



CHAPTER TWO

Aviation Demand Forecasts

AVIATION DEMAND FORECASTS

Facility planning begins with a definition of the demand that may occur over a specified period of time. In airport master planning, this involves forecasts of aviation activity indicators over a twenty-year planning period. Regarding Cottonwood Municipal Airport, forecasts of based aircraft, based aircraft fleet mix, and annual aircraft operations will serve as the basis for facility planning.

Due to the cyclical nature of the economy, it is virtually impossible to predict, with any reliability, year-to-year fluctuations in aviation activity when looking as far as 20 years down the road. As aviation activity can be affected by many influences at the local, regional, and national level, it is important to remember that forecasts are to serve only as guidelines and planning must remain flexible enough to respond to unforeseen facility needs. The following forecast analysis examines recent developments,



historical information, and current aviation trends, to provide an updated set of based aircraft and operational projections. The intent is to permit Cottonwood Municipal Airport to make the planning adjustments necessary to ensure that the facility meets projected demands in an efficient and cost-effective manner.

SEPTEMBER 11, 2001

In light of the tragic events at the World Trade Center and the Pentagon on September 11, 2001, along with the ensuing U.S. military action in Afghanistan, the impact to the nation's



economy and aviation in particular is uncertain at this time. Nearly one month later, on October 17, Federal Reserve Chairman Alan Greenspan, in testimony before Congress's Joint Economic Committee, stated "*As the initial shock began to wear off, economic activity recovered somewhat from the depressed levels that immediately followed the attacks, though the recovery has been uneven. . . .*" Greenspan added "*The pronounced rise in uncertainty also has dampened consumer spending and capital investment; households and businesses, confronted with heightened uncertainty, have pulled back from the marketplace, though that withdrawal has been partial and presumably temporary. . . .*" While Greenspan conceded that it still may be too early to tell, he concluded that "*For the longer term, prospects for ongoing rapid technological advance and associated faster productivity growth are scarcely diminished. . . .*" As far as the economy, therefore, it is important to understand the economic conditions in place at the time of the tragedies and how the economy has responded to past national crisis for similarities and insights. Economic trends already underway before such unprecedented and unforeseen events influence considerably the perceptions of individuals and national responses to such events. For the most part, the U.S. economy had been decelerating since September 2000, as leading economic indicators used to measure the strength of the economy were either stagnant or headed down. Economic conditions on September 11, 2001, are comparable to those existing at both the time of the Oklahoma City bombing (April 1995) and the Iraqi invasion of Kuwait (August 1990). In each instance, the

U.S. economy was decelerating. Following the Oklahoma bombing, the economic slowdown ended within eight months. Prior to the Iraqi invasion, however, the U.S. had already entered a full recession (July 1990-March 1991).

For U.S. aviation, the impact of September 11 was felt immediately as U.S. Airspace was quickly closed to all civilian traffic. While the repercussions to the commercial aviation sector received the most coverage, all aspects of the nation's aviation industry were affected. Commercial aviation resumed operations on a reduced basis within a week, while the GA industry remained grounded longer. The layoffs and widely publicized Congressional airline relief bill passed by Congress and signed by the President is well documented. The plight of the GA community such as flight schools, FBOs, aircraft manufacturers, etc., however, received much less attention in the media.

As with the overall economy, the ultimate impact of these events on general aviation is hard to predict. Again, a comparison of the industries response to similar events in the past can be examined for insight. For example, following the Gulf War and the subsequent economic recovery of the early 1990s, general aviation began an unprecedented era of growth that has continued through late 2000 and early 2001. Meanwhile, little or no detectable effect on general aviation followed the April 1995 Oklahoma City bombing.

While the tragedies of September 11, 2001, have affected the U.S. in several ways, they are an anomaly in terms of

long term aviation demand. It is assumed, based on an examination of similar past events and their impacts, that the long term outlook for both the economy and general aviation will remain relatively unchanged from the forecasts presented in this chapter.

NATIONAL AVIATION TRENDS

Each year, the Federal Aviation Administration (FAA) publishes its national aviation forecast. Included in this publication are forecasts for air carriers, regional/commuters, general aviation, military, and FAA workloads. 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. At the time this chapter was prepared, the current edition was *FAA Aviation Forecasts - Fiscal Years 2001-2012*. 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.

According to FAA forecasts, the outlook for the U.S. aviation industry over the next twelve years is for moderate economic growth. Although fuel prices have jumped significantly in the last few years, they are expected to level off through the forecast period. Predictions for the final nine years of the forecast period (2004 to 2012) are for 1.8 percent average annual growth rate. Overall, fuel prices during the 12-year forecast

period are expected to decline at an average annual rate of 0.9 percent. By comparison, the predicted consumer price index for this period is 2.5 percent. Based on these assumptions, aviation activity at combined FAA and contract towered airports is forecast to increase from 68.7 million operations in 2000, to 91.5 million operations by 2012, an average annual growth rate of 2.4 percent.

Air route traffic control centers (ARTCC) are expected to handle 61.7 million IFR aircraft by 2012, compared with 46.0 million for the year 2000. This ARTCC workload increase represents an average annual growth rate of 2.5 percent for the 12-year period.

Nationwide, the general aviation active fleet is projected to increase 0.9 percent annually, from 221,213 aircraft in 2000 to 245,965 aircraft in 2010. General aviation hours flown are expected to increase to 41.7 million hours by 2012, an average annual growth rate of 2.2 percent.

GENERAL AVIATION

General aviation describes a diverse range of aviation activities that includes all segments of the aviation industry except commercial air carriers and military. General aviation (GA) is the largest component of the national aviation system and includes the production and sale of aircraft, avionics and other equipment, along with the provision of support services such as flight schools, fixed base operators, finance and insurance. The GA

industry is an important contributor to the nation's economy. It provides "on-the-spot" efficient and direct aviation services that commercial aviation either cannot or will not provide.

