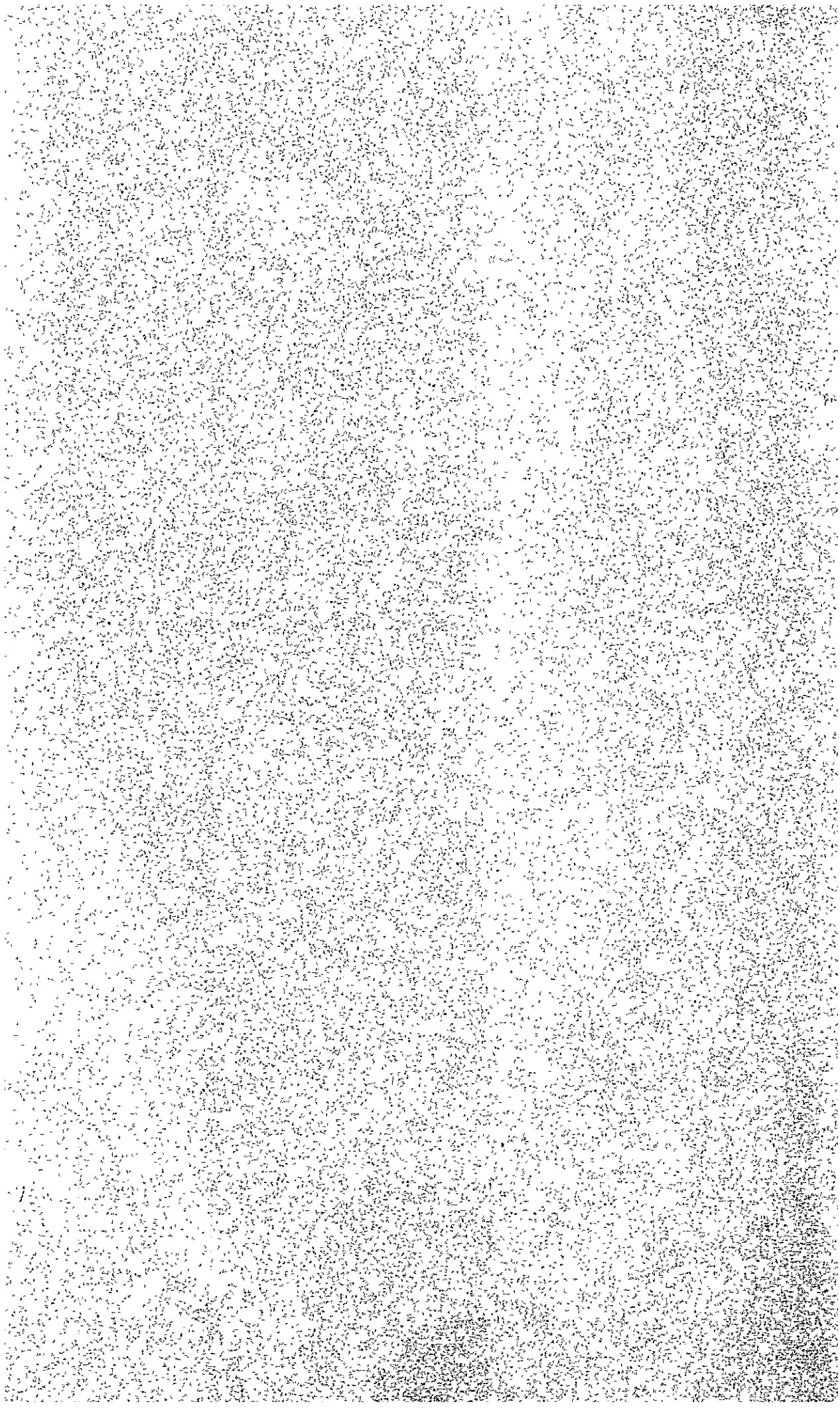
CHAPTER 5



CHAPTER 5 SITE SELECTION

During the field survey that took place from May 9 to June 17, 1979, the JICA survey team made a site selection study, as a result of which the site situated to the west of CPS at Calle 24 about 3 km north of Ruta 7 was found to be the most suitable for the new airport construction and was recommended as such in the Progress Report submitted to the Government of the Republic at the end of the field survey. The site thus recommended was officially selected by the Government of the Republic in July 1979. Presented hereunder is the amplified version of the site selection study into which are incorporated the results of the subsequent home office study made with the view to analysing in further depth the findings of the field survey in the light of the additional information made available to the JICA team, and which has led to the same conclusion as that reached and submitted previously in the Progress Report.

5.1 General

5.1.1 Premises

Having closely reviewed the previous study made for the Administracion Nacional de Aeropuertos Civiles (hereinafter referred to as ANAC), it was considered appropriate to confine the site selection study to the area covered by the same study, namely within the radius of about 30 km from the center of CPS. As mentioned in Section 2.4.1, however, the existing CPS Airport was considered of little worth to be studied on its possibilities of future development.

5.1.2 Potential Sites

As a first step of the study, potential sites were sought within the said area of 30-km radius. Potentiality

to ensure maximum runway usability and optimum construction practicability were the two major criteria for selecting the potential sites. Through a careful reading of the topographical map in scale of 1 to 50,000 and after a preliminary field reconnaissance, four potential sites considered to possess the following qualities were selected as shown in Fig. 5.1 for further study to single out an optimum site for the construction of the new airport with a runway of about 3,300 m in length.

- Be as far away as possible from the rivers and from the area to be submerged under the water of the Itaipu Dam thus minimizing the anticipated fog problem.

- Topographically able to locate a runway orientated northeast, which is the prevailing wind direction in the area.

- Free from obstructions to aircraft operation.

The description of the four potential sites is outlined as follows:

Site I

The site is situated about 8 km northwest of Hernandarias, at about 30 km of road distance from the center of CPS, with a possible runway to be oriented 01/19.

Site II

The site is situated west of CPS at Calle 14 and lies north of Ruta 7 at about 17 km of road distance from the center of CPS, with a possible runway orientation of 02-20.

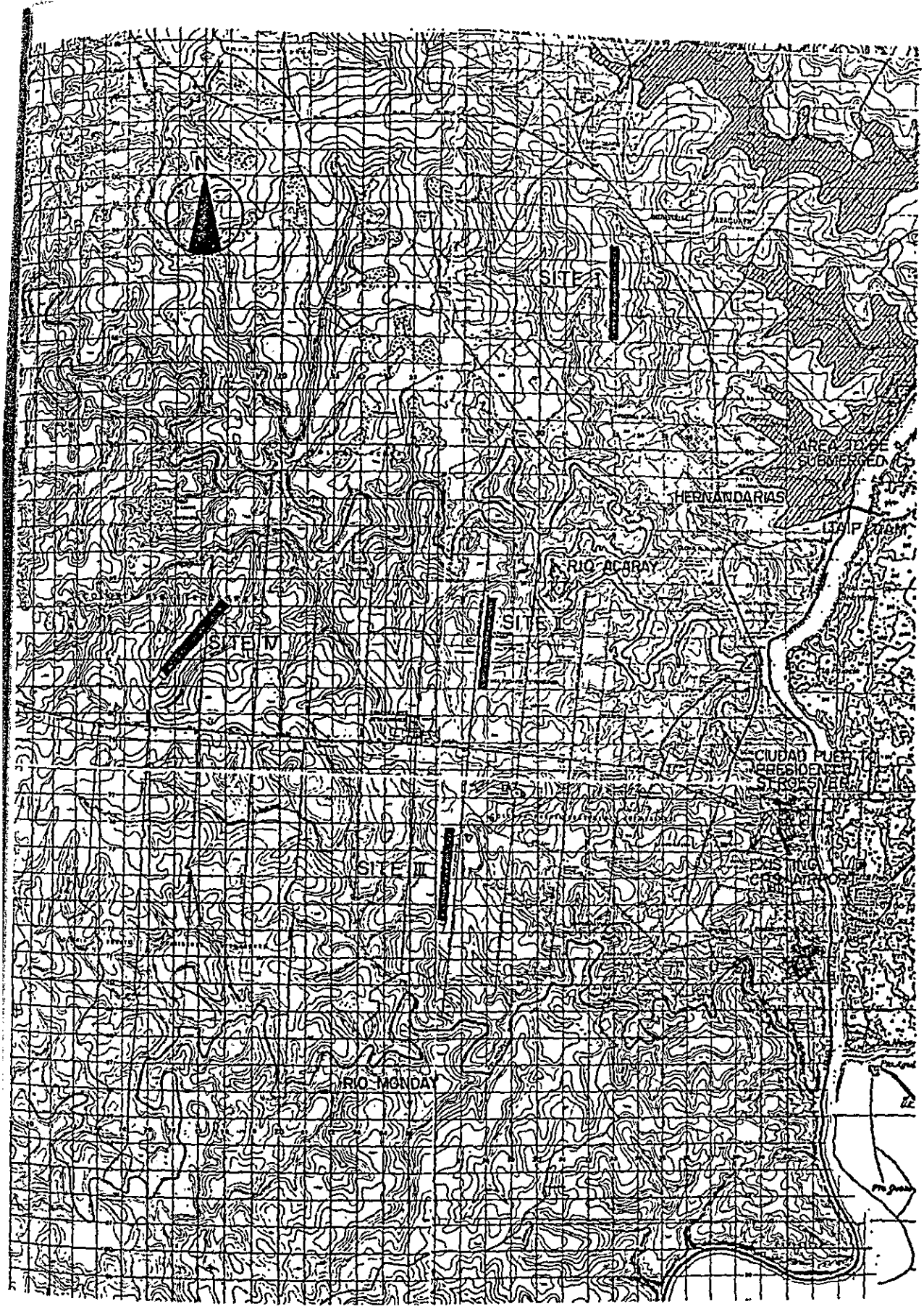


Fig. 5.1 LOCATION OF POTENTIAL SITES

Site III

Situated to the west of CPS at Calle 14 about 3 km south of Ruta 7, the site is able to accommodate a runway oriented 01/19.

Site IV

The site is situated to the west of CPS at Calle 24 about 3 km north of Ruta 7, orientation of a possible runway being 05/23.

5.2 Site Evaluation Criteria

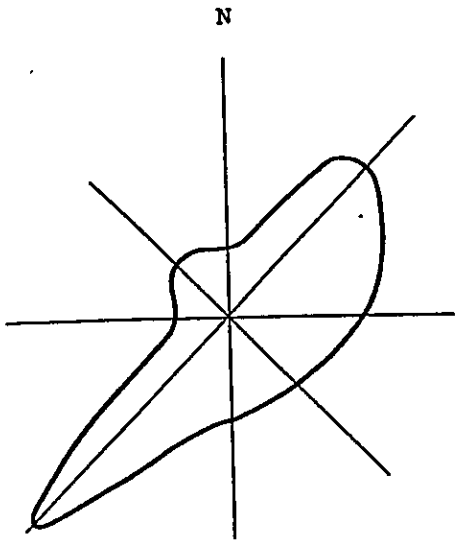
Evaluation of the four potential sites was made in terms of the meteorological conditions, availability of airspace, construction cost factors, present land use, and anticipated effects on the regional community caused by the development of the new airport. The difference in access time and distance from CPS to the four sites, however, is not considered significant enough to affect either potential or induced traffic demand, nor the consequent benefits of the new airport, and was, therefore, not included as an element of the site evaluation criteria.

5.3 Evaluation of Sites

5.3.1 Meteorological Conditions

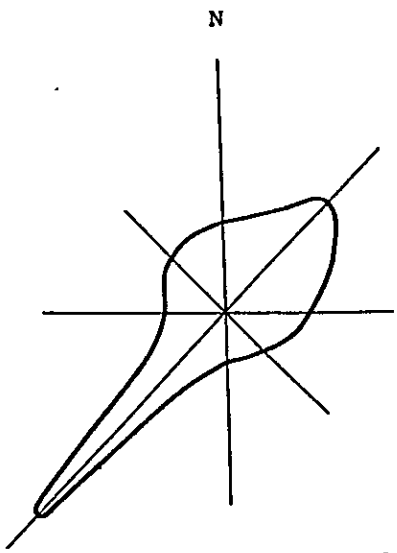
1) Wind

The results of the analysis of the wind data supplied by the Direccion de Meteorologia consisting of the observation records of four readings a day for the three year period of 1976-1978 at the existing CPS airport are shown in Figs. 5.2 and 5.3,



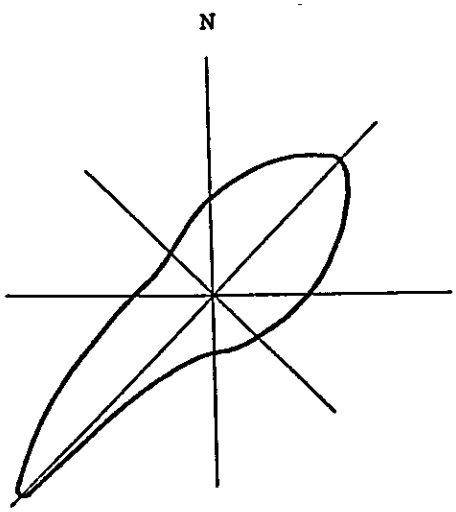
Scale : 1 cm to 2.0 %

Direction and percentage of occurrence of wind exceeding 4 knots



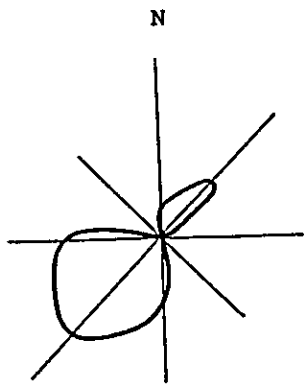
Scale : 1 cm to 0.5 %

Direction and percentage of occurrence of wind exceeding 10 knots



Scale : 1 cm to 0.25 %

Direction and percentage of occurrence of wind exceeding 13 knots



Scale : 1 cm to 0.05 %

Direction and percentage of occurrence of wind exceeding 20 knots

Fig. 5.2 WIND FORCE DISTRIBUTION

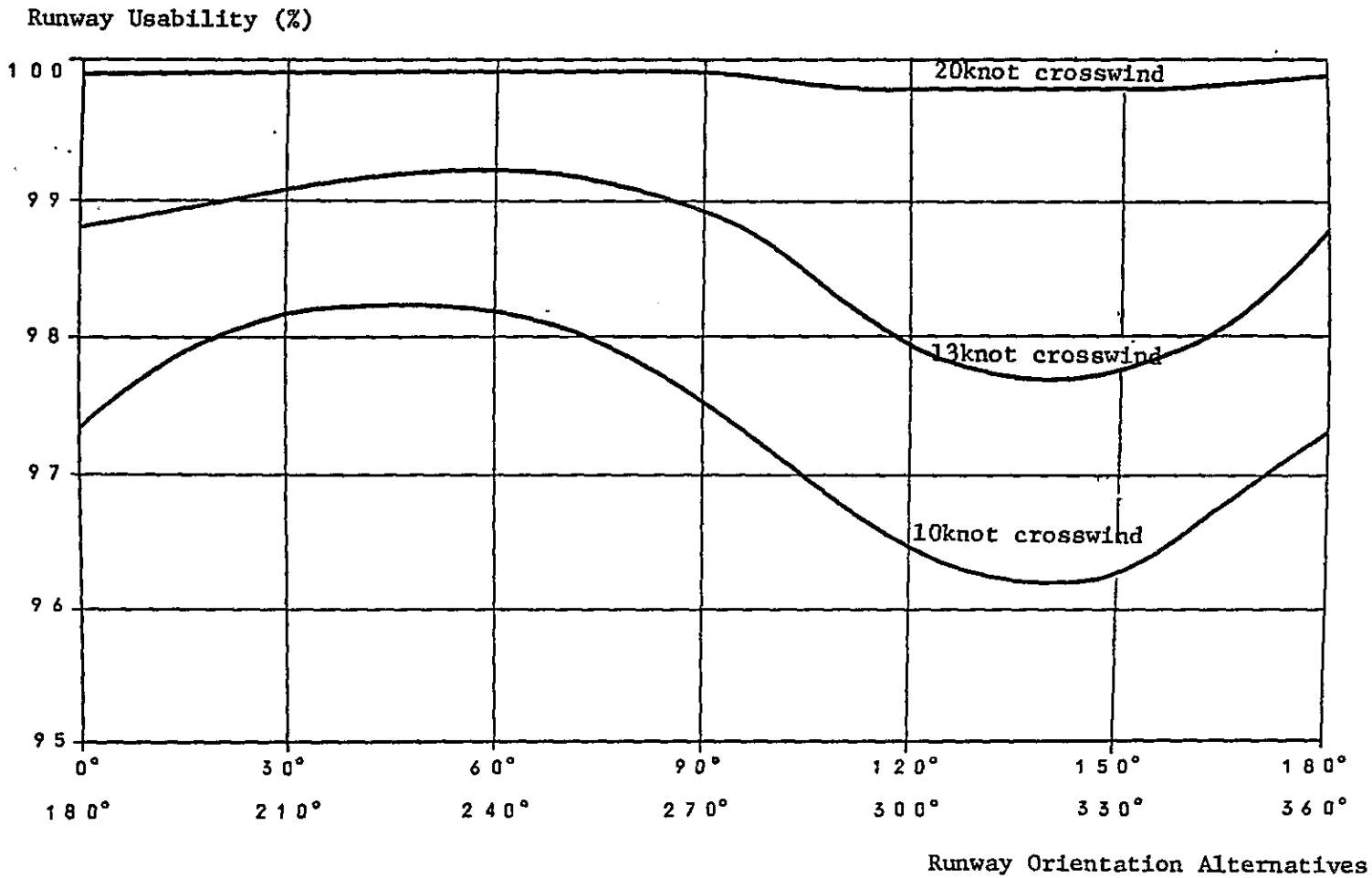


Fig. 5.3 RUNWAY USABILITY-ORIENTATION RELATIONSHIP

the former showing the wind force distribution and the latter showing the runway usability-orientation relationship. The wind roses based on the above mentioned observation data are given in Appendix 5-1 and 5-2.

