

IV. AIRCRAFT OPERATIONS AND TRAFFIC FORECASTS

1. INTRODUCTION

Over the past several years, there have been a number of activity forecasts prepared for Phoenix Sky Harbor International Airport (PHX). Among the more important forecasts are:

- (1) 1984 - Maricopa Association of Governments, Aviation Forecasts, prepared for the Regional Aviation System Plan.
- (2) 1985 - DWL, Forecasts of Aviation Activity and Terminal Area Facilities (amended 1987), prepared for the analysis of Terminal 4.
- (3) 1986 - FAA, Phoenix Hub Forecasts.
- (4) 1987 - Coffman Associates, F.A.R. Part 150 Noise Compatibility Study.
- (5) 1988 - FAA, Terminal Area Forecasts.

To ensure consistency with other planning programs, these previous forecasts have been reviewed, and the forecasts presented here draw from the material in them.

2. DOMESTIC AIR CARRIER FORECASTS

Table IV.1 presents the historical level of domestic scheduled passenger enplanements for the 1972-87 period. Through the period, enplanement growth at the airport was strong. The one weak period was in 1980-81, when the PATCO strike, general economic recession, substantial fare increases due to higher fuel prices and the acquisition of Hughes Airwest by Republic Airlines took place. Not shown in Table IV.1 is the fact that while traffic growth has been steady, there has been considerable change in the distribution of traffic and services between individual carriers.

Table IV.2 illustrates these major shifts which are caused by old carriers merging and realigning their networks, and new carriers beginning service. Perhaps no other airport has experienced as great a variety of carrier/service changes over the past decade as Sky Harbor. These changes reinforce the need for flexible facility planning that can accommodate a wide range of activities.

Another measure of passenger activity is passenger originations. Passenger originations represent only those passengers beginning their air trip at Phoenix, thus excluding passengers using the airport for connecting flights. Table IV.3 shows historical data on originating passengers for domestic scheduled air carrier airlines from 1972-86.

Table IV.1

AIR CARRIER ENPLANEMENTS

**HISTORIC DOMESTIC SCHEDULED AIR CARRIER ENPLANEMENTS
1972-1987**

Year -----	Enplanements -----
1972	1,704,303
1973	1,907,784
1974	2,005,626
1975	2,033,049
1976	2,273,658
1977	2,533,728
1978	3,054,186
1979	3,586,533
1980	3,378,052
1981	3,394,485
1982	3,946,094
1983	4,799,637
1984	5,745,046
1985	6,699,363
1986	7,688,594
1987	8,748,423

Sources: 1972-1986, FAA/CAB, "Airport Activity Statistics."
1987, U.S. DOT, Form 41, Schedule T3.

Table IV.2

HISTORIC AIR CARRIER SHARES OF DOMESTIC SCHEDULED ENPLANEMENTS (percent), 1972-1987

Year	American	Continental	Frontier	America West	Northwest	PSA	Republic	Hughes Airwest	TWA	United	Western	Southwest	Other	Total
1972	31.1	6.7	5.6	0.0	0.0	0.0	0.0	15.7	18.2	0.0	18.9	0.0	3.8	100.0
1973	32.9	7.4	4.9	0.0	0.0	0.0	0.0	18.0	15.9	0.0	17.5	0.0	3.4	100.0
1974	28.4	7.9	6.2	0.0	0.0	0.0	0.0	19.7	17.8	0.0	16.8	0.0	3.2	100.0
1975	27.3	8.2	7.0	0.0	0.0	0.0	0.0	20.5	18.6	0.0	15.0	0.0	3.4	100.0
1976	27.7	7.5	7.5	0.0	0.0	0.0	0.0	19.1	19.1	0.0	15.4	0.0	3.6	100.0
1977	27.1	8.4	6.9	0.0	0.0	0.0	0.0	19.4	19.6	0.0	15.0	0.0	3.5	100.0
1978	27.2	8.0	7.0	0.0	0.0	0.0	0.0	20.4	19.0	0.0	14.4	0.0	4.1	100.0
1979	25.6	8.6	6.8	0.0	0.1	3.1	0.0	16.7	19.1	0.0	12.9	0.0	7.1	100.0
1980	20.8	8.2	5.9	0.0	1.3	4.0	5.5	17.1	13.2	0.1	13.4	0.0	10.4	100.0
1981	16.6	6.6	6.3	0.0	1.6	6.3	20.7	0.0	13.3	4.9	11.9	0.0	11.9	100.0
1982	11.5	4.2	3.6	0.0	2.0	6.4	21.8	0.0	10.5	9.2	10.6	7.8	12.3	100.0
1983	9.7	2.3	3.1	2.6	2.1	8.1	26.1	0.0	5.8	8.6	8.2	14.4	9.0	100.0
1984	8.6	2.8	3.3	18.4	2.5	4.9	18.6	0.0	4.4	7.5	4.9	14.0	10.1	100.0
1985	7.7	4.0	3.0	35.0	2.9	3.5	6.0	0.0	3.9	6.2	4.0	13.3	10.5	100.0
1986	7.0	4.2	1.6	40.4	4.0	2.6	2.7	0.0	3.0	6.3	3.9	13.4	10.9	100.0
1987	5.7	4.3	0.0	44.9	4.8	2.2	0.0	0.0	3.0	7.3	0.9	14.5	12.5	100.0

Sources: 1972-1986, FAA/CAB, "Airport Activity Statistics," Table 6.
1987, U.S. DOT, Form 41, Schedule T3.

Table IV.3

SCHEDULED AIR CARRIER ORIGINATING PASSENGERS

HISTORIC DOMESTIC SCHEDULED AIR CARRIER
ORIGINATING PASSENGERS, 1972-1986

Year -----	Originating Passengers -----
1972	1,351,800
1973	1,493,650
1974	1,585,710
1975	1,597,610
1976	1,740,150
1977	1,952,020
1978	2,412,250
1979	2,690,900
1980	2,623,550
1981	2,680,410
1982	2,964,950
1983	3,472,590
1984	4,184,180
1985	4,705,620
1986	5,612,560

Source: 1972-1986, CAB/U.S.DOT, "Origin-Destination
Survey of Airline Passenger Traffic," Table 1.