Based on most statistical measures, general aviation recorded its sixth consecutive year of growth (1994-1999). This period followed 14 years of annual decline. By all accounts, 2000 was another extremely good year for general aviation. GA aircraft unit shipments were heading toward a sixth consecutive year of increase. General aviation manufacturers' shipments increased by 172 percent, from 928 units in 1994 to 2,525 units in 1999. An additional 2,000 units were reportedly shipped during the first three quarters of 2000. Particularly important is the renewed interest in piston powered aircraft. Shipments of piston powered aircraft more than tripled between 1994 and 1999 (from 499 to 1,747 units), and were up an additional 13.6 percent (1,336 units) following the first nine months of 2000.

Jet aircraft shipments have nearly tripled from 1992 (171 units) to 1999 (514 units). The first three quarters of 2000 promised an eighth consecutive successful year, with shipments up 15.1 percent (352 units) over the same period in 1999. Meanwhile, shipments of turboprop aircraft have not fared as well as the other two aircraft categories, with shipments down 2.6 percent for 1999, however, shipments did total 233 units (up 36 percent) for the first nine months of 2000.

Billings for GA aircraft totaled \$7.9 billion in 1999, an all-time high. The industry's year 2000, third quarter, reported billings of \$6.3 billion, reflecting an increase of 10.4 percent over the same 1999 period. This relatively smaller increase in the billings-to-shipments ratio reflects the increased shipment of generally lower cost-per-unit priced piston powered aircraft. Additionally, export shipments were up 11.3 percent through the third quarter of 2000. Billings, however, declined 20.7 percent for the same period.

The results of the 1999 General Aviation and Air Taxi Activity and Avionics Survey showed that both the active general aviation fleet and hours flown increased for the fifth consecutive year. Fleet numbers were up 7.2 percent, and hours flown, 13.0 percent respectively. The 1999 survey reported the active general aviation fleet at 219,464 aircraft, and hours flown at 31.8 million.

After eight consecutive years of record increased activity (up 20.3 percent between 1992 and 1999), general aviation activity at FAA enroute centers (ARTCCs) declined by 0.7 percent in 2000. Despite this decline in the number of general aviation aircraft handled, there were some positive trends that reflect the continuing growth in business and corporate flying. Domestic departures at FAA enroute centers were down 1.7 percent for 2000; however, oceanic departures were up 40.3 percent. In addition, both domestic and ocean "overs" showed increased gains in 2000, up 2.5 and 16.2 percent, respectively.

In 2000, the number of active pilots increased for the third straight year to 645,639. The four major pilot categories; student, private, commercial, and airline transport were all estimated to have increased in 2000. In addition, the number of instrument rated pilots also increased for the third consecutive year, rising by 6,000 to 315,000 for 2000.

Other factors influenced general aviation growth over the last several years. The New Piper Aircraft Company has created Piper Financial Services, offering competitive interest rates and/or the leasing of Piper aircraft. Also, a dramatic industry trend is the continued growth of fractional ownership programs. These programs allow an individual or business to purchase an interest in an aircraft and pay only for the time they use that aircraft. These programs allow many individuals and businesses, who were once priced out of the market, to own or use GA aircraft for business or corporate purposes. Aircraft manufacturers Raytheon, Bombardier, and Dassault Falcon Jets have all established their own fractional ownership programs. Industry leader Executive Jet Aviation has expanded their program to include Boeing Business Jets and Gulfstream aircraft.

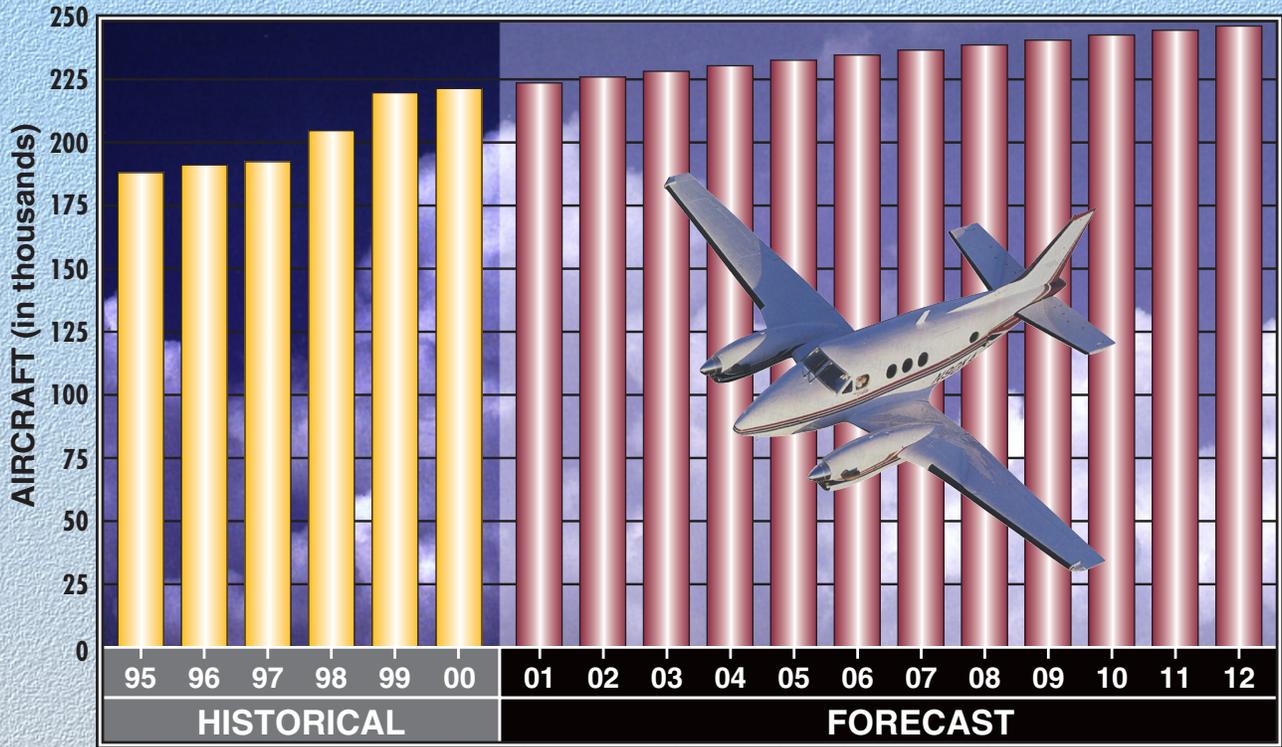
Of all the encouraging statistics relating to general aviation growth, it is the numbers relating to student pilots that are most important to the general aviation industry. A number of industry-wide programs, such as "BE A PILOT," have been instituted over the last several years, designed to attract new pilots to general aviation. The

