THE FEASIBILITY STUDY
ON
THE DEVELOPMENT PROJECT
OF
JORGE CHAVEZ LIMA-CALLAO INTERNATIONAL AIRPORT
IN
THE REPUBLIC OF PERU

FINAL REPORT

JULY 1986

THE JAPAN INTERNATIONAL COOPERATION AGENCY

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PREFACE

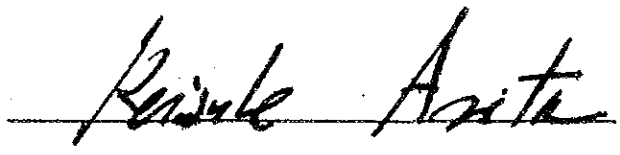
In response to the request of the Government of the Republic of Peru, the Japanese Government decided to conduct a feasibility study on the Lima International Airport Development Project and entrusted the study to the Japan International Cooperation Agency (JICA). JICA sent to Peru a survey team headed by Mr. Shigeru Shibata, Japan Airport Consultants, Inc., from July to August, 1985.

The team had discussions on the Project with the officials concerned of the Government of the Republic of Peru and conducted a field survey. After the team returned to Japan, further studies were made and the present report has been prepared.

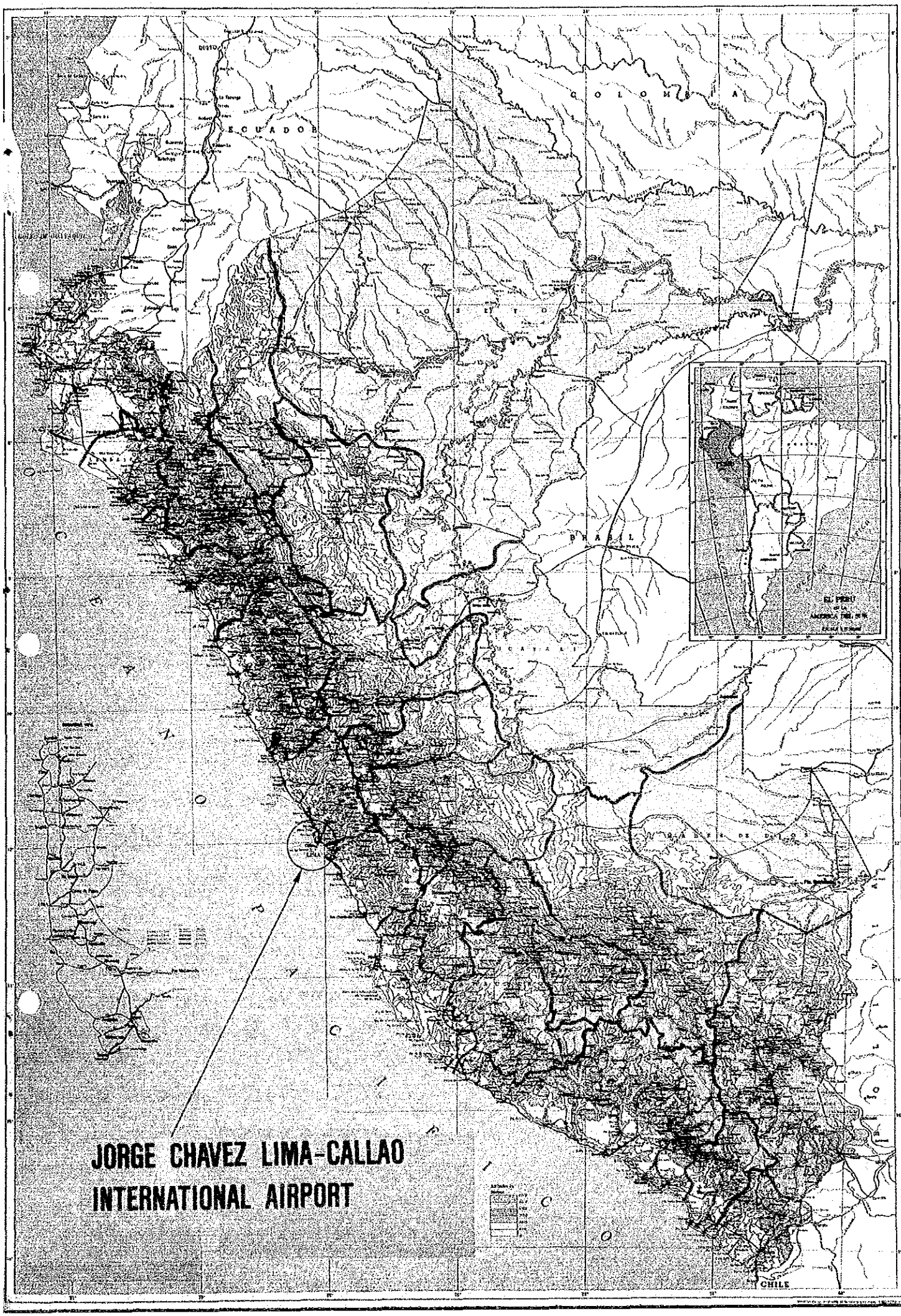
I hope that this report will serve for the development of the project and contribute to the promotion of friendly relations between our two countries.

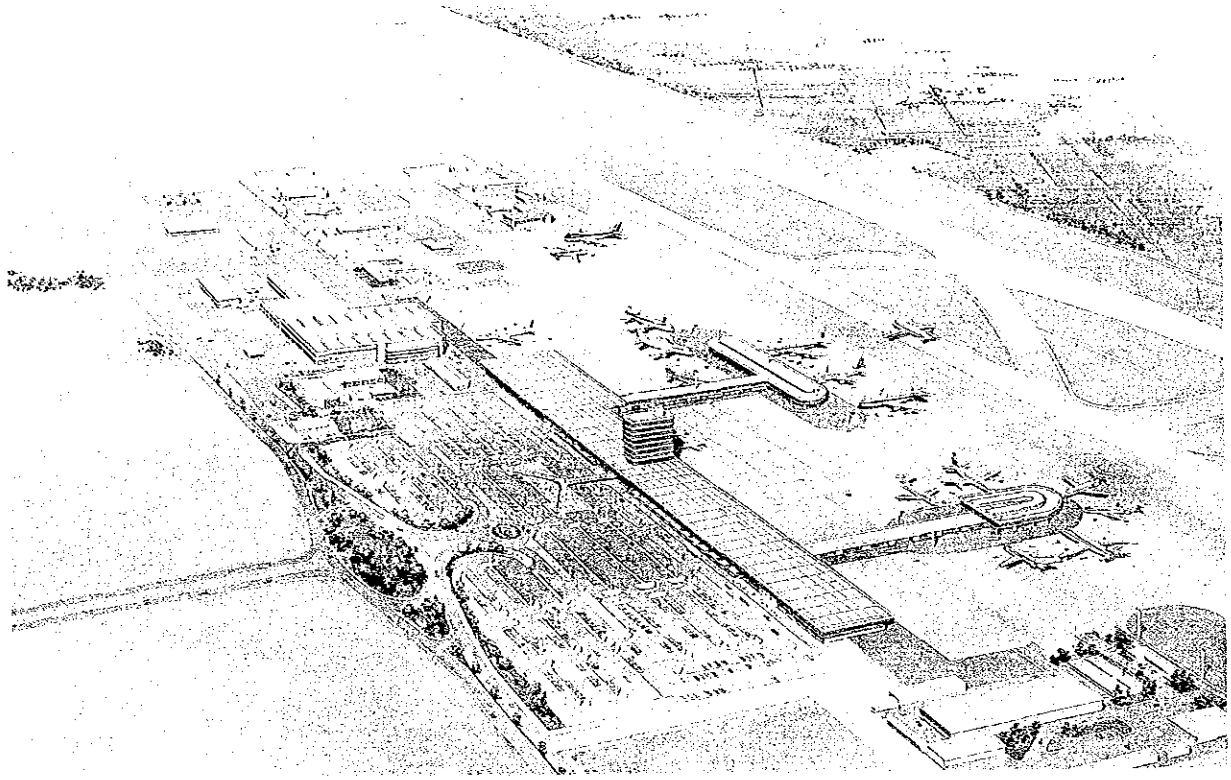
I wish to express my deep appreciation to the officials concerned of the Government of the Republic of Peru for their close cooperation extended to the team.

July, 1986



Keisuke Arita
President
Japan International Cooperation Agency


JORGE CHAVEZ LIMA-CALLAO
INTERNATIONAL AIRPORT



JORGE CHAVEZ LIMA-CALLAO INTERNATIONAL AIRPORT (TARGET YEAR 1995)

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LIST OF APPENDICES

CONCLUSIONS AND SUMMARY

CONCLUSIONS

1. The development of the Lima International Airport is urgently needed for the following reasons:

   (1) It will be difficult to secure air safety if the Airport is kept open with the present airfield and air navigation facilities;

   (2) It will be hard to maintain a service level of international standard if the terminal facilities remain as at present;

   (3) The project is indispensable for the national economic development; and

   (4) The present state of the gateway airport requires considerable improvements, at least to bring it up to accord with the international status and prestige of Peru as one of the leading nations in the region.

2. No significant technical difficulty is anticipated in implementing the Project.

3. The Project is economically feasible, since the economic internal rate of return is 33.6%, while the social discount rate of Peru is understood to be 12%.

4. The Project is financially feasible, since the financial internal rate of return has shown a positive value of 4.1% under the current tariff level. It is recommended that the Project be implemented by a foreign soft loan supplemented by the Government's own financing.

SUMMARY

1. Objectives of the Study

The objectives of the Study are:

(1) To formulate a Master Plan for the Development Project of the Lima International Airport up to the year 2005;
(2) To examine the technical and economic feasibility for a Short-Term Development Plan for the Project; and
(3) To pursue technology transfer to Peruvian Government personnel in the course of the Study.

2. Air Transport Demand Forecast

Forecast is made for a period of 20 years between 1985 and 2005 at intervals of every 5 years.
Forecasting of international passengers is based on the simulation analysis, using as economic indices the real GDP of Peru, index of airfare and long-term foreign debt of Peru.
International freight, domestic passengers and domestic freight are forecast by means of the regression analysis, using the real GDP of Peru and oil crisis dummy.
Forecast of small aircraft movement is based on the time trend analysis.
Table S-1 shows the results of forecast.

Table S-1 Summary of Air Transport Demand Forecast

	1985	1990	1995	2000	2005
International Passengers					
(thousand persons)					
High Case	890	1,180	1,490	1,910	2,430
Main Case	890	1,090	1,350	1,640	2,000
Low Case	880	1,030	1,210	1,410	1,640
International Freight					
(thousand tons)					
High Case	33.8	44.3	57.4	71.8	89.3
Main Case	32.9	40.8	50.2	59.6	70.6
Low Case	32.2	37.6	43.7	49.1	55.3
Domestic Passenger					
(thousand persons)					
High Case	1,100	1,510	1,970	3,400	2,920
Main Case	1,100	1,480	1,760	2,040	2,360
Low Case	1,100	1,380	1,570	1,730	1,910
Domestic Freight					
(thousand tons)					
High Case	32.0	37.6	46.3	55.1	65.9
Main Case	32.0	35.5	41.4	47.1	53.7
Low Case	32.0	33.2	37.1	40.3	43.7
Small Aircraft Movement	5.7	7.8	8.9	10.0	11.0
(thousand movement)					

3. Airport Facility Requirements

The facility requirements that will meet the air transport demand forecast have been developed in conformity with ICAO standards and/or the FAA regulations, also giving due consideration to the special local conditions and practices. The results of facility requirements analysis are summarized in Table S-2.

Table S-2 Summary of Facility Requirements

Facility	1995	2005
Runway Strip	3,627 m x 300 m	
Runway	3,507 m x 45 m	
Taxiway	Full parallel 4 high-speed exit 1 90° exit	
Apron (International Pax.)		
350 Seater Jet	6	7
250 Seater Jet	4	4
150 Seater Jet	3	3
Apron (Domestic Pax.)		
200 Seater Jet	4	6
120 Seater Jet	9	8
65 Seater Jet	4	4
Apron (Freighter)		
B-747-F	0	1
DC-8-62F	1	1
Passenger Terminal Building	40,000 m^2	60,000 m^2
International Cargo Building	14,000 m^2	25,000 m^2
Aircraft Maintenance Hangar	3 docks	3 docks
Catering Facilities	7,700 m^2	9,200 m^2
Car Parking	1,370 cars	1,650 cars

Table S-2 (Continued) Summary of Facility Requirements

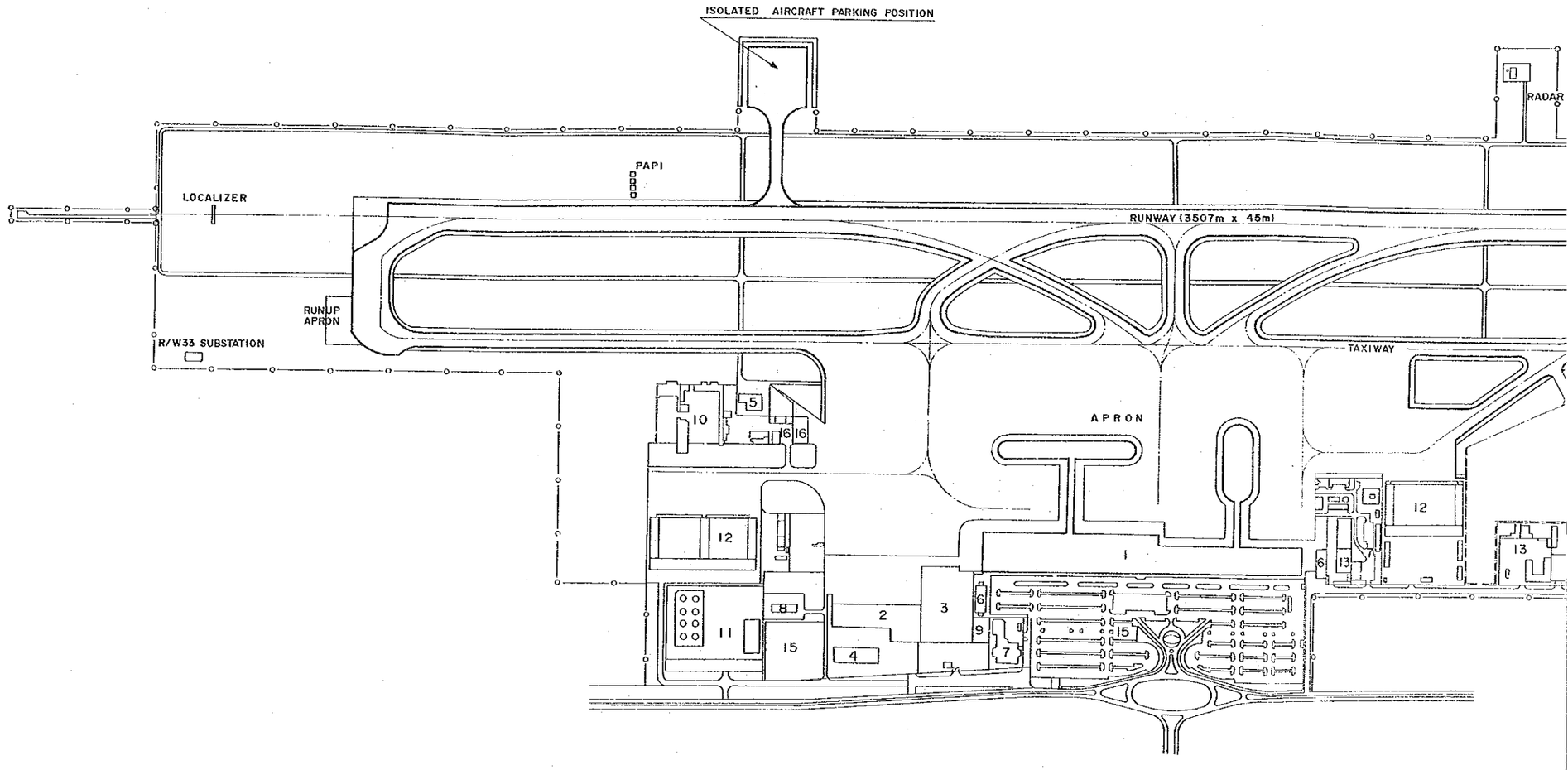
Facility		1995	2005
Fire Station		1,300 m^2	1,300 m^2
Fuel Supply	Storage Capacity		
	Jet-A1	4,600 kl	5,800 kl
	Av-Gas	30 kl	30 kl
	Distribution System	Hydrant	Hydrant
Water Supply	Demand/day	900 m^3/day	1,100 m^3/day
	Demand at Peak Level	28 l/sec	32 l/sec
VHF Transmitter/Receiver		5 frequencies	6 frequencies
Radio Link for TX Station		24 channels	36 channels
Radio Link for RX Station		24 channels	36 channesl
ATC Console		1 set	1 set
Radar		TSR/SSR/DPS	TSR/SSR/DPS
VOR/DME		5 sets	5 sets
ILS/MLS		ILS (Cat-II)	MLS
NDB		8 stations	8 stations
Lighting System for Runway 15		Cat-II	Cat-II
Lighting System for Runway 33		Instrument	Instrument
Lighting System for Taxiway		Cat-II	Cat-II
VASIS/PAPI (R/W 15 & R/W 33)		PAPI	PAPI
Apron Flood Lights		1 series	1 series
Weather Observation Facilities		1 set	1 set
Satellite Receiver		1 set	1 set
Weather Data Recorder		1 set	1 set
Weather Data Processing System		1 set	1 set

4. Master Plan

The master plan of the Lima International Airport was formulated to meet the demand of 2005. Fig. S-1 shows the layout plan of the airport facilities for the master plan. Table S-3 summarized the improvement measures to be taken under the master plan.

Table S-3 Summary of Improvement Measures under the Master Plan

Facility	Improvement Measures
Runway Strip	- Grading and surface treatment
Runway	- Bituminous overlay
Taxiway	- Bituminous overlay and construction of a high-speed exit taxiway
Apron	- Expansion with concrete pavement (partly asphalt pavement)
Pax. Terminal Bldg.	- Expansion of main building, construction of satellites, etc.
Cargo Terminal Bldgs.	- Relocation of export cargo terminal and customs office
Airport Administration Bldg.	- Construction of a new building
Other Buildings	- Relocation of fire station, training centre, etc.
Car Parks	- Expansion
Air Navigation Facilities	- Replacement of VOR and NDB, introduction of MLS, installation of weather data recorder, etc.


ISOLATED AIRCRAFT PARKING POSITION
RADAR
PAPI
LOCALIZER
RUNWAY (3507m x 45m)
RUNUP APRON
R/W33 SUBSTATION
TAXIWAY
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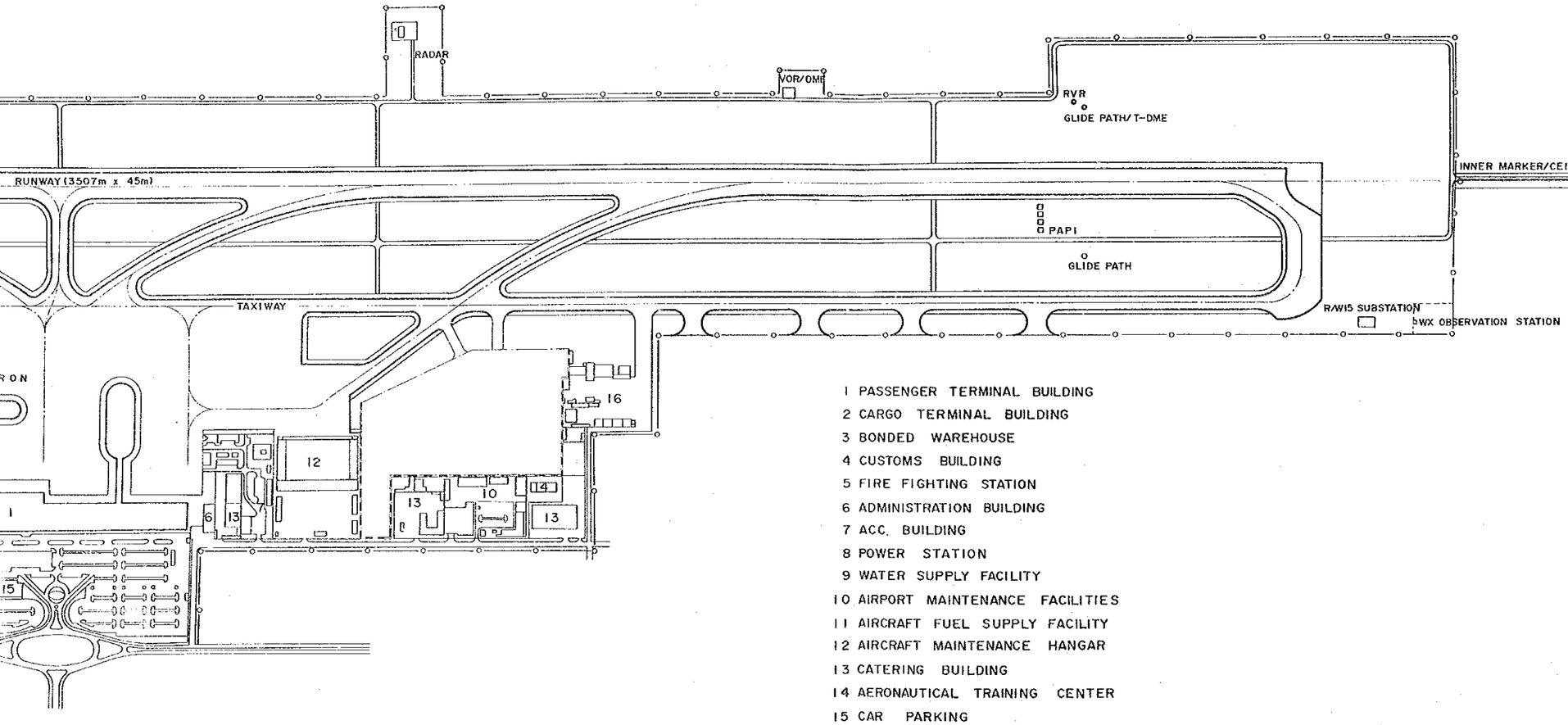


1 PASSENGER TERMINAL BUILDING
2 CARGO TERMINAL BUILDING
3 BONDED WAREHOUSE
4 CUSTOMS BUILDING
5 FIRE FIGHTING STATION
6 ADMINISTRATION BUILDING
7 ACC. BUILDING
8 POWER STATION
9 WATER SUPPLY FACILITY
10 AIRPORT MAINTENANCE FACILITIES
11 AIRCRAFT FUEL SUPPLY FACILITY
12 AIRCRAFT MAINTENANCE HANGAR
13 CATERING BUILDING
14 AERONAUTICAL TRAINING CENTER
15 CAR PARKING
16 SMALL AIRCRAFT FACILITIES

0 200 400 800M

FIG. S - 1

THE DEVELOPMENT PROJEC
OF
JORGE CHAVEZ LIMA-CALLAO INTERNATI

MASTER PLAN

THE JAPAN INTERNATIONAL COOPERAT

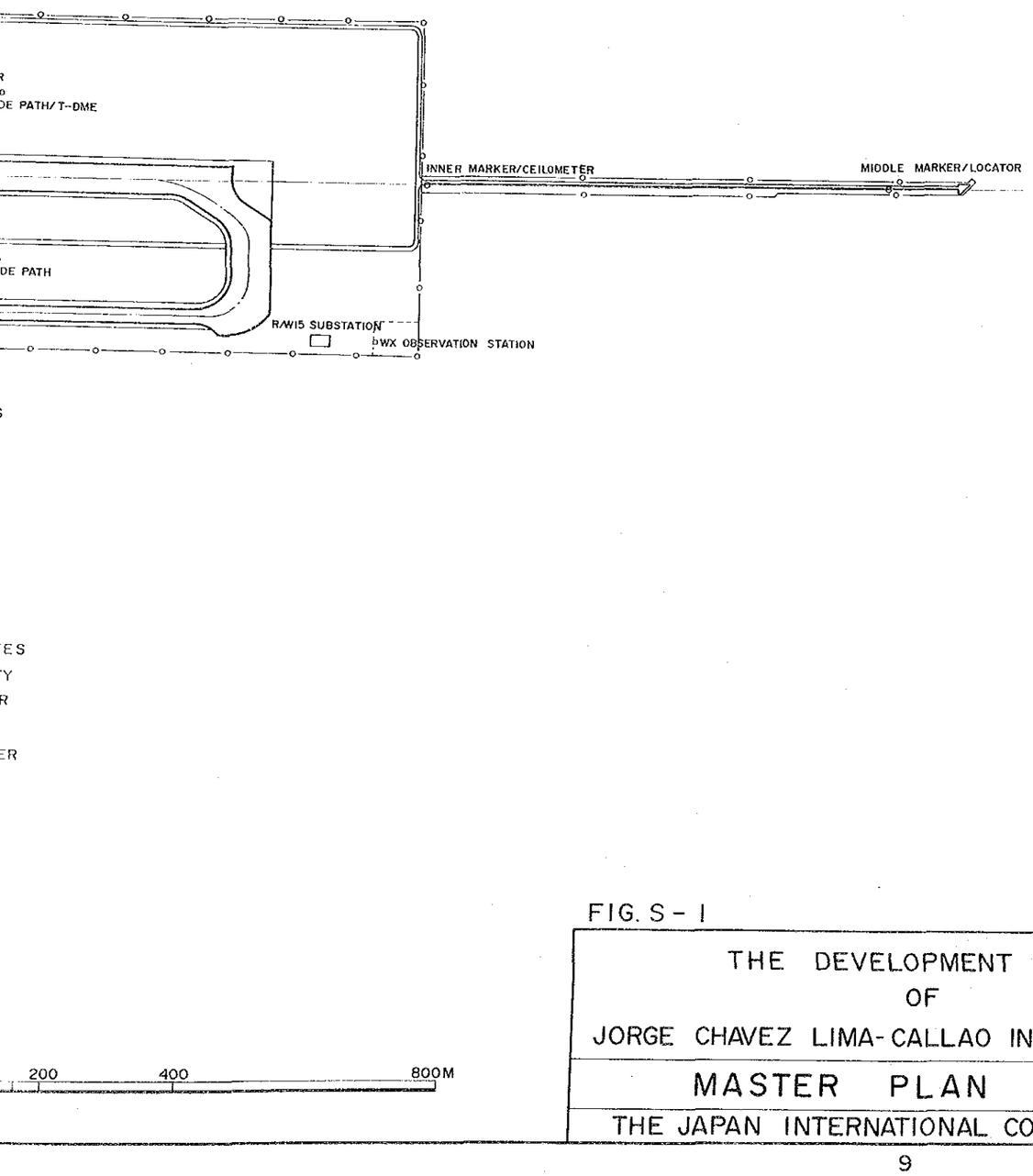


FIG. S - 1

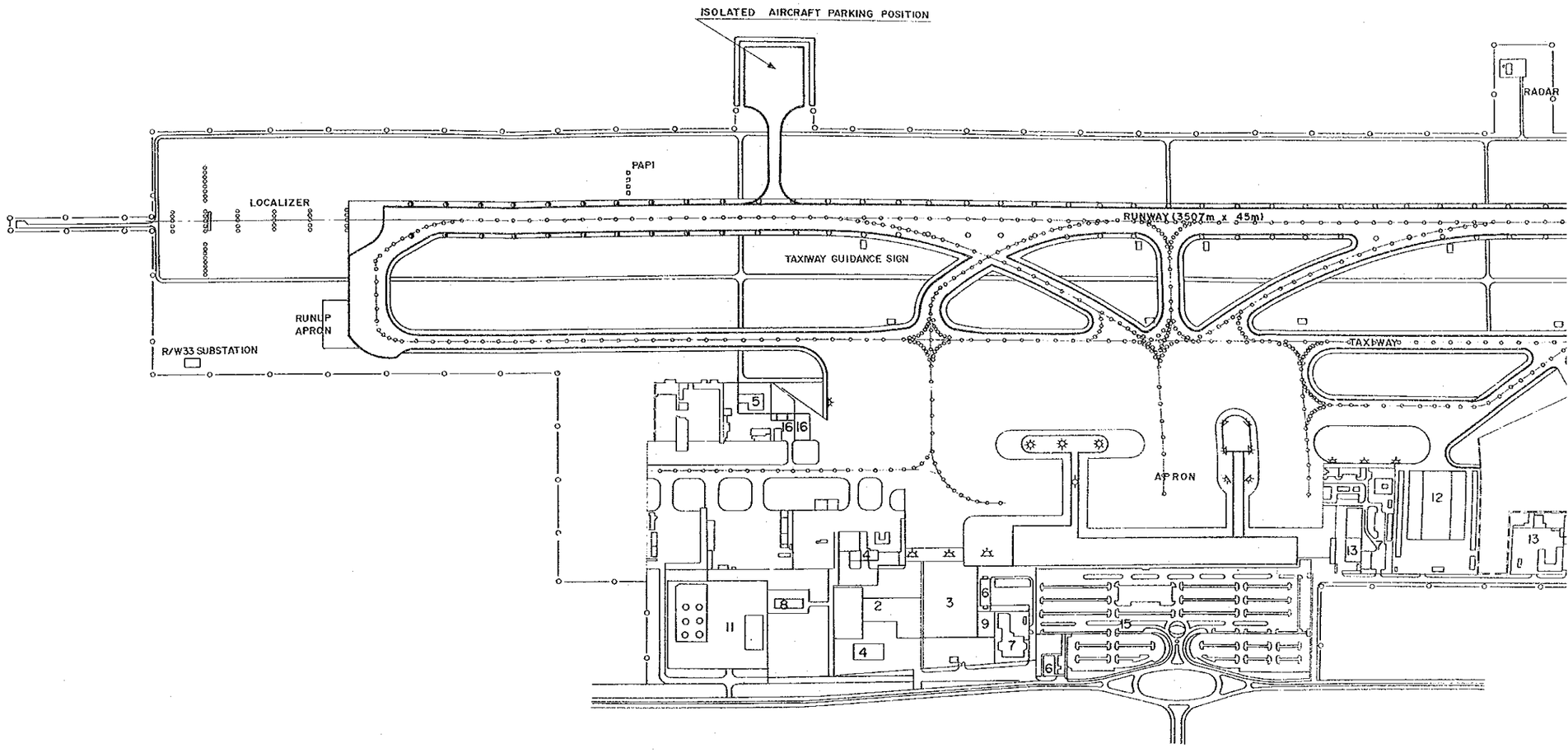
THE DEVELOPMENT PROJECT OF JORGE CHAVEZ LIMA-CALLAO INTERNATIONAL AIRPORT	
MASTER PLAN	S = 1 : 8,000
THE JAPAN INTERNATIONAL COOPERATION AGENCY	

5. Short-Term Development Plan

The short-term development plan of the airport was prepared, to solve the problems of the existing facilities and also to meet the demand of 1995. Fig. S-2 shows the layout plan of the airport facilities for the short-term development plan. Table S-4 presents the summary of the improvement measures for the short-term development plan.