As expected, the historic trend in passenger originations (Table IV.3) closely follows that of enplanements (Table IV.1).

Table IV.4 shows the major travel markets for originating passengers in 1986, and indicates the top 30 markets account for over 75 percent of total originations. All of the top 30 markets have direct service, and most have frequent non-stop service.

Table IV.5 lists calculations of connecting passenger enplanements (total enplanements minus originations), and shows that over time, there has been a general increase in the percentage of connecting passengers.

Another measure of air carrier activity is aircraft operations or departures (i.e., "flights"). Table IV.6 shows the historical trend in air carrier departures over the 1972-87 period. The trend in departures closely follows the trend in enplanements (Table IV.1). However, the overall growth in aircraft departures has been relatively less than the growth in enplanements due to the airlines' use of larger aircraft (measured by seats per aircraft) and higher enplaning load factors (measured by enplanements per departure).

Table IV.7 shows the historic trend in enplanements per departure at Sky Harbor. An analysis of the air carrier operations in calendar year 1987 indicates that aircrafts averaged 134 seats per departure. This means that in 1987 the average enplaning load factor was 52.1 percent (i.e., 69.9 enplanements per departure/134 seats per departure).

Since originating passengers represent the basic traffic demand that must be met by airlines and airports, the starting point for deriving forecasts for future air carrier activity is previous forecasts of passenger originations. Regression equation techniques were used to estimate the relationship among historic originations, Phoenix Metropolitan Statistical Area (MSA) socio-economic data, an air fare yield variable and a dummy variable for the 1980-1981 period. Using U.S. Department of Commerce projections of employment for the Phoenix MSA and FAA forecasts of real air fare yield changes, forecasts of future originations were prepared. The passenger origination forecasts are shown in Table IV.8.

In order to obtain forecasts of passenger enplanements, assumptions have been made regarding the trend in airlines using Sky Harbor as a "hub." The historical data indicates there has been a steady increase in the amount of connecting passenger activity. Also, the known plans of the airlines, particularly America West and Southwest, indicate this trend will continue into the future. The enplanement forecast presented in Table IV.8 assumes the connecting percentage will rise to 34 percent by 1992, and will continue to increase at a diminishing rate through the study period. By the year 2007 it is assumed that connecting passengers will represent 40 percent of the total air carrier enplanements.

Table IV.4

MAJOR ORIGIN-DESTINATION MARKETS, 1986

Rank	Market	Origin-Dest. Passengers	Percent	Cumulative Percent
1	Los Angeles	1,311,950	11.74	11.74
2	San Diego	602,400	5.39	17.14
3	Denver	549,590	4.92	22.06
4	Chicago	548,160	4.91	26.96
5	Las Vegas	482,020	4.31	31.28
6	Ontario, CA	474,710	4.25	35.53
7	New York	433,990	3.88	39.41
8	Seattle/Tacoma	306,760	2.75	42.16
9	San Francisco	305,260	2.73	44.89
10	Albuquerque	274,050	2.45	47.34
11	Orange County, CA	268,110	2.40	49.74
12	Dallas-Fort Worth	262,720	2.35	52.10
13	Minneapolis-St. Paul	246,590	2.21	54.30
14	Salt Lake City	240,700	2.15	56.46
15	Tucson	234,620	2.10	58.56
16	Burbank	211,440	1.89	60.45
17	Detroit	209,300	1.87	62.32
18	San Jose	203,560	1.82	64.15
19	Houston	164,740	1.47	65.62
20	Oakland	163,750	1.47	67.09
21	Portland, OR	146,190	1.31	68.40
22	El Paso	136,170	1.22	69.61
23	Kansas City	130,450	1.17	70.78
24	Washington, DC	129,650	1.16	71.94
25	Boston	124,890	1.12	73.06
26	St. Louis	106,890	0.96	74.02
27	Cleveland	98,670	0.88	74.90
28	Austin	95,960	0.86	75.76
29	Philadelphia	94,800	0.85	76.61
30	Atlanta	94,470	0.85	77.45
	Subtotal of Above	8,652,560	77.45	77.45
	All Other Markets	2,518,630	22.55	100.00
	Total	11,171,190	100.00	

Source: U.S. DOT, "Origin-Destination Survey of Airline Passenger Traffic", Table 8.

Table IV.5

AIR CARRIER CONNECTING ENPLANEMENTS

HISTORIC DOMESTIC SCHEDULED AIR CARRIER CONNECTING ENPLANEMENTS
1972-1986

Year	Enplanements	Originating Passengers	Connecting Enplanements	Connecting Percentage
1972	1,704,303	1,351,800	352,503	20.7
1973	1,907,784	1,493,650	414,134	21.7
1974	2,005,626	1,585,710	419,916	20.9
1975	2,033,049	1,597,610	435,439	21.4
1976	2,273,658	1,740,150	533,508	23.5
1977	2,533,728	1,952,020	581,708	23.0
1978	3,054,186	2,412,250	641,936	21.0
1979	3,586,533	2,690,900	895,633	25.0
1980	3,378,052	2,623,550	754,502	22.3
1981	3,394,485	2,680,410	714,075	21.0
1982	3,946,094	2,964,950	981,144	24.9
1983	4,799,637	3,472,590	1,327,047	27.6
1984	5,745,046	4,184,180	1,560,866	27.2
1985	6,699,363	4,705,620	1,993,743	29.8
1986	7,688,594	5,612,560	2,076,034	27.0

Sources: Tables IV.1 and IV.3.

Table IV.6

AIR CARRIER OPERATIONS--DEPARTURES

**HISTORIC DOMESTIC SCHEDULED AIR CARRIER
AIRCRAFT DEPARTURES PERFORMED, 1972-1987**

Year -----	Aircraft Departures Performed -----
1972	37,307
1973	42,114
1974	42,072
1975	43,761
1976	45,223
1977	47,836
1978	50,524
1979	60,825
1980	66,745
1981	61,657
1982	69,421
1983	77,477
1984	97,280
1985	101,077
1986	111,730
1987	125,230

Sources: 1972-1986, FAA/CAB, "Airport Activity
Statistics," Table 7.
1987, U.S.DOT, Form 41, Schedule T3.

