2.3 AIR TRANSPORT SYSTEM IN VIETNAM

2.3.1 Airport System

In Vietnam, there are 17 airports under the control of CAAV as shown in Figure 2.3.1. The following three airports are designated as the international airports.

- Hanoi/Noi Bai
- Ho Chi Minh City/Tan Son Nhat
- Danang

Noi Bai and Tan Son Nhat Airports are the two major international airports with regular international flights. Noi Bai has a 3,200m long runway, while Tan Son Nhat has two runways of 3,048m and 3,036m in length in a close parallel configuration. Danang Airport, with two 3,050m long close parallel runways, receives only occasional international charter flights. The runways at Noi Bai and Tan Son Nhat can accommodate landings of B747 aircraft, while these of Danang are suitable for aircraft of the A300 class.

Fourteen domestic airports serve the administrative centers of Vietnam's provinces. During the economic adjustment period in the late 1980s, air services to many of those airports were suspended. By the beginning of the 1990s, only Hai Phong , Nha Trang and the three international airports were re-opened for regular domestic air services. However, as of May 1995, domestic regular air services have been resumed at all CAAV airports except Na Son, Phucat, Conson and Rech Gia. The domestic airports are located at:

- Dien Bien
- Hai Phong/Catbi
- Hue/Phu Bai
- Phucat
- Buon Me Thout/Honthang
- Da Lat/Leinkhuong
- Rech Gia
- Na San
- Vinh
- Pleiku
- Qui Nhon
- Nha Trang
- Conson
- Phu Quoc/Duong Dong

The lengths of the runways at those airports range from 1,200m to 3,050m. Among these, Hai Phong, Hue and Qui Nhon have jet aircraft (TU134) services. The others airports are used by turbo-prop aircraft (ATR72 or YAK40).

2.3.2 Air Services

The existing international air routes connecting Vietnam directly with the outside world are primarily concentrated in Ho Chi Minh City. Noi Bai Airport located at the state capital, Hanoi, can be considered as the secondary international airport in Vietnam at the present time. The route map and list of scheduled international flights from/to Vietnam are shown in Figure 2.3.2 and Table 2.3.1.

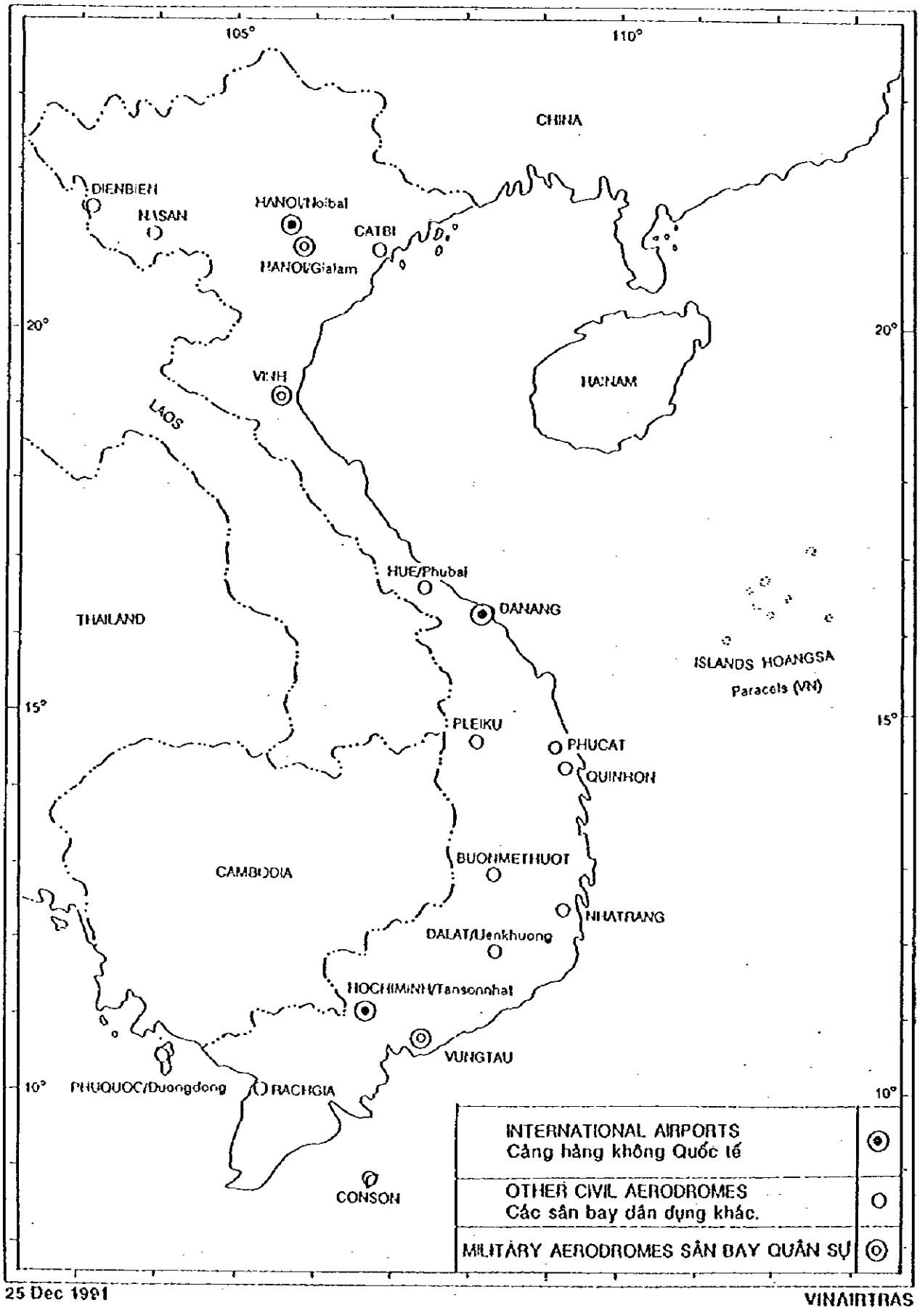

Figure 2.3.1 Airports in Vietnam

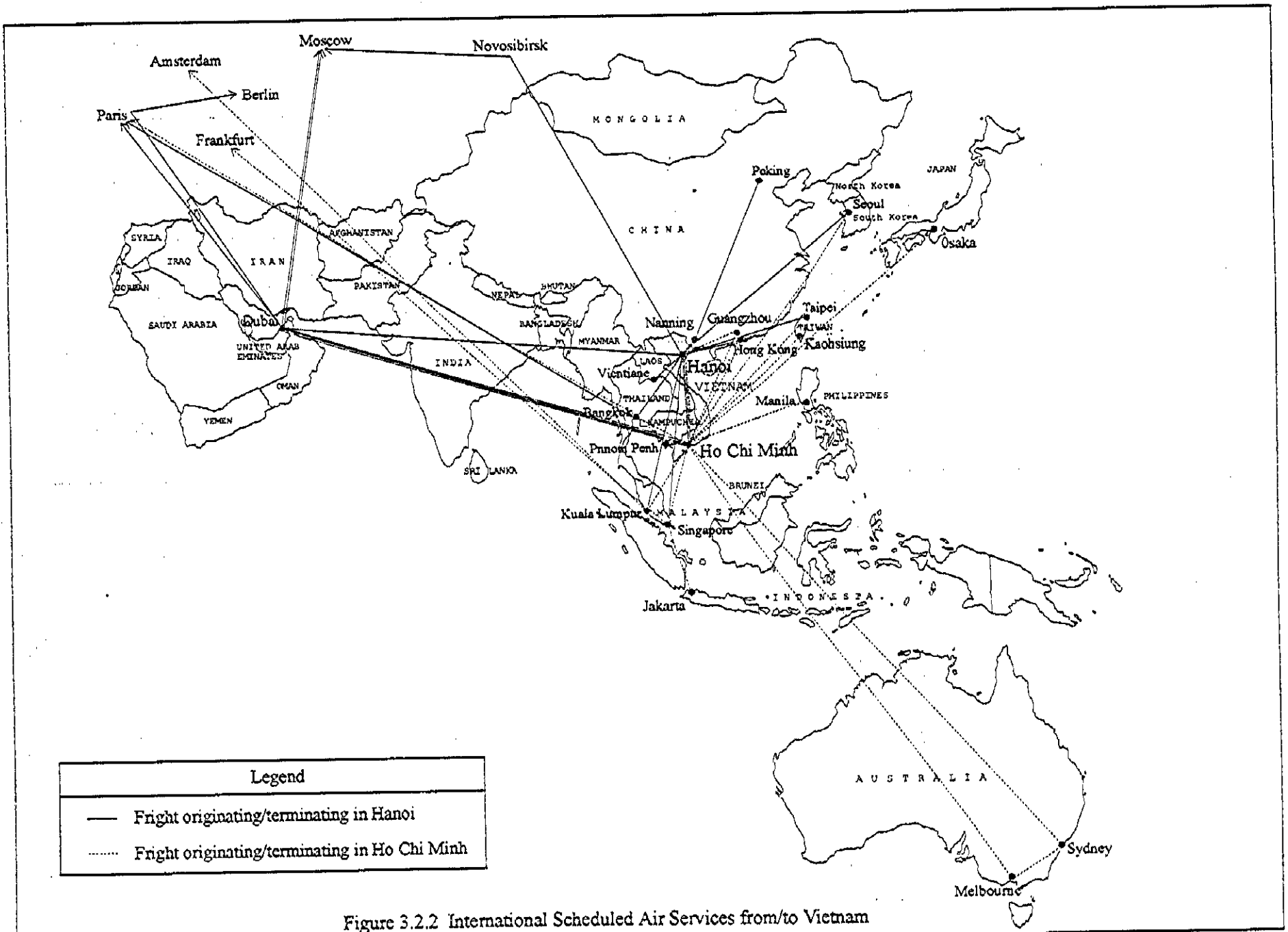

Figure 3.2.2 International Scheduled Air Services from/to Vietnam

Table 2.3.1 International Scheduled Flights from/to Hanoi and Ho Chi Minh
(Effective July 10, 1995)

Routes		Airlines	Aircraft Types	Mvmts/Week
Hanoi	Bangkok	VN	A320	18
		TG	A300	6
	Bangkok- Paris	AF	A340	4
	Dubai - Paris - Berlin	VN	B767	2
	Guangzhou	VN	TU134	4
	Ho Chi Minh - Dubai - Moscow	VN	B767	2
	Ho Chi Minh - Dubai - Paris	VN	B767	2
	Hong Kong	VN/CX	L1011	6
		VN/CX	A320	18
	Kuala Lumpur	MH	B735	4
	Nanning - Beijing	CZ	B733	2
	Novosibirsk - Moscow	SU	IL62	4
	Seoul	VN	A320	4
	Singapore	SQ	A310	6
	Taipei	VN	A320	6
	Vientiane	VN	TU134	8
	Total from/to Hanoi			96
Ho Chi Minh	Bangkok	VN	A320	18
		TG	A300	14
	Bangkok - Paris	AF	A340	6
	Dubai - Moscow	VN	A320	2
		SU	IL62	2
	Dubai - Paris	VN	A320	6
	Guangzhou	CZ	B735	4
	Hanoi - Guangzhou	VN	TU134	4
	Hong Kong	VN/CX	L1011	12
		VN/CX	B767	10
	Kaohsiung	VN	A320	4
		BL	B732	6
	Kuala Lumpur	VN/MH	A320	6
		VN/MH	B734	8
	Kuala Lumpur - Amsterdam	VN/KL	B747	4
	Manila	VN	A320	4
		PR	B734	6
	Melbourne - Sydney - Ho Chi Minh	VN	B767	2
	Osaka	VN	B767	6
		JL	DC10	4
	Phnom Penh	VN	TU134	14
			ATR72	14
		OZ	ATR72	6
	Seoul	VN/KE	A300	2
		VN	B767	8
	Sydney	QF	B767	2
	Singapore	VN	A320	20
		SQ	A310	14
	Singapore - Frankfurt	LH	B747	4
	Singapore - Jakarta	GA	B734	2
	Taipei	VN	A320	14
		BL	B732	6
		CI	B747	14
		BR	B767	14
	Total from/to Ho Chi Minh			262

Note: VN: Vietnam Airlines, AF: Air France, BL: Pacific Airlines, BR: Eva Air, CA: China Airlines, CZ: China Southern Airlines, CX: Cathay Pacific, GA: Garuda Indonesia, JL: Japan Airlines, KE: Korean Airlines, KL: KLM, LH: Lufthansa, MH: Malaysia Airlines, OZ: Cambodia International Airlines, PR: Philippine Airlines, QF: Quantas, TG: Thai Airways International, SQ: Singapore Airlines, SU: Aeroflot.
B767: 248 seats (300 series), 204 seats (200 series), A320: 140 or 150 seats, TU134: 68 or 72 seats, ATR72: 66 seats for VN aircraft.
B747: 281 seats (CI), 284 seats (KL), 260 seats (LH), L1011: 299 seats (CX), A340: 260 seats (AF), DC10: 200 seats (JL), A300: 258 seats (KE), 247 seats (TG), B767: 197 seats (BR), 240 seats (QF), A310: 189 seats (SQ), B735: 132 seats (CZ), 106 seats (MH), B734: 124 seats (GA), 146 seats (MH), 110 seats (PR), B733: 145 seats (CZ), B732: 124 seats (BL), IL62: 142 seats (SU), ATR72: 70 seats (OZ).

Long-haul, non-stop, international routes are relatively rare in Vietnam. They include: Vietnam Airlines' Hanoi - Dubai[23] (and then to Paris), Ho Chi Minh City - Dubai (and then to Paris and Berlin or to Moscow), Ho Chi Minh City - Melbourne (then to Sidney and back to Ho Chi Minh City) and Quantas' Ho Chi Minh City - Sydney services. Air France flies to both Hanoi and Ho Chi Minh City via Bangkok. Similarly, Lufthansa operates to Ho Chi Minh City via Singapore, and KLM to Ho Chi Minh City via Kuala Lumpur. The major reason of this underdevelopment is that the demand for air traffic between Western Europe and Vietnam has not been large enough until recently to justify non-stop services. In addition, Vietnam Airlines' B767s do not have the range to fly non-stop to Western Europe. Short runways at Noi Bai and Tan Son Nhat is another reason since large aircraft, such as B747s and A340s, require a longer runway to take-off without undue payload penalties.

In contrast with long-haul international services, regional international routes have rapidly been developing in recent years. According to Vietnam Airlines, the current main target market is East and Southeast Asia, which is becoming a center of growth of the world economy.[24] Ho Chi Minh City has been connected with most of major cities in East and Southeast Asia. The recent increase in flight frequency on the Ho Chi Minh City - Taipei route is particularly significant, probably due to Taiwan being the number one foreign investor to Vietnam. Ho Chi Minh City - Bangkok, Ho Chi Minh City - Hong Kong, Ho Chi Minh City - Singapore, Hanoi - Hong Kong and Hanoi - Bangkok are other major international routes from/to Vietnam.

Domestic air services in Vietnam are structured around the two main airports in Hanoi and Ho Chi Minh City. Other airports are either transit or feeder airports connecting with either Hanoi or Ho Chi Minh City. The number of passengers on the Hanoi - Ho Chi Minh City route accounted for approximately 75% of the total passengers at Noi Bai and 60% at Tan Son Nhat in 1994. This

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23 Main reason for Vietnam Airlines stopping at Dubai is for refueling its B767 aircraft, which has insufficient range for Ho Chi Minh City - Europe non-stop operations. Although it has traffic rights for passengers and cargo in Dubai, Vietnam Airlines' officials said that most passengers travel to final destinations.

24 Vietnam Airlines' load factors on regional international flights are around 70% on average, which is well above the break-even load factor. That of long-haul flights is 50-60% depending on routes and seasons. Since break-even load factor on long-haul flights is high, at 75-80%, VAL feels that the long-haul services are currently not commercially viable due to its limited marketing capacity.

proportion is higher in Hanoi because it has fewer satellite airports in the northern Vietnam than Ho Chi Minh City has in the southern Vietnam. The route map and list of scheduled domestic flights from/to Hanoi and Ho Chi Minh City are shown in Figure 2.3.3 and Table 2.3.2.

There are two domestic scheduled carriers in Vietnam; one is the former monopolistic, state-owned Vietnam Airlines, and the other is Pacific Airlines, which is a joint venture of state-owned companies. Vietnam Airlines uses B767, A320, TU134, ATR72 and YAK40 aircraft for domestic services, while Pacific Airlines operates B737-200 for its Hanoi - Ho Chi Minh City service.

Vietnam Airlines and Pacific Airlines have a 2 tier airfare system for domestic routes. Cheaper rates apply to resident Vietnamese, with higher rates for foreigners and overseas Vietnamese. Hanoi - Ho Chi Minh City (one way) costs US$170 to non-residents and D700,000 ($63) to resident Vietnamese. Airfares are regulated by the Government, and those for resident Vietnamese are kept far below the economic cost. Although this policy may be necessary for the transition period to a market economy, it would require a review in the near future in view of the self-financing policy for state-owned enterprises mandated by the same Government.

Table 2.3.2 Domestic Scheduled Flights from/to Hanoi and Ho Chi Minh (Effective July 1, 1995)

Routes		Airlines	Aircraft Types	Movements /Week
Hanoi	Danang	VN	A320	4
			TU134	38
	Dien Bien Phu	VN	ATR72	4
	Ho Chi Minh	VN	B767	19
			A320	74
		BL	B732	14
	Hue	VN	ATR72	22
	Nha Trang	VN	ATR72	6
	Vinh	VN	ATR72	4
	Total from/to Hanoi			185
Ho Chi Minh	Boun Me Thout	VN	ATR72	14
	Da Lat	VN	YAK40	6
	Danang	VN	A320	4
			TU134	38
	Hanoi	VN	B767	19
			A320	74
		BL	B732	14
	Hai Phong	VN	TU134	14
	Hue	VN	ATR72	22
	Nha Trang	VN	ATR72	18
	Phu Quoc	VN	ATR72	4
	Pleiku	VN	ATR72	8
	Qui Nhon	VN	TU134	4
			YAK40	3
	Total from/to Ho Chi Minh			242

Note: VN: Vietnam Airlines, BL: Pacific Airlines
B767: 248 seats (300 series), 204 seats (200 series), A320: 140 or 150 seats, TU134: 68 or 72 seats, ATR72: 66 seats, YAK40: 32 seats for VN aircraft.
B732: 124 seats for BL aircraft.

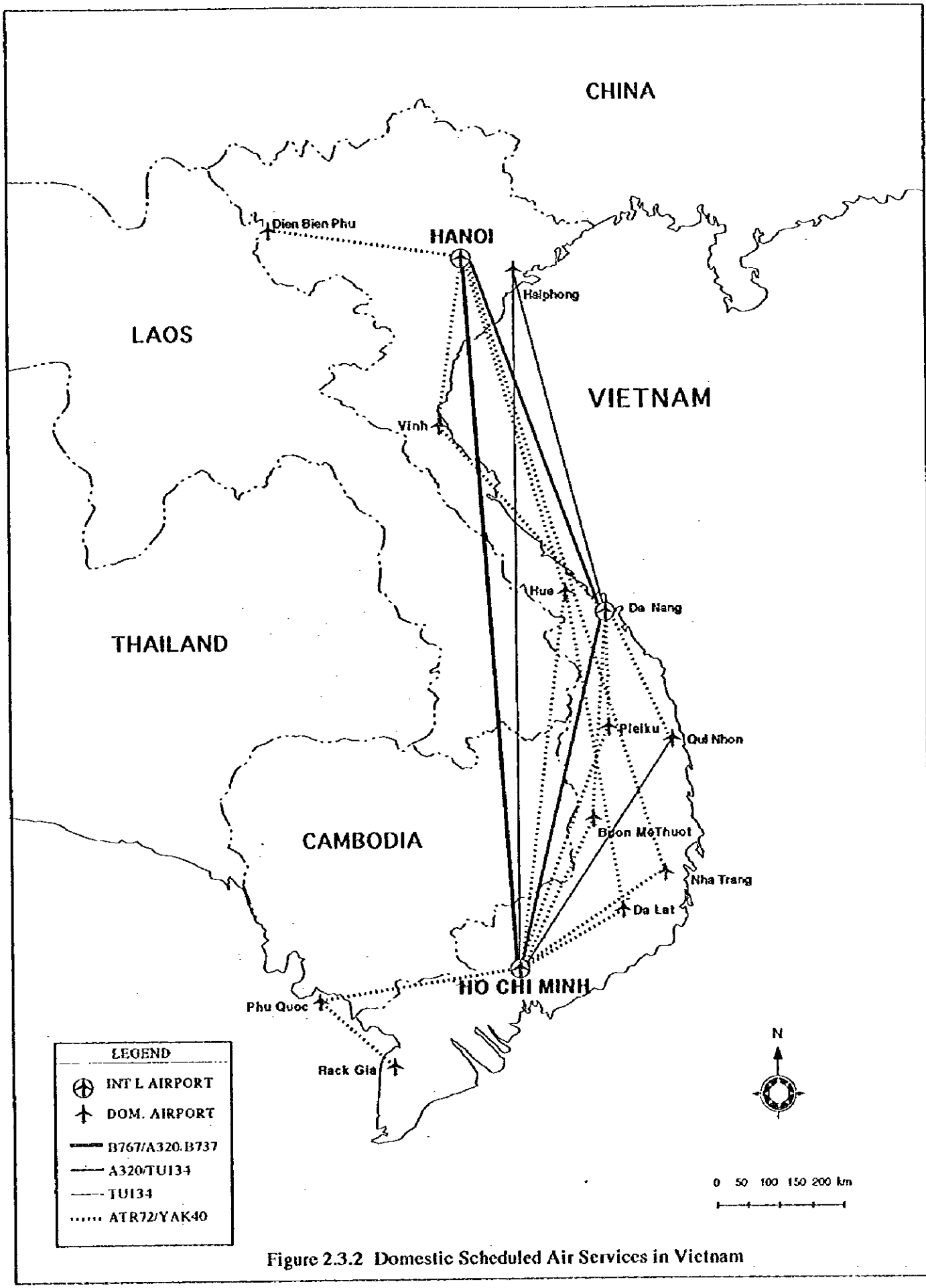
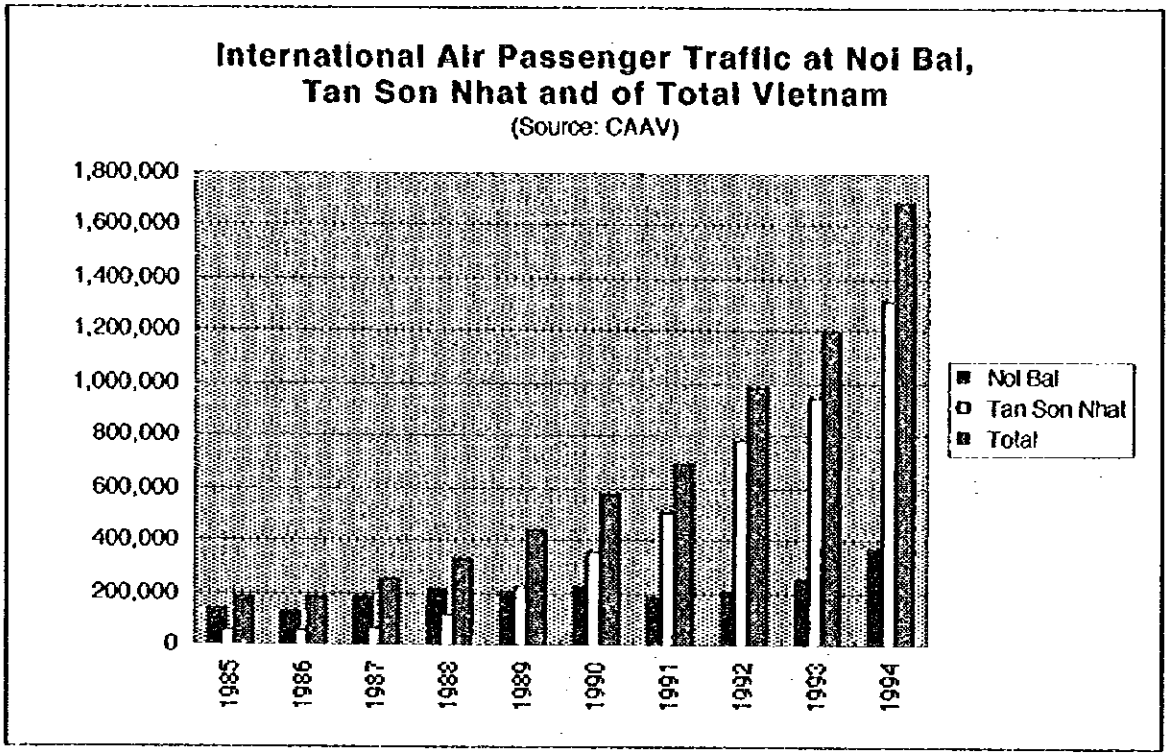