Table S-4 Summary of Improvement Measures for the Short-Term Development Plan

Facility	Improvement Measures
Runway Strip	- Grading and surface treatment
Runway	- Bituminous overlay
Taxiway	- Construction of a high-speed exit taxiway
Apron	- Expansion
Pax. Terminal Bldg.	- Expansion of mein building construction of satellites, etc.
Cargo Terminal Bldgs.	- Relocation of export cargo termianl and customs office
Airport Administration Bldg.	- Construction of a new building
Other Buildings	- Relocation of fire station, etc.
Car Parks	- Expansion
Air Navigation Facilities	- Replacement of VOR and NDB, introduction of PAPI, upgrading of ALS to Cat-II, etc.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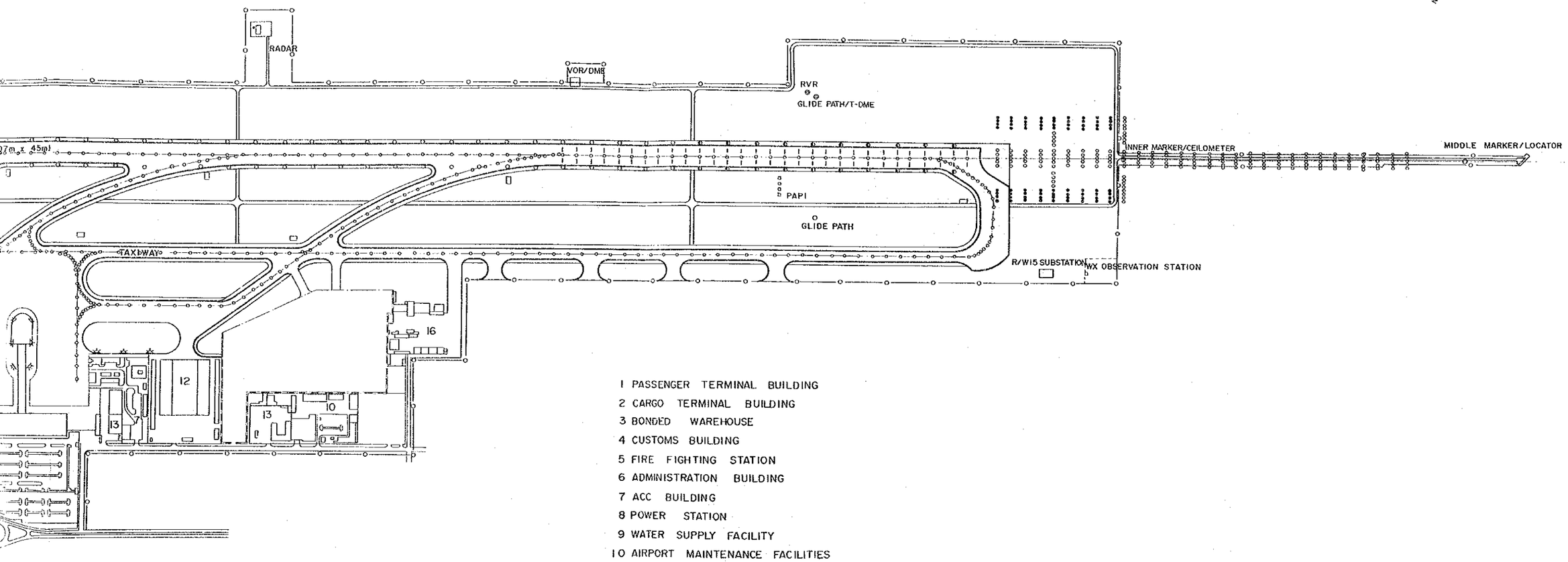

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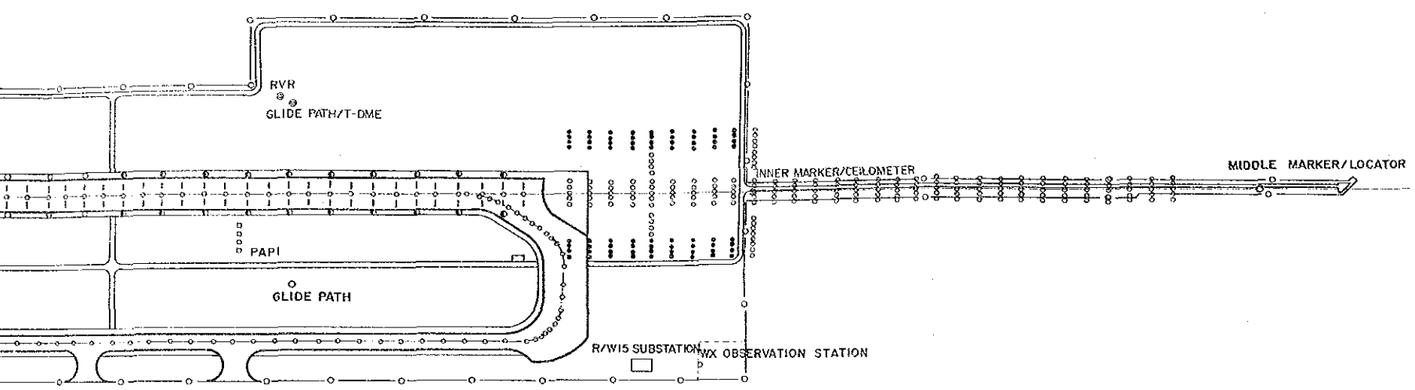
0 200 400 800M

FIG. S-2

THE DEVELOPMENT PROJECT
OF
JORGE CHAVEZ LIMA-CALLAO INTERNATIONAL AI
SHORT TERM DEVELOPMENT PLAN S=1:
THE JAPAN INTERNATIONAL COOPERATION AGE



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0 200 400 800M

FIG. S - 2

THE DEVELOPMENT PROJECT
OF
JORGE CHAVEZ LIMA-CALLAO INTERNATIONAL AIRPORT

SHORT TERM DEVELOPMENT PLAN | S = 1 : 8,000

THE JAPAN INTERNATIONAL COOPERATION AGENCY

6. Construction Schedule and Cost Estimate

6.1 Construction Schedule

The construction schedule is developed with due regard to the timing and availability of funds for the Project time length, including the pre-construction engineering services, and land acquisition.

Engineering design and construction for the short-term development for the design year 1995 is scheduled to commence in or about 1987, for completion in time for opening of the new facilities in 1991.
Construction schedule for the short-term development plan is shown in Table S-5.

6.2 Cost Estimate

Construction cost of short-term development is estimated as shown in Table S-6. Breakdown by year of the construction cost based on the construction schedules as per Table S-5 is shown in Table S-7.

Table S-5 Construction Schedule for Short-Term Development Plan

Item	1986	1987	1988	1989	1990	1991
Feasibility Study						
Financing Preparation						
Engineering (Design)						
" (Supervision)						
Land Acquisition						
Construction (Temporary Works)						
" (Site Grading)						
" (Runway)						
" (Taxiway)						
" (Apron)						
" (Car Parks)						
" (Pax. Terminal Bldg.)						
" (Cargo Terminal Bldg.)						
" (Administration Bldg.)						
" (Radio Navaids)						
" (Airfield Lighting)						
" (Met. Facilities)						

Table S-6 Construction Cost Estimate for Short-Term Development

(unit: US$ thousand)

	Foreign Portion	Local Portion	Total
1. Airfield Facilities	4,810	9,984	14,794
2. Terminal Area Facilities	29,700	19,670	49,370
3. Radio Navaids	2,931	22	2,953
4. Airfield Lighting	10,362	2,334	12,696
5. Met. Service Facilities	1,119	43	1,162
6. Fuel Supply	3,695	1,040	4,735
1-6. Sub-total of Works	52,617	33,093	85,710
7. Engineering Services	5,262	3,309	8,571
8. Land Acquisition	-	7	7
9. Contingency	2,894	1,820	4,714
1-9. Grand Total	60,773	38,229	99,002

* Exchange rates as of July 1985: US$1.00 = S/14,000 = ¥240

Table S-7 Annual Breakdown of Estimated Construction Cost

(unit: US$ thousand)

Year	Foreign Portion	Local Portion	Total
1987	3,321	2,102	5,423
1988	17,551	8,386	25,937
1989	21,619	17,794	39,413
1990	18,282	9,947	28,229
Total	60,773	38,229	99,002

7. Economic Analysis

The economic internal rate of return (EIRR) has shown a value of 33.6% for implementation of short-term development of the Project, as a result of the cost-benefit analysis made from the viewpoint of the Peruvian national economy. It is, therefore, concluded that the Project is economically feasible, since this EIRR is comfortably above the social discount rate of the country, which is understood to be 12%.

8. Financial Analysis

The financial internal rate of return is estimated to have a positive value of 4.1% for the implementation of short-term development of the Project, as a result of the financial cost-benefit analysis made on the assumption that the Airport would be administrated on a self-supporting accounting principle. It is, therefore, concluded that the Project is financially feasible under the current tariff level. It is recommended that the Project be implemented by a foreign soft loan supplemented by the Government's own financing.

9. Project Implementation Programme

It is recommended that a special team to be exclusively in charge of the Project implementation be established within DGTA and CORPAC.

CHAPTER 1

INTRODUCTION

CHAPTER 1 INTRODUCTION

1.1 History of Study

Lima International Airport was established in 1965, about 20 years ago, and its facilities are physically aged and outdated, and have become inadequate to cope with the recent increase and change in air traffic brought about by the introduction of wide-body aircraft. In particular, the passenger terminal building is beginning to fall short of the demand.

Under these circumstances, the Government of the Republic of Peru (hereinafter called the "Government") has given high priority to the Lima International Airport Development Project (hereinafter referred to as the "Project") in order to cater for wide-body aircraft.

In response to the request of the Government for a feasibility study (hereinafter called the "Study") to be made of this Project, the Japan International Cooperation Agency (hereinafter referred to as "JICA") sent a preliminary survey mission to Peru in October 1984 for the purpose of project identification. As a result, the Scope of Work for the Study was agreed upon between the Government (represented by the Ministry of Transport and Communications, hereinafter referred to as "MTC") and the JICA Mission.

The second JICA survey mission was sent to Peru in July 1985, and presented the Inception Report. The methodology and work programme proposed in the report were accepted by the MTC. The mission then proceeded with the field survey, examining existing facilities and collecting relevant data and information. The survey lasted through August 1985.

This was followed by the submission in November 1985 of the Interim Report describing air transport demand forecast, facility requirements and Master Plan.

The Study then went on to prepare short-term development plan, construction schedule and cost estimate, economic and financial analysis of the Project and the recommendation on the Project implementation programme, and the Draft Final Report containing the comprehensive results of the study was submitted to and accepted by the Government in March 1986, and finalized into the present Final Report to mark the completion of the Sutdy.

1.2 Objectives and Scope of Study

The objectives of the Study, according to the agreed Scope of Work, are:

(1) To formulate a Master Plan for the Lima International Airport Development Project up to the year 2005;

(2) To examine the technical and economic feasibility of a Short-Term Development Plan for the Project; and

(3) To pursue technology transfer to the Peruvian Government personnel in the course of the Study.

In order to achieve the above-mentioned objectives, the Study is to be made on the following items:

(1) Collection and analysis of relevant data and information;

(2) Review and evaluation of previous study reports;

(3) Analysis of capacities and problems of existing airport facilities;

(4) Air transport demand forecast;

(5) Facility requirement analysis;

(6) Airport layout plan;

(7) Airport facility plan;

(8) Construction schedule;

(9) Construction cost estimate;

(10) Economic analysis;

(11) Financial analysis; and

(12) Project implementation programme.

CHAPTER 2

BACKGROUND OF THE PROJECT

CHAPTER 2

CHAPTER 2 BACKGROUND OF THE PROJECT

2.1 Economic Development of the Republic of Peru

2.1.1 Geographical Location of the Country

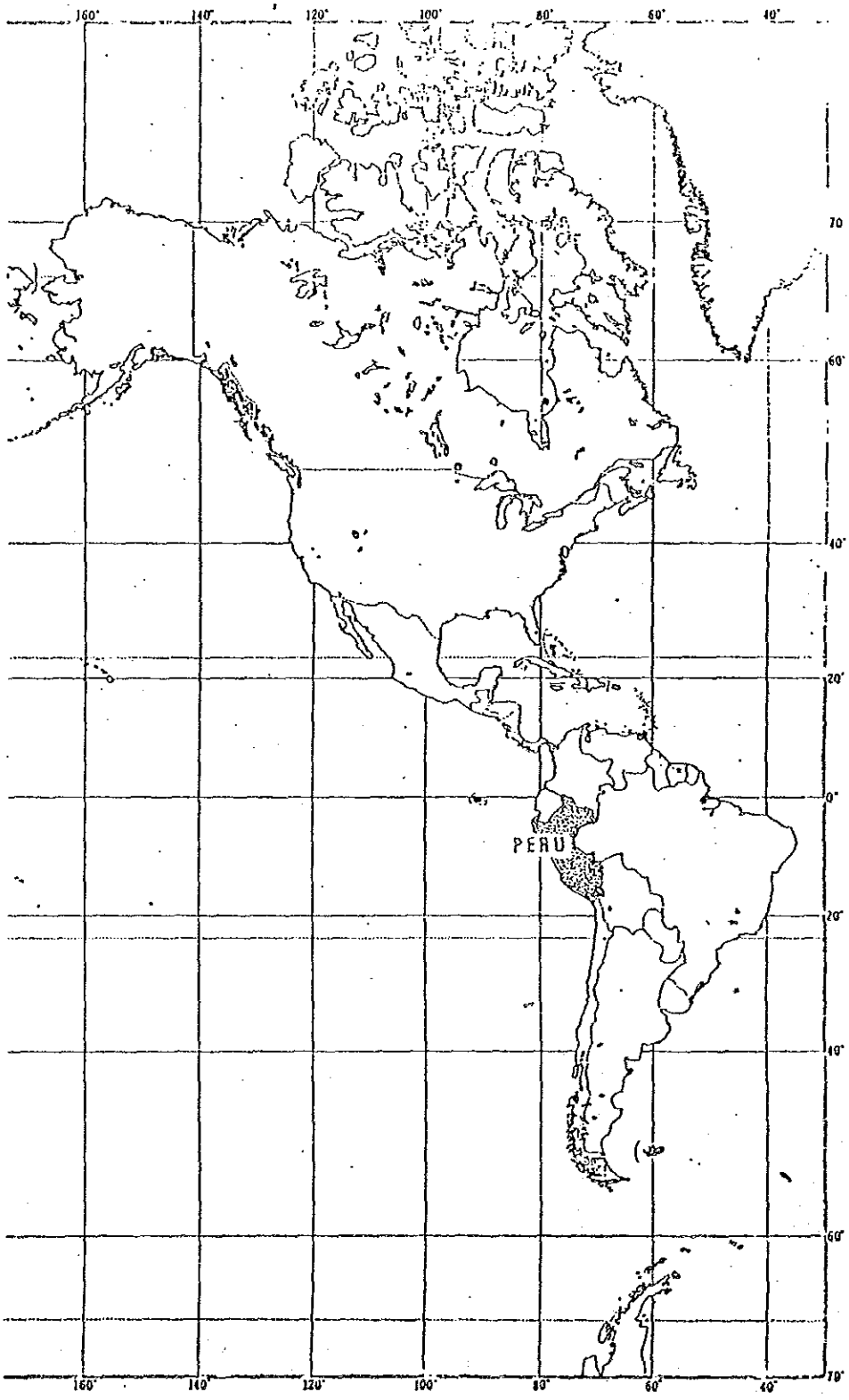
The Republic of Peru is situated in northwestern part of South America, lying between 0-19 degrees south latitude, and between 69-81 degrees west longitude. It forms a long coastline (the length is about 2,600 kilometres), and bordered by as many as 5 countries, namely Ecuador, Colombia in the north, Brazil in the east, and Bolivia and Chile in the south.

Peru, with an area of 1,280,000 sq.km, is the fourth largest country in Latin Ameria. The Andes, which closely parallel the Pacific coastline of Peru over its entire length, divide the country into three regions: Costa, Sierra and Selva.

Table 2-1-1 Topographical Zones in Peru

Zone	Particulars
Costa	• Costa is the desert zone. It stretches along the coast line, and covers the low land. • Share of the land : about 10%
Sierra	• Sierra consists of mountains, some as high as over 5,000 metres above sea-level, and a wide plateau with an altitude ranging between 2,000 and 3,000 metres. • Share of the land : about 30%
Selva	• Selva is the jungle zone. It is an origin of the Amazon. • Share of the land : about 60%

Fig. 2-1-1 Location Map of Peru



Peru belongs to the tropical zone in geograpy, but its climate is quite different in Costa, Sierra and Selva.

In Costa, climate is warm-dry, because the Peru Current moderates the tropical heat, but the current causes dense fogs, too. In Sierra, climate is divided into two distinct seasons, a warm-wet summer season lasting from December through March, a cool-dry winter season from April to November. And the daily temperature range between maximum and minimum is large. Selva has a tropical climate. Average temperature through the year is 36 degrees centigrade and annual precipitation amounts to 3,000 mm in this zone.

In Lima region (recorded at La Punta), little variation in temperature is noted throughout the year and the daily temperature ranges are small. Temperature is relatively high during summer (November-May) and relatively low during winter (June-October). High humidity of 83-90% is recorded throughout the year. Yearly precipitation is very low, about 10-20 mm.

Table 2-1-2 Monthly Climate in Lima Region

Month		1	2	3	4	5	6	7	8	9	10	11	12
Temperature (centigrade)	Highest	23.0	24.2	23.5	22.5	21.5	19.0	18.6	18.4	18.6	19.2	20.2	21.6
	Lowest	17.2	17.6	19.0	15.7	16.5	15.1	14.6	14.5	14.8	14.2	14.6	16.0
Average Humidity(%)		88	86	90	90	83	88	90	89	89	87	86	86
Precipitation (mm)		0.5	0.4	0.4	0.5	1.1	3.6	1.5	7.6	2.3	0.4	0.1	0.3

2.1.2 Population

Population of Peru is estimated to have reached 19.7 million in 1985 (Table 2-1-3). The 1981 Census has revealed distinct demographic changes that had occurred during the 1970s. While death rate fell slowly during the 1970s, it was not until the 1981 Census that the full extent of birth-rate drops was known. This recent birth-rate decline outweighed the moderate fall in death-rate, and population growth rate has fallen from about 3% yearly in the 1960's to 2.6% in the early 1980's. Decline in urban birth rate was strongest. This has apparentry slowed the growth of metropolitan Lima population to about 3% per year as compared with over 5% in the 1960s and 1970s. Urban population is estimated to have risen from 46% of the total population in 1960 to 67% in 1985 (Fig. 2-1-2).

The population of metropolitan Lima in 1984 was 5.5 million (28.9% of total) compared with 3.5 million (25.5% of total) in 1972. The population density by prefecture is shown in Fig. 2-1-3.

Table 2-1-3 Population of Peru

Year	Population (million)	Average Annual Growth Rate (%)
1961	10.2175	-
1972	13.9547	(1961-1972) 2.87
1981	17.7548	(1972-1981) 2.71
1982*	18.2257	(1981-1982) 2.65
1983*	18.7070	(1982-1983) 2.64
1984*	19.1979	(1983-1984) 2.62
1985*	19.6975	(1984-1985) 2.60

* Estimated

Source : "La Poblacion del Peru"
su Crecimitento y Distribucion
Abril 1984
Instituto Nacional de Estadistica

Fig. 2-1-2 URBAN AND RURAL POPULATION OF PERU

(1940 - 1985)

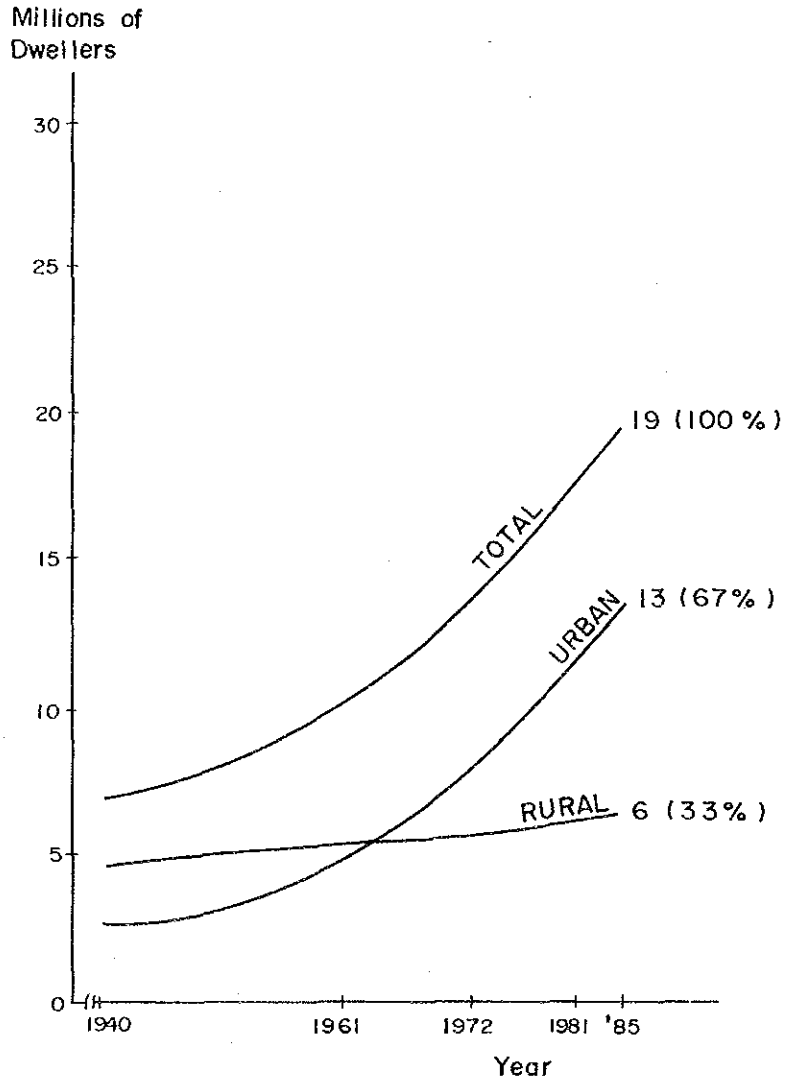
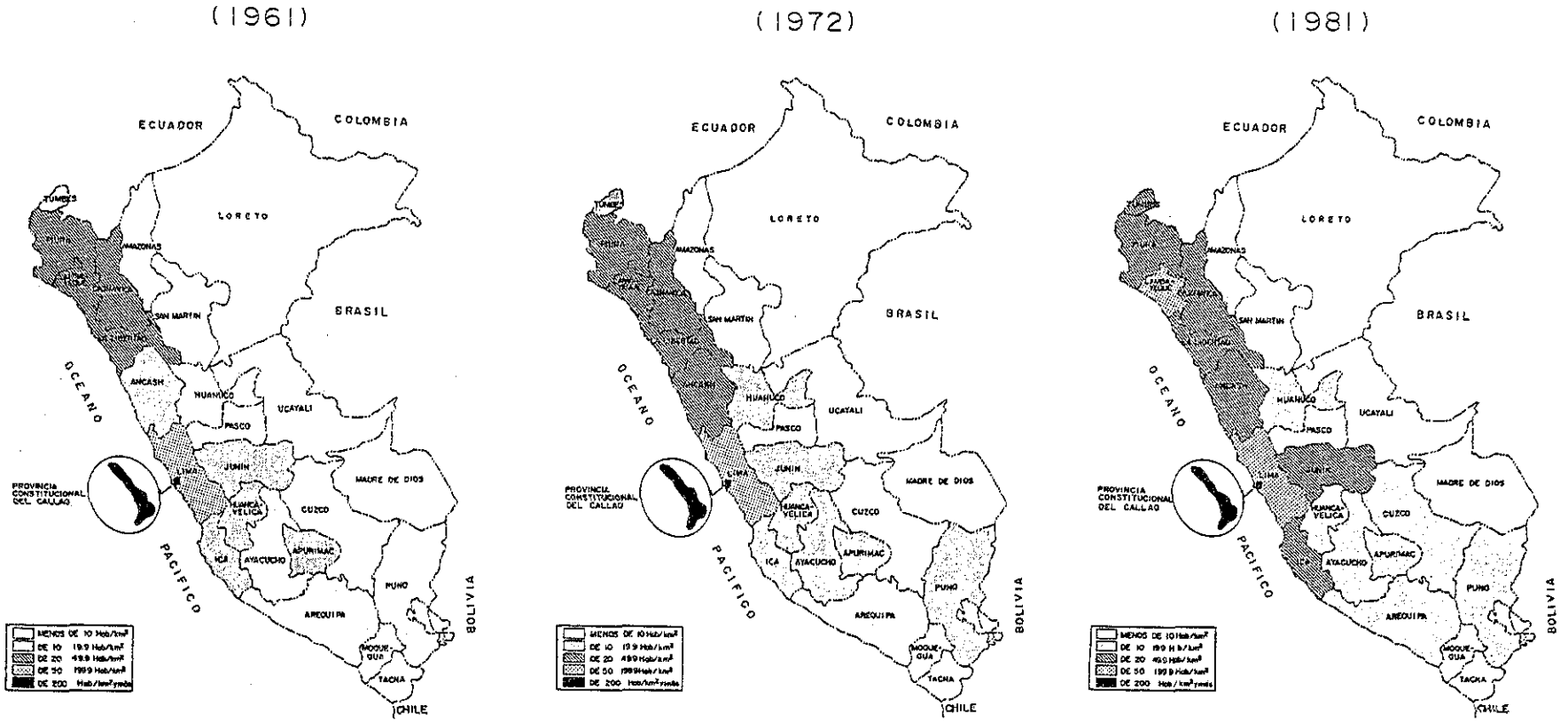


Fig. 2-1-3 Population Density by Prefecture



2.1.3 National Economy

(1) Economic Growth

The Peruvian economy is now in deep depression. The period 1970-1974 saw an average GDP growth rate of 6.0%, along with big spending, heavy borrowing abroad and increasing overvaluation of the sol ("GDP means Real GDP thorughout this Report). After 1975, Peru had to come to terms with the reality. Average rate of GDP growth decreased to 2.4% in 1975 and 3.3% in 1976, and turned negative in 1977 (-0.3%) and 1978 (-1.8%). After only three years of recovery to the 3.4% range between 1979 and 1981, external difficulities again halted growth in 1982. The Central Bank's figures show a GDP growth of 4.5% for 1984 which, after the drastic 12.0% fall in 1983, means that the economy has not yet recovered to the levels of activity recorded prior to 1983 (Fig. 2-1-4 and -5).