Table IV.7

AIR CARRIER ENPLANEMENTS PER DEPARTURE

HISTORIC DOMESTIC SCHEDULED AIR CARRIER ENPLANEMENTS
PER DEPARTURE, 1972-1987

Year	Enplanements	Aircraft Departures Performed	Average Enplanements per Departure
1972	1,704,303	37,307	45.7
1973	1,907,784	42,114	45.3
1974	2,005,626	42,072	47.7
1975	2,033,049	43,761	46.5
1976	2,273,658	45,223	50.3
1977	2,533,728	47,836	53.0
1978	3,054,186	50,524	60.5
1979	3,586,533	60,825	59.0
1980	3,378,052	66,745	50.6
1981	3,394,485	61,657	55.1
1982	3,946,094	69,421	56.8
1983	4,799,637	77,477	61.9
1984	5,745,046	97,280	59.1
1985	6,699,363	101,077	66.3
1986	7,688,594	111,730	68.8
1987	8,748,423	125,230	69.9

Sources: Tables IV.1 and IV.6.

Table IV.8

AIR CARRIER ENPLANEMENTS

FORECAST OF DOMESTIC SCHEDULED AIR CARRIER ORIGINATIONS,
CONNECTING ENPLANEMENTS AND TOTAL ENPLANEMENTS, 1992-2007

Year	Originations (b)	Connecting Enplanements	Total Enplanements	Connecting Percentage
1986 (a)	5,612,560	2,076,034	7,688,594	27.0
1992	6,855,437	3,531,589	10,387,026	34.0
1997	8,761,760	5,145,796	13,907,556	37.0
2002	10,523,852	6,728,364	17,252,216	39.0
2007	11,759,234	7,839,489	19,598,723	40.0

(a) Actuals from Table IV.5.

(b) $\ln(\text{Originations}) = -6.007485 + 1.646323 \times \ln(\text{Employment}) -$
 $0.7654041 \times \ln(\text{Yield}) - 0.0995126 \times \text{Dummy}$

However, it should be noted that connecting passenger traffic will be determined largely by corporate decisions of the airlines, and forecasts of connecting activity are less certain than forecasts of originating passengers. The connecting percentages shown in Table IV.8 are assumed to apply to monthly, daily and hourly enplanement levels.

Because of the multiple passenger terminals at the airport, a special analysis was made of connecting passenger enplanements, by carrier. For the year ending June 30, 1986, the U.S. DOT Origin-Destination Survey (as processed by I.P. Sharp) shows that of the total connecting passengers, America West accounted for 67.6 percent of the total connections with 65.4 percent of the connections being on-line America West connections. In total, 92.5 percent of the connections were on-line connections, and only 7.5 percent were interline connections requiring passengers to change between airlines. With the current location of carriers in the specific terminal buildings, only 5.6 percent of the connecting passengers must change between terminals.

The number of connecting passengers needing to move from one terminal to another in the future is not easy to predict. Given the current airlines' abilities to capture their connections through reservation systems and plans for terminal development that include closing Terminal 1 in the short-term and Terminal 2 in the mid- to long-term, it is unlikely that the percentage of inter-terminal connections will exceed current levels. For planning purposes, most importantly in relation to the inter-terminal transportation system, the conservative assumption that inter-terminal connections will remain at today's levels will be used.

Table IV.9 shows the projected total of connecting passengers, inter-airline connections and inter-terminal connections, assuming the current pattern of connections continues throughout the study period. These inter-airline and inter-terminal connecting passenger volume estimates probably are high since airline consolidation, marketing and scheduling practices increasingly will discourage passengers from transferring between airlines.

In order to convert passenger enplanements into aircraft operations, it is necessary to project future average aircraft sizes (seats) and enplaning load factors for the air carriers. The FAA projects that the average size of domestic air carrier aircrafts will increase by 1.229 percent and load factors will increase by 0.422 percent annually between 1987 and 1999. Assuming that these growth rates continue through 2007 and applying them to 1987 Phoenix averages, forecasts of average aircraft sizes, enplaning load factors and enplanements per departure for Sky Harbor for the study period were generated (Table IV.10).

Table IV.11 presents the resulting forecast of domestic air carrier aircraft departures through the year 2007.

Table IV.9

AIR CARRIER CONNECTING PASSENGERS

**FORECAST OF DOMESTIC SCHEDULED AIR CARRIER CONNECTING PASSENGERS
1992-2007**

Year	Total Connections (a)	Inter-Airline Connections (b)	Inter-Terminal Connections (c)
1986	2,076,034	155,703	116,258
1992	3,531,589	264,869	197,769
1997	5,145,796	385,935	288,165
2002	6,728,364	504,627	376,788
2007	7,839,489	587,962	439,011

(a) Table IV.8.
(b) 7.5 percent of total connections.
(c) 5.6 percent of total connections.

Table IV.10

ENPLANEMENTS PER DEPARTURE

FORECAST OF DOMESTIC SCHEDULED AIR CARRIER AIRCRAFT SIZE,
ENPLANING LOAD FACTOR AND ENPLANEMENTS PER DEPARTURE, 1992-2007

Year	Average Aircraft Size (seats)	Enplaning Load Factor (percent)	Enplanements Per Departure
1987	134	52.1	69.9
1992	142	53.2	75.5
1997	151	54.3	82.0
2002	161	55.5	89.4
2007	172	56.7	97.5

Table IV.11

AIR CARRIER AIRCRAFT DEPARTURES

**FORECAST OF DOMESTIC SCHEDULED AIR CARRIER
AIRCRAFT DEPARTURES, 1992-2007**

Year	Enplanements	Enplanements per Departure	Aircraft Departures
1987	8,748,423	69.9	125,230
1992	10,387,026	75.5	137,577
1997	13,907,556	82.0	169,604
2002	17,252,216	89.4	192,978
2007	19,598,723	97.5	201,013

Sources: Tables IV.8 and IV.10.