Figure 2.3.2 Domestic Scheduled Air Services in Vietnam

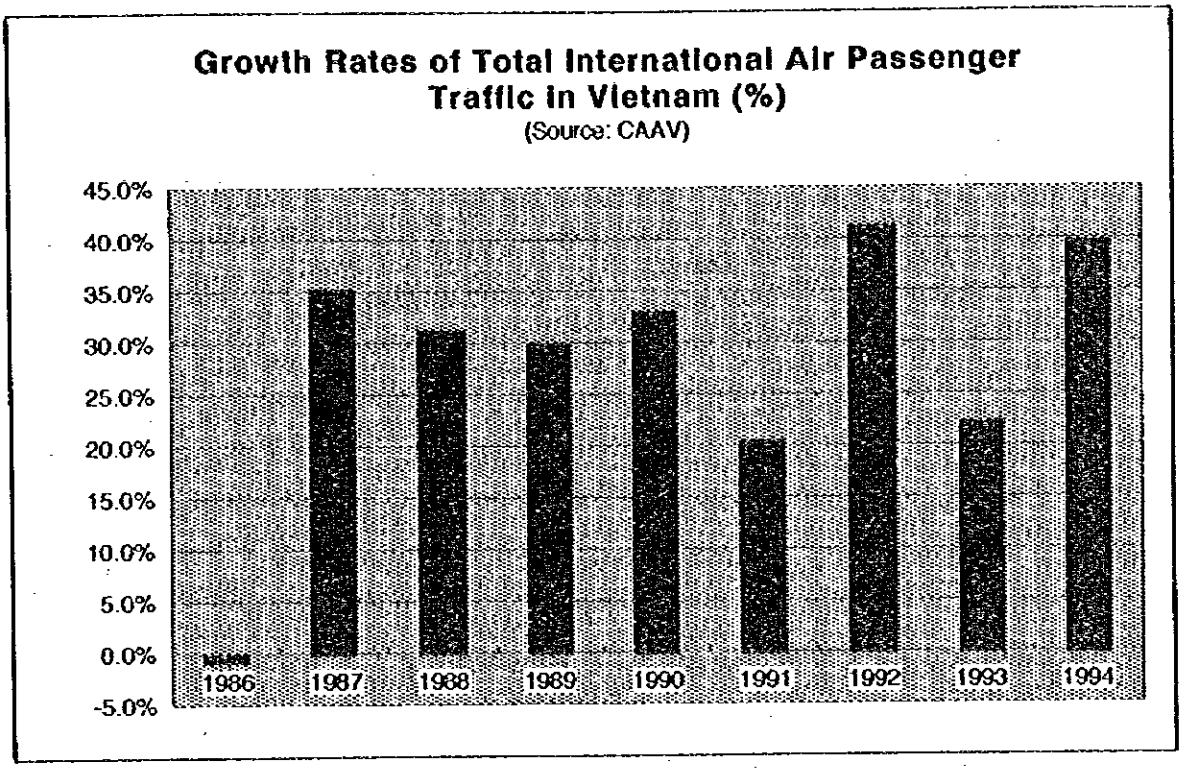
2.3.3 Air Traffic

1) International Air Passenger Traffic

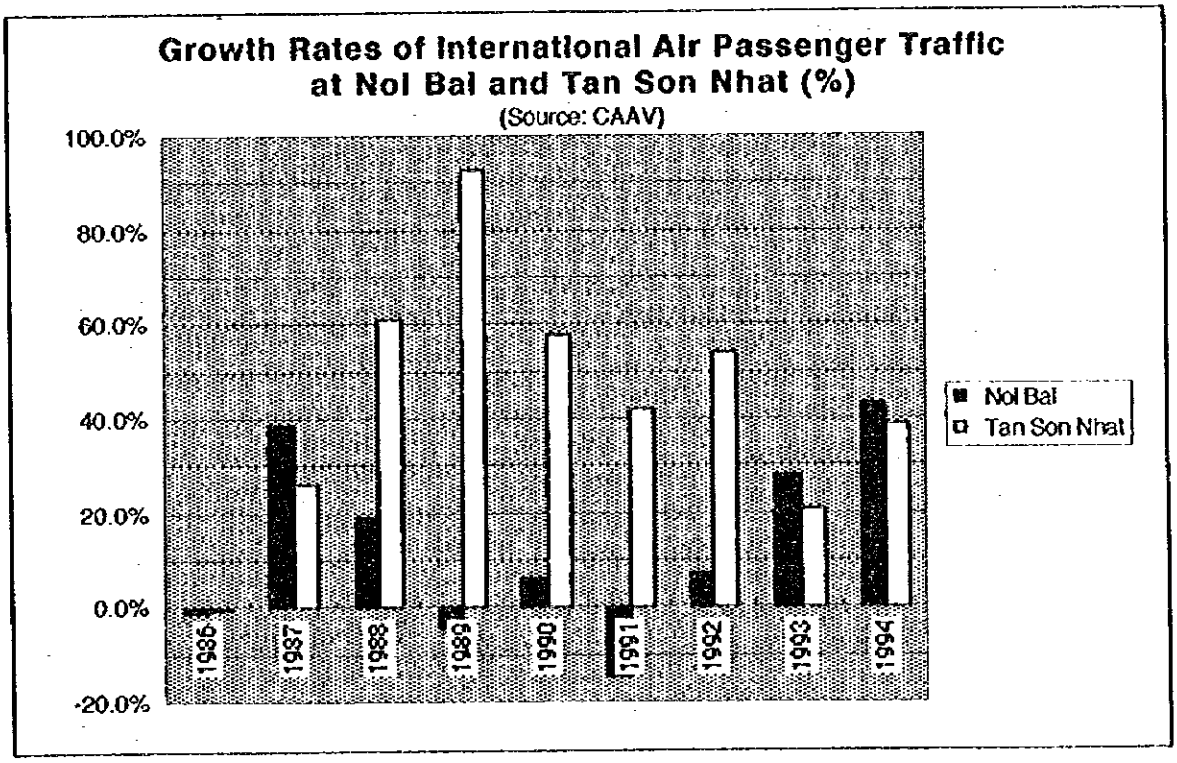
The historical trends of international air passenger traffic at Noi Bai Airport, Tan Son Nhat Airport and the total traffic in Vietnam, which is the sum of the two airports, are shown for 1985 to 1994 in the figure below.



The totals of international air passengers in Vietnam have increased from 189,000 in 1986 to 1,688,000 in 1994, nine fold in the 8 years of the renovation period, at an average growth rate of 31% per annum. The growth rate on the previous year ranges was from 18% to 40% for the same period, as shown on the next page. This figure indicates that although there were relatively large fluctuations about the 30% per annum level, the growth of international air passenger traffic has been maintained to date, and there are no signs of deceleration so far.



However, the growth patterns of international air passengers differ significantly between the two international airports in Hanoi and Ho Chi Minh.

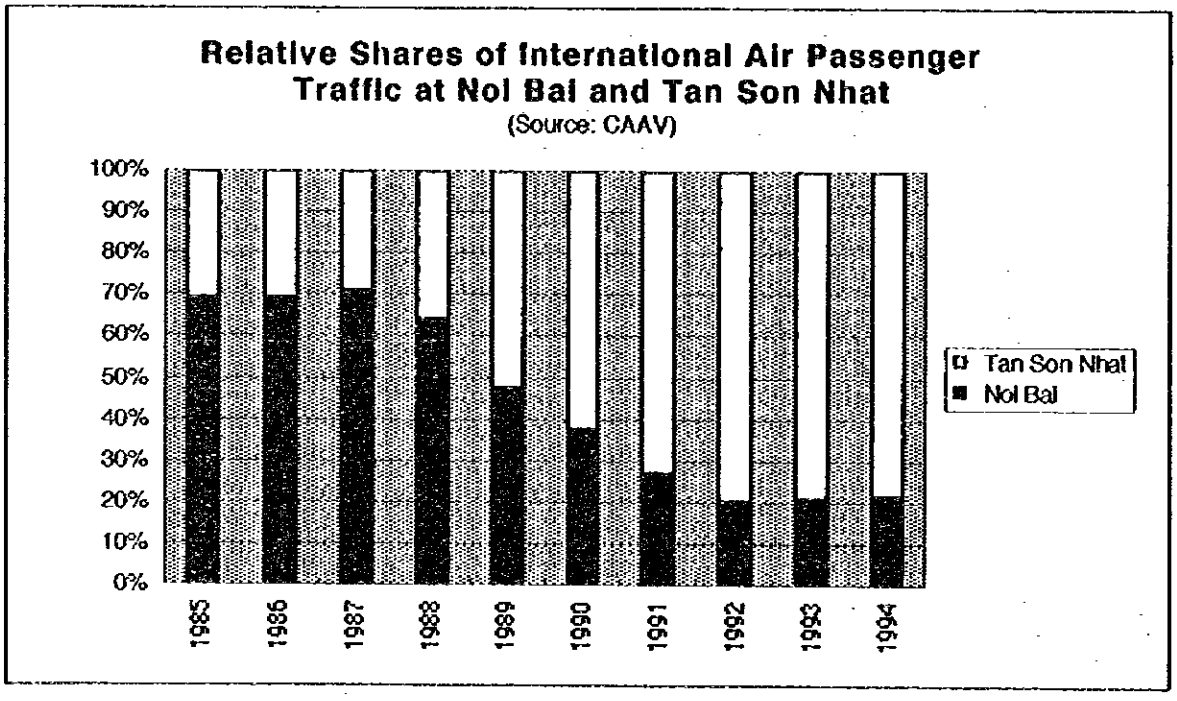


The growth of international air passenger traffic at Tan Son Nhat Airport turned positive in 1987 and accelerated thereafter. It recorded its highest growth rate of 93% in 1989. Since

then, the general trend of annual growth rates seems to indicate a decelerating pace of growth, although fluctuations prevent a definitive judgment.

The growth pattern of international air passenger traffic at Noi Bai Airport is complicated. After having high growth rates for two years in 1987 and 1988, it recorded a negative growth rate in 1989, when price liberalization was implemented as a part of the "Shock Therapy" on the Vietnamese economy. Noi Bai traffic, after picking up in 1990, declined again in 1991 and increased only slightly in 1992. These were the period that Vietnam lost its economic ties with the former COMECON countries. The effects of the political disruptions in those countries disproportionately affected the traffic growth at Noi Bai Airport more than at Tan Son Nhat Airport since the former functioned as the gateway airport to those countries. However, the growth rate at Noi Bai Airport drastically increased in 1993 and 1994, exceeding that of Tan Son Nhat Airport.

The relative shares of Noi Bai and Tan Son Nhat has changed significantly due to the above-mentioned factors. Noi Bai Airport, which accounted for approximately 70% of total international passenger traffic in the latter half of the 1980s, lost its share in the early 1990s. It declined to 20% in 1992, but slightly increased to 22% in 1994.



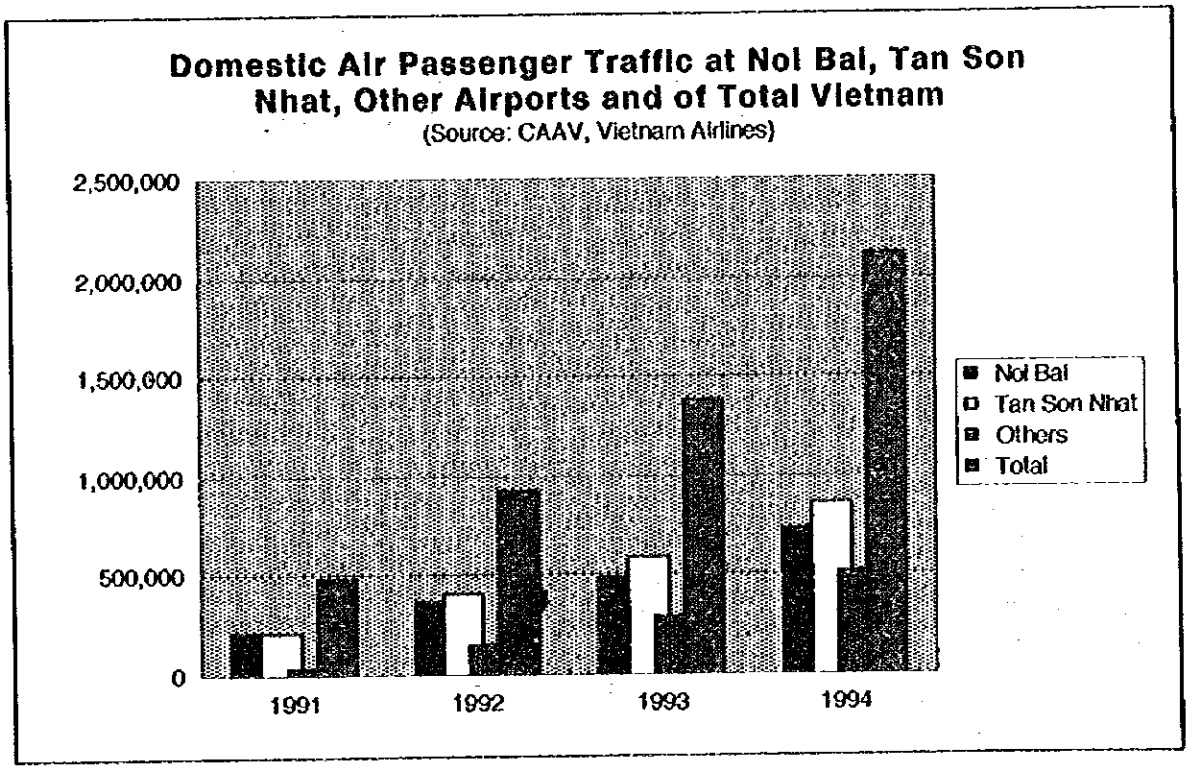
2) Domestic Air Passenger Traffic

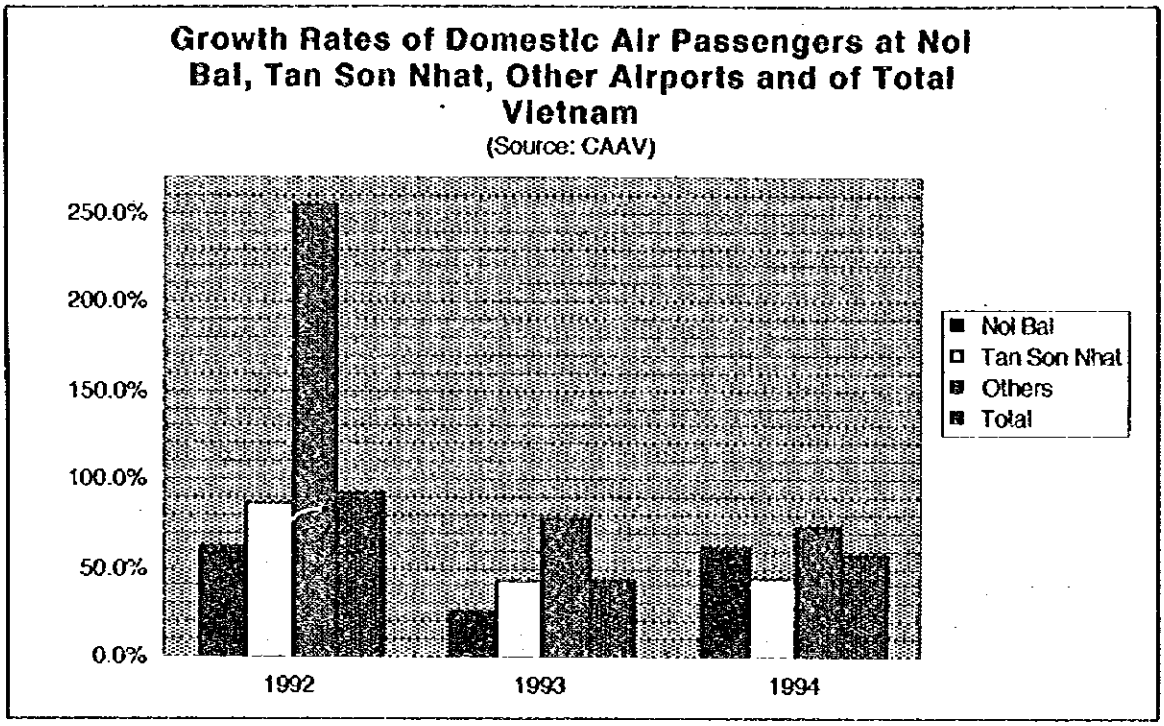
The limitation of available data only allowed analysis of total domestic airport traffic since 1991. The figures below and on the next page indicate the number of domestic air passengers at Noi Bai, Tan Son Nhat, the other airports and total airport traffic in Vietnam, and their respective growth rates on the previous year.

The number of total airports' domestic passengers increased from 486,000 to 2,125,000 in 1994, an average annual growth rate of 63%, higher than the already-high growth rate for international air passenger traffic of 37% per annum for the same period.

One obvious reason of this extremely high growth rate is the increased number of airports in operation in Vietnam. The two airports in Hanoi and Ho Chi Minh accounted for 90% of total airport traffic in Vietnam, i.e., the other airports had only 10% in 1991 when 5 airports were available for regular air services. Since then, an additional 8 local airports have become available for regular services, and the passenger share of the airports other than Noi Bai and Ho Chi Minh has increased to 26% in 1994.

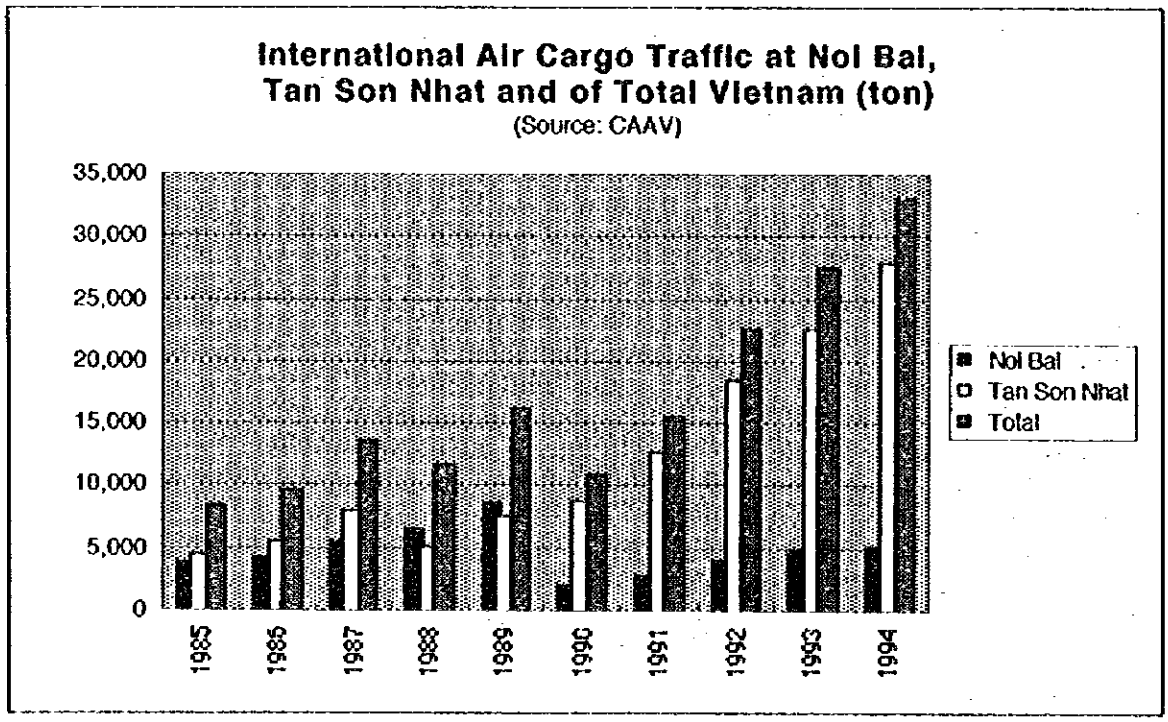
The number of domestic air passengers at Noi Bai and Tan Son Nhat was approximately the same in 1991. Tan Son Nhat increased its domestic passenger traffic faster than Noi Bai in 1992 and 1993. However in 1994, as is the case of international traffic, Noi Bai's domestic air passenger traffic grew more rapidly than that of Tan Son Nhat.