Since quite a few general aviation aircraft are expected to operate at the new airport, it is desirable to have the runway orientated so that the usability of at least 95 percent is secured for small aircraft. The maximum permissible cross wind component of 10 KT was considered for small aircraft for the site selection purposes in accordance with the Recommendation of ICAO ANNEX 14. The runway usability at each site was calculated on the basis of the wind data at the existing airport for the purpose of the present study, with the results as shown in Table 5.1.

Table 5.1 RUNWAY USABILITY BY SITE

(%)

Site	Orientation	Runway Usability by Maximum Permissible Cross Wind Component		
		10 knot	13 knot	20 knot
I	01 - 19	97.3	98.8	99.9
II	02 - 20	97.3	98.8	99.9
III	01 - 19	97.3	98.8	99.9
IV	05 - 23	98.2	99.2	99.9

2) Visibility and ceiling

Fog problem is anticipated at every site to a varying degree due mainly to the surrounding water surfaces and to the big difference between daytime and night time temperatures. In the absence of adquate observation data about the intensity and

extent of fog the following presumptions were made based on the hearings from the pilots familiar with the meteorological conditions of the area and from the inhabitants in and around each site made during the field survey.

Site I

It is anticipated that some significant environmental change around this site including an increased fog occurrence may be caused by the formation of a great artificial lake as by-product of the Itaipu Dam presently under construction.

Site II

The site being only 2 km south of the Rio Acaray, fog is anticipated to pose a problem.

Site III

The Rio Monday is anticipated to cause a fog problem on this site.

Site IV

The site is considerably away from the rivers and consequently may suffer least fog problem among the four sites.

5.3.2 Availability of Airspace

Since Foz do Iguacu Airport in Brazil is located within a short range from each of the four potential sites of the new airport as indicated in Table 5.2, and the holding airspace presently in use of the Foz do Iguacu Airport extends into the CPS area, the airspaces of the new airport for instrument

approach and departure should be so established as to be compatible, in the interest of safety, with those of the Foz do Iguacu Airport. From this viewpoint of assuring safe operation of aircraft, availability of airspace at each site was studied as presented hereunder.

Table 5.2 BEARING AND DISTANCE FROM EACH POTENTIAL SITE TO FOZ DO IGUACU AIRPORT

Site	Bearing	Distance
I	140° (True North)	17.6 (NM)
II	117°	15
III	101°	14
IV	111°	20.8

Site I

On the north side of the site, the airspace required for the new airport is available independent of the holding airspace of Foz do Iguacu Airport. On the south side, however, the airspace cannot be established without conflict with that of Foz do Iguacu Airport as shown in Fig. 5.4. The airspace of the two airports, therefore, must be carefully adjusted so as to be compatible with each other. In addition, special arrangement must be made in order to avoid conflict with the established airspace of the airport owned by the Itaipu Binacional. Neither structural nor topographical obstruction to aircraft operation are found in and around the site.

Site II

The holding area of Foz do Iguacu Airport prevents the instrument approach and departure procedures from being established at this site. (Fig. 5.5)

Site III

It is difficult to establish at this site the instrument approach and departure procedures that are compatible with the holding and approach areas of Foz do Iguacu Airport. (Fig. 5.6)

Site IV

Airspace independent from and compatible with that of Foz do Iguacu is available as shown in Fig. 5.7.

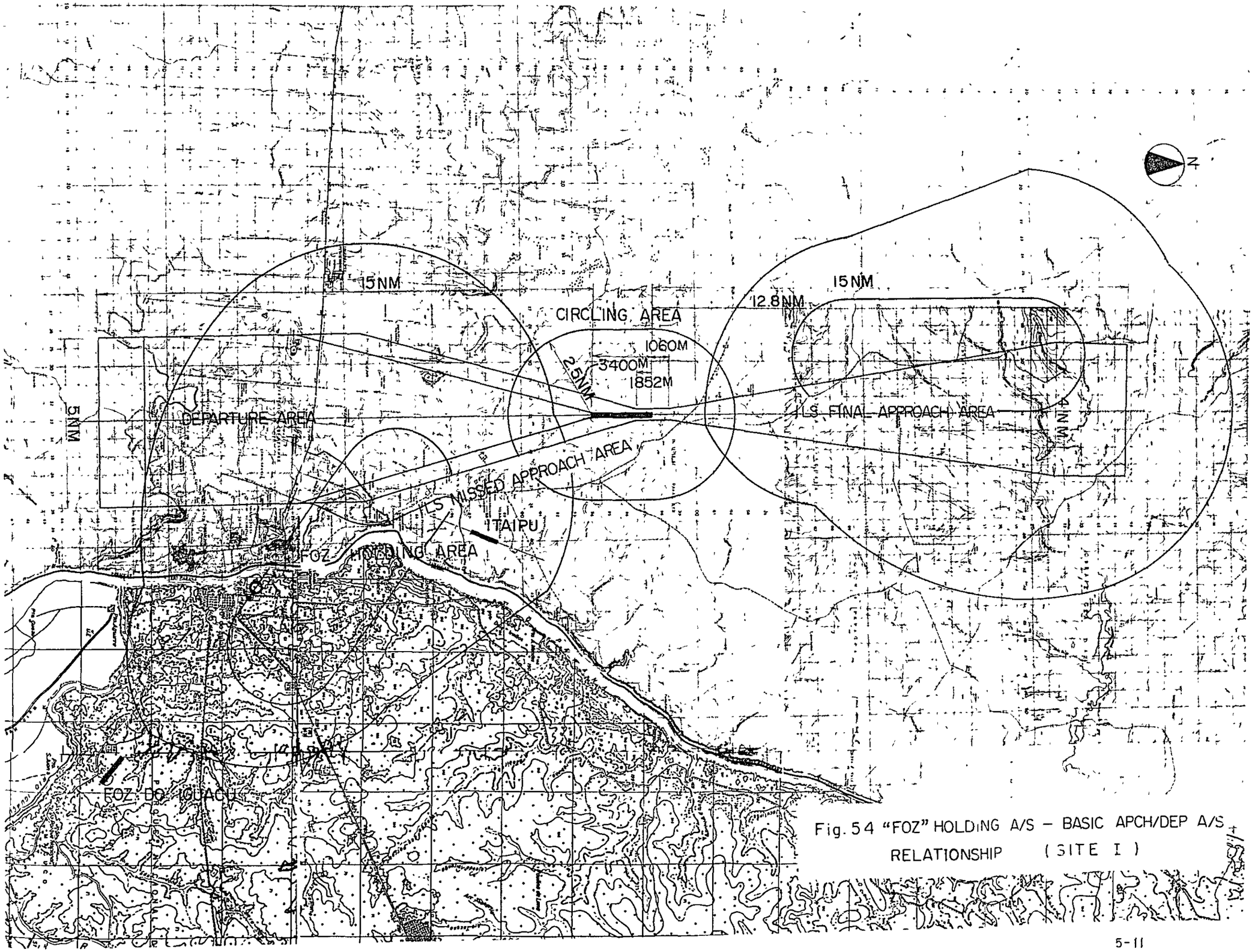


Fig. 54 "FOZ" HOLDING A/S – BASIC APCH/DEP A/S RELATIONSHIP (SITE I)

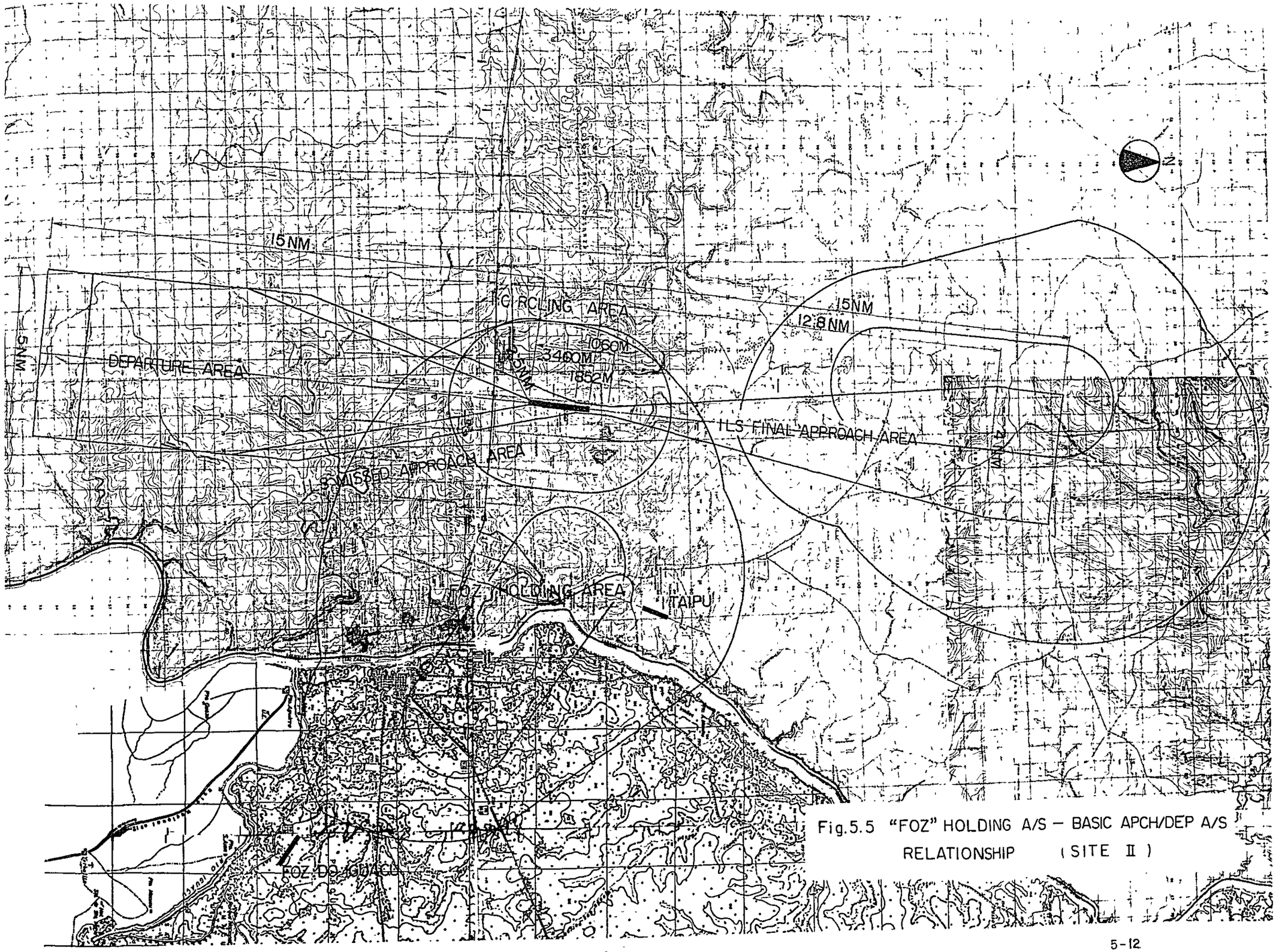


Fig.5.5 "FOZ" HOLDING A/S – BASIC APCH/DEP A/S RELATIONSHIP (SITE II)

Fig. 56 "FOZ" HOLDING A/S – BASIC APCH/DEP A/S RELATIONSHIP (SITE III)

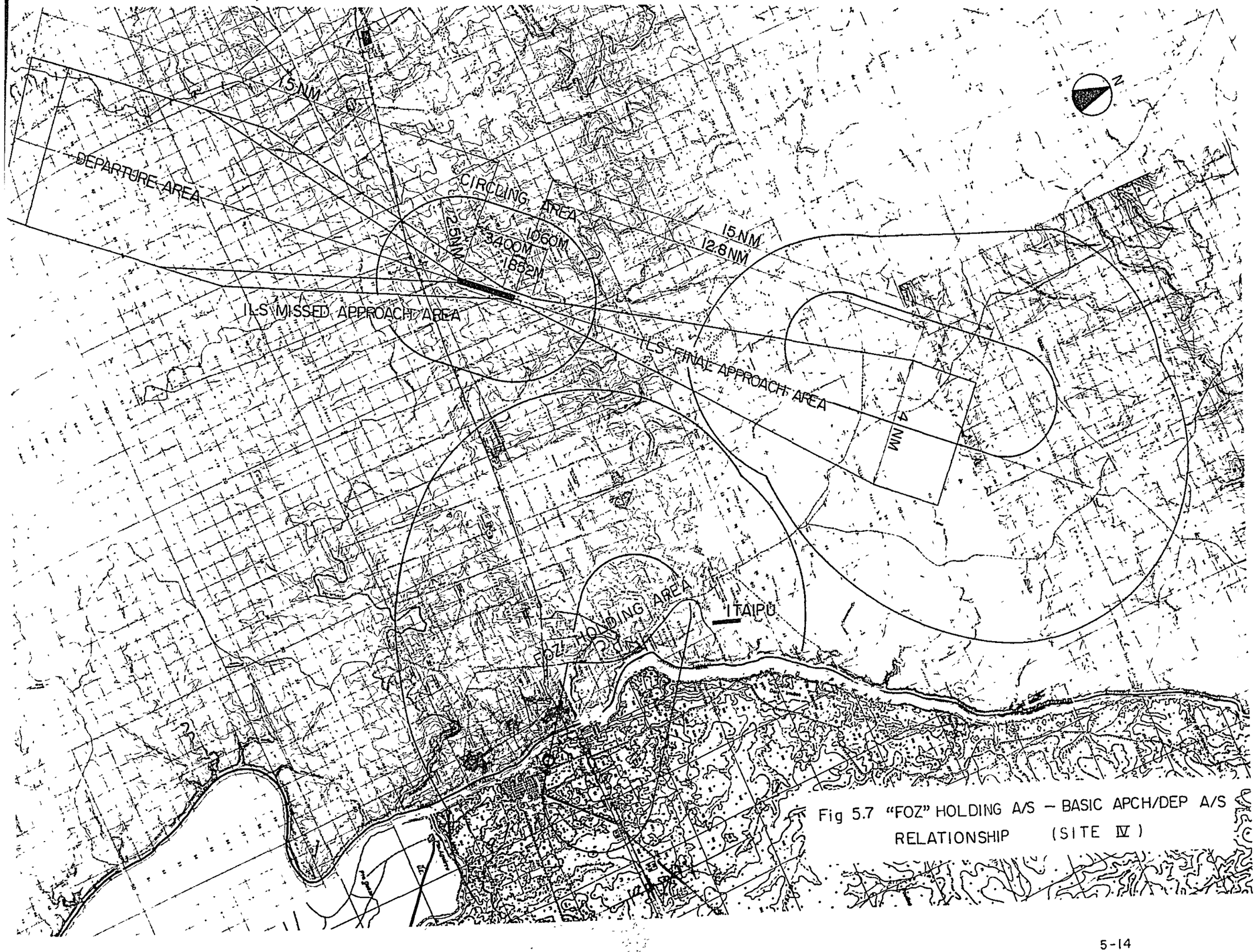


Fig 5.7 "FOZ" HOLDING A/S – BASIC APCH/DEP A/S RELATIONSHIP (SITE Ⅳ)

5.3.3 Construction Cost Factors

1) Soil characteristics

Inspection of the wells existing in and around each possible site revealed that the ground water level at the four sites ranges between 9 m and 12 m below the ground level. It was also confirmed through hearings from the well owners that no rocks are encountered within the depths of the wells in the area. Having confirmed the above, test pits about 2.5 m deep were excavated at the four sites on the locations shown in Figs. 5.8 through 5.11, followed by laboratory test, CBR test, etc. made on the soil samples from each test pit in order to evaluate their suitability as filling material of earthwork. Besides, one boring test combined with standard penetration test was made at each site to the depth of about 20 m from the ground level. The test results are summarized in Table 5.3 and Fig. 5.12.

