Chapter 3
Aviation Demand Forecasts

INTRODUCTION

Aviation demand forecasts represent the estimated demand expected to be generated in the Austin metropolitan area that should be served at Austin-Bergstrom International Airport (ABIA). Projections of future traffic are used to determine the extent of development needed to accommodate the expected traffic. The forecasts provide the basis for estimating the type, level and approximate timing for airport capital investments, and for assessing the environmental and fiscal consequences associated with the required improvements and levels of traffic.

Components of Demand

The demand for air transportation at ABIA is comprised of two primary components – demand for air passenger service provided by the passenger airlines, and demand for air cargo service provided by the passenger and dedicated all-cargo carriers. To a lesser extent, non-commercial or general aviation and military operations are components of the air traffic demand. The aviation activity also creates surface transportation demands for auto, bus and truck access roadways, parking, and rental cars. Therefore, this chapter describes the forecasts for five elements of Airport activity: (1) air passengers; (2) air cargo; (3) based general aviation aircraft; (4) aircraft operations (takeoffs and landings), and (5) surface transportation. Additional technical information regarding the forecasting methodology and findings can be found in Technical Report No. 2, *Aviation Demand Forecasts.*

It is important to note that the forecasts presented herein represent unconstrained potential or "market-driven" demand, without consideration of the physical, safety, noise, regulatory, institutional, or political constraints that may preclude development of facilities to fully serve the demand. Also, these forecasts have been prepared on the basis of the information and assumptions described in the report. The achievement of any forecast is dependent on the occurrence of future events that cannot be assured. Therefore, the actual future traffic may vary from the forecasts.

Range of Forecasts

A range of forecasts was developed to account for the uncertainty associated with a twenty-year planning horizon: High, Medium and Low Growth forecasts. The High Growth forecasts were selected as the bases for determining future facility requirements for passenger, cargo, access and parking, general aviation, and other airport components for the following reasons:

- The Department of Aviation policy is to be proactive, rather than reactive, in planning for future facility requirements. The High Growth Forecast establishes the probable upper bound of potential growth at ABIA over the planning period. Given that actual activity levels, not forecast years, will be used for implementing airport improvements, using the High Growth Forecasts as a basis for establishing facility needs is a rational planning approach in that it ensures that plans are in place to meet the probable range of potential future demand for aviation services at ABIA. This approach will also allow the City to respond to rapid and sudden changes in activity levels.

- Strong Local Economy. For the past several years, the Austin area has experienced strong economic growth three to four times above the national average. In fact, vigorous economic expansion ranked Austin the second fastest growing economy in the United States. Austin's role as the Capital of Texas, expansion of educational institutions and high technology businesses, and continued growth in export industries has fueled this growth.

- Continued Population Growth. Austin's strong economy continues to attract workers to the region, boosting the Austin area. By year-end 2000, population of the Air Service Area reached 1,260,000 persons. Austin's high quality of life and diversified technology sector drew over 80 individuals each day to the Austin area.

- High Per Capita Income. High technology companies continue to recruit skilled workers from the U.S. and the rest of world. These skilled workers command progressive employee compensation packages that are well above other industry sectors. As such, the per capita income for families residing in the Austin area is 11.5 percent higher than the state average and 4 percent higher than the national average. With a higher per capita income, the propensity to travel increases significantly as more families have a larger percentage of disposable income.

As a result of the above, the airport has experienced strong growth in aviation activity for several years and there are no indications that growth, especially over the long-term, should not be expected to continue. Air passenger enplanements have grown at over 10 percent per year for the past two years, while enplaned air cargo tonnage has increased at over 18 percent per year over the same period. This growth ranked Austin the fourth fastest growing airport in the United States.

PLANNING LEVELS

Estimates of the timing of certain threshold events are the basis of planning decisions, and in an airport master plan these events correspond to levels of aviation demand. For this Master Plan, the future levels of demand are referenced to "planning levels." The projected need for facility improvements is based on these planning levels rather than specific time periods. This report addresses three future planning levels, which correspond to the High Growth forecast for 2005, 2010 and 2020. Future planning levels have been identified for million annual (enplaned plus deplaned) passengers (MAP), annual tons of enplaned cargo and annual aircraft operations and are presented in Table 3-1 together with the corresponding actual traffic for the year 2000.

The base year for aviation demand forecasts in this Master Plan Update is the year 2000, as this represented the last complete year of historical data at the time forecasts were prepared. The Base Year and forecast years reflect calendar years (as opposed to fiscal years). As previously explained the DOA selected the High Growth forecast as the basis for determining facility requirements. Once the forecasts are adopted for subsequent planning analyses it is not practical to change the base year forecasts.

The facility requirements for the passenger terminal and some other airport facilities are based on planning levels of annual passengers. Facility requirements for cargo facilities are based on planning

levels of annual enplaned tons of enplaned cargo, and the requirements for airfield (runway) facilities are tied to aircraft operations.

