Chapter 2

FORECASTS

FORECASTS

The aviation demand forecasts presented in this chapter have been prepared using data provided by the Scottsdale Airport administrative staff, as well as FAA aircraft operational records. **Table 2A** outlines the history of operational activity at Scottsdale Airport over the last twenty years. In addition, the forecasts take into account updated national forecasts released in March 2003 by the Federal Aviation Administration (FAA) in the publication FAA *Aerospace Forecasts, Fiscal Years 2003-2014*. This analysis is included as part of the Title 14, Code of Federal Regulations (CFR), Part 150 Study and examines recent developments in general aviation and air taxi trends, as well as recent developments in aircraft mix.

Aviation activity is affected by many influences on the national, regional, and local levels, making it virtually impossible to predict year-to-year fluctuations of activity over a twenty-year planning period, with any certainty. Therefore, it is important to remember that forecasts are to serve only as guidelines and planning must remain flexible enough to respond to a range of unforeseen developments.

The following forecast analysis examines recent developments, historical information, and current aviation trends to provide an updated set of aviation demand projections for Scottsdale Airport (SDL). The intent is to permit the Part 150 Noise Compatibility Study to take into account changes that have occurred in the general aviation industry since the airport's last Master Plan was completed in 1997, as well as subsequent impacts resulting from the events of September 11, 2001.

TABLE 2A
Historical Airport Activity Summary
Scottsdale Airport

Year	Annual Operations	Based Aircraft
1984	156,612	447
1985	170,559	462
1986	189,789	432
1987	188,043	409
1988	192,541	375
1989	229,816	414
1990	265,819	410
1991	234,597	405
1992	197,577	403
1993	184,512	420
1994	166,738	393
1995	178,109	403
1996	183,104	403
1997	185,100	400
1998	208,464	401
1999	230,572	424
2000	206,533	425
2001	184,727	439
2002	195,474	446
2003	194,472	460

Source: FAA ATCT Staff and Scottsdale Airport Administration

This begins with a discussion of the trends in general aviation at the national level.

NATIONAL AVIATION TRENDS

Each year, the Federal Aviation Administration (FAA) updates and publishes a national aviation forecast. Included in this publication are forecasts for air carriers, regionals/commuters, general aviation, and FAA workload measures. The forecasts are prepared to meet budget and planning needs of the constituent units of the FAA and to provide information that can be used by state and local authorities, the aviation industry, and the general public. The current edition when this chapter was prepared was *FAA Aerospace Forecasts-Fiscal Years 2003-2014*, published in March 2003. The forecasts use the economic performance of the United States as an indicator of future aviation industry growth. Similar economic analyses are applied to the outlook for aviation growth in international markets.

The National Bureau of Economic Research has officially confirmed that the tenth recession since the end of World War II began in March 2001. Not surprisingly, the downturn in passenger and cargo demand in the United States domestic market began at the same time. Coupling this with the events of September 11, 2001, an unprecedented seven-year period of growth throughout

the air transportation industry was brought to an end.

It was early in 2002, however, before the severity of the recession was realized. The domestic economy declined for three consecutive quarters in 2001. In 2002, the recovery was underway, but considered weak when compared to past recoveries. In general, the economic projections used by the FAA anticipated a strong recovery beginning in 2003, followed by moderate long-term growth.

Following more than a decade of decline, the general aviation industry was revitalized with the passage of the *General Aviation Revitalization Act* in 1994, which limits the liability on general aviation aircraft to 18 years from the date of manufacture. This legislation sparked an interest to renew the manufacturing of general aviation aircraft due to the reduction in product liability, as well as renewed optimism for the industry. The high cost of product liability insurance was a major factor in the decision by many American aircraft manufacturers to slow or discontinue the production of general aviation aircraft.

The sustained growth in the general aviation industry slowed considerably in 2001, negatively impacted by the events of September 11. Thousands of general aviation aircraft were grounded for weeks due to "no-fly zone" restrictions imposed on operations of aircraft in security-sensitive areas. Some U.S. airports in and around Washington, D.C., and New York City remain closed to visual flight rules (VFR) traffic. This, in addition to the economic recession that began in March 2001, has had a profoundly negative impact on the general aviation industry as a whole.

According to a report released by the General Aviation Manufacturers Association (GAMA), aircraft shipments in 2002 were down 16.9 percent for the first three quarters of fiscal year 2002. The Aerospace Industries Association of America (AIAA) expected general aviation shipments in 2002 to decline 17.7 percent, to 2,153 aircraft. The number of general aviation hours flown declined by 5.9 percent in 2002, and was projected to increase by only 1.1 percent in 2003 and 1.4 percent in 2004.

The events of September 11 have not had as negative an impact on the business/corporate side of general aviation. The increased security measures placed on commercial flights has increased interest in fractional and corporate aircraft ownership, as well as on-demand charter flights. This is reflected in the forecast of active general aviation pilots (excluding air transport pilots), who are projected to increase by 81,000 (1.2 percent annually) over the forecast period.

According to the FAA, the number of general aviation operations handled at enroute traffic control centers increased for the ninth consecutive year. The forecast for general aviation aircraft predicts that business use of general aviation will expand much more rapidly than personal/sport use, due largely to the expected growth in fractional ownership.

In 2002, there was an estimated 211,040 active general aviation aircraft in the U.S., representing a decrease of

0.2 percent from the previous year and the third straight decline following five years of increases. **Exhibit 2A** depicts the FAA forecast for active general aviation aircraft in the United States. The FAA forecasts general aviation aircraft to increase at an average annual rate of 0.7 percent over the 12-year forecast period. Piston-powered aircraft are expected to grow at an average annual rate of 0.2 percent. This is due, in part, to declining numbers of multi-engine piston aircraft, while single engine and rotorcraft increase at rates of 0.3 and 1.1 percent, respectively.

The FAA projections for active GA fixed-wing turbine aircraft are also included in *FAA Aerospace Forecasts FY 2003-2014*. **Exhibit 2B** depicts the projections for both active aircraft and hours flown. The general aviation fixed-wing turbine fleet is forecast to increase at an average annual rate of 2.3 percent through 2014. Within this fleet, business jets are projected to grow at an average annual rate of 3.6 percent, from 7,787 in 2001, to 12,300 in 2014. While jets comprised 3.7 percent of the active GA fleet in 2001, they are projected to be 5.4 percent of the fleet by 2014.

By comparison, turboprop growth projections have been tempered, growing only from 6,596 in 2001, to 8,020 in 2014. While business jets will average a net gain of 347 aircraft per year, turboprops will increase at a rate of 110 aircraft per year. The FAA suggests this may occur due to the increasing cost and performance advantages of business jets over turboprops. Aircraft utilization rates for active business jet aircraft are projected to increase from 341 hours per aircraft in 2001, to 485 hours in 2014. The increases are attributed primarily to the increased number of fractional aircraft. While the typical corporate jet is utilized 300 hours per year, the fractional jet is used nearly three times as much. As a result, total business jet hours flown are projected to increase from 2.7 million hours in 2001, to 6.0 million hours in 2014, for an annual average of 6.4 percent.

The Business Aviation Panel has suggested that the market for the new Eclipse jet aircraft could add 5,000 more aircraft to the fleet by 2010. This twin-engine business jet is expected to be priced under one million dollars, and is believed to have the potential to redefine business jet flying with the capability to support a true air taxi business service. It should be noted, however, that as of November 2003, the aircraft had not yet been certified. Earlier, it had to change to a different make of engine. Therefore, its entry into the market has not been included in the FAA forecasts.

In summary, business aviation, by nature of its ownership and use, will experience cyclical movements in activity relating to economic conditions. Over the long term, however, it is anticipated to continue to be the strongest growth market in general aviation.

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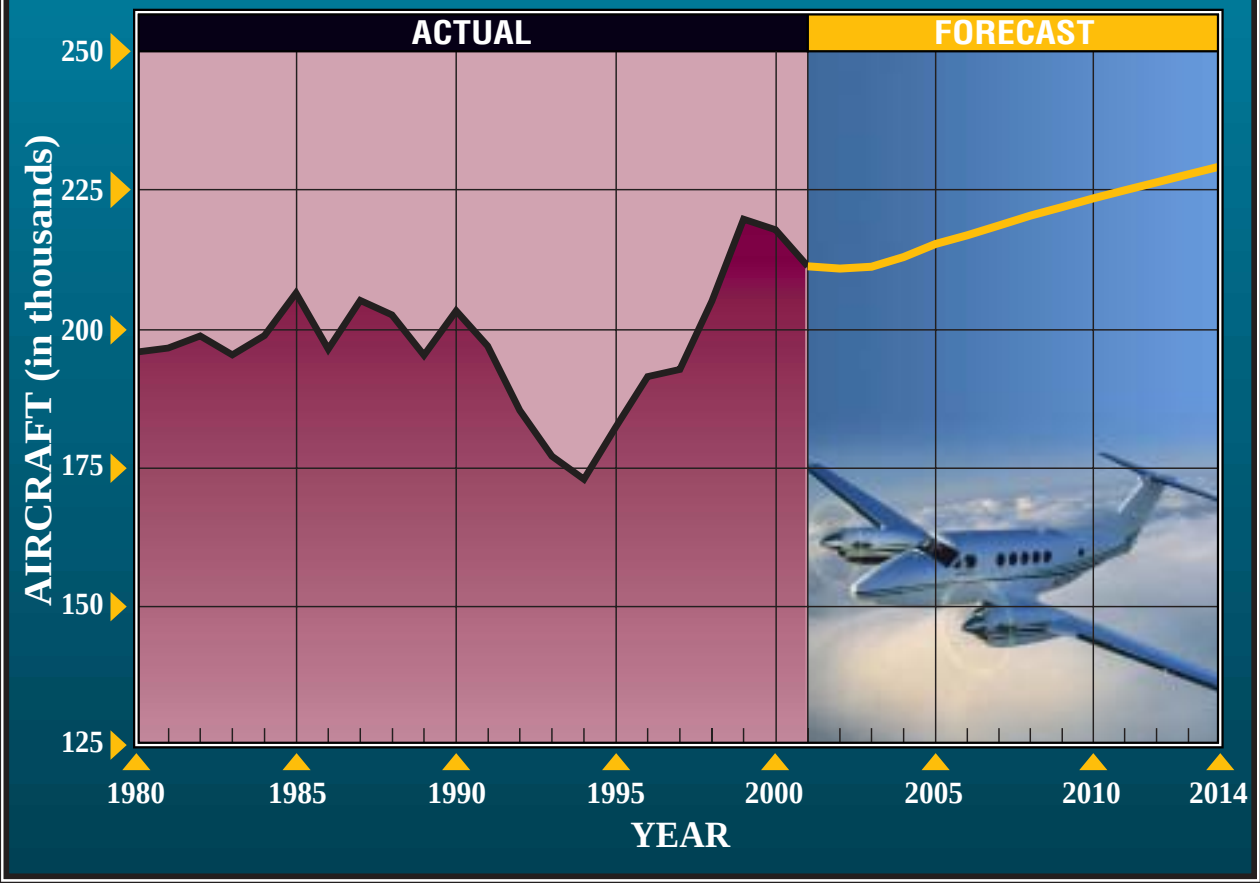
ACTIVE GENERAL AVIATION AIRCRAFT