As seen from the above test results there is no remarkable difference among the four sites in terms of the soil characteristics.

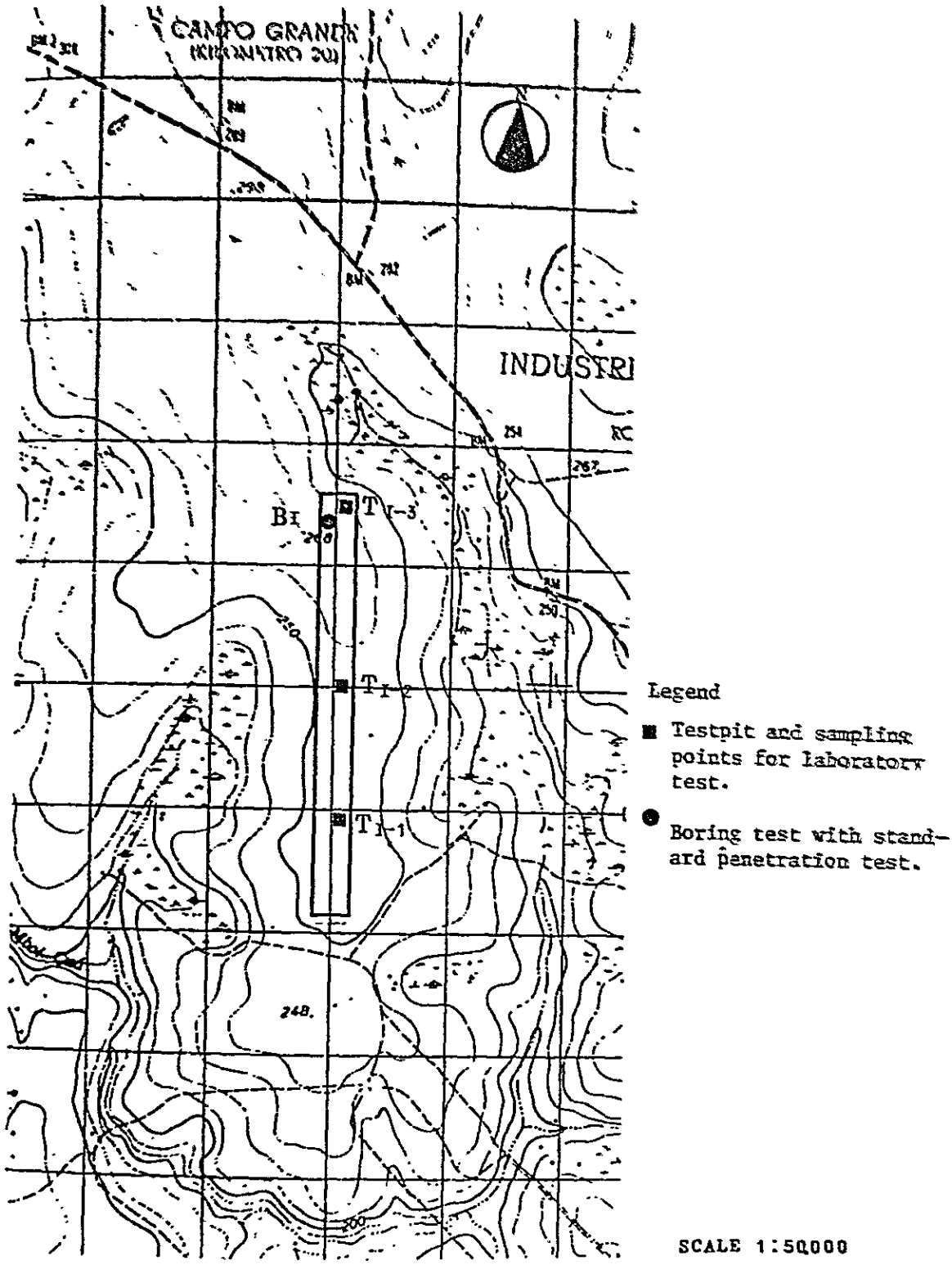
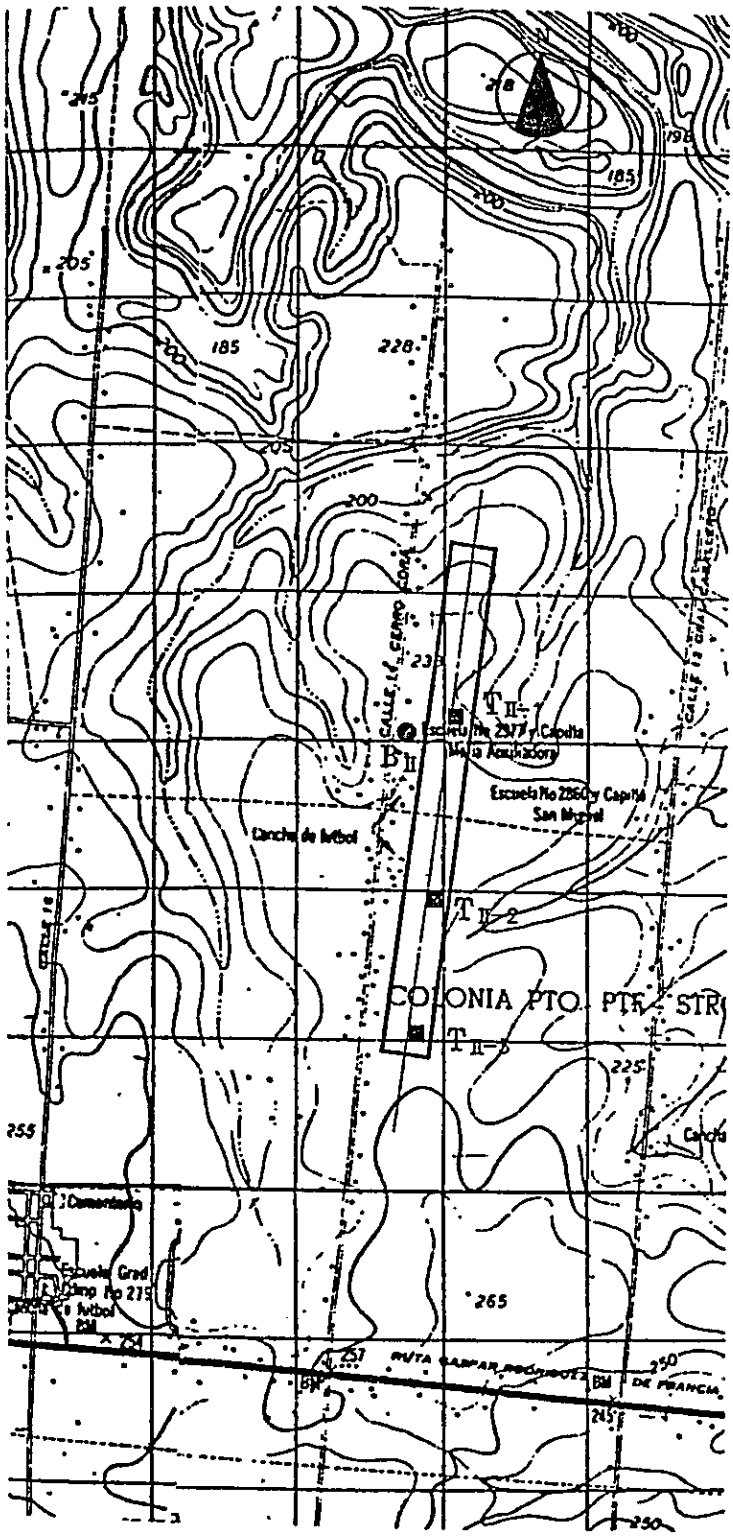


Fig. 5.8 LOCATIONS OF TESTPITS AND BORING TEST AT SITE I



Legend

- Testpit and sampling points for laboratory test.
- Boring test with standard penetration test.