Real per capita GDP in 1983 was 13% below the 1982 level. Indeed, it was 10% below the 1970 level, and about equal to that of twenty years ago (Fig. 2-1-4 and -5).

Internal and external factors of the depression are as follows:

- high external debt
- rising world interest rates
- extremely decreasing mineral prices
- drought and floods
- domestic terrorism
- accelerated inflation

Fig. 2-1-4 GDP and Per Capita Income of Peru

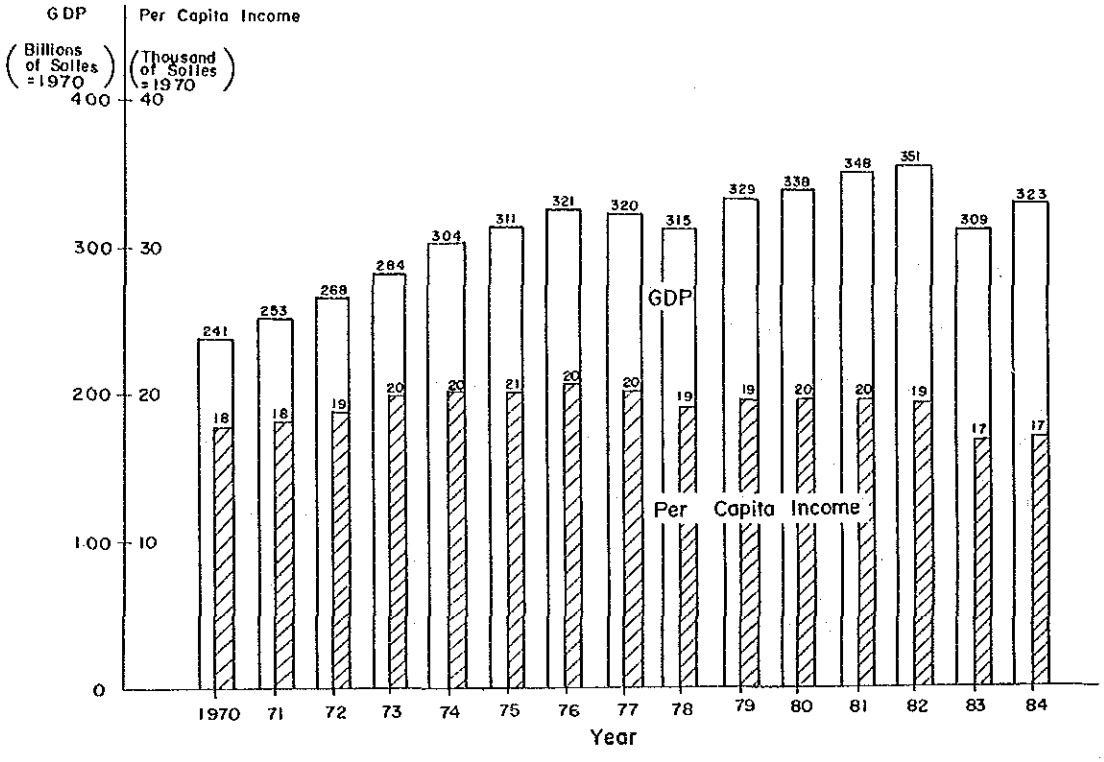
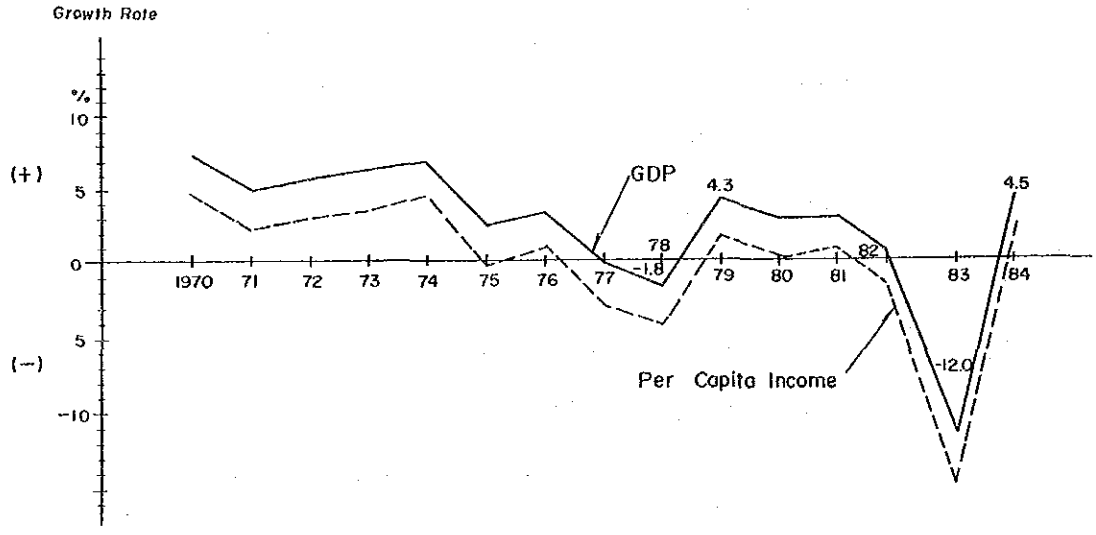


Fig. 2-1-5 Average Annual Growth Rates of GDP and Per Capita Income



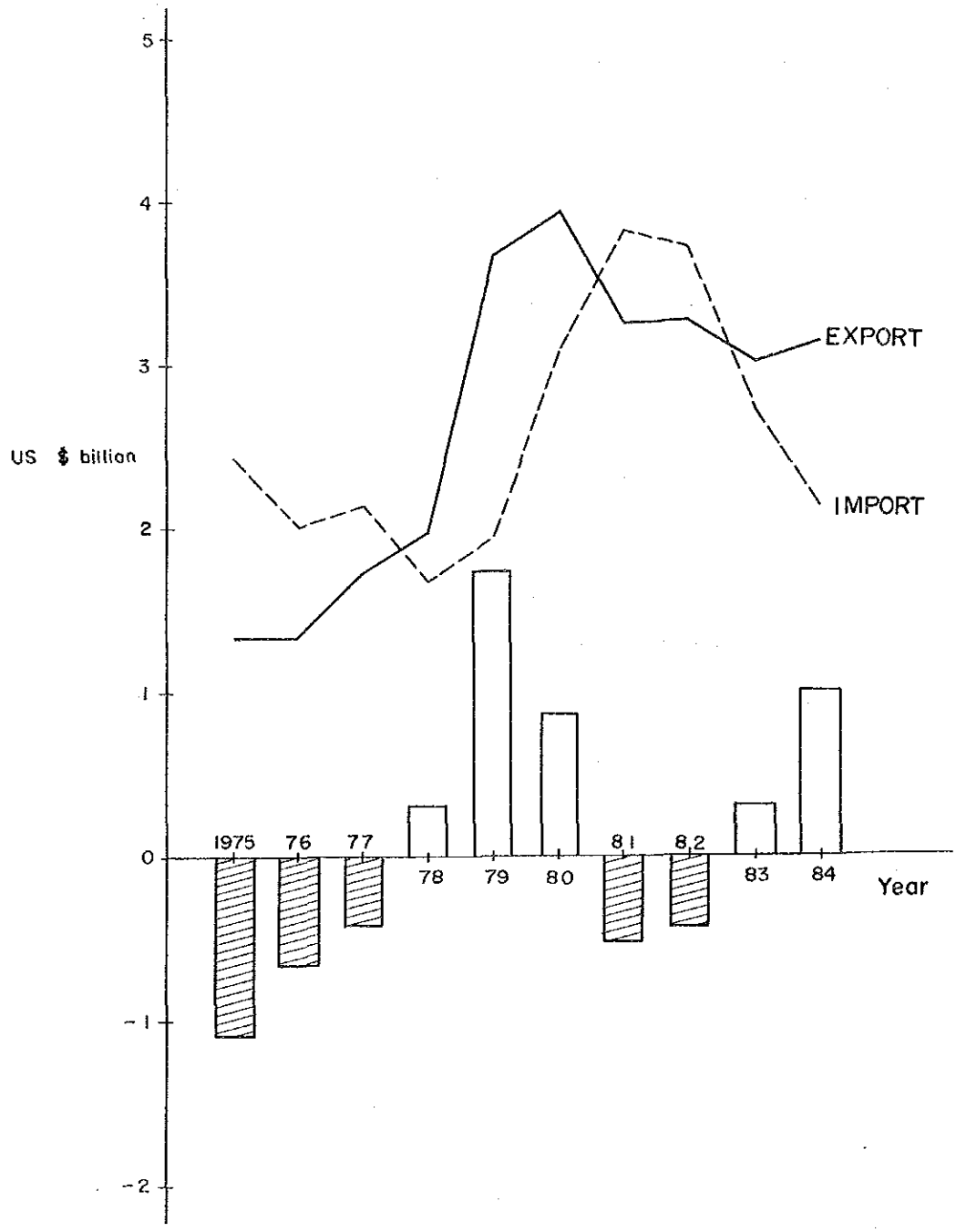
(2) Exports and Imports

Trade balance of Peru had recorded deficit till 1977, but showed surplus in 1978 due to increase in oil production. Export volume peaked in 1980, after which the export of copper, petroleum, iron and non-traditional goods has all fallen (Fig. 2-1-6).

As a result of expansionary monetary and fiscal policies and the appreciating foreign exchange rate, the payment for imports rose rapidly. Food imports actually fell between 1980 and 1982 as better weather and policies encouraged crop production, but other consumer imports and capital imports grew quite rapidly.

Although the sol was devalued 13% in real terms against the U.S. dollar during the second half of 1982, the dollar kept rising in world markets, meaning Peru's real devaluation against the currencies of its trading partners was much less. The 1982 balance of payments deficits was filled only by borrowing.

Fig. 2-1-6 Foreign Trade of Peru



Main export and import commodities are shown in Table 2-1-4.

Table 2-1-4 Main Export and Import commodities (% value)

Export Commodities			
Commodities	1975	1980	1984
Traditional	92.8	78.4	76.9
Minerals	44.3	45.8	43.5
Oil & By-products	3.1	20.2	19.6
Agri-products	27.9	5.8	6.3
Fishmeal	12.6	5.0	4.3
Others	4.9	1.6	3.2
Non-traditional	7.2	21.6	23.1
Total	100.0	100.0	100.0

Import Commodities			
Commodities	1975	1980	1984
Consumer Goods	8.9	12.5	11.9
Other Inputs	48.3	37.9	44.4
Capital Goods	32.8	35.2	36.0
Diverse & Adjustment	10.0	14.4	7.7
Total	100.0	100.0	100.0

Main Trade Partners are shown in Table 2-1-5.

Table 2-1-5 Main Trade Partners (% value)

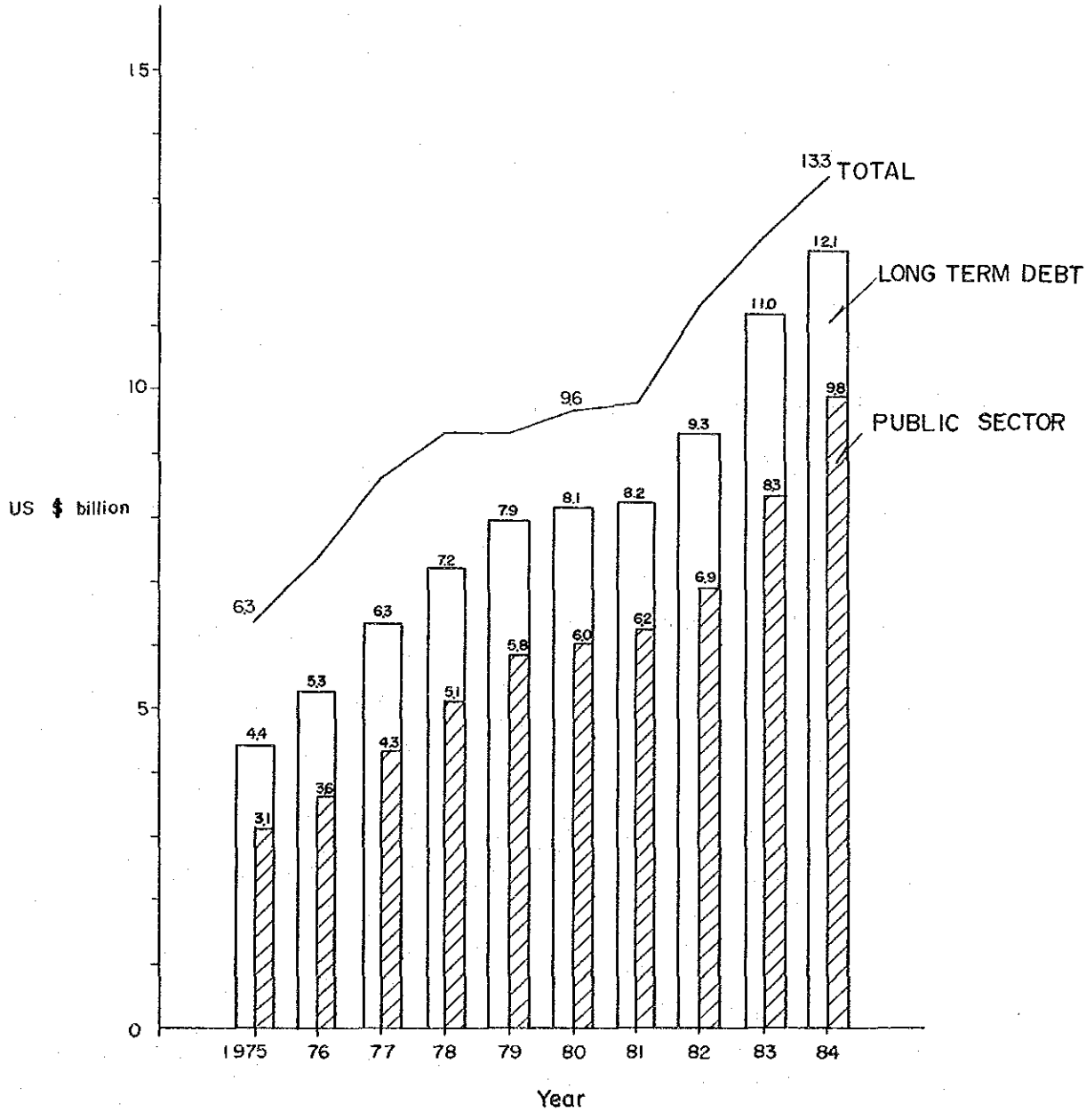
Exports To			Imports From		
	1977	1982		1977	1982
USA	30.0	32.7	USA	29.0	31.5
Japan	12.0	15.4	Japan	7.4	9.1
West Germany	4.3	3.8	West Germany	7.4	6.8
UK	3.8	4.6	UK	4.3	2.0
Netherlands	2.3	1.4	Argentina	3.1	3.5
Colombia	1.1	2.4	Brazil	3.3	6.3
Others	46.5	39.7	Others	45.5	40.8
Total	100.0	100.0	Total	100.0	100.0

(3) Foreign Debt

Heavy public spending was responsible for a rapid increase in Peru's foreign debt in the mid-1970s. From 1978 to 1981, the total foreign debt grew by only 1.3% yearly, but between 1982 and 1984 saw a much faster rate (11.2% a year) of increase (Fig. 2-1-7).

According to the World Bank figures, debt service as a proportion of export earnings increased from 22.2% in 1979 to 36.7% in 1982.

Fig. 2-1-7 Foreign Debt of Peru



2.1.4 National Development Plan

(1) The National Development Plan for 1982-1985

Various plans (sectorial, public enterprises, departmental, etc.) are carried out in accordance with the National Development Plan for 1982-1985, approved on December 31, 1982 and published in January 1983. This Plan will be in force in substance until publication of the next Global Plan.

The macroeconomic forecast embodied in the National Development Plan for 1982-1985 has been formulated on the basis of the various economic policies called for in the plan, including a mid-term economic recovery, gradual suppression of inflation, and maintenence of a realistic exchange policy.

Table 2-1-6 Gross Domestic Product 1982-1985

(Million of Soles 1970)

	1981	1985	Annual growth rate (%) 1985/1982
Gross Domestic Product	346,541	384,323	3.1
Production (goods)	182,946	203,897	3.4
- Agriculture	43,777	48,936	2.9
- Fishing	3,520	3,800	5.9
- Mining	31,377	37,217	4.3
- Manufacturing	86,211	91,203	2.8
- Construction	18,101	22,741	5.3
Production (services)	163,595	180,426	2.8
- Government	26,047	27,238	1.2
- Others	137,548	153,188	3.1

Source : "Plan Nacional Desarrollo Para 1982-1985"
Instituto Nacional de Planifieacion, Enero 1983

(2) The new government's policy

The new government installed on 28 July 1985 has announced an economic package to try to solve some of the country's economic problems.

The main points are as follows:

a. Peru will dedicate no more than 10% of its export revenue to servicing the foreign debt during the next 12 months or until its economic plight improves.

b. Some form of import restrictions, exchange controls and additional price controls is to be introduced.

c. On the home front, the new government's priorities are to be agriculture and the poorest strata of the population.

Decentralisation and a radical redistribution of income will be the key to creating the local market from which Peru will gain strength and independence.

d. Inflation is to be fought by increasing local food production to replace costly imports.

Fish caught off the Peruvian coast will in future be used mainly for canning and freezing not for fishmeal.

2.1.5 Future Prospects of Peruvian Economy

(1) The World Economy

With respect to the world economy, inflation has been dampened, and the economic activity is now in the recovery phase after 1983, sustained by the expansion of the American economy.

It has overcome the economic recession and inflation left over since the second oil crisis, and has basically followed the path of recovery.

World output appears to have expanded at a rate of about 2.7% in 1983 and 4.6% in 1984 (Table 2-1-7).

Table 2-1-7 Growth of World Output (GDP)

(%)

	1980	1981	1982	1983	1984[a]	1985[b]	1986[b]
World	2.0	1.7	0.7	2.7	4.6	3.6	3.2
Developing Countries	3.2	1.3	-0.4	0.2	2.9	3.3	3.6
Developed Markert economies	1.2	1.5	-0.2	2.4	4.6	3.2	2.5
Centrally Planned economies	3.4	2.3	3.9	5.2	5.5	4.9	4.7

Source : Department of International Economic and Social Affairs of the United Nations Secretariat. World Economic Survey 1985.

a : Preliminary estimates.
b : Forecasts.

The situation in much of the developing world remains deeply troubling. Debt service ratios, particularly in Latin America, are likely to remain high even after recovery in industrial countries, and debtor countries will still be compelled to retrench severely.

While there is recognition of the need for adjustment of productive structures to allow higher levels of domestic activity that would be consistent with lower current acount deficits, internal and external conditions are not conducive to the mobilizations of sufficient resources for the needed investment.

Generally, in developed countries a significant decline of inflation and slowdown in wage increases have improved business confidence, and rates of investment have recently been picking up.

There are concerns that it may be vitiated by the persistence of structural budget deficits and high interest rates in the United States or by a prolonged period of restrictive policies in Western Europe.

(2) Main Factors Affecting World Economic Trends

Basic future trends will be determined by these factors:

1) trends for mutually dependent relationships

- If the present shaky world economic system can be mended and international collaboration maintained and strengthened, the world economy and trade will continue to enjoy sustained growth.

- However, if stable international mutual relations cannot be maintained, tensions will build up, impairing the growth of the world economy and trade.

2) Growth Potential of Developed Countries

- If revolutionary technological developments are achieved in these countries and a loss of vitality, peculiar to the "advanced country disease", can be prevented, their growth potential will be fully displayed.
- On the other hand, if technological innovation declines and the various symptoms of the "advanced country disease" cannot be cured, the economic growth of Developed Countries will inevitably slow down.

3) The World Energy Situation

- If oil supplies become stable and if consumer countries make progress both in the development of alternative energy sources and in energy conservations, energy will not be a serious problem for the world economy.
- However, if little progress is made by consumer countries in the development of alternative energy sources, actual oil prices will rise substantially, impeding the economic performance of industrialized countries.

(3) Future Prospect of World Economy (Scenario for Main case)

Views on future prospect of the world economy may differ depending on how these factors are assesed. This study will be based on the assumption that countries of the world will adopt the best conceivable policies for addressing the dificult problems.

1) Trends for mutually dependent relationships

a. The free trade system will be basically maintained.

b. High interest rates will decline as a result of appropriate policy implementations by the United States.

c. The problem of debt accumulation will be alleviated by self-supporting efforts of debtor nations themselves, by the lowering of world interest rates, and by cooperation of the parties concerned by such means as multi-year re-scheduling.

2) Growth Potential of Developed Countries

a. Stagflation will not be easy to overcome.

b. The growth in Developed Countries over the coming years will be slower than in the 1960s and 1970s, even if some progress is made in their efforts at industrial revitalization.

3) The World energy situation

a. Progress will continue to be made in international collaboration between consumer countries for the

development of alternative energy sources, conservation of energy and the stockpiling of oil.

b. The world economy will not be jolted by a dramatic increase in oil prices as on the occasion of the first and second oil crises.

Based on the premises mentioned above regarding the world economy, the Economic Planning Agency of Japan forecasts the growth patterns in major regional economies as shwon in Table 2-1-8 .

Table 2-1-8 World GNP Composition in 2000

(%)

	GNP Composition in 1960	Present GNP Composition	Real economic growth rate (annual)		GNP Composition in 2000
			Latest 10 years (1970-1979)	1980-2000	
Industrialized countries					
Japan	3	10	5.2	4.0	12
U.S.	33	22	3.1	2.5	20
EC and other OECD member	26	31	3.1		26
Total	(62)	(63)	(3.3)	(2.8)	(58)
Developing countries					
Newly industrializing countries	3	4	8.0	6.0	7
Other LDCs	11	11	5.7	4.0	13
Total	(14)	(15)	6.3)	(4.6)	(20)
Socialist countries					
USSR	15	13	5.1	3.0	12
East Europe, etc.	4	5	5.9		5
China	5	5	5.8	4.0	5
Total	(24)	(22)	(5.4)	(3.2)	(22)
World total/average	100	100	4.3	3.2	100

Source: "Japan in the year 2000" Economic Planning Agency of Japan 1982.

Notes 1. The economic growth rates were estimated by the Planning Bureau of the Economic Planning Agency.

2. GNP is at 1978 prices in U.S. dollars.

3. Newly industializing countries are South Korea, Hong Kong, Singapore, Brazil, Mexico and Taiwan.

Among the developing countries, newly industrializing countries are assumed to an annual growth ratio of about 6%. The annual growth rate in other developing countries will be about 4%.

(4) Other forecasts

Forecast presented by "The Global 2000 Report to the President-Entering the Twenty - First Century" (U.S. Government 1980) is shown in Table 2-1-9, Fig. 2-1-8. The low case of the forecast is reflected in the world economic movements after 1980.

Table 2-1-9 Annual growth rate of GNP (1985-2000)

	growth rate	range
World	2.73%	+0.61% -0.59%
Developing Countries	3.50%	+0.80% -0.78%
Advanced Countries	2.52%	+0.54% -0.53%
Peru	3.90%	+0.50% -0.50%

(5) Peru's long - term outlook

A number of other forecasing reports has been consulted. It seems that the most reliable forecast for

the world economy is the forecast given by the Economic Planning Agency of Japan.

The "main case" for the future prospects of Peruvian economy means the most probable one. There are many uncertain factors that may affect the future prospects of international politics and the world economy. Therefore, in this study two more cases are taken for the annual growth rate of GDP in Peru: low case and high case.

Growth rate of GDP for each case is based on the basic data as shown below:

1) Main case (1985 - 1995) 3.5%

   a. Annual growth rate of GDP between 1960 and 1984 in Peru (Fig. 2-1-8 and Fig. 2-1-9) 3.5%

   b. Annual growth rate of GDP in the National Development Plan for 1982 - 1985 (Fig. 2-1-8). 3.1%

   c. Annual growth rate of GNP in Developing Countries (except NICs) estimated by the Economic Planning Agency of Japan for the period from 1980 to 2000 (Table 2-1-8 and Fig 2-1-8). 4.0%

   d. Annual growth rate of Peru's GNP given in "The Global 2000 Report to the President" (U.S. Report for the period from 1985 to 2000),

(Table 2-1-9 and Fig. 2-1-8). 3.9%

e. Annual growth rate of GNP in Developing Countries given in the above-mentioned U.S. Report (for the period from 1985 to 2000), (Table 2-1-9 and Fig. 2-1-8) 3.5%

2) Low case (1985 - 1995). 2.5%

a. Annual growth rate of the population in Peru from 1985 to 2000 (2.6% - 2.4%) . . . 2.5%

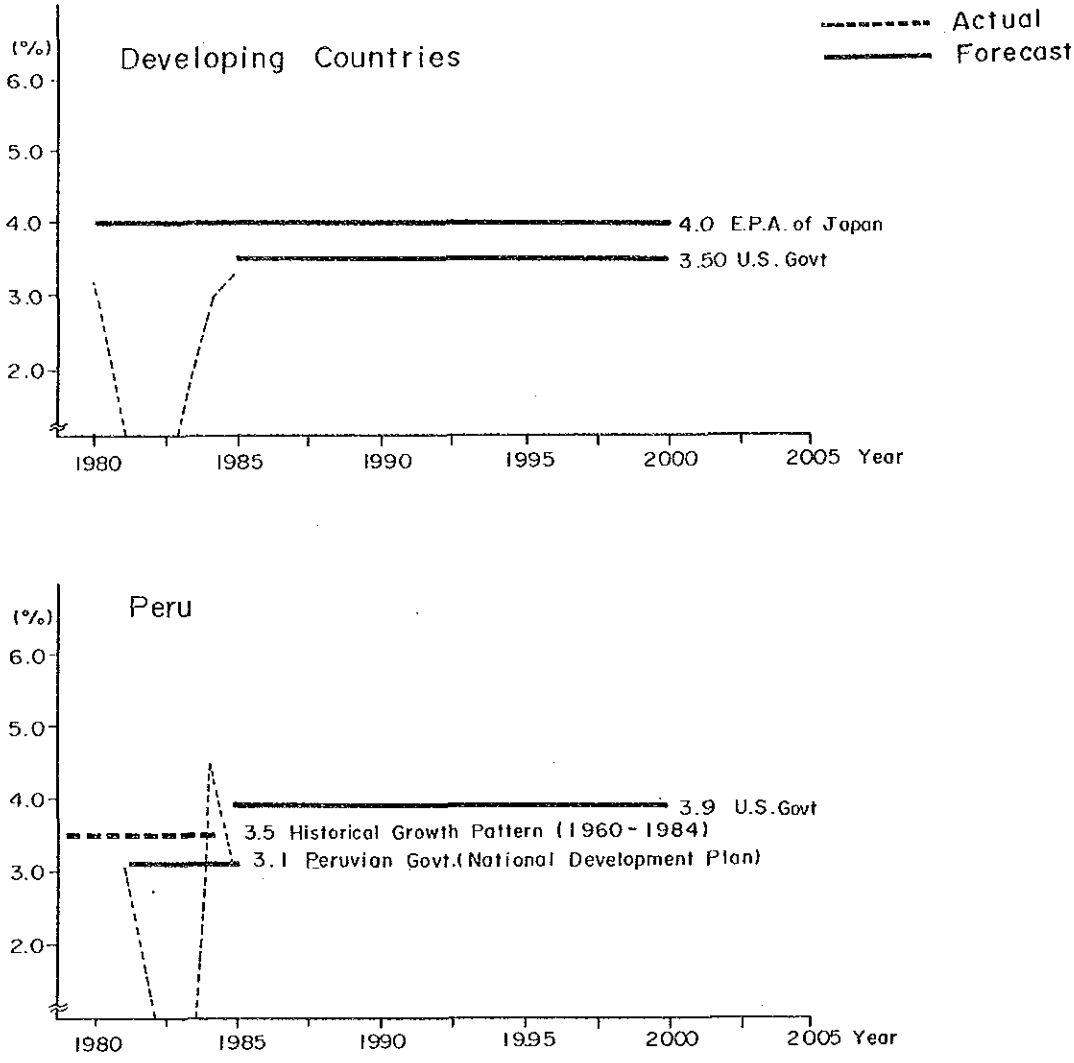
3) High case (1985 - 1995) 4.5%

a. Annual growth rate of Peru's GNP given in the above-mentioned U.S. Report (main case 3.9% + range 0.5). 4.4%

b. Annual growth rate of Peru's GDP estimated in "Lima Metropolitan Development Project, June 1, 1984" by the World Bank (for the period from 1985 to 1990). 4.6%

c. Annual growth rate of GNP in Developing Countries (including NICs) estimated by the Economic Planning Agency of Japan (for the period from 1980 to 2000). 4.6%

Fig. 2-1-8 Forecasts of Annual Growth Rate of GDP (or GNP)



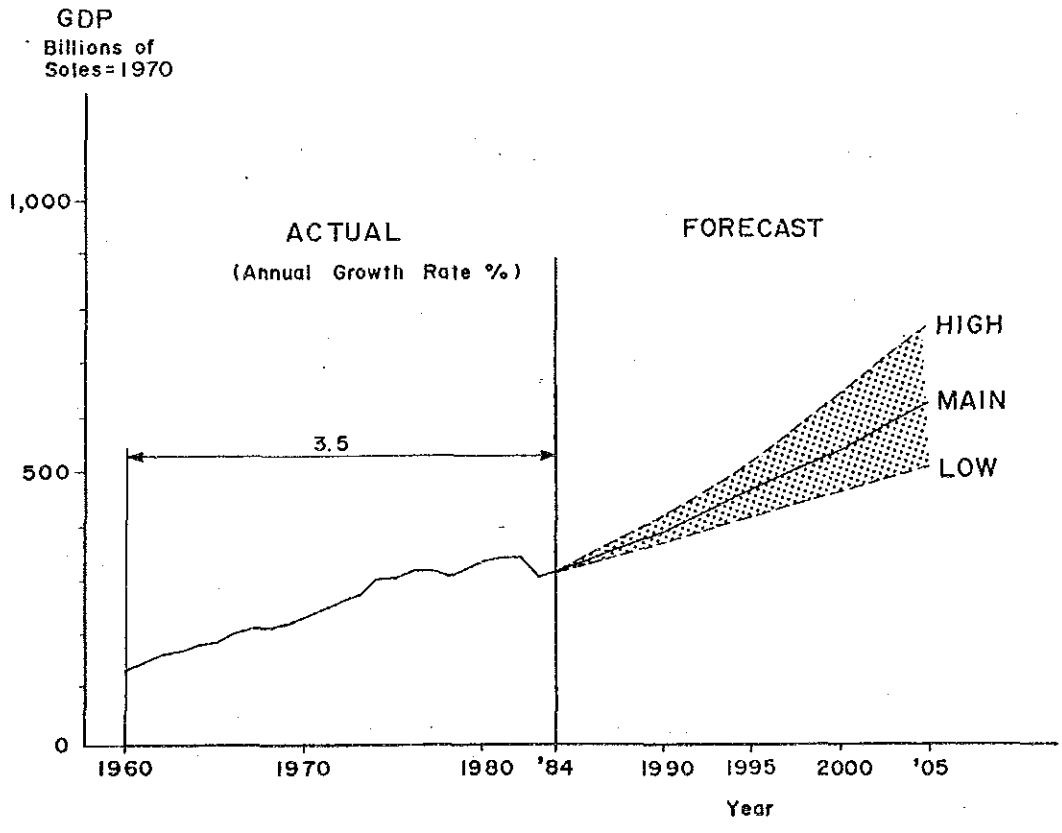
Industrialized countries have been reasonably successful in the pursuit of material affluence through an expansion of their economic activity and improvement of their efficiency. In this sense they are thought to be facing a major turning point in the long-term perspective.