U.S. ACTIVE GENERAL AVIATION AIRCRAFT (in thousands)

Year	FIXED WING				ROTORCRAFT		Experimental	Other	Total
	PISTON		TURBINE						
	Single Engine	Multi-Engine	Turboprop	Turbojet	Piston	Turbine			
2001 (Actual)	145.0	18.3	6.6	7.8	2.3	4.5	20.4	6.5	211.0
2004	144.9	18.2	6.8	8.4	2.5	4.4	20.5	6.5	213.1
2009	147.6	18.0	7.5	10.3	2.7	4.5	21.0	6.6	222.2
2014	149.6	17.8	8.0	12.3	2.8	4.6	21.5	6.7	229.5

Sources: FAA General Aviation and Air Taxi Activity (and Avionics) Surveys.
FAA Aerospace Forecasts, Fiscal Years 2003-2014.

Notes: An active aircraft is one that has a current registration and was flown at least one hour during the calendar year.

SCOTTSDALE AIRPORT

Exhibit 2A
U.S. ACTIVE GENERAL AVIATION
AIRCRAFT FORECASTS

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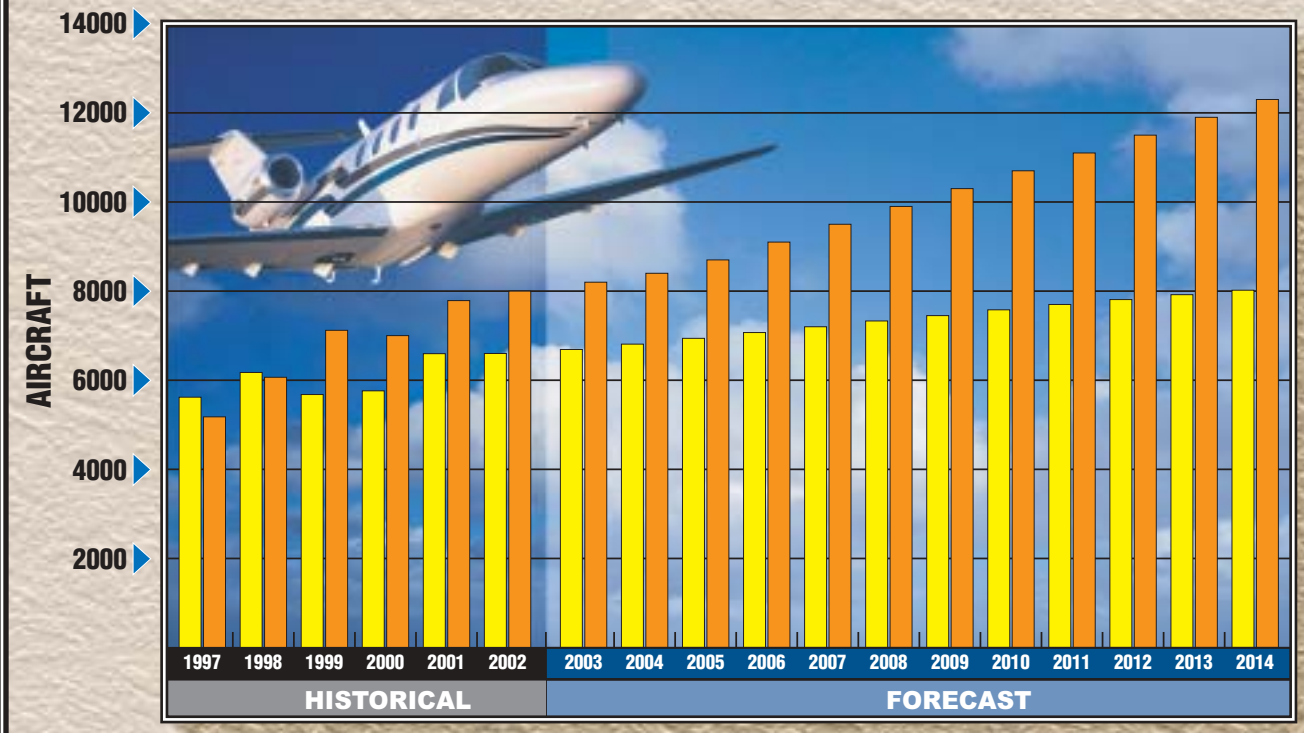
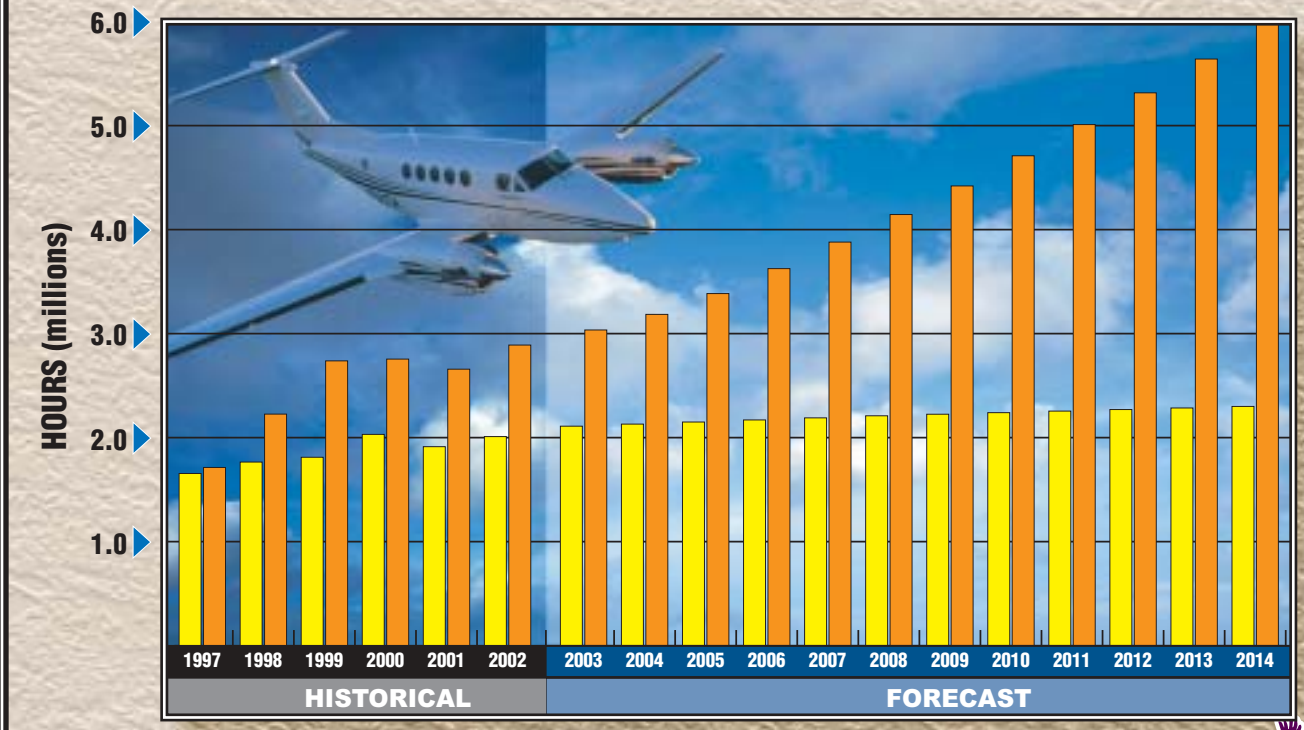
ACTIVE AIRCRAFT - GENERAL AVIATION FIXED-WING TURBINE



GENERAL AVIATION FIXED-WING TURBINE HOURS FLOWN



LEGEND

- Jet
- Turboprop

Source: FAA Airspace Forecasts - FY 2001-2014, March 2003

SCOTTSDALE AIRPORT

Exhibit 2B
BUSINESS AIRCRAFT FORECAST

STATE AND REGIONAL TRENDS

The Arizona Department of Transportation (ADOT) Aeronautics Division assists airports in the state in identifying infrastructure needs with a state aviation needs study and other special aviation studies. The most recent study on a statewide basis is the *State Aviation Needs Study (SANS) - 2000*. The *SANS* includes forecasts of aviation activity in the state. The Maricopa Association of Governments (MAG) is charged with preparing and updating a *Regional Airport System Plan (RASP)* for the Phoenix metropolitan area. The most recent aviation forecasts for the *MAG-RASP* were prepared in late 2001, after the events of September 11. They were adopted by MAG in 2003.