SCALE 1:50,000

Fig. 5-9 LOCATIONS OF TESTPITS AND BORING TEST AT SITE II

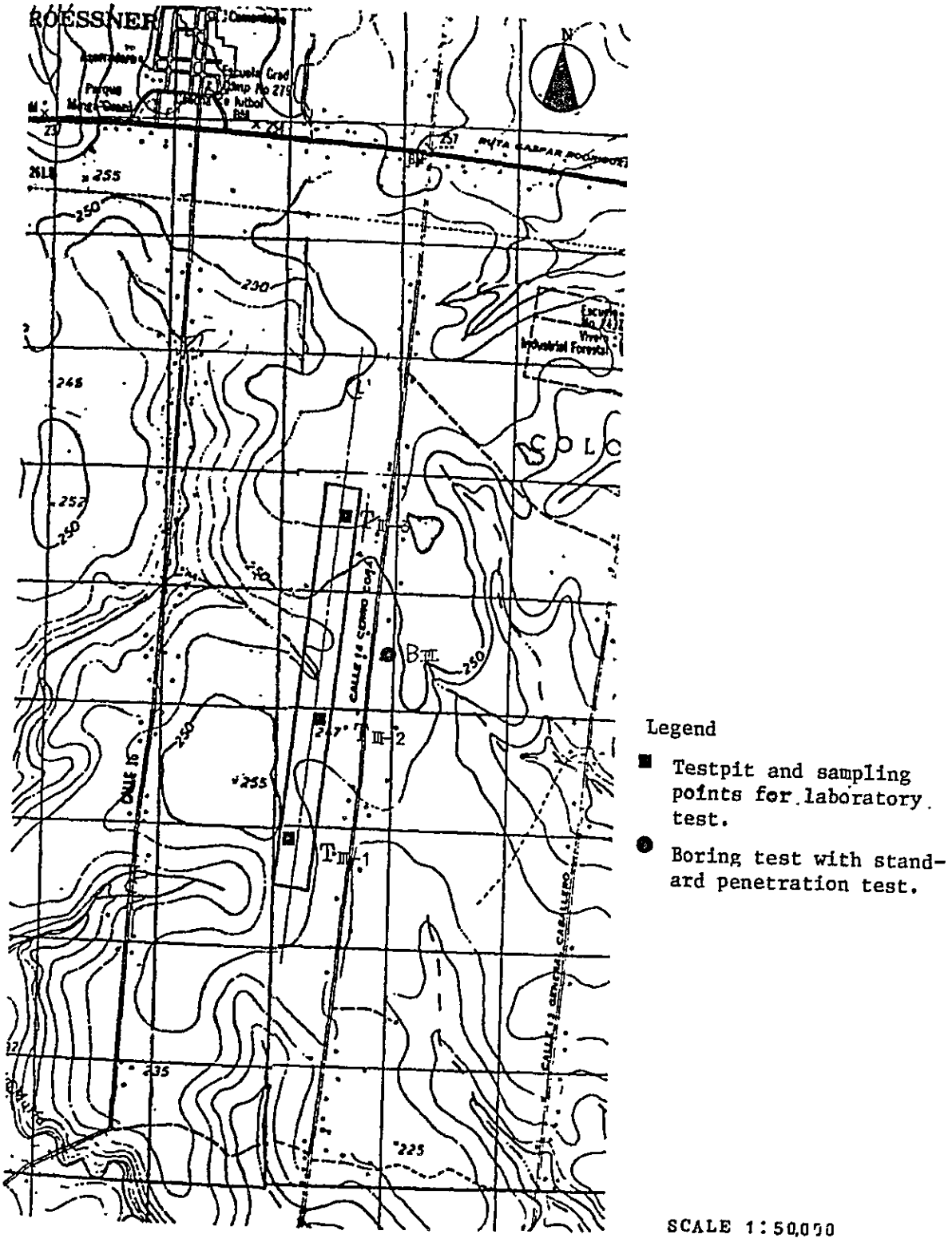


Fig. 5.10 LOCATIONS OF TESTPITS AND BORING TEST AT SITE III

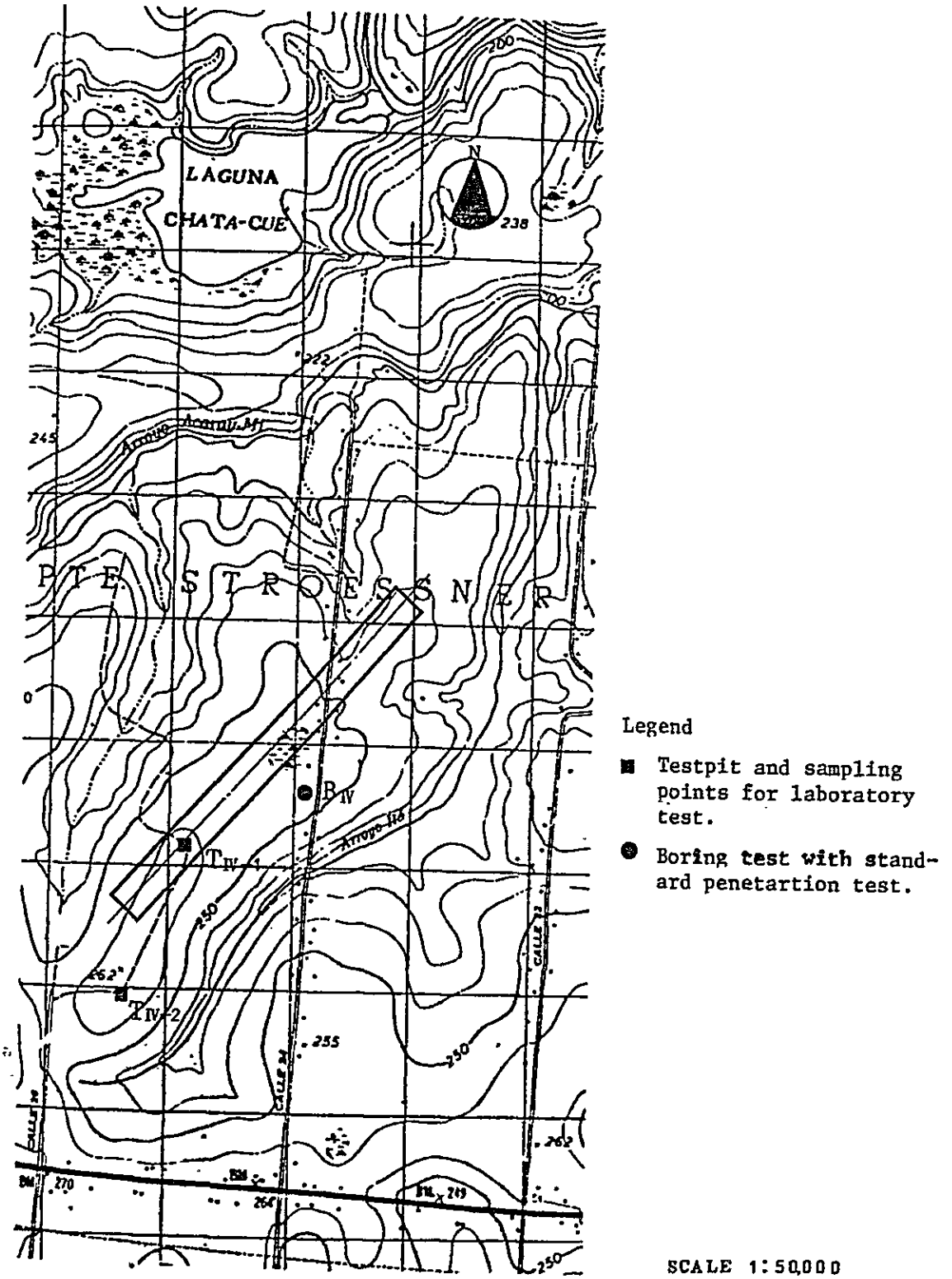


Fig. 5.11 LOCATIONS OF TESTPITS AND BORING TEST IN SITE IV

Table 5.3 SUMMARY OF SOIL TEST RESULTS

Site	Pit No.	Grading Analysis % Sieve No. 10	40	200	Index Tests LL %	PL %	PI %	Extended Casagrande Classification	Compaction Test Max. Dry Density kg/m^3	Optimum M.C. %	CBR Test CBR %	at M.C. %	Specific Weight	Natural Water Content %
I	I-1-1	99.2	98.5	97.2	50.4	28.0	22.4	CH	1435	30.9	9	31.1	2.79	37.2
	I-1-2	99.5	98.7	97.3	55.1	27.7	27.4	CH	1415	31.4	11	30.8	2.75	41.9
	I-2-1	99.5	98.8	97.5	52.3	29.0	23.3	CH	1440	30.4	9	30.7	2.78	38.0
	I-2-2	98.9	98.1	96.6	63.2	29.5	33.7	CH	1470	29.3	20	28.9	2.86	-
	I-3-1	99.8	99.3	97.6	52.9	30.1	22.8	MH	1490	28.6	20	29.0	2.77	35.9
	I-3-2	99.6	98.8	97.3	50.8	26.7	24.1	CH	1430	29.9	14	29.7	2.79	43.0
II	II-1-1	99.7	99.1	97.4	57.5	30.6	26.9	CH	1410	30.9	14	31.1	2.78	41.0
	II-1-2	99.9	98.9	97.5	66.2	30.0	36.2	CH	1410	32.5	11	32.6	2.76	41.1
	II-2-1	98.1	97.0	95.1	61.1	29.0	32.1	CH	1430	29.9	17	29.8	2.78	38.6
	II-2-2	97.1	96.0	94.1	59.0	29.2	29.8	CH	1465	30.4	16	29.8	2.76	-
	II-3-1	99.9	99.5	98.3	56.9	26.9	30.0	CH	1440	29.7	14	30.0	2.78	40.3
	II-3-2	99.9	99.5	98.3	57.6	29.4	28.2	CH	1415	31.3	19	31.6	2.74	41.3
III	III-1-1	99.6	99.1	96.6	54.0	28.9	25.1	CH	1449	29.9	14	29.8	2.76	38.5
	III-1-2	99.5	98.9	96.5	58.9	28.6	30.3	CH	1475	29.2	15	29.5	2.83	39.6
	III-2-1	99.7	99.4	97.8	55.3	27.7	27.6	CH	1415	31.0	14	31.1	2.73	41.2
	III-2-2	99.9	99.6	98.7	61.6	28.8	32.8	CH	1455	29.5	21	29.6	2.76	-
	III-3-1	99.8	99.5	98.5	59.6	27.9	31.7	CH	1430	31.0	12	31.0	2.69	41.3
	III-3-2	99.8	99.2	97.9	57.8	28.6	29.2	CH	1440	30.7	16	30.5	2.67	41.7
IV	IV-1-1	99.9	99.6	98.2	62.6	28.0	34.6	CH	1450	31.2	14	31.0	2.76	41.3
	IV-1-2	99.8	99.2	96.7	63.2	30.1	33.1	CH	1455	29.4	19	29.4	2.82	-
	IV-2-1	99.9	99.7	97.5	49.4	26.3	23.1	CH	1475	29.3	12	28.8	2.75	37.3
	IV-2-2	98.2	97.2	95.3	60.4	30.3	30.1	CH	1405	30.9	16	31.2	2.71	38.9

Note: A dash indicates test not carried out.

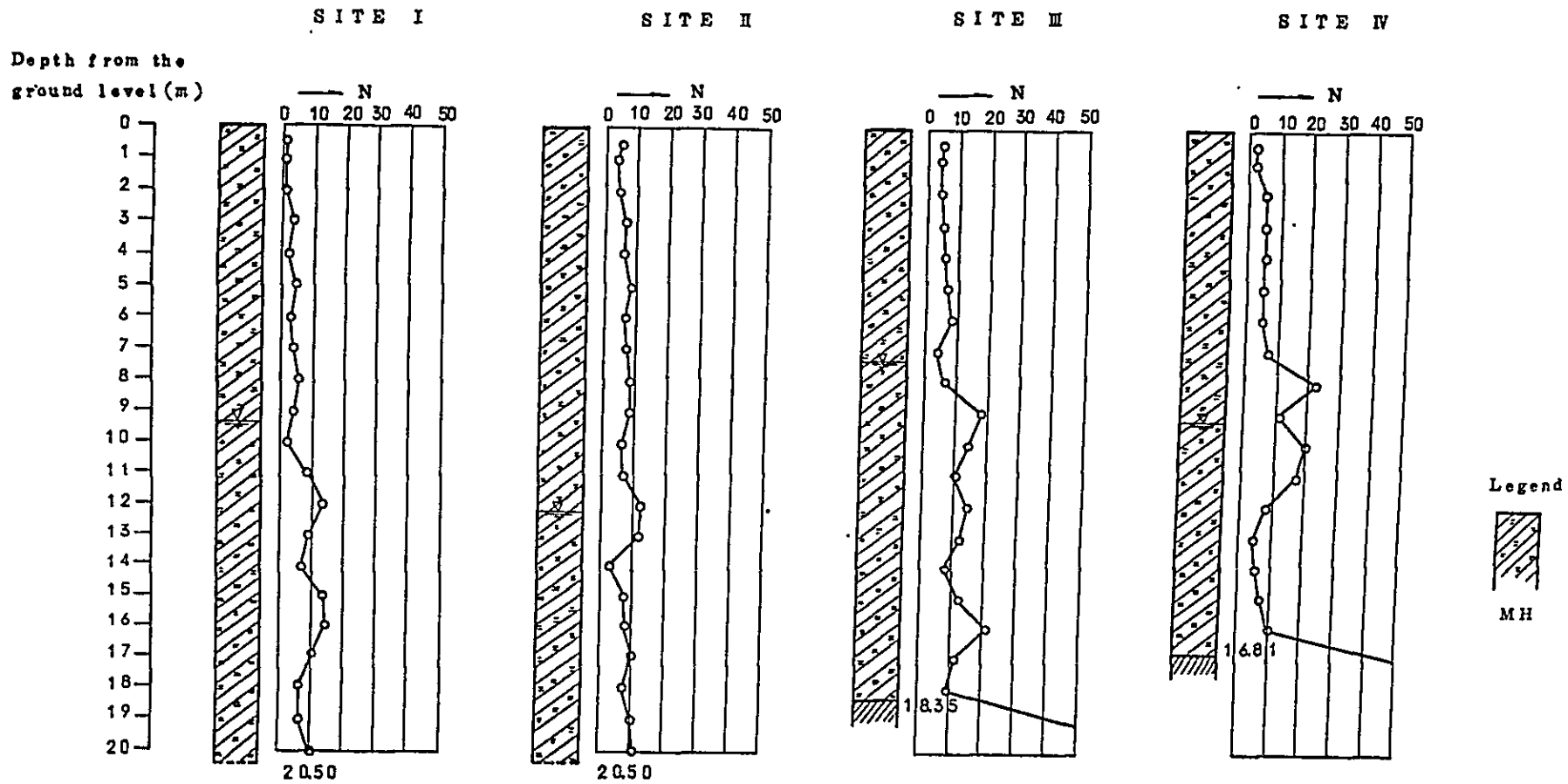


Fig. 5.12 RESULTS OF STANDARD PENETRATION TEST

2) Topographical features

A series of reconnaissance was made in and around each site with the help of the map in scale of 1 to 50,000 in order to identify the topographical conditions that might affect the earthwork, drainage works, accessibility from the near-by existing roads, and countermeasures against obstacles to aircraft operation, if any.

Site I

The elevation of the site grades down slightly toward south and the entire area is generally cultivated. The quantity of earthwork is anticipated to be comparatively small among the four sites. The principal disadvantage of this site is access, which requires an access road some 15 km long to be newly built.

Site II

In order to avoid the existing high tension electric power lines on Pylons 32 m to 38 m high, the site must be located sufficiently away from it to the north, and this requires high elevated approach lights to be provided on the north side of the runway. Ruta 7 gives good access from CPS to this site.

Site III

The site slopes down toward the south with considerable undulation, which will cause bigger amount of earthwork than any other potential sites.

Site IV

About one third of the site is uncultivated and covered with thick forests. The site is located on a hill gently falling toward the northeast. On

account of the advantage of having Ruta 7 passing nearby, the access feeder road required to be constructed amounts only to 3 km.

5.3.4 Present Land Use

The present land use in and around each and all of the four potential sites invariably poses no particular problem in possible development of the new airport.

5.3.5 Anticipated Effects on the Regional Community

The present situation and the possible manner of future development of the region centered around CPS were studied through reconnaisance and discussions with the officials concerned of the Government of the Republic, the municipal authorities, etc. in order to estimate both beneficial and adverse effects on the surrounding community of the possible development of the new airport at each site.

Site I

Since there are and expected to be very limited number of inhabitants in and around the site, the noise hazard caused by the new airport will not become a serious problem in the surrounding community. On the other hand, the orientation of the runway at this site is such that it will undoubtedly cause a noise problem not only to the existing urban community of CPS but also to the future urban area of CPS which is expected to grow along Ruta 7 toward the west.

Site II

The new airport at this site may block the future development of CPS which, as mentioned above, is

expected to grow rapidly along Ruta 7 toward the west. The airport will also cause a noise problem to the community to be newly developed.

Site III

Similar effects to those on site II are anticipated on this site.

Site IV

The new airport at this site will cause to accelerate the growth of CPS toward the west along Ruta 7. Being reasonably away from the center of CPS, it will not block the future growth of CPS nor will it cause any serious noise nuisance to the regional community.

5.4 Overall Evaluation of Sites

Evaluation by criterion of the four potential sites is summarized as follows:

1) Meteorological conditions

Site IV may have the least fog problems among the four sites, and its runway orientation best meets the prevailing wind direction in the area.

2) Availability of airspace

In terms of aviation safety, site IV has the best availability of airspace compatible with that of the Foz do Iguacu Airport in Brazil.

3) Construction cost factors

No significant differences among the four sites are found.

4) Present land use

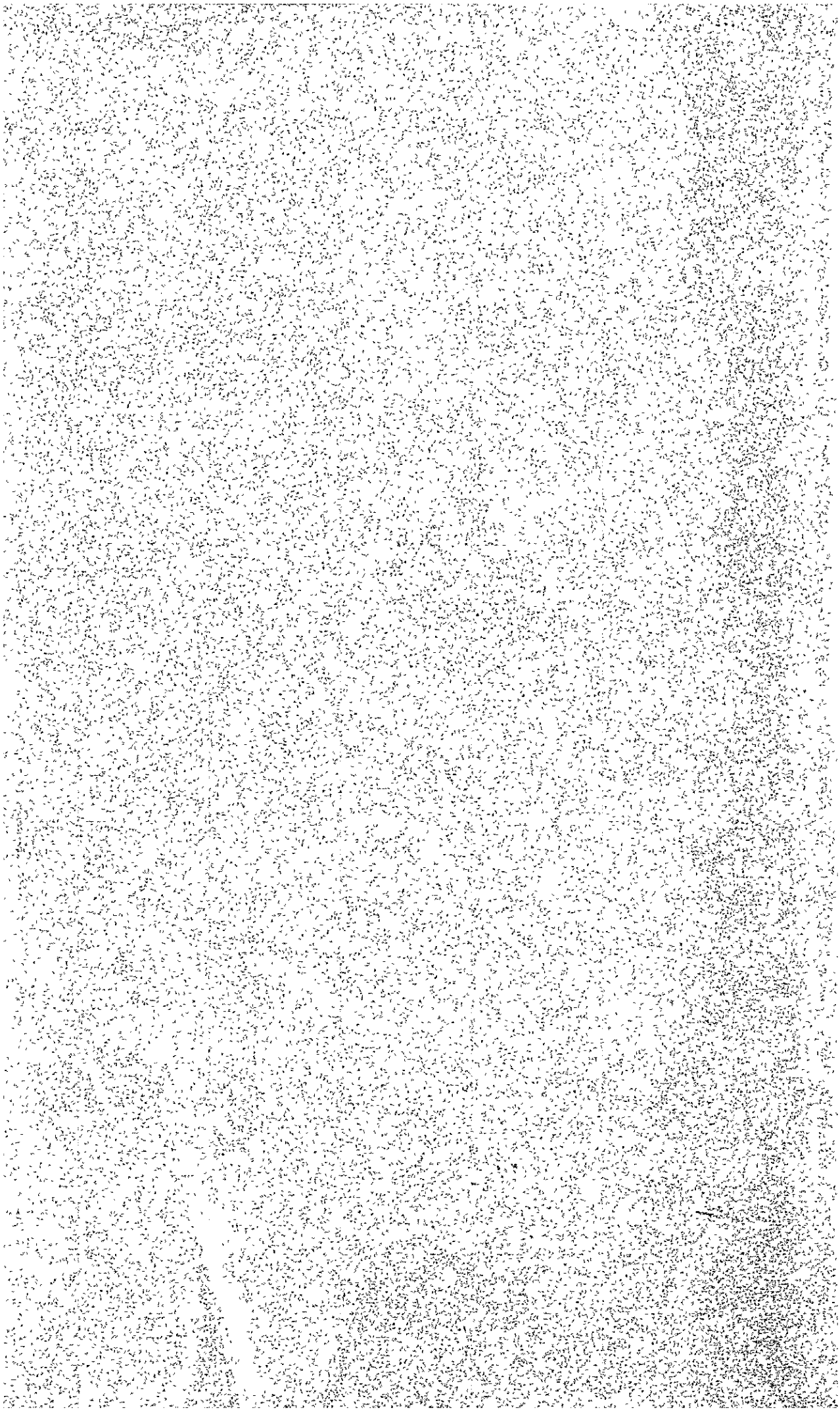
No particular problems are expected in this regard at any of the potential sites.

5) Anticipated effects on the regional community

Site IV will have the most advantageous effects of all four sites on the development of CPS.

Based on the above, site IV is considered to be the optimum site for the construction of the new CPS airport.

CHAPTER 6



CHAPTER 6 AIRPORT FACILITY AND AIRSPACE USE PLAN

Planning of the airport facility and of the airspace use presented in this chapter were made for the assumed construction of the new airport in site IV officially selected by the Government of the Republic as mentioned in the preceding chapter, with due consideration for the results of the discussions on the planning conditions with the officials concerned of the Government during the field survey period, and using the topographical map in scale of 1 to 5,000 prepared by Instituto Geografico Militar (IGM) by request of ANAC.

6.1 Parameters of Planning

6.1.1 Stages of New Airport Development

On the basis of discussions held in Paraguay as mentioned above, ultimate design year of the new airport construction project was established for the year 2004, and the development of the new airport was planned in the following two stages.

First stage (Stage I) : To be serviceable from 1985 to 1994

Second stage (Stage II): To be serviceable from 1995 to 2004

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 1994 and those of the Stage II, up to the year 2004, based on the traffic forecast made in

Chapter 3. Table 6.1 presents an outline of the facility requirements of each stage.