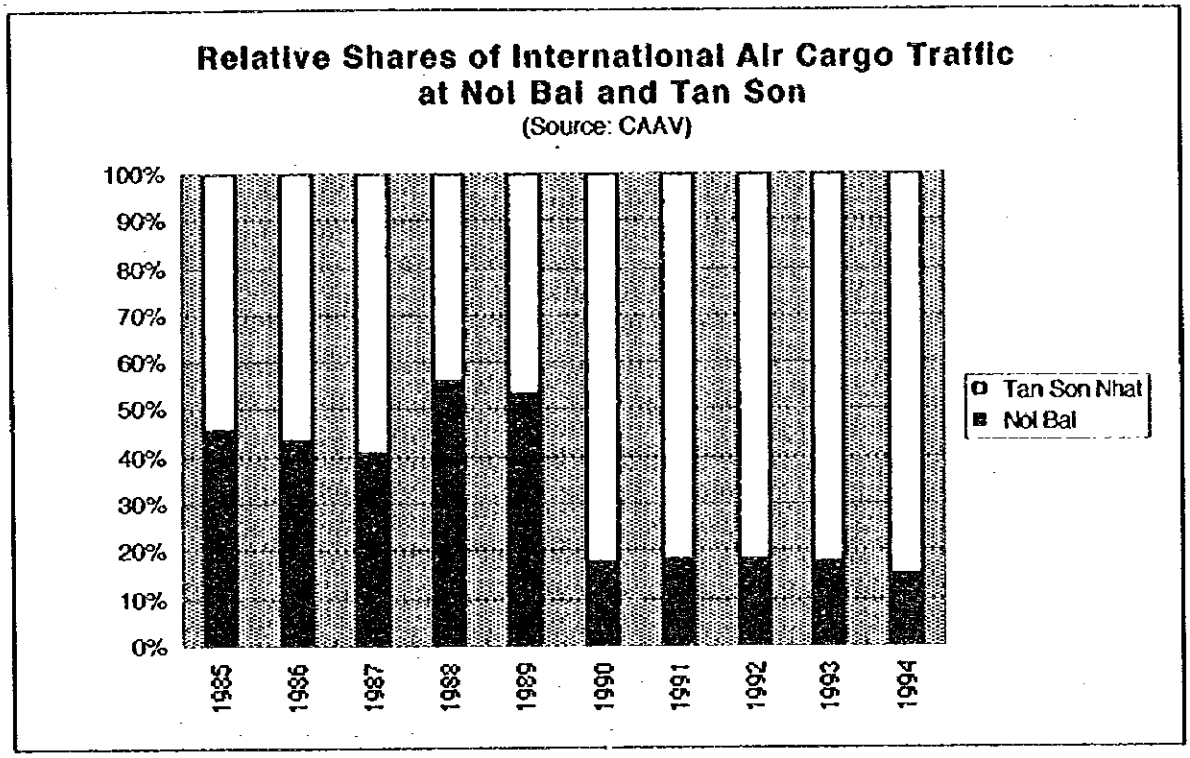


3) **International Air Cargo Traffic**

The historical trends of international air cargo traffic at Noi Bai Airport, Tan Son Nhat Airport and the total traffic in Vietnam, which is the sum of the two airports, are shown for 1985 to 1994 in the figure below.



The trends for international air cargo traffic in Vietnam is different from the trends for passenger traffic. A large drop in cargo traffic in 1990 may mean that statistical methods might have been altered since 1990. Looking at the trend after the year 1990, the average annual growth rate from 1990 to 1994 was 32%, which was almost the same as that of air passengers. The share of Noi Bai Airport in the total traffic in Vietnam was relatively stable at 15-18% in those years as shown in the next figure.

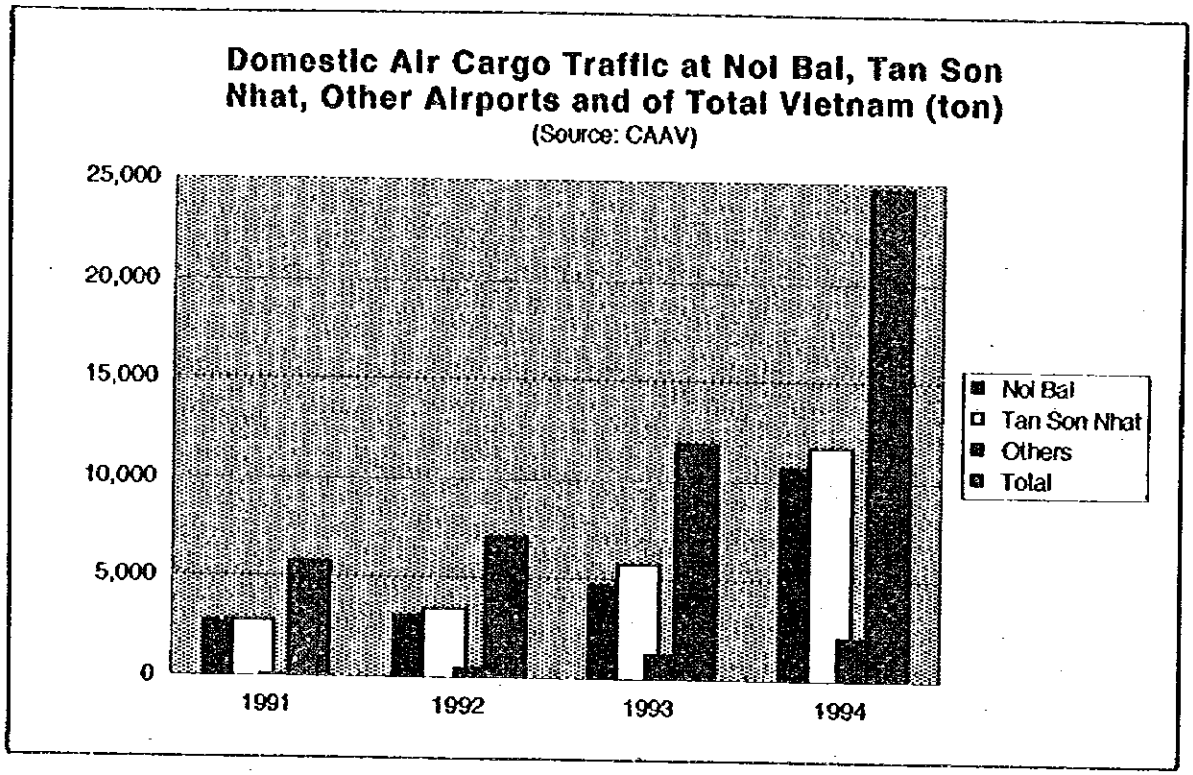


4) **Domestic Air Cargo Traffic**

The figures on the next page indicate the volume of domestic air cargo at Noi Bai, Tan Son Nhat, other airports and total airport traffic in Vietnam.

The volume of total domestic cargo increased from 5,769 tons in 1991 to 24,691 tons in 1994, an average annual growth rate of 43%. As is the case of domestic passenger traffic, it is obvious, apart from the strong economic growth in Vietnam, that the increased number of airports in operation contributed to this extremely high growth rate.

The volume of domestic air passengers at Noi Bai and Tan Son Nhat was approximately the same in 1991. Since then, Tan Son Nhat has increased its domestic cargo traffic slightly faster than Noi Bai.



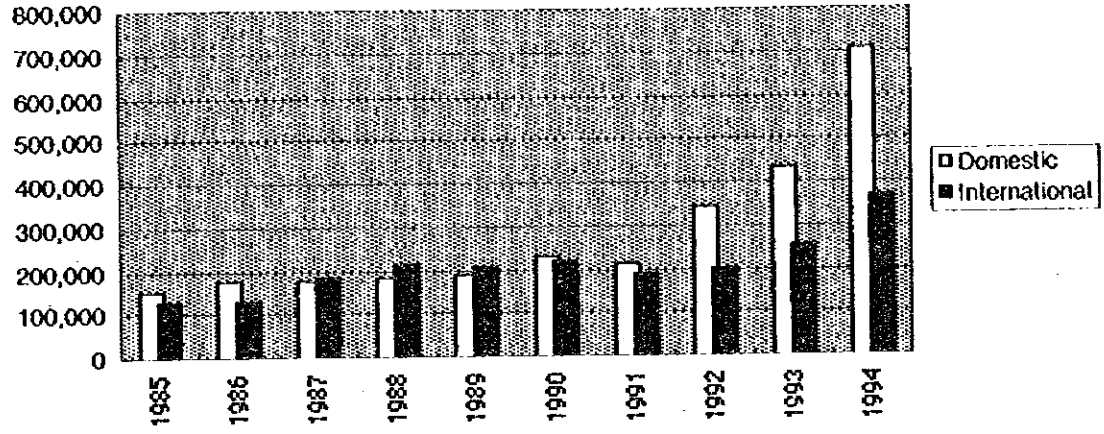
5) Air Traffic at Noi Bai International Airport

Until 1991, air passenger traffic growth at Noi Bai Airport had stagnated with small fluctuations, and then passenger and cargo traffic started a rapid growth trend in 1992, which has continued to date. As shown in the next figures and in Table 2.3.3, international and domestic passenger traffic grew by a remarkable rate of over 40% in 1994, which far exceeded the growth rates of air traffic at major airports in other countries in Asia.

The growth of aircraft movements has still been fluctuating considerably; however, the slower growth of aircraft movements than passenger traffic growth in 1993 and 1994 indicates that the average number of aircraft seats has been increasing. This coincides with the fact that larger aircraft such as A340, L1011, A300 and B767 have recently been introduced at international and domestic routes from/to Noi Bai Airport.

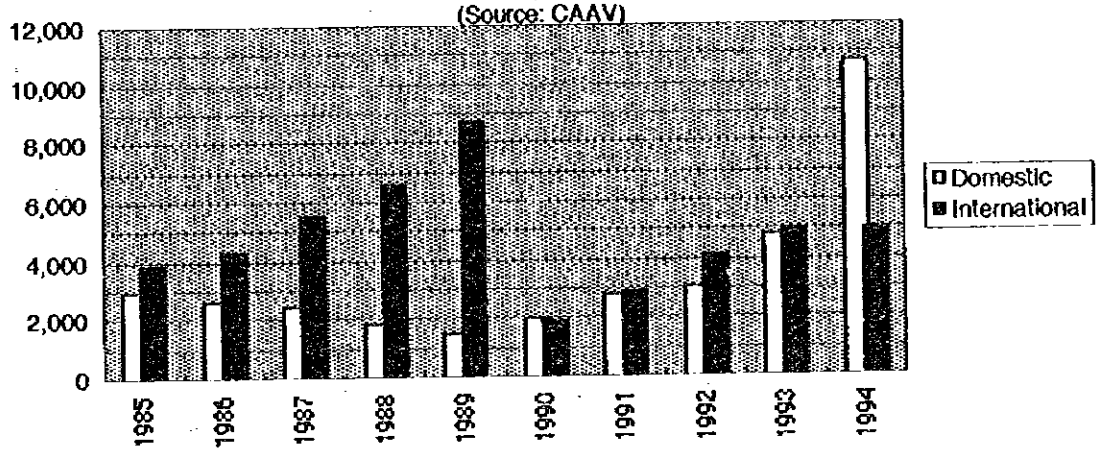
Air Passenger Traffic at Noi Bai International Airport

(Source: CAAV)



Air Cargo Traffic at Noi Bai International Airport (ton)

(Source: CAAV)



Commercial Aircraft Movements at Noi Bai International Airport (ton)

(Source: CAAV)

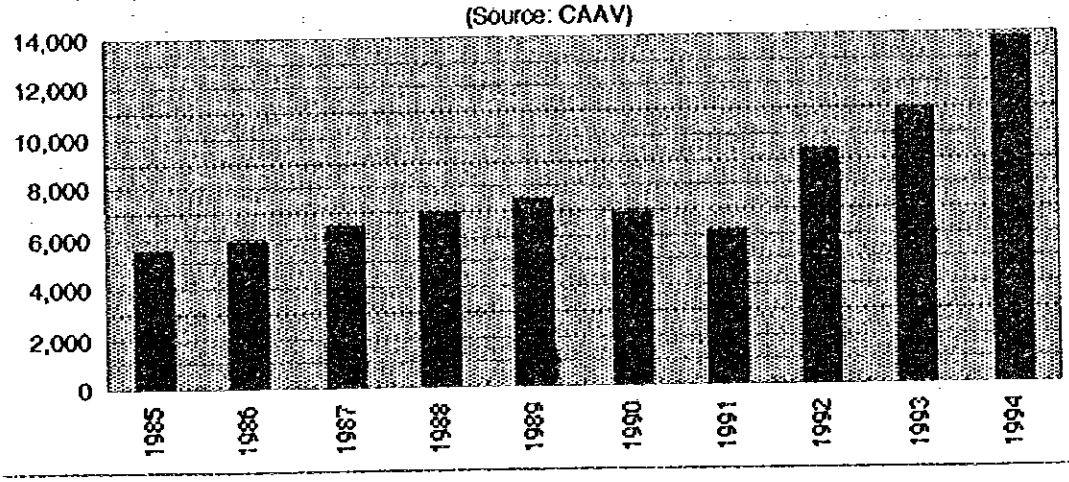


Table 4.3.1 Air Traffic at Noi Bai International Airport: 1985-1994

Year	Passengers			Annual Growth Rate		
	International	Domestic	Total	International	Domestic	Total
1985	132,109	154,035	286,144	-	-	-
1986	131,035	180,916	311,951	-0.8%	17.5%	9.0%
1987	182,297	181,376	363,673	39.1%	0.3%	16.6%
1988	217,106	183,552	400,658	19.1%	1.2%	10.2%
1989	208,378	188,818	397,196	-4.0%	2.9%	-0.9%
1990	221,007	230,812	451,819	6.1%	22.2%	13.8%
1991	188,826	213,924	402,750	-14.6%	-7.3%	-10.9%
1992	202,341	347,610	549,951	7.2%	62.5%	36.5%
1993	258,711	438,107	696,818	27.9%	26.0%	26.7%
1994	370,307	711,997	1,082,304	43.1%	62.5%	55.3%

Year	Cargo (tons)			Annual Growth Rate		
	International	Domestic	Total	International	Domestic	Total
1985	3,863	3,012	6,875	-	-	-
1986	4,282	2,688	6,970	10.8%	-10.8%	1.4%
1987	5,583	2,445	8,028	30.4%	-9.0%	15.2%
1988	6,616	1,896	8,512	18.5%	-22.5%	6.0%
1989	8,735	1,532	10,267	32.0%	-19.2%	20.6%
1990	1,976	2,073	4,049	-77.4%	35.3%	-60.6%
1991	2,891	2,786	5,677	46.3%	34.4%	40.2%
1992	4,146	3,059	7,205	43.4%	9.8%	26.9%
1993	5,022	4,821	9,843	21.1%	57.6%	36.6%
1994	5,062	10,765	15,827	0.8%	123.3%	60.8%

Year	Aircraft Movements			Annual Growth Rate		
	International	Domestic	Total	International	Domestic	Total
1985	2,870	2,702	5,572	-	-	-
1986	2,872	3,016	5,888	0.1%	11.6%	5.7%
1987	3,506	3,022	6,528	22.1%	0.2%	10.9%
1988	4,208	2,822	7,030	20.0%	-6.6%	7.7%
1989	4,300	3,174	7,474	2.2%	12.5%	6.3%
1990	3,332	3,547	6,879	-22.5%	11.8%	-8.0%
1991	3,720	2,481	6,201	11.6%	-30.1%	-9.9%
1992	3,477	5,908	9,385	-6.5%	138.1%	51.3%
1993	4,410	6,648	11,058	26.8%	12.5%	17.8%
1994	6,188	7,642	13,830	40.3%	15.0%	25.1%

Source: CAAV

2.4 SURFACE TRANSPORT SYSTEM IN VIETNAM

2.4.1 General

Vietnam's public transport system consists of road, rail and inland water transport systems, other than air transport. This section outlines those transport systems, and analyzes the competitiveness with air transport.

2.4.2 Road Transport

The road network in Vietnam consists of about 105,000km of roads ranging from a earth tracks to four-lane highways, and it is unevenly distributed throughout the country. The density is highest in the Red River Delta and Eastern Delta of the South where the capital Hanoi and the commercial center Ho Chi Minh City are located respectively. The overwhelming majority of roads are single-lane dirt roads and their serviceability is poor during the rainy season.

There are six official road classifications: national roads (10,805km); provincial roads (15,295km); district roads (25,290km); village roads (46,200km); urban roads (2,570km); and special roads (5,450km).

The proportion of hard-surface (asphalt concrete, penetration macadam or cement concrete) roads is less than 10% of the whole road network. The paved proportion of the national roads, provincial roads and district roads are 70%, 20% and 5% respectively. It is estimated that 431.4 million passengers traveled on roads in 1993, and their average trip length was 26km.[25]

The Route No.1 traverses the country from the north to the south, through the important urban centers of Hanoi, Danang and Ho Chi Minh City. Several sections of Route No.1 are earmarked for improvement with financial assistance from the World Bank, ADB and Japan.

2.4.3 Railroads

The rail network in Vietnam consist of some 2,630km of single track line. Some 2,150km of the network is of a one meter gauge (1,000mm wide) and the rest is of various gauges.

Virtually all the railroad bridges were destroyed during the war. Of the 31km in total length of bridges, some 20km has been repaired but mostly on a temporary basis. Thus the railroad infrastructure, including rails and sleeping ties, requires substantial rehabilitation.

Out of some 500 locomotives, 25% are steam engines and the remainder are diesel powered. Because these locomotives are old, of various make from different countries such as the former USSR, Rumania, USA and Japan, these are considerable operational and maintenance problems, including spare parts shortages. Average speeds are 25km/h and 15km/h for passenger and freight trains respectively. In 1993, 8.0 million passengers traveled by train. Their average trip length was 229km.

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25 Volumes of passenger and average travel distance of road, rail and inlandwater transport from "Statistical Yearbook 1993", General Statistical Office, 1994, Statistics Publishing House, Hanoi, pp. 197-198.

Hanoi - Danang - Ho Chi Minh City (1,730km) is the trunk line of the network. The Japan International Cooperation Agency is now conducting a feasibility study[26] of its improvement plan, which will shorten the travel time between Hanoi and Ho Chi Minh City from the present 36 hours to 24 hours by the year 2010.

2.4.4 Inland Waterways

There are two main inland waterway systems in Vietnam, one in the Red River basin of some 2,500km and the other in the Mekong River basin of some 4,500km.

The Red River basin system has five centrally managed main ports, including Hanoi, Ha Bac, Viet Tri, Ninh Binh and Hoa Binh Ports and other two ports under the provincial management. The main commodity transported is coal from the Qung Ninh coal mine. The Mekong River basin system has about 30 ports, of which eight ports, at Binh Dong, Thu Duc, Tan Thuan, Long Xuyen, Vinh Long, Cao Lanh, Can Mau and My Tho, are main ports of the system. It is navigable to Phnom Penh in Cambodia, which is about 230km upstream from Ho Chi Minh City.

Inland water transport is slow and faces seasonal differences in navigability due to fluctuations in water depth. However, it is an economical mode for transporting heavy materials and where speed and punctuality are not very important.

In 1993, 98.3 million passengers traveled on the river. Their average trip length was a relatively short 13km.

2.4.5 Competition with Air Transport

Air transport has quite different characteristics from the three modes of transport outlined above. Its speed, punctuality and reliability are far higher than the other three. On the other hand, its fare levels are much higher. Therefore, air transport is used by high-income people and for goods with a high value-weight ratio or required at short notice.

As far as freight is concerned, the modal choice depends on kind of goods to be transported. Therefore, there is direct relationship between the kind of goods and mode of transport chosen. Alternatively, it may be said that there is little competition between air and other modes of transport.

In the case of passengers, modal choice depends much on how he or she values time. Taking Hanoi - Ho Chi Minh City route (2 hours by air, 36 hours by the fastest express train, 48 hours by bus) as an example, the critical income between air and rail transport is calculated as VND1,725,000/month or

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26 "The Feasibility Study on the Rehabilitation and Improvement of the Railway in Viet Nam", JICA. The final report will be submitted early in 1996.

US$157/month for Vietnamese.[27] This level of income is higher than income of ordinary urban workers,[28] but would be lower than salaries of higher managerial workers. This results in most air passengers being high-income people, including foreigners, who can accept airfares for saving time.

Another analysis of the Hanoi - Ho Chi Minh City route is the modal shares of air, rail and bus transport. Due to a lack of statistical data, the modal shares were calculated by using seat capacity available for each transport mode as follows:

Air:	16,760	seats per week	(65%)
Express Train:	6,240	seats per week	(24%)
Bus:	2,800	seats per week	(11%)
Total:	25,800	seats per week	(100%)

This result seems to contradict with the result of the first analysis indicating that air transport is only used by high-income people, who obviously account for smaller proportion of population. However, this can be explained by the fact that mobility of high-income people is much higher than others. In other words, most of the population in Vietnam rarely travel the long distances for which high-income people use air transport.

The modal share analysis of Hanoi - Danang (70 minutes by air, 16 hours and 40 minutes by the fastest express train, 24 hours by bus) below indicates a smaller share of air passengers than the case of Hanoi - Ho Chi Minh City, implying that the shorter the travel distance, the less competitive air transport is.

Air:	3,240	seats per week	(35%)
Express Train:	3,240	seats per week	(35%)
Bus:	2,800	seats per week	(30%)
Total:	9,280	seats per week	(100%)

It may be concluded that air transport competes favorably with rail transport in the long distance travel market. Its future competitiveness depends on the improvement of railroads, relative difference between airfare and railfare, and increases in the incomes of travelers.

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27 Air travel between Hanoi and Ho Chi Minh requires 6 hours consisting of 2 hours of flying time and another 4 hours for city to airport, waiting time and airport to city. The cost is assumed to be VND725,000, VND700,000 for airfare plus VND25,000 for airport access/egress and passenger service charge. Rail travel takes 36 hours on the fastest express train and 0.5 hour of waiting time at the station. The train fare for a first class seat is VND462,000. The critical time value is calculated as:

(725,000 - 462,000) / (36.5 - 6) = VND8,620/hour.

Assuming 200 working hours (8 hours x 25 days) per month, the critical monthly income would be VND1,724,000 or US$157.

28 Factory workers in foreign-Vietnamese joint ventures usually earn US$70-75 per month in Hanoi according to the Industrial Department of Hanoi People's Committee.

CHAPTER 3 EXISTING CONDITIONS OF THE AIRPORT AND ITS SURROUNDINGS

CHAPTER 3 EXISTING CONDITIONS OF THE AIRPORT AND ITS SURROUNDINGS

3.1 GENERAL

This chapter outlines the existing conditions of Hanoi International Airport and its surroundings. It consists of the following sections:

a) Geographical and Geological Conditions
b) Outline of Existing Airport Facilities
c) Current Development Projects
d) CAAV's Master Plan for Development of Hanoi International Airport
e) Outline of Existing Airport Access System
f) Outline of Existing Airspace Use and Air Traffic Control
g) Outline of Existing Airport Management, Operations and Training
h) Outline of Existing Financial System of the Airport
i) Outline of Existing Legislation on Environment

Detailed evaluations of the airport facilities are presented in Chapter 5.

3.2 GEOGRAPHICAL AND GEOLOGICAL CONDITIONS

3.2.1 Geographical Features

The Airport is located in the Soc Son District of Hanoi City, approximately 20 km north of the city center. It is on an alluvial plain formed by Hong (Red) River and its tributaries. The southern area of the existing airport is the New Development Area. The area is a relatively flat with a ground elevation of about 10 to 12 meters above mean sea level. The land is utilized mainly for agriculture (mostly paddy fields). The Noi Bai Canal, which pours into Ca Lo River, meanders and is accompanied with ponds in the New Development Area. Some stretches of the Noi Bai Canal have been widened in order to be utilized as a source of irrigation water. These ponds and widened stretches act as flood regulation ponds in the rainy season and reservoirs for irrigation. Irrigation channels are prevalent in the area.