Table 2B depicts the based aircraft forecasts prepared from the *SANS 2000* for the state and Maricopa County. The base year for these forecasts was 1998. The *SANS* forecast that based aircraft in the state would grow at an annual average rate of 1.3 percent through 2020. This is well above the 0.7 percent that FAA projects for active aircraft nationwide.

The percentage of Arizona based aircraft in Maricopa County was actually forecast to decline over the years from 57.6 percent in 1998 to 54.8 percent in 2020. Thus the average growth rate for based aircraft in Maricopa County was projected to be slightly lower at 1.2 percent.

Table 2B also presents the more recent forecast of Maricopa County based aircraft prepared for the *MAG-RASP*. The base year for this year was 2000. As evident from the table, based aircraft in Maricopa County increased by 12 percent between 1998 and 2000. In fact, the actual based aircraft in 2000 were more than the SANS forecast for 2010.

As could be expected, the *MAG-RASP* forecast of based aircraft is higher. This forecast projects total based aircraft in the region to reach 7,612 by 2025. This would be an annual average increase of 2.1 percent, significantly stronger than the national or statewide growth rates projected by FAA and ADOT, respectively.

TABLE 2B
Maricopa County Based Aircraft Forecasts

	Base Year	2005	2010	2015	2020	2025
SANS 2000						
Arizona	6,700	7,156	7,674	8,247	8,896	NA
Maricopa County	3,857	4,065	4,303	4,568	4,877	NA
MAG-RASP						
Maricopa County	4,317	4,820	5,517	6,215	6,913	7,612

Sources: *State Aviation Needs Study – 2000*; ADOT, 1999.
Regional Airport System Plan; Maricopa Council of Governments, 2001.

* Base Year: SANS – 1998
MAG-RASP – 2000.

Keeping in line, the *MAG-RASP* projects fixed-wing turbine aircraft based in the county to grow from 170 in 2000, to 427 by 2025. This would be an increase of 151 percent (3.75 percent annually). Turbine aircraft would also grow as a percentage of all based aircraft from 3.9 percent in 2000, to 9.3 percent in 2025.

SERVICE AREA

The generalized service area of an airport is defined by its proximity to other airports providing similar service. Scottsdale Airport (SDL) is one of several airports serving the general aviation needs of the Phoenix metropolitan area.

Exhibit 2C depicts Scottsdale Airport in relationship to other airports that serve the Northeast Valley. The airports with comparable capabilities to Scottsdale Airport are Deer Valley Airport to the northwest, Sky Harbor Airport to the southwest, and Mesa Falcon Field to the southeast.

Sky Ranch is a smaller, privately-owned general aviation airport located to the north in Carefree. There are no existing airports to the northeast as the mountains limit the need and capability. **Table 2C** compares the runway lengths and based aircraft of these airports to SDL.

The five airports base a total of 3,119 aircraft. Deer Valley Airport (DVT) has the most with 1,375. Phoenix Sky Harbor International Airport (PHX) has the most annual operations with 590,329. Deer Valley Airport was next at 389,570, followed by Mesa Falcon Field at 288,717. As the commercial service airport for the Phoenix metropolitan area, however, PHX had just 95,834 general aviation operations in 2002. All three airports have parallel runways available, allowing them to better accommodate higher traffic levels than Scottsdale's single runway.

The *MAG-RASP* has considered the alternative of developing a new airport further east in the valley. There is no specific site, but the *MAG-RASP* assumed a location east of Fountain Hills in the vicinity of Highway 87, and northeast of the Salt River-Maricopa Indian Community. The study recognized an airport in this area would have only moderate potential for implementation because of the location in the Tonto National Forest and the proximity to Indian communities. As the next section demonstrates, growth in the eastern portions of the county are expected to slow. Should this airport be implemented in the future, it would likely be for the purpose of relieving capacity-related delays at Mesa, Deer Valley, and Scottsdale.

The *1997 Scottsdale Airport Master Plan* indicated that the primary service area for Scottsdale Airport is generally comprised of Scottsdale, Carefree, Cave Creek, Fountain Hills, Paradise Valley, as well as portions of northeast Phoenix, unincorporated areas of northeast Maricopa County, and the Salt River Pima-Maricopa Indian Community. According to **Table 2D**, the population of this area totaled 420,759 in 2000. This represented 13.7 percent of the popula-

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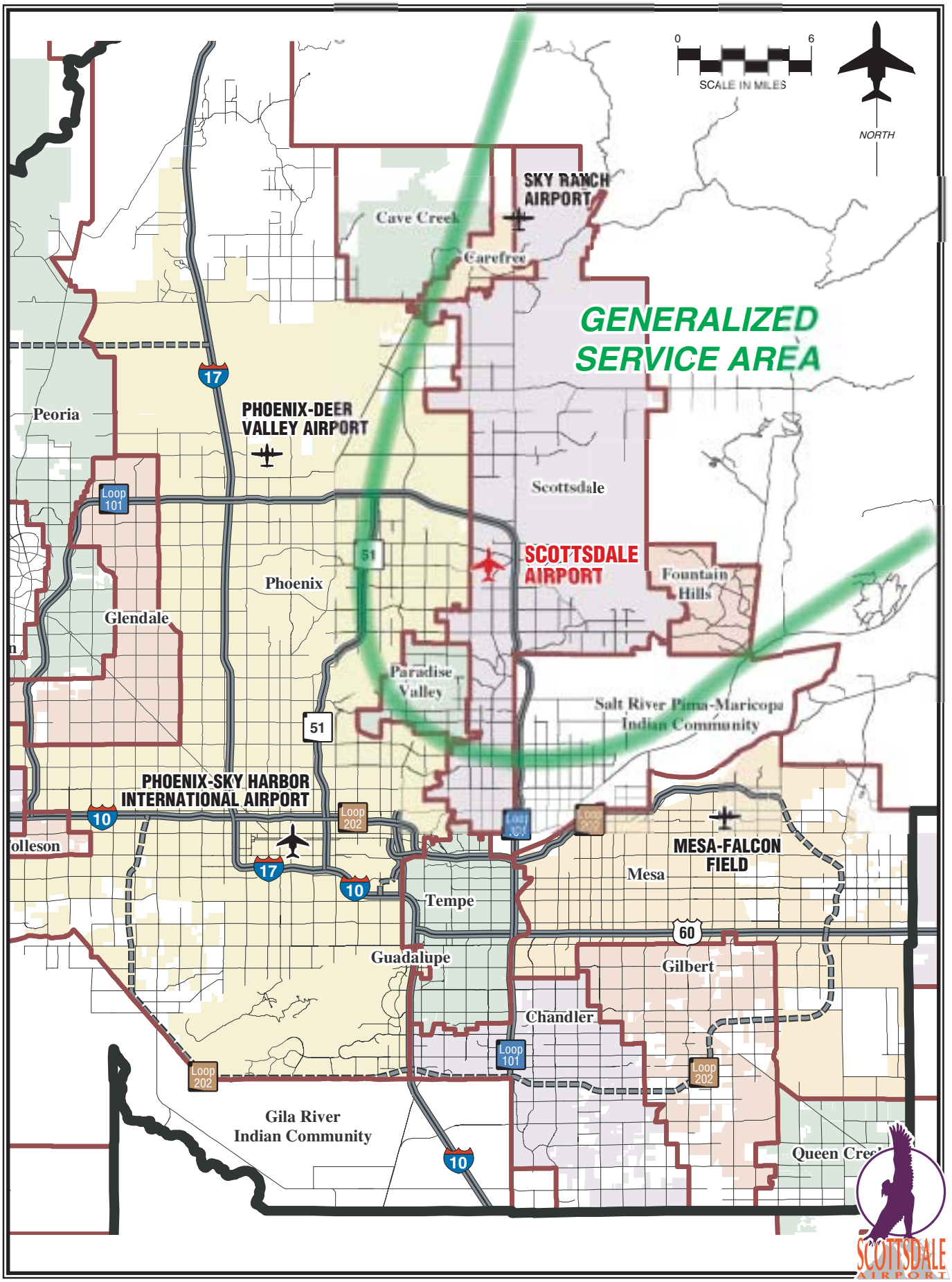

Exhibit 2C
GENERALIZED SERVICE AREA

tion of Maricopa County. As shown on **Table 2E**, people employed in the area around Scottsdale Airport totaled 252,339 in 2000, or 16.1 percent of the total employment in Maricopa County.

TABLE 2C
Public Airports
Northeast Valley

Name	Longest Runway (ft.)	Approach Minimums (feet-miles)	Based Aircraft	2002 Annual Operations*
Scottsdale	8,249	700 – 1 ¾	460	195,564
Deer Valley	8,208	600 – 1 ½	1,375	389,570
Sky Harbor	11,490	200 – ½	227	590,329
Falcon Field	5,102	500 – 1 ¼	947	288,717
Sky Ranch	4,037	VFR	110	4,160

* Tower count, except for Sky Ranch, which is estimated.