future direction of general aviation depends, in a large part, on the success of these programs.

Exhibit 2A depicts the FAA forecast for active general aviation aircraft in the United States. The FAA forecasts general aviation active aircraft to increase at an average annual rate of 0.9 percent over the 12-year forecast period, increasing from 221,213 in 2000 to 245,965 in 2012. Over the forecast period, the active fleet is expected to increase by just over 2,000 annually, considering approximately 2,000 annual retirements of older aircraft and new aircraft production of nearly 4,000 annually. Turbine-powered, fixed wing aircraft are projected to grow five times faster than piston aircraft, growing 3.0 percent annually through the year 2012. This includes the number of turboprop aircraft increasing from 5,736 in 2000, to 6,600 in 2012, and the number of turbojet aircraft climbing from 7,440 in 2000, to 12,280 in 2012. Likewise, the turbine-powered rotocraft fleet is expected to equal 5,960 in 2012, an average annual increase of 1.5 percent.

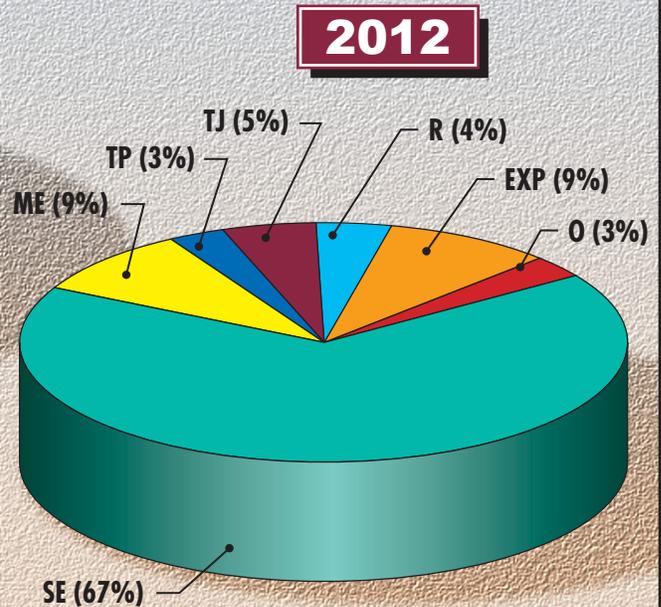
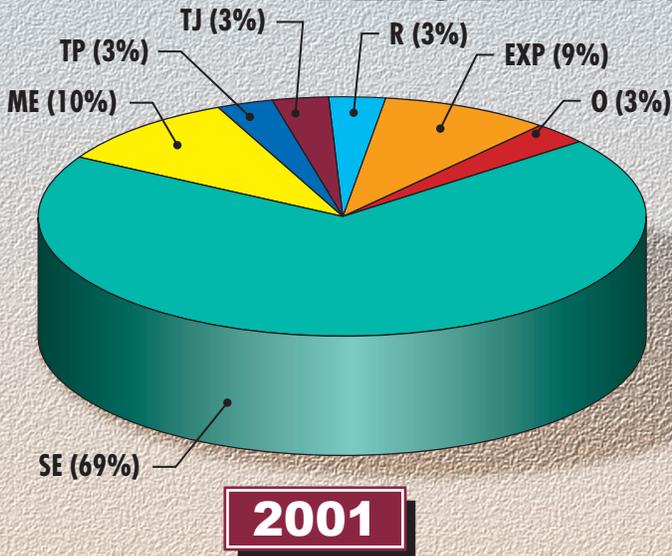
The general aviation piston fleet is projected to increase by 13,217 aircraft (0.6 percent annually) over the forecast period, for a total of 186,000 aircraft in 2012. The number of single engine piston aircraft is expected to rise to 164,800 (0.7 percent annually) while multi-engine piston aircraft is projected at 21,200 (0.02 percent annually) in 2012. The number of piston powered rotocraft is expected to rise to 3,500 by the end of the forecast period, a 2.2 percent annual increase. Amateur-built (experimental) aircraft are projected to

ACTIVE GENERAL AVIATION AIRCRAFT



Source: FAA Aerospace Forecasts, FY 2001-2012

PERCENT BY AIRCRAFT TYPE



- SE Single-Engine Piston
- ME Multi-Engine Piston
- TP Turboprop
- TJ Turbojet
- R Rotorcraft
- EXP Experimental
- O Other



increase at an average annual rate of 1.2 percent over the next twelve years, from 20,780 in 2000, to 24,080 in 2012.