As multipolarization countinues, the nations of the world will have to try and establish a new

framework for a more stable relationship of interdependence by making efforts to stabilize exchange rates, to prevent the spread of trade protectionism and to maintain a cooperative relationship between the North and South. Therefore, the economic growth of Peru is likely to be about 3.0% (Main Case) after 1996 with a moderate slowdown. Peruvian economic growth during the forecast period is assumed as follows:

	1985 - 1995	1996 - 2005
Main case	3.5%	3.0%
Low case	2.5%	2.0%
High case	4.5%	4.0%

Fig. 2-1-9 ECONOMIC GROWTH OF PERU



2.2 Transport System of the Republic of Peru

2.2.1 General

Topographic, geographical and climatic conditions of Peru render transport extremely difficult.

The transport network reflects these difficulties and has shaped the country's development accordingly. Since the nineteenth century, several isolated railways have been built by private interests to connect mining areas in the Sierra with coastal ports, but highways and road transport are the country's basic movers of domestic freight and passengers. Only highways and, more recently, civil aviation, have been instrumental in integrating the country, but lack of an adequate road network is still one of the most difficult problems confronting Peru.

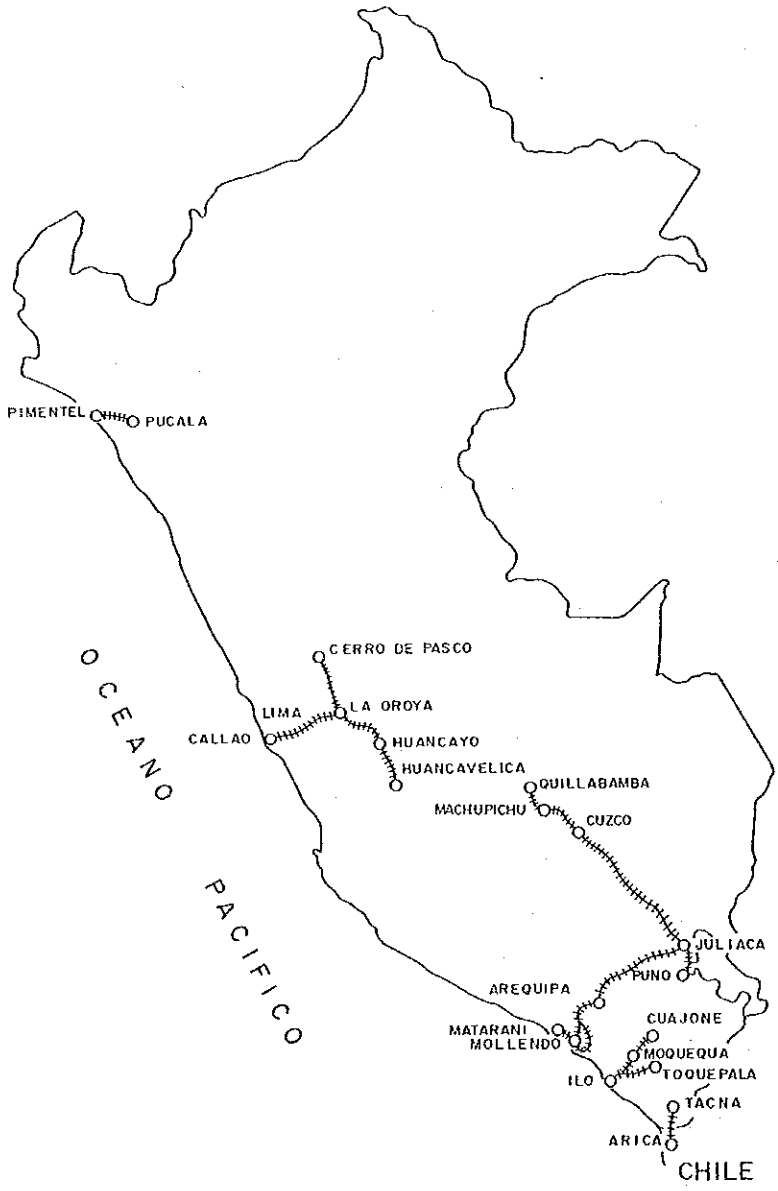
2.2.2 Railway

Peru has never had a fully integrated railway system. Several separate east-west railway lines have been developed, largely as part of the mining interests for export of mineral deposits from the Sierra. These lines still serve that main purpose. In the 1930s, the railway system consisted of about 4,200 km of track; at present, after closing of several lines, the system has been reduced to a total route length of about 2,200 km (Fig. 2-2-1).

The Central and Southern Railways are by far the most significant in the country and they have an important role to play in their respective environment. The Central Railway links the mineral-producing area of Cerro de Pasco and La Oroya with the port of Callao and, therefore, is an important supplement to the limited capacity of the Central Highway. It also hauls some agricultural products from the Sierra to Lima and general cargo in the opposite direction. It is the highest stnadard gauge railway in the world (4,829 m) and one of the most difficult to operate because of the steep grades (over 4%), with many switch-backs and sharp curves.

The Southern Railway connects the Pacific port of Matarani with Puno in the Sierra and, by ferry over Lake Titicaca, with Bolivia. From Puno, another line goes to Cuzco over the main plateau. The grades of the Southern Railway are not as steep as those of the Central, but they are still quite severe. The railways have declined in importance and now carry only about 5% of the total traffic.

Fig 2-2-1 Railways in Peru



2.2.3 Road

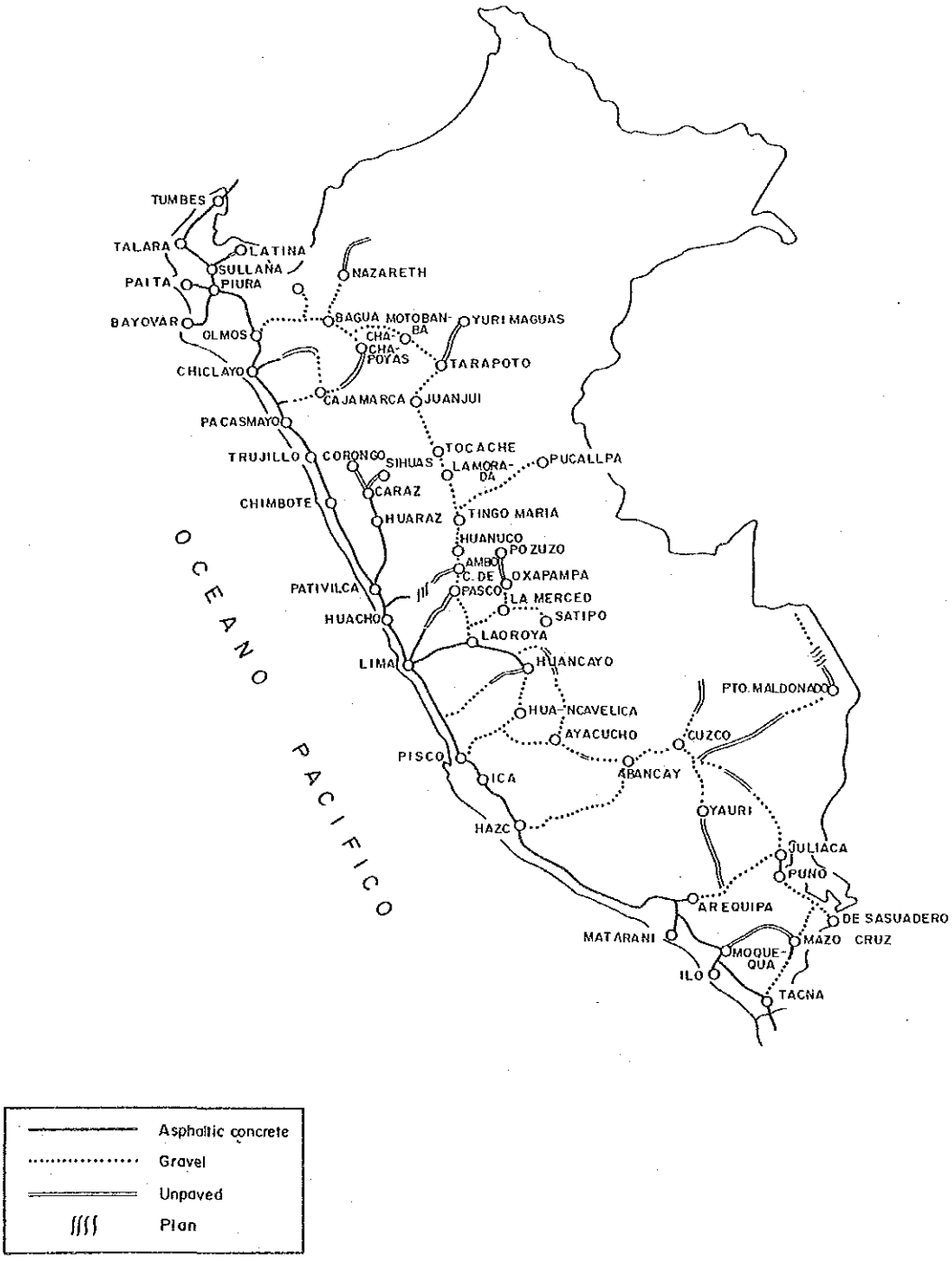
Peru's highway network totals some 58,500 km, of which only about 6,000 km are paved. After the heavy emphasis on highway construction in the mid-1960s, road development has concentrated on paving and improving some of the more heavily used roads and slowly extending the system. The highway system, except in the Costa, is, however, still in an early stage of development. Peru's road density is half that of its neighbours, Ecuador and Chile, partly because of the large unexplored areas in the Selva and high concentration of economic activity in the Costa. The roads connecting the Costa with the Sierra and the Selva are generally low in standard; the roads in the Sierra are at best passable; and the roads in the eastern piedmont and in the Selva are rudimentary, being mainly dry weather tracks.

Road transport is the basic carrier for domestic freight traffic. In 1980, highways carried 80% of all domestic traffic. During the past five years, domestic road freight volume has grown at an average annual rate of about 6%, which is more or less the same as the rate at which total domestic freight has grown. The share of international freight transported by road is not very important except for limited traffic to and from Bolivia (Fig. 2-2-2).

Road transport service carries 70% of interurban passengers and about 7% of the international passenger traffic. Most of the services operate along the Pan-American Highway running between Piura, Lima and Pisco. Across the country, the most

important service lines are Lima-La Oroya (centre) and Arequipa-Puno (south). The road transport shares of both freight and passenger traffic are not expected to show significant changes in the future.

Fig. 2-2-2 Roads in Peru

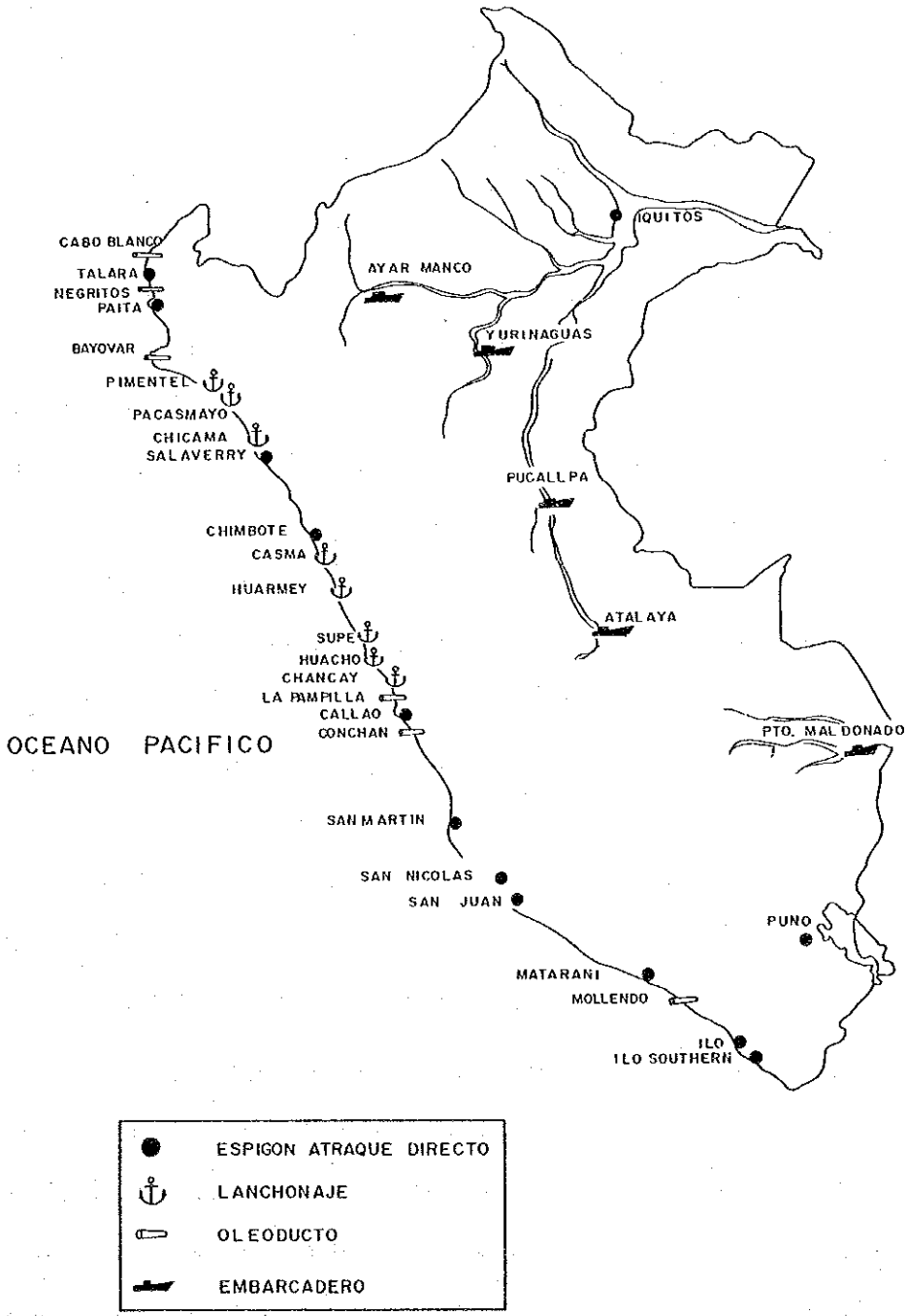


2.2.4 Water Transport

Domestic coastal and river shipping provides about 36% of the ton-km in the overall movement of cargo traffic in Peru. Coastal shipping is engaged mostly in the movement of bulk cargo, particularly crude oil and oil products. PETROPERU, the state oil company, ships crude oil from its loading installations at Bayovar, terminal of the North Peruvian pipeline, to the refineries near Talara and Callao, as well as products and natural gas, from Talara mainly to Callao (Fig. 2-2-3).

Domestic river traffic, although growing, still transports only about 2.5% of total traffic; it is fairly diversified, consisting mainly of dry cargo. As a result of improved economic conditions since 1979 and trade liberalization, import traffic at the ports of Matarani and Callao is now causing congestion and ship delays. For the immediate term, better equipment will be acquired to improve the situation. For the longer term, the Empresa Nacional de Puertos (ENAPU) is planning expansion of both ports.

Fig. 2-2-3 Aquatic Infrastructure in Peru



2.2.5 Air Transport

Peru, for topographical reasons, has long relied on air transport as one of the means of regional integration. As is the case with other Andean countries, aviation has been particularly useful to overcome the difficult crossing of high mountain ranges. One of the two main airlines, Faucett, which is privately owned, was founded as early as 1928 and is, therefore, one of the oldest in the Americas. The other important carrier, Aeroperu, was created by the Government in 1973 as a result of a reorganization of SATCO, the airline element of the Peruvian Air Force, which had been in operation since 1960. These two carriers have had about equal shares of the domestic traffic, with Aeroperu dominating the international traffic. On the ground, the Governmental Agency, Corporacion Peruana de Aeropuertos y Aviacion Comercial (CORPAC), is charged with operating and maintaining airports and enroute facilities. CORPAC now administers 57 airports, or almost all the airports serving commercial air transport in Peru (Fig. 2-2-4). About 110 civil aircraft are registered in Peru, of which about half are used for air taxi and crop-spraying operations.

The most important part of the domestic traffic is the movement of passengers, with air freight significant for high-value air cargo and movement to isolated areas of the country. Sustained growth has been aided to a great extent by the provision of improved and expanded air services. The two commercial airlines, Aeroperu and Faucett, have both suffered from inade-

quate airport infrastructure, which has limited them to aircraft that are costly to operate. In part, this situation will be alleviated by a recent World Bank Loan to CORPAC.

Airport Development Plan in Peru is shown in Fig. 2-2-5. new airport Jaen is under construction in Cajamarca.
Cuzco is the most important local airport in Peru.

Feasibility study of the construction of the International Airport of Cuzco at Chinchero was concluded in March 1978.

The new Cuzco International Airport will contribute to the development of the region of Cuzco.

Fig. 2-2-4 Airports and Aerodromes Controlled by CORPAC S.A.

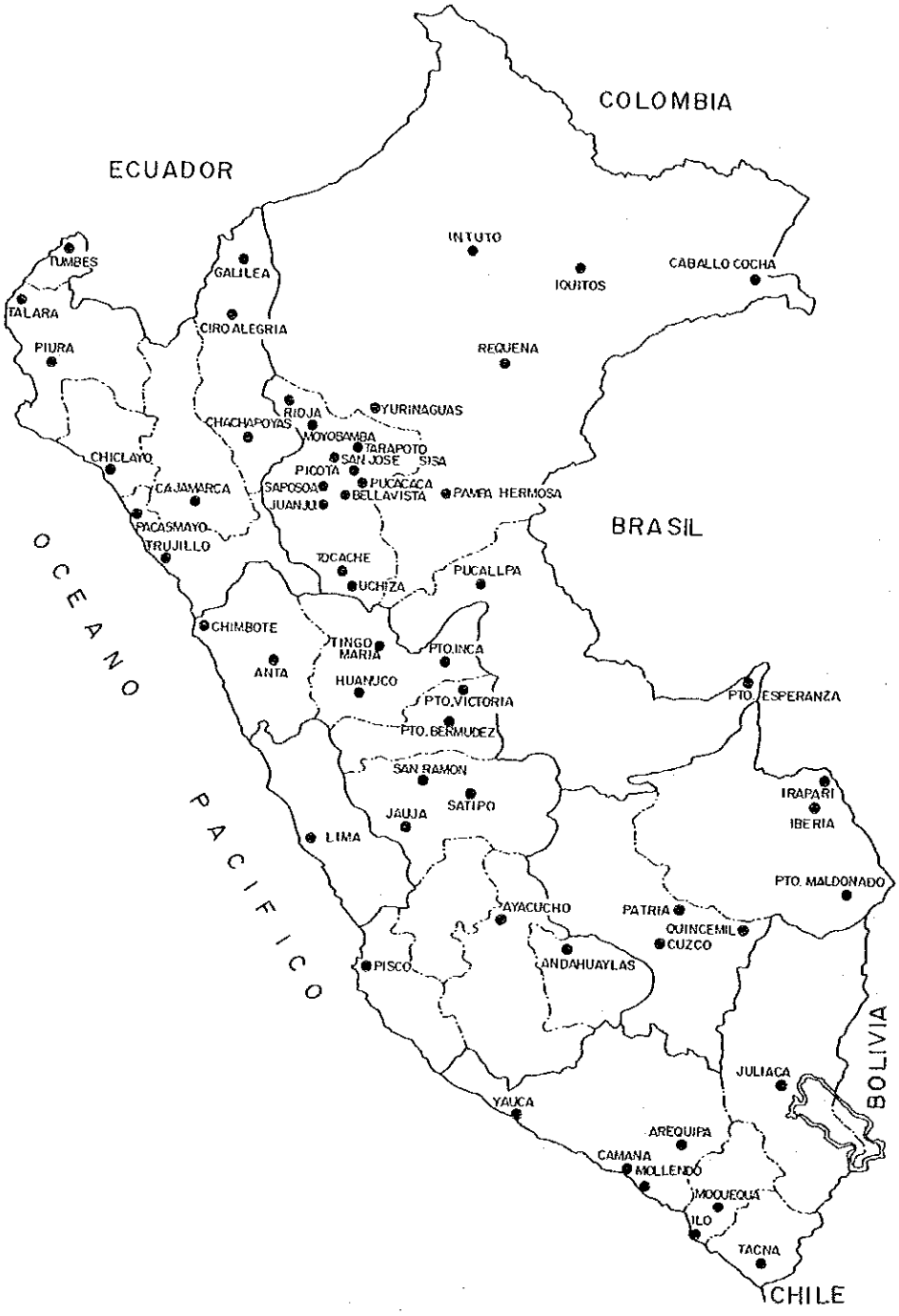
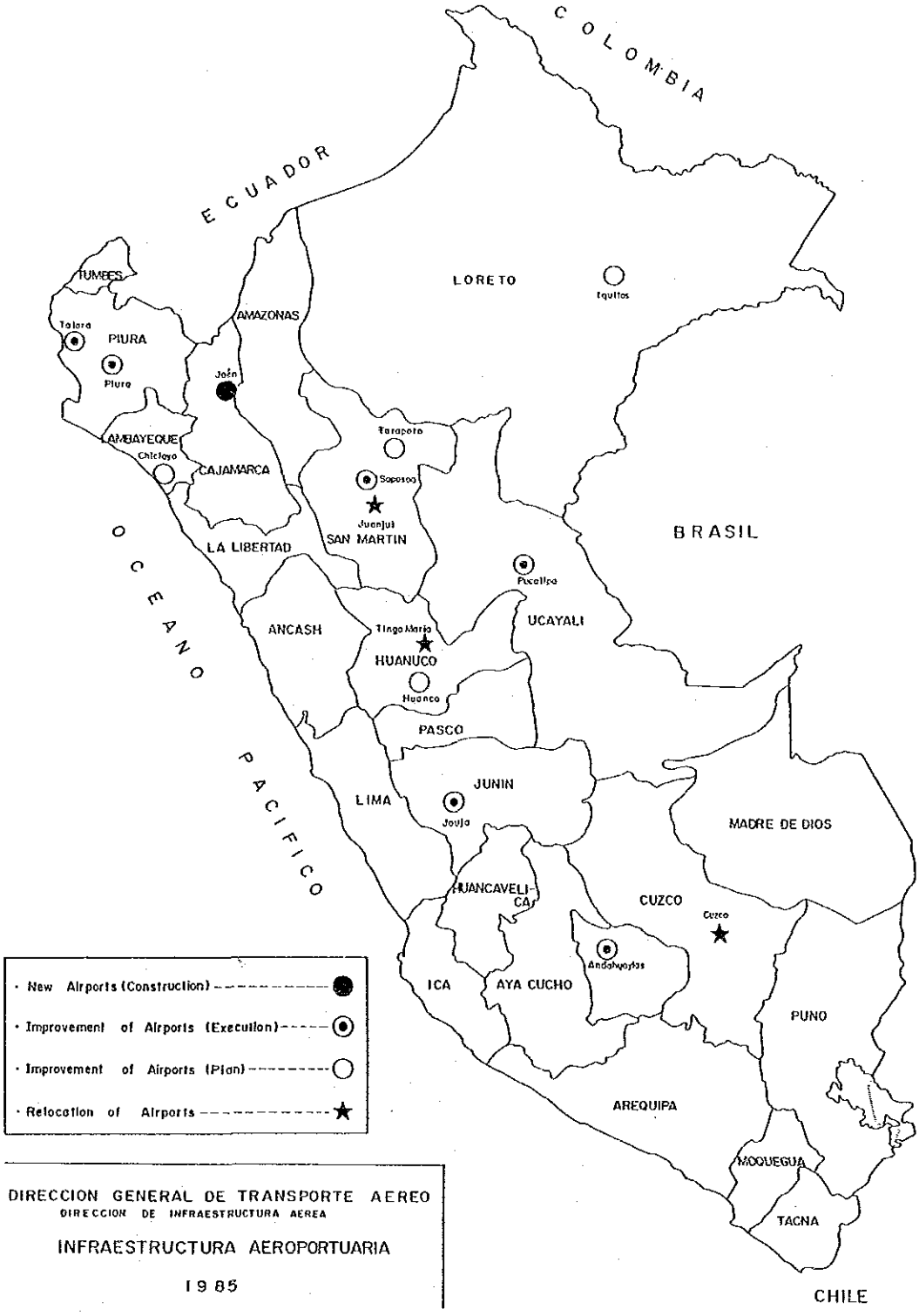


Fig. 2-2-5 AIRPORT DEVELOPMENT PLAN



CHAPTER 3

LIMA INTERNATIONAL AIRPORT

CHAPTER 3 LIMA INTERNATIONAL AIRPORT

3.1 Outline of Airport

Lima International Airport is located 10 km northwest of the centre of Lima, the capital of Peru. The airport was opened in 1965. It then was certainly a first-class international airport with a 3,507 m runway, 22,000 sq.m of passenger terminal, ILS, etc. as shown in Table 3-1-1 and Fig. 3-1-1. The airport facilities, however, have now become phisically antiquated. Furthermore, due to the recent increase and progress of air traffic brought about by the introduction of wide-body jet aircraft such as DC-10 and B747, the passenger terminal building in particular is now obviously inadequate to meet the demand.

The airport handled 883 thousand international passengers, and 1,103 thousand domestic passengers, totalling 1,986 thousand passengers in 1984. It is now served by, apart from local carriers of Aeroperu and Faucett, 16 foreign carriers: Aeroflot, A. Argentinas, Air France, Air Panama, Avianca, CP Air, Cubana, Ecuatoriana, Iberia, K.L.M., LAN-Chile, LL. A. Boliviano, L.A. Paraguayas, Lufthansa, VARIG and VIASA.