The analysis above addresses annual forecast levels of air carrier activity. These measures that are the primary determinants of such facilities as curbs length, ticket counter and baggage claim are the average day of the peak month (ADPM) and peak hour of the ADPM. The 1985 forecasts indicate significant seasonality in Sky Harbor activity. Monthly data of enplanements and aircraft departures for the period 1984-87 were analyzed for seasonality and the results are shown in Table IV.12. In terms of both enplanements and aircraft operations, the month of March remains the peak month for air carrier activity. For example, March 1987 passenger traffic was over 11 percent higher than April's, which was the next best month. The fact that enplanements increase relatively more in March indicates that for this month, load factors are higher and, therefore, enplanements per departure also are higher.

Table IV.13 shows the forecast of peak month enplanements, aircraft departures and enplanements per departure assuming the current seasonality pattern continues through the forecast period. Table IV.14 contains the forecast of ADPM enplanements. It is assumed that ADPM deplanements equal ADPM enplanements.

ADPM peak hour enplanements and deplanements were derived by assuming that hourly enplanements and deplanements are proportional to scheduled aircraft departures and arrivals. Table IV.15 shows the calculation of peak hour enplanements and deplanements for the ADPM.

3. INTERNATIONAL AIR CARRIER FORECASTS

Sky Harbor International Airport currently has minimal international service. In 1986, the air carriers filing reports with the U.S. DOT indicated there were only 24,443 international passenger enplanements associated with 363 international flights. These international flights were exclusively to Mexico. If non-reporting airlines were to be included, the totals would be higher.

Because of the airport's continued growth as a domestic connecting hub airport, the growth in originating passengers, the potential for Sky Harbor to expand its international role, and city policy to develop this traffic, it is likely that there will be substantial increases in international passenger activity. This activity will likely result in the introduction of service to North Atlantic and/or Pacific destinations.

Table IV.16 shows projections of international activity for the study period. These projections are subject to considerably more uncertainty than the domestic forecasts presented above due to limited historical data and the fact that they depend upon city policy, corporate decisions and international agreements. The annual levels of international passenger and aircraft operations will not add materially to the domestic activity since international

¹ FAA, Aviation Forecasts: 1988-1999, February 1988.

Table IV.12

1984-1987 SEASONAL ADJUSTMENT FACTORS
FOR ENPLANEMENTS AND AIR CARRIER AIRCRAFT DEPARTURES

Month	Monthly Activity as a Percent of Annual	
	Passenger Enplanements	Aircraft Departures
January	7.922	8.606
February	7.977	7.784
March	10.386	8.725
April	9.234	8.380
May	8.712	8.252
June	8.503	8.081
July	8.178	8.430
August	8.400	8.565
September	6.814	8.185
October	7.684	8.319
November	7.764	8.138
December	8.370	8.535
Average	8.333	8.333

Source: HNTB analysis.

Table IV.13

PEAK MONTH ENPLANEMENTS PER DEPARTURE

FORECAST PEAK MONTH (MARCH) AIR CARRIER ENPLANEMENTS,
AIRCRAFT DEPARTURES AND ENPLANEMENTS PER DEPARTURE
1992-2007

Year	Peak Month		
	Passenger Enplanements (a)	Aircraft Departures (b)	Enplanements per Departure
1987 (c)	749,020	10,620	70.5
1992	1,078,797	12,004	89.9
1997	1,444,439	14,798	97.6
2002	1,791,815	16,837	106.4
2007	2,035,523	17,538	116.1

(a) Annual enplanements (Table IV.11) times 0.10386.
(b) Annual departures (Table IV.11) times 0.08725.
(c) Actual.

Table IV.14

DAILY AIR CARRIER ENPLANEMENTS

FORECAST OF AVERAGE DAY PEAK MONTH
AIR CARRIER ENPLANEMENTS, 1992-2007

Year	ADPM Enplanements (a)
1987	24,162
1992	34,800
1997	46,595
2002	57,800
2007	65,662

(a) Peak month enplanements (Table IV.13)
divided by 31.

Table IV.15

PEAK HOUR PASSENGERS

FORECAST OF PEAK HOUR AIR CARRIER PASSENGER ENPLANEMENTS AND DEPLANEMENTS, 1992-2007

Year	ADPM (a) Enplanements (b)	ADPM (a) Deplanements (c)	Ratio of Peak Hour to ADPM Departures (d)	Ratio of Peak Hour to ADPM Arrivals (d)	Peak Hour Enplanements	Peak Hour Deplanements
1987	24,162	24,162	0.0862	0.0891	2,083	2,153
1992	34,800	34,800	0.0862	0.0891	3,000	3,101
1997	46,595	46,595	0.0862	0.0891	4,016	4,152
2002	57,800	57,800	0.0862	0.0891	4,982	5,150
2007	65,662	65,662	0.0862	0.0891	5,660	5,850

(a) Average day peak month.

(b) Table IV.14.

(c) Assumed to equal ADPM enplanements.

(d) HNTB analysis of OAG schedules for March 22-28, 1987.

Table IV.16

INTERNATIONAL AIR CARRIER ACTIVITY
FORECAST OF INTERNATIONAL AIR CARRIER ACTIVITY

Year	Annual Enplanements and Deplanements	Aircraft Departures	Peak Hour Deplanements
1986 (a)	24,443	363	120
1992	87,600	1,095	236
1997	132,500	1,460	236
2002	189,700	1,820	320
2007	262,000	2,190	320

(a) Actual.

arrivals and departures tend to occur during non-peak hours of domestic activity. The activity measure most critical to facility planning is the peak hour deplanement figure, which determines the size of the Federal Inspection Service (FIS) facility. Table IV.16 indicates that through 1997 the airport should have an FIS sufficiently sized to process an arriving DC-10 aircraft. Given the uncertainties of forecasting international activities and the potential for increases international service, the facilities should be designed so they can be expanded quickly and economically to accommodate two B-747's in any one hour. The timing and scale of the development of these international facilities will be adjusted to the airlines' programs for the introduction of new services.

