck	100	36	3.0/ton *6	Truck	100	72	6.0/ton *6
	Domestic	*2	Truck	100	18	1.5/ton *6	Truck	100	36	3.0/ton *6	Truck	100	72	6.0/ton *6
Employee		*3	Private Car	40	15	0.94	Private Car	40	30	1.88	Private Car	40	60	3.75
			Bus	60	18	0.15	Bus	60	36	0.45	Bus	60	72	0.9

*1 For the time value of resident passengers refer to Table 9-11 in Subsection 9.4.2 of Chapter 9.
*2 Time value of cargo is assumed to be zero.
*3 Time value of employee is estimated by the annual salary of US$3,000 and the annual working time of 2,000 hours.
*4 Operating cost of private car per km is assumed to be US$0.063, including depreciation, fuel and maintenance costs.
*5 Bus fare is based on the existing tariff structure.
*6 Transport cost of cargo by truck per km is assumed to be US$0.1 per ton.

5.6.4 Results of Preliminary Cost-Benefit Analysis

Results of the preliminary cost-benefit analysis of the new airport construction made with the costs and benefits calculated in Subsections 5.6.2 and 5.6.3 are shown in Tables 5-13 and 5-14 respectively for the PEDREGAL and TALANGA sites. The results lead to a conclusion that TALANGA site with the internal rate of return of 14.9% is definitely more advantageous economically than PEDREGAL site with the IRR of 9.1%. Furthermore, the internal rate of return calculated of the differences in cash flows between those of construction at PEDREGAL site over TALANGA site shows a value of 1.3%, again indicating the advantage of TALANGA site over PEDREGAL site (Table 5-15).

Sensitivity analysis was made for the cost fluctuations of up to ±30% of the cost estimated in Subsection 5.6.2 with the results as shown in Table 5-12, indicating that TALANGA site could still be more advantageous than PEDREGAL site even if the cost at TALANGA were to be increased by 30% while at the same time the cost at PEDREGAL, on the contrary, were reduced by 30%, due to changes in technical conditions of the original estimate.

Table 5-12 SENSITIVITY ANALYSIS

Cost Fluctuation	IRR	
	Pedregal Site	Talanga Site
+30% of Estimated Cost	7.2%	12.8%
-30% of Estimated Cost	11.8%	18.0%

Table 5-13 CASHFLOW OF COSTS AND BENEFITS OF NEW AIRPORT CONSTRUCTION PLANNED AT PEDREGAL SITE

(Thousand US$)