Table 3-1-1 Description of Lima International Airport

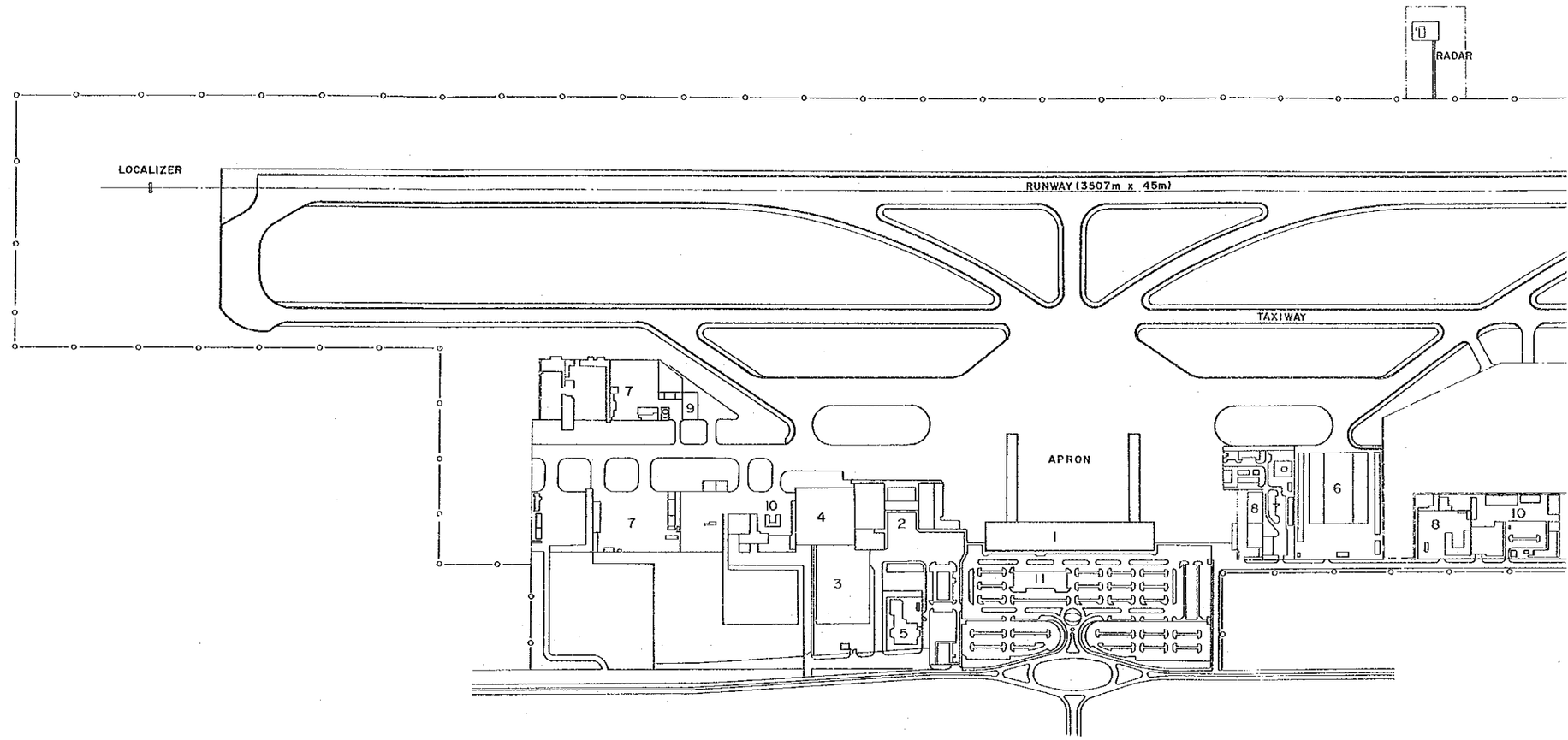
1 of 2

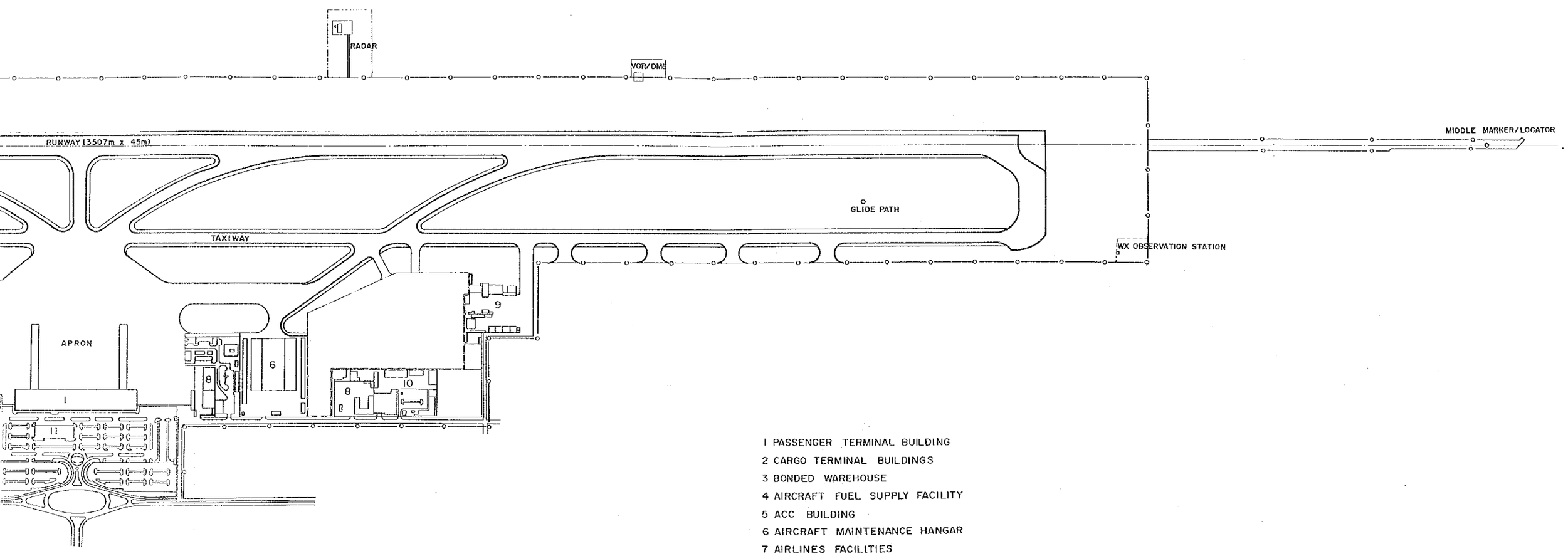
Location	Lat. 12 01'06" South, Long. 77 06'44" West	
Elevation	112 ft (34.14 m)	
Administrator	CORPAC (Corporacion Peruana de Aeropuertos y Aviacion Comercial)	
Operational Hours	24 Hours (0:00 - 24:00)	
Aerodrome Reference Temperature	26.5 degrees C.	
Airfield Facilities	1) Runway Strip:	3,627 m x 300 m
	2) Runway:	3,507 m x 45 m (Concrete Pavement)
	3) Taxiways:	5,000 m x 23 m (Concrete Pavement)
	4) Apron:	173,000 sq.m (Concrete Pavement)
Terminal Area Facilities	1) Passenger Terminal Building with Administration Block:	RC10F, 29,600 sq.m
	2) Cargo Terminal Buildings:	24,300 sq.m
	3) Fire Station:	ICAO Category 9
	4) Fuel Supply:	Hydrant System Storage Capacity 2,250 kl
	5) Other Facilities:	Catering Buildings, Aircraft Maintenance Hangar, General Aviation Facilities, etc.
Air Navigation Facilities	1) Radio Navaids:	VOR/DME, Cat-I ILS, Three NDB
	2) ATS Facilities:	ACC/FIC, Radar Facility, APPAC, Control Tower
	3) Telecomm. Facilities:	Air/Ground Communication, Inter Facility Coordination Circuits, AFTN Circuits

Table 3-1-1 Description of Lima International Airport

2 of 2

Air Navigation Facilities	4) Visual Navaids:	Approach Lights, VASI, Runway Centre Lights, Runway Edge Lights, Threshold Lights, Taxiway Edge Light, Airport Rotating Beacon
	5) Met. Facilities	RVR, Ceilometer, Windvane and Anemometer, APT, Rawinsonde, etc.

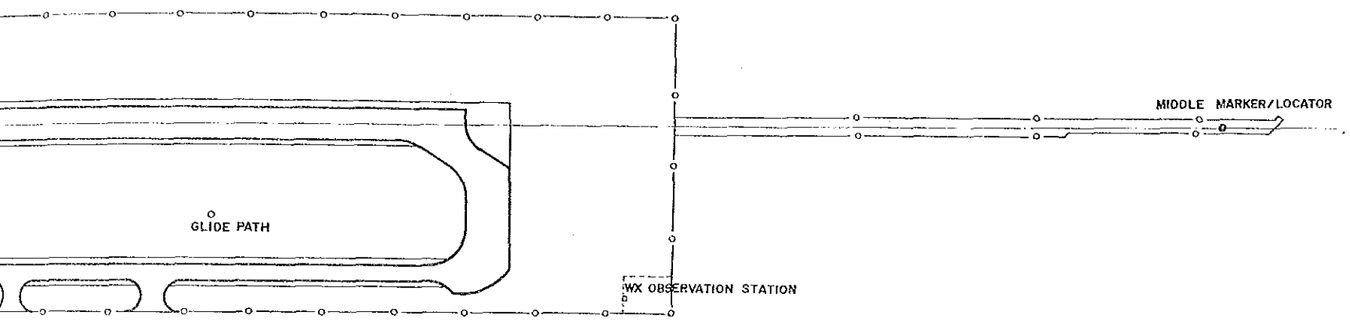

RADAR
LOCALIZER
RUNWAY (3507m x 45m)
TAXIWAY
APRON
1
2
3
4
5
6
7
8
9
10
11



1 PASSENGER TERMINAL BUILDING
2 CARGO TERMINAL BUILDINGS
3 BONDED WAREHOUSE
4 AIRCRAFT FUEL SUPPLY FACILITY
5 ACC BUILDING
6 AIRCRAFT MAINTENANCE HANGAR
7 AIRLINES FACILITIES
8 CATERING BUILDINGS
9 SMALL AIRCRAFT FACILITIES
10 AIRPORT MAINTENANCE FACILITIES
11 CAR PARKING

FIG. 3-1-1

THE DEVELOPMENT
OF
JORGE CHAVEZ LIMA-CALLAO I
EXISTING LAYOUT P
THE JAPAN INTERNATIONAL C



1 PASSENGER TERMINAL BUILDING
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9 SMALL AIRCRAFT FACILITIES
10 AIRPORT MAINTENANCE FACILITIES
11 CAR PARKING

0 200 400 800M

FIG. 3-1-1

THE DEVELOPMENT PROJECT
OF
JORGE CHAVEZ LIMA-CALLAO INTERNATIONAL AIRPORT

EXISTING LAYOUT PLAN | S = 1 : 8,000

THE JAPAN INTERNATIONAL COOPERATION AGENCY

3.2 Conditions of Existing Facilities

3.2.1 Airfield Facilities

The present conditions and problems of the existing airfield facilities are described below and summarized in Table 3-2-1.

(1) Runway Strip

Surface of runway strip is covered by accumulated silt, silty sand and gravel. There is no turf or grass but shrubs are found in some places. Therefore, clouds of dust are formed at the time of landings or take-offs of wide-body aircraft and strong winds. This condition may be harmful to aircraft engines. Surface of runway strip undulates greatly and hand-holes of electric cables and inlets of drainage are left uncovered.

To increase safety of aircraft in case of an emergency landing, runway strip should be graded, and at the same time surface should be treated to prevent rising dust.

(2) Runway

There are considerable cracks in the concrete slabs. Longitudinal cracks at both sides of the runway centreline are observed in almost all of the slabs. These cracks seem to stretch long in rows.

According to the sampled data shown in the Appendix 3-1, these longitudinal cracks are located about 5 m - 7 m apart where maingears of aircraft touch down. Conspicuous cracking of concrete slabs is observed especially at both sides of the aircraft touchdown zone.

Many isolated coarse aggregate or spalls of concrete are also found in some longitudinal cracks.

In such slabs, there are also many hair cracks or thin cracks in the transverse direction which seem to emanate from the severe longitudinal cracks.

The slabs have few defects of stepping, separation or edge breaking and are rather in good condition, but joint sealers are mostly missing.

In the middle part of the runway which is overlaid by asphaltic concrete on the concrete slabs, reflective cracks are observed along all of the concrete slab joints.

Both touchdown zones are covered extensively with aircraft wheel rubber abrasions, about 25 m wide. Runway marking has disappeared in that area.

(3) Runway Shoulder

The 7.5 m wide shoulder is paved with asphaltic concrete. Peeling-off of surface is observed. Surface of the shoulder is weathered, leaving many pebbles and bits of gravel.

Outside of the shoulder is covered with asphaltic material, 7.5 metres wide. However, its surface is weathered and scattered by gravel.

(4) Overrun

The asphalt pavement surface of the overrun has been weathered and peeled off, leaving pebbles and gravel on the whole surface.

(5) Taxiway

In the surface of the cement concrete pavement, longitudinal cracks have occurred in most places except in the right-angled exit taxiway leaving the runway 2,150 m from the end of Runway 15.
The condition of the surface and joints is better than that of the runway, but some parts are damaged.
The condition of the transverse joints is rather good, but few longitudinal joint sealers remain.
Taxiway shoulder is paved with asphaltic concrete which has been weathered and partly worn off.
Both right-angled taxiways at the ends of the runway have no paved shoulders. Paving is necessary.

(6) Apron

The condition of the apron concrete pavement seems to be better than that of the runway and taxiway.

Conspicuous cracks are comparatively few, and most of the cracks are small except for a certain part of the apron.

In most of the slabs, joint sealer has either been removed or solidified.

Concrete slabs in the aircraft spots do have stepping, but it is very small.

Surface of the pavement has been stained with oil and fuel extensively.

Asphaltic concrete pavement of remote spots area (called "Black Zone") has been weathered and the surface has eroded extensively.

(7) Drainage

No problem can be seen with the drainage system for rain water and sewage.

(8) Maintenance and Fire Rescue Roads

There are no maintenance roads as such, but in some parts of the runway strip the paths are indicated by laying stones in line. Fire-fighting vehicles or other maintenance automobiles cannot move about smoothly in the runway strip because of undulation and roughness. Paved roads will be necessary between the runway and the parallel taxiway, and along the boundary fence.

Table 3-2-1 Conditions of Existing Facilities

Airfield Facilities (Page 1 of 2)

Facility	Description		Condititon
Runway Strip	Dimensions:	3,627 m x 300 m	Dust rises at the time of landings and take-offs of wide bodies.
	Surface:	Naked	
Runway	Dimensions:	15/33 3,507 m x 45 m	There are cracks in concrete slabs along most of the runway and most of them remain unrepaired. Sealer is either absent or weathered.
	Surface:	Cement concrete, except for the 900 m part which is overlaid with asphaltic concrete.	
	Strength:	AUW 73 t/2, 160 t/4 251 t/5, 323 t/8	
Taxiway	Width:	23 m, except for the right-angled exit taxiway leaving the runway 2,150 m from the northern end of the runway, which is 30 m wide.	Unrepaired cracks in concrete slabs except in the right angled exit taxiway mentioned at left. Few longitudinal joint sealers remain.
	Surface:	Cement concrete partially overlaid with asphaltic concrete.	
	Strength:	Equal to the runway	
Overrun	Dimensions:	15 : 60 m x 45 m 33 : 60 m x 45 m	Asphaltic concrete surface is weathered.
	Surface:	Asphaltic concrete	
Shoulder	Width:	R/W : 7.5 m T/W : 6.0 m	Erosion of asphaltic concrete is apparent, and is left mostly unrepaired.
	Surface:	Asphaltic concrete	

Table 3-2-1 (Cont'd) Conditions of Existing Facilities

Airfield Facilities (Page 2 of 2)

Facility	Description		Condition
Apron	Area:	170,000 sq.m	Cracking of concrete slabs is observed.
	Aircraft Stand:	Int'l 6 stands Domes. 7 stands	Joint sealer is weathered and missing.
	Surface:	Cement concrete, except for the "Black Zone", which is paved with asphaltic concrete.	
	Strength:	Equal to the runway	
Drainage	Sub-drainage System:	6"-24" Dia. pipes	There is no functional disorder.
	Upstream:	Separate system	
	Downstream:	Combined system	
Security Fence	Brick wall with barbed wire.		Approach light area is not surrounded by fences.
Maintenance and Fire/ Rescue Road	No paved road.		Roughness and undulation are conspicuous.

3.2.2 Terminal Area Facilities

Present conditions and problems of the existing Terminal Area Facilities are as follows, and particulars of the existing Terminal Area Facilities are shown in Table 3-2-2.

(1) Loading Apron

Wide-body jets such as B747 and DC-10 are already in service at the airport, which is designed and constructed only for DC-8 class aircraft.

(2) Passenger Terminal Building

Flow of both international and domestic passengers is one level type respectively, and the passenger boarding is by passenger steps.

The spaces of International Departure Lobby and Holding Room are inadequate. Particularly, Domestic Lobby is limited in space and forces departure and arrival passenger flows to mix, causing confusion in the Lobby and the Holding Room.

Capacity of International Baggage Handling Equipment is insufficient and the Domestic Arrival Baggage Claim is manually handled. These poor conditions of Baggage Claim compels arrival passengers to take unduly long time for collection of their baggage.

(3) Cargo Terminal Building

The layout of cargo terminal buildings seems to be unsuitable for the actual cargo flows. The cargo-handling facilities are dispersed and complicates the cargo flow within the terminal area.

The cargo storage time is so long that the space of Bonded Warehouse is not used efficiently.

(4) Administration Building

There is no problem generally in respect of its capacity and conditions, but a new office building must be constructed to meet the increase of employees.

(5) Aircraft Maintenance Facilities

There is only one hangar which can accommodate aircraft up to DC-8 class, causing line maintenance service to be carried out often in the open.

(6) Catering Facility

In-flight meals required at present are supplied by two catering companies in the terminal area.

(7) Fire-fighting Facility

Fire-fighting facility of this airport falls under Category 9 of the ICAO Recommendations.

There are four fire-fighting vehicles now used in the airport. Two larger vehicles which were delivered 20 years ago have already worn out and are only operable well below their nominal capacities.

Many ground support vehicles passing the front of the fire station may prevent the fire-fighting vehicles from turning out quickly in an emergency.

(8) Fuel Supply Facility

Aircraft are supplied with Jet A-1 fuel at 13 loading stands of the apron in front of the terminal building by hydrant systems. For small aircraft, Av-Gas is supplied.

Fuel storage capacity corresponds to 2.8 days' supply of the present daily fuel requirement. This volume is considered to be sufficient because the fuel supply base in La Pampilla is near, being about 30 minutes by vehicle.

Reception, storage and distribution facilities are in good working condition and well maintained.

(9) Water Supply Facility

Water for the airport is supplied from three deep wells in the terminal area.

Water quality, according to the analysis made in 1976, is up to the WHO standard. Simple purification apparatus is installed at each of the two catering works to improve water quality.

The passenger terminal building and other three facilities are supplied with water from their own storage tanks. The rest of the facilities draw water directly from the deep-well pumps. Main feeder pipes of asbestos cement are 6" and 4" in diameter, and feed the facilities.

Diagram of the existing water supply system is shown in Fig. 3-2-1.

Water demand was 9.6 l/sec in average and 20.4 l/sec at maximum when surveyed in 1976.

No. 3 main water pump has sufficient capacity of 65 l/sec. However, the 6" and 4" pipes are limited in capacity to 33 l/sec and 13 l/sec flows respectively, thus restricting the overall capacity.

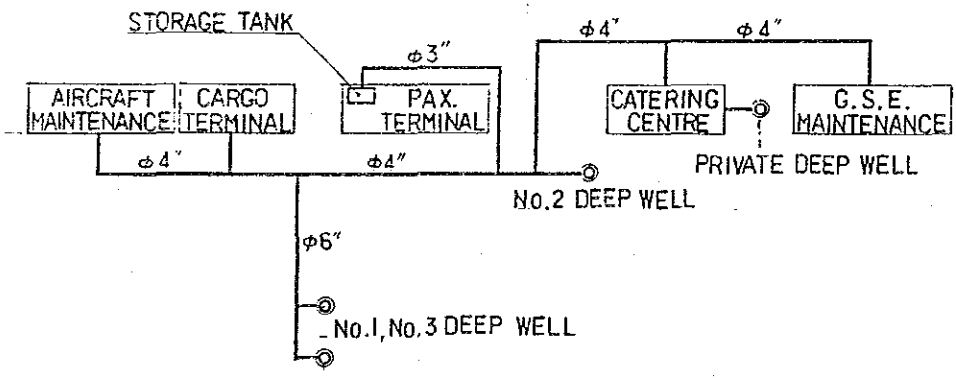


Fig. 3-2-1 Diagram of the Existing Water Supply System

(10) Sewage Disposal System

Sewage from the airport facilities is drained without treatment through Callao Sewer to the sea at Fertisa in Port of Callao. Fig. 3-2-2 shows a diagram of the existing sewer system.

Drain pipes and manholes are in good condition and there is no functional disorder.

Oil-contaminated drainage from the catering works, aircraft maintenance facilities and vehicles is also carried to the sea without treatment.

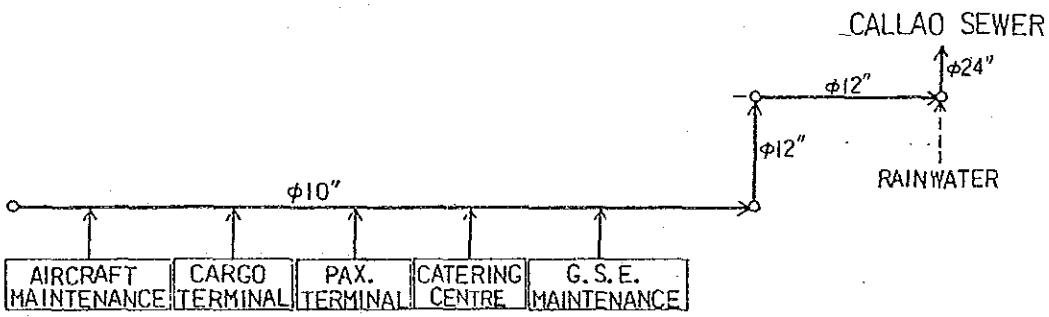


Fig. 3-2-3 Diagram of the Existing Sewer System

(11) Electric Power Supply System

1) The Power Supply Company

The electric power is supplied to Lima International Airport by ELECTROLIMA S.A. via 10,000-V high-tension line. The supply has been stable except when the power line happened to be disconnected by occasional civil disturbances during the last two years. It has been confirmed that the power supply company has ample capacity to meet the future demand of the airport and can provide dual power lines if required.

2) Primary Power Supply

The Main Substation of the airport receives power of 10,000 V and distributes electricity to 11 out of 18 substations in the airport without transformation. The other substations receive power from the Main Substation through 2,300 V distribution lines. The passenger terminal building receives 10,000 V as primary and 2,300 V as secondary power source.

3) Emergency Power Sources

There are three emergency back-up power generators in the airport. The engine generator of 2,300 V/1,000 KVA in the Main Substation supplies secondary power to 8 substations including the passenger terminal building. The area control centre has an engine generator of

230 V/260 KVA and the radar site has one of 230 V/75 KVA. There are 8 substations which have no secondary power source. However, these existing emergency back-up systems fully meet the need of important aviation-supporting services.

4) Facilities and Equipment

The power supply facilities and equipment are of old type, having been installed some twenty years ago except for the engine generators and some receiving/distributing equipment. However, all are in good condition and are operating normally.

(12) Telephone System and Public Information Facility

1) Telephone System

There are three different telephone systems (ANEXO, I.C., and A.I.) in the airport and their functions are unsatisfactory. Renewal and unification of the telephone systems are needed to improve telephone communications.

2) Public Information System

The public information facilities installed in the passenger terminal building are composed of public address system and public flight information system. They were installed some 20 years ago. Their conditions and standards are not quite satisfactory. The systems should be modernized by equipping completely new systems.

Table 3-2-2 Particulars of Existing Facilities
Terminal Area Facilities (Page 1 of 7)

Facilities	Particulars
Passenger Terminal Building	Owner : CORPAC S.A. Year Built : 1965 Structure : Reinforced concrete 10 storeys Floor Area-Main Building : 19,600 sq.m (1 storey, Mezzanine) Int'l Check-in Counter : 44 units Departure Lobby : 2,400 sq.m Departure Imm. Counter : 6 Transit Room : 600 sq.m Baggage Claim Carousel : 3 Baggage Check Counter : 6 Arrival Lobby : 400 sq.m Domes. Check-in Counter : 16 units Public Lobby : 990 sq.m CIQ, Security and CORPAC Offices : 1,900 sq.m Airline Office : 3,100 sq.m Concessions : 2,300 sq.m Floor Area-fingers : 5,500 sq.m (1 storey) Int'l Metal Detector : 1 unit Departure Lounge : 800 sq.m Arrival Imm. Counter : 6

Table 3-2-2 (Cont'd) Particulars of Existing Facilities
Terminal Area Facilities (Page 2 of 7)

Facilities		Particulars
Passenger Terminal Building		Domes. Departure Lounge : 800 sq.m Baggage Claim Area : 300 sq.m Floor Area-Administration Tower Building : 4,500 sq.m (2 storeys - 10 storeys)
Cargo Terminal Building	Bonded Warehouse	Owner : CORPAC S.A. Year Built : 1983 Structure : Reinforced concrete 1 storey (Partly 2 storeys) Floor Area : 12,800 sq.m Storage : 11,400 sq.m Inspection : 1,400 sq.m
	Cargo Terminal Building	Owner : CORPAC S.A. Year Built : 1960 Structure : Reinforced concrete and steel 2 storeys Floor Area : 9,300 sq.m Storage : 3,500 sq.m C.I.Q. and CORPAC OFFICE : 900 sq.m Tenants' Office : 350 sq.m
	Airline Cargo Storages	Owner : Air France Structure : Steel - 1 storey Floor Area : 350 sq.m

Table 3-2-2 (Cont'd) Particulars of Existing Facilities
Terminal Area Facilities (Page 3 of 7)

Facilities		Particulars	
Cargo Terminal Building	Airline Cargo Storages	Owner	: Iberia
		Structure	: Brick - 1 storey
		Floor Area	: 250 sq.m
		Owner	: Lufthansa
		Structure	: Reinforced concrete, 1 storey
		Floor Area	: 400 sq.m
	Customs Building	Owner	: CORPAC S.A.
		Year Built	: 1962
		Structure	: Reinforced concrete, 2 storeys
		Floor Area	: 1,700 sq.m
	Cargo Office Building	Owner	: CORPAC S.A.
		Structure	: Reinforced concrete, 2 storeys
		Floor Area	: 2,000 sq.m
		Tenants' Office	: 700 sq.m
		ICAO Office	: 1,000 sq.m
Fire Station		Owner	: CORPAC S.A.
		Structure	: Reinforced concrete, 2 storeys
		Floor Area	: 350 sq.m
		1st storey	Garage for 4 vehicles
		2nd storey	Watching and Waiting Room
ACC Building		Owner	: CORPAC S.A.
		Year Built	: 1978
		Structure	: Reinforced concrete, 1 storey
		Floor Area	: 2,300 sq.m
Aeronautical Training Centre		Owner	:
		Year Built	: 1968
		Structure	: Reinforced concrete, 1 storey
		Floor Area	: 1,600 sq.m

Table 3-2-2 (Cont'd) Particulars of Existing Facilities

Terminal Area Facilities (Page 4 of 7)

Facilities	Particulars
Maintenance & Administration Building	Owner : CORPAC S.A. Structure : Reinforced concrete, 2 storeys Floor Area : 800 sq.m (Water Storage Tanks and Power Station are included.)
Catering Building	Owner : Docampo Year Built : 1975 Structure : Reinforced concrete, 1 storey Floor Area : 1,200 sq.m Site Area : 7,200 sq.m Rate of Production : 2,500 meals a day Owner : Marriot Year Built : 1970 Structure : Reinforced concrete, 1 storey (Partly 2 storeys) Floor Area : 3,900 sq.m Site Area : 5,000 sq.m Rate of Productuion : 1,700 meals a day
Fuel Supply Facility	Owner : Petroperu Site Area : 9,500 sq.m Year Built : 1960 System : Hydrant Input by : Refueller Output Capacity : 140 kl/hr Consumption : 800 kl/day (Jet A-1) 2.3 kl/day (Av-Gas) Storage Capacity: 2,250 kl (Jet A-1) 90 kl (Av-Gas)

Table 3-2-2 (Cont'd) Particulars of Existing Facilities

Terminal Area Facilities (Page 5 of 7)

Facilities	Particulars
Car Parking	Owner : CORPAC S.A. Site Area : 55,000 sq.m Parking Capacity : 1,100 cars
Airline and General Aviation Facilities	User : Aeroperu (with Air France and Aeroflot) Site Area : 30,000 sq.m Facilities : Aircraft Maintenance Workshops, Offices and Storage Buildings
	User : Avianca Site Area : 4,400 sq.m Facility : Office
	User : Pesca Peru Site Area : 1,400 sq.m Facility : Hangar 300 sq.m Year Built : 1969
	User : Hieroperu Site Area : 3,600 sq.m Facilty : Hangar 1,100 sq.m Year Built : 1964
	User : Eastern Site Area : 30,000 sq.m Facility : Radar Station

Table 3-2-2 (Cont'd) Particulars of Existing Facilities

Terminal Area Facilities (Page 6 of 7)

Facilities	Particulars
Airline and General Aviation Facilities	User : Faucett Site Area : 43,000 sq.m Facilities : Hangar 4,800 sq.m Maintenance Workshops and Storage, Office and Cargo Building
	User : Aero Servicios Tecnicos Site Area : 900 sq.m Facility : Maintenance Workshops
	User : Del Solar Site Area : 4,800 sq.m Facilities : Hangar 4,400 sq.m Maintenance Workshops
	User : Aero Condor Site Area : 6,800 sq.m Facilities : Hangar 2,700 sq.m Maintenance Workshops, Office and Storage Buildings
	User : Aeronaves del Peru Site Area : 4,200 sq.m Facilities : Maintenance Workshops, Office and Storage Buildings

Table 3-2-2 (Cont'd) Particulars of Existing Facilities
Terminal Area Facilities (Page 7 of 7)

Facilities		Particulars	
Airline and General Aviation Facilities		User	: Golden Aircraft Service
		Site Area	: 900 sq.m
		Facilities	: Maintenance Workshops, Office and Storage Building
CORPAC S.A. Facilities	G.S.E. Maintenance Workshops	Site Area	: 6,300 sq.m
	Vehicle and Equipment Maintenance Centre	Site Area	: 18,600 sq.m
	Athletic Ground	Site Area	: 11,000 sq.m
	Waste Disposal	Site Area	: 2,200 sq.m
Water Supply Facilities		Source	: No.1 Deep well 16 l/sec, 40 m deep No.2 Deep well 25 l/sec, 40 m deep No.3 Deep well 65 l/sec, 110 m deep
		Water Main	: Asbestos cement pipes 4" and 6" Dia.