4. AIR CARRIER SUMMARY

Table IV.17 presents a summary of the air carrier activity forecasts.

5. REGIONAL AIRLINE FORECASTS

Regional airline (commuter) activity is an increasingly important activity both in terms of passenger movements and aircraft operations. Unfortunately, because of their size, most commuter airlines are not required to report as much information about their operations as the larger air carriers. What data does exist indicate that the commuter airlines at the airport are following the national trend of aligning themselves with larger air carriers through code-sharing arrangements. Such arrangements mean the commuter airlines become feeders to the larger carriers' systems.

Table IV.18 lists historical commuter airline enplanement data for the 1976-86 period. In forecasting future regional airline enplanements and aircraft operations, the FAA's national trends were used.

Table IV.19 contains the forecasts of annual enplanements and operations for the study period based on the assumption that regional airline activity at Sky Harbor follows the projections for the industry at the national level. Since no data exist on the division of regional airline passengers between connecting and originating passengers, it is assumed that the relationship is the same as for the air carrier airlines. This is a conservative assumption since, because of the increasing role of commuter airlines as feeders to the air carriers, it is likely that a relatively larger percentage of regional airline passengers are connecting. The peak month, ADPM and peak hour ADPM activity forecasts for the commuter airlines are derived using the same methodology and assumptions as was used for the air carrier forecasts.

¹ FAA, Aviation Forecasts: 1988-1999, February 1988.

Table IV.17

SUMMARY OF FORECASTS OF AIR CARRIER ACTIVITY, 1992-2007 (a)

Activity Measure	1987	1992	1997	2002	2007
Annual:					
Total Psgrs. (b)	17,496,846	20,949,252	28,080,112	34,883,832	39,721,446
Enplanements (b)	8,748,423	10,474,626	14,040,056	17,441,916	19,860,723
Originations	NA	6,855,437	8,761,760	10,523,852	11,759,234
Acft. Depart. (b)	125,230	138,672	171,064	194,798	203,203
Acft. Oper. (b)	250,460	277,344	342,128	389,596	406,406
Peak Month:					
Total Psgrs.	1,498,040	2,157,594	2,888,878	3,583,630	4,071,046
Enplanements	749,020	1,078,797	1,444,439	1,791,815	2,035,523
Originations	NA	706,051	901,409	1,081,120	1,205,202
Aircraft Departures	10,620	12,004	14,798	16,837	17,538
Aircraft Operations	21,240	24,008	29,596	33,674	35,076
ADPM:					
Total Psgrs.	48,324	69,600	93,190	115,600	131,324
Enplanements	24,162	34,800	46,595	57,800	65,662
Originations	NA	22,776	29,078	34,875	38,877
Aircraft Departures	343	387	477	543	566
Aircraft Operations	685	774	955	1,086	1,131
Peak Hour ADPM:					
Enplanements	2,083	3,000	4,016	4,982	5,660
Originations	NA	1,963	2,506	3,006	3,351
Aircraft Departures	30	33	41	47	49
Deplanements	2,153	3,101	4,152	5,150	5,850
Terminations	NA	2,030	2,591	3,107	3,464
Aircraft Arrivals	31	35	43	48	50

(a) Domestic only unless otherwise specified. Commuter statistics not included.

(b) Includes international activity.

Sources: See accompanying tables and text.

Table IV.18

COMMUTER AIRLINE ENPLANEMENTS

HISTORIC COMMUTER AIRLINE ENPLANEMENTS, 1972-1986

Year	Enplanements	Change Over Previous Year (percent)
1976	8,000	NA
1977	8,000	0.00
1978	9,000	12.50
1979	4,000	-55.56
1980	9,000	125.00
1981	22,000	144.44
1982	37,000	68.18
1983	51,000	37.84
1984	66,000	29.41
1985	76,000	15.15
1986	90,000	18.42

Source: FAA, "Terminal Area Forecast," 1988.

Table IV.19

SUMMARY OF FORECASTS OF COMMUTER AIRLINE ACTIVITY, 1992-2007

Activity Measure	1986	1992	1997	2002	2007
Annual:					
Total Psgrs.	180,000	264,200	356,900	455,500	581,340
Enplanements	90,000	132,100	178,450	227,750	290,670
Originations	65,340	87,186	112,425	138,930	174,402
Aircraft Departures	14,342	16,935	19,828	21,485	23,254
Aircraft Operations	28,684	33,870	39,656	42,970	46,508
Peak Month:					
Total Psgrs.		27,440	37,068	47,308	60,378
Enplanements		13,720	18,534	23,654	30,189
Originations		9,055	11,676	14,429	18,113
Aircraft Departures		1,478	1,730	1,875	2,029
Aircraft Operations		2,955	3,460	3,749	4,058
ADPM:					
Total Psgrs.		885	1,196	1,526	1,948
Enplanements		443	598	763	974
Originations		292	377	465	584
Aircraft Departures		48	56	60	65
Aircraft Operations		95	112	121	131
Peak Hour ADPM:					
Enplanements		44	60	76	97
Originations		29	38	47	58
Aircraft Departures		5	6	6	7
Deplanements		59	79	101	129
Terminations		39	50	62	77
Aircraft Arrivals		6	7	8	9

6. AIR TAXI OPERATIONS

Air taxi operations consist of for-hire passenger and cargo operations performed on a non-scheduled basis. These operations typically are performed with smaller turboprop aircraft.

Data from the FAA's Airport Traffic Records indicates "air taxi" operations have been increasing. Unfortunately, the FAA's definition of "air taxi" includes operations by the regional (commuter) airlines and cargo operators. This consolidation of several categories of activity makes it difficult to separate the historic trends. Therefore, it is unclear how much of the reported increases in the FAA's definition of "air taxi" operations can be attributed to non-scheduled activity and how much is due to the known growth in commuter and cargo activities.