Year	Costs			Benefits								Discounted Cashflow at 12%	
	Construction Cost	Maintenance & Operation Cost	Total Costs	Accommodated Overflowing Passengers	Accommodated Overflowing Cargo	Net Increase of Tourism Income	Improved Runway Usability	Counter Noise Cost Saved	Maintenance & Operation Cost Saved	Additional Access Time & Costs	Total Benefits	Total Costs	Total Benefits
1979	2,130	0	2,130	0	0	0	0	0	0	0	0	2,130	0
1980	5,020	0	5,020	0	0	0	0	0	0	0	0	4,482	0
1981	52,865	0	52,865	0	0	0	0	0	0	0	0	42,144	0
1982	52,150	0	52,150	0	0	0	0	0	0	0	0	37,119	0
1983	56,810	0	56,810	0	0	0	0	0	0	0	0	36,104	0
1984	65,135	0	65,135	0	0	0	0	0	0	0	0	36,959	0
1985	13,040	0	13,040	0	0	0	0	0	0	0	0	6,606	0
1986	0	1,285	1,285	0	3,267	0	419	0	45	-1,241	2,490	581	1,126
1987	0	1,311	1,311	0	3,888	0	477	5,670	45	-1,367	8,713	529	3,519
1988	0	1,339	1,339	1,668	4,628	957	503	0	45	-1,506	6,295	483	2,270
1989	0	1,368	1,368	3,666	5,508	2,100	516	0	45	-1,660	10,175	440	3,276
1990	0	1,400	1,400	5,850	6,556	3,456	542	0	45	-1,829	14,620	402	4,203
1991	0	1,427	1,427	7,275	7,385	4,833	561	0	45	-2,005	18,094	366	4,644
1992	0	1,455	1,455	9,047	8,318	6,416	581	0	45	-2,197	22,210	333	5,090
1993	0	1,485	1,485	11,250	9,370	8,288	602	0	45	-2,409	27,146	304	5,555
1994	0	1,518	1,518	13,990	10,555	10,457	623	0	45	-2,641	33,029	277	6,034
1995	0	1,551	1,551	17,398	11,889	12,938	645	0	45	-2,895	40,020	253	6,528
1996	0	1,583	1,583	19,794	13,103	15,778	664	0	45	-3,117	46,267	231	6,739
1997	0	1,618	1,618	22,521	14,441	18,990	685	0	45	-3,359	53,323	210	6,934
1998	0	1,653	1,653	25,623	15,916	22,680	705	0	45	-3,618	61,351	192	7,123
1999	0	1,691	1,691	29,152	17,542	26,897	726	0	45	-3,897	70,465	175	7,305
2000	0	1,730	1,730	33,168	19,333	31,744	748	0	45	-4,199	80,839	160	7,482
2001	0	1,771	1,771	36,691	21,124	37,188	776	0	45	-4,562	91,262	146	7,542
2002	0	1,814	1,814	40,589	23,082	43,423	807	0	45	-4,957	102,989	134	7,599
2003	0	1,858	1,858	44,900	25,221	50,542	837	0	45	-5,386	116,159	122	7,653
2004	0	1,904	1,904	49,670	27,558	58,564	870	0	45	-5,852	130,855	112	7,697
2005	0	1,954	1,954	54,946	30,111	67,764	903	0	45	-6,362	147,407	103	7,742
Total	247,150	31,715	278,865	427,198	278,795	423,015	13,190	5,670	900	-65,059	1,083,709	171,101	116,062
Economic Internal Rate of Return = 9.1%										Net Present Value = -55,038			
										Benefit - Cost Ratio = 0.678			

Table 5-14 CASHFLOW OF COSTS AND BENEFITS OF NEW AIRPORT CONSTRUCTION PLANNED AT TALANGA SITE

(Thousand US$)

Year	Costs			Benefits								Discounted Cashflow at 12%	
	Construction Cost	Maintenance & Operation Cost	Total Costs	Accommodated Overflowing Passengers	Accommodated Overflowing Cargo	Net Increase of Tourism Income	Improved Runway Usability	Counter Noise Cost Saved	Maintenance & Operation Cost Saved	Additional Access Time & Costs	Total Benefits	Total Costs	Total Benefits
1979	1,200	0	1,200	0	0	0	0	0	0	0	0	1,200	0
1980	4,845	0	4,845	0	0	0	0	0	0	0	0	4,326	0
1981	3,660	0	3,660	0	0	0	0	0	0	0	0	2,918	0
1982	10,665	0	10,665	0	0	0	0	0	0	0	0	7,591	0
1983	26,535	0	26,535	0	0	0	0	0	0	0	0	16,863	0
1984	29,535	0	29,535	0	0	0	0	0	0	0	0	16,759	0
1985	15,460	0	15,460	0	0	0	0	0	0	0	0	7,833	0
1986	0	1,254	1,254	0	3,000	0	419	0	45	-3,460	4	567	2
1987	0	1,280	1,280	0	3,596	0	477	5,670	45	-3,820	5,968	517	2,410
1988	0	1,306	1,306	900	4,311	522	503	0	45	-4,216	2,065	471	745
1989	0	1,335	1,335	2,650	5,167	1,613	516	0	45	-4,655	5,336	430	1,718
1990	0	1,366	1,366	4,640	6,194	2,912	542	0	45	-5,138	9,195	393	2,643
1991	0	1,392	1,394	5,928	6,979	4,229	561	0	45	-5,640	12,102	358	3,106
1992	0	1,420	1,420	7,574	7,864	5,781	581	0	45	-6,192	15,653	325	3,587
1993	0	1,450	1,450	9,678	8,861	7,548	602	0	45	-6,798	19,936	297	4,079
1994	0	1,481	1,481	12,365	9,984	9,602	623	0	45	-7,463	25,156	271	4,596
1995	0	1,514	1,514	15,798	11,250	11,999	645	0	45	-8,192	31,545	247	5,146
1996	0	1,545	1,545	18,075	12,419	14,706	664	0	45	-8,825	37,084	225	5,401
1997	0	1,578	1,578	20,680	13,708	17,820	685	0	45	-9,507	43,431	205	5,648
1998	0	1,613	1,613	23,661	15,132	21,357	705	0	45	-10,244	50,656	187	5,882
1999	0	1,649	1,649	27,072	16,704	25,408	726	0	45	-11,038	58,917	171	6,108
2000	0	1,688	1,688	30,974	18,439	30,076	748	0	45	-11,897	68,385	156	6,330
2001	0	1,727	1,727	34,346	20,148	35,328	776	0	45	-12,933	77,710	143	6,422
2002	0	1,770	1,770	38,085	22,015	41,298	807	0	45	-14,061	88,189	131	6,507
2003	0	1,813	1,813	42,231	24,056	48,129	837	0	45	-15,289	100,009	119	6,589
2004	0	1,860	1,860	46,828	26,286	55,842	870	0	45	-16,626	113,245	109	6,661
2005	0	1,908	1,909	51,926	28,722	64,704	903	0	45	-18,080	128,220	100	6,734
Total	91,900	30,949	122,849	393,411	264,835	398,874	13,190	5,670	900	-184,074	892,806	62,912	90,314
Economic Internal Rate of Return = 14.9%										Net Present Value = 27,402			
										Benefit - Cost Ratio = 1.436			