The topographic map of the Study area (2.5 km x 8 km) in the scale 1:5,000 was produced from aero-photographs taken in 1992 and a supplemental field survey. Specifications for the Topographic Survey are attached in Appendix 3.2.1.

3.2.2 Geological Features

Alluvial clayey deposits, which originate in the sediments of Hong River and its tributaries, are widely distributed in and around the Study area with a thickness of about 20 to 25 m (locally more than 30 m). Basement rocks lay under these deposits. The alluvial deposits are divided into three layers as follows:

a) Upper Layer: This layer includes top soil, a clay layer (Ac1) and a sandy clay layer (Ac1s, Ac1r), and is about 2 to 4 m thick from the surface.

b) Second Layer: This layer includes a clay layer (Ac2), a sand layer (As2), a clayey sand layer (As2c) and a thin gravel layer (Ag2), and is about 5 to 20 m thick.

c) Third Layer: This layer is composed of gravel (Ag3).

It was reported that ground water table was at a depth of 0.7 to 1.3 m from the surface in the rainy season and 3.2 m in the dry season.

Soil investigations, including mechanical boring, standard penetration tests, field CBR tests, plate bearing tests, soil sampling and various laboratory tests, were carried out. Specifications for the Soil Investigation are attached in Appendix 3.2.2.

3.3 OUTLINE OF EXISTING AIRPORT FACILITIES

Hanoi/Noi Bai International Airport is located some 20 km north of Hanoi City. It is jointly used for civil and military aviation. The two operations are reasonably segregated, the civil area being to the south of the runway and the military area to the north. Noi Bai Airport, of the Northern Airports Region of the CAAV, administers the civil area. Table 3.3.1 outlines the existing airport used for civil aviation. Facilities, which are solely for military purposes such as the northern parallel taxiway, are not included in Table 3.3.1. Figure 3.3.1 shows the existing airport layout.

Table 3.3.1 Outline of Hanoi/Noi Bai International Airport

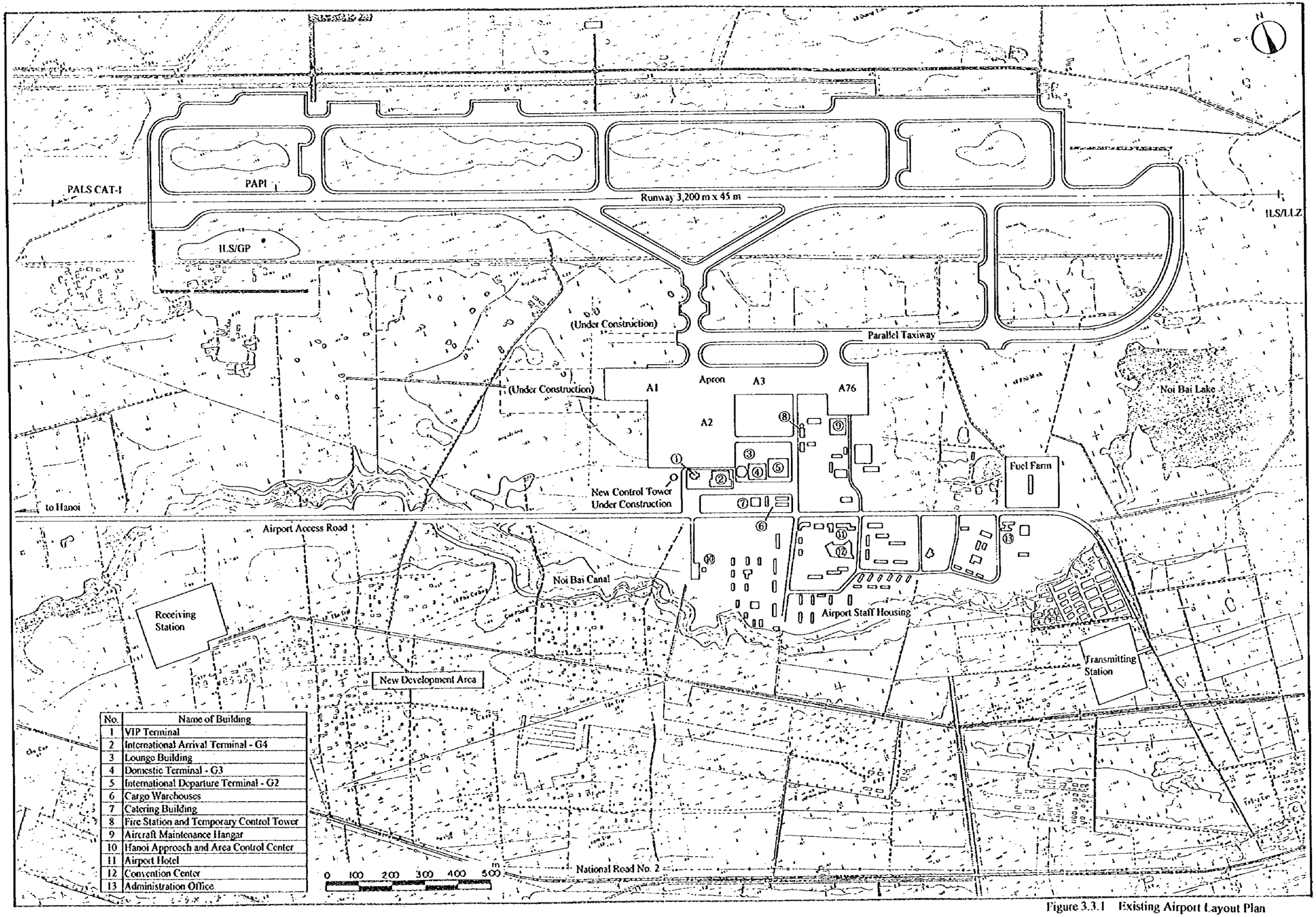
Items	Description
1. Aerodrome Data	
Name of Airport	Noi Bai International Airport
Domestic/International	Domestic and International
ICAO Reference Code	4E
Reference Point	21° 13' 18" N, 105° 48' 16" E
Distance and Direction from City	22 km North of city center
Elevation	12 m
Reference Temperature	32.9°C
Magnetic Variation	1° W (1989)
Operation Hours	24 hrs
Seasonal Availability	All season
Administrative Authority	Civil Aviation Administration of Vietnam
Transportation Available	Bus and taxi
2. Aircraft Operational Data	
Wind Coverage	More than 99.9% with 20 kt Cross Wind
Operational Category	Precision Approach Category-I
Established Procedures	ILS/DME RWY 11 NDB/ILS RWY 11 VOR/DME RWY 11 and 29
Transition Altitude	1,800 m
Local Flying Restriction	
3. Facilities	
Runway	
Designation	11/29
True Bearing	106° 52' 48" /286° 51' 12"
Dimension	3,200 m x 45 m
Longitudinal Slope	0.007%
Stopway	Nil
Clearway	400 x 300
Runway Strip	3,320 m x 300 m (4,000 m x 300 m in the AIP)
Surface	Concrete
Strength	PCN 54 R/B/W/U
Taxiway	
Configuration	Y-Shaped Connecting Taxiway Partial Parallel Taxiway with One Exit Taxiway
Width	30 m / 23 m
Surface	Concrete
Strength	PCN 54 R/B/W/U
Apron	
Area	Apron A1: 33,300 m^2 and 12,600 m^2 Apron A2: 44,400 m^2 Apron A3: 21,800 m^2 Apron A76: 22,400 m^2 Total 134,500
Surface	Concrete

Table 3.3.1 Outline of Hanoi/Noi Bai International Airport (Continued)

Items	Description
Passenger Terminal Buildings	
Floor Area	G2 Building : 3,200 m^2 G3 Building : 1,920 m^2 G4 Building : 3,450 m^2
Cargo Terminal Building	
Cargo Storage	Warehouses with a total floor area of 1,900 m^2
Car Park	
Number of lots	Approximately 320
Access Road	
	Toll Road (four lanes) National Road No. 2 (two lanes)
Air Navigation System	
Radio Navigation Aids	ILS Cat-I (LLZ, GP, MM, OM) VOR/DME, NDB's
Air Traffic Control Systems	Aerodrome Control Tower Hanoi Approach and Area Control Center Air Route Surveillance Radar Ground Controlled Approach
Aeronautical Communication Systems	ATS Direct Speech between TWR and ACC Aeronautical Fixed Services through INTERSAT and HF Aeronautical Mobile Services on 125.9, 118.1 and 121.0 MHz and HF
Aeronautical Ground Lighting Systems	Precision Approach Lighting Cat-I (RWY 11) Precision Approach Path Indicator (RWY 11/29) Runway Edge Lights Runway Threshold and End Lights (RWY 11/29) Taxiway Edge Lights Stop Bar Lights Aerodrome Beacon Apron Flood Lights
Meteorological Observation Systems	Automatic meteorological observation equipment
Rescue and Fire Fighting Facilities	
Level of Protection	Category-8
Fire Fighting Vehicles	Two major vehicles with 8,000 l water and 1,000 l foam, and One rapid intervention vehicle with 2,400 l water and 300 l foam

Table 3.3.1 Outline of Hanoi/Noi Bai International Airport (Continued)

Items	Description
Public Utilities	
Power Supply	
Capacity of Transformers	630 kVA x 2 (one each for civil and military)
Receiving Voltage	35 kV
Stand-by Generators	500 kVA x 2 (one each for civil and military)
Water Supply	
Water Source	Six deep wells (one out of six is not used.)
Supply capacity	3,000 kl/day
Sewerage System	
Type of Treatment	Septic tanks for individual buildings
Solid Waste Disposal System	Dumping outside the airport
Telephone System	Automatic Branch Exchange
Other Facilities	
Aircraft Maintenance Hangar	
Floor Area	54 m x 55 m
Maximum Aircraft	One IL-62
Aviation Fuel Supply System	
Storage Capacity	N-1: 6,500 kl N-2: 1,500 kl
Supply System	Pipe line between N-1 and N-2, refueller tankers are used from N-2 to aircraft.



No.	Name of Building
1	VIP Terminal
2	International Arrival Terminal - G4
3	Lounge Building
4	Domestic Terminal - G3
5	International Departure Terminal - G2
6	Cargo Warehouses
7	Catering Building
8	Fire Station and Temporary Control Tower
9	Aircraft Maintenance Hangar
10	Hanoi Approach and Area Control Center
11	Airport Hotel
12	Convention Center
13	Administration Office

Figure 3.3.1 Existing Airport Layout Plan

3.4 CURRENT DEVELOPMENT PROJECTS

3.4.1 General

As of August 1995, five major projects were being either implemented or contemplated at the NBIA as follows:

a) Construction of a western half of the parallel taxiway
b) Expansion of the passenger loading apron - A1
c) Construction of a new control tower
d) Construction of a new aircraft maintenance hangar
e) Construction of a new passenger terminal - T1 (contemplated)

These projects were, in principle, being executed in line with the CAAV's Master Plan described in Section 3.5. Subsequent sub-sections provide outlines of the above projects.

3.4.2 Construction of Parallel Taxiway

The western half of the parallel taxiway was being constructed. The works started in 1994 and was expected to be completed in 1996. The specifications of the pavement were the same as those of the eastern half of the parallel taxiway, i.e. 34 cm thick cement concrete slab with 20 cm sand-cement stabilized base course. The estimated cost for constructing the western half of the parallel taxiway is about US$ 5 million.

3.4.3 Expansion of Apron - A1

The expansion of Apron A1 started in 1994, and was expected to be completed in 1996, the same as the western half of parallel taxiway. The total area of the expansion was 61,600 sq. m (460 m x 134 m), and approximately 12,600 sq. m (127 m x 99 m) had been completed and was operational as of April 1995. This project did not cover the area around the new terminal building T1 and the expansion of apron A2 to the East, as shown in the feasibility study of T1. The total estimated cost for this project was about US$ 4 million.

3.4.4 Construction of New Control Tower

A new control tower with an Operations Building Annex was being constructed to the west of the existing VIP Terminal. The foundations of the building had been completed as of the end of April 1995 by the local construction company. The height of the control tower would be about 40 m. The Operations Building would be a 3 stories high with a total floor area of 600 sq. m. The estimated construction cost was about US$ 0.4 million at 1993 prices (this did not include ATC equipment, since procurement of ATC equipment was being planned as a separate project). It was expected to be completed by the end of year 1995.

3.4.5 Construction of New Aircraft Maintenance Hangar

A new aircraft maintenance hangar would be constructed to the east of the existing hangar by Vietnam Airlines. The area of the hangar would be about 90 m x 120 m in order to accommodate one B747 and one A320 simultaneously. Steel members for the new hangar were procured from Russia, and the construction was expected to be completed by the year 1998.

3.4.6 Construction of New Passenger Terminal - T1

A feasibility study on the construction of a new passenger terminal named "T1" was approved by the Prime Minister on 5 May, 1995 (Decision No. 275/TTg). The next steps for the implementation of this project were basic and detailed designs, cost estimates and site preparation. The project would be carried out by the CAAV. External financial assistance was being sought for this project in addition to the local finance by the State Government. Local and foreign consultants would be invited for the basic and detailed designs.

The planned location of T1 was to the west of the existing VIP Building, where over 1,200 piles were driven for the terminal G5 (not constructed) in the 1980's (refer to Figure 3.4.1).

T1 would be a six-story building including one basement floor. The terminal building would have two passenger processing levels, i.e. arrival processing on the first floor and departure processing on the second floor. The 3rd floor would accommodate a transit lounge, a restaurant, rental rooms and airline and government offices. The 4th and 5th floors would be used for hotel rooms. The basement would accommodate equipment rooms, and provide spare space (for a future car park).

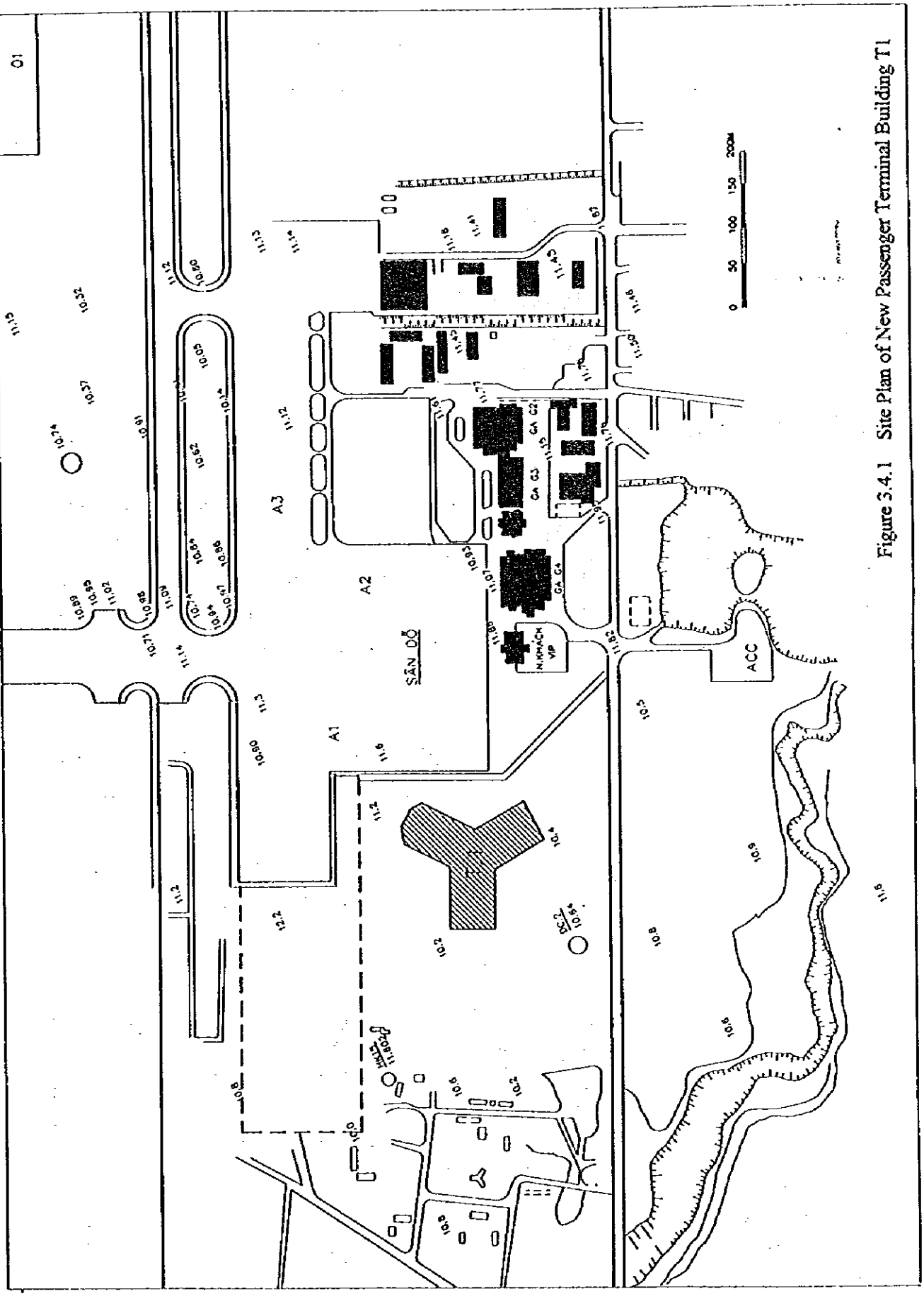


Figure 3.4.1 Site Plan of New Passenger Terminal Building T1

The total floor area of the building would be about 55,700 sq. m (the spare area of 21,300 sq. m in basement is not included in the total floor area), and the breakdown was shown below:

First Floor	18,300 sq. m
Second Floor	22,100 sq. m
Third Floor	7,800 sq. m
Fourth Floor	2,500 sq. m
Fifth Floor	2,500 sq. m
Basement	2,500 sq. m
Total	55,700 sq. m

Figures 3.4.2 through 3.4.6 show floor plans of T1, and Figure 3.4.7 shows a cross section.

T1 was to be constructed in two stages; i.e. Phase 1 development by the year 1997 to cope with 2.5 to 3 million passenger per annum (mppa) or 1,325 passengers per hour (pph); and Phase 2 development by the year 2000 to cope with 4 to 5 mppa or 1,850 pph. The building structures for both the Phase 1 and Phase 2 areas would be constructed in Phase 1, but total area of 18,200 sq. m would remain unfinished until Phase 2. The approval by the Prime Minister mentioned previously permits implementation of the project up to and including Phase 2.

T1 would be equipped with four (4) passenger loading bridges in Phase 1, and 4 to 6 additional bridges would be provided in Phase 2. Baggage conveyors, flight information display system, security system, public address system, escalators, lifts, etc. were also included in the T1 project. The area of car park would be 10,000 to 15,000 sq. m in Phase 1, and would be increased by 10,000 to 12,000 sq. m in Phase 2. Costs for the development of T1 were estimated as shown in Table 3.4.1.

Table 3.4.1 Summary of Estimated Cost for T1

Item	Phase 1	Phase 2	Total
1. Terminal Building	VND 323 billion US$ 17.828 million	VND 90 billion US$ 10 million	VND 413.2 billion US$ 27.828 million
2. Car Park	VND 4.5 billion	VND 4 billion	VND 8.5 billion
3. Road	VND 27.25 billion	-	VND 27.25 billion
4. Landscape and Lighting	VND 1.5 billion	VND 0.5 billion	VND 2.0 billion
Total of Local Portion	VND 356.5 billion	VND 94.5 billion	VND 450.95 billion
Total of Foreign Portion	US$ 17.828 million	US$ 10 million	US$ 27.828 million
Equivalent Total	US$ 50.23 million	US$ 18 million	US$ 68.23 million

Note : The above costs do not include those for the apron pavement around T1 and the expansion of A2 to the East.