The recent Part 150 Noise Compatibility Study estimates that of the 62,983 "air taxi" operations reported by the FAA in 1986, 24,522 were associated with true air taxi activity. Table IV.20 shows the forecast of air taxi operations.

7. AIR CARGO OPERATIONS

Table IV.21 shows the forecast of air cargo tonnage from the Part 150 Noise Compatibility Study. This forecast shows that over time, the all-cargo operators will account for an increasing share of the tonnage. Given the significant growth in the operations of the small package and express companies relative to the belly cargo operations of the passenger carriers, this forecast is considered reasonable. Table IV.22 lists the associated forecast of cargo aircraft operations.

8. MILITARY OPERATIONS

Military aircraft operations at Sky Harbor have remained relatively stable over the past decade. The Part 150 Noise Compatibility Study forecasts this trend will continue, and Table IV.23 illustrates the forecast of military aircraft operations.

9. GENERAL AVIATION OPERATIONS

Table IV.24 shows historic general aviation operations. It is clear from this table that there has been a significant decrease in general aviation activity. Since 1976 operations have declined at an 8.8 annual percentage rate from over 310,000 to 113,000. This trend is not unusual and, on the national level, has been attributed to dramatically higher ownership and operating costs associated with general aviation aircraft operations. Indeed, while the downward trend has continued in recent years, the rate of decline has been less since fuel prices have stabilized.

Table IV.20

AIR TAXI OPERATIONS

FORECAST OF ANNUAL AIR TAXI
AIRCRAFT OPERATIONS, 1992-2007

Year	Aircraft Operations
1986	24,522
1992	30,482
1997	36,190
2002	42,983 (a)
2007	51,050

(a) Interpolated.

Source: Part 150 Noise Compatibility Study.

Table IV.21

AIR CARGO TONNAGE

FORECAST OF AIR CARGO ENPLANED TONNAGE, 1992-2007

Year	Total Enplaned Tonnage	All-Cargo Operators Enplaned Tonnage	Percent All-Cargo
1986	18,488	10,349	56.0
1992	25,800	15,480	60.0
1997	32,700	20,699	63.3
2002	40,070 (a)	26,466 (a)	66.0
2007	49,100	33,840	68.9

(a) Interpolated.

Source: Part 150 Noise Compatibility Study.

Table IV.22

ALL-CARGO AIRCRAFT OPERATIONS

**FORECAST OF ALL-CARGO AIRCRAFT OPERATIONS
1992-2007**

Year	Aircraft Operations
1986	8,316
1992	10,676
1997	12,544
2002	14,569 (a)
2007	16,920

(a) Interpolated.

Source: Part 150 Noise Compatibility Study.

Table IV.23

MILITARY AIRCRAFT OPERATIONS

**FORECAST OF MILITARY AIRCRAFT OPERATIONS
1992-2007**

<u>Year</u>	<u>Aircraft Operations</u>
1986	7,597
1992	8,000
1997	8,000
2002	8,000 (a)
2007	8,000

(a) Interpolated.

Source: Part 150 Noise Compatibility Study.

Table IV.24

GENERAL AVIATION OPERATIONS

HISTORIC GENERAL AVIATION OPERATIONS, 1976-1987

Year	Local Operations	Itinerant Operations	Total Operations
1976	87,071	223,741	310,812
1977	71,182	235,490	306,672
1978	39,106	240,084	279,190
1979	16,496	243,743	260,239
1980	7,212	216,203	223,415
1981	4,870	193,729	198,599
1982	4,628	162,883	167,511
1983	3,004	136,387	139,391
1984	2,730	136,235	138,965
1985	1,830	134,594	136,424
1986	2,836	120,274	123,110
1987	3,264	109,499	112,763

Sources: 1976-1978, FAA, "Tower Airport Statistics Handbook."
 1979-1986, Aviation Department.
 1987, FAA, "Airport Traffic Records."

Table IV.25 shows the forecast of general aviation operations for the study period. This forecast assumes the decline in general aviation operations will continue, reflecting both the historic trend and the fact that increases in other types of aircraft operations at Sky Harbor will make the airport an increasingly unattractive airport for the casual general aviation pilot. General aviation operations are decreased at a constant 5.1 annual percentage rate over the study period.

Table IV.26 shows the associated forecast of based general aviation aircraft for the airport. The overall decline in the total based aircraft reflects the decrease in operations. However, it is anticipated that there will be a significant change in the composition of the based aircraft as the number of business jets increases and the number of small, single engine aircraft decreases.

10. PASSENGER AND OPERATIONAL SUMMARY

Tables IV.27 and IV.28 show summaries of passenger and aircraft activity. In comparison to the 1988 FAA Terminal Area Forecast, the 1997 enplanement forecast here is approximately 15 percent lower. The largest relative difference in enplanements is for commuter airlines, which the FAA projects to be 23 percent higher. In terms of total aircraft operations, the FAA forecast is 13 percent higher in 1997 with the largest difference being general aviation operations.

Figures IV.1 and IV.2 show graphic summaries of the forecasted aircraft operations and total passengers.

11. AIRCRAFT FLEET MIX

Table IV.29 shows the forecasted mix of aircraft operations by aircraft type.

12. ON-AIRPORT EMPLOYMENT

The number of employees working at the airport generates requirements for employee related services (e.g., parking, food services). Table IV.30 shows the projections for on-airport employment. In forecasting on-airport employment, employment levels were related to a previously forecasted activity measure. Fixed Base Operator (FBO) employment was held constant even though based aircraft and general aviation operations are forecasted to decline because the mix of based aircraft is expected to change to larger and more sophisticated aircraft.