Table 3-1
FUTURE PLANNING LEVELS

Item	Actual (2000)	Planning Level 1 (2005)	Planning Level 2 (2010)	Planning Level 3 (2020)
Annual Passengers	7.7 MAP	11.0 MAP	13.2 MAP	18.4 MAP
Annual Enplaned Cargo	83,612 tons	147,200 tons	204,600 tons	322,700 tons
Annual Aircraft Operations	212,620	268,825	300,989	372,670

Note: MAP = Million Annual Passengers

DESCRIPTION OF AIR SERVICE AREA

ABIA primarily serves ten counties in the central portion of Texas, referred to in the Master Plan as the Air Service Area (ASA), shown in Figure 3-1. The ASA coincides with the region served by the Capital Area Planning Council (CAPCO) and covers the majority of population and employment that contribute to demand. It is also consistent with the Airport Service Area identified in the 1993 Master Plan. The primary service area within the ASA is the Austin Metropolitan Statistical Area (MSA), consisting of Hays, Travis, and Williamson counties. The secondary service area of the ASA includes Bastrop, Blanco, Burnet, Caldwell, Fayette, Lee, and Llano counties.

The demand for air service in a region is affected by a range of local issues (population, economic activity, and air carrier service and market strategies), national considerations (economy, cost of air travel, technological advances in communications), and international factors (economic growth and cost of air travel). The forecasts described in the following sections were developed with an understanding of the possible impact of these factors on the demand for air travel in the ASA.

PASSENGER FORECAST

Air passenger traffic in the ASA increased from 982,600 enplanements in 1981 to 3.7 million enplanements in 2000, or 7.3 percent per annum over the period. Between 1981 and 1990, enplanements increased at 9.0 percent annually, decreasing to 4.5 percent per annum between 1990 and 1995, and increasing to 7.0 percent between 1995 and 2000. Limited direct international service to North American destinations has been initiated at ABIA in the past two years. In 1999, 12,550 passengers enplaned to international destinations, increasing to 19,300 in 2000.