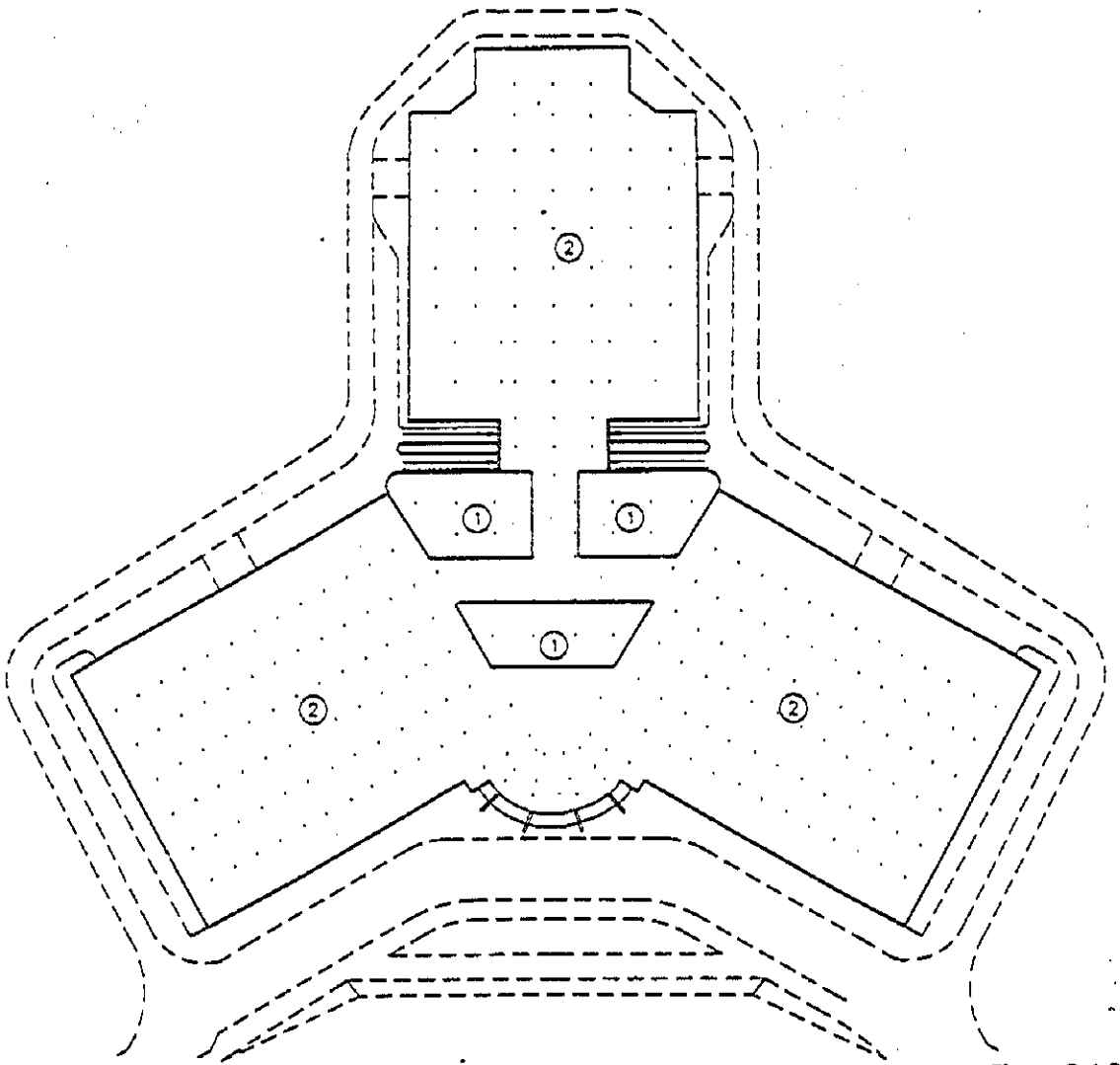


Figure 3.4.2 Floor Plan of New Passenger Terminal Building T1 - Basement

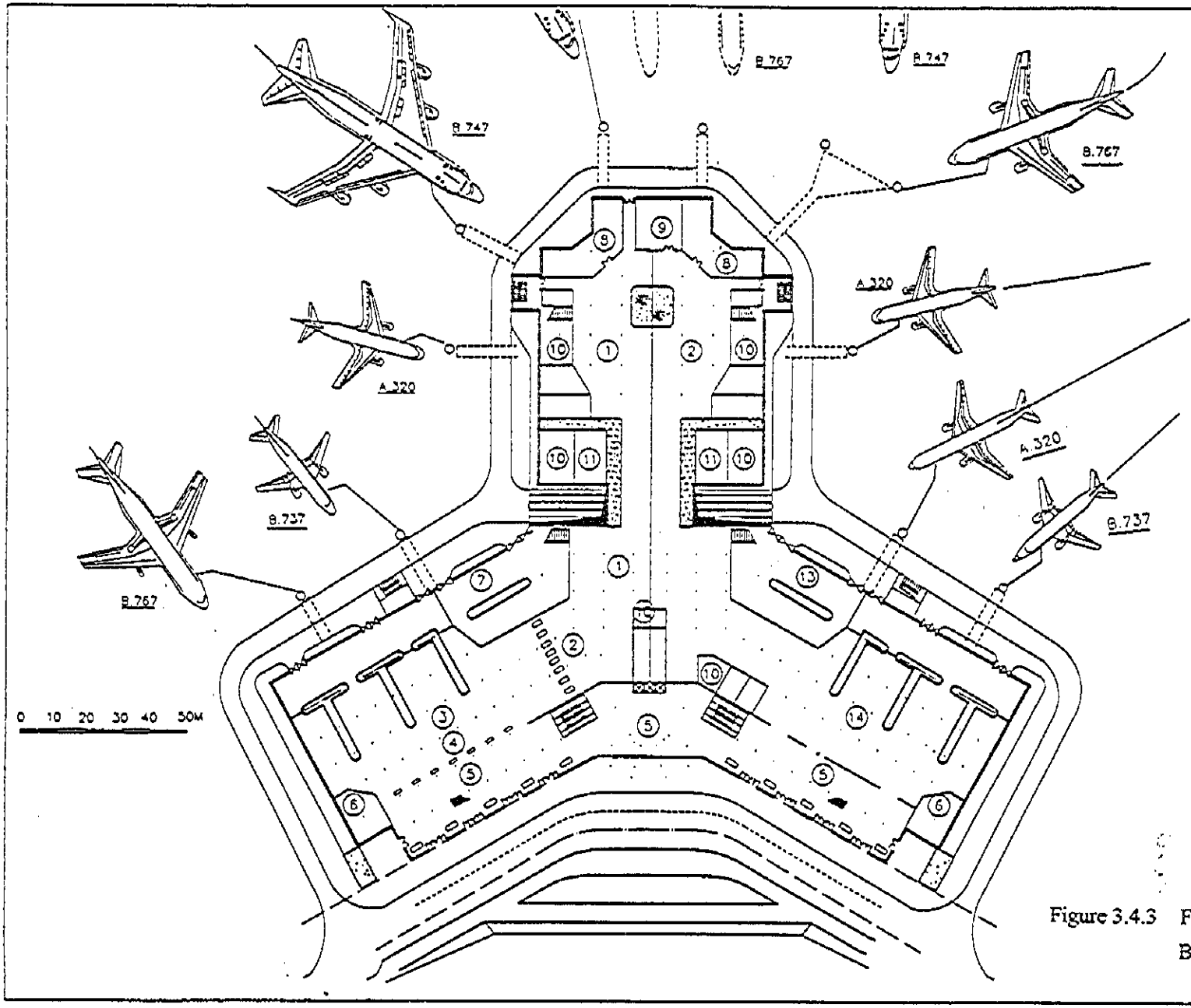


Figure 3.4.3 Floor Plan of New Passenger Terminal Building T1 - Ground Floor

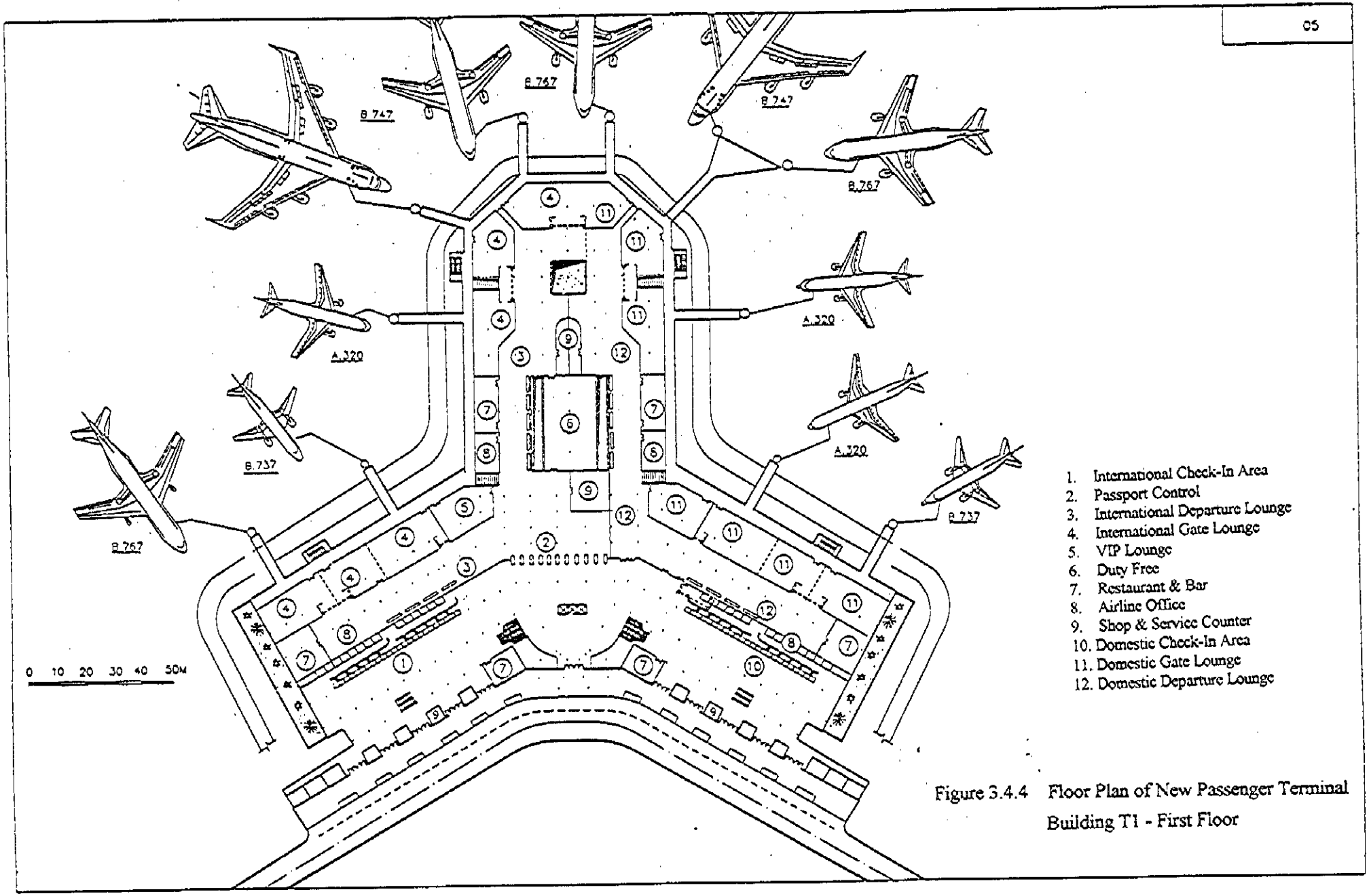


Figure 3.4.4 Floor Plan of New Passenger Terminal Building T1 - First Floor

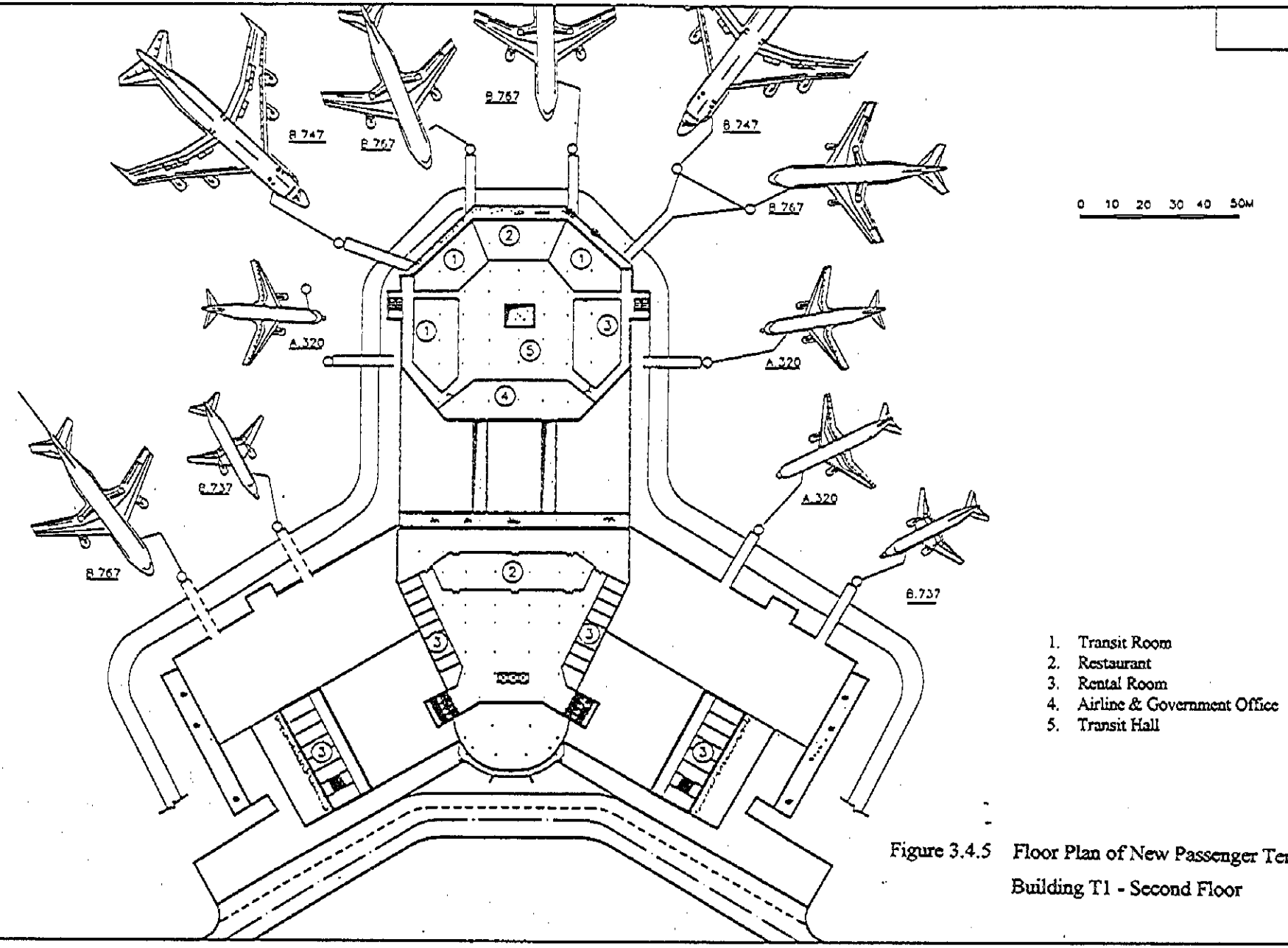


Figure 3.4.5 Floor Plan of New Passenger Terminal Building T1 - Second Floor

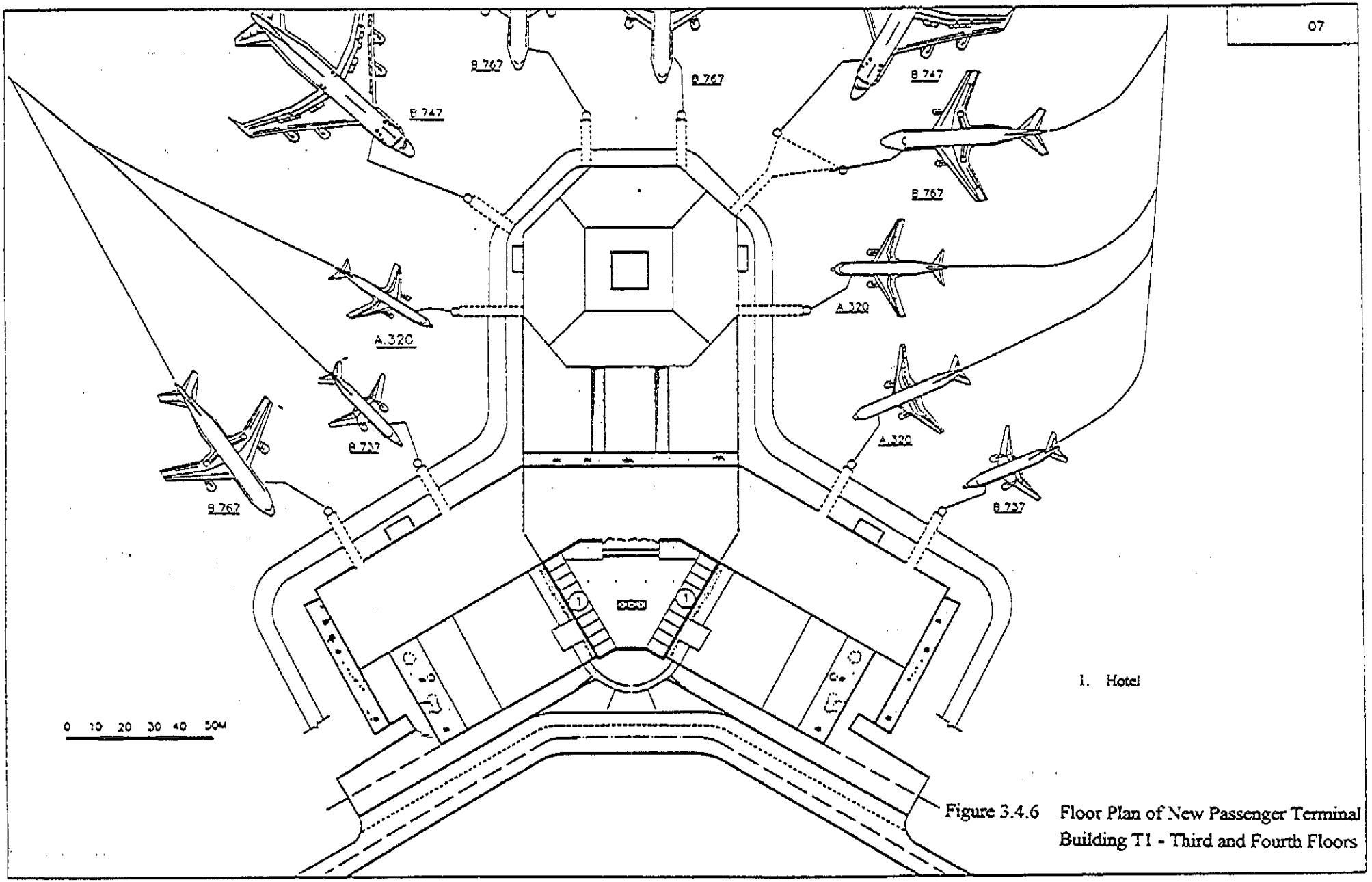


Figure 3.4.6 Floor Plan of New Passenger Terminal Building T1 - Third and Fourth Floors

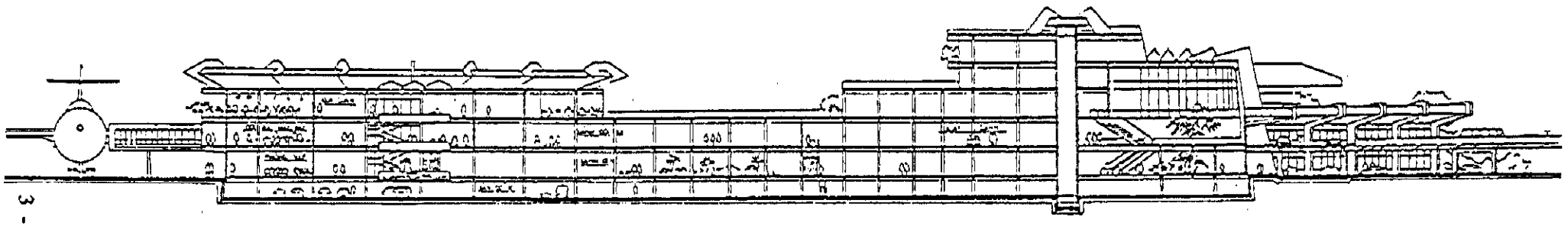


Figure 3.4.7 Cross Section of New Passenger Terminal Building T1

Revenues resulting from this project were estimated to be US$ 10.04, 30.93 and 64.88 million in the years 1997, 2005 and 2015 respectively. Estimated operation and maintenance costs for the project were US$ 10.71, 22.18 and 48.83 million in the years 1997, 2005 and 2015 respectively. Based on these figures, the Financial Internal Rate of Return (FIRR) of the T1 project (up to Phase 2) was calculated to be 14.5 %.

3.5 CAAV'S MASTER PLAN FOR DEVELOPMENT OF HANOI INTERNATIONAL AIRPORT

The CAAV conducted a Master Plan Study for Hanoi International Airport in 1992-1993. Based on this study, the Master Plan was approved by the Prime Minister on 4 April, 1994 (Decision No. 152/TTg). The Master Plan provided a framework of the future developments of NBIA. However, details of the each development project shown in the Master Plan were indicative only. A feasibility study and its approval would be required for execution of each project.

The Master Plan was formulated based on the air traffic demand forecast up to the year 2010 and a prospective outline after 2010. Table 3.5.1 summarizes the results of the air traffic demand forecast used in the Master Plan (note that the forecast has been revised upward in the Feasibility Study of T1).

Table 3.5.1 Summary of Air Traffic Demand Forecast in the Master Plan

	Actual	Forecast			
	1992	1995	2000	2005	2010
International Pax	184,000	400,000 360,000 310,000	1,100,000 850,000 600,000	2,100,000 1,800,000 1,500,000	4,000,000 3,500,000 3,000,000
Domestic Pax	345,000	700,000 640,000 590,000	1,900,000 1,650,000 1,400,000	2,700,000 2,300,000 2,100,000	4,000,000 3,500,000 3,000,000
Total Pax	530,000	1,100,000 1,000,000 900,000	3,000,000 2,500,000 2,000,000	4,800,000 4,100,000 3,400,000	8,000,000 7,000,000 6,000,000
Int'l Cargo (ton)	1,598	10,000	21,000	33,000	50,000
Dom. Cargo (ton)	2,625	5,000	11,000	18,000	30,000
Total Cargo (ton)	7,223	15,000	32,000	51,000	80,000
Aircraft Movements	8,438	15,000	25,000	50,000	75,000

Note: 1. Three figures in a row of passenger forecast show high, medium and low cases.
2. Aircraft movements do not include military aircraft movements.

In the Master Plan Study, the construction of the second runway of auxiliary character was recommended for the following reasons:

a) A single runway used by both civil and military aircraft was somewhat unsafe in aircraft operations.

b) The second runway would increase reliability of operations (e.g. in the case of maintenance or accident on a runway, the airport could maintain its services with the other runway.)

c) The second runway would increase the capacity of the runways and the Airport.

The following three (3) alternatives in layout of the runways were compared in the Master Plan Study.

Alternative 1: Closed Parallel Runways consisting of the existing runway and a new runway at 235 m South of the existing runway

Alternative 2: Open Parallel Runways consisting of the existing runway and a new runway at 1,750 m South of the existing runway

Alternative 3: Closed Parallel Runways consisting of the existing runway and a new runway at 250 m North of the existing runway

Alternative 2 was recommended for the following reasons:

a) Open Parallel Runways could be operated independently under the Instrument Flight Condition (IFC).

b) The capacity of Open Parallel Runways was greater than that of Closed Parallel Runways.

c) Alternative 2 provided greater potential of future developments beyond the year 2010.

The separation distance of 1,750 m between the two runways was greater than the minimum standard of 1,520 m in Annex 14 of ICAO so as to provide enough space for the new terminal area on the south of airport access road, i.e. similar apron and terminal depth for both north and south side of access road.[1]

[1] It should be noted that the separation distance between the existing runway and its parallel taxiway is 437.5 m, i.e. 255 m greater than the minimum separation distance of 182.5 m for aerodrome code 4E, instrument runways recommended by ICAO.

Major development projects included in the Master Plan were as follows:

a) Complete the parallel taxiway up to the existing threshold of Runway 11.

b) Extension of the existing runway by 600 m toward the west by the year 2005, and extend the parallel taxiway to the new threshold.

c) Construction of the second runway of 3,200 m x 45 m at 1,750 m south of the existing runway within the period of 2006-2010.

d) Construction of two connecting taxiways at east and west to link the parallel taxiway and the second runway.

e) Construction of a new module of passenger terminal building on the west of the existing VIP Terminal during the period of 1993-2000. The new terminal module will have a capacity of about 3 mppa to cope with the international and domestic passenger traffic anticipated in the year 2003. The second module, which is a mirror image of the first module, will be put into services in 2003.

f) Convert the existing passenger terminal buildings into cargo terminal buildings as required.

g) Construction of a new control tower within the period of 1993-1995.

h) Improvement of air navigation and communication systems for NBIA and Hanoi FIR.

i) Improvement of surface drainage.

Figure 3.5.1 shows the airport layout plan for the year 2010 that was approved by the Prime Minister. It also indicates development potential beyond the year 2010 with broken lines.