Table 5-15 CASHFLOW OF DIFFERENCES BETWEEN NEW AIRPORT CONSTRUCTION PLANNED AT PEDREGAL OVER TALANGA

(Thousand US$)

Year	Costs			Benefits								Discounted Cashflow at 12%	
	Construction Cost	Maintenance & Operation Cost	Total Costs	Accommodated Overflowing Passengers	Accommodated Overflowing Cargo	Net Increase of Tourism Income	Improved Runway Usability	Counter Noise Cost Saved	Maintenance & Operation Cost Saved	Additional Access Time & Costs	Total Benefits	Total Costs	Total Benefits
1979	930	0	930	0	0	0	0	0	0	0	0	930	0
1980	175	0	175	0	0	0	0	0	0	0	0	156	0
1981	49,205	0	49,205	0	0	0	0	0	0	0	0	39,226	0
1982	41,485	0	41,485	0	0	0	0	0	0	0	0	29,528	0
1983	30,275	0	30,275	0	0	0	0	0	0	0	0	19,240	0
1984	35,600	0	35,600	0	0	0	0	0	0	0	0	20,200	0
1985	-2,420	0	-2,420	0	0	0	0	0	0	0	-	-1,226	0
1986	0	31	31	0	267	0	0	0	0	2,219	2,486	14	1,125
1987	0	31	31	0	292	0	0	0	0	2,453	2,745	13	1,109
1988	0	33	33	768	317	435	0	0	0	2,710	4,230	12	1,525
1989	0	33	33	1,016	341	487	0	0	0	2,995	4,839	11	1,558
1990	0	34	34	1,210	362	544	0	0	0	3,309	5,425	10	1,560
1991	0	35	35	1,347	406	604	0	0	0	3,635	5,992	9	1,538
1992	0	35	35	1,473	454	635	0	0	0	3,995	6,557	8	1,503
1993	0	35	35	1,572	509	740	0	0	0	4,389	7,210	7	1,475
1994	0	37	37	1,625	571	855	0	0	0	4,822	7,873	7	1,438
1995	0	37	37	1,600	639	939	0	0	0	5,297	8,475	6	1,382
1996	0	38	38	1,719	684	1,072	0	0	0	5,708	9,183	6	1,337
1997	0	40	40	1,841	733	1,170	0	0	0	6,148	9,892	5	1,286
1998	0	40	40	1,962	784	1,323	0	0	0	6,626	10,695	5	1,242
1999	0	42	42	2,080	838	1,489	0	0	0	7,141	11,548	4	1,197
2000	0	42	42	2,194	894	1,668	0	0	0	7,698	12,454	4	1,153
2001	0	44	44	2,345	976	1,860	0	0	0	8,371	13,552	4	1,120
2002	0	44	44	2,504	1,067	2,125	0	0	0	9,104	14,800	3	1,092
2003	0	45	45	2,669	1,165	2,413	0	0	0	9,903	16,150	3	1,064
2004	0	44	44	2,842	1,272	2,722	0	0	0	10,774	17,610	3	1,036
2005	0	46	46	3,020	1,389	3,060	0	0	0	11,718	19,187	2	1,008
Total	155,250	766	156,016	33,787	13,960	24,141	0	0	0	119,015	190,903	108,189	25,748
Economic Internal Rate of Return = 1.3%										Net Present Value = -82,441			
										Benefit - Cost Ratio = 0.238			