Throughout the forecast period, general aviation hours flown are expected to increase 2.2 percent annually, for a total of 41.7 million hours in 2012. This larger increase in hours in relation to the number of aircraft reflects expected increases in the utilization of general aviation aircraft, i.e., more hours flown per aircraft. By the year 2012, piston powered aircraft are projected to fly 28.1 million hours (1.5 annual increase), and turbine-powered (including rotocraft) aircraft, 11.7 million hours (up 4.4 percent annually). These large increases are due to the expected increases in both the fractional ownership fleet and its utilization. Fractional ownership business jet usage averages nearly 900 hours annually, while business jets owned by single corporate/business entities average only 325 hours.

The number of pilots is forecast at 827,177 in 2012, an increase of nearly 179,000 or 2.0 percent annually over the forecast period. Student pilots are projected to increase by 40,000 (2.7 percent annually) for a total of 144,200 in 2012. Projected forecast growth among other types of pilot certificates include: private pilots, 309,600 (1.4 percent annually); airline transport pilots, 204,400 (3.2 percent annually); commercial pilots, 148,800 (1.4 percent annually); and helicopter pilots, 9,890 (1.8 percent annually).

Finally, there are two items of note immediately affecting general aviation following the events of September 11,

2001. The first concerns legislation, tentatively named the *General Aviation Small Business Relief Act of 2001*, which was introduced in the House of Representatives on October 3, 2001. This bill is designed to provide relief to those general aviation businesses damaged by the ground stop and airspace restrictions that occurred in the wake of the September 11 attacks. The legislation would require the Small Business Administration to provide grants and loans to small GA businesses that qualify and would defer repayment of loans and interest rates for one year.

Second, according to the Internet aviation magazine *AvWeb* (www.avweb.com), there has been a sharp increase in business-jet travel by means of on-demand jet charter services, as frequent business fliers and other financially able individuals seek a safe and efficient means of travel. While demand has accelerated tremendously since September 11, this trend actually began before then. Executive Jet's NetJets program, which currently operates more than 340 aircraft, announced an order for approximately 600 more jets last May. Executive Jet is the largest provider of fractional ownership of bizjets and is continuing to expand operations throughout the world.

Even commercial airline companies are beginning to explore the possibilities of expanding into this fairly new segment of the general aviation industry. In April 2001, United Airlines confirmed it was considering entering the corporate jet market. In June, United placed orders for 40 Falcon jet aircraft with

options for 60 more, as well as an order for 12 Gulfstreams with options for 23 more. The *Wall Street Journal* reported on Tuesday, October 2, 2001, that UAL Corp. (parent company of United Airlines) had formally announced plans to move ahead next April with a launch of its bizjet subsidiary, to be titled "Avolar.". Avolar is set up to be a wholly-owned but separate subsidiary and will operate the jets through leases with corporate customers via a fractional ownership arrangement. Altogether, Avolar has 225 jets either on order or option. The company expects first deliveries in Spring 2002, and may eventually seek pilots among the 20,000 workers recently laid off from United's 98,000-strong workforce.

Another company, Nimbus Group, is expected to make at least a grab for some of the light-jet-traveler market with the delivery of the first of 1,000 *Eclipse 500* jets that they expect to see sometime in 2004. The Nimbus/Eclipse order announcement is the only one of those mentioned above that was not public until after September 11. Finally, since that date, operational fractionals and charter operators have reported a dramatic increase in interest and demand.

AIRPORT SERVICE AREA

The first step in determining aviation demand for an airport is to define its generalized service area for the various segments of aviation the airport can accommodate. The airport service area is determined primarily by evaluating the location of competing airports, their capabilities and services, and their

relative attraction and convenience. With this information, a determination can be made as to how much aviation demand would likely be accommodated by a specific airport. It should be understood that aviation demand does not necessarily conform to political or jurisdictional boundaries.

The airport service area is an area where there is a potential market for airport services. Access to general aviation airports, commercial air service, and transportation networks enter into the equation that determines the size of a service area, as well as the quality of aviation facilities, distance, and other subjective criteria.

In determining the aviation demand for an airport, it is necessary to identify the role of the airport. Cottonwood Municipal Airport is classified by the FAA in the *NPIAS* as a general aviation airport. General aviation includes all components of the aviation field with the exception of the military and commercial air carriers. General Aviation includes all business flying (corporate and executive), all agricultural aviation, personal flying for sport or pleasure, as well as flight schools and flight clubs. Aircraft manufacturers and aircraft maintenance facilities are also a part of general aviation.

Due to the proximity of Sedona Airport (SEZ) and Prescott's Ernest A. Love Field (PRC), as well as the area's seven private airports, the service area for Cottonwood Municipal Airport is primarily limited to the Verde Valley area of eastern Yavapai County. Included within Verde Valley are the communities of Clarkdale, Jerome,

Camp Verde, Cornville, Page Springs, Rimrock, McGuireville, Lake Montezuma, and Verde Village.

PRC is the nearest airport providing scheduled commercial service. Sedona Airport, due to its location atop a high mesa, is used primarily by recreational/pleasure flyers. The potential for increased aviation demand for Cottonwood Municipal Airport lies in the growing population and promising business growth of the City of Cottonwood and surrounding communities. Ever-growing tourism and recreation industries promise increased private flying activity in the region, while the continued growth in the services and trade sectors offer a potential for increased corporate and business general aviation activity. The forecast analyses conducted in the following sections take into consideration the expected local and regional growth, as well as the nearby airports which influence the Cottonwood Municipal Airport service area.

POPULATION PROJECTIONS

Population growth provides an indication of the potential for sustaining growth in aviation activity over the planning period. A summary of historical and forecast population for the City of Cottonwood, Yavapai County and the State of Arizona is presented in **Table 2A**. As reflected in the table, each of these entities has experienced continued population growth throughout each decade. Cottonwood grew at an average annual rate of 3.57

percent, while the County's growth rate was 4.33 percent over this period, and Arizona experienced a 3.14 percent annual growth rate (AGR) between 1980 and 2000.