3.2.3 Air Navigation Facilities

(1) ATS Units

1) ACC/FIC

Lima Area Control Centre (ACC), Flight Information Centre (FIC) and Lima Radio are located in the ATS operation building of the airport. Air Traffic Control (ATC) Services are provided within the designated control area (CTA) along the Pacific coast. Remote extended-range VHF sites are located near Chiclayo and Arequipa. The CTA is wholly within the coverage of VHF air-ground communication. The area east of the CTA is out of VHF range due to high mountain range of the Andes. HF air-ground channels are used to provide Flight Information Service in this area.

2) ATC Radar

The radar system installed in 1979 is composed of a Terminal Area Surveillance Radar (TAR), a Secondary Surveillance Radar (SSR) and a Radar Data Processing System. The TAR/SSR antennas are located west of the runway. Three radar displays are mounted in the ACC control room.

3) Approach Control Service

Lima Sector of the ACC provides approach control service for Lima International Airport using one

22-inch radar display. Its range switch is normally set at 32 nautical miles so as to obtain clear and enlarged picture of radar targets on the CRT. Limited number of the radar display screens prevents the use of off-centering feature of the display unit. A discrete frequency, 119.7 Mhz is assigned to the Lima Sector.

4) Aerodrome Control Tower

The Control tower is located on top of the passenger terminal building. Frequency of 118.3 MHz is assigned to the local control position and 121.9 MHz to the ground control position.

(2) Communication Facilities

1) Condition of VHF Communication

The coverage of approach control and tower frequencies are generally good. However, communication is interrupted on occasion due to the deterioration of the control units and cables.

2) Transmitter/Receiver Sites

Main transmitter site and main receiver site are both located outside the airport. The latter is not in operation due to the outage of the control cables. Backup receivers mounted in the ATS operation building are used instead.

(3) Radio Aids to Navigation

1) VOR

a) There are three VORs in the Lima Terminal Control Area (TMA). Those VORs are located approximately 50 nautical miles apart from each other and serve as en-route and terminal aids.

b) On-airport facility

Existing VOR was installed in 1984. The DME, initially installed in 1977, was then co-located with the VOR. Both are operating normally and are serving as approach and departure aids.

c) Off-airport facilities

There are two off-airport VOR stations in the TMA, located approximately 50 nautical miles to the north and south of the airport respectively. Both are serving as terminal aids but no DME is attached thereto. Two more VORs will be added in the near future. One of them will be located approximately 73 nautical miles north of the airport to provide better coverage in lower air-space, and the other one will be located approximately 40 nautical miles north to facilitate navigation from over the mountain range east of the airport.

2) ILS

a) Precision approach aid of the airport is Category-I ILS installed in 1974 and serving Runway 15. Components of the system are localizer, glide-path, middle marker and compass locator (LMM). There is neither outer marker nor T-DME incorporated in the system.

b) Localizer antenna is located 175 m from departure end of Runway 33 which is less than the standard spacing. The glide-path antenna is located between the runway and the taxiway (130 m from the runway centreline and 350 m from the approach end of runway). An interference with glide-path signal is likely to occur when aircraft is taxiing to Runway 15 via parallel taxiway.

3) NDB

There are six NDBs in the Lima TMA. Three of them are in the Lima control zone, and two are colocated with VORs 50 nautical miles north and south of the airport respectively. The remaining one, located 83 nautical miles north north-east of the airport, also serves as en-route/terminal aid. Those NDBs are very old except for Oyon and San Bartolo NDB, but all of them are operating normally. Two more NDBs will be installed within two years. One of them will be a low-powered homing facility used as an approach aid to Runway 33.

(4) Visual Aids (Lighting Facilities)

1) Approach Lighting System (ALS)

Runway 15 is equipped with the barrette-type Category-I precision approach lighting system, but it is partly unlighted due to theft. Remaining portion of 420 m is operating normally. There is no ALS for Runway 33.

2) VASIS

Three-bar A-VASIS for Runway 15 was renewed in 1980 and operating normally. No VASIS is available for Runway 33.

3) Runway and Taxiway Lightings

Runway edge lights, runway centreline lights and taxiway lights are placed at 60 m intervals. Repair works have been carried out on the wiring of the runway lights, but power supply equipment has long been used without renewal.

4) Apron Flood Light

Apron flood lights are installed on six metal poles standing on the fingers. There are six to eight 1,000-W mercury-vapour lamps set on each pole (40 lamps in all). However, they are not sufficiently intensive to support ramp activities during the hours of darkness.

(5) Aeronautical Meteorological Facilities

Although most of the weather observation instruments are very old, windvane and anemometer, barometer, air and dewpoint indicator, raingauge and rawinsonde are in order. However, some important weather observation apparatuses such as ceilometer, runway visual range measurement equipment (RVR), weather facsimile receiver and auto-picture transmitter (APT) are out of order because of the shortage of spare parts and/or outage of control cables. Of the 3 existing windvanes, one on the roof-top of the control tower is supplying the wind direction and speed data to the tower control, one at the radar site on the other side of the runway opposite to the terminal is feeding the data to ACC, and one at the weather observation station provides the information for the observation records. Weather observation report is distributed to the ATS units by using ordinary telephone. There is no display unit of RVR either in the Control Tower or in the radar control room.

CHAPTER 4

AIR TRANSPORT DEMAND FORECAST

CHAPTER 4 AIR TRANSPORT DEMAND FORECAST

4.1 Demand Analysis of Air Transport

4.1.1 Air Passenger Transport

In 1984, Lima International Airport handled 1,986,000 passengers including 196,000 transit passengers. Between 1975 and 1980, passengers increased at an average annual rate of 3.4%. However, since 1981, the passenger demand declined, and eventually, it fell to the level of 1974 (Fig. 4-1-1).

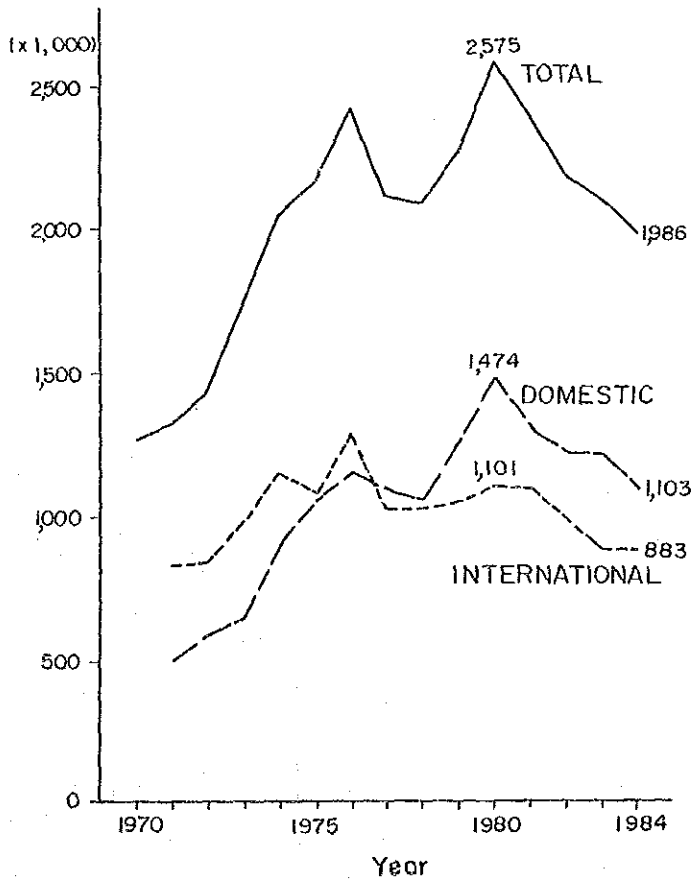


Fig. 4-1-1 Air Passenger Transport

It can be said that this was caused by the following intertwined problems:

(1) the recession of the world economy, especially after the second oil crisis;

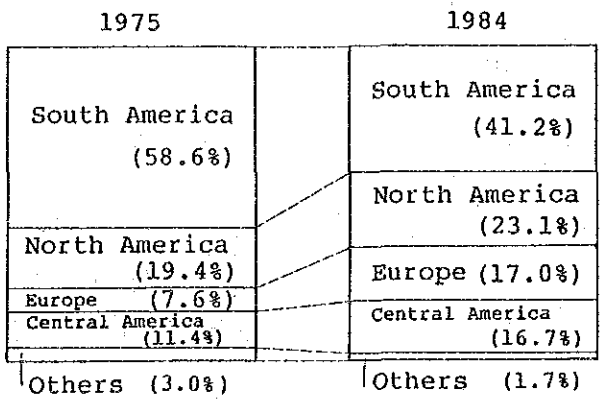
(2) the stagnation of the Peruvian economy

(a) International Passenger

The annual growth rate for international passengers from 1975 to 1980 was 0.05%. However, since 1981, the passenger demand decreased, and in 1984 it fell to 80% of the level of 1980.

Approximately 41.2% of international passengers in 1984 were travelling to or from South American destinations, 23.4% to or from North America, 17.0% to or from Europe, 16.7% to or from Central America, and 1.7% to or from other destinations (Fig. 4-1-2).

Fig. 4-1-2 Share of International Passsenger by Geographic Zone at Lima International Airport



The immigration statistics shows that the proportion of Peruvian residents in the total was 41% in 1983.

Transit passengers are those who arrive at the airport on a flight and depart on the same flight. Historically (1975-1984), the proportion of transit passengers to the total passengers has fluctuated between 16.8% and 26.3%. The ratio in the last three years (20%) has generally been lower than in earlier periods (21%).

(b) Domestic Passenger

The annual growth rate for domestic passengers from 1975 to 1980 was 6.5%. However, since 1981, the passenger demand declined, and in 1984 it fell to 75% of the level of 1980.

Table 4-1-1 shows the flows of passengers to and from the main domestic destinations.

Table 4-1-1 Best 8 of Domestic Routes at Lima International Airport

(Passenger)

Route	1980 Passenger	%	1984 Passenger	%
1. Cuzco	290,400	19.7	213,100	19.3
2. Iquitos	245,100	16.6	179,700	16.3
3. Arequipa	148,400	10.1	120,200	10.9
4. Pucallpa	95,900	6.5	71,800	6.5
5. Tarapoto	64,800	4.4	68,800	6.2
6. Trujillo	80,100	5.4	68,000	6.2
7. Piura	84,700	5.7	65,900	6.0
8. Chiclayo	71,400	4.8	62,900	5.7
9. Others	393,000	26.8	252,900	22.9
Total	1,473,800	100.0	1,103,300	100.0

Cuzco is the most important local airport with 213,100 passengers (19.3% of total domestic passengers) in 1984. Iquitos is the second busiest route with 179,700 passengers (16.3% of the total). The top eight destinations make up 77.1% of total domestic passengers.

4.1.2 Air Freight Transport

In 1984, Lima International Airport handled 60,000 tons of freight, which consisted of 28,000 tons of international freight and 32,000 tons of domestic freight. The freight handled at Lima International Airport increased at an annual rate of 7.8% between

1975 and 1983. In 1984, it fell to 93% of the level of 1983, probably for the same reasons applicable to passenger traffic mentioned previously (Fig. 4-1-3).

(1) International Freight

The tonnage of international freight handled at Lima International Airport increased at an annual rate of 11% between 1975 and 1982. In 1983, the demand fell to 73% of the level of 1982. However, it recovered in 1984 with a 6% increase from the previous year.

Exports, comprising only 26.9% of the total in 1975, have grown at an annual rate of 12%, faster than imports which increased at an average rate of only 2% per year between 1975 and 1984 (Fig. 4-1-4 and Fig. 4-1-5).

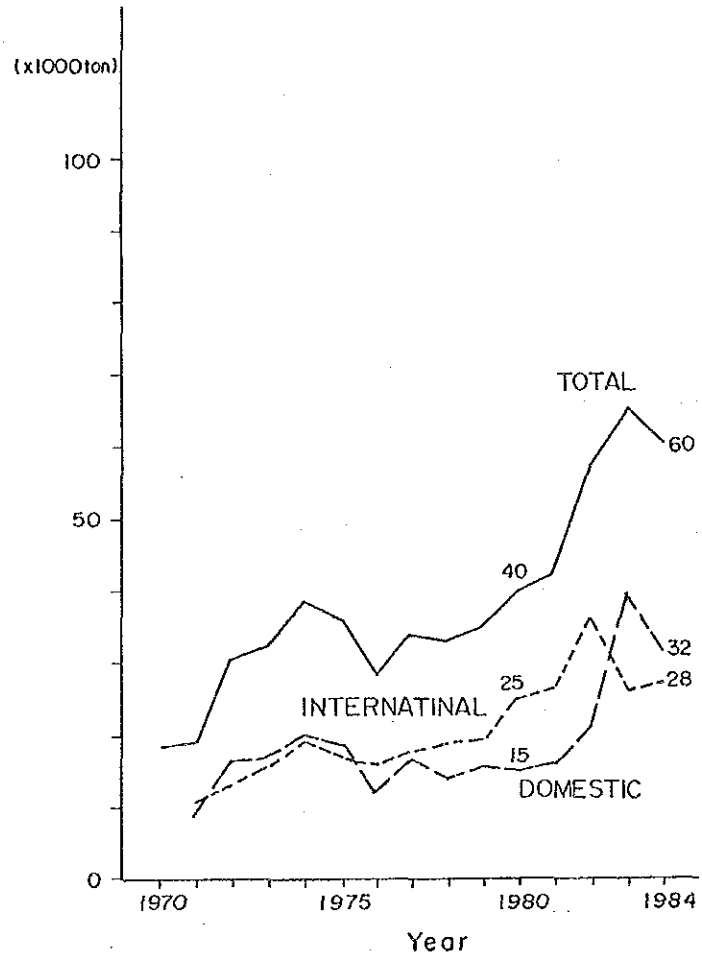


Fig. 4-1-3 Air Freight Transport

Fig. 4-1-4 Ratio of Export & Import of Air Freight at Lima International Airport

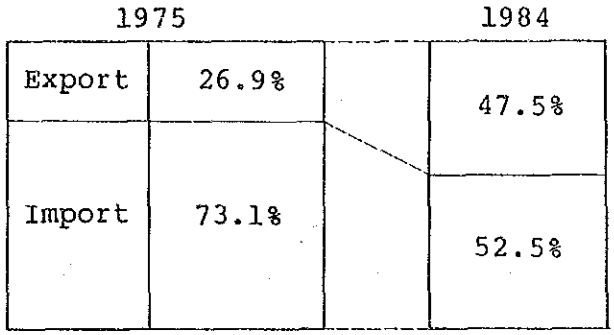
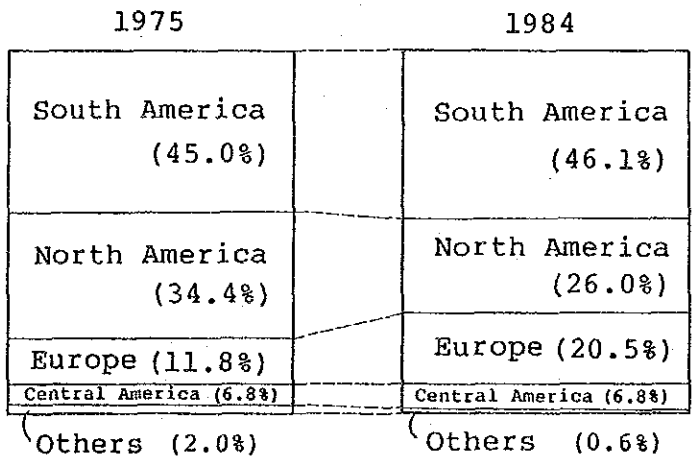


Fig. 4-1-5 Share of International Freight by Geographic Zone at Lima International Airport



(2) Domestic Freight

The tonnage of domestic freight handled at Lima International Airport increased at an annual rate of 9% between 1975 and 1983. In 1984, the volume fell to 84% of the level of 1983.

Table 4-1-2 shows the flows of freight to and from the main domestic destinations in 1980 and 1984.

Table 4-1-2 Best 8 of Domestic Routes at Lima International Airport

(Freight)

Route	1980		1984	
	Tons	%	Tons	%
1. Iquitos	7,846	53.0	17,471	65.0
2. Tarapoto	430	2.9	2,214	8.7
3. Cuzco	1,872	12.6	1,518	5.6
4. Arequipa	1,200	8.1	1,117	4.2
5. Pucallpa	753	5.1	744	2.8
6. Pto. Maldonado	66	0.4	723	2.7
7. Tacna	480	3.2	615	2.3
8. Talara	956	6.5	578	2.2
9. Others	1,204	8.2	1,889	7.0
Total	14,807	100.0	26,869	100.0

4.1.3 Small Aircraft Movements

Small aircraft movements increased at an annual rate of 8% between 1975 and 1981. However, since 1982, the movements decreased, and in 1984, it fell to the level of 1979. This decrease since 1982 has broadly reflected the depression in the Peruvian and world economies (Fig. 4-1-6).

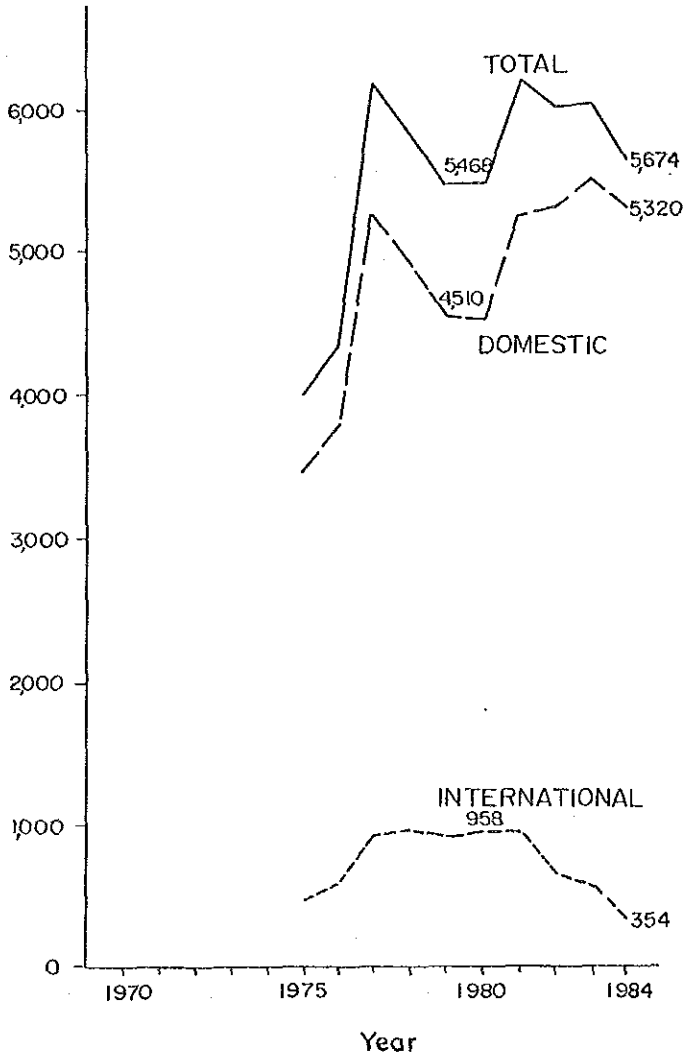


Fig. 4-1-6 Small Aircraft Movements

4.2 Air Transport Demand Forecasts

4.2.1 Summary of Air Transport Demand

Future air transport demand (1990 - 2005) at Lima International Airport is forecast as shown in Table 4-2-1 (Fig. 4-2-1, Fig. 4-2-2)

Table 4-2-1 Lima International Airport Demand

	1984*	1990	1995	2000	2005
Passenger Demand (Unit=1,000)					
International	883	1,090	1,350	1,640	2,000
Domestic	1,103	1,480	1,760	2,040	2,360
Total	1,986	2,570	3,110	3,680	4,360
Freight Demand (Unit=ton)					
International	28,000	41,000	50,000	60,000	71,000
Domestic	32,000	35,000	41,000	47,000	54,000
Total	60,000	76,000	91,000	107,000	125,000
Small Aircraft Movement (Excluding military)					
Movement	5,700	7,800	8,900	10,000	11,000

* Actual

Note 1 : Passenger demand covers embarking and disembarking passengers.

Note 2 : Freight demand is made up of loaded and unloaded freight.

Note 3 : International demand includes transit passengers and freight.

Fig. 4-2-1 Passenger Demand at Lima International Airport

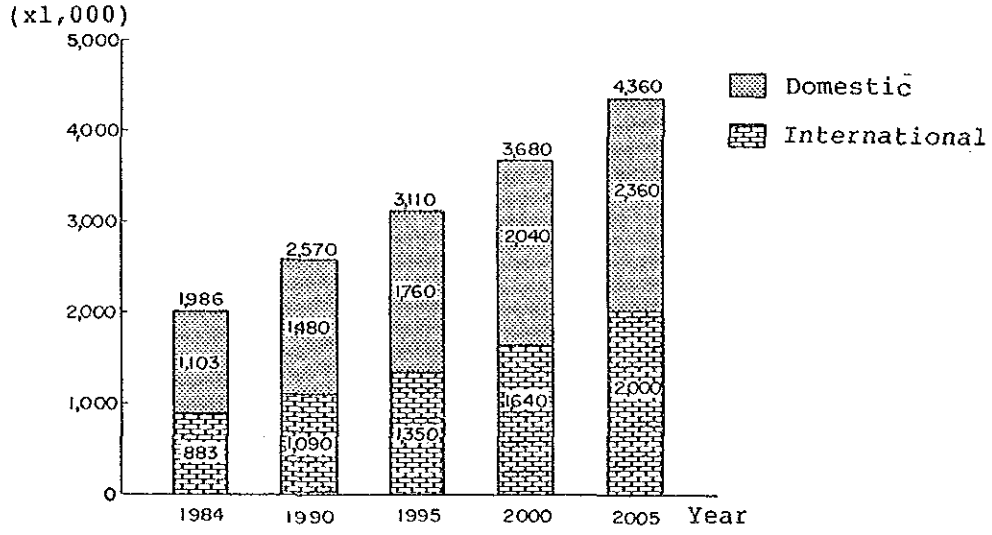
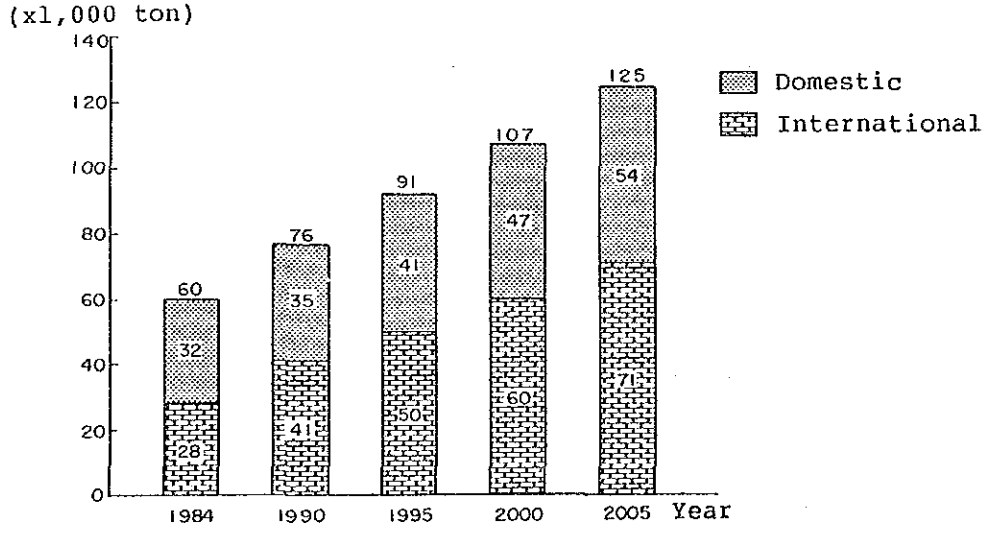


Fig. 4-2-2 Freight Demand at Lima International Airport



The results of forcasting are summarized as follows:

(1) Total number of passengers at Lima International Airport will rise to 3,110,000 in 1995, of which international passengers are 1,350,000, or 43.4% of total, and domestic passengers 1,760,000 (56.6%).

(2) In 2005, international passengers are 2,000,000 and domestic 2,360,000: therefore, total passengers are 4,360,000.

(3) Average annual growth rate of passengers is 3.9% during the first decade (1985-1995) and 3.4% during the second (1995-2005).

(4) Total freight including mail amounts to 91,000 tons in 1995. International demand is 50,000 tons (54.9% of total) and domestic 41,000 tons (45.1%).

(5) In 2005, total freight demand is 125,000 tons. International is 71,000 tons and domestic 54,000 tons.

(6) Average growth rate of freight demand is 3.6% between 1985 and 1995 and 3.2% for 1995 - 2005.

(7) Small aircraft movements excluding military is 8,900 in 1995 and 11,000 in 2005.

The above results seem to be plausible. The methodology of demand forecast is shown in Appendix 4-1, 4-2 and 4-3.

4.2.2 International Air Passenger Forecasts

Future international passenger demand at Lima International Airport is shown in Table 4-2-2 and Fig. 4-2-3.