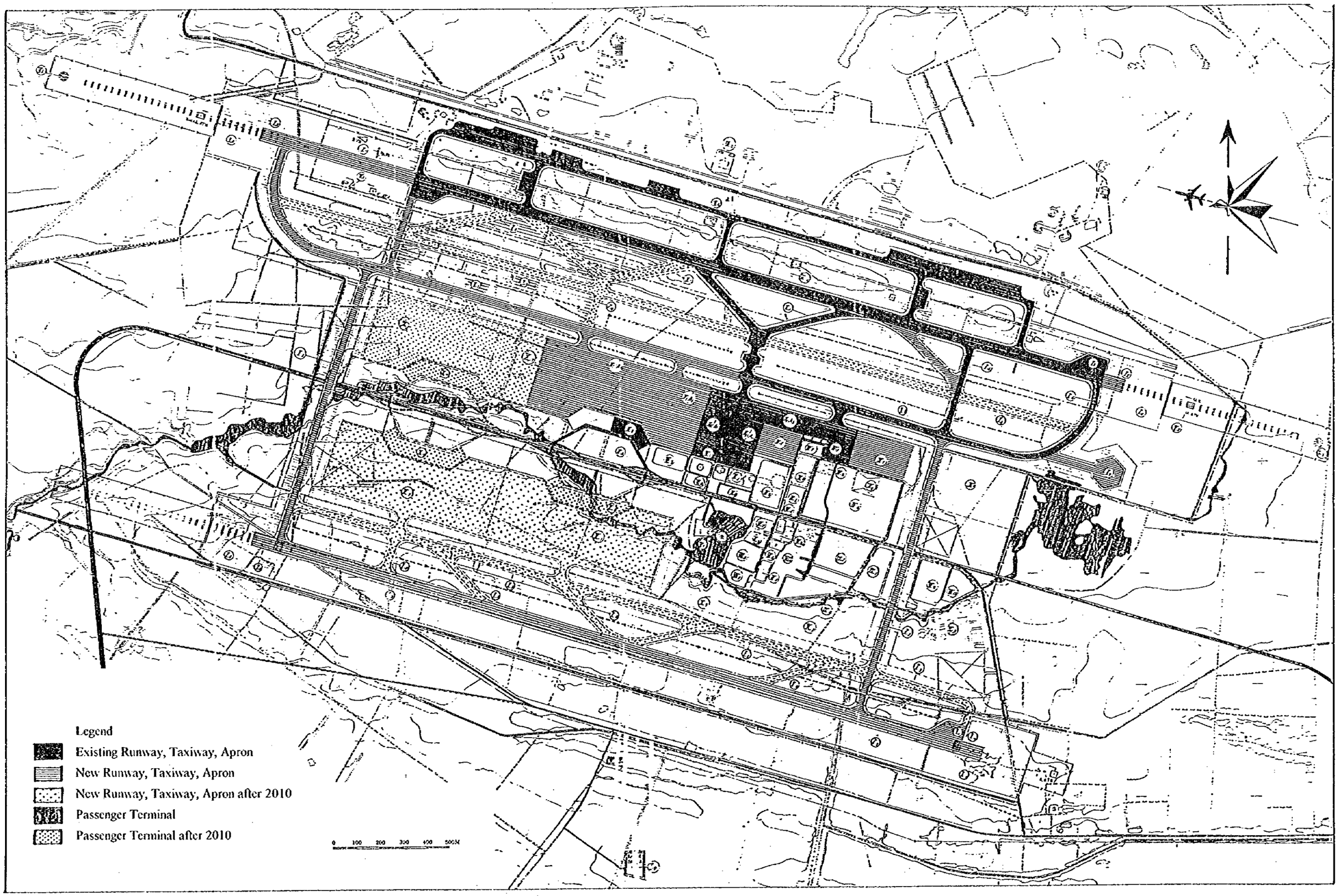


Figure 3.5.1 Airport Layout Plan for the Year 2010 - CAAV's Master Plan

A land acquisition of about 490 ha was required for the development of southern area. For this land acquisition, a resettlement of 2,402 families (as of the year 1992) would be required as follows.

a) For construction of the airport facilities

Phu Ninh Village	150 families
Phu Tan Village	28 families
Cau Den Village	35 families
Living quarter of airport staff	200 families
Total	672 families

a) For height restriction and aircraft noise pollution

Thach Loi Village	280 families
Chi Dong Village	150 families
Phu Xa Dong Village	500 families
Thai Phu Village	400 families
Total	1,730 families

The following measures were recommended in the Master Plan for the resettlement:

a) Families living in the new development area should be resettled at Noi Bai City, which would be built to the North of NBIA based on the regional plan.

b) Job opportunities such as working in NBIA, export processing zones, commercial and public services in the region should be offered to the people to be resettled.

The estimated cost for the development of NBIA up to the year 2010 is shown in Table 3.5.2.

Table 3.5.2 Estimated Cost for Development of NBIA in US$

Items	1993-2000	2001-2005	2006-2010	Total
Preparation for Investment	3,480,700	2,088,400	1,392,400	6,961,500
Earthworks	8,590,000	3,681,500	-	12,271,500
Runway, Taxiway and Apron	25,369,500	11,085,400	24,829,700	61,284,600
Passenger Terminal Building	30,280,000	31,130,000	2,380,500	63,790,500
Road and Bridges	18,237,800	7,505,100	775,900	26,850,000
Operation Center, Maintenance Workshop	2,666,900	986,700	-	3,653,600
Hotel, Catering, Medical Office, etc.	6,542,900	8,547,400	-	15,090,300
Other Ancillary Facilities	355,800	402,100	-	757,900
Aircraft Maintenance Facilities	4,364,200	5,723,600	-	10,087,800
Electrical Power Supply	1,934,600	806,100	429,900	3,170,600
Drainage System	719,900	525,900	2,918,300	4,164,100
Water Supply System	150,400	398,400	111,300	660,100
Air Navigation Systems	30,431,600	17,458,000	17,458,000	65,347,600
Fencing	997,100	-	-	997,100
Compensation and Land Clearance	14,616,100	32,384,000	-	46,545,100
Landscaping	1,488,400	879,500	304,300	2,627,600
Fuel Supply System	20,591,600	5,839,400	4,303,000	30,734,000
Total	170,693,800	129,441,500	54,903,700	355,039,000

Note: Prices are as of the second quarter of 1993.

3.6 OUTLINE OF EXISTING AIRPORT ACCESS SYSTEM

Airport access transportation is provided only with roads. No railway access is available, although the railway runs north-south near the center of Soc Son District. There are several access roads connecting the center of Hanoi City and other regions.

3.6.1 Hanoi City Access

Two airport access roads are available to/from the center of Hanoi City, the major and the minor access. The major access road is the "Noi Bai-Thang Long Express" which has been in operation since July 1994 with 4 lanes for auto-vehicles and 2 lanes for non-auto-vehicles, as shown in Figure 3.6.1. A highway with such a design structure possesses a possible traffic capacity of approximately 90,000 pcu (passenger car unit) per day [1].

Since the Thang Long Bridge crossing the Red River is a toll bridge, all vehicles driving on this highway are charged; for instance VND 10,000 per sedan per trip.

This highway functions as part of the Hanoi Ring Road running along the fringe of the urbanized areas of Hanoi City. As of 1995, the Ring Road has been partially completed up to Mai Dich, the intersection with Highway No. 32. As discussed in Section 2.2.5, should the Ring Road be completed, road traffic conditions in Hanoi City would be considerably improved. At present, financing is being sought for the implementation of remaining sections of Ring Road, including the third Red River Bridge.

With the Noi Bai-Thang Long Express, airport access has been greatly improved. However, since all the connecting roads with the Ring Road and the central district are still unimproved, a smooth traffic flow to/from the airport is not yet possible[2].

The minor access from Hanoi City is Highway No. 3, which used to be the major access before the completion of the Noi Bai-Thang Long Expressway. Highway No. 3 connects Hanoi City via Gia Lam District. This is 2 lane road with a right of way of 8-9 meters, and a carriage way of 5-6 meters wide. This road accommodates heavy traffic with a mixture of trucks, motor-bikes, bicycles and ordinary cars. Since the Chuang Duang Bridge is a toll-bridge, all vehicles using this access are charged, for instance VND 6,000 per sedan per trip. The Government plans to improve Highway No. 3 between Hanoi and Thai Nguyen (68 km) to a Grade 3 standard by 2000.

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[1] This was computed based on assumptions of: 1) 4 lane-divided; 2) 3.5 meter wide per lane; 3) average shoulder of 1.0 meter; 4) running in flat terrain; and 5) 8% peak ratio.

[2] In morning peak-hours, it usually takes 50-60 minutes by car from the area nearby Hoan Kiem Lake to Noi Bai International Airport.

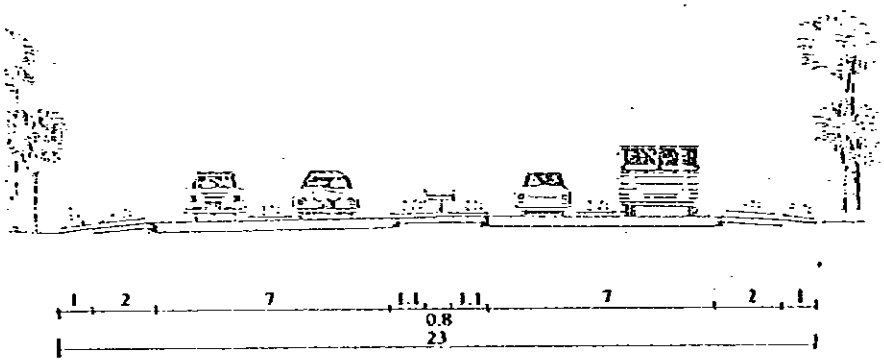
3.6.2 Regional Accesses

The regional roads serving Noi Bai Airport are:

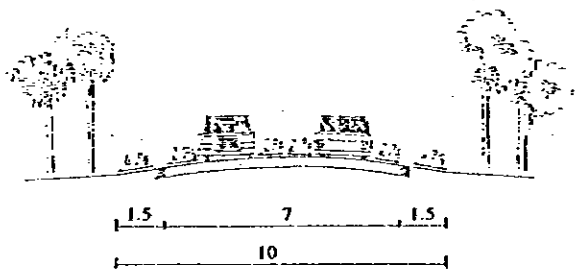
(1) Highway No. 2 connecting with Viet Tri and the west,
(2) Highway No. 3 connecting with Thai Nguyen,
(3) Highways No. 18 and No. 286 connecting with Ha Long City and the east;
(4) Highway No. 5 connecting Hai Phong through Gia Lam District.

As mentioned in Section 2.2.5, since the Government has placed special emphasis on strengthening international gateway functions of Noi Bai (air) and Hai Phong and Cai Lan (sea) on the eastern coast, Highways No. 18 and No. 5 are considered the most significant regional accesses. In this regard, new highway projects are now being planned in parallel with the existing Highways 5 and 18, as shown in Figure 3.6.2. In order to strengthen a direct access to/from Ha Long City and the eastern industrial economic areas, Highway No. 286 needs to be up-graded.

Meanwhile, it is planned to up-grade Highway No. 2 to a road with 20 meter wide and a Grade 3 standard to Viet Tri (15 km) by 2000. Once this project is completed, airport access to/from the western areas will be greatly improved.



Standard 4 Lane Motor Way (Noi Bai-Thang Long Expressway)



Unit : meter

Standard 2 Lane Motor Way (Grade 3)

Figure 3.6.1 Sections of Airport Access Roads

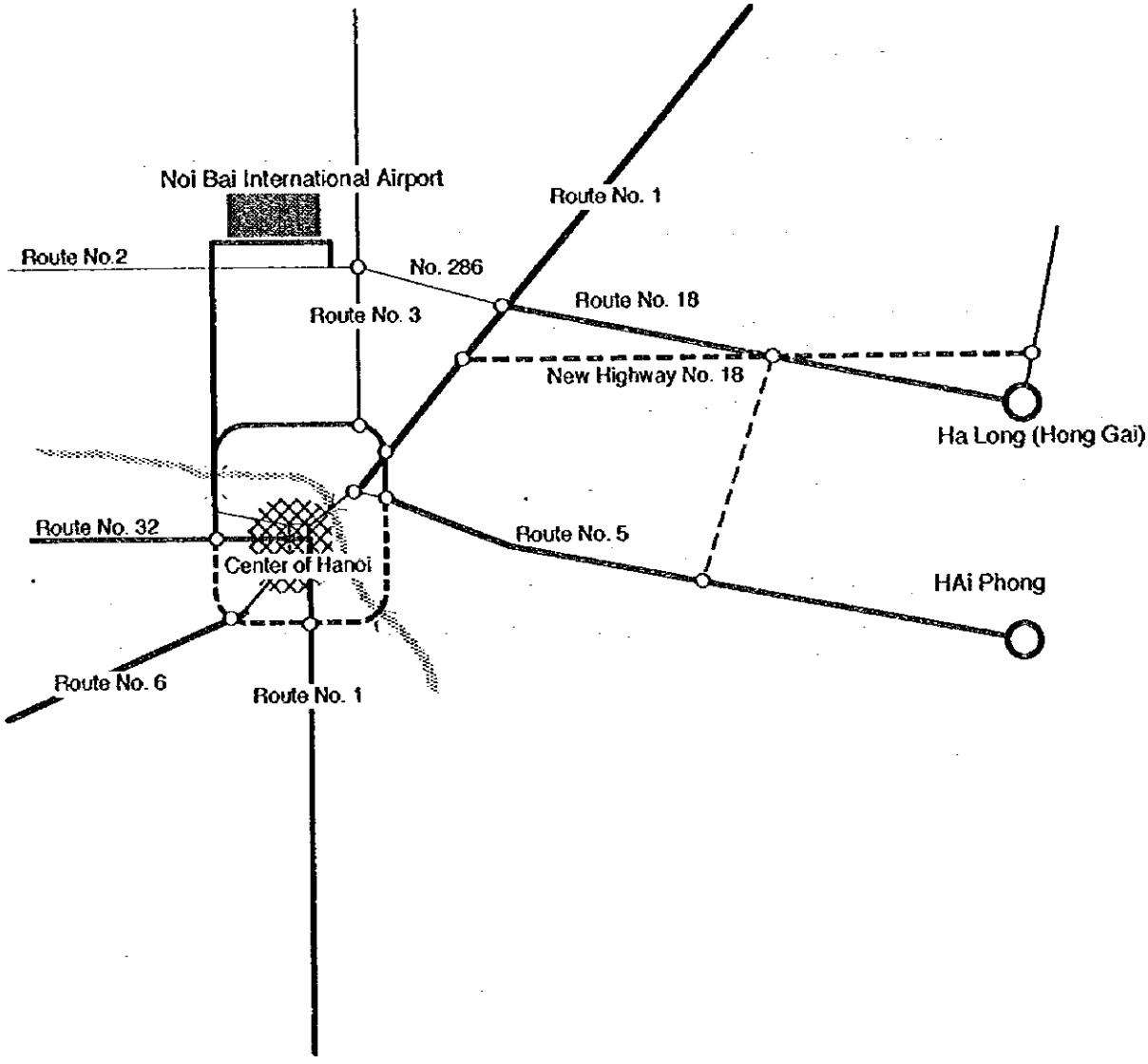


Figure 3.6.2 Network of Regional Accesses to Noi Bai International Airport

3.7 OUTLINE OF EXISTING AIRSPACE USE AND AIR TRAFFIC CONTROL

3.7.1 Flight Information Regions in Vietnam

Vietnam provides air traffic services (ATS) in the airspace above its territory and over the high seas to the East and South. The airspace is divided into two Flight Information Regions (FIR) wherein Area Control Services are provided (refer Figure 3.7.1):

a) Hanoi Flight Information Region (FIR) by the Hanoi Approach and Area Control Centre (AACC); and

b) Ho Chi Minh (HCM) FIR by the HCM ACC.

The responsibility for providing ATS in the Eastern and Southern high seas portions of the HCM FIR, previously covered by the Areas of Responsibility (AOR) of Bangkok, Singapore and Hong Kong, was assumed by Vietnam during 1994.

3.7.2 Air Traffic Services In Vietnam

The following ATS are currently provided by Vietnam:

a) Area Control Services are provided to control Instrument Flight Rule (IFR) aircraft operating within the areas of jurisdiction of the Hanoi and HCM ACC's;

b) Aerodrome Control Services are provided at the Noi Bai, Tan Son Nhat and Danang International Airports. For domestic airports, advisory services are provided to known traffic; and

c) Flight Information Services are provided by ACC's and other ATS units.

3.7.3 Air Traffic Services provided by the Hanoi Approach and Area Control Centre

The Hanoi ACC, call sign "Hanoi Control", was relocated from the Civil Aviation of Vietnam Headquarters (CAAV) building at Gia Lam to the Noi Bai International Airport (NBIA) in 1994. The preparation of new facilities, such as the provision of new consoles and the assignment of new frequencies for air traffic control, has been completed and was commissioned in May, 1995.

The new AACC is responsible for providing enroute control, flight information and alerting services within the Hanoi FIR, and for providing Approach Control. Area Control is provided for separate North and South Sectors.

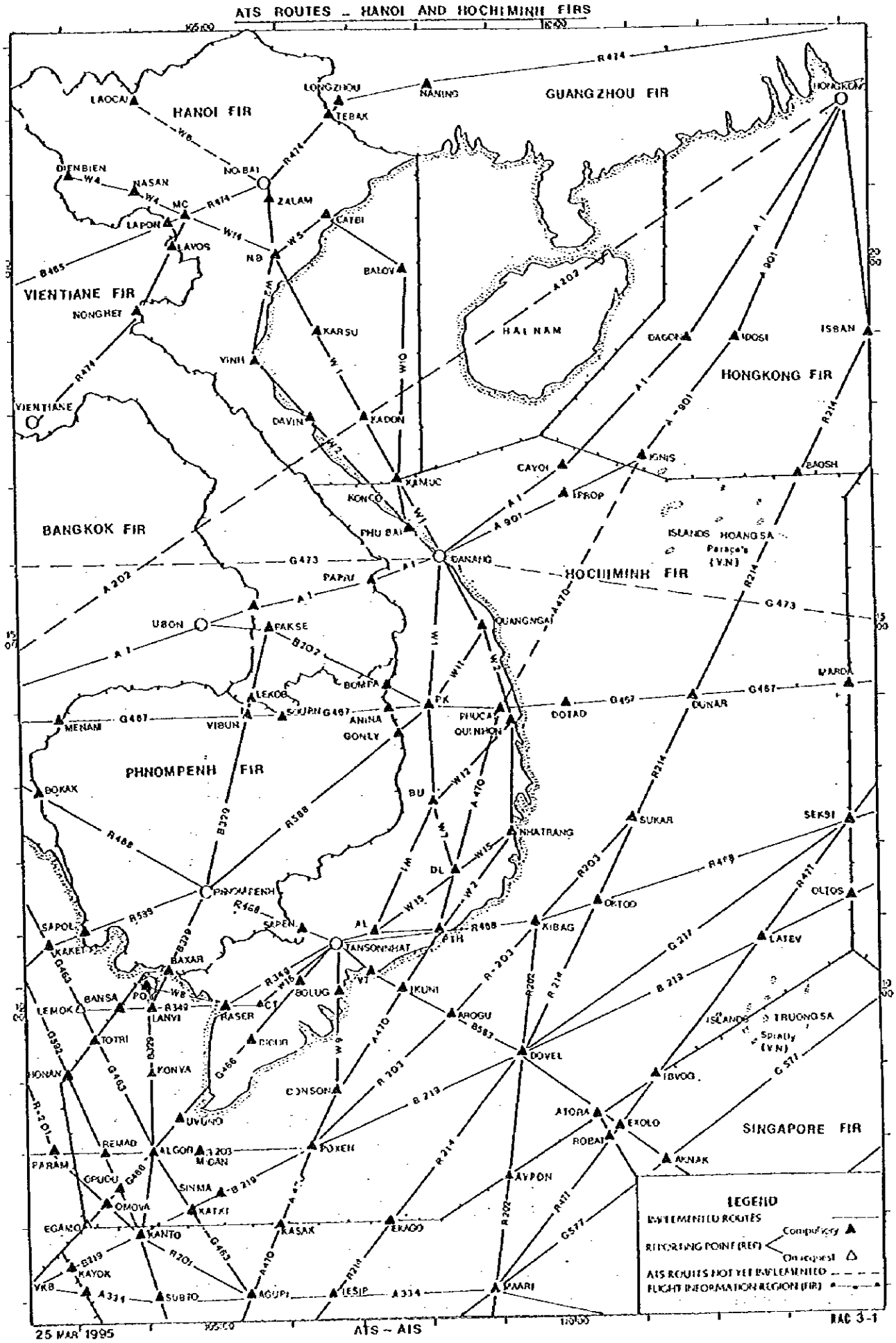


Figure 3.7.1 ATS Routes - Hanoi and Ho Chi Minh FIRs

Within the main AACC room, two flight progress boards are provided for Area Control, one flight progress board for Approach Control (for departures and arrivals), and two consoles for Area and Approach Radar Control. The flight progress boards have built-in electronic visual display units called Information Display Systems (IDS) for presenting meteorological and other information. Two single consoles are provided for Flight Data and Air Movements Identification Section (AMIS) respectively. The latter will be used for coordination between the AACC and a military unit when trying to identify unknown aircraft. The Supervisor's Position is at a desk located near to the entrance of the main AACC room.

Long range Primary and Secondary Radar coverage within the Hanoi FIR and for ranges of up to 460 km (250 NM) has been provided since 1991. A radar advisory service only was provided until 27 April, 1995, after which an Enroute Control Services (7 NM separation) has also been provided. Long range Primary and Secondary radar are operational at Tan Son Nhat and Danang. Secondary Radar only is operational at Quinhon.

Area Control from two consoles is provided directly on three VHF channels (125.9, 132.3 and 121.5 MHz) or may be relayed through Hanoi Radio on seven HF communication channels (8942, 5655, 11396 and 13309 kHz for international, and 7034, 5056 and 8187 kHz for domestic services). Approach Control is provided on 121.0 MHz and 119.6 MHz for arrival and departures respectively.

Most of the VHF transmitters and receivers which serve the AACC are located on site. The exception is a remotely located mountain top site 30 km to the north and 1,200 m above sea level site. This operates on 125.9 MHz, which serves the South Sector of the FIR, and which is also transmitted and received from equipment located at the AACC. Hanoi Radio is located on the first floor of the AACC building. It provides Flight Information Services within Hanoi FIR and relays control information to aircraft outside of VHF range. The HF Transmitters and Receivers are located at separate site near to the Airport.

The Hanoi Rescue Coordination Center is also located in the AACC building.

3.7.4 Control Zone of Noi Bai Airport

The Control Zone (CTR) of the NBIA is the airspace within a 30 km radius of the Aerodrome Reference Point (ARP) and up to a height of 7,000 feet from ground level, except for a southern area wherein Air Traffic Control (ATC) services are provided by Gia Lam tower. The areas of responsibility for the provision of ATC services are shown in Figure 3.7.2. When an aircraft is taking off to the north from Gia Lam, it must turn right after take off so as not to be near or enter the NBIA CTR. The aircraft is required to complete its turn well before the Duong River (refer Figure 3.7.3). When an aircraft wishes to fly near to the boundary between the NBIA CTR and the Gia Lam CTR, prior approval of the NBIA tower is required. The request for such approval is made through Noi Bai Approach Control.