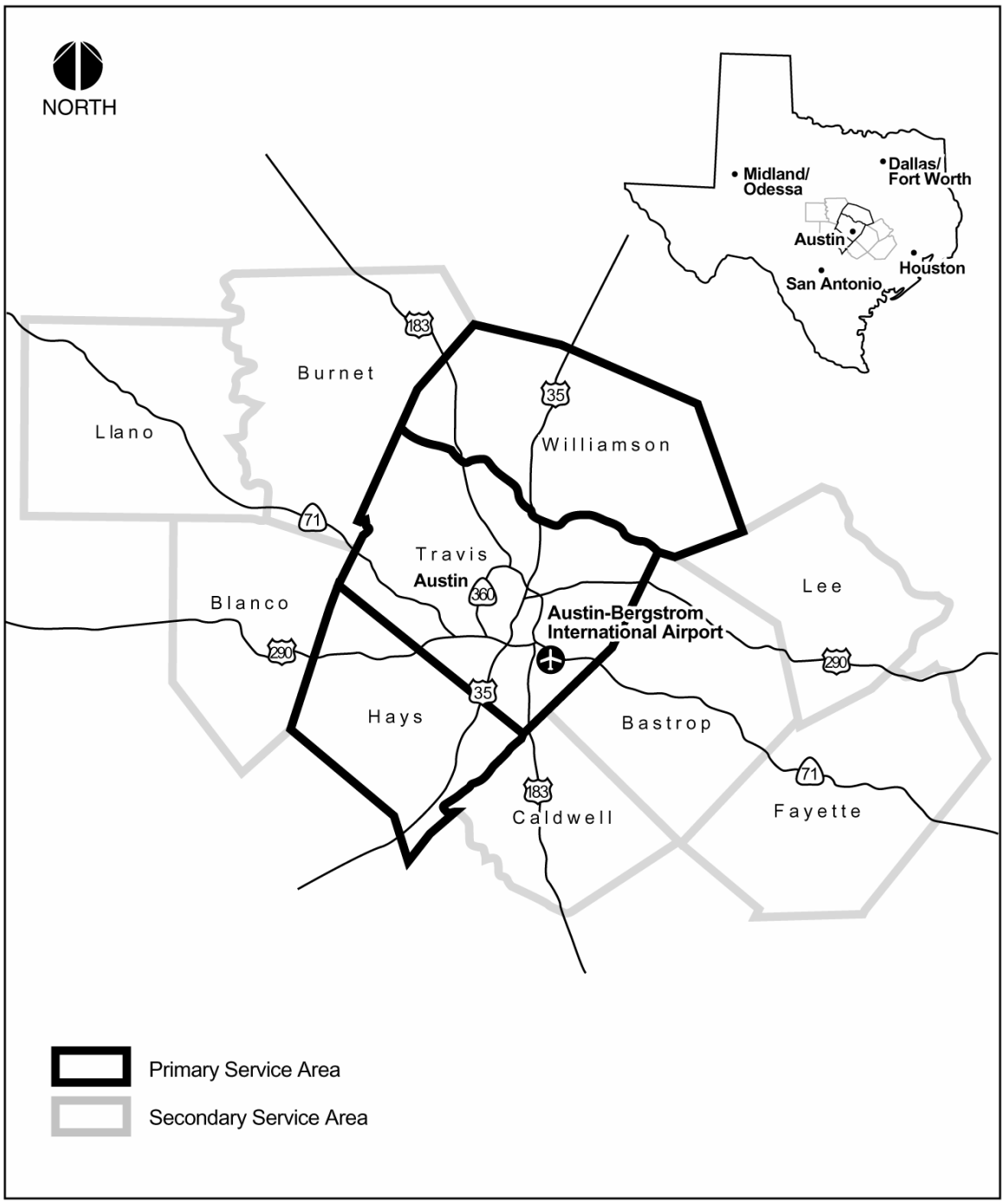

Figure 3-1
Air Service Area
Austin-Bergstrom International Airport

Forecast Methodology

The High, Medium, and Low Growth forecasts of enplaned air passenger demand in the ASA were developed by using the following approach:

- Project the total ASA enplaned passengers. The forecast approach uses multiple linear regression analysis to relate historic ASA enplaned passenger activity with those variables known to influence the level of air passenger activity. The approach follows generally accepted practices in the aviation industry for long-range forecasting of passenger demand. Variables used in the forecast model to estimate future passenger demand were ASA population, ASA per capita personal income, and the average cost of air travel (as measured by average domestic revenue per revenue passenger mile, or yield, in constant dollars).

- Project the share of passengers who are traveling domestically and internationally. As passenger demand at the Airport grows, and the number and variety of domestic flights increases, the demand for direct international service to the Austin area should increase. For purposes of this forecast, this relationship was quantified based on the growth trends experienced at other airports. The results of the analysis indicated a trend in increasing international passenger traffic with increasing total passenger activity. This trend information was applied to existing and projected conditions at ABIA to project the future share of international enplanements.

- Project the share of passengers traveling on major air carrier airlines versus regional/commuter airlines. The share of passengers using regional/commuter airlines at Austin has historically ranged from 1.0 to 1.5 percent of total passenger traffic. In 1999 and 2000, regional/commuter passengers represented about one percent of total passenger traffic. This relationship was assumed to continue over the 20-year forecast horizon.

- Estimate High, Medium and Low Growth forecasts. High, medium and low population and income growth scenarios for the Austin area were evaluated to establish the potential impacts on future demand for air passenger service at the Airport under each scenario.

High Growth Air Passenger Demand Forecast

Projected enplaned air passenger demand at ABIA under the High Growth forecast is shown in Table 3-2. Total enplanements at the Airport are expected to increase from 3.7 million in 2000 to 9.2 million by 2020, an average increase of 4.6 percent per year.[1]

Domestic enplanements are forecast to increase from 3.7 million in 2000 to almost 9.1 million by 2020, an average increase of 4.6 percent per year. International passengers are anticipated to increase from 19,300 in 2000 to almost 118,000 in 2020, for an average increase of 9.5 percent per year.

[1] Unless otherwise noted, all percentage increases are compounded annual rates.

Major air carrier airline enplanements are forecast to increase from 3.7 million in 2000 to 9.1 million in 2020, or 4.6 percent per year. Regional/commuter airline enplanements are expected to increase from almost 36,000 in 2000 to 92,100 by 2020, an increase of 4.8 percent per year.

Table 3-2
HIGH GROWTH PASSENGER ENPLANEMENT FORECAST
AUSTIN-BERGSTROM INTERNATIONAL AIRPORT

	Historic			Forecast		
	1991	**1995**	**2000**	**2005**	**2010**	**2020**
Domestic versus International Enplanements						
Domestic	2,054,310	2,668,447	3,717,858	5,445,200	6,548,400	9,096,200
International	-	-	19,310	51,800	74,600	117,800
Total	2,054,310	2,668,447	3,737,168	5,497,000	6,623,000	9,214,000
Air Carrier versus Regional/Commuter Enplanements						
Air Carrier	2,022,277	2,637,833	3,701,250	5,442,000	6,556,800	9,121,900
Regional/Commuter	32,033	30,614	35,918	55,000	66,200	92,100
Total	2,054,310	2,668,447	3,737,168	5,497,000	6,623,000	9,214,000

Source: 1993 Master Plan (1991 data); Airport records (1995 and 2000 data); P&D Aviation (forecast data)

Range of Passenger Forecasts For Growth Scenarios

The range of forecasts resulting from the High, Medium and Low Growth scenarios is presented in Table 3-3. As may be noted, the 2020 High Growth enplanement forecast is 19 percent greater than the Medium Growth forecast and 34 percent greater than the Low Growth forecast.