Table 4-2-2 International Passenger Demand

Unit=1,000

	1985	1990	1995	2000	2005
Main Case					
Peruvians	260	320	380	450	520
Foreigners	450	550	700	860	1,080
Transit	180	220	270	330	400
Total	890	1,090	1,350	1,640	2,000
Low Case					
Peruvians	260	290	330	370	400
Foreigners	440	530	640	760	910
Transit	180	210	240	280	330
Total	880	1,030	1,210	1,410	1,640
High Case					
Peruvians	260	340	440	550	680
Foreigners	450	590	750	980	1,260
Transit	180	230	300	380	490
Total	890	1,160	1,490	1,910	2,430

Note: Main Case : growth rate of Peru's GDP=3.5% (1985-1995) and 3.0% (1995-2005)
Low Case : growth rate of Peru's GDP=2.5% (1985-1995) and 2.0% (1995-2005)
High Case : growth rate of Peru's GDP=4.5% (1985-1995) and 4.0% (1995-2005)

Fig.4-2-3 International Passengers at Lima International Airport

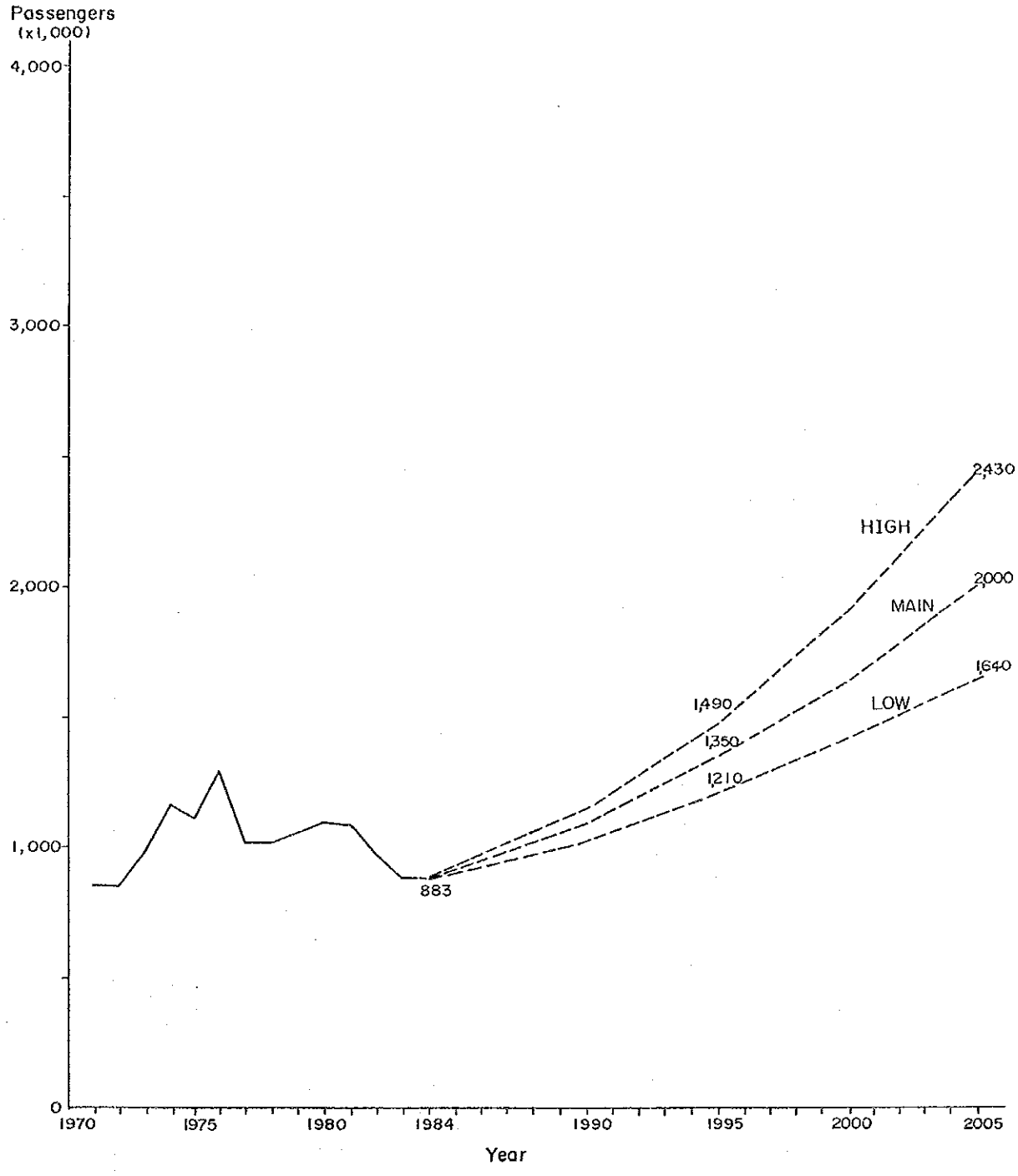


Table 4-2-3 International Passenger by Route(Main Case)

Unit = 1000

Route	1985	1990	1995	2000	2005
Lima -Buenos Aires	36	44	55	66	81
-La Paz	46	57	69	85	103
-Rio de Janeiro	23	29	35	43	53
-Sao Paulo	15	18	22	27	33
-Manaos	1	2	2	2	3
-Bogota	41	51	62	76	93
-Cali	1	1	1	2	2
-Santiago	49	60	75	90	110
-Quito	23	29	36	43	53
-Guayaquil	22	27	33	41	49
-Asuncion	3	4	5	6	7
-Caracas	31	38	47	57	70
-Havana	8	10	12	15	18
-Panama	54	67	83	102	126
-C.A. Other	19	24	30	37	45
-Mexico	39	48	61	74	91
-Miami	100	120	146	174	207
-New York	26	31	37	45	54
-Los Angeles	21	26	31	37	44
-Houston	3	4	5	6	7
-Washington D.C.	4	5	6	7	9
-Vancouver	4	4	5	6	8
-Toronto	8	10	12	15	18
-Amsterdam	4	5	6	8	9
-Frankfurt	22	27	33	41	50
-Madrid	26	32	40	49	60
-Moscow	41	50	62	76	93
-London	1	1	1	1	1
-Paris	26	33	40	49	60
-Zurich	2	2	3	3	4
-Tokyo	5	7	9	12	15
-Other	8	10	14	18	24
Transit	178	218	269	328	400
Total Lima Route	890	1,094	1,347	1,641	2,000

(1) In 1995, Lima International Airport will handle 1,350,000 international passengers including 270,000 transit passengers. In 2005, it will handle 2,000,000 international passengers (main case).

(2) In the low case, international passengers demand will be 1,210,000 in 1995 and 1,640,000 in 2005.

(3) In the high case, international passengers demand will be 1,490,000 in 1995 and 2,430,000 in 2005.

(4) In each case the average annual growth rates of international passengers are as follows:

(a) main case 4.3% (1985-1995) and 4.0% (1995-2005)

(b) low case 3.2% (1985-1995) and 3.1% (1995-2005)

(c) high case 5.3% (1985-1995) and 5.0% (1995-2005)

(5) The share of foreigners demand shows an increasing trend, accounting for 64.8% in 1995 and 67.5% in 2005 excluding transit passengers.

(6) Transit passengers are those who arrive at the airport on a flight and depart on the same flight. Historically (1975 - 1984), the proportion of transit passengers to the total passengers has fluctuated between 16.8% and 26.3%. The proportion in the last three years (20%) has generally been lower than in earlier periods (21%).

There are many uncertain factors that many affect the future prospects for the proportion of transits in the total passengers. The most important factor is

an airline's policies. It is assumed that the proportion of transit passengers to the total passengers is 20%.

(7) International routes to and from Lima International Airport are divided into five regions. In 1995, the shares of passengers for these regions are as follows:

(a) South America	32.8%
(b) Central America and Mexico	13.8%
(c) U.S.A. and Canada	18.0%
(d) Europe	13.7%
(e) Others	1.7%

The remainder (20%) accounts for transit passengers (Table 4-2-3).

4.2.3 International Air Freight Forecasts

Future international freight demand at Lima International Airport is shown in Table 4-2-4 and Fig. 4-2-4.

Table 4-2-4 International Freight Demand

Unit=ton

	1985	1990	1995	2000	2005
Main Case					
Export	14,000	16,100	18,800	21,200	24,100
Import	15,400	20,300	26,200	32,100	38,900
Transit	3,500	4,400	5,400	6,400	7,600
Total	3,2900	40,800	50,200	59,600	70,600
Low Case					
Export	13,800	15,300	16,900	18,400	20,000
Import	14,900	18,300	22,100	25,500	29,300
Transit	3,400	4,000	4,700	5,300	5,900
Total	32,200	37,600	43,700	49,200	55,300
High Case					
Export	14,300	17,100	20,600	24,400	29,100
Import	15,900	22,500	30,700	39,700	50,600
Transit	3,600	4,700	6,200	7,700	9,600
Total	33,800	44,300	57,400	71,800	89,300

Note: Main Case : growth rate of Peru's GDP=3.5% (1985-1995) and 3.0% (1995-2005)
Low Case : growth rate of Peru's GDP=2.5% (1985-1995) and 2.0% (1995-2005)
High Case : growth rate of peru's GDP=4.5% (1985-1995) and 4.0% (1995-2005)

Fig.4-2-4 International Freight at Lima International Airport

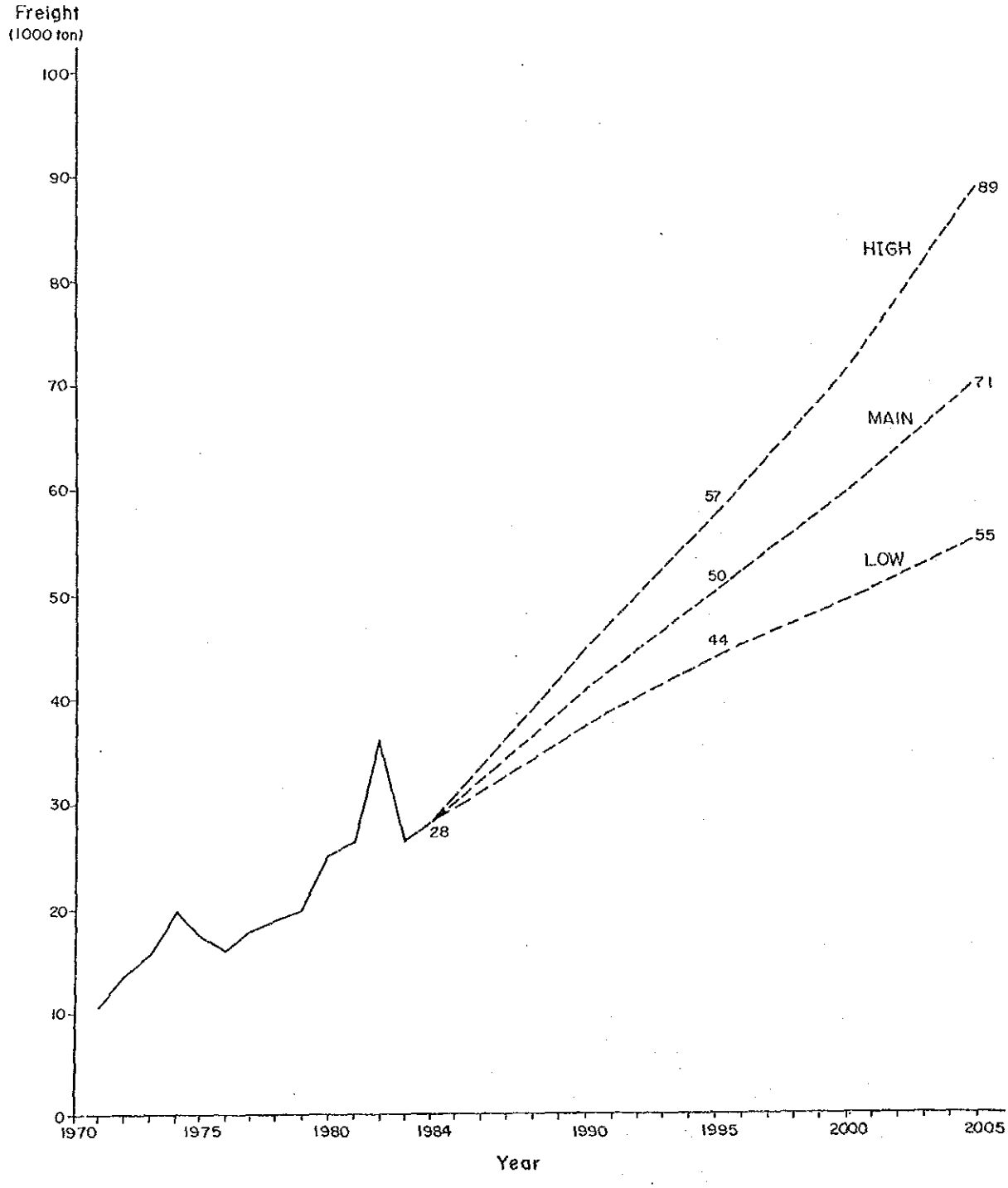


Table 4-2-5 International Freight by Route(Main Case)

unit = ton

Route	1985	1990	1995	2000	2005
Lima -Buenos Aires	2,690	3,480	4,420	5,360	6,470
-La Paz	790	970	1,190	1,410	1,660
-Rio de Janeiro	750	960	1,220	1,470	1,770
-Sao Paulo	430	540	680	820	980
-Manaos	150	190	240	290	350
-Bogota	4,900	5,820	6,900	7,990	9,260
-Cali	120	140	170	200	230
-Santiago	1,220	1,560	1,970	2,380	2,860
-Quito	460	580	720	870	1,030
-Guayaquil	280	340	410	480	560
-Asuncion	250	330	420	520	620
-Montevideo	400	520	660	810	980
-Caracas	1,050	1,250	1,490	1,740	2,020
- Havana	60	80	100	120	140
-Panama	440	570	720	870	1,040
-C.A. Other	900	1,100	1,340	1,570	1,850
-Mexico	340	430	540	640	770
-Miami	6,580	8,140	10,000	11,890	14,070
-New York	1,620	1,970	2,380	2,790	3,280
-Los Angeles	550	660	790	930	1,080
-Houston	30	30	40	50	60
-Washington D.C.	20	20	20	20	30
-Vancouver	200	240	290	340	400
-Toronto	260	320	400	470	550
-Amsterdam	560	670	810	950	1,100
-Frankfurt	1,680	2,100	2,610	3,120	3,710
-Madrid	1,110	1,400	1,790	2,150	2,580
-Moscow	90	110	140	170	200
-Paris	1,280	1,580	1,950	2,320	2,740
-Zurich	50	70	80	100	120
-Tokyo	190	250	320	380	460
-Other	10	10	10	10	10
Transit	3,530	4,420	5,370	6,380	7,560
Total Lima Route	32,970	40,830	50,190	59,610	70,540

(1) Lima International Airport will handle 50,200 tons of international air freight including mail in 1995. And in 2005, it will handle 70,600 tons of international air freight (main case).

(2) In the low case, international freight demand will be 43,700 tons in 1995 and 55,300 tons in 2005.

(3) In the high case, international freight demand will be 57,400 tons in 1995 and 89,300 tons in 2005.

(4) In each case, the average annual growth rates of international freight are as follows:

(a) main case 4.3% (1985-1995) and 3.5% (1995-2005)

(b) low case 3.1% (1985-1995) and 2.4% (1995-2005)

(c) high case 5.4% (1985-1995) and 4.5% (1995-2005)

(5) In the main case, the shares of export, import and transit freight are as follows:

(a) export 37.2% (1995) and 34.1% (2005)

(b) import 52.1% (1995) and 55.1% (2005)

(c) transit 10.7% (1995) and 10.8% (2005)

(6) Therefore, the growth rates of import freight demand are higher than those of export freight demand. In the main case, import freight increases 5.5% per year during the first decade and 4.0% in the second decade, while the export freight increases only 2.9% and 2.6% respectively.

(7) Historically (1976 - 1984), the proportion of transit freight to the total freight has fluctuated between 6.5% and 32.8%. The proportion in the last three years was 10.7%.

There are many uncertain factors that many affect the future prospects for the proportion of transits in the total freight. It is assumed that the proportion of transit freight to the total freight is 10.7%.

(8) In 1995, the shares of 5 regions in international freight are as follows:

(a) South America	40.8%
(b) Central America and Mexico	5.4%
(c) U.S.A. and Canada	27.8%
(d) Europe	14.7%
(e) Others	0.6%

The remainder (10.7%) represents transit cargo (Table 4-2-5).

4.2.4 Domestic Air Passenger Forecasts

Future domestic passenger demand (1990 - 2005) at Lima International Airport is shown in Table 4-2-6 and Fig. 4-2-5.

Table 4-2-6 Domestic Passenger Demand

Unit=1,000

	1984	1990	1995	2000	2005
Main Case	1,100	1,480	1,760	2,040	2,360
Low Case	1,100	1,380	1,570	1,730	1,910
High Case	1,100	1,510	1,970	2,400	2,920

Note: Main Case : growth of Peru's GDP=3.5% (1985-1995) and 3.0% (1995-2005)
Low Case : growth of Peru's GDP=2.5% (1985-1995) and 2.0% (1995-2005)
High Case : growth of Peru's GDP=4.5% (1985-1995) and 4.0% (1995-2005)

Fig. 4-2-5 Domestic Passengers at Lima International Airport

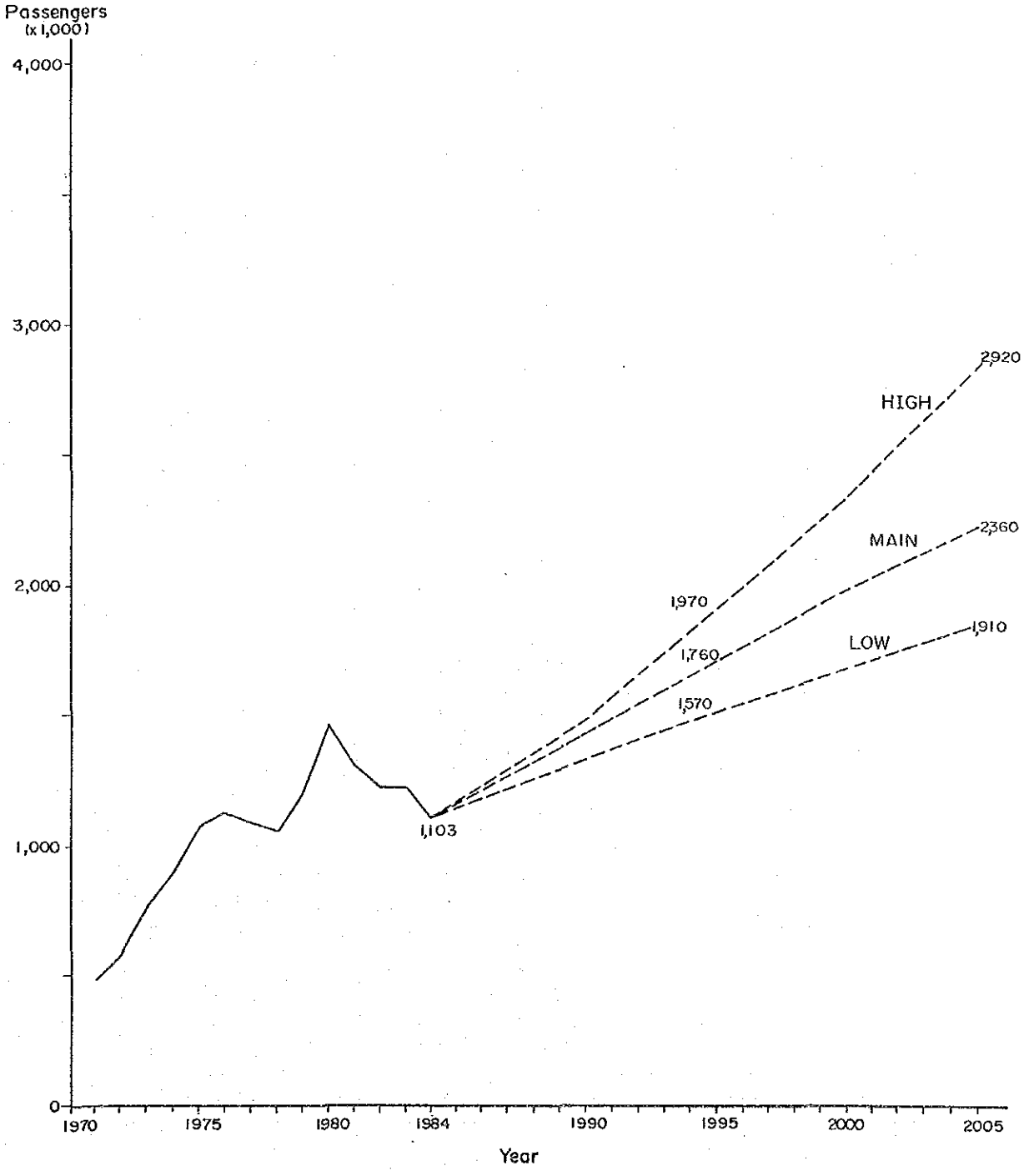


Table 4-2-7 Domestic Passenger by Route (Main Case)

unit = 1000

Route	1985	1990	1995	2000	2005
Lima -Chiclayo	70	89	114	143	180
-Iquitos	202	251	314	381	462
-Juanjui	4	5	6	7	8
-Piura	71	87	106	127	150
-Pucallpa	77	91	107	122	138
-Rioja	9	11	13	15	17
-Tacna	66	76	88	98	110
-Talara	46	56	69	83	99
-Tarapoto	73	89	107	124	144
-Trujillo	76	87	98	108	118
-Tumbes	23	27	33	39	45
-Yurimaguas	2	3	3	4	5
-Arequipa	132	156	185	211	242
-Ayacucho	48	54	62	70	78
-Cajamarca	10	12	14	17	19
-Cuzco	228	258	292	321	352
-Huanuco	22	25	29	32	36
-Juliaca	14	16	18	20	22
-Pto. Maldonado	13	17	22	27	34
-Tingo Maria	24	28	32	36	40
-Jaen	31	40	48	55	65
Total Lima Route	1,241	1,478	1,760	2,040	2,364

(1) Domestic passenger at Lima International Airport in the main case will be 1,760,000 in 1995 and 2,360,000 in 2005.

(2) In the low case, it will be 1,570,000 in 1995 and 1,910,000 in 2005. In the high case, the domestic passengers will be 1,970,000 in 1995 and 2,920,000 in 2005.

(3) In 1995, total domestic passengers in Peru are 4,120,000, the share of Lima Airport being about 43% of the total (in the main case).

(4) In each case, the annual average growth rates of domestic passengers of Lima are as follows:

(a) main case 3.6% (1985-1995) and 3.0% (1995-2005)

(b) low case 2.6% (1985-1995) and 2.0% (1995-2005)

(c) high case 4.6% (1985-1995) and 4.0% (1995-2005)

(5) Lima-Iquitos is the most important route with 314,000 passengers in 1995, and 462,000 in 2005 (Table 4-2-7). The high growth rate of this route is due to the oil activities and poor surface links with Lima.

(6) The next significant route is the Lima-Cuzco, whose passengers will be 292,000 in 1995 and 352,000 in 2005. Between 50% and 60% of the passengers seem to be foreign tourists.

4.2.5 Domestic Air Freight Forecasts

Future domestic freight (including mail) demand (1990 - 2005) at Lima International Airport is shown in Table 4-2-8 and Fig. 4-2-6.

Table 4-2-8 Domestic Freight Demand

Unit=ton

	1984	1990	1995	2000	2005
Main case	32,000	35,500	41,400	47,100	53,700
Low case	32,000	33,200	37,100	40,300	43,700
High case	32,000	37,600	46,300	55,100	65,900

Note: Main case : growth of Peru's GDP=3.5% (1985-1995) and 3.0% (1995-2005)
Low case : growth of Peru's GDP=2.5% (1985-1995) and 2.0% (1995-2005)
High case : growth of Peru's GDP=4.5% (1985-1995) and 4.0% (1995-2005)

Fig. 4-2-6 Domestic Freight at Lima International Airport

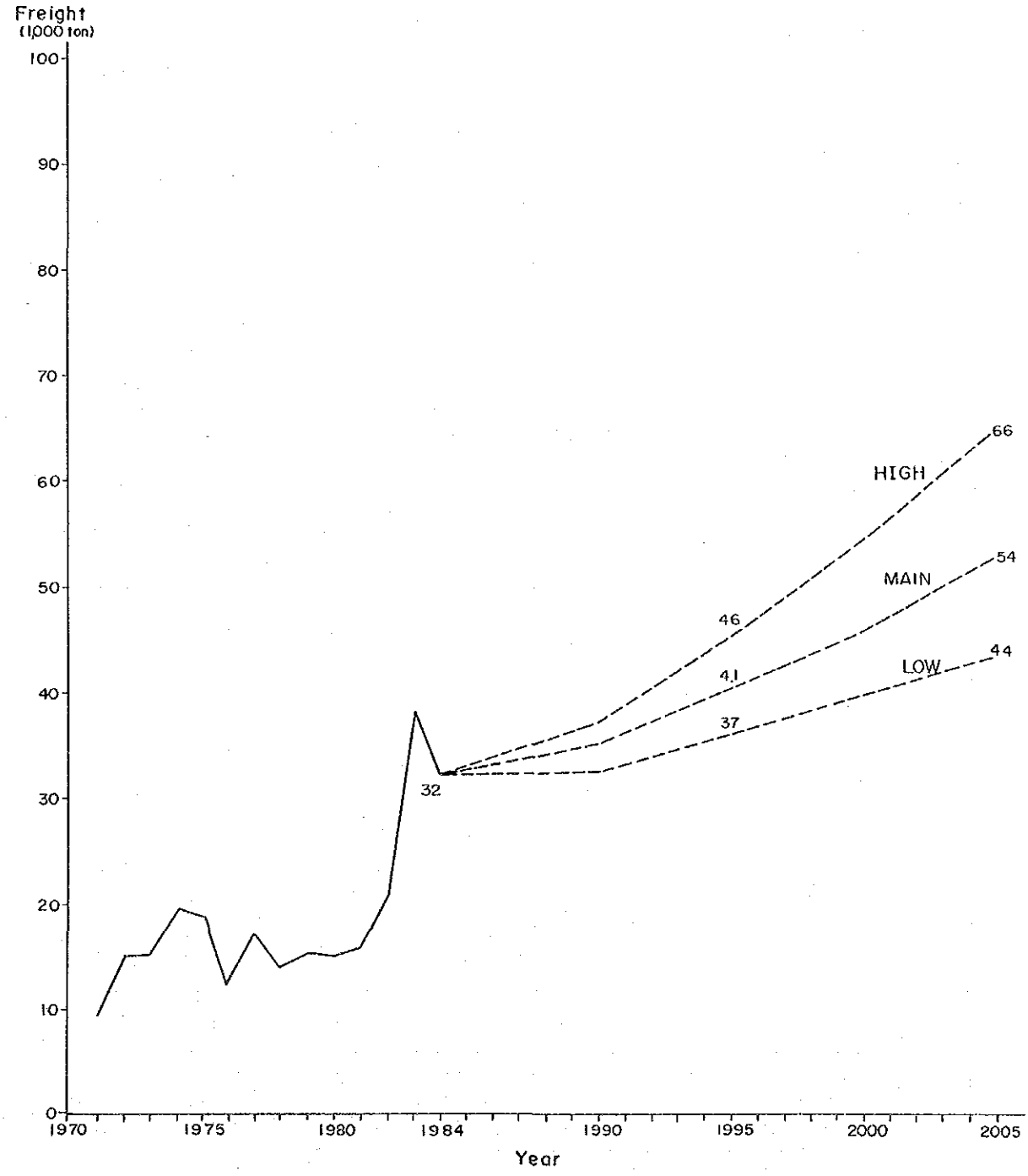


Table 4-2-9 Domestic Freight by Route(Main Case)

Unit = ton

Route	1985	1990	1995	2000	2005
Lima - Chiclayo	170	220	280	360	470
- Iquitos	19,600	23,290	27,670	32,120	37,280
- Juanjui	80	90	110	120	140
- Piura	380	450	530	610	700
- Pucallpa	830	890	940	950	950
- Rioja	110	120	140	150	170
- Tacna	680	770	870	970	1,080
- Talara	650	760	910	1,050	1,210
- Tarapoto	2,490	2,710	2,890	2,910	2,910
- Trujillo	240	260	270	290	310
- Tumbes	210	250	290	320	360
- Yurimaguas	20	30	30	30	40
- Arequipa	1,240	1,410	1,600	1,790	2,010
- Ayacucho	460	520	600	680	760
- Cajamarca	50	60	70	80	90
- Cuzco	1,680	1,830	2,000	2,150	2,340
- Huanuco	140	170	190	220	250
- Juliaca	110	120	140	160	170
- Pto. Maldo-Nado	820	990	1,210	1,430	1,700
- Tingo Maria	140	160	190	220	250
- Jaen	340	390	440	500	560
Total Lima Route	30,440	35,490	41,370	47,110	53,750

(1) Lima International Airport will handle 41,400 tons of domestic freight in 1995 and 53,700 tons in 2005 (main case).

(2) In the low case, it will handle 37,100 tons in 1995 and 43,700 tons in 2005. In the high case, the domestic freight is 46,300 tons in 1995, and 65,900 tons in 2005.

(3) Total domestic freight in Peru is 143,000 in 1995 and 197,000 tons in 2005, giving Lima Airport the share of some 26 to 22% of the total domestic freight.