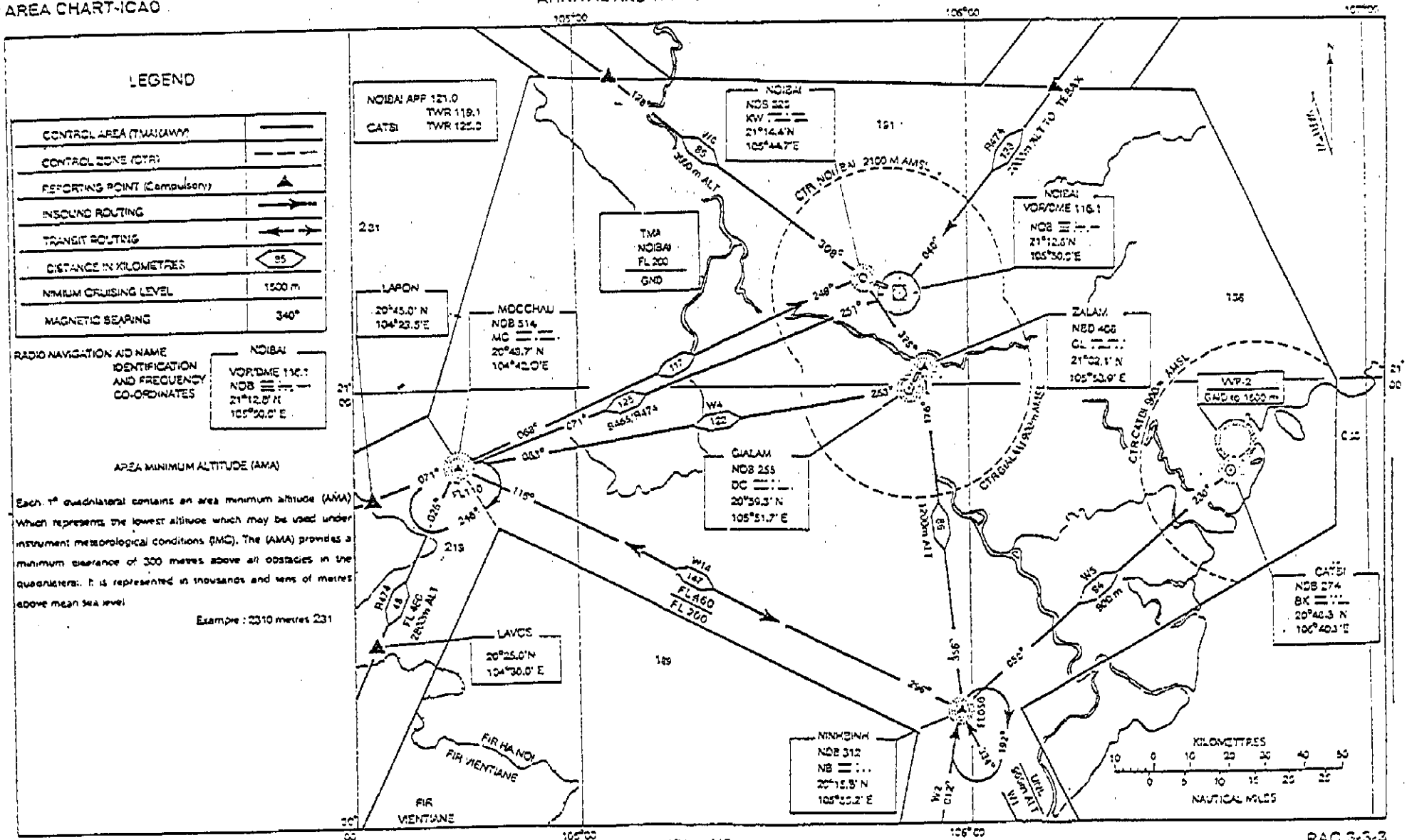


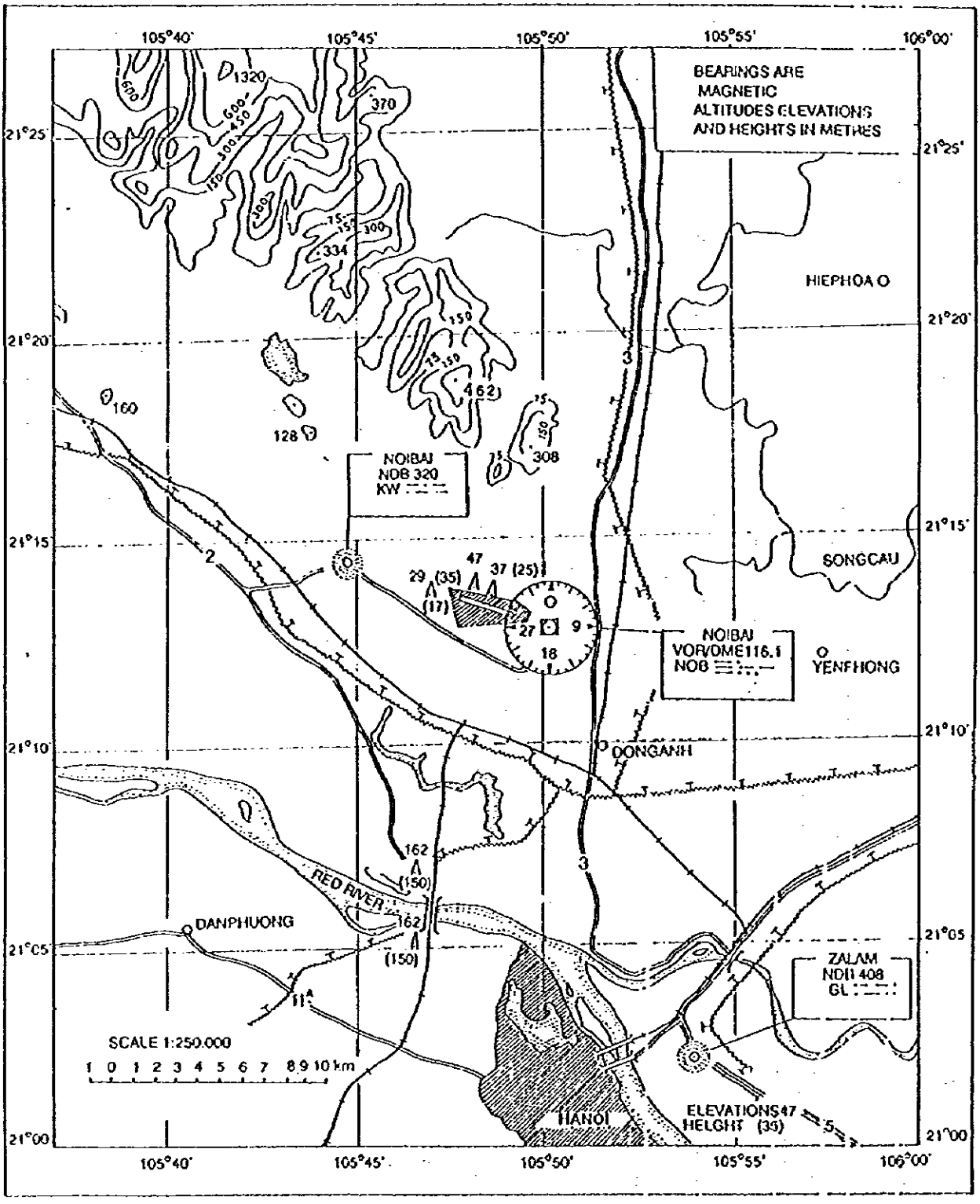
Figure 3.7.2 Arrival and Transit Routes TMA Hanoi/Noi Bai

VISUAL APPROACH CHART-ICAO

AD ELEV 12 m
HEIGHTS RELATED TO AD ELEV

APP 121.0
TWR 118.1

HANOI/NOIBAI



25 Dec 1991

VINAIRTRAS

VIA VFR-1

Figure 3.7.3 Visual Approach Chart Hanoi/Noi Bai

An Aerodrome Traffic Zone (ATZ) has not been established for the NBIA.

The traffic pattern for the NBIA is always to the south side of the runway regardless of wind direction.

3.7.5 Air Traffic Services at the Noi Bai International Airport

The types of ATC service is provided at the NBIA are:

a) Aerodrome Control;
b) Approach Control; and
c) Ground Controlled Approach (GCA)

Aerodrome Control is provided 24 hours a day by the NBIA Control Tower, call sign "Noi Bai Tower". It is responsible for controlling the movements of and ensuring sufficient separation between aircraft in flight, and for controlling all ground movements of aircraft and other surface traffic within the NBIA aircraft movement area. There are two positions in the control tower: Controller and Assistant. Both are normally manned by tow (2) controllers. The Controller provides both Local Control, through air/ground communications, and Ground Control. The Assistant's main responsibility is coordination with the Area Control, Approach Control and other ATS facilities, as required.

Approach Control functions are shared between the Aerodrome and Approach controllers. An approach clearance is issued by the Aerodrome controller and not the Approach controller. Details of the coordination procedures between the 2 controllers appear below.

1) Jurisdiction

Noi Bai Approach is responsible for controlling IFR traffic within the Approach Control Area (Figure 3.7.2) except within the Noi Bai CTR.

2) Departures

a) When aircraft request a departure clearance, Noi Bai Tower notifies Noi Bai Approach of: the call sign and aircraft type; the flight routing; the destination airport; and the runway in use.

b) Noi Bai Approach obtains a clearance from Hanoi Control and relays this to Noi Bai Tower.

c) Noi Bai Tower immediately notifies Noi Bai Approach of the aircraft's departure time.

d) Noi Bai Tower transfers control of the aircraft to Noi Bai Approach at the release points.

e) Noi Bai Approach notifies Noi Bai Tower when radio contact with the aircraft has been established.

3) Arrivals

a) At least 10 minutes before an inbound aircraft crosses the control release point, Noi Bai Approach notifies Noi Bai Tower of: the call sign and aircraft type; the release point; and the estimated time of arrival at the release point.

b) Noi Bai Approach transfers control of the inbound aircraft to Noi Bai Tower at the release point.

c) Noi Bai Tower notifies Noi Bai Approach when radio contact has been established with the aircraft and issues an approach clearance.

d) Whenever an aircraft makes a missed approach, Noi Bai tower notifies Noi Bai Approach if it is likely to affect other aircraft in the Approach Control Area.

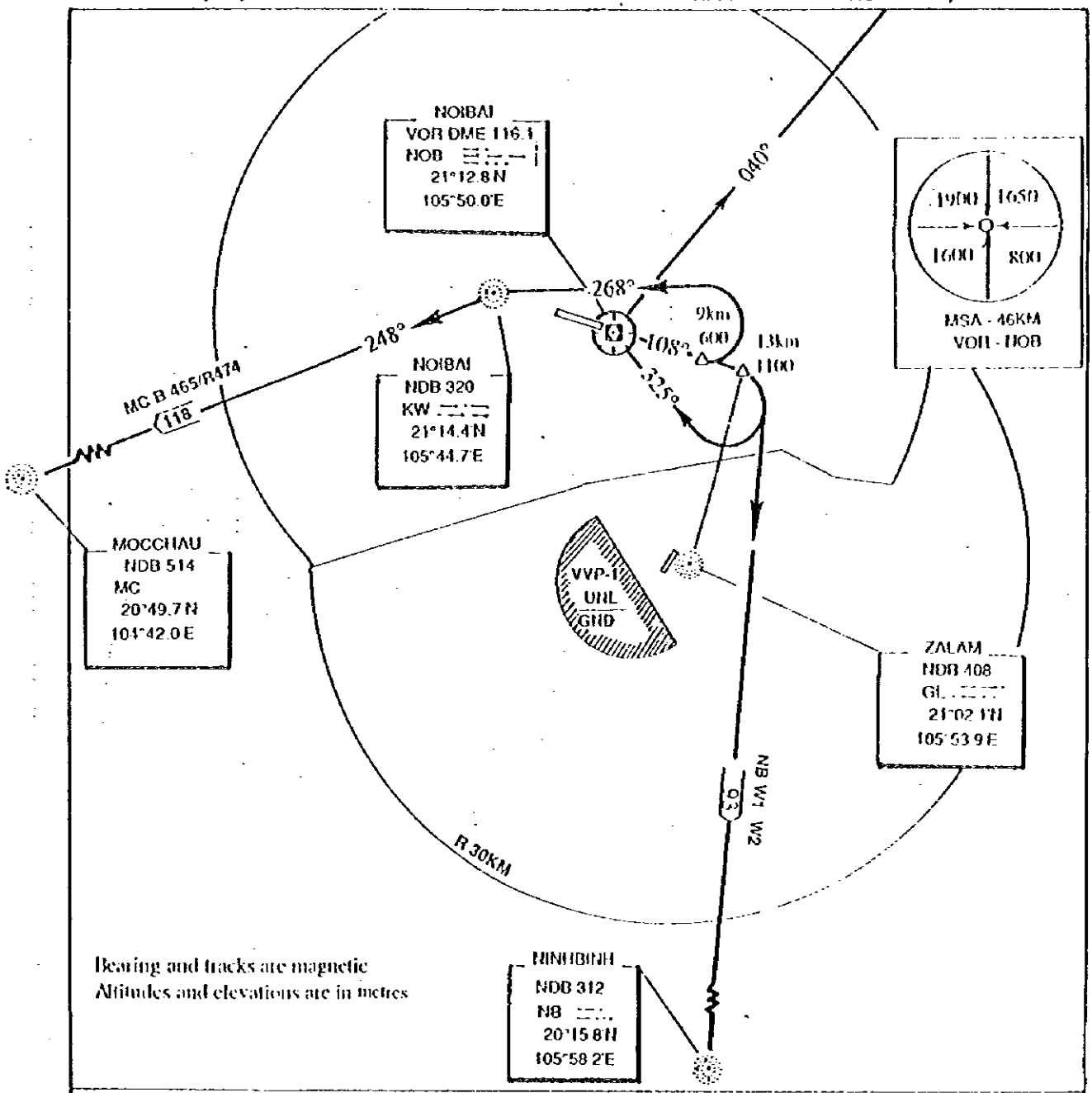
GCA is provided on an "as request" basis, whenever visibility goes below 2,000 m. At the NBIA, visibility often goes below 2,000 m from December through April. The GCA is provided as an advisory service.

3.7.6 Instrument Flight Procedures

At present, the following Standard Instrument Departure (SID) routes have been established for aircraft departing from the NBIA as shown in Figures 3.7.4 through 3.7.6.

Instrument Approach Procedures have been established as shown in Figures 3.7.7 through 3.7.11.

a) VOR/DME RWY 29;
b) VOR/DME RWY 11;
c) NDB/DME RWY 11;
d) NDB/ILS RWY 11; and
e) VOR/ILS RWY 11



RWY 11

DEP TO MC: Maintain RWY heading until 9km (D5.0) from NOB turn left to KW at 1800m then continue climbing on course 248° to MC'.

DEP TO NB: Maintain RWY heading until 13km (7NM) from NOB, 1100m or above turn right climbing to NB.

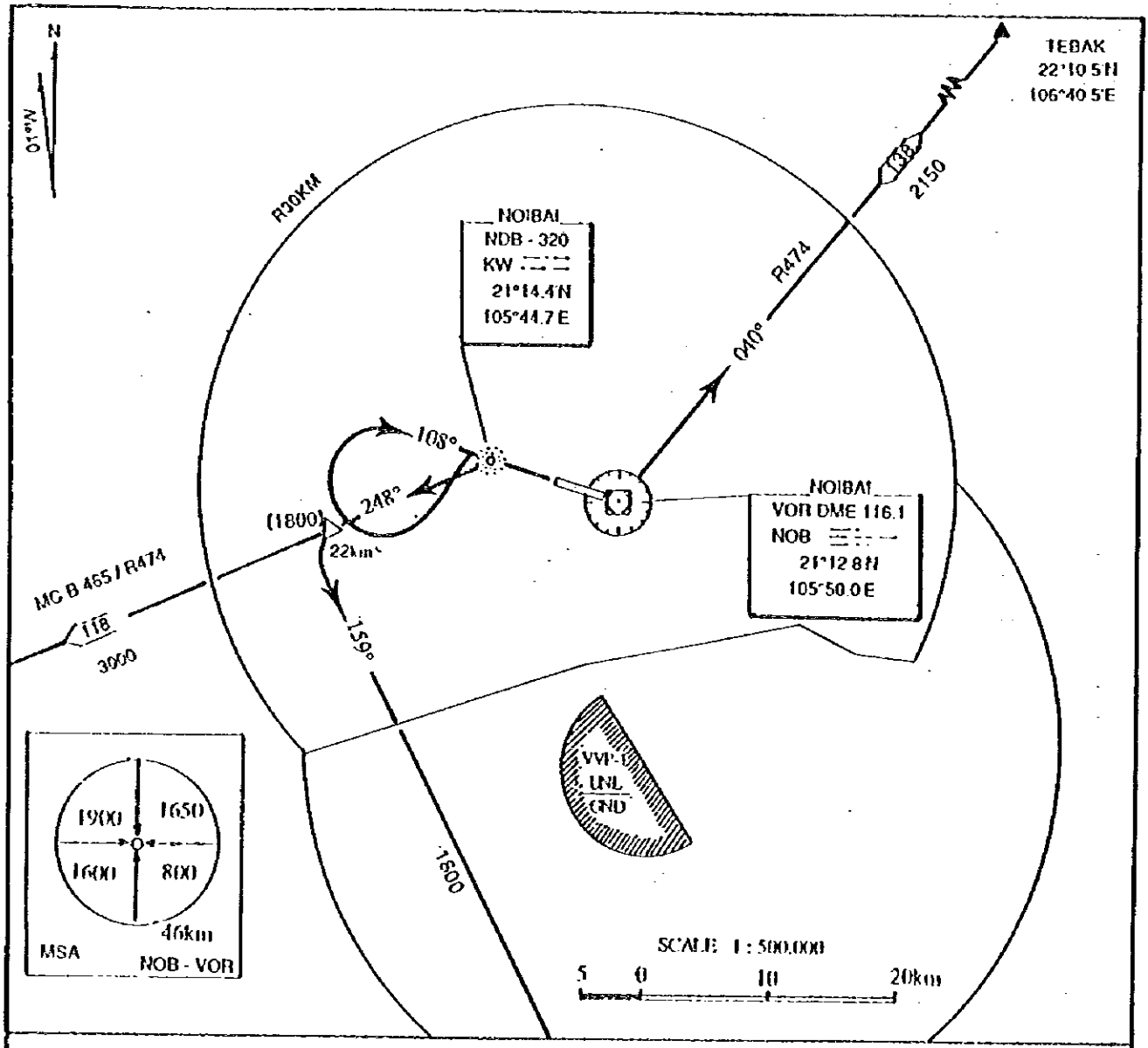
DEP TO TEBAK: Maintain RWY heading until 13km (7NM) from NOB, 1100m or above turn right climbing to NOB at 2150m then proceed via R-010 to TEBAK.

Figure 3.7.4 Standard Instrument Departure Chart "A" Hanoi/Noi Bai

STANDARD DEPARTURE CHART
INSTRUMENT (SID) - ICAO

NOIBAI TOWER 118.1
NOIBAI APP 121.0
TRANSITION ALTITUDE: 1800M
ELEV 12M

HANOI / NOIBAI
RWY 29



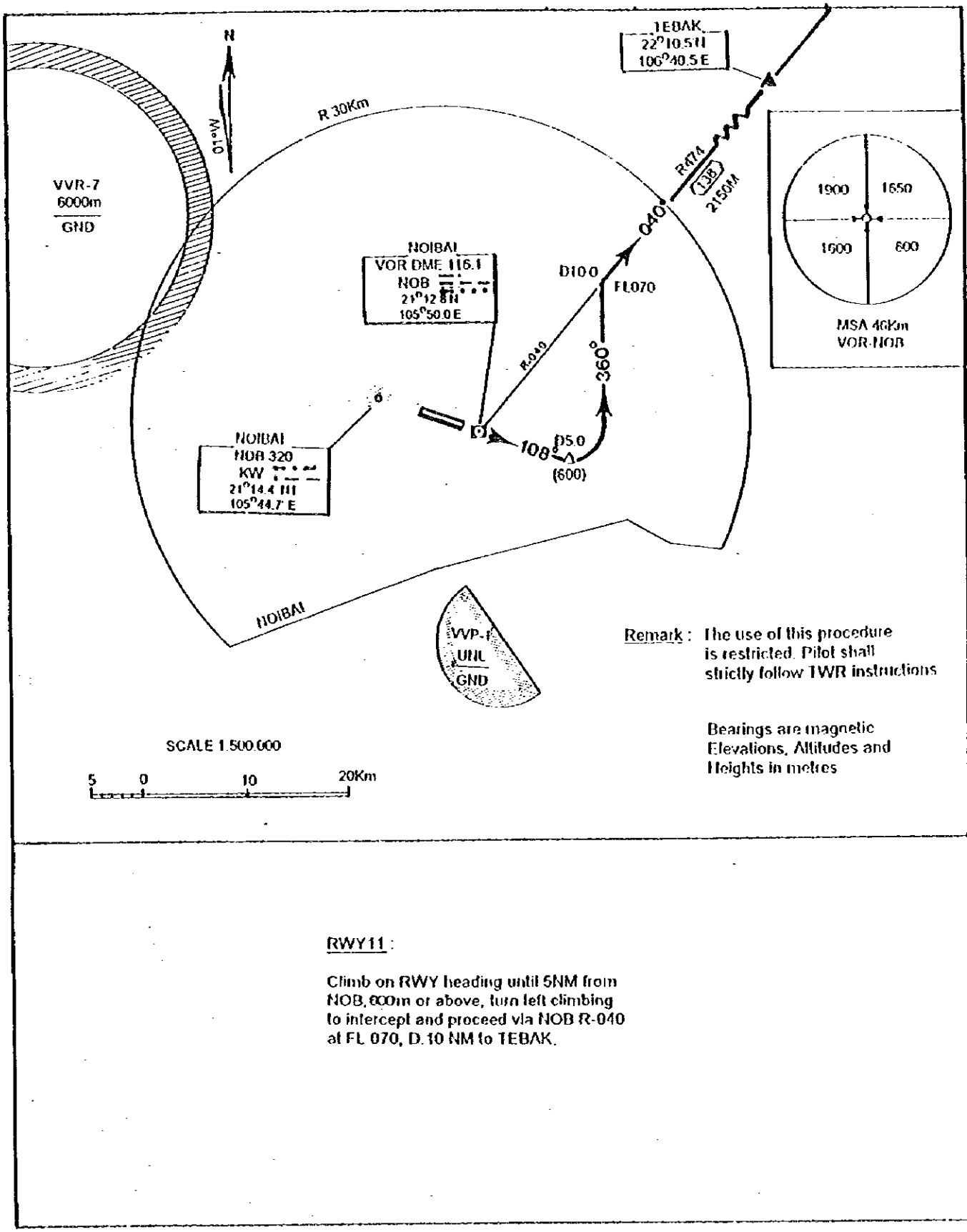
RWY 29

DEP TO MC : Climb ahead until passing KW turn left and proceed to MC.

DEP TO NB : Climb ahead after passing KW turn left on course 248° until 22km (D 12.0) from NOB turn left and proceed to NB.

DEP TO TEBAK: Climb via NDB KW then turn left and reverse to VOR/DME on course 108° at or above 2100 after that proceed via R 040 to TEBAK.