5.7 Overall Evaluation of Alternative Sites

As a result of the foregoing site selection study the overall evaluation of the two alternative sites is made both from the technical and the economic points of view as summarized hereunder.

5.7.1 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 barely large enough and steeply sloped tableland may well cause pilots considerable uneasiness. Besides, if the Toncontín Airport continues to operate as an air force or general aviation airport, appropriate adjustments between the control zones of the existing and that of the new airport will be necessary, 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 considerations lead to a conclusion that from engineering points of view TALANGA site is more suitable for the new airport construction than PEDREGAL site.

5.7.2 Economic Evaluation

Results of the preliminary cost-benefit analysis indicate the obvious advantage of TALANGA site over PEDREGAL site.

5.7.3 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 Tegucigalpa metropolitan area.

CHAPTER 6 AIRPORT FACILITY AND AIRSPACE USE PLAN

Planning of the airport facility and of the airspace use presented in this chapter are made for the assumed construction of the new airport in Talanga officially selected by the Government in December 1978 shortly following the submission of the Interim Report of the present JICA Feasibility Study, which presented the results of the site selection study, with due consideration for the results of the discussions with the officials concerned of the Government which took place in Honduras in February 1979.

6.1 Parameters of Planning

6.1.1 Stages of New Airport Development

On the basis of discussions held in Honduras as mentioned above, ultimate design year of the new airport construction project has been established for the year 2005, and the development of the new airport is planned in the following two stages.

First Stage (Stage I) : To be serviceable from 1986 to 1995

Second Stage (Stage II): To be serviceable from 1996 to 2005

6.1.2 Determination of Facility Requirements by Development Stage

As mentioned above the facilities of the Stage I development are meant to cater for the air transport requirements up to the year 1995 and those of the Stage II, up to the year 2005, based on the traffic forecast made in Chapter 3.

Table 6-1 presents an outline of the service and facility requirements of each stage established through the study process similar to that used in Chapter 4 as presented in Fig. 4-1 therein.

Among the facilities shown in Table 6-1, the international export and domestic cargo terminal buildings, as well as the aircraft maintenance hangar, are understood to be designed and constructed by airlines, and the fuel storage and distribution facilities by fuel supply companies, based on the February 1979 discussions held in Honduras as mentioned above. In the present facility planning, therefore, only the location and space assigned to these facilities are indicated.

The runway length of 2,650 meter calculated in Chapter 4 has been rounded into 2,700 meters.