Peak Hour Passenger Forecast

Passenger peaking characteristics are important for assessing terminal space requirements. As airports increase in overall passenger activity, peak hour activity tends to decline as a percentage of daily activity. The number of passengers in the peak hour was calculated for the average day in the peak month (peak month passengers divided by 31 days) at the Airport (see Table 3-4). The projected number of passengers in the peak month was developed from peak activity at the Airport in 2000, with adjustments in the future to account for the spreading, or flattening of peak hours as enplanements increase. The peak month in 2000 was July, with 9.2 percent of annual passengers. This figure is consistent with historic peaking characteristics, which have ranged from 9.0 to 9.3 percent since 1996.

Table 3-3
RANGE OF PASSENGER FORECASTS
AUSTIN-BERGSTROM
INTERNATIONAL AIRPORT

Year	Forecast		
	High Growth	Medium Growth	Low Growth
Enplaned Passengers			
2000	3,737,168	3,737,168	3,737,168
2005	5,497,000	5,047,000	4,855,000
2010	6,623,000	5,937,000	5,535,000
2020	9,214,000	7,745,000	6,867,000
Percent Annual Change			
2000-2005	8.0%	6.2%	5.4%
2005-2010	3.8%	3.3%	2.7%
2010-2020	3.4%	2.7%	2.2%
2000-2020	4.6%	3.7%	3.1%
Percent Total Change			
2000-2005	47.1%	35.0%	29.9%
2005-2010	20.5%	17.6%	14.0%
2010-2020	39.1%	30.5%	24.1%
2000-2020	146.6%	107.2%	83.7%

Source: P&D Aviation.

Table 3-4
PASSENGER PEAKING CHARACTERISTICS
HIGH GROWTH PASSENGER FORECAST
AUSTIN-BERGSTROM INTERNATIONAL AIRPORT

Description	Estimated 2000	Forecast 2005	2010	2020
Passengers in Peak Hour of Average Day Peak Month (ADPM)				
Enplanements	1,741	2,342	2,729	3,577
% ADPM	15.3%	14.3%	13.8%	13.0%
Deplanements	1,639	2,192	2,546	3,321
% ADPM	14.4%	13.4%	12.9%	12.1%
Total Passengers	2,644	3,546	4,125	5,394
% ADPM	11.6%	10.8%	10.5%	9.8%

Source: P&D Aviation.

Regional Hub Scenario

The potential impact on enplanement levels of developing a regional airline hub at ABIA was also evaluated. Under this scenario, an airline providing regional air service was assumed to develop a hub at ABIA. The primary effect of this development on total enplanement levels would be to increase the level of connecting passenger activity at the Airport. Under the High Growth Hub Scenario, enplanement levels could reach 10.6 million by 2020, a 15 percent increase over the High Growth forecast (see Table 3-5).

Table 3-5
HIGH GROWTH HUB SCENARIO
ENPLANED PASSENGER FORECAST
AUSTIN-BERGSTROM
INTERNATIONAL AIRPORT

Year	High Growth Forecast	High Growth Hub Scenario
Enplaned Passengers		
2000	3,737,168	3,737,168
2005	5,497,000	5,772,000
2010	6,623,000	7,285,000
2020	9,214,000	10,596,000
Percent Annual Change		
2000-2005	8.0%	9.1%
2005-2010	3.8%	4.8%
2010-2020	3.4%	3.8%
2000-2020	4.6%	5.3%
Percent Total Change		
2000-2005	47.1%	54.4%
2005-2010	20.5%	26.2%
2010-2020	39.1%	45.4%
2000-2020	146.6%	183.5%

Source: P&D Aviation.

The High Growth Hub Scenario could potentially increase passenger peaking activity by more than the 15 percent increase in passengers. This is due to the fact that a hub airline would schedule banks of arrivals and departures to facilitate passenger connections. The effect of accommodating these connecting flights could potentially increase the peak hour activity under the Hub Scenario by 18 percent.

AIR CARGO FORECAST

A total of 83,600 tons of air cargo were enplaned at ABIA in 2000, up from 4,100 tons in 1981, or an increase of 17.1 percent per year over the period. The majority of air freight is carried by all cargo airlines. All cargo airlines share of air cargo volume increased from 77 percent in 1995 to 86 percent in 2000. International air freight service was initiated from ABIA in 1998, and by 2000, the amount of international enplaned air freight reached 2,879 tons (3.7 percent of enplaned air freight).

The ratio of enplaned and deplaned air cargo at ABIA is relatively balanced. Since 1995, enplaned air cargo has accounted for 47 to 51 percent of total air cargo at the Airport.

High Growth Air Cargo Demand Forecast

Projected enplaned air cargo demand at ABIA under the High Growth forecast is shown in Table 3-6. Total enplaned air cargo (cargo carried on all-cargo aircraft as well as belly cargo on passenger aircraft) at the Airport is expected to increase from 83,600 tons in 2000 to almost 323,000 tons by 2020, an average increase of 7.0 percent per year.