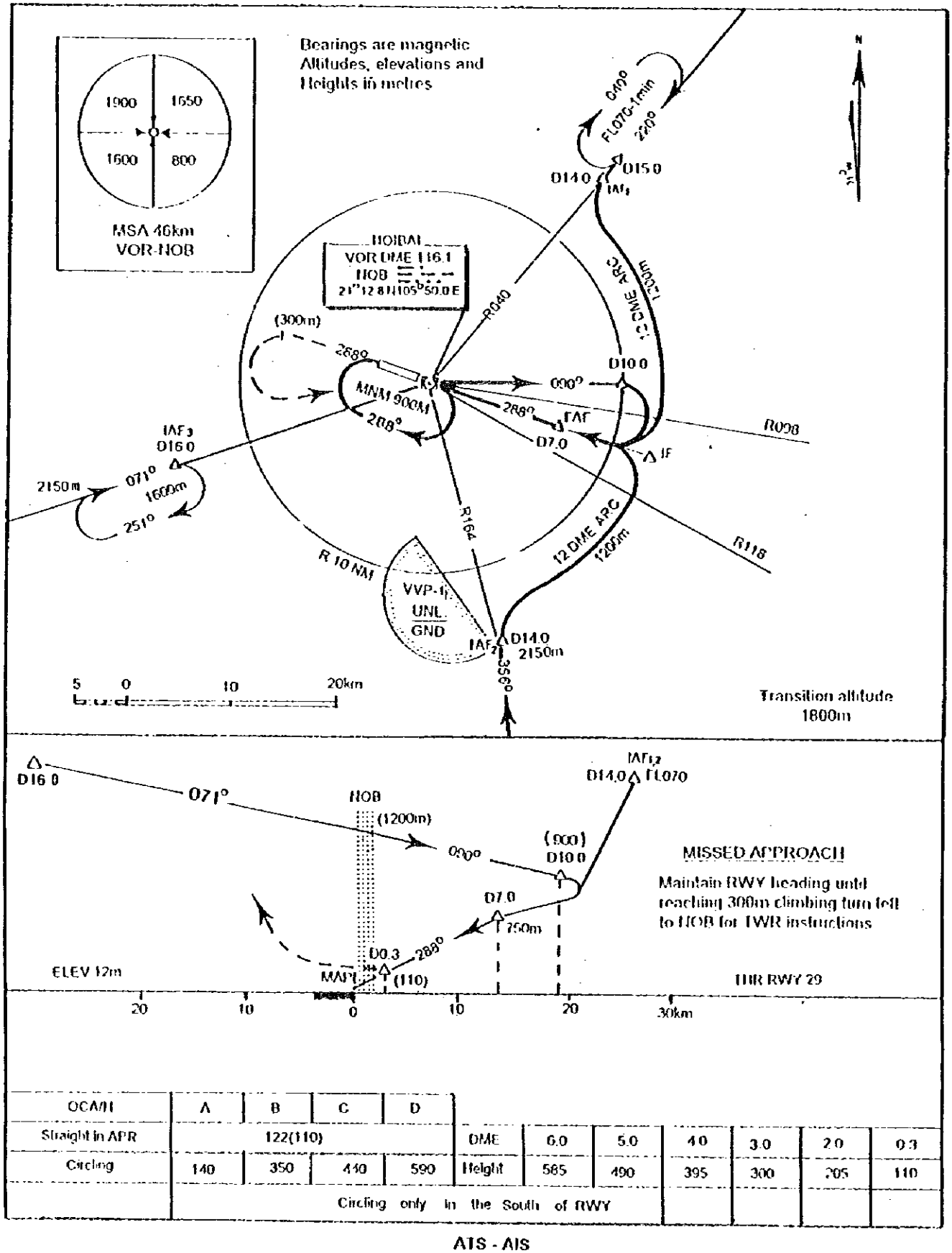
Figure 3.7.5 Standard Instrument Departure Chart "B" Hanoi/Noi Bai



RWY11 :

Climb on RWY heading until 5NM from NOB, 600m or above, turn left climbing to intercept and proceed via NOB R-040 at FL 070, D.10 NM to TEBAK.

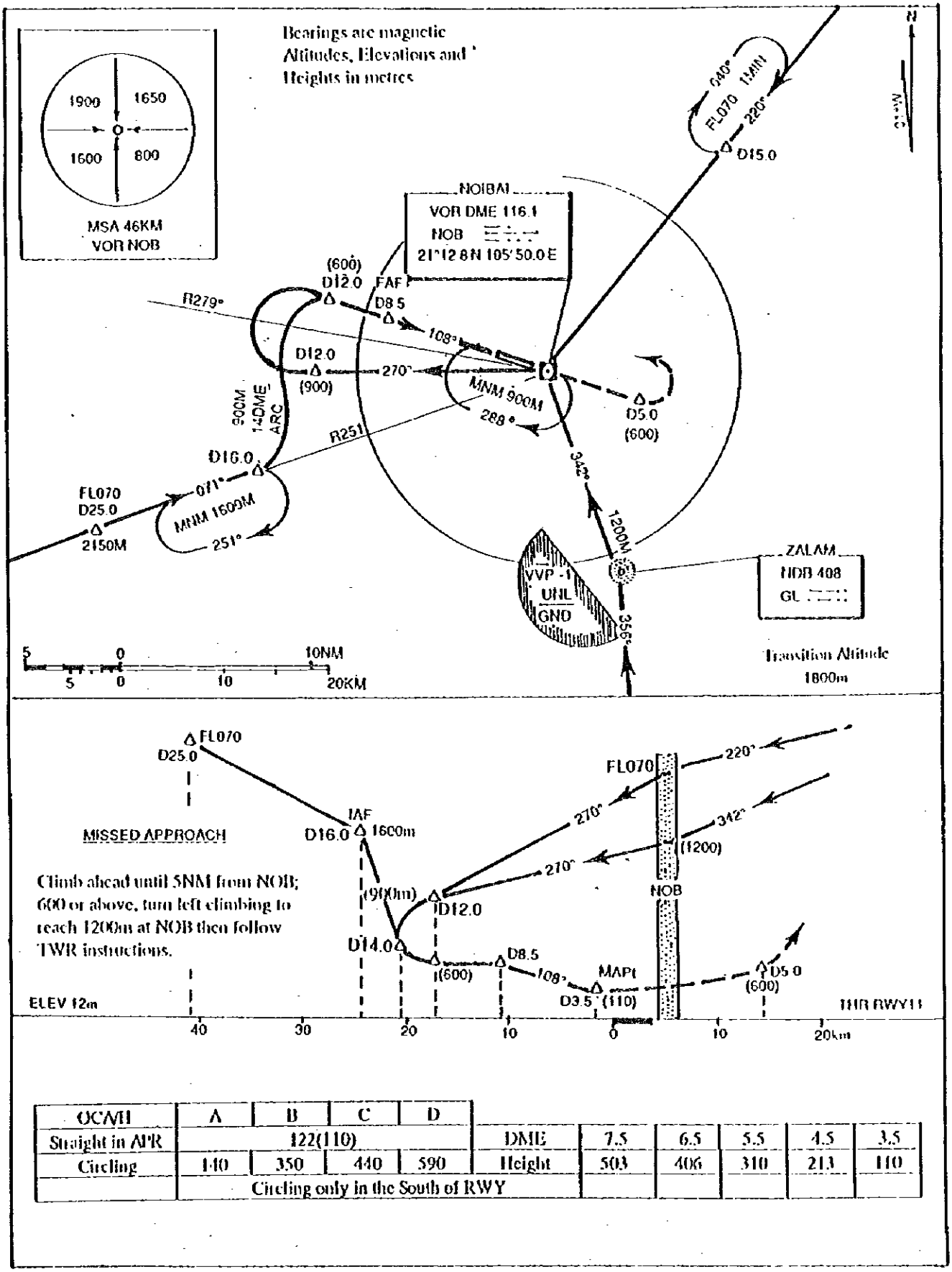
Figure 3.7.6 Standard Instrument Departure Chart "C" Hanoi/Noi Bai



OCA/H	A	B	C	D							
Straight in APR	122(110)				DME	6.0	5.0	4.0	3.0	2.0	0.3
Circling	140	350	440	590	Height	585	490	395	300	205	110
	Circling only in the South of RWY										

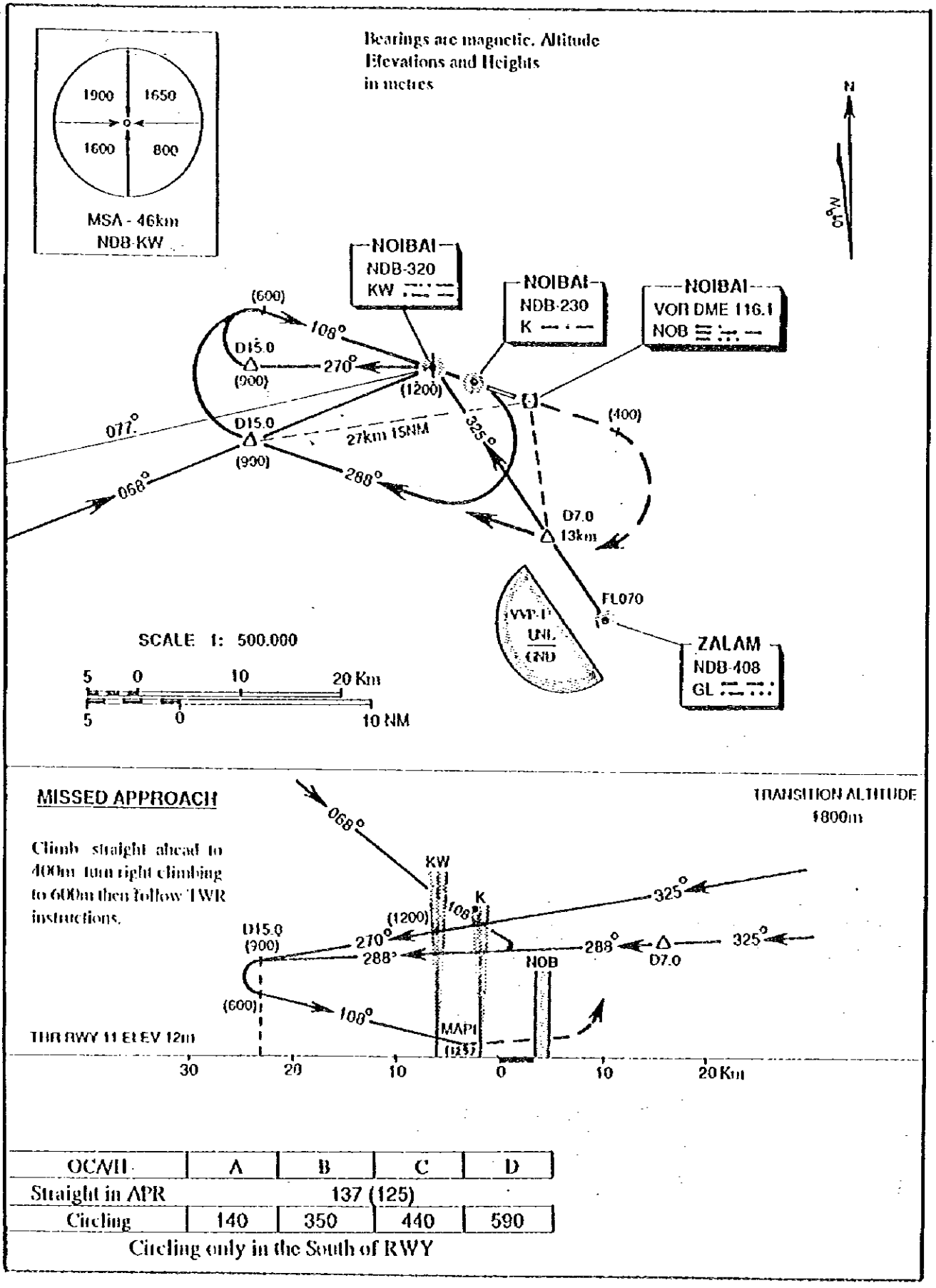
ATS - AIS

Figure 3.7.7 VOR/DME Instrument Approach RWY 29 Hanoi/Noi Bai



OCMH	A	B	C	D						
Straight in APR	122(110)				DME	7.5	6.5	5.5	4.5	3.5
Circling	140	350	440	590	Height	503	406	310	213	110
	Circling only in the South of RWY									

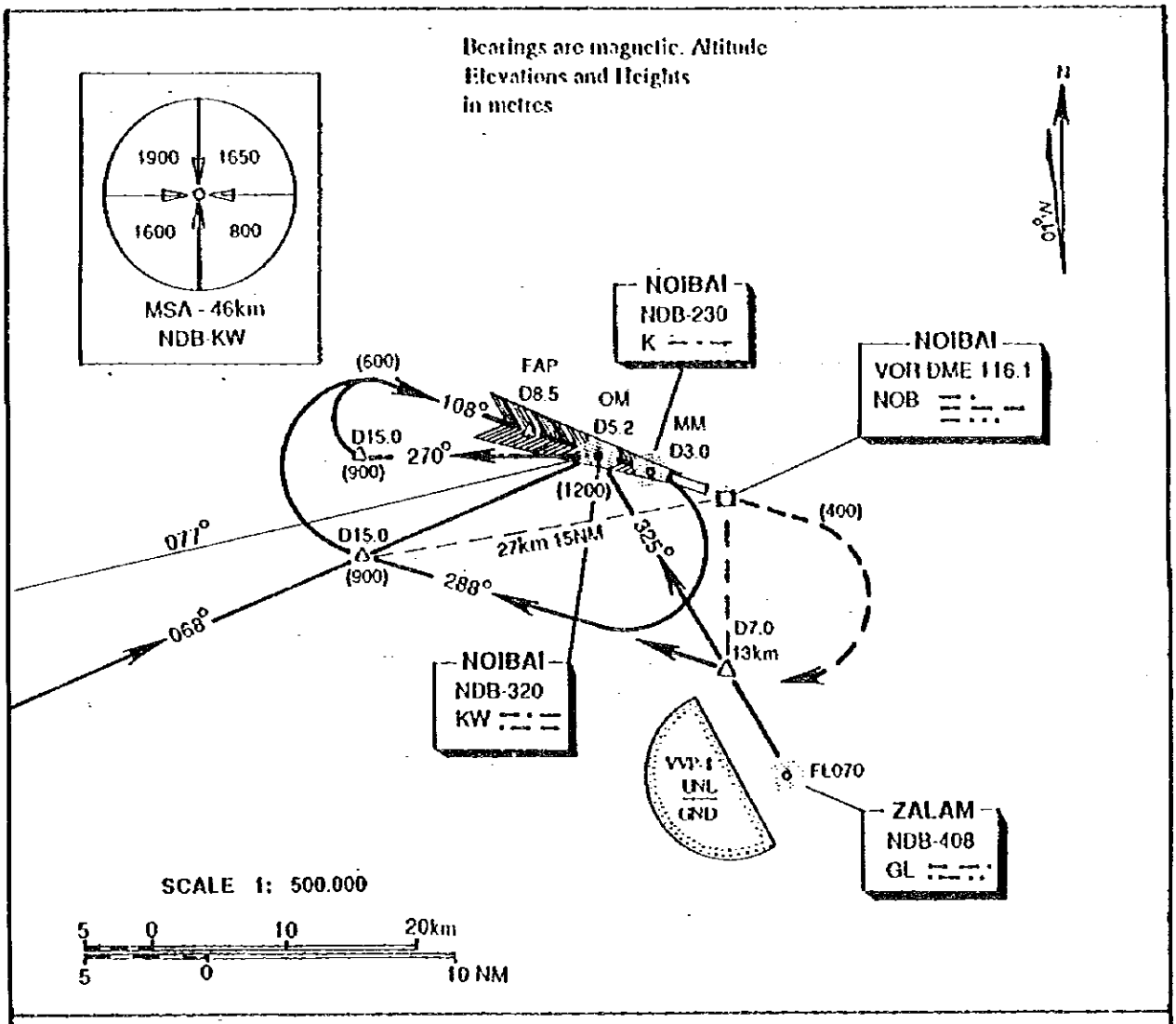
Figure 3.7.8 VOR/DME Instrument Approach RWY 11 Hanoi/Noi Bai

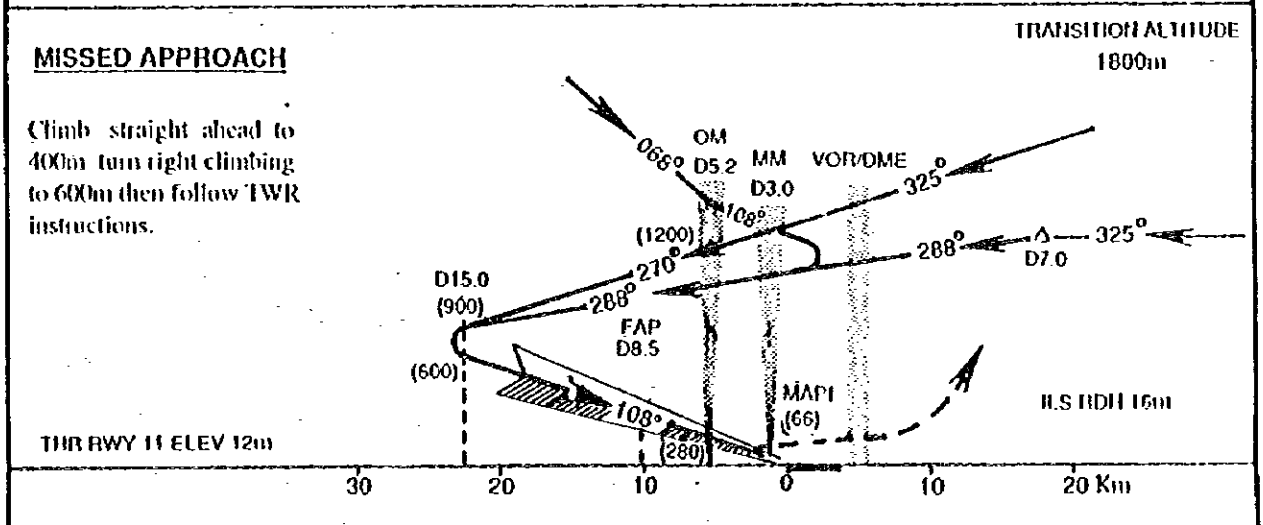


OCA/H	A	B	C	D
Straight in APR		137 (125)		
Circling	140	350	440	590

Circling only in the South of RWY

Figure 3.7.9 NDB/DME Instrument Approach RWY 11 Hanoi/Noi Bai

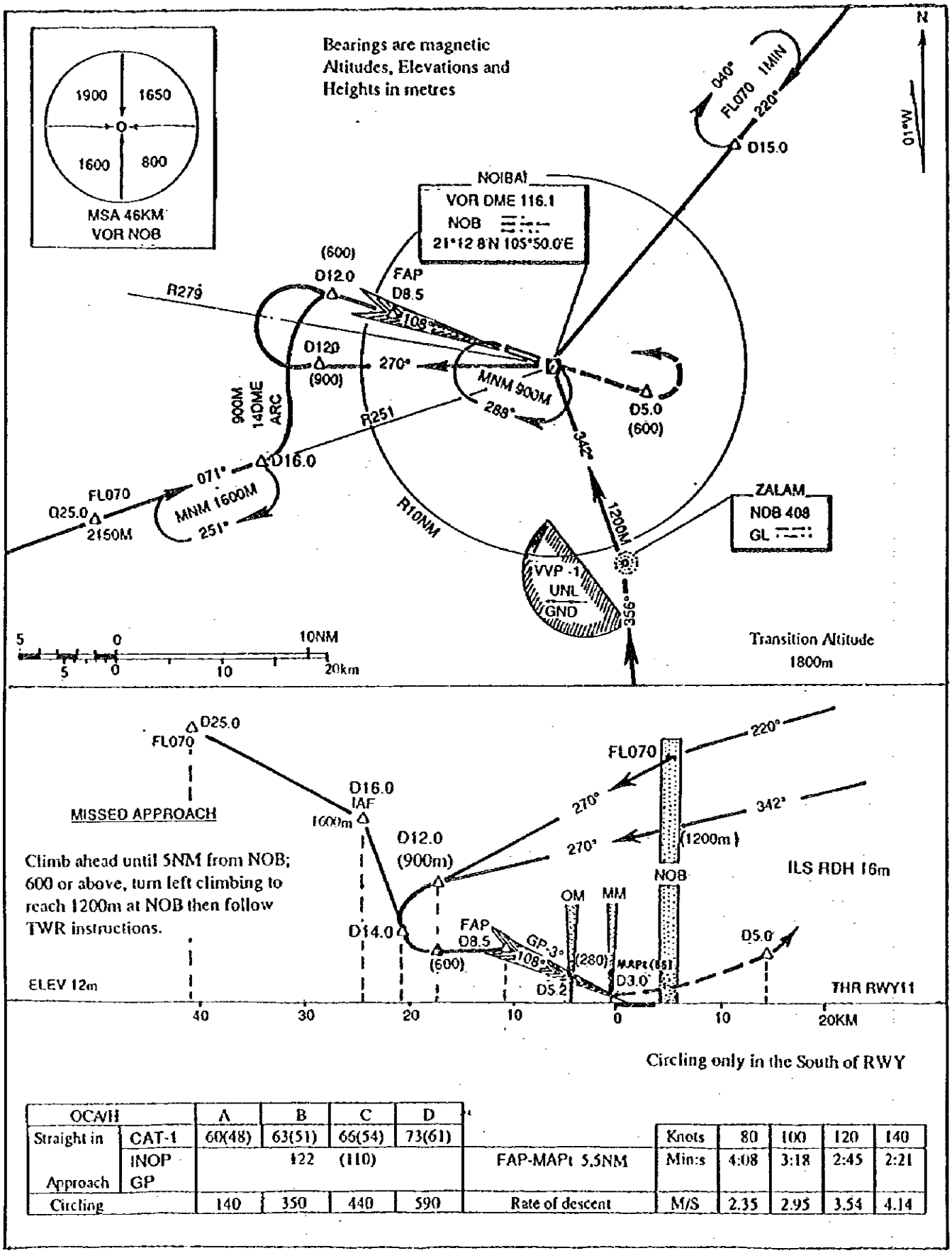




OCA/H		A	B	C	D						
Straight in Approach	CAT-I	60(48)	63(51)	66(54)	73(61)		Knots	80	100	120	140
	INOP GP	122(110)				FAP-MAPt 5.5NM	Min:S	4:08	3:18	2:45	2:21
Circling		140	350	440	590	Rate of descent	M/S	2.35	2.95	3.51	4.14

Circling only in the South of RWY

Figure 3.7.10 NDB/ILS Instrument Approach RWY 11 Hanoi/Noi Bai



OCA/H		A	B	C	D
Straight in	CAT-1	60(48)	63(51)	66(54)	73(61)
	INOP	122	(110)		
Approach	GP				
Circling		140	350	440	590

FAP-MAPt 5.5NM					
Knots	80	100	120	140	
Mins	4:08	3:18	2:45	2:21	
Rate of descent	M/S	2.35	2.95	3.54	4.14

ATS - AIS

Figure 3.7.11 VOR/ILS Instrument Approach RWY 11 Hanoi/Noi Bai