Table 6-1 AIR TRANSPORT DEMAND AND AIRPORT FACILITY REQUIREMENTS

		Stage I (1995)	Stage II (2005)
Annual Air Traffic			
Passengers			
International	Emb. & Disemb.	677,000	1,356,000
	Transit	344,000	702,000
	Total	1,021,000	2,058,000
Domestic	Emb. & Disemb.	230,000	351,000
	Transfer	73,000	151,000
	Total	303,000	502,000
Cargo (metric tons)			
International		28,350	59,800
Domestic		1,700	2,220
Aircraft Movements			
International Passenger Flight		10,762	21,593
Domestic Passenger Flight		4,967	8,025
International Freighter		846	1,781
Total		16,575	31,399
General Aviation (Small Aircraft)		6,960	11,120
Peak Hour Demand			
Scheduled Aircraft Movements/day		58	102
Aircraft Parking Positions			
200-seater jet		3	5
120-seater jet		5	7
40-seater non-jet		1	2
Total		9	14
Freighter		1	2
Small Aircraft		88	139
Passengers/half-hour			
International	Departure	150	250
	Arrival	130	230
	Transit	140	240
	Total	420	720
Domestic	Departure	110	140
	Arrival	110	140
	Total	220	280

Table 6-1 - Continued

		Stage I (1995)	Stage II (2005)
Cargo Tonnage/day			
International	Outbound	20	44
	Inbound	102	208
	Total	122	252
Domestic		7	9
Facility Requirements			
Runway Strip		2,820 m x 300 m	
Runway, N073°W		2,700 m x 45 m	
Longitudinal Gradient (Maximum)		0.5%	
Taxiway, Strip		2,700 m x 60 m	
Parallel		2,700 m x 23 m	
Exit		161 m x 23 m x 6	
Apron, Passenger		69,075 m^2	99,775 m^2
Cargo		-	26,095 m^2
Maintenance		18,420 m^2	18,420 m^2
General Aviation		29,165 m^2	46,050 m^2
Horizontal Clearances			
Runway-Taxiway Center Line Clearance (Precision Approach Cat-I)		195 m	
Edge-to-Edge Runway-Taxiway Clearance (Precision Approach Cat-I)		150 m	
Clearance between Taxiway Edge and Building Restriction Line		38 m	
Taxiway-Apron Wingtip Clearance		15 m	
Apron Parking Wingtip Clearance		7.5 m	
Buildings			
Passenger Terminal,	International	9,200 m^2	15,300 m^2
	Domestic	2,800 m^2	3,900 m^2
Cargo Terminal,	Import	5,500 m^2	11,000 m^2
	Export	810 m^2	1,020 m^2
	Domestic	420 m^2	420 m^2
Airport Administration/Operation with Control Tower		2,900 m^2	3,400 m^2

Table 6-1 - Continued

	Stage I (1995)	Stage II (2005)
Fire Station/Garage	850 m^2	850 m^2
Main Power Substation	900 m^2	900 m^2
COCESNA Office	by COCESNA	
Area to be Airconditioned		
International Passenger Terminal Building	3,400 m^2	4,700 m^2
Domestic Passenger Terminal Building	1,000 m^2	1,300 m^2
Administration/Operation Building	1,600 m^2	1,600 m^2
Aeronautical Telecommunications Facility		
Aeronautical Mobile Service Facilities		
VHF Transmitter 50W	10 units	
VHF Receiver	10 units	
VHF Transceiver 10W	1 unit	
VHF/FM Transceiver	6 units	
VHF Auto Direction Finder	1 unit	
Air Traffic Control Consoles	1 set	
Approach Control Consoles	1 set	
Magnetic Taperecorder	1 unit	
Automatic Terminal Information Service Equip.	1 set	
ATIS Broadcasting Console and Taperecorder	1 set	
Aeronautical Fixed Service Facilities		
Teletypewriter	1 set	
Other Equipment required to be installed by COCESNA		
Radio Navigational Aids	Cat-I ILS VOR/DME NDB (100W)	MLS
Meteorological Service Facility		
Weather Data Collecting Equipment	1 set	
Runway Visual Range Measuring Equipment (RVR)	1 set	
Ceilometer	1 set	
Rawinsonde Sounding System	1 set	
APT Receiver	1 set	
Weather Facsimile Receiver	2 units	
HF Transmitter and Receiver (Radio Teletype)	2 units	
Teletypewriter	4 units	