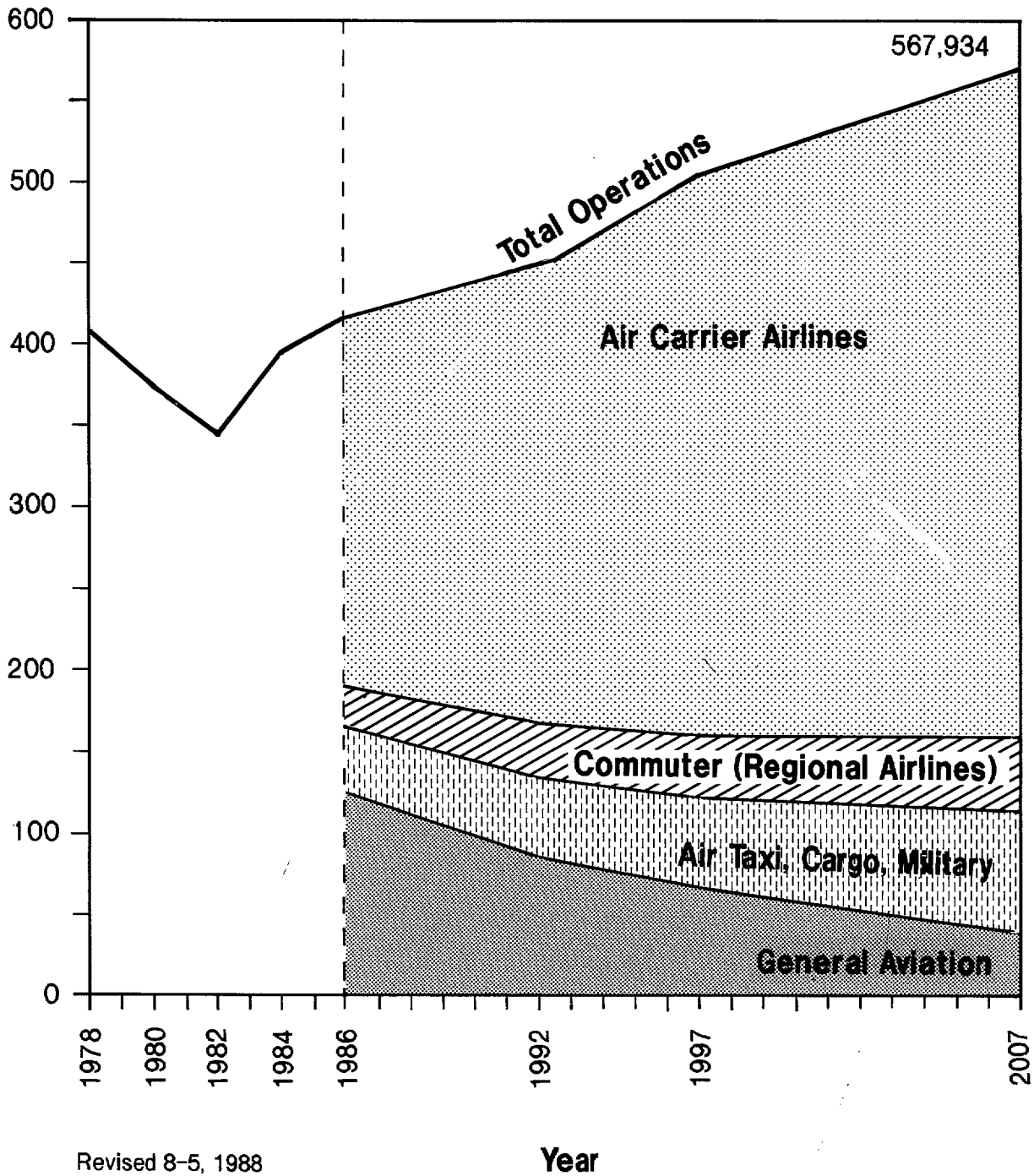
Table IV.25

GENERAL AVIATION OPERATIONS

FORECAST GENERAL AVIATION OPERATIONS, 1992-2007

Year	Local Operations	Itinerant Operations	Total Operations
1987	3,264	109,499	112,763
1992	1,510	85,000	86,510
1997	500	65,870	66,370
2002	500	50,400	50,900
2007	500	38,550	39,050

Operations (Thousands)