In July of 2003, the MAG Regional Council adopted a new set of population, housing and employment forecasts for the county. This included not only the county total but a breakdown of sub-areas. **Tables 2D** and **2E** present the population and employment forecasts for the various areas included in the Scottsdale Airport service area, as well as the Maricopa County total.

Population and employment are projected to increase through 2010 at annual average rates of 2.1 percent and 1.9 percent respectively. The growth rates slow between 2010 and 2020, to 1.4 and 1.3 percent. Between 2020 and 2025, the average annual growth rates slow to 0.3 percent for population and 0.6 percent for employment.

TABLE 2D
Population Forecasts
Primary Service Area
Scottsdale Airport

	Actual	Forecast		
	2000	2010	2020	2025
Scottsdale	202,705	253,100	287,300	289,600
Carefree	2,927	4,000	4,800	4,800
Cave Creek	3,728	5,110	5,764	9,787
Fountain Hills	20,235	24,700	30,400	30,400
Paradise Valley	13,664	15,180	15,712	15,767
Northeast Phoenix	174,079	211,383	247,128	249,639
Uninc. County	3,421	4,548	5,926	7,491
Total	420,759	518,021	597,030	607,484
Avg. Annual % Change	NA	2.1%	1.4%	0.3%
Maricopa County	3,072,149	4,134,388	5,164,142	5,663,999
Area % of County	13.7%	12.5%	11.6%	10.7%

Source: Interim Projections of Population, Housing, and Employment, Maricopa Association of Governments, July 2003.

TABLE 2E Employment Forecasts Scottsdale Area	2000	2010	2020	2025
Scottsdale	152,116	181,267	205,887	209,797
Carefree	1,546	2,749	3,218	3,183
Cave Creek	813	1,890	2,147	2,865
Fountain Hills	4,285	7,686	8,963	8,776
Paradise Valley	5,358	5,597	5,869	5,876
Northeast Phoenix	85,375	103,587	117,768	123,555
Uninc. County	2,846	2,996	3,660	4,649
Total	252,339	305,772	347,512	358,701
Avg. Annual % Change	NA	1.9%	1.3%	0.6%
Maricopa County	1,564,836	2,112,000	2,705,000	3,002,000
Area % of County	16.1%	14.5%	12.8%	11.9%

Source: Interim Projections of Population, Housing, and Employment, Maricopa Association of Governments, July 2003.

While the growth rates are relatively strong, particularly in the early periods, the percentage of the county population and employment in the Scottsdale Airport service area is projected to decline over the entire forecast period. This is indicative of the direction of urban growth in the metropolitan area. As the Northeast Valley fills in, the growth rate will begin to slow. As that occurs, areas in the south and west areas of the Valley will experience a larger percentage of the population and employment growth.

BASED AIRCRAFT

The number of based aircraft is one of the most basic indicators of general aviation demand. By first developing a forecast of based aircraft, the growth of other general aviation activities and demands can be projected.

Table 2F presents a history of Scottsdale Airport's based aircraft, dating back to 1983. As graphically depicted on **Exhibit 2D**, the based aircraft totals at Scottsdale Airport generally declined in the late 1980s, from a high of 462 in 1985 to a low of 375 in 1988. During most of the 1990s, based aircraft fluctuated around 400. Since 1998, however, based aircraft at SDL have grown from 401, to 460 in 2003.

Table 2G compares the based aircraft at each of the airports (public and private) serving the Northeast Valley over the last ten years. The total number of based aircraft at these airports has increased by 54 percent since 1994. Scottsdale Airport's growth of 17 percent over this time period was slower than all the other airports except for Sky Harbor International, which is also the air carrier airport for the region.

A closer examination of the increases reveals that the growth at Deer Valley, Falcon Field, and Sky Ranch has been in piston-powered fixed wing aircraft. Scottsdale and Sky Harbor, however, have seen their growth driven by turbine-powered aircraft. In fact, the

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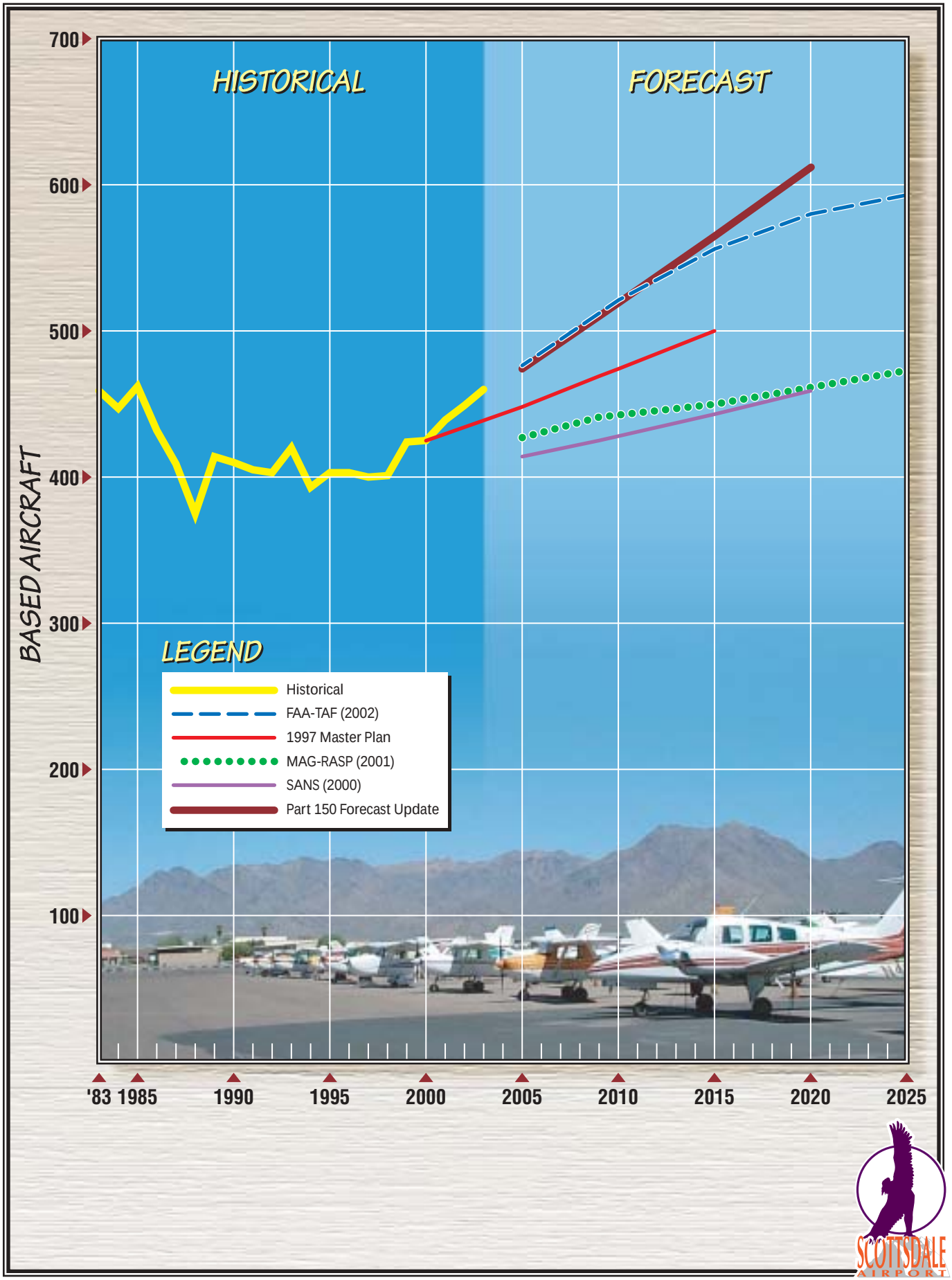

SCOTTSDALE AIRPORT

Exhibit 2D
BASED AIRCRAFT

number of piston-powered fixed-wing aircraft has declined at both of these airports.

TABLE 2F
Based Aircraft History
Scottsdale Airport

Year	Total Aircraft
1983	459
1984	447
1985	462
1986	432
1987	409
1988	375
1989	414
1990	410
1991	405
1992	403
1993	420
1994	393
1995	403
1996	403
1997	400
1998	401
1999	424
2000	425
2001	439
2002	446
2003	460

As shown on **Table 2H**, single engine piston aircraft based at Scottsdale Airport have grown by just six aircraft since 1994, while multi-engine piston aircraft have declined by 33. This has resulted in a net loss of 27 piston-powered fixed-wing based aircraft at Scottsdale Airport. Over the same time frame, based turboprops have increased by 19 and based jets have increased by 59, for a net gain of 78 turbine-powered fixed-wing aircraft. Rotorcraft (helicopters) have grown from nine to 15 aircraft, adding six to the total.

Exhibit 2D and **Table 2J** outline previous forecasts of based aircraft prepared for Scottsdale Airport. The oldest forecast shown is from the *1997 Airport Master Plan*. The base year for that forecast was 1994. More recent forecasts were prepared in the *SANS-2000* and the *MAG-RASP* (2001). The most current forecast, however, is the FAA *Terminal Area Forecast* (TAF) which was prepared in 2002.