Air freight (including express mail) is projected to increase from 78,500 tons in 2000 to almost 307,000 tons in 2020. Air mail is forecast to increase from about 5,100 tons in 2000 to 16,100 tons in 2020. Domestic enplaned air cargo is forecast to increase from 80,700 tons in 2000 to 301,000 tons in 2020 (6.8 percent per year). Reflecting the increasing importance of international trade and multi-national component manufacturing, international air cargo is forecast to increase at almost twice the rate of domestic air cargo, from 2,900 tons in 2000 to 21,500 tons in 2020, or 10.6 percent per year over the forecast period.

It is important to note that this forecast accounts for locally generated demand for air cargo services, consistent with the activity that has been occurring over time. It does not account for cargo transfer activity that might occur if one or more carriers decided to develop a "hub" type of operation at the Airport. The impact of that type of scenario would need to be assessed based on the specific operating plans of potential carriers.

Range of Cargo Demand Forecasts For Growth Scenarios

Medium and Low Growth scenarios of potential air cargo demand were also explored. Air cargo activity could reach 271,000 tons by 2020 under the Medium Growth scenario. Under the Low Growth scenario, air cargo demand would reach almost 228,000 tons by 2020 (see Table 3-7).

Table 3-6
HIGH GROWTH FORECAST
OF ENPLANED AIR CARGO BY TYPE
AUSTIN-BERGSTROM INTERNATIONAL AIRPORT
(U.S. tons)

	Actual		Forecast		
	1991	2000	2005	2010	2020
Freight versus Mail					
Freight	12,581	78,545	139,104	194,370	306,565
Mail	3,756	5,067	8,096	10,230	16,135
Total	16,337	83,612	147,200	204,600	322,700
Domestic versus International					
Domestic	16,337	80,733	140,030	192,861	301,151
International	-	2,879	7,170	11,739	21,549
Total	16,337	83,612	147,200	204,600	322,700

Sources: 1991: 1993 Master Plan Update; 2000: Airport records; 2005-2020: P&D Aviation.

Table 3-7
RANGE OF AIR CARGO FORECASTS
AUSTIN-BERGSTROM
INTERNATIONAL AIRPORT

Year	Enplaned Air Cargo (U.S. tons)		
	High Growth	Medium Growth	Low Growth
Enplaned Air Cargo (U.S. tons)			
2000	83,612	83,612	83,612
2005	147,200	140,800	133,000
2010	204,600	188,900	170,500
2020	322,700	271,300	227,600
Percent Annual Change			
2000-2005	12.0%	11.0%	9.7%
2005-2010	6.8%	6.1%	5.1%
2010-2020	4.7%	3.7%	2.9%
2000-2020	7.0%	6.1%	5.1%
Percent Total Change			
2000-2005	76.1%	68.4%	59.1%
2005-2010	39.0%	34.2%	28.2%
2010-2020	57.7%	43.6%	33.5%
2000-2020	285.9%	224.5%	172.2%

Source: P&D Aviation.

FORECAST OF BASED GENERAL AVIATION AIRCRAFT

A based aircraft is an airplane that is permanently housed at a particular airport. In 2000, ABIA had 126 general aviation aircraft based at the Airport (about 15 percent of the Austin area total). The distribution of aircraft based at the Airport is as follows:

- Single-engine piston 51
- Multi-engine piston 55
- Jet 15
- Helicopter 5
- Total 126

High Growth Forecast of Based General Aviation Aircraft

In the High Growth forecast, it is assumed that the number of aircraft based at ABIA will increase to 238 in 2005, an increase of 112, which is equal to the total number of T-hangar and tiedown spaces being constructed. It is further assumed that a new general aviation airport in 2005 would not draw general aviation aircraft from ABIA. Under these conditions, ABIA would base about 27 percent of the Austin-area general aviation aircraft. It is assumed that the Airport would continue to base 27 percent of the area aircraft under the High Growth scenario. In this scenario, the number of general aviation aircraft would grow from 126 in 2000 to 245 in 2010 and 266 in 2020 (Table 3-8).

Table 3-8
HIGH GROWTH FORECAST OF GENERAL AVIATION BASED AIRCRAFT AT AUSTIN BERGSTROM INTERNATIONAL AIRPORT, 2000-2020

Year	Single Engine Piston	Multi-Engine Piston	Jet	Helicopter	Total
Existing					
2000	51	55	15	5	126
High Growth Forecast					
2005	96	104	30	8	238
2010	98	104	35	8	245
2020	109	104	44	9	266

Sources: existing-Austin-Bergstrom International Airport; forecast-P&D Aviation analysis, 2001.

Range of Forecasts of General Aviation Based Aircraft Demand For Growth Scenarios

For the Medium forecast, it was estimated that 53 additional aircraft would locate at the Airport between 2000 and 2005. This increase in aircraft equals the number of T-hangar spaces to be added. It is estimated that the increase in aircraft parking apron area would not result in a net increase of based aircraft in this scenario due to the impact of a new general aviation airport in the Austin area. The Medium Growth scenario envisions the number of general aviation aircraft based at ABIA will be 179 in 2005, 173 in 2010 and 167 in 2020.