6.1.3 Topography and Geology of Proposed Site

The proposed airport site extends over gentle hills undulating 240 m - 260 m above sea level and generally sloping down toward the northeast. As mentioned in the preceding chapter, about one half of the site is uncultivated and covered with thick forest. The bed rocks of basalt lie at the depth of 16 - 20 m below ground level, on which lie laterite soil of weathered basalt rocks.

6.2 Airport Layout Plan

Figs. 6.1 and 6.2 show the proposed airport facility layout plan for Stages I and II respectively.

The major facilities are sited along the ridge of the gentle hill so as to minimize the amount of earthwork involved and to facilitate drainage works as well. The runway is orientated 05/23, with apron and terminal facilities located on the southeast side of the runway in a place convenient for the surface approach from the existing highway, Ruta 7. The runway usability related to the wind coverage is expected to be more than 98% under the maximum permissible cross wind component of 10 knots. Since aircraft approach to the runway will be made principally from the northeast, ALPA type approach lighting system is to be installed along the extended runway centerline to the northeast, and simplified approach lighting system long the extended runway centerline to the southwest.

Table 6.1 AIR TRANSPORT DEMAND AND AIRPORT FACILITY REQUIREMENTS BY DEVELOPMENT STAGE

		Stage I (1994)	Stage II (2004)
Annual Air Traffic			
Passengers			
International	Emb. & Disemb.	292.9	552.2
	Transit	32.1	60.7
	Total	325.0	612.9
Domestic	Emb. & Disemb.	97.3	179.7
	Transfer	116.7	214.3
	Total	214.0	394.0
Cargo (metric tons)			
International		3,020.4	5,837.8
Domestic		1,979.8	3,785.2
Aircraft Movements			
International Passenger Flight		3,900	6,900
Domestic Passenger Flight		5,940	8,640
International Freighter		0	71
Total		9,840	15,611
General Aviation (Small Aircraft)		6,960	11,120
Peaking Demand			
Scheduled Aircraft Movements/day		35	55
Passengers/half-hour			
International	Departure	90	180
	Arrival	90	180
	Transit	9	9
	Total	189	369
Domestic	Departure	76	160
	Arrival	76	160
	Total	152	320
Cargo Tonnage/day			
International	Outbound	4	7
	Inbound	9	38
	Total	13	45
Domestic		7	14

Facility Requirements		Stage I (1994)	Stage II (2004)
Runway Strip		3,520 m x 300 m	
Runway		3,400 m x 45 m	
Longitudinal Gradient (Maximum)		1.1%	
Taxiway, Exit		161 m x 23 m x 2	
Aircraft Parking Positions			
250-seater jet		-	2
180-seater jet		2	-
150-seater jet		1	2
120-seater jet		-	1
55-seater non-jet		3	3
Freighter		-	1
Total		6	9
Apron Area	Passenger	42,443 m^2	55,107 m^2
	Cargo	-	6,831 m^2
	Maintenance	7,291 m^2	7,291 m^2
	General Aviation	52,500 m^2	70,000 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,	Intenational	5,900 m^2	9,800 m^2
	Domestic	2,200 m^2	4,400 m^2
	Total	8,100 m^2	14,200 m^2
International Cargo Terminal		1,400 m^2	4,300 m^2
Domestic Cargo Terminal		400 m^2	800 m^2
Administration Building with Control Tower		2,300 m^2	

	Stage I (1994)	Stage II (2004)
Fire Station	460 m^2	
Main Substation	980 m^2	
Other Buildings (Substation, Navaids Housing)	1,120 m^2	
Area to be Airconditioned		
Passenger Terminal Building	2,000 m^2	4,000 m^2
Administration Building	1,000 m^2	
Main Substation	550 m^2	
Other Buildings (Navaids Housing)	370 m^2	
Aeronautical Telecommunications Facility		
Aeronautical Mobile Service Facilities		
VHF Transmitter 50W	10 units	
VHF Receiver	10 units	
VHF/FM Transceiver	5 units	
VHF Auto Direction Finder	1 unit	
Air Traffic Control Consoles	1 set	
Magnetic Taperecorder	1 unit	
Aeronautical Fixed Service Facilities		
HF Transmitter and Receiver	2 units	
Teletypewriter	2 units	
VHF Transceiver (10W)	3 units	
Radio Navigational Aids	Cat-I ILS VOR/DME NDB (100W) NDB (1KW)	
Airport Surveillance Radar	1 set	
Meteorological Service Facility		
Weather Data Collecting Equipment	1 set	
Runway Visual Range Measuring Equipment (RVR)	1 set	
Ceilometer	1 set	
Weather Facsimile Receiver	2 units	
HF Transmitter and Receiver (Radio Teletype)	2 units	
Teletypewriter	4 units	

	Stage I (1994)	Stage II (2004)
Lighting Facilities		
Approach Lighting System		
Runway 23, ALPA Type, 900 m		1 set
Runway 05, Simple Type, 420 m		1 set
Approach Light Beacon		2 sets
Visual Approach Slope Indicator Systems (3BAR Type)		2 sets
Runway Edge Lights		
High Intensity Elevated Type		1 set
Runway End Lights		
High Intensity Elevated Type		1 set
Runway Threshold Lights		
High Intensity Elevated Type		1 set
Taxiway Edge Lights		
Medium Intensity Elevated Type		1 set
Aerodrome Beacon		1 unit
Wind Direction Indicator Lights		2 units
Apron Flood Lights		1 set
Car Parking and Street Lights		1 set
Car Parking		
Parking Spaces	447 cars	689 cars
Area	16,905 m^2	26,075 m^2
Fuel Storage & Distribution		
Daily Demand	120 Kl.	180 Kl.
Storage Capacity	1,050 Kl.	1,750 Kl.
Storage Area	6,500 m^2	
Distribution System	Hydrant	
Aircraft Maintenance Hangar Area	15,000 m^2	

	Stage I (1994)	Stage II (2004)
Utilities		
Electric Power Supply Contract Demand		
Passenger Terminal Building	430 KVA	770 KVA
International Cargo Building	50 KVA	160 KVA
Domestic Cargo Building	20 KVA	30 KVA
Administration Building	140 KVA	140 KVA
Fire Station	20 KVA	20 KVA
Main Substation	70 KVA	70 KVA
Other Buildings	40 KVA	40 KVA
Airfield Lighting	220 KVA	220 KVA
Apron Flood Lighting	80 KVA	110 KVA
Car Parking and Street Lights	30 KVA	40 KVA
Radio Nav-aids	110 KVA	110 KVA
Water Supply	20 KVA	30 KVA
Reserve	-	480 KVA
Total	1,230 KVA	2,220 KVA
Water Supply/day		
Average	160 Kl.	250 Kl.
Maximum	240 Kl.	375 Kl.
Sewage Treatment/day	240 Kl.	375 Kl.
Microwave Telephone Circuit Facility	1 set	
Approach Road		
One Way Traffic		
Private Car/peak hour		
Passenger and Wellwishers	36	36
Employees	157	251
Taxies	79	91
Total	272	378
Bus/peak hour		
Passengers and Wellwishers	7	7
Employees	6	9
Total	13	16
Truck/day	26	42
Number of Lanes	one for each direction	
Lane Width	3.5m	

	Stage I (1994)	Stage II (2004)
Airport Special Equipment		
Passenger Boarding Bridge	1	3
Baggage Handling Unit		
International, Outbound	1	2
Inbound	1	2
Domestic, Outbound	1	1
Inbound	1	2
X-Ray Baggage Inspection System		
International	1	2
Domestic	1	1
Metal Detector System		
International	1	2
Domestic	1	1
Flight Information Display System		
International	1 set	
Domestic	1 set	
Elevator	1	
Control Tower	1	
Escalator, Passenger Terminal	1	
Cold Storage System		
International Cargo Bldg.	25 m^2	50 m^2
Fire Fighting & Rescue Vehicles		
Rapid Intervention Vehicle	1	
Major Vehicle	2	
Ambulance	1	
Command	1	

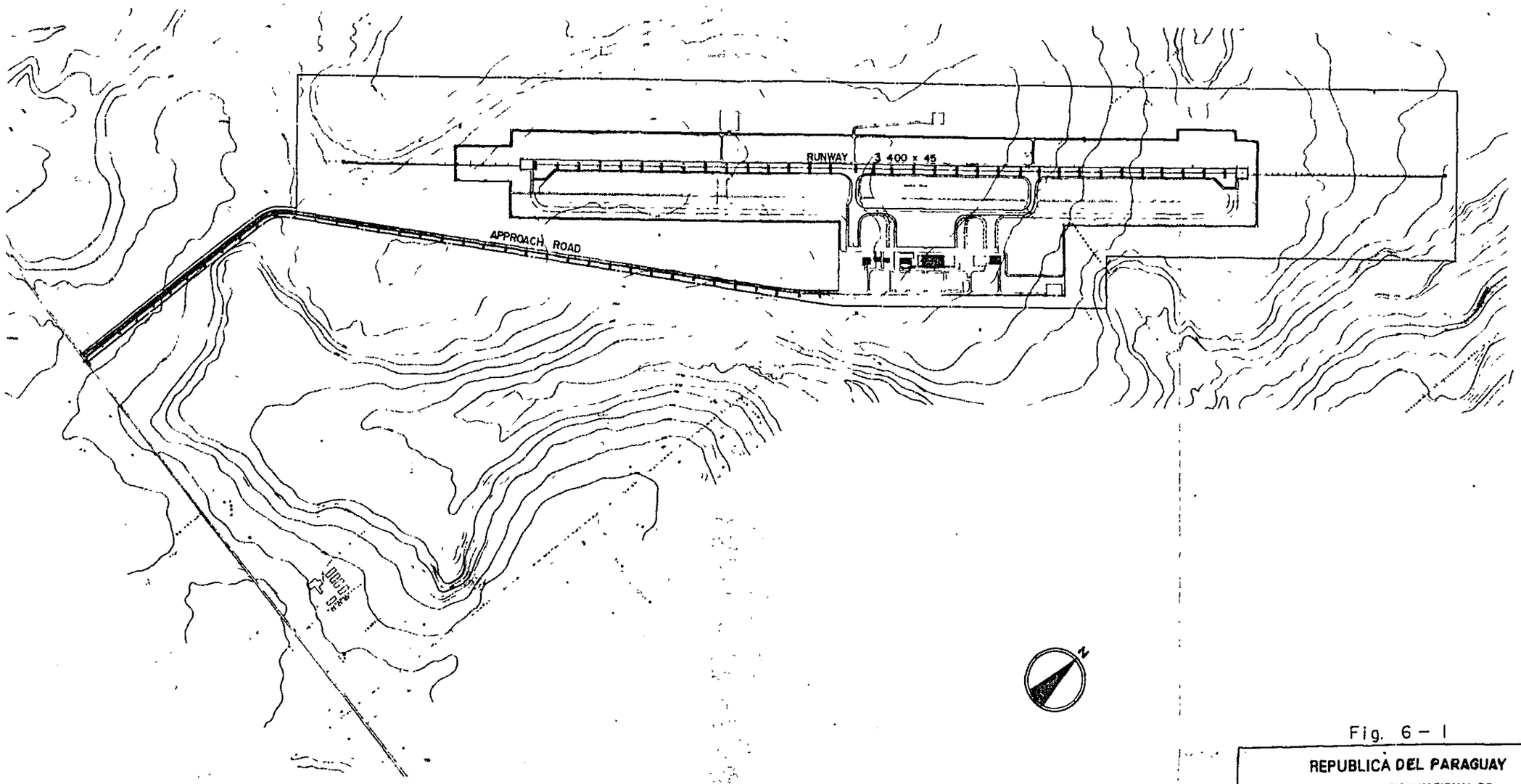
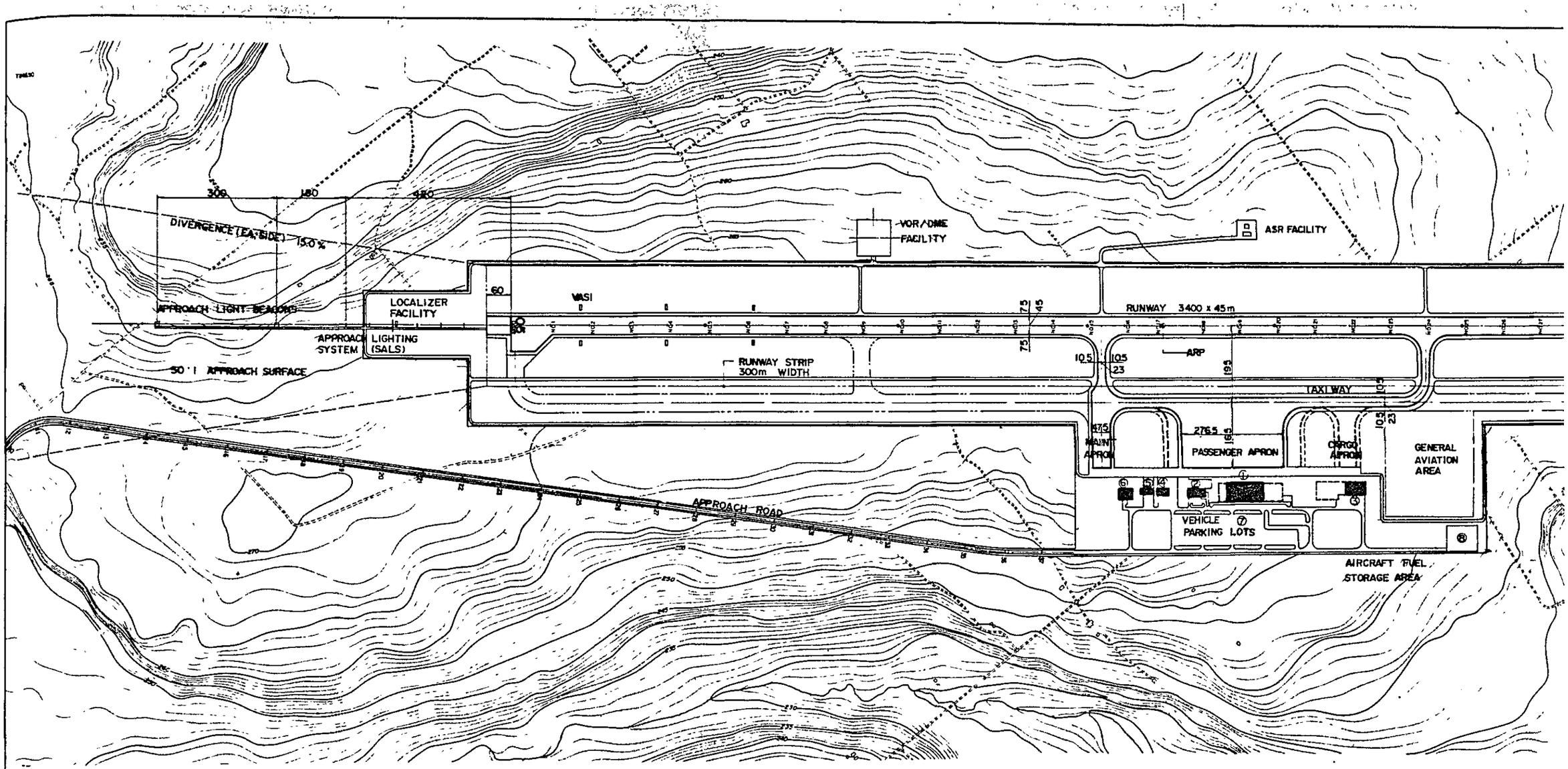
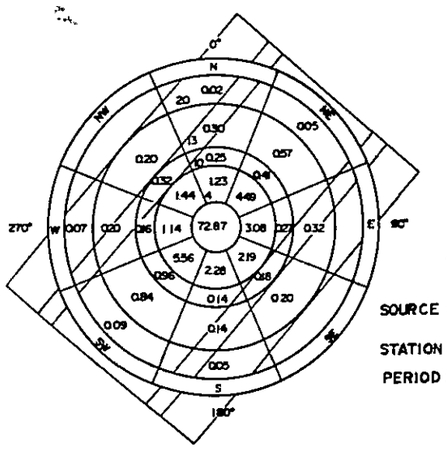