TABLE 2G
Based Aircraft (1994-2003)
Northeast Valley Airports

	1994	1997	2000	2003	% Increase 1994-2003
Scottsdale	393	400	425	460	17%
Deer Valley	803	908	1,206	1,375	71%
Sky Harbor	224	265	237	237	6%
Falcon Field	559	878	923	947	69%
Sky Ranch	52	54	84	115	121%
Total	2,031	2,505	2,875	3,134	54%

TABLE 2H
Based Aircraft Mix (1994-2003)
Scottsdale Airport

	1994	2000	2003	% Change 1994-2003
Piston				
Single Engine	270	267	276	+2%
Multi-Engine	82	68	59	-28%
Turbine				
Turboprop	8	18	27	+237%
Jet	24	54	83	+246%
Rotorcraft	9	16	15	+67%
Other	0	2	0	0%
Totals	393	425	460	+17%

As can be readily seen on the exhibit, the SDL based aircraft forecast for 2020 from the *SANS-2000* has already been reached. This forecast is low primarily because the overall projection for based aircraft in the Maricopa County has proven to be low. SDL was also projected to base a slowly declining share of the county based aircraft.

The 2015 projection from the recently adopted *MAG-RASP* forecast was already exceeded in 2003. This forecast first projected total based aircraft in Maricopa County; then distributed these aircraft to the airports within the county. A strong correlation was found between Maricopa County based aircraft and the County's population.

TABLE 2J
Based Aircraft Forecasts
Scottsdale Airport

	2000	2003	2005	2010	2015	2020	2025
Maricopa County Based Aircraft Forecasts							
MAG-RASP (2001)	4,133		4,615	5,282	5,950	6,618	7,288
Updated (2003) *	4,133		4,907	5,724	6,541	7,345	8,126
Previous SDL Based Aircraft Forecasts							
Actual	425	460					
Master Plan (1997)	424		448	474	500		
SANS-2000 (1998)			414	428	443	459	
MAG-RASP (2001)			427	438	450	462	473
FAA-TAF (2002)			474	519	565	612	
Updated SDL Forecast							
Part 150			476	521	556	580	593
Percent of Updated County Forecast			9.7%	9.1%	8.5%	7.9%	7.3%

* Update prepared by Coffman Associates to account for new county population forecasts.

Thus, the county-wide based aircraft forecasts were derived from a linear regression, using the county population as the independent variable. The population forecasts used were prepared in 1997. Those population forecasts for Maricopa County are lower than the recent population forecasts approved by the MAG Council in July of 2003. By comparison, the population forecasts used by the *MAG-RASP* projected 4.95 million residents in the county by 2025. The updated population forecast expects 5.66 million residents, or 14.4 percent higher than previously forecast.

The *1997 Master Plan* forecast 500 based aircraft by the year 2015. This forecast was on target through 2000, as the projected total was off the actual by just one aircraft. Since that time, however, the actual growth has begun to exceed the forecast. The *FAA-TAF* is the most optimistic, as it projects that SDL will have 612 based aircraft by the year 2020. This would be an annual average increase of 1.7 percent over the planning period, or approximately nine aircraft per year.

Since the *MAG-RASP* found such a high correlation, a projection utilizing the updated county population forecast was developed. This resulted in a projection of 8,126 based aircraft in the county by 2025. This figure is 11.5 percent higher than the *MAG-RASP* projection.

The *MAG-RASP* projected that Scottsdale Airport's market share of based aircraft would steadily decline, from 10.3 percent in 2000, to 6.2 percent in 2025. A decline in the percentage would seem reasonable as the population growth in the Northeast Valley is anticipated to be slower than for Maricopa County as a whole. To adjust the based aircraft to reflect the updated population forecasts for the Northeast Valley, SDL's share of the county's based aircraft was projected to decline at a rate similar to the population. As shown on **Table 2D,** the Northeast Valley population share is projected to decline by 3.0 percent between the 2000 census count and the 2025 forecast. The resulting based aircraft forecast is presented on **Table 2J** and **Exhibit 2D** for comparison. The projection is very similar to the *FAA-TAF* projection through 2015; then the growth slows just as the population growth does.

The SDL based aircraft mix in the *MAG-RASP* was projected to increase by 21 piston and 21 turbine fixed-wing aircraft between 2000 and 2025. In the past three years, however, the number of piston aircraft has actually remained constant, while the turbine aircraft have increased by 38.

The based aircraft fleet mix at Scottsdale Airport (**Table 2K**) was compared to the existing and forecast U.S. general aviation fleet mix trends as presented in FAA *Aerospace Forecasts Fiscal Years 2003-2014*. The current based aircraft fleet mix at SDL has a higher-than-average percentage of multi-engine aircraft, including both piston and turbine, and a lower-than-average percentage of single engine aircraft.

TABLE 2K Based Aircraft Mix Forecast Scottsdale Airport	2003	2009	2015	2025
Single Engine Piston	276	300	318	332
Multi-Engine Piston	59	58	57	55
Turboprop	27	34	41	48
Jet	83	103	121	138
Rotorcraft	15	17	19	20
Total	460	512	556	593

According to the FAA forecasts, active single engine aircraft will experience a slow growth trend of 0.3 percent per year. So the overall percentage of single engine aircraft will decline slightly, but remain dominant into the future.

The number of multi-engine piston aircraft will actually decline slightly as older aircraft are retired, according to the FAA forecasts. Turboprop aircraft are expected to experience gains of approximately 120 per year nationwide (1.6 percent annually). The largest percentage growth nationwide is anticipated in the business jet market, where an average annual increase of 3.6 percent is expected. This relates to a net gain of nearly 360 business jets a year. Rotorcraft are anticipated to show a growth rate slightly better than the single engine aircraft.

As one of the country's premier corporate airports, Scottsdale Airport can expect turbine aircraft to show the strongest growth into the future. Piston aircraft growth is going to be affected somewhat by the availability of services, competitive rates and charges, as well as the storage space available. **Table 2G** outlines the forecast for the based aircraft mix. The forecast years are adjusted to comply with the future noise contour years of this Part 150 Study. These are years 2009 and 2025. Over the planning period, based jets are forecast to increase by 66 percent.

GENERAL AVIATION OPERATIONS

General aviation operations are classified by the airport traffic control tower (ATCT) as either local or itinerant. A local operation is a take-off or landing performed by an aircraft that operates within sight of the airport, or which executes simulated approaches or touch-and-go operations at the airport. Itinerant operations are those performed by aircraft with a specific origin or destination away from the airport. Generally, local operations are characterized by training operations. Typically, itinerant operations increase with business and commercial use.

ITINERANT OPERATIONS

Table 2L depicts the history of general aviation itinerant operations, as counted by the ATCT at SDL since 1990. Itinerant operations declined

from a high of 136,917 in 1990, to 91,638 in 1994. Itinerant operations recovered somewhat from that year and remained in the 100,000s until 1998, when traffic jumped to 127,613. That was followed in 1999 with 129,774 operations. Since this later peak, general aviation itinerant operations dipped back to 106,654 in 2001. The events of September 11, 2001, resulted in that month producing the lowest numbers of operations of the period from 1990. Operations in 2002 grew back to 110,331. In 2003, general aviation itinerant operations increased to 112,700.

TABLE 2K
General Aviation Operations
Scottsdale Airport

Year	Itinerant	Local	Total
1990	136,917	123,283	260,200
1991	128,908	101,045	229,953
1992	103,448	89,373	192,821
1993	102,566	77,442	180,008
1994	91,638	70,902	162,540
1995	102,606	71,667	174,273
1996	104,703	74,136	178,839
1997	105,233	75,024	180,257
1998	127,613	73,281	200,894
1999	129,774	93,119	222,893
2000	113,203	85,298	198,501
2001	106,654	68,894	175,548
2002	110,331	74,398	184,729
2003	112,700	71,121	183,821

Exhibit 2E and **Table 2M** compare the previous forecasts of general aviation itinerant operations. The forecasts from the *1997 Master Plan* tended to be high. This can be attributed to the itinerant-local split for the base year of 1994 being different than the official ATCT count for that year. The *1997 Master Plan* estimated there were 110,920 itinerant operations, while the official tower count was 91,638.

The *MAG-RASP* forecast indicates a strong recovery in itinerant operations within the next two years to 132,000 operations. This would signal a recovery of 21,000 operations in two years. Between 2005 and 2025, however, growth was forecast to reach just 145,900, or just another 13,900 over the next twenty years.

The *FAA-TAF* has the advantage of being the more current forecast and thus has a better consideration for the effects of the post-September 11 period. The *FAA-TAF* projects general aviation itinerant operations to grow at a rate faster than based aircraft, reaching nearly 174,000 by 2020.

Table 2N outlines the history of itinerant operations in relation to the total general aviation itinerant operations at towered airports in the U.S. As with the operations themselves, the SDL market share as a percentage of general aviation itinerant operations at towered

airports across the country declined from a high of 0.593 percent in 1990, to 0.434 in 1994. In 2002, the share was up to 0.516, which was essentially the average market share for the 13-year period.

TABLE 2M
Previous General Aviation Operations Forecast
Scottsdale Airport

	2000	2005	2010	2015	2020	2025
Itinerant Operations						
1997 Master Plan	128,754	138,690	153,456	168,000		
MAG-RASP (2001)		132,000		138,900		145,900
FAA-TAF (2002)		117,816	136,502	155,189	173,876	
Local Operations						
1997 Master Plan	57,846	62,310	68,947	72,000		
MAG-RASP (2001)		92,800		97,800		102,700
FAA-TAF (2002)		73,822	77,758	81,695	85,632	
Total Operations						
1997 Master Plan	186,600	201,000	222,400	240,000		
MAG-RASP (2001)		224,800		236,700		248,600
FAA-TAF (2002)		191,638	214,260	236,884	259,508	
SANS-2000		186,790	195,000	210,000	240,000	

This table also depicts the itinerant operations as a ratio to based aircraft. Again this ratio varied from a high of 334 itinerant operations per based aircraft in 1990, to a low of 233 in 1994. The average for the 14-year period was 270 operations per based aircraft. After 1994, the ratio built back up to over 300 operations per base aircraft in 1998 and 1999. After dropping back to near the average the next year, 2001 saw the ratio dip, due to the drop in operations following 9-11.