Under the Low Growth Forecast, it is assumed the number of aircraft based at ABIA will increase after the new T-hangars and tiedowns are constructed but will decline when a new general aviation airport is built by 2005. The Low Growth scenario envisions the number of general aviation aircraft will be 126 in 2005 (the same as in 2000), 118 in 2010 and 108 in 2020.

FORECAST OF AIRCRAFT OPERATIONS

Passenger Aircraft Operations Forecast

Forecast Methodology

Passenger aircraft operations include air carrier operations, regional/commuter operations and air taxi operations. Air carrier and regional/commuter passenger operations are projected from estimates of future aircraft size (average seats per departure) and load factor (percentage of seats occupied by enplaning passengers). The average number of enplaning passengers per aircraft departure is derived by multiplying the average seats per departure by the load factor. Aircraft departures are derived by dividing the number of passengers by type by the number of passengers per departure. Total air carrier and regional/commuter operations are calculated by multiplying aircraft departures by two.

The assumptions used in this analysis were developed from analyses of existing and historic fleet mix, average number of seats per departure, and load factors for passenger operations at the Airport; Airport service role; FAA forecasts of growth in average seat size; and FAA forecasts of load factors. Assumptions used in this forecast are discussed below:

- **Air Carrier Seats per Departure.** Air carrier aircraft (including charter flights) averaged 129 seats per departure in 2000. This is slightly lower than the 133 seats per departure in 1991, reflecting the replacement of some larger aircraft (such as the B727) with somewhat smaller types (such as B737 series aircraft[2]). Based on the existing and anticipated fleet mix at the Airport, average aircraft size is expected to increase to almost 140 seats by 2020.

- **Air Carrier Load Factors.** Load factors averaged 63.5 percent in 2000, up from 50 percent in 1991. Load factors are projected to increase slightly to 69.5 percent over the forecast period, due

[2] B737 aircraft are the predominant passenger aircraft at the Airport due in large part to the presence of Southwest Airlines, which exclusively uses B737s. Southwest is the largest air carrier at the Airport with 35 percent of passenger enplanements in 2000.

to airline scheduling policies that allow air carriers to rapidly adjust capacity levels to more closely correspond to changes in passenger demand.

- **Regional/Commuter Seats per Departure.** Regional/commuter aircraft at the Airport averaged almost 34 seats per departure in 2000. This figure was almost double the 19 seats per departure in 1991, reflecting an increase in regional/commuter aircraft size at the Airport. Based on anticipated fleet mix and FAA forecasts, average aircraft size is expected to grow by less than one seat per year over the forecast period, reaching 48 seats in 2020.

- **Regional/Commuter Load Factors.** Regional/commuter load factors averaged almost 40 percent in 2000, up from 29 percent in 1991. Load factors are projected to increase to 46 percent over the forecast period. The higher load factor results from continued introduction of larger aircraft and the need to cover the higher cost per seat mile flown.

- **Air Taxi Operations.** Air taxi operations have remained fairly constant in recent years, averaging about 6,500 in 1999 and 2000. Based on this historic trend, for this forecast it was assumed that air taxi operations would remain constant at 6,500 over the forecast horizon.

High Growth Forecast of Passenger Aircraft Operations

These assumptions were applied to the High Growth forecasts of passenger activity by type to project aircraft operations. Aircraft operations derived from this methodology are shown for the High Growth Forecast in Table 3-9. As may be noted, passenger aircraft operations are projected to increase from 102,145 in 2000 to about 134,000 in 2005, 154,000 in 2010 and 203,000 in 2020. The increase in passenger aircraft operations is projected at a lower rate of growth relative to passenger activity due to an anticipated increase in aircraft size and load factors over the forecast period.

If the hub scenario were to materialize, passenger aircraft operations would increase. The level and type of increase (air carrier versus regional/commuter operations) would depend on the type of hub operation that was developed.

All Cargo Aircraft Operations Forecast

Forecast Methodology

All-cargo aircraft operations include both air carrier and regional/commuter aircraft. All-cargo aircraft operations were forecast based on the projected share of air cargo carried as belly hold cargo versus on all-cargo aircraft, the distribution of all-cargo tonnage between air carrier and regional/commuter aircraft and the average load factor (pounds per departure) for all-cargo aircraft. Assumptions are as follows:

Table 3-9
SUMMARY OF HIGH GROWTH AIRCRAFT OPERATIONS FORECAST
AUSTIN-BERGSROM INTERNATIONAL AIRPORT

	Historic		Forecast		
Type of Operation	**1991**	**2000**	**2005**	**2010**	**2020**
Passenger					
Air Carrier	60,538	90,306	120,465	140,286	188,173
Commuter/Air Taxi	-	-			
Regional/Commuter	11,720	5,320	7,003	7,528	8,360
Air Taxi	1,645	6,519	6,500	6,500	6,500
Subtotal	13,365	11,839	13,503	14,028	14,860
Total	73,903	102,145	133,968	154,314	203,032
All Cargo					
Air Carrier	1,346	9,698	17,000	23,181	34,729
Regional/Commuter	4,808	6,180	11,357	15,994	25,408
Total	6,154	15,878	28,357	39,175	60,137
General Aviation / Military					
General Aviation	95,229	88,873	101,000	102,000	104,000
Military	6,012	5,724	5,500	5,500	5,500
Total	101,241	94,597	106,500	107,500	109,500
Total Operations					
Total	181,298	212,620	268,825	300,989	372,670

Source: 1991: 1993 Master Plan Update; 2000: Airport records; 2005-2020: P&D Aviation

- **Share of Air Cargo Carried as Belly Cargo.** The share of air cargo carried as belly cargo assumed that (1) 80 percent of air mail is carried as belly cargo[3] and (2) the portion of air freight carried as belly cargo is a function of the number of passenger aircraft departures and average pounds of freight carried per departure. In 2000, air freight carried as belly cargo averaged 244 pounds per passenger aircraft departure. This was up from 200 pounds per departure in 1991. As

[3] Historically all air mail has been carried as belly cargo. However, the recently signed service agreement between the USPS and Federal Express will ship some USPS priority and overnight mail on Federal Express aircraft, providing USPS with a more reliable air distribution network. It will also continue to ship mail as belly hold on passenger aircraft. No estimates are available as to the total share of U.S. mail that may be shipped on Federal Express aircraft. For this forecast, it was assumed that 20 percent of mail would be transported on all cargo aircraft.

the fleet mix changes and larger passenger aircraft come into service at the Airport, this figure is expected to increase to 270 pounds per departure by 2020.

- **All-Cargo Aircraft Load Factors.** In 2000, air carrier all cargo aircraft averaged just over 29,000 pounds of air freight per departure. As the fleet mix changes and larger all cargo aircraft begin service at the Airport, this figure is expected to increase over time, reaching 33,400 pounds per departure in 2020. In 2000, regional/commuter all cargo aircraft averaged just under 1,000 pounds of air freight per departure. The types and size of aircraft expected to serve this market segment (such as the Cessna Caravan) are expected to remain fairly stable, and this figure is expected to remain constant over the forecast horizon.

- **Share of Air Freight Carried on Air Carrier and Regional/Commuter Aircraft.** In 2000, almost 98 percent of freight carried on all cargo aircraft was transported on air carrier aircraft. This share was up from about 89 percent in 1991. It is anticipated that the 2000 share of freight carried on air carrier aircraft will remain constant over the forecast horizon.

High Growth Forecast of All-Cargo Aircraft Operations

These assumptions are applied to the High Growth forecasts of enplaned air cargo activity by type to project all cargo aircraft operations (see Table 3-9). All-cargo aircraft operations are projected to increase from 15,878 in 2000, to about 28,000 in 2005, 39,000 in 2010 and 60,000 in 2020. The lower rate of growth in operations relative to cargo activity is due to anticipated increases in aircraft size and load factors over the forecast period.

If a cargo hub scenario were to materialize that included a significant share of connecting cargo, the overall cargo tonnage figures at ABIA would increase and the level of all cargo aircraft operations would most likely also increase. The level and type of increase in all cargo aircraft operations would depend on the type of cargo hub operation that was developed.

General Aviation Aircraft Operations Forecast

From 1991 to 2000, general aviation operations at RMMA and ABIA averaged approximately 75,000 plus 110 operations per based aircraft. This relationship is estimated to continue in the future. For the High Growth forecast of general aviation operations, it is estimated that general aviation operations will increase to 101,000 by 2005, 102,000 in 2010, and 104,000 in 2020 (see Table 3-9).

Military Aircraft Operations Forecast

In 2000, there were 5,724 military aircraft operations at the Airport. This figure has remained relatively constant over the past five years, ranging from a high of 6,300 in 1996 to a low of 3,800 in 1998. Military aircraft operations are projected to remain constant at 5,500 over the forecast horizon (see Table 3-9).

Total Aircraft Operations Forecast

Total aircraft operations under the High Growth scenario are forecast to increase from 212,620 in 2000, to about 269,000 in 2005, 301,000 in 2010, and 373,000 in 2020 (see Table 3-9). The projected growth in aircraft operations is driven by increasing passenger and air cargo demand at the Airport, as well as increasing general aviation activity. The increase in operations equates to a 2.8 percent annual growth rate over the 20 year forecast horizon.