Fig. 6 – 1

REPUBLICA DEL PARAGUAY ADMINISTRACION NACIONAL DE AEROPUERTOS CIVILES	
NEW CPS AIRPORT DEVELOPMENT	
LAYOUT – 1	FEB 1980 2
JAPAN INTERNATIONAL COOPERATION AGENCY	



WIND ROSE



SOURCE : DIRECCION DE METEOROLOGIA
STATION : EXISTING CPS AIRPORT
PERIOD : 1976 ~ 1978

AIRPORT DATA

AIRPORT ELEVATION	257 m
AIRPORT REFERENCE POINT (ARP) COORDINATES	S 025° 27' W 054° 51'
AIRPORT & TERMINAL NAV AIDS	VOR.
MEAN MAX. TEMP OF HOTTEST MONTH	33.0°C

RUNWAY DATA

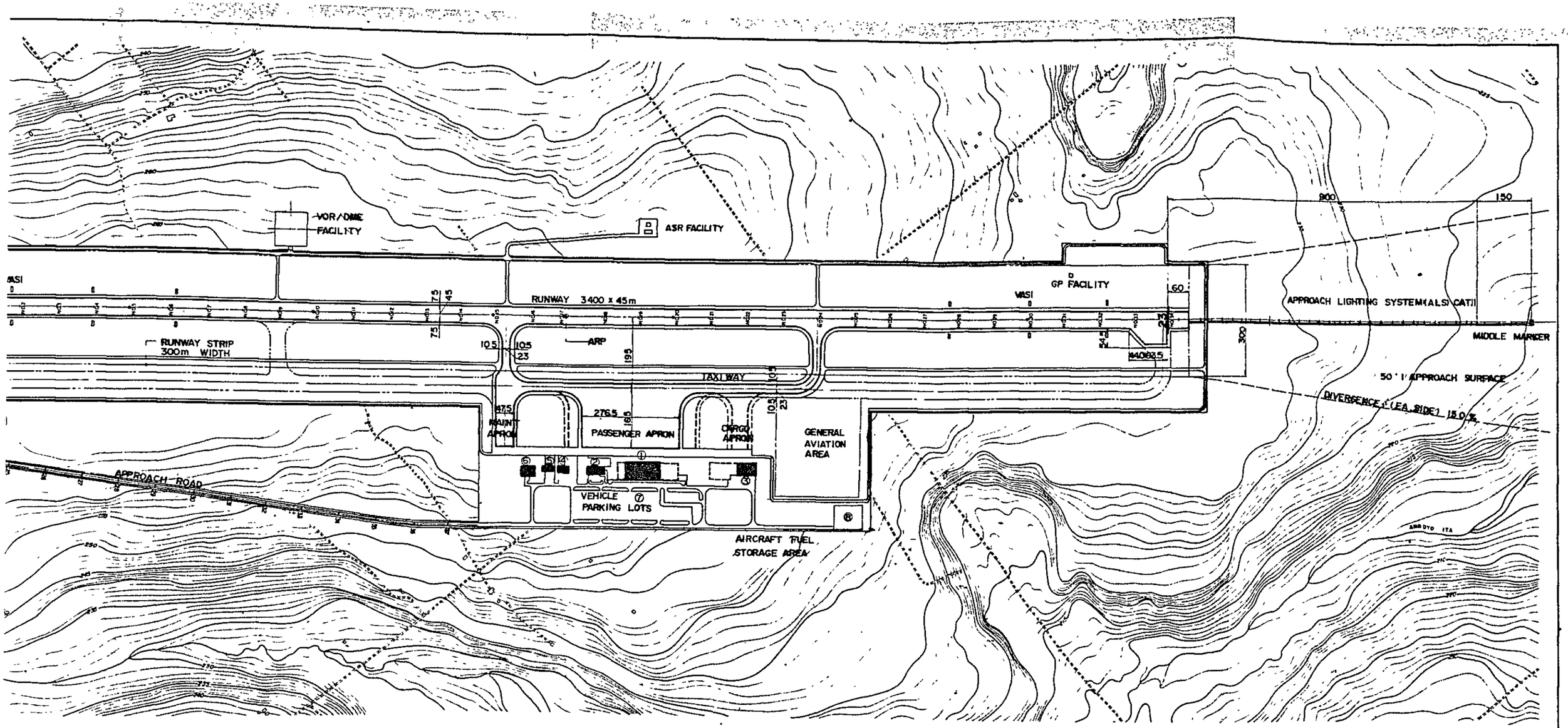
EFFECTIVE RUNWAY GRADIENT (IN %)		0 825
% WIND COVERAGE	20 KNOTS	99 9
	13 KNOTS	99 2
	10 KNOTS	98 2
PRECISION APPROACH RUNWAY CAT I		RUNWAY-23
PAVEMENT STRENGTH		B747, L-1011, DC-8 CLASS
APPROACH SLOPES		50 I
LIGHTING		HIRL
MARKING		ICAO STANDARDS
NAVIGATIONAL AIDS		ILS, ALS, SALS, VASIS

LEGEND
STAGE I
STAGE II

BUILDINGS

① PASSENGER TERMINAL BUILDING
② AIRPORT ADMINISTRATION BUILDING
③ INTERNATIONAL CARGO BUILDING
④ DOMESTIC CARGO BUILDING
⑤ FIRE STATION
⑥ MAIN SUB-STATION
⑦ PARKING LOT
⑧ FUEL STORAGE

LEGEND
STAGE
STAGE



AIRPORT DATA

AIRPORT ELEVATION	257 m
AIRPORT REFERENCE POINT (ARP) COORDINATES	S 025° 27' W 054° 51'
AIRPORT & TERMINAL NAV AIDS	VOR
MEAN MAX. TEMP. OF HOTTEST MONTH	33.0°C

RUNWAY DATA

EFFECTIVE RUNWAY GRADIENT (IN%)		0.825
% WIND COVERAGE	20 KNOTS	99.9
	13 KNOTS	99.2
	10 KNOTS	98.2
PRECISION APPROACH RUNWAY CAT I		RUNWAY-23
PAVEMENT STRENGTH		B747, L-1011, DC-8 CLASS
APPROACH SLOPES		50:1
LIGHTING		HIRL
MARKING		ICAO STANDARDS
NAVIGATIONAL AIDS		ILS, ALS, SALS, VASIS

LEGEND
- STAGE I
- STAGE II

BUILDINGS

① PASSENGER TERMINAL BUILDING
② AIRPORT ADMINISTRATION BUILDING
③ INTERNATIONAL CARGO BUILDING
④ DOMESTIC CARGO BUILDING
⑤ FIRE STATION
⑥ MAIN SUB-STATION
⑦ PARKING LOT
⑧ FUEL STORAGE

LEGEND
- STAGE I
- STAGE II

GRAPHIC SCALE
0 100 200 300 400 500m
1 : 5,000

Fig 6 - 2

REPUBLICA DEL PARAGUAY
ADMINISTRACION NACIONAL DE AEROPUERTOS CIVILES

NEW CPS AIRPORT DEVELOPMENT

LAYOUT — 2 | FEB 1980 | 3

JAPAN INTERNATIONAL COOPERATION AGENCY

An approach feeder road to connect the new airport to the existing highway Ruta 7 is routed in such a manner as to optimize smooth surface traffic movements and to minimize the amount of earthwork involved.

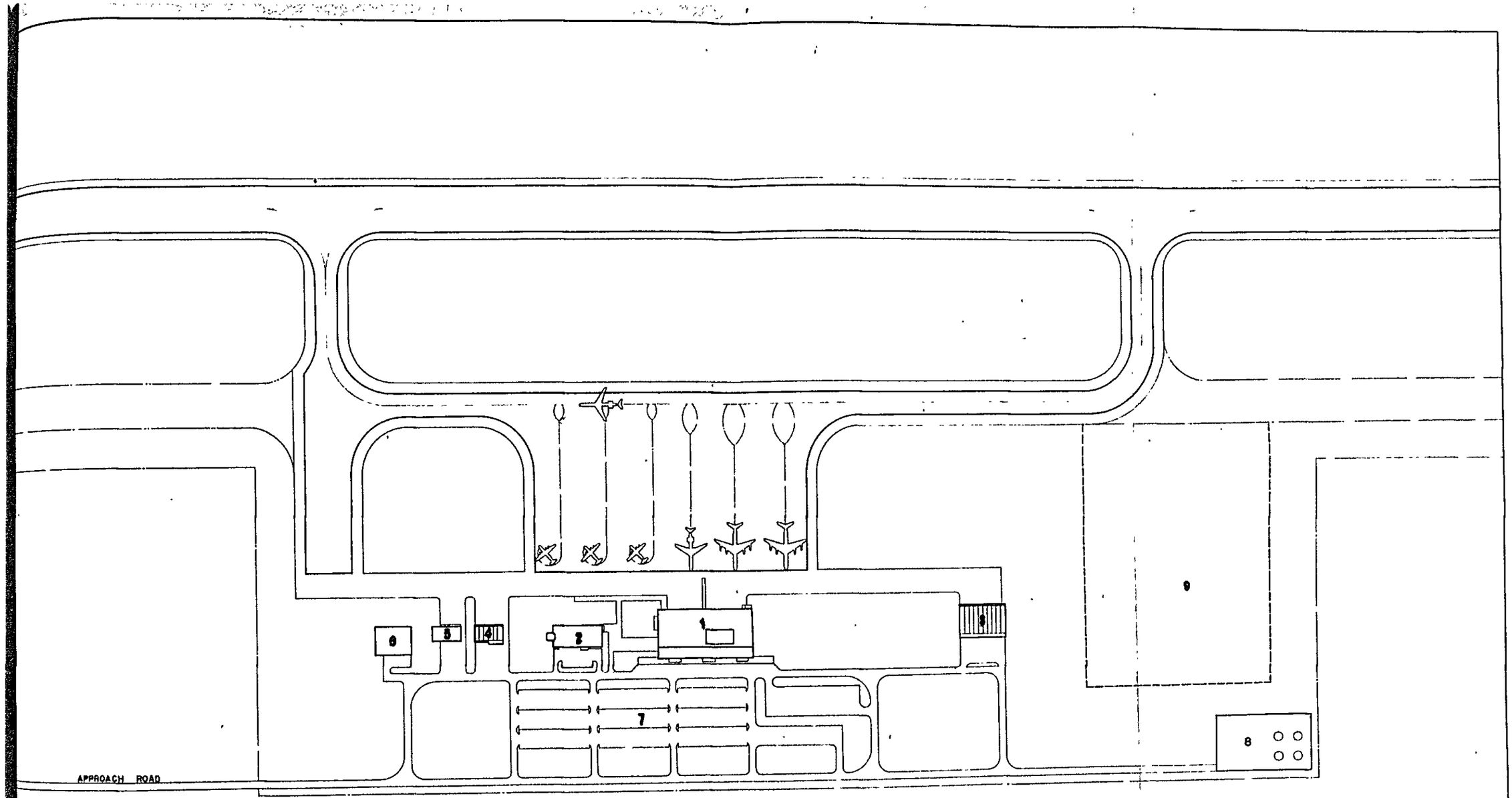
6.3 Airport Facility Plan

6.3.1 Runway, Taxiway and Apron

As mentioned in Chapter 4 above, the length of the runway is determined to be 3,400 m after correction for the planned gradient of the prepared site.
Stage I, and no addition nor extension is considered for Stage II. The width is planned to remain at 45 m through the ultimate design year of 2004. All of the 23-meter wide taxiways are to be provided in Stage I and are expected to be adequately serviceable through Stage II. Turning pad designed for B747-class aircraft is to be provided at either end of the runway in Stage I. Passenger loading apron is to be sited close to the center of the runway, and extends 165 m in depth from the centerline of the apron edge taxiway so as to accommodate nose-in parking of B747-class aircraft. Cargo loading apron is not to be provided in Stage I where freighters are expected to share the passenger loading apron as necessary. Separate cargo apron with one freighter parking position will be provided to the northeast of the passenger apron in Stage II. Apron for aircraft maintenance is planned on the southwest of the passenger loading apron. The general aviation apron to accommodate 150 small aircraft in Stage I and 200 in Stage II is to be sited on the northeast end of the terminal area.

6.3.2 Terminal Facilities

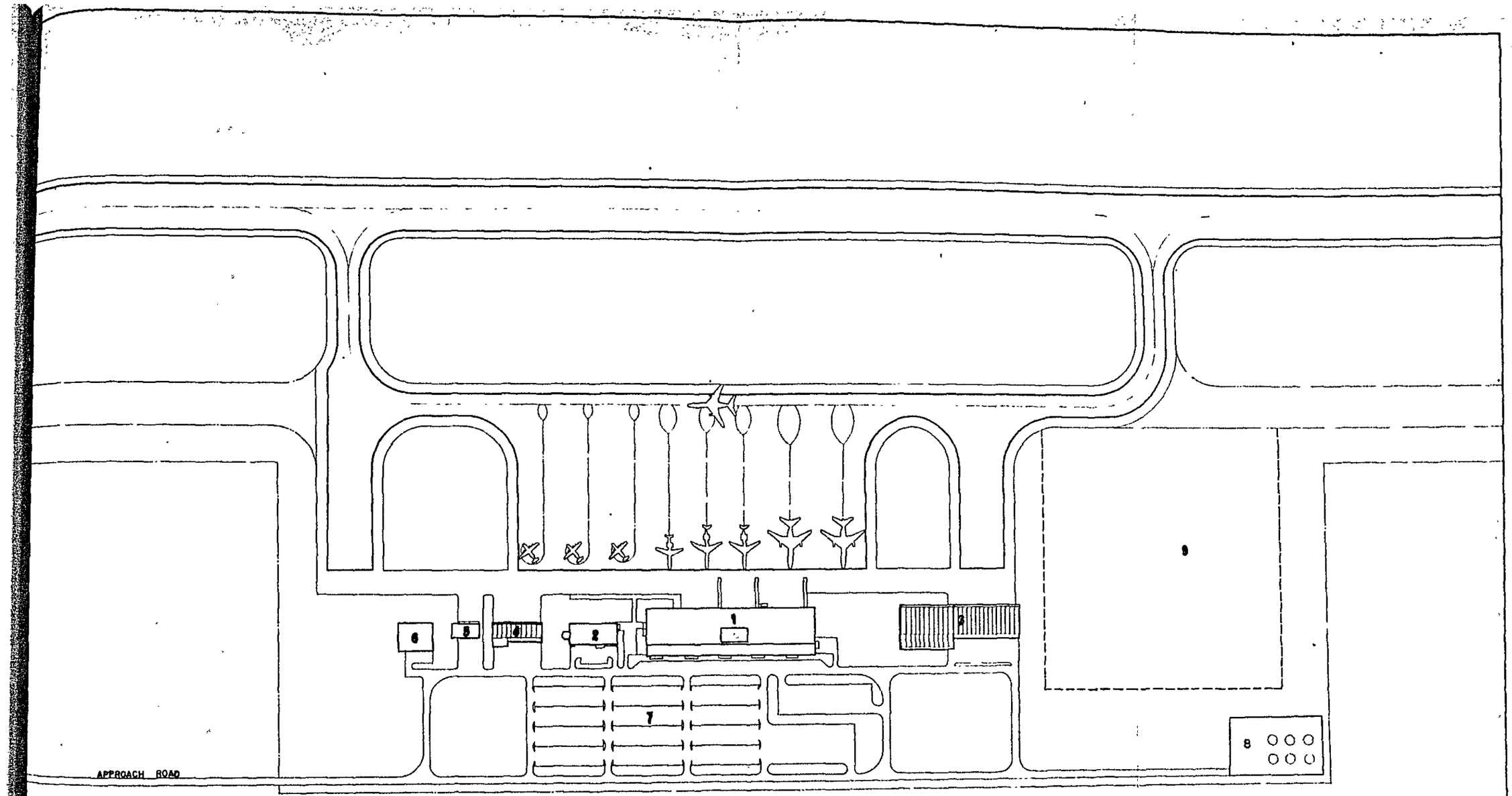
The entire terminal facility layout plan is shown in Figs. 6.3 and 6.4 for Stage I and Stage II respectively.