Population forecasts through 2020 show an AGR of 2.57 for Cottonwood, 2.61 percent for the County, and 1.83 percent for Arizona. By the year 2020, Cottonwood's population is forecast to reach 15,246, the County's to exceed 280,000 and Arizona's to nearly reach 7.4 million.

ECONOMIC OUTLOOK

ARIZONA

According to the article *The Good News...Bad News* by Marshall J. Vest, in the October 2001 issue of *Arizona's Economy* (published by the Economic and Business Research Program, Eller College of Business, University of Arizona), Arizona economic measures were disappointing for the second quarter of 2001. Both job market statistics (growth and total employment) and personal income showed significant weakness. Despite this, consumer confidence remained relatively optimistic, which benefitted both retailers and the housing market. Mr. Vest predicts Arizona's economic path will remain below its long term potential through the end of this decade, before returning to trend growth. With regard to population and economic growth, however, forecasts are that Arizona will continue to be one of the fastest growing states in the nation over the next 25 years.

TABLE 2A Historical and Forecast Population Data			
	Cottonwood	Yavapai County	Arizona
<i>Historical</i>			
1980	4,550	68,145	2,716,546
1990	5,918	107,714	3,665,339
1995	6,545	129,500	4,228,900
2000	9,179	167,517	5,130,632
(%) Average Annual Increase	3.57%	4.60%	3.23%
<i>Forecast</i>			
2010	10,749	219,910	6,145,108
2020	15,246	280,530	7,363,604
(%) Average Annual Increase	2.57%	2.61%	1.82%
Sources: Arizona Department of Economic Security, U.S. census Bureau, and the Arizona Department of Commerce (November 2001).			

COTTONWOOD AND VERDE VALLEY

Historically, Cottonwood and the Verde Valley’s economy was centered around agriculture and mining. Today’s economic focus, however, is on manufacturing, retail, service, recreation/tourism and the retirement industries.

Highlighting the area’s close proximity to interstate trucking routes, available land, affordable labor force and other incentives, Cottonwood’s Foundation for Economic Development Council has been actively pursuing general manufacturing to locate to the area.

Tourism and recreation, meanwhile, are becoming an increasingly important part of the economic engine fueling the Cottonwood and Verde Valley area. The region’s central location offers close proximity to several of Arizona’s historic, cultural and recreational destinations. Three national monuments, four state parks and several Indian ruins are located nearby. Recreational opportunities including fishing, boating, hunting, hiking, etc., are also located within short distances of the area.

Another industry which is seeing promising growth is the retirement industry, as senior citizens are

attracted to the Verde Valley's comfortable and affordable lifestyle. It is estimated that nearly two new jobs are generated for each retiree who moves into the area. As more senior citizens retire to the area they will serve to attract and expand the essential services they require such as real estate, financial, legal and estate planning, and especially health care.

The Verde Valley Medical Center (VVMC), one of the area's largest employers with nearly 560 people, is located in Cottonwood and continues to expand.

Between 1980 and 2000, Cottonwood's labor force nearly doubled from 1,649 to 3,263, for an average annual growth rate of 3.47 percent. This rate was slightly higher than the state's AGR of 3.40 percent, but lower than the County's AGR of 5.48 for the 20-year period. Cottonwood's unemployment during this period remained nearly unchanged, from 4.3 percent in 1980 to 4.4 percent in 2000.

Additional growth indicators for Cottonwood, as reported by the Arizona Department of Commerce, which continue to rise include: taxable sales up 8.5 percent, from \$120 million in 1990 to \$230 million in 1998; postal receipts, up 7.2 percent, from \$1.07 million to \$1.85 million for the same period; and new building permits between 1980 and 1999, which increased 28 percent, from 106 to 767. Housing starts continue to be up for the area as several master planned communities are presently under development for Cottonwood and the surrounding area.

All of these indicators would appear to point to continued moderate growth for the Cottonwood area for the foreseeable future.

FORECASTING METHODOLOGY

The development of aviation forecasts is both an analytical and judgmental process. Several mathematical relationships are tested and applied to establish statistical logic and rationale for projected aviation growth. In addition, the forecast analyst must depend upon their own professional experience, aviation industry knowledge, and personal assessment of the service area situation in making the final determination of the preferred forecast.

Reliable aviation demand estimates are best arrived at through the utilization of more than one analytical technique. Methodologies frequently employed include trend line projections, correlation/regression analysis, and market share analysis.

Aviation forecasts which extend beyond five years should not be granted an overly high level of confidence. Due to the fact that it often takes longer than five years to complete a major facility development program, facility and financial planning usually require a minimum ten-year projection. It is important, however, to use forecasts which do not overestimate the Airports revenue-generating capability or underestimate future facility needs which are required to meet aviation activity demands.

Many factors influence the aviation industry, some of which can have significant impact both locally and nationally. Advances in aviation technology have in the past and will in the future continue to affect the growth rate of aviation demand. As these technologies evolve and new ones emerge, it is hard to predict their impact on the aviation industry; simply put, there is no way to mathematically estimate what influence they may have. Therefore, a broad band of local, regional, and national socioeconomic information must be applied in the analysis and development of aviation forecasts. The following forecast analysis examines general aviation demand at Cottonwood Municipal Airport over the next twenty years.

AVIATION ACTIVITY FORECASTS

To determine the types and sizes of facilities that should be planned to accommodate general aviation activity, certain elements of this activity must be forecast. Indicators of general aviation demand usually include:

- Based Aircraft
- Based Aircraft Fleet Mix
- Annual Operations
- Peak Activity

The remainder of this chapter will examine historical trends regarding these areas of general aviation and project future demand for these segments of general aviation activity at Cottonwood Municipal Airport.