Table 6-1 - Continued

	Stage I (1995)	Stage II (2005)
Airfield Lighting System		
Approach Lighting System		
Runway 10, Calvert System, 900m	1 set	
Runway 28, Simple System, 420m	1 set	
	1 set	
Approach Light Beacon	2 sets	
Visual Approach Slope Indicator		
Runway Edge Lights		
High Intensity Elevated Type	1 set	
Runway End Lights		
High Intensity Inset Type	1 set	
Runway Threshold Lights		
High Intensity Inset Type	1 set	
Taxiway Edge Lights		
Medium Intensity Elevated Type	1 set	
Aerodrome Beacon	1 unit	
Illuminated Wind Cone	2 units	
Apron Flood Lights	1 set	
Car Parking		
For Passengers and Employees		
Parking Spaces	510	750
Area	18,000 m^2	26,000 m^2
For Cargo Use		
Area	1,500 m^2	3,000 m^2
Fuel Storage		
Daily Capacity	310 Kl.	540 Kl.
7-day Reserve	2,200 Kl.	3,800 Kl.
Storage Area	8,000 m^2	
Distribution System	Hydrant	
Aircraft Maintenance Hangar Area	20,000 m^2	
General Aviation Hangar Area	20,000 m^2	35,000 m^2
COCESNA Building Area	10,000 m^2	
Utilities		
Electric Power Capacity		
Passenger Terminal Buildings	960 KVA	1,400 KVA
Cargo Terminal Buildings	250 KVA	500 KVA
Admini./Operation Building	400 KVA	420 KVA
Airfield Lighting	350 KVA	420 KVA
Radio Nav-aids	50 KVA	50 KVA
Others	210 KVA	210 KVA
Total	2,220 KVA	3,000 KVA

Table 6-1 - Continued

	Stage I (1995)	Stage II (2005)
Water Supply/day		
Passenger Terminal Buildings	240 Kl.	330 Kl.
Cargo Terminal Buildings	45 Kl.	70 Kl.
Administration/Operation Building	15 Kl.	15 Kl.
Others	50 Kl.	85 Kl.
Total	350 Kl.	500 Kl.
Sewage Treatment		
Capacity/day	350 Kl.	500 Kl.
Area	11,000 m^2	17,000 m^2
Telephone Circuits	80	110
Approach Road		
One Way Traffic		
Private Car/peak hour		
Passenger and Wellwishers	250	270
Employees	140	230
Total	390	500
Bus/peak hour		
Passengers and Wellwishers	6	8
Employees	10	16
Total	16	24
Truck/day	110	220
Number of Lanes	one for each direction	
Lane Width	3.8 m	
Airport Special Equipment		
Boarding Bridge	3	10
Baggage Handling Unit		
International, Out-bound	1	2
In-bound	2	2
Domestic, Out-bound	1	1
In-bound	1	1
X-Ray Baggage Inspection System		
International	1	1
Domestic	1	1
Metal Detector System		
International	1	1
Domestic	1	1

Table 6-1 - Continued

	Stage I (1995)	Stage II (2005)
Flight Information Display System		
International	-	1
Domestic	-	1
Elevator		
International Passenger Terminal (750 kg)	1	1
Tower (600 kg)	-	1
Escalator, International Passenger Terminal	-	1
Cold Storage System		
Import Cargo Bldg. (sq.m)	50	100
Vehicles		
Fire Fighting and Rescue		
Crash Fire and Rescue Truck, 1890 lit./minute	3	3
Water Supply Truck, 6000 liters	1	1
Rapid Intervention Vehicle	1	1
Airport Maintenance		
Dump Truck		2
Roller		1
Sweeper		1
Water Supply Truck, 3000 liters		1
Mowing Machine		1
Aircraft Ground Service		by Airlines

6.1.3 Project Site

The Project site of Talanga selected by the Government for the new airport construction is located in the Talanga Basin, Valle de Talanga, about 60 kilometers to the northwest from the national capital of Tegucigalpa City, and about 8 kilometers to the west from downtown Talanga.

Tegucigalpa and Talanga are connected by the national highway at an hour's car distance. The features of the topography, geology and meteorology of the site, as well as the present land use are outlined below.