1 PASSENGER TERMINAL BUILDING
2 ADMINISTRATION BUILDING
3 INTERNATIONAL CARGO BUILDING
4 DOMESTIC CARGO BUILDING
5 FIRE STATION
6 MAIN SUBSTATION
7 PARKING LOT
8 FUEL STORAGE
9 GENERAL AVIATION APRON

Fig 6 - 3

REPUBLICA DEL PARAGUAY ADMINISTRACION NACIONAL DE AEROPUERTOS CIVILES	
NEW CPS AIRPORT DEVELOPMENT	
TERMINAL AREA LAYOUT – STAGE 1	FEB 1980 11
JAPAN INTERNATIONAL COOPERATION AGENCY	



1 PASSENGER TERMINAL BUILDING
2 ADMINISTRATION BUILDING
3 INTERNATIONAL CARGO BUILDING
4 DOMESTIC CARGO BUILDING
5 FIRE STATION
6 MAIN SUBSTATION
7 PARKING LOT
8 FUEL STORAGE
9 GENERAL AVIATION APRON

Fig. 6 - 4

REPUBLICA DEL PARAGUAY ADMINISTRACION NACIONAL DE AEROPUERTOS CIVILES	
NEW CPS AIRPORT DEVELOPMENT	
TERMINAL AREA LAYOUT - STAGE II	FEB 1980 12
JAPAN INTERNATIONAL COOPERATION AGENCY	

1) Passenger terminal building

Passenger terminal for international and domestic services is planned in one building, taking into account the convenience of passengers transferring between international and domestic services, and to optimize administrative efficiency of terminal operation. To minimize the passenger walking distance, the terminal building is placed right in front of the center of the passenger loading apron, with due consideration for facilitating the staged construction.

The building is functionally divided into the international service block and the domestic service block. One-and-half-level passenger processing system is planned for international service and one-level processing for domestic service. A combined international and domestic passenger check-in facilities are planned on the first floor with separate international and domestic baggage claim facilities on either side. Customs facilities are located on the first floor, and international departure lounge, security check facilities, Quarantine and Immigration facilities both for international departing and arriving passengers are planned on the second floor of the international service block. Restaurants and gift shops are placed on the second floor of the domestic service block in such a manner as to serve both international and domestic passengers. In the second stage of development, the terminal building is to be expanded by seven 7-meter spans in the international service block, and by four 7-meter spans in the domestic service block, and the facilities for arriving passengers of both international and domestic services are to be relocated to the expanded areas in order to meet the increasing

passenger handling requirements. The conceptual plan of the passenger flow in the terminal building is shown in Fig. 6.5. The plans and sections of the passenger terminal building are shown in Appendix 6-1, 6-2 and 6-3.

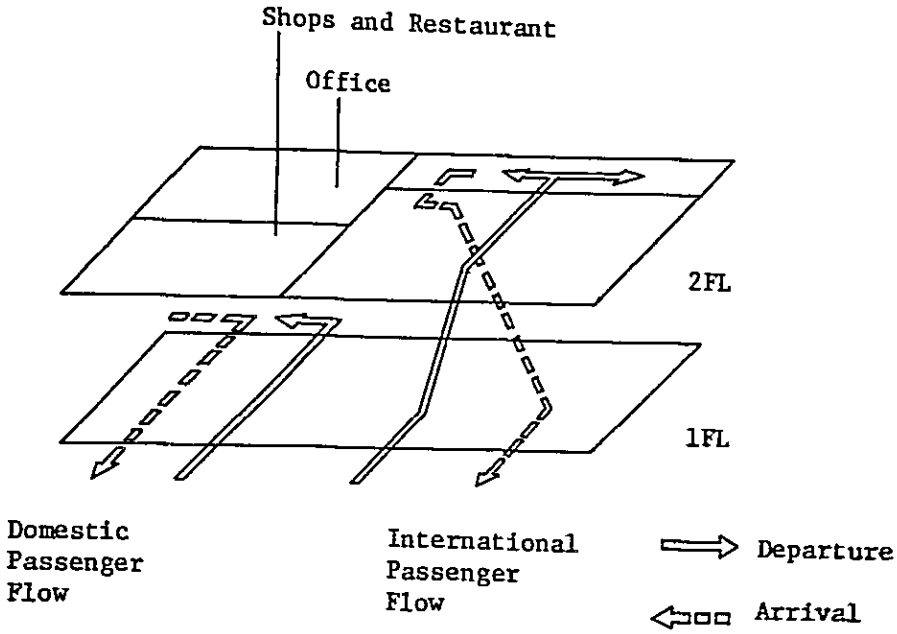


Fig. 6.5 CONCEPTUAL PLAN OF PASSENGER FLOW IN TERMINAL BUILDING

2) Cargo terminal building

Cargo terminal is planned in 2 separate buildings, one for domestic cargo and the other for international cargo. The international cargo building is located right in front of the site reserved for cargo loading apron to be constructed in Stage II. The domestic cargo building is located near the domestic passenger aircraft apron since all domestic cargo is assumed to be transported in belly.

International cargo terminal building measuring 49 m x 28 m is planned with due regards for the functional coordination among the cargo storage area, cargo processing area, offices and the cold storage

area. The international cargo processing area is planned with sufficient depth to allow for systematic handling of cargo distinguished between those requiring and not requiring customs clearance. The building is divided into the import and the export cargo processing areas, with the offices located in between. The bonded cargo storage area is planned adjacent to the import cargo processing area. In the second stage of development, the international cargo building is to be expanded by three 7-meter spans in width, plus an area measuring 56 m x 42 m intended for the bonded cargo storage.

The domestic cargo building measuring 28 m x 14 m is planned consisting of the cargo processing area and the offices. In the second stage of development, the office is to be expanded by one 7-meter span toward the land side, and the cargo processing area by three 7-meter spans toward the northeast. The plans and sections of the cargo terminal buildings are shown in Appendix 6-4.

3) Airport administration building

An independent airport administration building with control tower is planned in the interest of security. It is placed in between the passenger terminal building and the domestic cargo terminal building.

The two-level airport administration building with the control tower attached on the southwest side of the building, is planned with six functional blocks as illustrated in Fig. 6.6. The floor plans and sections of the building are shown in Appendix 6-4.

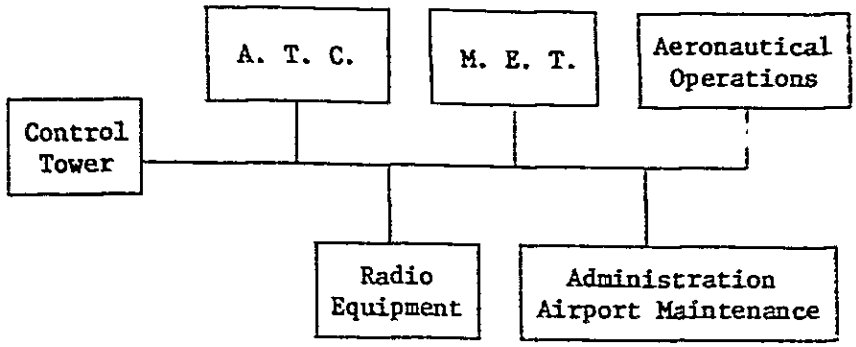


Fig. 6.6 FUNCTIONAL BLOCKS OF ADMINISTRATION BUILDING

4) Fire-fighting and rescue facilities

These facilities are planned at a location to facilitate speedy mobilization in case of emergency on the Southwest side of the domestic cargo terminal building where few obstacles exist.

5) Main substation

Main substation is placed to the southeast of the terminal area for the sake of optimum layout of the electric power distribution system of the airport.

6) Fuel storage

Aviation fuel storage facilities are placed away from other facilities of the airport for the sake of safety and security.

6.3.3 Airfield Lighting, Radio Nav-aids, Telecommunications and Meteorological Facilities

1) Airfield lighting system

Airfield lighting is planned as listed in Table 6.1 above for installation as illustrated in Appendix 6-5 in conformity with the standards and recommendations of Annex 14 and Aerodrome Design Manual Part 4 of ICAO.

ALPA formula (Barrete Centreline) approach lighting system is planned for the precision approach runway 23, and Simplified Approach Lighting System (SALS) is planned for the non-precision runway 05.

2) Radio navigational aids

A set of Instrument Landing System (ILS), VHF-Omni-directional Radio Range and Distance Measuring Equipment (VOR/DME), and two Non-directional Radio Beacons (NDBs) are planned in Stage I. The ILS planned for Stage I for the precision approach runway 23 consists of Localizer (LLZ), Glide Path (GP), Middle Marker (MM) and Outer Marker (OM). One of the NDBs to be located at a distance of 11 NM on the extended runway center-line from the threshold of the precision approach runway 23 is to be so powered as to be able to function as an en-route aid and also as a compass locator. Another NDB needed to establish a 3-mile wide ADF final approach area based on the "Two-NDB" criteria of ICAO will be located at 1.1 NM on the same runway extension.

3) Telecommunications facilities

The telecommunications facilities planned for the new airport consist of those for the Aeronautical Mobile Service (AMS), the Aeronautical Fixed Service (AFS) and for the Meteorological Information Service (MET) as shown in Table 6.1. As for the AFS, a radio-teletype-writer circuit connecting with the Area Control Center (ACC) at Asuncion Airport is planned, along with a VHF link connecting with the neighboring airports such as Foz do Iguacu airport, Cataratas airport and Itaipu Binacional airport. All of the telecommunications facilities serviceable through the year 2004 are to be provided in Stage I.

4) Meteorological service facilities

The meteorological service facilities to accommodate the requirements of up to 2004 are planned for installation all in Stage I as listed in Table 6.1 based on the requirements of meteorological service standards specified in Annex 3, ICAO.

Radio nav-aids, Telecommunications and Meteorological System diagrams are shown in Fig. 6.7.

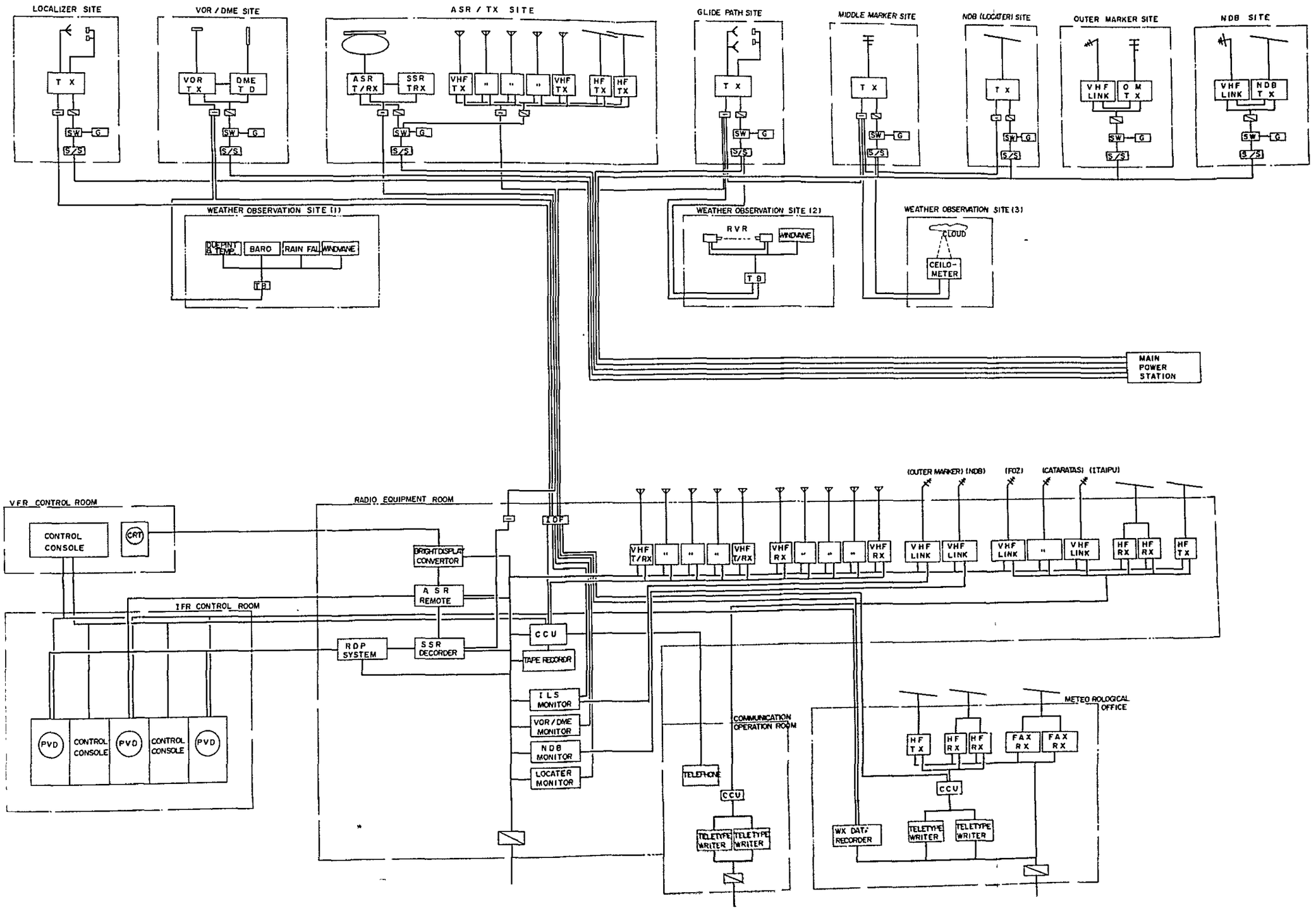


Fig 6.7 RADIO NAV-AIDS. TELECOMUNICATIONS AND METEOROLOGICAL SYSTEMS

6.3.4 Utilities

1) Electric power supply system

Power to be supplied to the new airport by Administracion Nacional De Electricidad (ANDE) from the existing medium-tension power line along Ruta 7 will be of the following characteristics:

Service Voltage	23 KV
System	3 phase 3-wire
Cycle	50 Hz

A main substation is planned on the airport premises to receive the ANDE-supplied power and to supply the power at the voltage lowered to 6.6 KV for distribution to the airport facilities including the passenger terminal building, cargo terminal buildings and administration building, as well as to the visual and radio navigational aids, etc. Schematic diagram of the electric power distribution system is shown in Fig. 6.8.

2) Potable water supply facilities

An independent water supply system for exclusive use of the new airport is to be provided. The water pumped up from a deep well will be purified through a siltation pond, a filter and a sterilizer, and will be distributed by gravity from an elevated storage tank to the various facilities of the airport, as illustrated in Fig. 6.9.