BASED AIRCRAFT FORECASTS

At an airport, the number of based aircraft is the primary indicator of general aviation demand. By first developing a forecast of based aircraft, the growth of aviation activities at the airport can be projected. In the preparation of based aircraft forecasts for Cottonwood Municipal Airport, existing and historical based aircraft records maintained by the City, the State and the FAA were obtained and reviewed. According to tiedown and hangar lease records provided by the City of Cottonwood and the FBO, as of October 2001, there were 40 based aircraft at Cottonwood Municipal Airport.

Based aircraft totals for the State are derived from aircraft registrations and are updated as new aircraft are registered. The accuracy of the State data depends upon the registered aircraft owner listing Cottonwood Municipal Airport as the basing location of their aircraft, and not using their home or another address instead. Current (2000-2001) State records indicate 32 based aircraft at Cottonwood Municipal Airport.

Based aircraft totals for the FAA are usually derived from annual inspection of the airport, and are often carried over from year-to-year, depending on the frequency of inspection. The current FAA Form 5010 Airport Master Record for Cottonwood Municipal Airport indicates 30 based aircraft for the Airport in 2000. The latest FAA Terminal Area Forecast records indicate 23 based aircraft for the Airport in

1999, however, this total has not changed in their reporting since 1993.

For purposes of determining future airport facility needs and developing on-airport based aircraft projections, this master plan will utilize current based aircraft totals provided by the City, as they appear to more accurately reflect

existing Airport conditions. Detailed current based aircraft information is provided in **Appendix B**.

Table 2B presents historical registered based aircraft for Cottonwood Municipal Airport and offers a future market share analysis based on percentages of Yavapai County registered aircraft.

TABLE 2B			
Historical Based Aircraft and Market Share Forecast vs. Yavapai County Registered Aircraft			
Cottonwood Municipal Airport			
Year	Cottonwood Municipal Airport Based Aircraft	Yavapai County Registered Aircraft	% of County Registered Aircraft at Cottonwood Municipal Airport
<i>HISTORICAL</i>			
1995	29 ¹	379 ¹	7.65
1996	32 ¹	411 ¹	7.79
1997	30 ¹	427 ¹	7.03
1998	32 ¹	435 ¹	7.36
1999	33 ¹	446 ¹	7.40
2000	32 ¹	461 ¹	6.94
2001	40 ²	471 ⁴	8.49
<i>FORECASTS</i>			
Constant Market Share			
2005	42	491 ³	8.49
2010	47	556 ³	8.49
2015	53	627 ³	8.49
2020	60	708 ³	8.49
2025	68	800 ⁴	8.49
Increasing Market Share			
2005	44	491 ³	9.00
2010	51	556 ³	9.10
2015	58	627 ³	9.20
2020	66	708 ³	9.30
2025	75	800 ⁴	9.40
Sources: ¹ ADOT - Aeronautics Division, Historical Aircraft Registration Records. ² City of Cottonwood Tiedown and Hangar Lease Records. ³ ADOT - Aeronautics Division, "Draft" <i>Arizona State Aviation Needs Study (SANS) 2000</i> . ⁴ Extrapolated by Coffman Associates, Inc.			

Future based aircraft demand at Cottonwood Municipal Airport has been analyzed by evaluating the Airport's share of the County's and State aviation markets. According to **Table 2B**, the percent of County registered aircraft currently based at Cottonwood Municipal Airport totals 8.49 percent through the first three quarters of 2001. ADOT's "Draft" *Arizona State Aviation Needs Study (SANS) 2000* projects Yavapai County registered aircraft to grow to 708 by the year 2020, which equates to a 2.2 percent AGR from the 2000 figure of 461. The County's registered aircraft total of 800 for 2025 was extrapolated based on ADOT's 2.2 AGR. The constant market share analysis shown in **Table 2B** assumed that the Airport's share of Yavapai County registered aircraft remains unchanged at 8.49 percent (Year 2001) and would result in 68 based aircraft by 2025. The forecast of continued population growth and increased economic importance of Cottonwood and other nearby communities to the overall economic outlook for Yavapai County should translate to a greater share of County registered aircraft for the Airport. The forecast increasing market share of County registered aircraft yields 75 based aircraft by the end of the planning period.