Peak Hour Aircraft Operations Forecast

The peaking characteristics of aircraft operations, particularly peak hour operations, are important in considering runway capacity needed to accommodate the demand and associated aircraft delays. The number of commercial, general aviation and military aircraft operations in the peak month at ABIA were estimated from the FAA Air Traffic Control Tower logs for calendar year 2000. The peak month for aircraft operations was August. The number of operations in the average day of the peak month was derived by dividing peak month operations by 31 days. The peak hour operations factor by type of operation was estimated from the FAA Air Traffic Control Tower hourly logs for the month of August 2000. The peak hour aircraft operations for the average day of the peak month for the Airport under the High Growth Forecast are shown in Table 3-10.

Table 3-10
HIGH GROWTH PEAK HOUR AIRCRAFT OPERATIONS
IN THE AVERAGE DAY OF THE PEAK MONTH
AUSTIN-BERGSTROM INTERNATIONAL AIRPORT

	Actual	Forecast		
	2000	2005	2010	2020
Operations in Peak Hour of Average Day Peak Month (ADPM)				
Air Carrier	24	33	39	54
Commuter / Air Taxi	4	6	7	10
General Aviation	26	30	30	31
Military	2	2	2	2
Total	57	71	79	96

Source: P&D Aviation.

SURFACE TRANSPORTATION FORECASTS

High Growth surface transportation forecasts were estimated for the average day peak month (ADPM) conditions at the following activity centers (summarized in Table 3-11):

- Passenger Terminal
- Public Parking

- Rental Car Ready/Return
- Employee Parking
- Ground Transportation Staging Area (GTSA)
- Air Cargo

Terminal trip generation[4] forecasts were based on the observed trip generation rate of approximately 1.85 vehicles per day (vpd) per origin-destination (O&D) non-connecting passenger. Based on this rate continuing, ADPM trip generation is expected to increase from 40,880 vpd in 2000, to 58,700 vpd in 2005, 70,700 vpd in 2010, and 98,400 vpd in 2020.

Table 3-11
HIGH GROWTH SURFACE TRANSPORTATION FORECASTS
FOR THE AVERAGE DAY PEAK MONTH (ADPM)

Item	Year			
	2000	**2005**	**2010**	**2020**
Million Annual Passengers	7.7	11.0	13.2	18.4
Terminal Trip Generation	40,880	58,700	70,700	98,400
Public Parking Transactions	6,620	9,500	11,440	15,920
Rental Car Transactions	1,810	2,860	3,440	4,790
Employee Parking Transactions	1,150	1,570	1,830	2,430
GTSA Transactions	1,060	1,600	1,990	2,900
Air Cargo Trip Generation	3,510	6,170	8,580	13,530

Notes: Terminal trip generation includes traffic on Presidential Boulevard and Spirit of Texas Drive, and excludes traffic on Golf Course Road and General Aviation Avenue. Traffic associated with public parking, rental car, employee parking, GTSA, and air cargo are included in the terminal trip generation estimates.

Parking transaction forecasts were based on the existing ratio of 0.30 parking transactions per O&D passenger. The ADPM public transaction level at ABIA is projected to increase from approximately 6,620 daily transactions in 2000, to 9,500 transactions in 2005, 11,440 transactions in 2010, and 15,920 transactions in 2020.

Rental car transaction forecasts were based on the observed ratio of approximately 90 transactions per 1,000 O&D passengers. The level of rental car transactions is projected to increase from approximately 1,810 daily transactions in 2000, to 2,860 transactions in 2005, 3,440 transactions in 2010, and 4,790 transactions in 2020.

[4] Due to the interconnectivity of the roadway system in the vicinity of the passenger terminal, terminal-related trip generation at ABIA is assumed to consist of inbound and outbound traffic at Presidential Boulevard and Spirit of Texas Drive, and excludes traffic on Golf Course Road and General Aviation Avenue.

Employee parking transaction forecasts were based on the existing ratio of approximately 50 daily transactions per 1,000 total passengers. This ratio is assumed to decrease in the future, as the number of airport employees does not generally increase at the same rate as air passengers. The ADPM employee parking transaction level at ABIA is projected to increase from approximately 1,150 daily transactions in 2000, to 1,570 transactions in 2005, 1,830 transactions in 2010, and 2,430 transactions in 2020.

Ground Transportation Staging Area (GTSA) transaction forecasts are based on the existing peak rate of approximately 48 transactions per 1,000 O&D passengers. In conjunction with the expected increase in transit use as airport size increases, it is reasonable to assume a corresponding increase in GTSA transaction rate in the future. The level of GTSA transactions is projected to increase from approximately 1,060 daily transactions in 2000, to 1,600 transactions in 2005, 1,990 transactions in 2010, and 2,900 transactions in 2020.

Air cargo trip generation forecasts were based on the existing rate of 6.5 vpd per daily ton of air cargo. This rate is assumed to remain constant in the future. The ADPM air cargo vehicular traffic is projected to increase from approximately 3,510 vpd in 2000, to 6,170 vpd in 2005, 8,580 vpd in 2010, and 13,530 vpd in 2020.