1) Topography and Geology

The Talanga Basin extends about 16 kilometers in the east-west direction and 10 kilometers in the north-south direction. Altitude of the basin averages approximately 750 meters above sea level.

The topography of the Project site is generally flat, but there is a slight down slope towards the north. The site is drained by several small water veins of El Espino, El Camalotal and Aqua Salada, all connecting to the river of Rio Talanguita which crosses the central part of the Talanga Basin in the east-west direction. These veins, however, have no water in the dry season.

The basin is surrounded by mountains whose height is about 1,000 meters on the eastern side, 800 to 1,400 meters on the western side, 1,200 to 1,400 meters on the southern side and 1,000 to 1,600 meters on the northern side.

The geological formation of the Project site consists of a surface layer of alluvial deposit containing some gravel lying on top of the tuffaceous base. The results of the geological investigation

conducted by the Government of Honduras in February 1979 are given in Chapter 7.

2) Present Land Use

Except for a few small cotton and tobacco plantations existing in the vicinity of the Project site, the surrounding area for the most part is covered by shrubbery. There are no hamlets or villages within the possible airport boundary except for a few houses scattering here and there.

Present land use of the project site and its surrounding area is shown in Appendix 6A.

3) Meteorology

a. Temperature, Humidity and Rainfall

Table 6-2 shows the temperature, humidity and rainfall of the site observed at La Ermita observation station established in February 1978. According to the observation data, the annual average mean temperature of the area is 23°C, and the aerodrome reference temperature calculated in accordance with the standard defined in ICAO Annex 14 is 31°C.

The seasonal average mean humidity during the dry season is 50 percent and that of the wet season is 75 percent.

Rainfall in wet season is recorded at about 100 millimeter in seasonal average mean value, which is more than twice as much as that of the dry season.

Table 6-2 TEMPERATURE, HUMIDITY AND RAINFALL

		1978									1979			Annual Average
		Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	
		Dry Season			Wet Season						Dry Season			
Humidity (%)	Monthly Average of Daily Maximum					90	92	92	91	93	96	97	90	93
	Monthly Average of Daily Minimum					57	50	55	56	57	57	47	43	53
	Monthly Average					74	70	73	73	74	75	60	50	69
Temperature (°C)	Monthly Average of Daily Maximum	30.1	32.3	32.4	29.0	28.5	29.7	29.4	28.5	27.8	27.0	29.2	28.2	29.3
	Monthly Average of Daily Minimum	17.3	17.8	19.6	19.4	18.2	17.9	17.9	16.6	16.5	14.8	12.2	13.9	16.8
	Monthly Average	23.6	25.1	26.0	24.2	23.4	23.8	23.7	22.6	22.2	20.9	20.7	21.1	23.1
Rainfall (mm)	Monthly Average of Daily Maximum	11.5	29.5	57.5	45.8	9.4	18.3	13.6	21.4	26.0	12.0	9.1	9.5	22.0
	Monthly Total	37.0	83.4	188.1	139.2	66.7	48.7	96.0	70.8	60.7	42.9	5.3	3.3	842.1

Source: La Ermita Observation Station

b. Wind Direction and Velocity, Ceiling and Visibility

The wind rose and the correlation table of ceiling and visibility compiled from the meteorological observation data obtained since the end of February 1978 at La Ermita station and La Espino station both established by the Government of Honduras for the purpose of the present study are shown in Appendix 6B. At La Ermita station, periodic observations of wind direction and velocity, ceiling and visibility are being conducted according to the meteorological observation standards specified in Annex 3, ICAO, whereas at La Espino, wind direction and velocity only are being automatically recorded by instrument.

The numbers of observation data obtained in time for the preparation of the present report amounted to a total of 10,294 times as shown in Table 6-3.

Table 6-3 NUMBER OF METEOROLOGICAL OBSERVATIONS DATA OBTAINED

	El Espino	La Ermita
March 1978	77	711
April	-	684
May	485	628
June	114	654
July	329	744
August	41	744
September	108	719
October	-	713
November	203	643
December	521	722
January 1979	60	622
February	-	672
Sub Total	2,038	8,256
TOTAL	10,294	