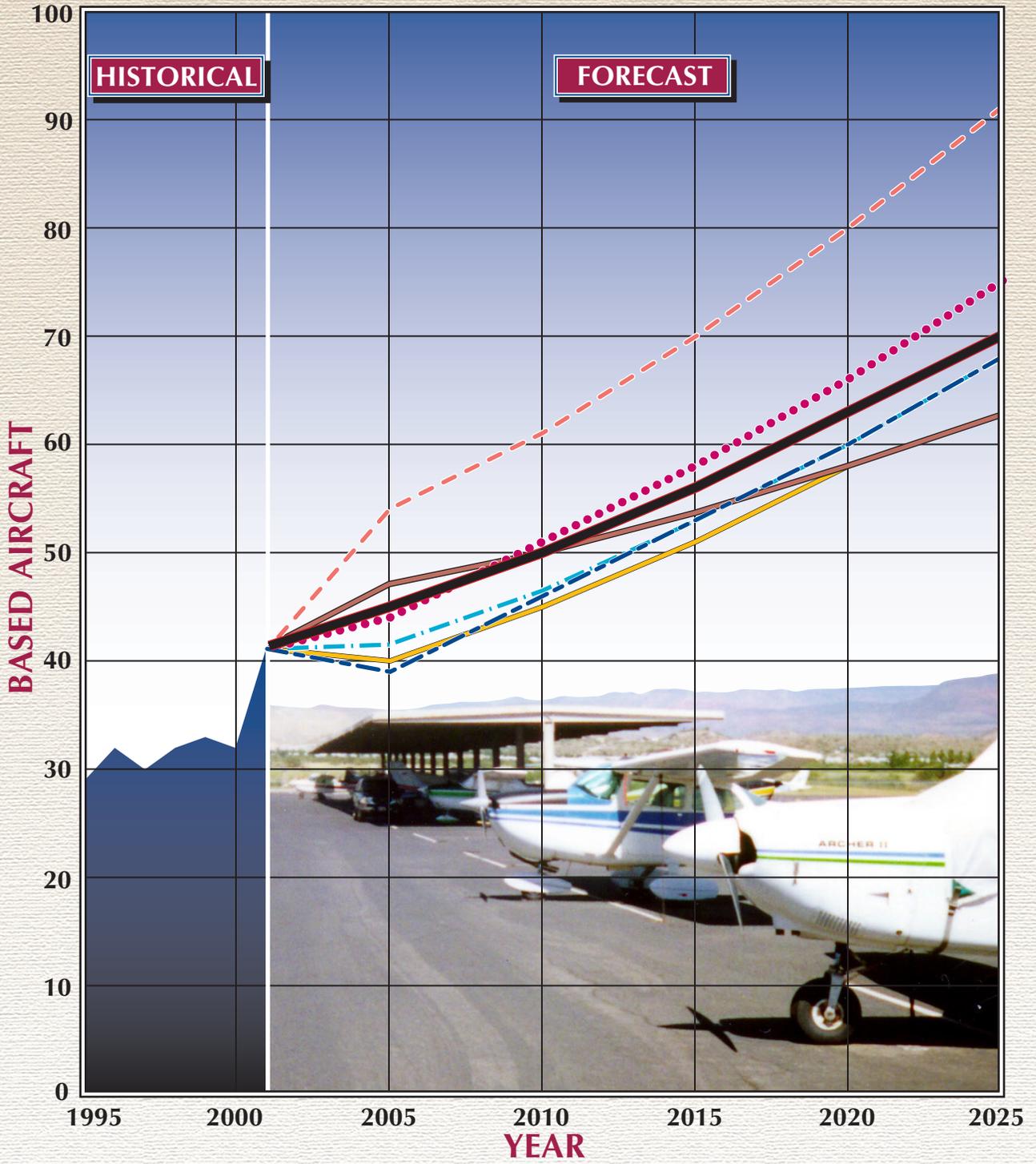
Additional historical based aircraft and forecast market share comparisons and analysis between Cottonwood Municipal Airport and the State of Arizona are presented in **Table 2C**.

Similar to the previous analysis, a constant share analysis assumes the Airport's current 0.65 percent share of State registered aircraft will not change

throughout the planning period. The *2000 SANS* forecasts State registered aircraft to grow by 1.99 percent annually, from 6,006 in 2000 to 8,896 in 2020. The year 2025 State total of 9,565 registered aircraft has again been extrapolated utilizing the projected AGR of 1.99 percent. The constant market share projection, therefore, yields 62 based aircraft for the Airport by 2025. Meanwhile, the increasing market share evaluation (based on the same factors used in the previous analysis) depicted in **Table 2C** results in 91 based aircraft at Cottonwood Municipal Airport by 2025.

A third comparative analysis method is presented in **Table 2D** which utilizes based aircraft per 1,000 Yavapai County residents. It was assumed that the aircraft per 1,000 residents ratio would rise slightly over its current ratio of 0.25, due to such factors as continued moderate population growth and economic development within the Airport's service area. This method results in 78 based aircraft for Cottonwood Municipal Airport by 2025.

A summary of all forecasts (including those from the 1993 Master Plan and ADOT) for based aircraft at Cottonwood Municipal Airport and the selected planning forecast is presented in **Table 2E**, and on **Exhibit 2B**. The planning forecast is a median range projection which reflects the Airport capturing a larger portion of regional and state aviation markets over the planning period. Continued local and regional economic and population growth supports the long-range potential for based aircraft growth at the airport.



LEGEND

- Constant Market Share of Yavapai County Registered Aircraft
- Constant Market Share of State of Arizona Registered Aircraft
- Increasing Market Share of Yavapai County Registered Aircraft
- Increasing Market Share of State of Arizona Registered Aircraft
- 2000 "Draft" Arizona SANS (State Aviation Needs Study)
- Aircraft per 1000 Yavapai County Residents
- Planning Forecast



TABLE 2C**Historical and Forecast Based Aircraft vs. Arizona Registered Aircraft
Cottonwood Municipal Airport**

Year	Cottonwood Municipal Airport Based Aircraft	State of Arizona Registered Aircraft	% of State Registered Aircraft at Cottonwood Municipal Airport
HISTORICAL			
1995	29 ¹	5,076 ¹	0.57
1996	32 ¹	5,338 ¹	0.60
1997	30 ¹	5,491 ¹	0.55
1998	32 ¹	5,717 ¹	0.56
1999	33 ¹	5,913 ¹	0.66
2000	32 ¹	6,006 ¹	0.53
2001	40 ²	6,126 ⁴	0.65
FORECASTS			
Constant Market Share			
2005	47	7,156 ³	0.65
2010	50	7,674 ³	0.65
2015	54	8,247 ³	0.65
2020	58	8,896 ³	0.65
2025	62	9,565 ⁴	0.65
Increasing Market Share			
2005	54	7,156 ³	0.75
2010	61	7,674 ³	0.80
2015	70	8,247 ³	0.85
2020	80	8,896 ³	0.90
2025	91	9,565 ⁴	0.95
Sources: ¹ ADOT - Aeronautics Division, Historical Aircraft Registration Records.			
² City of Cottonwood Tiedown and Hangar Lease Records.			
³ ADOT - Aeronautics Division, "Draft" <i>Arizona State Aviation Needs Study (SANS) 2000</i> .			
⁴ Extrapolated by Coffman Associates, Inc.			