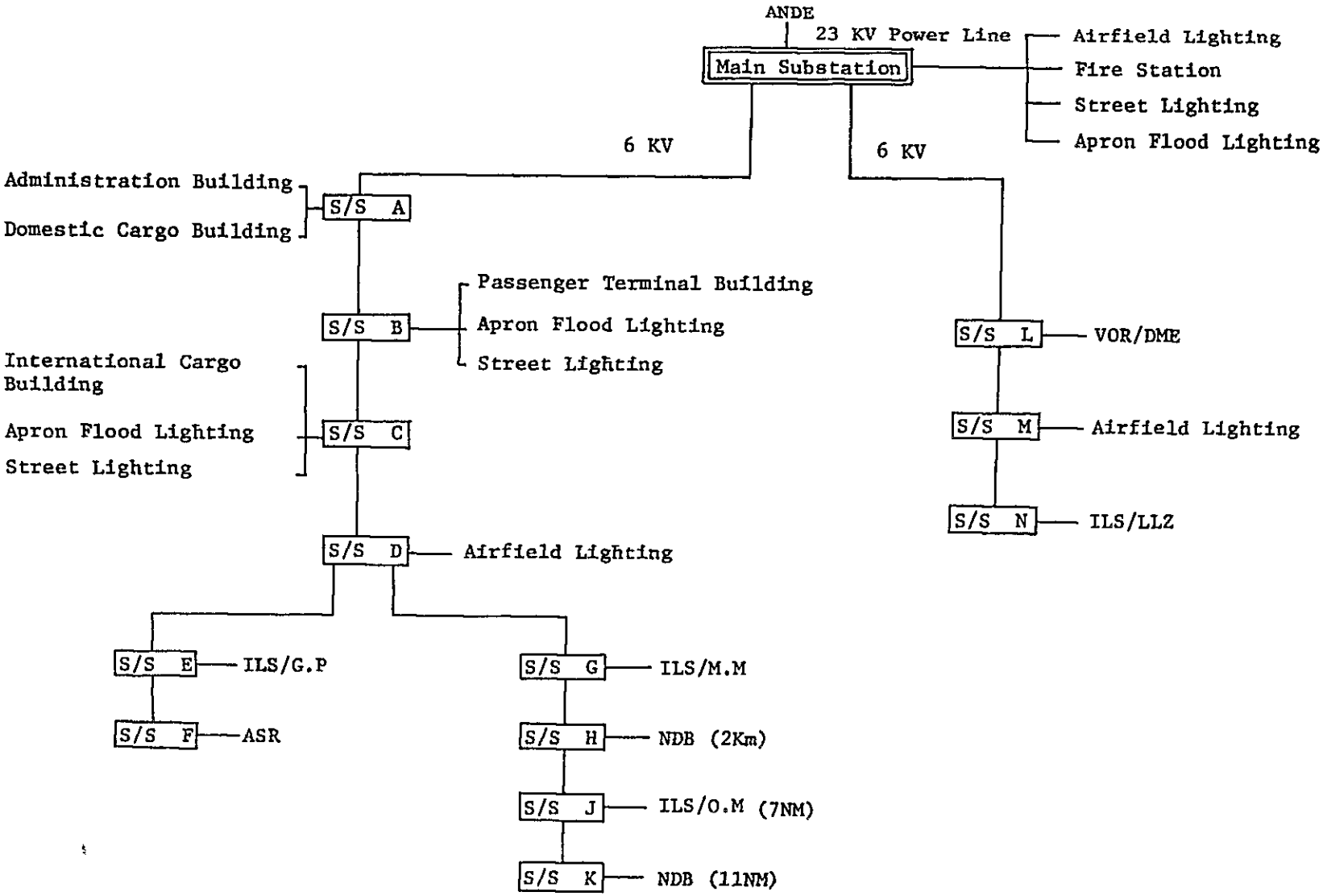


Fig. 6.8 ELECTRIC POWER DISTRIBUTION SYSTEM

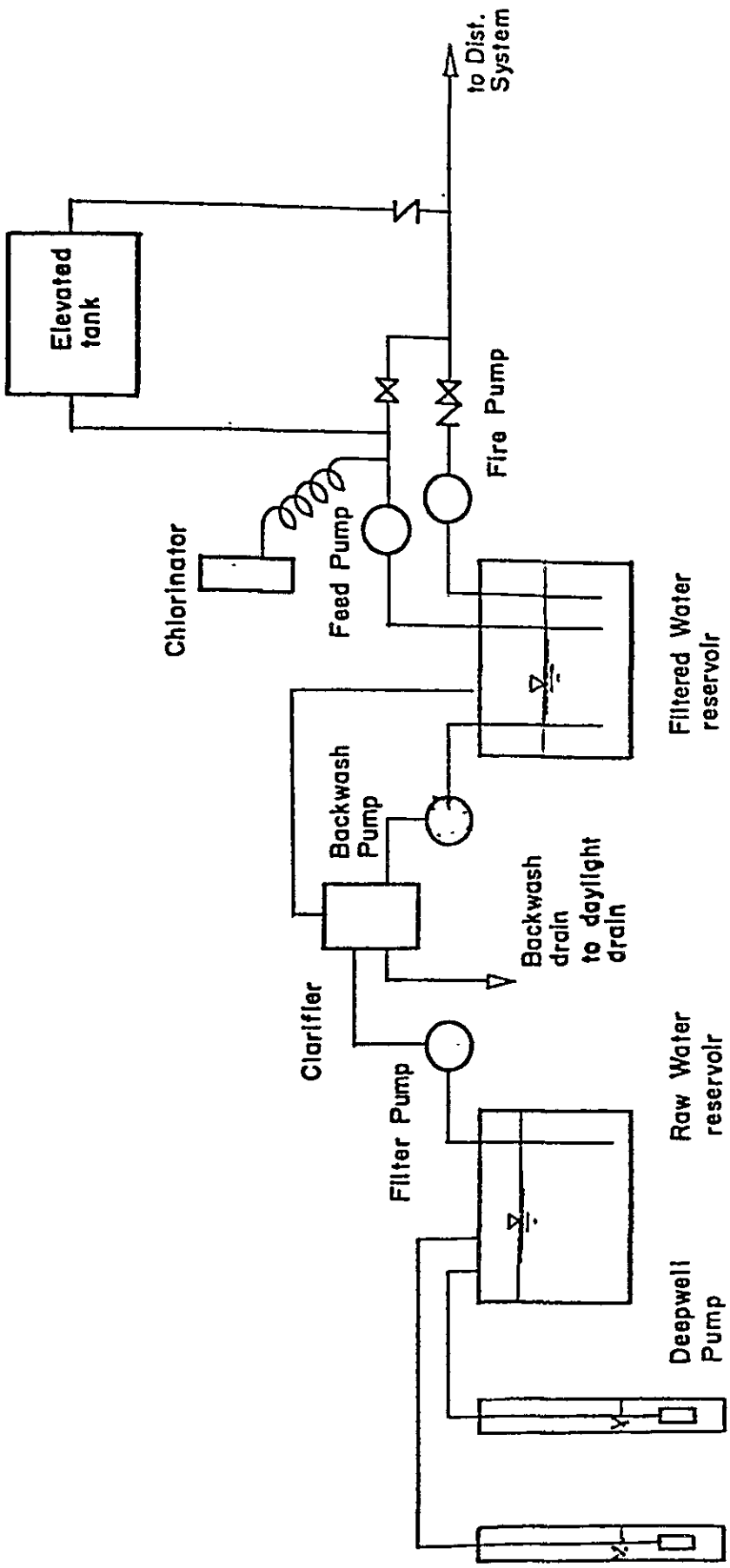


Fig. 6.9 POTABLE WATER SUPPLY SYSTEM

3) Sewage treatment facilities

No public sewage treatment facilities exist in the vicinity of the new airport site, nor any regulations are in force with regard to the quality of discharged sewage. Nevertheless, a preliminary treatment system is planned for the new airport consisting primarily of a septic tank and a filter bed as shown in Fig. 6.10. Biological Oxygen Demand (BOD) of the sewage purified by the planned system will be about 50 ppm.

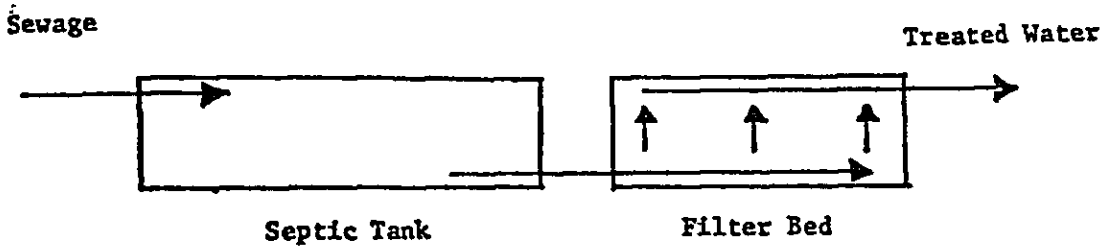


Fig. 6.10 SEWAGE TREATMENT FACILITIES

4) Telephone

A microwave circuit between CPS and the new airport is planned to provide the required telephone circuits to the private branch exchange station to be housed in the airport administration building.

6.3.5 Approach Road

1) Basic planning considerations

a. Number of lanes

One lane for each direction is considered enough to cater for the peak hour traffic volume of about 300 and 400 cars in Stages I and II respectively as shown in Table 6.1. Fig. 6.11 presents standard cross section of the feeder road.

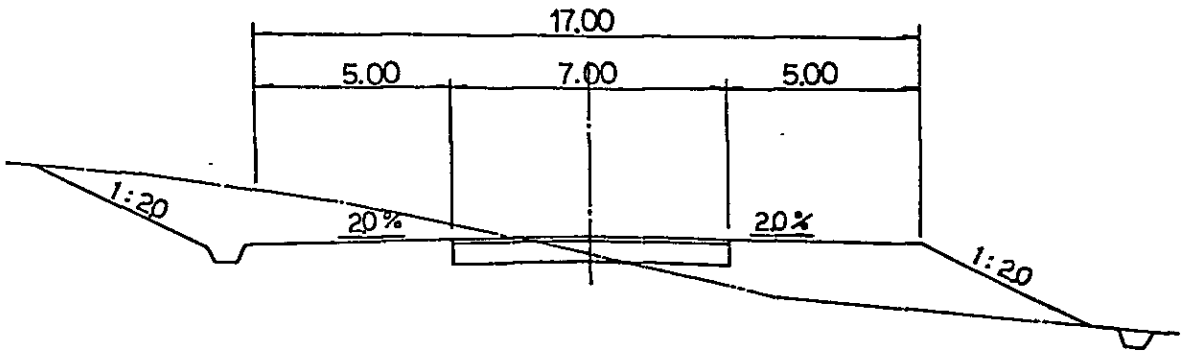


Fig. 6.11 STANDARD CROSS SECTION OF ACCESS FEEDER ROAD

b. Design criteria

Design velocity	60 km/hour
Min. radius of curvature	150 m
Min. length of curvature	700 m/θ*
Max. longitudinal slope	5%

*θ: intersection angle of centerlines of road (degree)

2) Routing alignment

The routing alignment was determined so as to minimize the quantity of earthwork involved and to provide smooth connection with the existing highway Ruta 7, with the results as shown in Appendix 6-6.

6.4 Establishment of Instrument Approach and Departure Procedures

Instrument approach and departure procedures at the new airport was established in accordance with the criteria contained in PANS-OPS (ICAO Doc. 8168/611/3).

Wherever necessary planning was made by referring also to the "Terminal Instrument Procedures" (FAA), and the "Criteria for Establishment of Instrument Approach and Departure Procedures and Weather Minima" established by the Civil Aviation Bureau of Japan.

The most important requirement in establishing these procedures is to maintain the required separation from those of the existing airport at Foz do Iguacu in Brazil. In order to satisfy this requirement, all the approach procedures were planned so that the final approach is commenced directly from the holding fix without making intermediate approach. The procedures planned for the new airport are illustrated in Appendix 6-7 and weather minima are shown in Table 6.2.

Table 6.2 WEATHER MINIMA

	LANDING MINIMA	
ILS RWY 23	DH - 1,000ft	VIS - 800 m (RVR) - 800 m
VOR RWY 23	MDA - 1,300ft	VIS - 1,400 m (RVR) - 1,400 m
VOR RWY 05	MDA - 1,300ft	VIS - 1,600 m
ADF RWY 23	MDA - 1,300ft	VIS - 1,600 m
CIRCLING	MDA - 1,440ft	VIS - 3,200 m

	TAKEOFF MINIMA	
RWY 23	CIG - 0ft	VIS - 600 m (RVR) - 600 m
RWY 05	CIG - 0ft	VIS - 600 m

Note: Minima listed above are based on Category "D" aircraft (120 seater jet) only.

DH - Decision Height
MDA - Minimum Descent Altitude
RVR - Runway Visual Range
Estimated TDZ ELV-800ft
Estimated ELV (Highest Point on Runway) - 882ft

CIG - Ceiling

6.5 Airport Boundary

The airport boundary was determined with due considerations for the future expansion of the terminal area and the noise nuisance buffer zone to prevent aircraft noise hazard anticipated in the future.

The expected aircraft noise was calculated in terms of the WECPNL (Weighted Equivalent Continuous Perceived Noise Level) in accordance with the recommendations of the ICAO Annex 16, based on the aircraft movements forecast for the year 2004. Fig. 6.12 shows the WECPNL contours expected in the same year.

The area under the WECPNL of 85 and more is considered unsuitable for residence, and should be under the control of the ANAC. The areas on the northeast and the southwest of the terminal complex should be reserved for future expansion of the terminal facilities. The airport boundary thus determined, having a total area of about 494 hectares, is shown in Fig. 6.1.

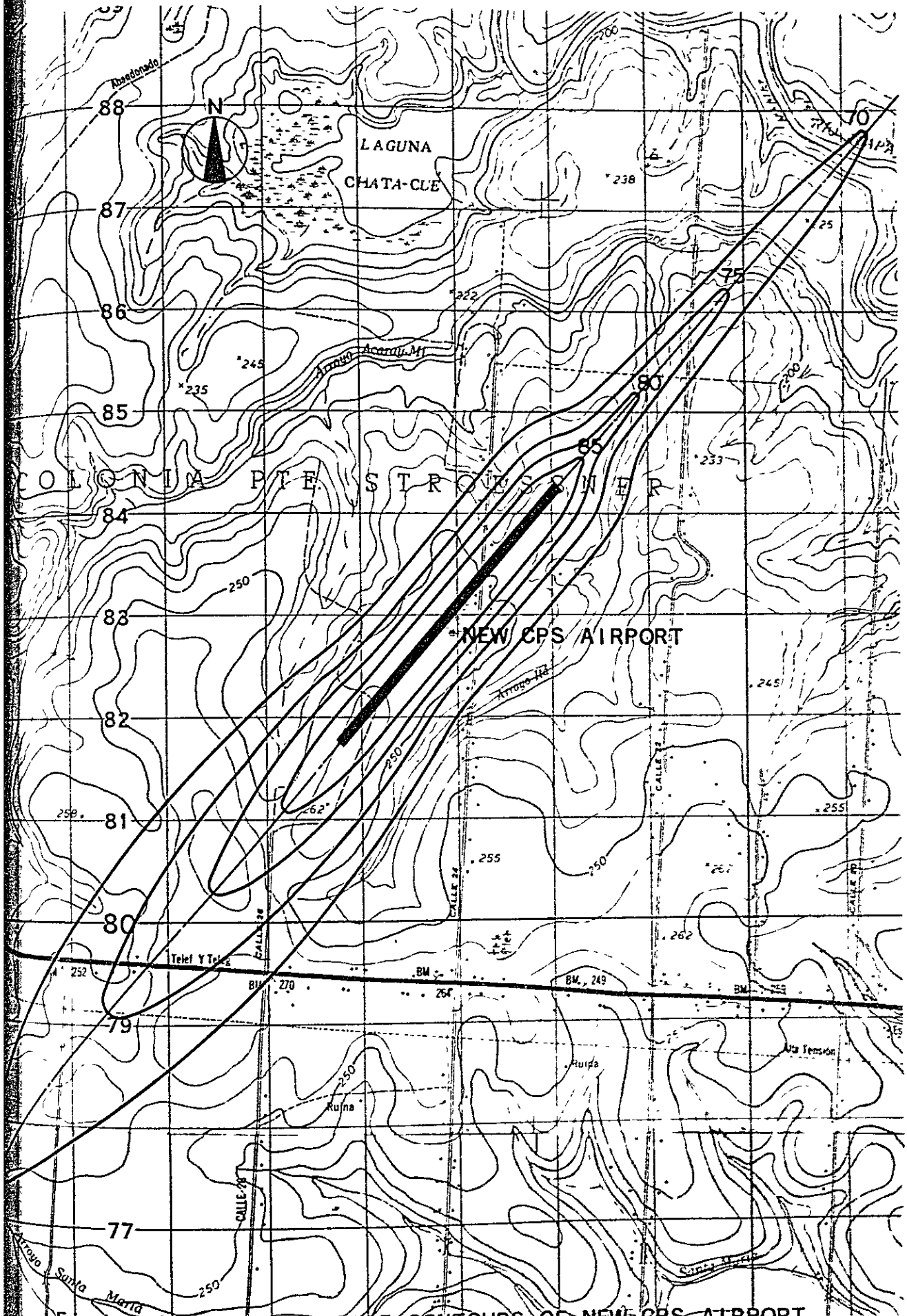


Fig 6-12 WECPNL NOISE CONTOURS OF NEW CPS AIRPORT (YEAR 2004)