Table 2N presents a pair of projections based upon maintaining the average market share of the towered traffic and the average ratio of operations per based aircraft. For comparison, the *FAA-TAF* projections are also presented in the table. The *FAA-TAF* operations would grow at a faster rate than the national average, as well as faster than based aircraft. This forecast would result in a significantly higher market share than has previously been experienced. The operations per based aircraft also grow under this forecast, but remain within the range of what has been experienced in the past.

As with the based aircraft, the *FAA-TAF* projection of general aviation itinerant operations appears reasonable for the short and intermediate terms. This would represent a recovery in the utilization over the next several years, as well as growth in the use of aircraft. In the long term, however, operations needs reflect the slow down in growth as projected for based aircraft. This will happen as the Northeast Valley progresses toward build-out of its developable area. The resulting forecast is presented at the bottom of **Table 2N,** as well as on **Exhibit 2E**.

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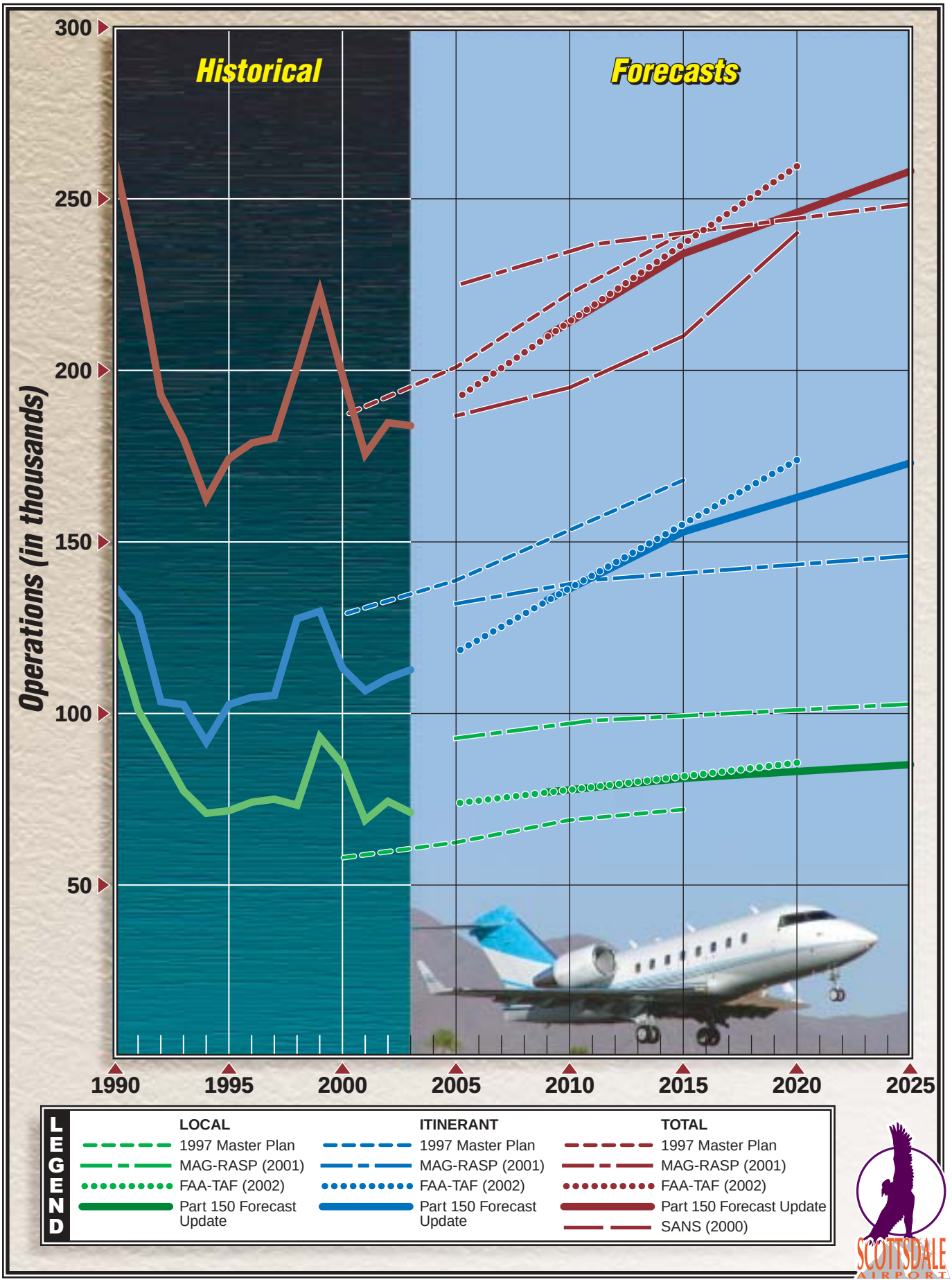

Exhibit 2E
GENERAL AVIATION
OPERATIONS FORECAST

TABLE 2N
General Aviation Itinerant Operations Forecast
Scottsdale Airport

Year	SDL GA Itinerant	U.S. ATCT GA Itinerant (millions)	SDL Market Share (%)	SDL Based AC	Itinerant Ops Per AC
1990	136,917	23.1	0.593%	410	334
1991	128,908	22.2	0.581%	405	318
1992	103,448	22.1	0.468%	403	257
1993	102,566	21.1	0.486%	420	244
1994	91,638	21.1	0.434%	393	233
1995	102,606	20.9	0.491%	403	255
1996	104,703	20.8	0.503%	403	260
1997	105,233	21.7	0.485%	400	263
1998	127,613	22.1	0.577%	401	318
1999	129,774	23.0	0.564%	424	306
2000	113,203	22.9	0.494%	425	266
2001	106,654	21.4	0.498%	439	243
2002	110,331	21.4	0.516%	446	247
2003	112,700	NA	NA	460	245
Constant Market Share Projection					
2009	120,510	23.4	0.515%	512	235
2015	130,295	25.3	0.515%	556	234
2025	148,320	28.8	0.515%	593	250
Operations Per Based Aircraft Projection					
2009	138,240	23.4	0.591%	512	270
2015	150,120	25.3	0.593%	556	270
2025	160,110	28.8	0.556%	593	270
FAA-TAF Projections					
2009	132,764	23.4	0.567%	510	260
2015	155,189	25.3	0.613%	565	275
2025	192,563	28.8	0.669%	660	292
Selected Forecast					
2009	133,000	23.4	0.568%	512	260
2015	153,000	25.3	0.605%	556	275
2025	173,000	28.8	0.601%	593	292

LOCAL OPERATIONS

A similar methodology was utilized to forecast general aviation local operations. **Table 2P** depicts the history of local operations at Scottsdale Airport, and examines its historic market share of local operations at towered airports in the United States. Local operations have varied over the past 14 years, depending upon the training that has been available at the airport. Local traffic entered the 1990s with a high of 123,283 operations, but dropped to 70,902 by 1994. Operations remained in the low to mid 70,000s until 1999, when traffic jumped to 93,119. In 2001, local operations were down to 68,894, as September 11 had an effect. In 2002, local traffic had increased to 74,398. Local operations in 2003 were down 4.4 percent.

Exhibit 2E and **Table 2M** compare the previous forecasts of general aviation local operations. The forecasts from the *1997 Master Plan* have proven to be low. This coincides with the high estimated forecast of itinerant operations, and can be attributed to the itinerant-local split for the base year of 1994 being different than the actual ATCT count for that year. The *1997 Master Plan* estimated 54,080 local operations in 1994, while the actual tower count shows 70,902. The long range forecast from the *1997 Master Plan* remains below the current level of local operations today.

Like its itinerant operations projection, the *MAG-RASP* forecast expects a strong recovery in local operations within the next two years to 92,800 operations. This would be an increase of over 24,000 operations in two years. Between 2005 and 2025, however, local operations would grow by only 10,000.

The *FAA-TAF* again has the advantage of being the more current forecast and thus has a better consideration for the effects of the post 9-11 period. The *FAA-TAF* projects general aviation local operations to grow at a rate slower than based aircraft, and slower than the national rate. Local operations would reach 85,600 by 2020.

The FAA *Aerospace Forecasts* project a 1.2 percent per year increase in local operations nationwide. The Scottsdale share of the U.S. market of local general aviation operations at towered airports has averaged 0.480. The high local share was in 1990 at 0.721 percent. The low was 0.425 in 2001. Since September 11, 2001, the market share has remained below the average for the period. **Table 2P** presents a market share projection carrying the average percentage forward through the planning period.

The years 1990 and 1991 were extremely high activity years and represent a period of high pilot training at SDL. The second projection on the table considers the local operations per based aircraft over the past 12 years since 1992. This ratio has been 184, with the high coming in 1992 at 222. The ratio was at its lowest in 2001, in part because of September 11. The ratio reached a new low of 155 in 2003. **Table 2P** presents a projection based upon maintaining the average ratio throughout the planning period.

For comparison, the *FAA-TAF* projections are also presented in the table. As indicated earlier, the *FAA-TAF* local operations are projected to grow at a slower rate than the national average, as well as slower than based aircraft. This forecast would result in a declining market share, as well as a declining ratio of operations per based aircraft.