(4) For the various cases, the average annual growth rates of domestic freight at Lima Airport are as follows:

(a) main case 3.1% (1985-1995) and 2.6% (1995-2005)

(b) low case 2.2% (1985-1995) and 1.7% (1995-2005)

(c) high case 4.1% (1985-1995) and 3.6% (1995-2005)

(5) In the main case, Lima-Iquitos is dominant with 27,700 tons in 1995 (67% of total) and 37,300 tons in 2005 (69% of total). The majority of freight in this route is thought to consist of consumer durables and capital goods required for oil development activities (Table 4-2-9).

(6) The second important route is Lima-Tarapoto which will move 2,900 tons of freight in 1995 and 2,900 tons in 2005. The third is the Lima-Cuzco route which will transport 2,000 tons of freight in 1995 and 2,300 tons in 2005.

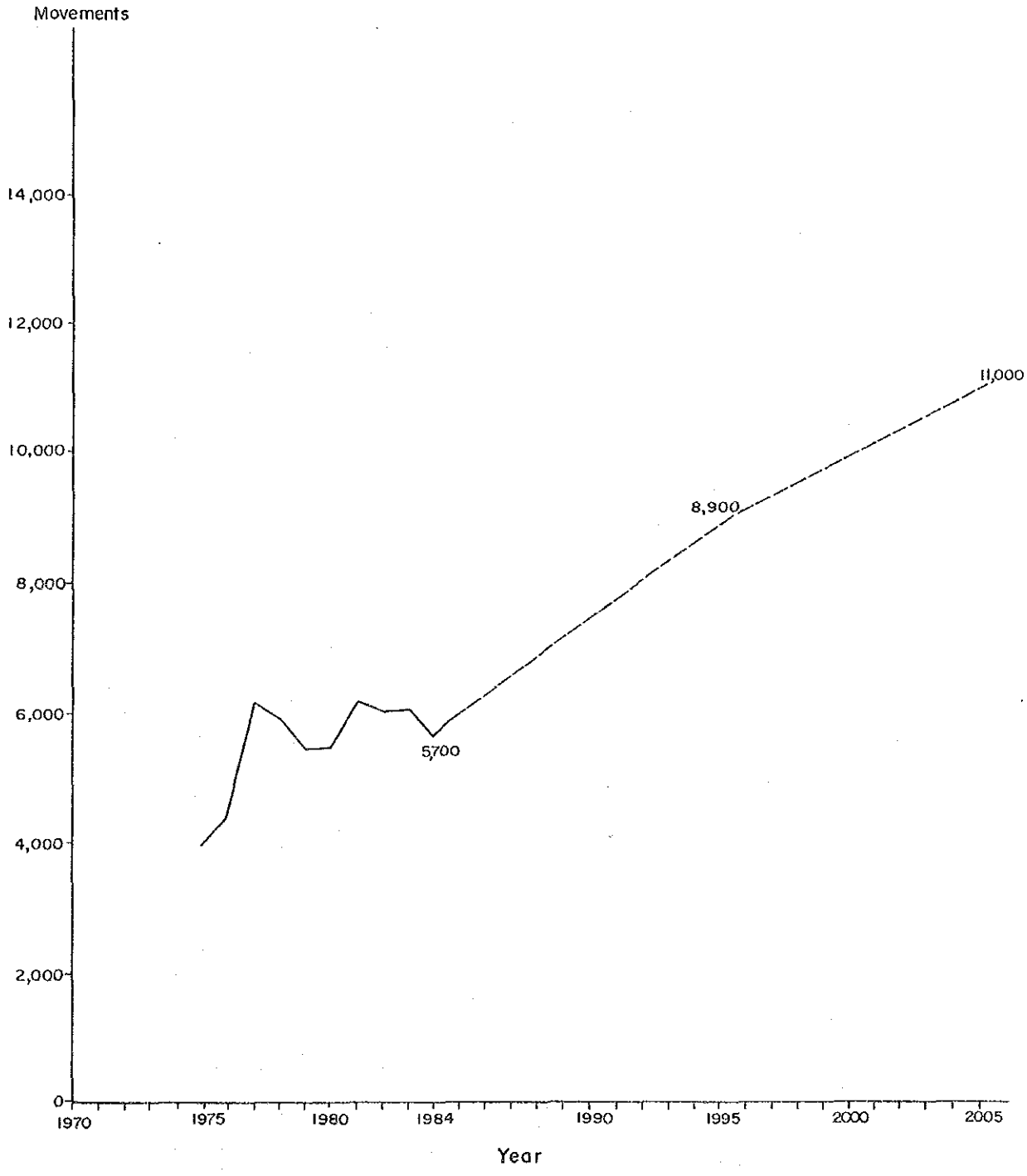
4.2.6 Small Aircraft Movement Forecast

Future small aircraft movements (excluding military) at Lima International Airport are shown in Fig. 4-2-7.

(1) Small aircraft movemnts will be 8,900 in 1995 and 11,000 in 2005.

(2) Average annual growth rate of movements (small aircraft only) is 2.8% in the first decade (1985 - 1995) and 2.2% in the second decade (1995 - 2005).

Fig.4-2-7 Small Aircraft Movements at Lima International Airport



CHAPTER 5

AIRPORT FACILITY REQUIREMENTS

CHAPTER 5 AIRPORT FACILITY REQUIREMENTS

5.1 General

The facility requirements that will satisfy the air transport demand forecast given in the previous chapter have been developed in conformity with the ICAO standards and/or the FAA regulations, also giving due consideration to the special local conditions and practices. The sequence of this work as outlined below is shown in the flow chart in Fig. 5-1-1.

Air transport demand forecast is made in the previous chapter for the three cases: main, high and low. For the purpose of the Short-Term Development Plan and the Master Plan, the facility requirements should be drawn up on the basis of the main case, which is considered to be the most probable.

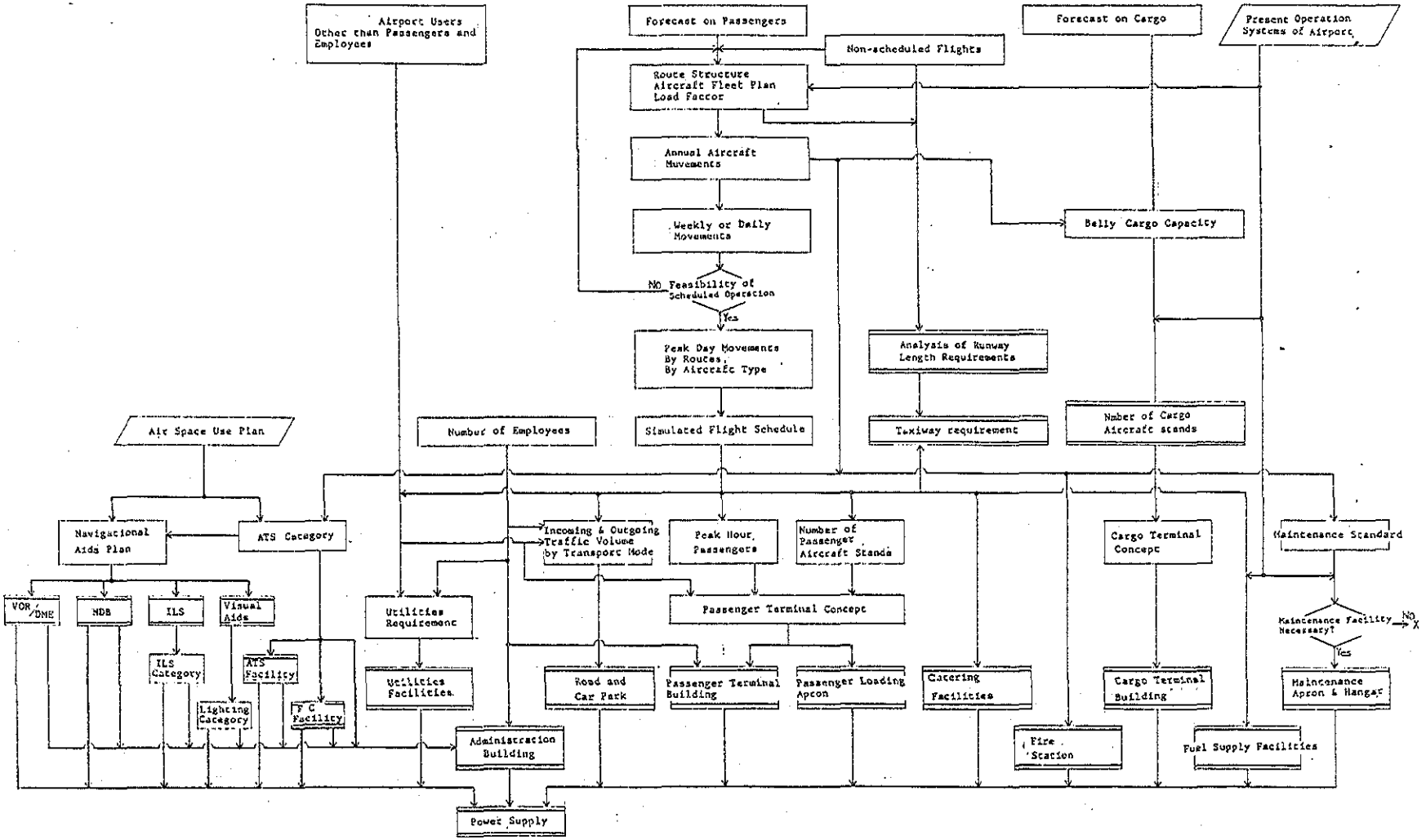


Fig 5-1-1 Sequence of Facility Requirement Analysis

5.2 Preparation of Simulated Flight Schedule

5.2.1 Projected Air Route Network

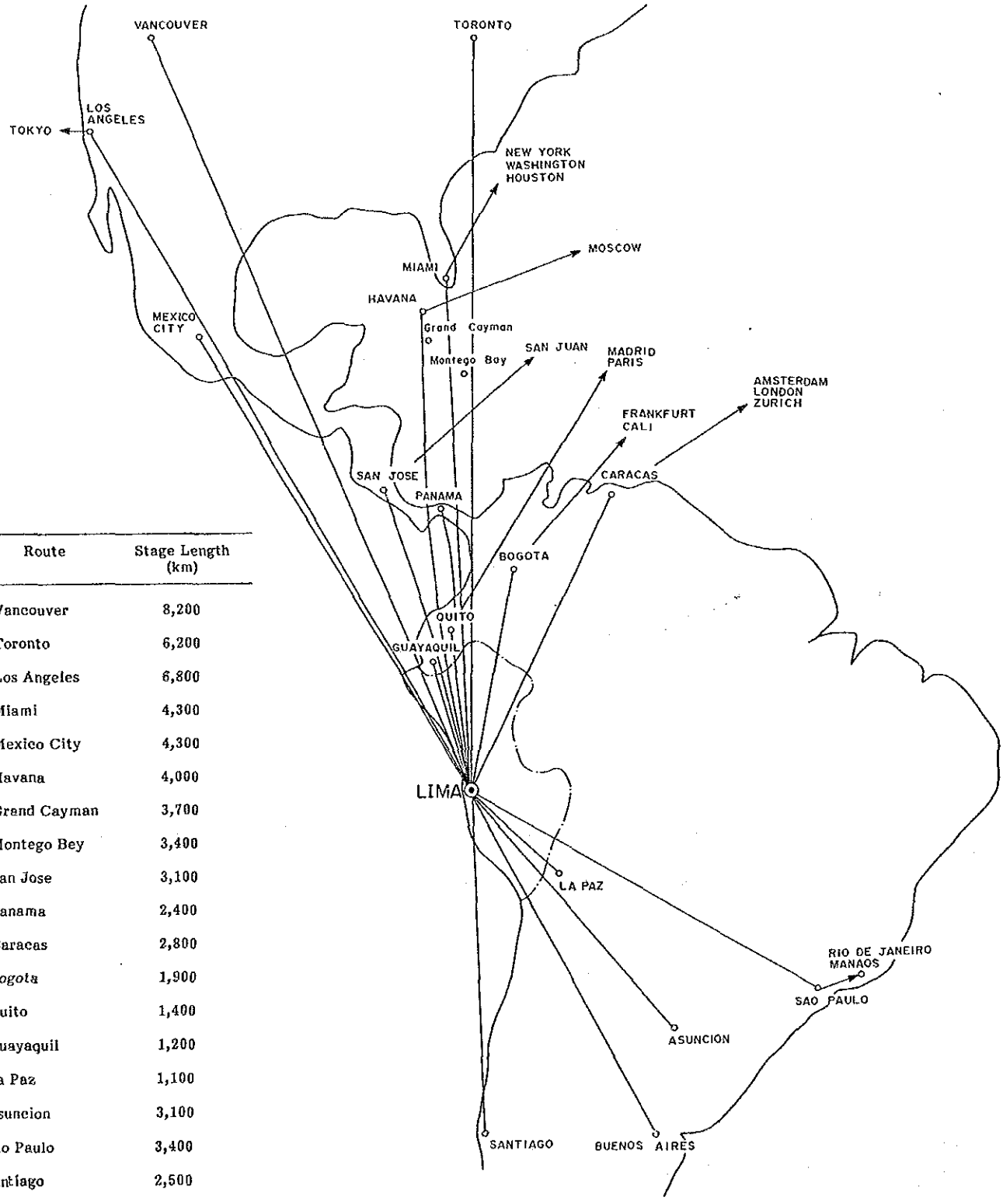
Taking into consideration the traffic forecast in the previous chapter and the actual air-route network, a projected air-route network has been drawn up, which would accommodate the entire air traffic of Peru. It is shown in Figs. 5-2-1 and 5-2-2, covering respectively the international service and domestic service. The entire international and domestic traffic by route is presented in Tables 5-2-2 and 5-2-3 for the two cases.

5.2.2 Type of Aircraft To Be in Service

(1) International Services

Taking into consideration the present aircraft mix and amount of traffic by routes, the types of aircraft to be in service for different air routes projected are classified into three categories for the purpose of this study as shown in Table 5-2-1.

Fig. 5-2-1 Projected International Air Route Network



Route	Stage Length (km)
Vancouver	8,200
Toronto	6,200
Los Angeles	6,800
Miami	4,300
Mexico City	4,300
Havana	4,000
Grand Cayman	3,700
Montego Bey	3,400
San Jose	3,100
Panama	2,400
Caracas	2,800
Bogota	1,900
Quito	1,400
Guayaquil	1,200
La Paz	1,100
Asuncion	3,100
Sao Paulo	3,400
Santiago	2,500
Buenos Aires	3,200

Fig. 5-2-2 Projected Domestic Air Route Network

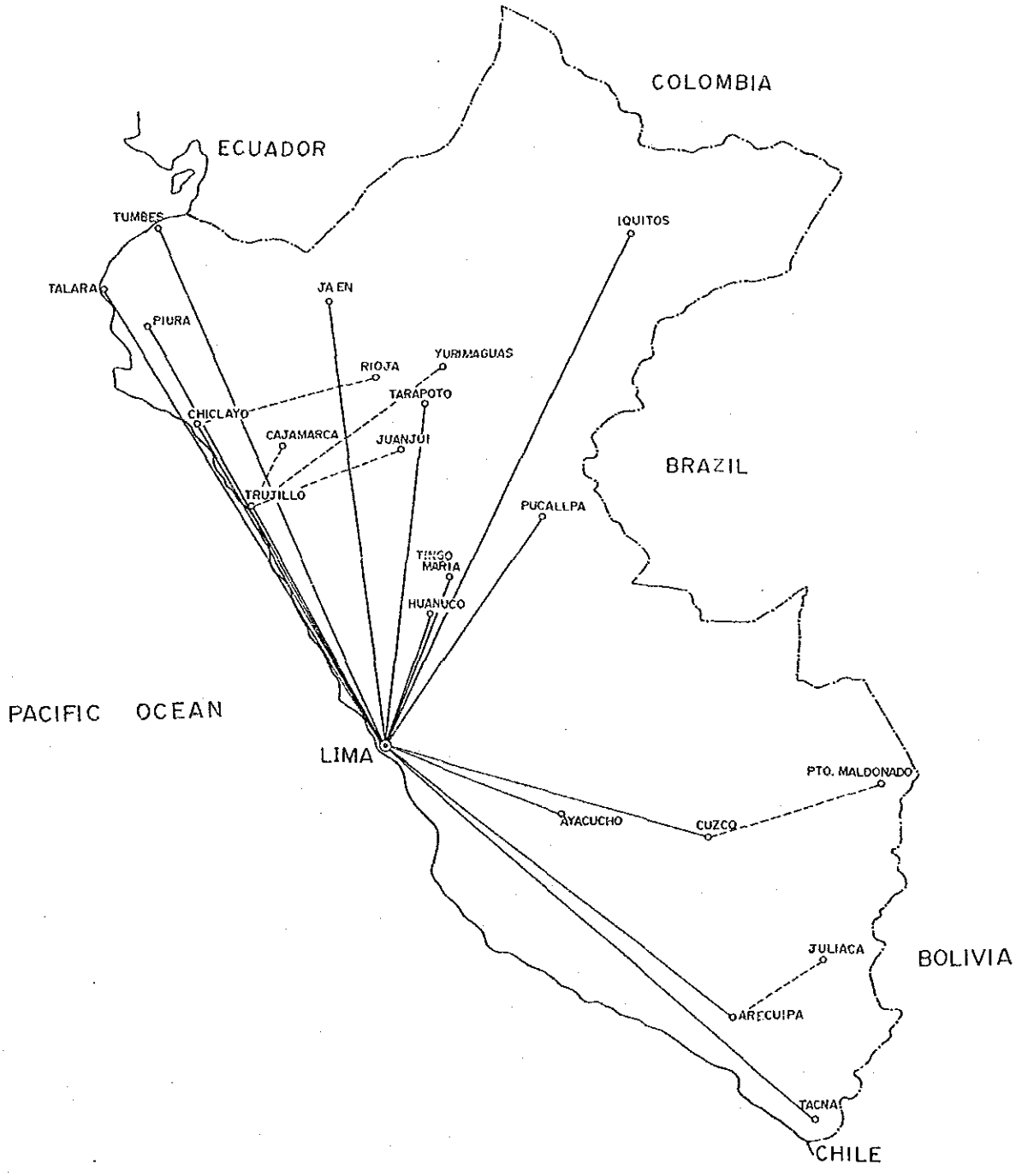


Table 5-2-1 Aircraft Categories (International Services)

Air Route	Aircraft Categories 1995	2005
LIM - BUE	B	B
- LPB	B	B
- SAO (RIO, MAO)	B	B
- BOG (CLO, FRA)	B	A
- SCL	B	B
- UIO (MAD, PAR)	A	A
- GYE	C	C
- ASU	C	C
- CCS (ZAH, LON, AMS)	B	B
- HAV (MOW)	B	B
- PTY	B	A
- SJO (SJU)	C	C
- MBJ	C	C
- GCM	C	C
- MEX	B	B
- MIA (NYC, HOU, WAS)	A	A
- YVR	B	B
- YYZ	B	B
- LAX (TYO)	B	B

Note: A type ... 350 Seater Jet
B type ... 250 Seater Jet
C type ... 150 Seater Jet

(2) Domestic Services

The type of aircraft expected to be in service for different air routes projected are classified into the following four categories by traffic volume as shown in Fig. 5-2-3, taking into account the passengers' requirement, airlines' profitability, minimisation of aircraft movements.

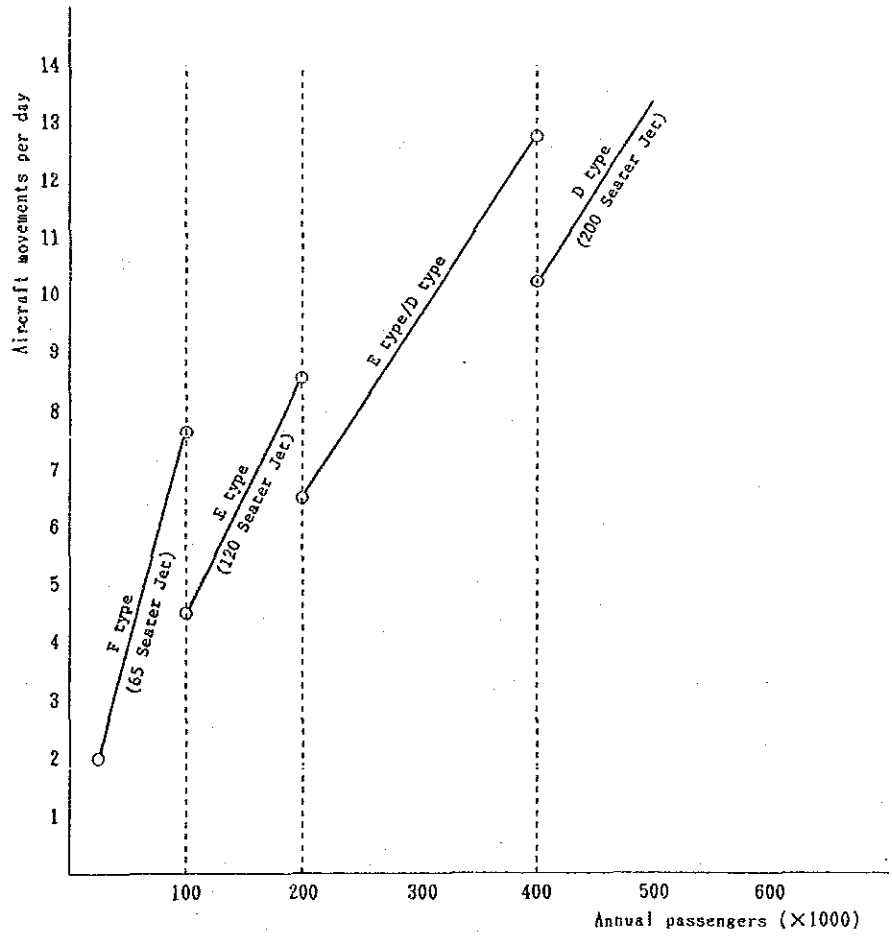


Fig. 5-2-3 Relationship between Aircraft Type, Number of Passengers and Aircraft Movements

5.2.3 Average Seating Load Factors

The average seating load factors for international flights and domestic flights are estimated to be 60% and 65% respectively.

5.2.4 Busiest-month Passenger-peaking Coefficient

The busiest-month peaking coefficient for international and domestic passengers is estimated to be 1.2.

5.2.5 Passenger Aircraft Movements

Passenger aircraft movements by route and per year and for the busiest-month, week and day are calculated as shown in Tables 5-2-2 and 5-2-3.

5.2.6 Simulated Flight Schedule

The following basic conditions have been taken into account in establishing the simulated flight schedules as shown in Appendix 5-1:

(1) The Lima International Airport is capable of permitting night-time operation, and is operable for 24 hours.

Table 5-2-2 Projected Aircraft Movements by Route (1995)

International

Route	Number of Passenger ('000)	Aircraft Type	Aircraft Movements		
			Annual	Busiest Month	Busiest Week
LIM - BUE	82.8	B	552	56	14
- LPB	105.6	B	704	71	18
- SAO (RIO, MAO)	90.2	B	602	61	14
- BOG (CLO, FRA)	147.2	B	982	99	24
- SCL	113.2	B	755	76	18
- UIO (MAD, PAR)	175.1	A	834	84	20
- GYE	50.4	C	560	56	14
- ASU	7.4	C	83	9	2
- CCS (ZAH, LON, AMS)	85.7	B	572	58	14
- HAV (MOW)	112.1	B	748	75	18
- PTY	127.0	B	847	85	20
- SJO (SJU)	22.6	C	252	26	6
- MBJ	11.3	C	126	13	4
- GCM	11.3	C	126	13	4
- MEX	91.9	B	613	62	16
- MIA (NYC, HOU, WAS)	295.1	A	1,406	141	34
- YVR	8.1	B	54	6	2
- YYZ	18.7	B	125	13	4
- LAX (TYO)	59.8	B	399	40	10
TOTAL	1,615.5		10,340	1,044	256

Domestic

Route	Number of Passengers ('000)	Aircraft Type	Aircraft Movements		
			Annual	Busiest Month	Busiest day
LIM - CIX (RIJ)	126.3	E	1,620	162	6
- IQT	314.0	D & E	3,020	302	6 & 4
- PIU	106.3	E	1,362	137	4
- PCL	107.0	E	1,372	137	4
- TCQ	87.6	F	2,074	208	6
- TYL	69.0	F	1,634	164	6
- TPA	106.8	E	1,370	137	4
- TRU (JJI, YMS)	121.2	E	1,554	156	6
- TBP	33.1	F	784	79	2
- AQP	202.6	D & E	1,948	195	4 & 4
- AYP	62.2	F	1,472	148	4
- CUZ	313.5	D & E	3,016	302	6 & 4
- HUU	28.9	F	684	69	2
- TGI	32.1	F	760	76	2
- JAEN	48.1	F	1,138	114	4
TOTAL	1,758.7		23,808	2,386	78

Table 5-2-3 Projected Aircraft Movements by Route (2005)

International

Route	Number of Passenger ('000)	Aircraft Type	Aircraft Movements		
			Annual	Busiest Month	Busiest Week
LIM - BUE	123.1	B	821	83	20
- LPB	157.2	B	1,048	105	24
- SAO (RIO, MAO)	134.3	B	896	90	22
- BOG (CLO, FRA)	220.5	A	1,056	105	26
- SCL	168.3	B	1,122	113	26
- UIO (MAD, PAR)	263.8	A	1,257	126	30
- GYE	75.1	C	835	84	20
- ASU	11.1	C	124	13	4
- CCS (ZAH, LON, AMS)	127.8	B	852	86	20
- HAV (MOW)	170.0	B	1,134	114	26
- PTY	191.6	A	913	92	22
- SJO (SJU)	34.1	C	379	38	10
- MBJ	17.1	C	190	19	6
- GCM	17.1	C	190	19	6
- MEX	138.6	B	924	93	22
- MIA (NYC, HOU, WAS)	421.4	A	2,007	201	46
- YVR	11.6	B	78	8	2
- YYZ	26.7	B	178	18	4
- LAX (TYO)	90.2	B	602	61	14
TOTAL	2,399.6		14,600	1,468	350

Domestic

Route	Number of Passengers ('000)	Aircraft Type	Aircraft Movements		
			Annual	Busiest Month	Busiest day
LIM - CIX (RIJ)	196.2	E	2,516	252	8
- IQT	462.1	D	3,555	356	12
- PIU	150.2	E	1,926	193	6
- PCL	138.1	E	1,771	178	6
- TCQ	110.1	E	1,412	142	4
- TYL	98.5	F	2,346	235	8
- TPA	143.7	E	1,843	185	6
- TRU (JJI, YMS)	150.3	E	1,927	193	6
- TBP	45.2	F	1,076	108	4
- AQP	264.1	D & E	2,540	254	4 & 4
- AYP	77.8	F	1,853	186	6
- CUZ	386.0	D & E	3,712	372	6 & 6
- HUU	36.1	F	860	86	2
- TGI	40.2	F	958	96	4
- JAEN	64.6	F	1,538	154	6
TOTAL	2,363.2		29,833	2,990	98

(2) Operational hours of the other local airports in Peru are the same as present.

(3) The number of aircraft to serve the projected air route is kept at a minimum so as to ensure the airlines' profitability.

(4) Aircraft parking time is assumed to be as follows on the basis of the past performances:

Table 5-2-4 Aircraft Parking Time at Fixed Spot

	International	Domestic
Turn-around Flights	90 minutes	60 minutes
Through Flights	60 "	60 "
Extended Layover	60 "	60 "

5.3 Airfield Facilities

5.3.1 Runway Strip

The width of the runway strip should be 300 m throughout its entire length for the year 1995 and 2005, as required for a precision approach runway.

5.3.2 Runway

(1) Number of Runways Required

The aircraft movement forecast for the year 2005 and

the usability of the existing runway do not justify provision of a second runway nor a cross-wind runway, as shown in Table 5-3-1. Therefore, the existing single runway should meet the requirement the year 1995 and 2005.

Table 5-3-1 Number of Runways Required

		Annual	Peak Hour
Capacity of existing runway (*)		160,000 operations	47 operations
Wind coverage		99.86%	
Aircraft movements in the year 2005:	Scheduled flight	44,400	22
	General aviation	11,000	5
	Others	20,000	13
	Total	85,400	40
Number of runways required		1	

(*) Calculated in accordance with FAA AC 150/5060-5 (Appendix 5-2)

(2) The runway length requirement is determined on the basis of the following design conditions:

1) Aircraft type: B 747-200B, DC-10-30

2) Maximum stage length: 8,200 km, equal to that between Lima and Vancouver (Canada)

3) Desired payload: 72,884 kg for B 747-200B, equal to the maximum structural payload, and 34,000 kg for DC-10-30