Revised 8-5, 1988

Year

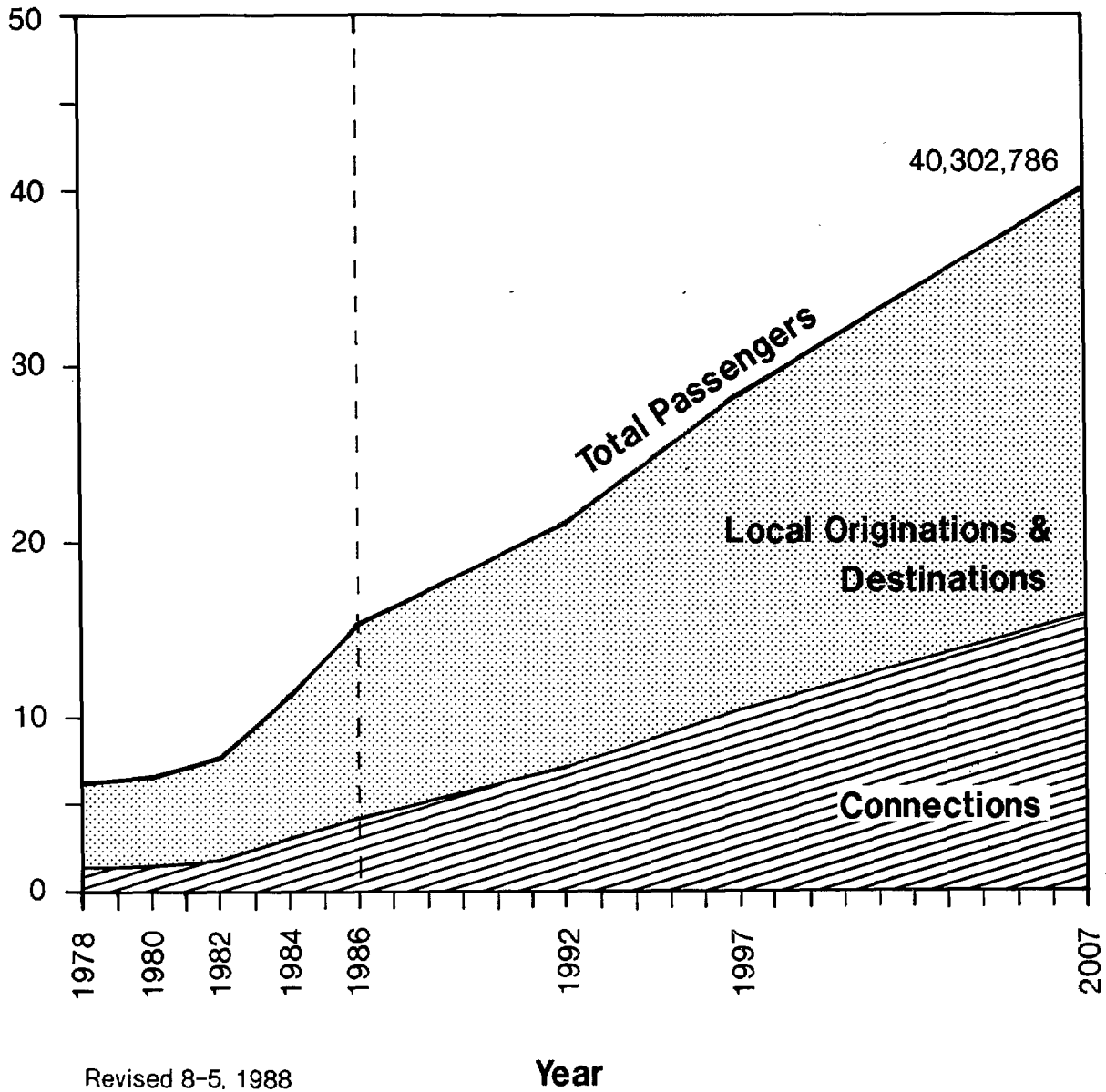


PHOENIX SKY HARBOR INTERNATIONAL AIRPORT MASTER PLAN UPDATE

Annual Operations, 1978-2007

Figure IV-1

Passengers (Millions)



PHOENIX SKY HARBOR INTERNATIONAL AIRPORT MASTER PLAN UPDATE

Annual Passengers, 1978-2007

Figure IV-2

Table IV.26

BASED GENERAL AVIATION AIRCRAFT

FORECAST OF BASED GENERAL AVIATION AIRCRAFT, 1992-2007

Year	Single-Engine	Twin-Engine	Business Jet	Helicopter	Total
1987 (a)	270	56	21	8	355
1992	207	56	26	9	298
1997	160	54	34	10	258
2002	122	53	41	11	227
2007	94	52	49	11	206

(a) From Aviation Department and fixed base operators.

Table IV.27

**SUMMARY OF PASSENGER ACTIVITY
1992-2007**

Year	Domestic Air Carrier Enplanements	International Air Carrier Enplanements	Commuter Enplanements	Total Enplanements	Total Passengers
1986	7,688,594	24,443	90,000	7,803,037	15,606,074
1992	10,387,026	87,600	132,100	10,606,726	21,213,452
1997	13,907,556	132,500	178,450	14,218,506	28,437,012
2007	19,598,723	262,000	290,670	20,151,393	40,302,786

Table IV.28

**SUMMARY OF AIRCRAFT OPERATIONS
1992-2007**

Year	Air Carrier (a)	Commuter	Air Taxi	Cargo	Military	General Aviation	Total
1986	224,186	28,684	24,522	8,316	7,597	123,110	416,415
1992	277,344	33,870	30,482	10,676	8,000	86,510	446,882
1997	342,128	39,656	36,190	12,544	8,000	66,370	504,888
2007	406,406	46,508	51,050	16,920	8,000	39,050	567,934

(a) Includes domestic and international.

Table IV.29

FORECAST AIRCRAFT OPERATIONS BY AIRCRAFT TYPE, 1992-2007

	1986 (a)	1992	1997	2007
747/D10/L10/AB3	5,030	15,111	20,394	31,141
767/A310	1,876	13,869	30,867	49,008
757/A320	4,176	25,042	47,395	89,260
72S	52,292	31,230	25,715	16,308
727	3,630	4,040	5,018	3,693
D8S	1,586	1,594	1,560	0
DC9/D9S/D95	6,864	5,676	753	0
M80	12,696	17,781	30,626	48,102
737/73S	117,276	136,083	141,850	90,174
733/734	23,220	33,284	44,585	86,418
141/142	1,114	810	3,166	8,041
Med. Twin Turboprop	22,146	29,242	36,403	47,070
Light Twin Turboprop	6,739	7,267	7,709	8,593
Twin Piston	38,401	29,161	23,034	16,455
Single Piston	103,185	78,153	64,067	46,020
Business Turbojet	4,790	5,919	7,713	11,046
Helicopter	4,041	4,620	6,033	8,605
KC135	1,920	2,000	2,000	2,000
C130/KC97/Huey/Other	5,677	6,000	6,000	6,000
	416,659 (b)	446,882	504,888	567,934

(a) From Part 150 Noise Compatibility Study.

(b) Differs from total shown on Table IV.28 by 244 operations.

Table IV.30

FORECAST OF ON-AIRPORT EMPLOYMENT, 1992-2007

Year	Airline (b)	Airport Bus. (c)	Air Cargo (d)	FBOs (e)	U.S. Gov't. (f)	Aviation Dept. (g)	Total
1987 (a)	4,257	8,600	950	160	1,500	479	15,946
1992	5,751	10,504	1,421	160	1,500	514	19,850
1997	7,700	13,425	1,900	160	1,500	580	25,265
2002	9,552	16,125	2,429	160	1,500	615	30,381
2007	10,851	18,018	3,106	160	1,500	653	34,288

- (a) Actual.
- (b) Proportional to forecasted increased in enplanements.
- (c) Proportional to forecasted increases in originations.
- (d) Proportional to forecasted increases in all-cargo tonnage.
- (e) Assumed constant due to increases in larger based aircraft.
- (f) Assumed constant.
- (g) Proportional to forecasted increases in total operations.