Of the eight towered airports in the Phoenix metropolitan area, Scottsdale Airport has the lowest level of local operations, with the exception of Sky Harbor International Airport. The higher level of corporate activity and the lack of a parallel runway are key reasons. With corporate traffic projected to continue to increase, it is anticipated that Scottsdale Airport will remain less attractive for training operations than airports such as Deer Valley, Chandler Municipal, Falcon Field, or Williams Gateway. Therefore, a local operations

per based aircraft ratio, similar to that of the *FAA-TAF* was selected. The resulting projection of local operations is presented at the bottom of **Table 2P** as well on **Exhibit 2E.** As with the itinerant operations, the local operations are similar to the *FAA-TAF,* but are lower in the long term.

TABLE 2P
General Aviation Local Operations Forecast
Scottsdale Airport

Year	SDL GA Local	U.S. ATCT GA Local (millions)	SDL Market Share (%)	SDL Based AC	Local Ops Per AC
1990	123,283	17.1	0.721%	410	301
1991	101,045	16.6	0.609%	405	249
1992	89,373	16.3	0.548%	403	222
1993	77,442	15.5	0.500%	420	184
1994	70,902	15.2	0.466%	393	180
1995	71,667	15.1	0.475%	403	178
1996	74,136	14.5	0.511%	403	184
1997	75,024	15.2	0.494%	400	188
1998	73,281	16.0	0.458%	401	183
1999	93,119	17.0	0.548%	424	220
2000	85,298	17.0	0.502%	425	201
2001	68,894	16.2	0.425%	439	157
2002	74,398	16.2	0.459%	446	167
2003	71,121	NA	NA	460	155
Constant Market Share Projection					
2009	84,480	17.6	0.480%	512	165
2015	90,720	18.9	0.480%	556	163
2025	103,200	21.5	0.480%	593	174
Operations Per Based Aircraft Projection					
2009	94,208	17.6	0.535%	512	184
2015	102,304	18.9	0.541%	556	184
2025	109,112	21.5	0.507%	593	184
FAA-TAF Projections					
2009	76,971	17.6	0.437%	510	151
2015	81,695	18.9	0.432%	565	145
2025	89,569	21.5	0.417%	660	136
Selected Forecast					
2009	77,000	23.4	0.329%	512	150
2015	81,000	25.3	0.320%	556	146
2025	85,000	28.8	0.295%	593	143

Exhibit 2E also provides a comparison of the total general aviation forecasts for Scottsdale Airport. The total general aviation operations from the previous forecast are also shown. The *SANS -2000* operations forecast is lower than the updated forecasts. The *MAG-RASP* is higher before 2015, but lower beyond 2015, while the *FAA-TAF* is just the opposite.

AIR TAXI

The air taxi category includes aircraft involved in on-demand passenger or small parcel transport. The control tower counts air taxi in the same category as commuter airlines. At Scottsdale Airport, however, there are currently no scheduled commercial service operations; thus, the ATCT air taxi count is entirely made up of air taxi activity.

Exhibit 2F and **Table 2Q** present the history of air taxi operations at Scottsdale Airport. Between 1990 and 1997, air taxi operations changed very little from year to year, averaging approximately 4,200 operations annually. In 1998, that began to change as air taxi operations grew by nearly 50 percent (more than 2000 operations) in one year. From 6,288 operations in 1998, air taxi activity at SDL grew to 8,477 in 2001. This occurred even with the events of 9-11.

TABLE 2Q
Historic Air Taxi Operations
Scottsdale Airport

Year	Air Taxi	Annual % Growth
1990	4,639	NA
1991	4,270	-8.0%
1992	4,475	+4.8%
1993	4,235	-5.4%
1994	3,868	-8.7%
1995	3,471	-10.3%
1996	4,167	+20.1%
1997	4,203	+0.9%
1998	6,288	+49.6%
1999	7,231	+15.0%
2000	7,955	+10.0%
2001	8,477	+6.6%
2002	10,253	+21.0%
2003	10,223	-0.3%

This rapid growth in air taxi activity can be attributed to the increased popularity of fractional ownership in aircraft, in particular, turbine aircraft. Fractional ownership allows companies to essentially time-share in an aircraft. A corporation or individual can purchase a fractional share in a type of corporate aircraft. This share will provide the owner a certain amount of flight time each year. This makes flying more feasible for a broader number of firms or individuals.

Fractional aircraft are counted as air taxi, as are many charter aircraft. As increased security measures placed on commercial flights increased, interest in fractional and corporate aircraft ownership, as well as on-demand charter flights, also increased. In 2002, air taxi operations rose once more to 10,252, then remained at a similar level (10,223) in 2003.

To project air taxi activity, several methods were considered. First, a trend line was analyzed to project future activity if the growth rate over the last nine years was maintained. A continuation of this growth rate would result in 30,500 air taxi operations by 2025. The resulting projection is presented on **Exhibit 2F** and **Table 2R**. It is questionable that this rate of growth can continue over an extended period of time, so this would have to be considered a high range forecast.

The next option was to consider that air taxi operations would grow at a rate similar to general aviation itinerant operations. This projection is also pre-

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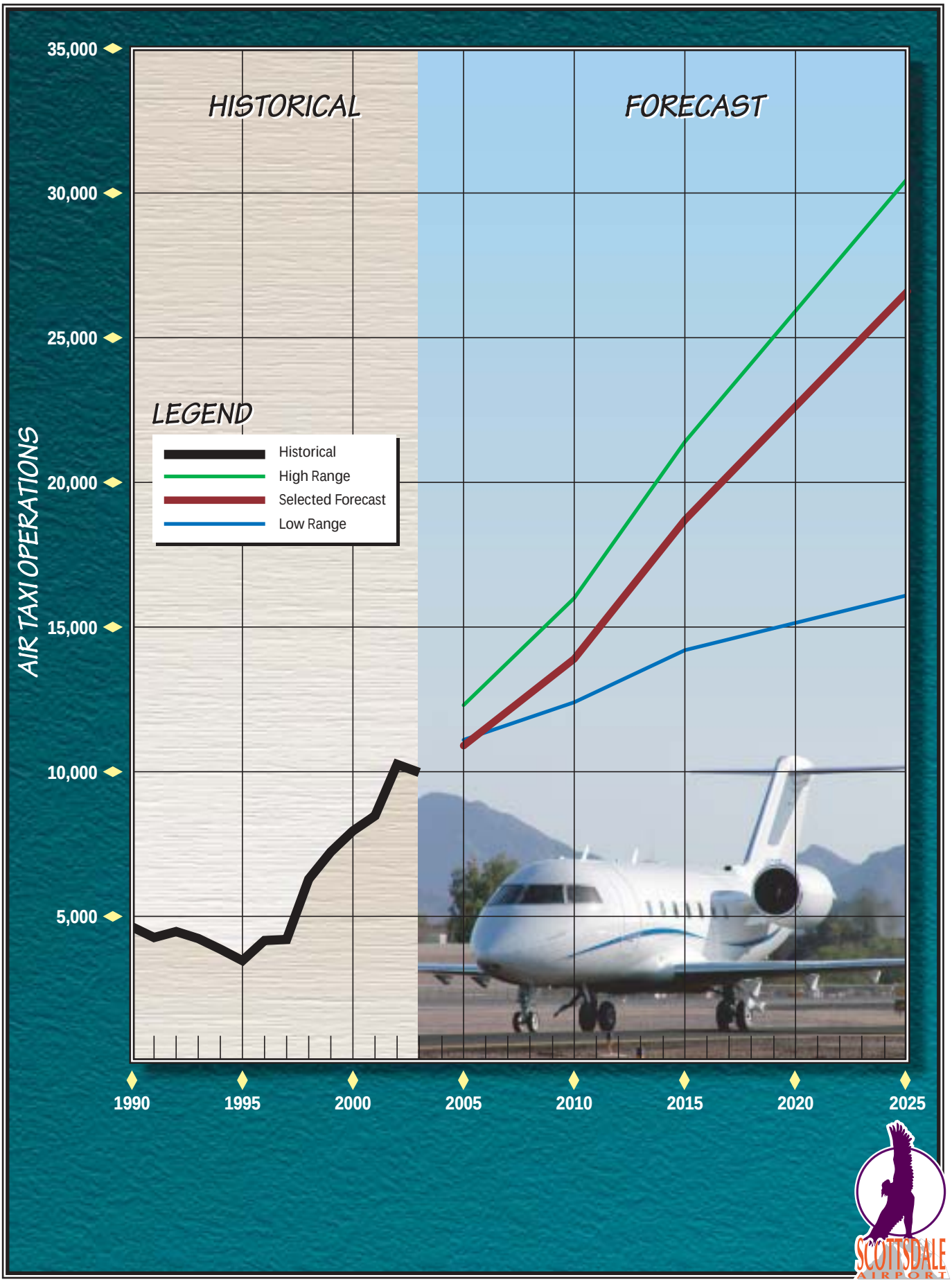

Exhibit 2F
AIR TAXI OPERATIONS FORECASTS

sented on **Exhibit 2F** and **Table 2N.** This scenario would appear to have some merit since fractional ownership is essentially a general aviation type of use being counted under air taxi. The resulting projection would reach 16,100 operations by 2025.

Since the vast amount of air taxi traffic at SDL is flown by business jets, the growth in business jet activity will affect air taxi growth. The FAA forecasts the number of business jets in the general aviation fleet to increase by an annual average of 3.6 percent. As was mentioned earlier in the chapter, the typical corporate-owned jet is utilized 300 hours per year, while the fractional jet is used nearly three times as much. As a result, the FAA projects total business jet hours flown are to increase from 2.7 million hours in 2001, to 6.0 million hours in 2014, for an annual average of 6.4 percent.

TABLE 2R
Air Taxi Operations Forecast
Scottsdale Airport

	2009	2015	2025
Projections			
Trend Line Analysis	16,000	21,400	30,500
GA Itinerant Growth	12,400	14,200	16,100
Selected Forecast			
Business Jet Growth	13,900	18,700	26,600

Realizing that the current move to fractional ownership is similar to a start-up industry, the early growth rates are going to be higher than after the fractional industry matures. For planning purposes, the SDL air taxi operations were projected to grow at the 6.4 percent rate through the short term (2009). Beyond the short term the growth rate would gradually reduce to the 3.6 percent. **Exhibit 2F** and **Table 2R** present this growth scenario that would result in 26,600 air taxi operations by 2025. This projection was selected as the preferred forecast for air taxi operations.

MILITARY

Military activity accounts for the smallest portion of the operational traffic at SDL. Since 1990, annual military operations have fluctuated between a high of 1,009 in 1998, and a low of 281 in 1992. Over that time period, military operations have averaged 500 annually. This is not anticipated to change significantly in the future.

ATCT COUNT ADJUSTMENT

Since the Scottsdale ATCT is not a 24-hour tower, its air traffic counts are not all-inclusive of aircraft operations at the airport. The noise analysis requires that all the airport activity be considered. For these evaluations, it is necessary to estimate and adjust for operations that occur when the tower is closed. The SDL tower hours are from 6:00 a.m. to 9:00 p.m. Indications are that military and local general aviation operations rarely occur when the tower is closed, so they do not need to be adjusted.

Air taxi and itinerant general aviation operations, however, do need to be adjusted from the tower count. Their op-

erations were adjusted based upon information obtained from a review of overnight counts performed by the Scottsdale Airport staff over the first nine months in 2003. These were compared to similar data from the nine months in 2000.

The counts indicated that air taxi and itinerant general aviation operations should be adjusted by 2.6 percent for activity that occurs when the tower is closed. This adjustment is included in **Table 2S**.

COMMERCIAL SERVICE

At the present time, Scottsdale Airport does not have any scheduled commercial service. The airport has had service in the past. The *1997 Master Plan* maintained a recognition of the potential for commercial service in the future, and provided a forecast of this potential. The *MAG-RASP* also maintains a recognition of this potential. For the purposes of the Part 150 Study, the commercial service forecasts from the Master Plan are carried forward, adjusting for the fact that there currently is no commercial service at the airport.

TABLE 2S
Forecast Adjustment
Scottsdale Airport

	2003	2009	2015	2025
ATCT Operations Count				
General Aviation				
Itinerant	111,498	133,000	153,000	173,000
Local	71,121	77,000	81,000	85,000
Total	185,284	210,000	234,000	258,000
Air Taxi	10,223	13,900	18,700	26,600
Military	428	500	500	500
Total ATCT Ops	194,472	224,400	253,200	285,100
Adjusted Operations				
General Aviation				
Itinerant	114,163	134,700	155,000	175,300
Local	71,121	77,000	81,000	85,000
Total	185,284	211,700	236,000	260,300
Air Taxi	10,569	14,400	19,300	27,500
Military	428	500	500	500
Total Adjusted Ops	196,281	226,600	255,800	288,300

Adjustment accounts for the hours (9 p.m. – 6 a.m.) when the ATCT is closed.

The Master Plan recognized the potential to serve short haul destinations popular in the Phoenix area with commuter flights from Scottsdale Airport. These destinations could include airports in the Los Angeles Basin, as well as San Diego and Las Vegas. The forecast took into account the potential for Williams Gateway Airport to provide commercial service as well.

The resulting forecast based upon capturing a market share of one to three percent is presented in **Table 2T.** Initially, traffic would be developed using small turboprop aircraft, generating an enplanement level of 11,200 in the short term (2009). In the long range, the potential for expanded service including regional jets led to a forecast of 98,000 annual enplanements. The table also includes a projection of commercial service operations as well as the aircraft mix by seating capacity.

Initial service by small aircraft with less than 19 passenger seats could generate as many as 6,500 annual operations. As traffic develops, larger commuter aircraft up to the 50 seat regional jets could be used. This could grow operations to approximately 10,700 annually by 2025.

SUMMARY

Exhibit 2G provides a summary of the aviation activity forecasts for Scottsdale Airport. These forecasts will be utilized in generating short term and long range noise exposure contours for the Part 150 Study.

TABLE 2T
Commercial Service Forecast Potential
Scottsdale Airport

	2003	2009	2015	2025
Annual Enplanements	0	11,200	36,300	98,000
Annual Operations	0	6,500	10,000	10,700
Fleet Mix % Seating Capacities < 19 Seats (Cessna 421, Twin, Other)	NA	100%	50%	20%
± 19 Seats (Beech 1900)	NA	0%	50%	15%
± 30 Seats (Saab 340, Regional Jets)	NA	0%	0%	40%
± 50 Seats (Regional Jets)	NA	0%	0%	25%

Based aircraft at Scottsdale Airport are projected to grow from 460 in the last year to 512 in 2009 and 593 on 2025. This represents a 1.8 percent annual average growth over the short term, and 0.9 percent annually beyond the short term. Part of the long term slow down in growth is related to the fact that population growth in the northeast area of the county is also expected to slow as the area fill in.

Business jets are anticipated to show the strongest growth into the future. Based jets are expected to grow from 18 percent of the based aircraft fleet to 23 percent over the long term. Turboprops are also projected to increase in percentage at Scottsdale Airport, growing from five to eight percent.

Annual operations are forecast to grow from 196,281 in 2003 to 233,100 in 2009

and 299,000 in 2025. It should be noted that both forecast years include operations reflecting the potential for commercial air service. Taken from the *1997 Master Plan*, this projects a potential of 11,200 enplanements in the short term and 98,000 in the long term. Operations are projected at 6,500 and 10,700, respectively.

Itinerant general aviation operations are projected to grow 2.8 percent annually over the short term, then 1.7 percent annually into the long term. Air taxi growth will be even stronger, growing from 10,569 operations to 27,500 in the long term. Local general aviation operations, however, are not anticipated to grow significantly. This will be due primarily to the limited airfield capacity at Scottsdale Airport and the growing mix of higher performance aircraft. Training operations comprise the majority of local operations. Other airports in the Valley provide parallel runways that are and will be more conducive to training activity.

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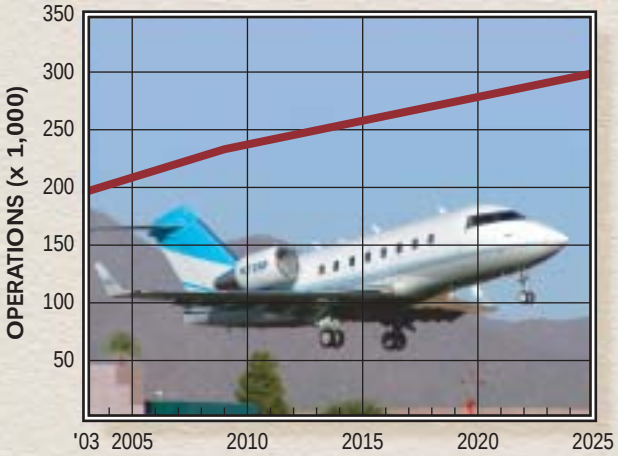
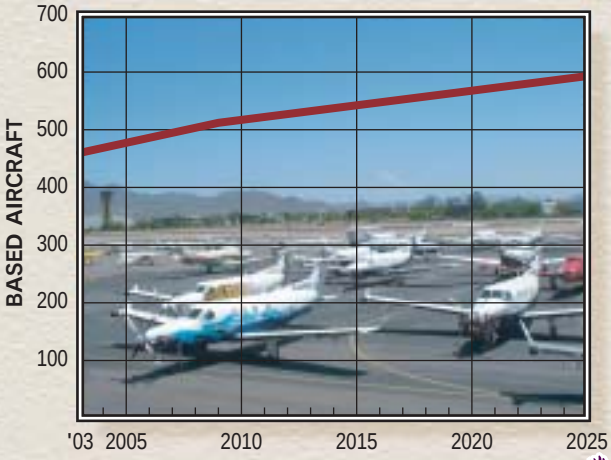
AVIATION FORECAST SUMMARY

CATEGORY	HISTORICAL 2003	FORECASTS 2009	FORECASTS 2025
ANNUAL OPERATIONS*			
General Aviation			
Itinerant	114,163	134,700	175,300
Local	71,121	77,000	85,000
Total GA	**185,284**	**211,700**	**260,300**
Airline	0	6,500	10,700
Air Taxi	10,569	14,400	27,500
Military	428	500	500
Total Operations	**196,281**	**233,100**	**299,000**
ANNUAL ENPLANEMENTS			
Total Enplanements	**0**	**11,200**	**98,000**
BASED AIRCRAFT			
Single Engine Piston	276	300	332
Multi-engine Piston	59	58	55
Turboprop	27	34	48
Business Jet	83	103	138
Helicopter	15	17	20
Total Based Aircraft	**460**	**512**	**593**

OPERATIONS FORECAST



BASED AIRCRAFT FORECAST



* Includes counts and adjustments for the hours (9:00 p.m. to 6:00 a.m.) when the ATCT is closed.

SCOTTSDALE AIRPORT

Exhibit 2G
AVIATION FORECAST SUMMARY