The planning forecast projects based aircraft at Cottonwood Municipal Airport growing at an average annual rate of 2.5 percent. It is more likely, however, that actual activity will not follow any one of the projections precisely. In all likelihood, based

aircraft levels will fluctuate within the range of the projections depicted on **Exhibit 2B**. Thus, these lines serve more as a planning envelope. The planning envelope reflects a reasonable range for based aircraft at the airport. With this in mind, the time-based

projections of anticipated growth should serve only as a guide. At any given time over the planning period, the actual level of based aircraft could fall

within the envelope area defined by the lower range forecast numbers and the higher range forecast numbers.

TABLE 2D			
Aircraft Per 1,000 Residents (Yavapai County)			
Cottonwood Municipal Airport			
Year	Based Aircraft¹	Yavapai County Residents²	Aircraft per 1,000 Residents
1995	29 ¹	130,300 ³	.22
1996	32 ¹	134,600 ³	.24
1997	30 ¹	142,075 ³	.21
1998	32 ¹	148,500 ³	.22
1999	33 ¹	152,957 ³	.22
2000	32 ¹	159,080 ³	.20
2001	40 ²	162,272 ²	.25
FORECASTS			
2005	46	175,693 ³	.26
2010	53	198,052 ³	.27
2015	61	219,614 ³	.28
2020	70	240,849 ³	.29
2025	78	260,779 ³	.30
Sources: ¹ ADOT - Aeronautics Division, Historical Aircraft Registration Records.			
² Extrapolated by Coffman Associates, Inc.			
³ Arizona Dept. of Economic Security, Research Administration, Population Statistics Unit.			

FLEET MIX

Anticipating the future aircraft fleet mix expected to utilize Cottonwood Municipal Airport is necessary to properly plan the facilities that will best serve not only the level of activity, but also, the type of activities occurring at the Airport. The current total of 40 based aircraft is comprised of 39 single-engine and one twin-piston aircraft. The based aircraft and fleet mix information was provided by the City of Cottonwood and verified through the inventory site visit to Cottonwood Municipal Airport.

The forecast mix of based aircraft for Cottonwood Municipal Airport was determined by examining existing and forecast U.S. general aviation fleet trends. The *FAA Aviation Forecasts - Fiscal Years 2001-2012* was consulted for the U.S. general aviation fleet mix trends and considered in the fleet mix projections. Although the majority of the fleet make-up at Cottonwood Municipal Airport will continue to be single-engine piston aircraft there is expected to be an increasing percentage of multi-engine, turboprop, jet, and helicopters in the future mix, all of

which is consistent with national trends. **Table 2F** summarizes the

based aircraft fleet mix projections for the Airport.

TABLE 2E					
Based Aircraft Forecast Summary					
Cottonwood Municipal Airport					
	2005	2010	2015	2020	2025
<i>Constant Market Share of:</i>					
Yavapai County Registered Aircraft	42	47	53	60	68
State of Arizona Registered Aircraft	47	50	54	58	62
<i>Increasing Market Share of:</i>					
Yavapai County Registered Aircraft	44	51	58	66	75
State of Arizona Registered Aircraft	54	61	70	80	91
<i>Other Forecasts:</i>					
1993 Master Plan	44	51	58	N/A	N/A
1995 Arizona SANS (State Aviation Needs Study)	56	64	71	N/A	N/A
2000 "Draft" Arizona SANS (State Aviation Needs Study)	40	45	51	58	N/A
Aircraft per 1,000 Yavapai County Residents	39	46	53	60	68
<i>Planning Forecast</i>	45	50	56	63	70

TABLE 2F						
Projected Based Aircraft Fleet Mix						
Cottonwood Municipal Airport						
Year	Total Based Aircraft	Single Engine	Multi Engine	Turbo Prop	Jet	Helicopter
<i>Historical</i>						
2001	40	39	1	0	0	0
<i>Forecast</i>						
2005	45	42	1	1	0	1
2010	50	45	2	2	0	1
2015	56	47	3	3	1	2
2020	63	51	4	4	2	2
2025	70	55	5	5	2	3

ANNUAL OPERATIONS

There are two types of general aviation operations at an airport: local and 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. Generally, local operations are characterized by training operations. Itinerant operations are those performed by aircraft with a specific origin or destination away from the airport. Typically, itinerant operations increase with business and industry use since business aircraft are used primarily to carry people from one location to another.

Cottonwood Municipal Airport has no airport traffic control tower, therefore,

aircraft operations have not been regularly counted. Instead, only general estimates of historical and current activity is available. **Table 2G** summarizes historical operational estimates for the airport. The operations data sources for the years depicted in the table are from the FAA Form 5010 for Cottonwood Municipal Airport and FAA Terminal Area Forecast (TAF) System Records. On examination of these records, it would appear that operations estimates have been carried over from year-to-year since 1991, as the totals have remained constant at 19,410 operations. During this time, the itinerant to local operations split is approximately 54 percent to 46 percent, respectively. Military operations between 1980 and 2000 have averaged 10 total operations annually.

TABLE 2G
Historical Operations Summary
Cottonwood Municipal Airport

Year	Based Aircraft	Annual Operations	Operations Per Based Aircraft
1980 ²	30	12,110	404
1985 ²	31	12,110	391
1990 ²	46	21,410	465
1995 ²	29	19,410	669
2000 ¹	32	19,410	606
2001 ³	40	19,410	485

Sources: ¹ FAA Form 5010, Airport Master Record (Year 2000), Cottonwood Municipal Airport.
² Historical FAA Terminal Area Forecast (TAF) System Records (Query Date: Sept. 2001).
³ Based Aircraft from City of Cottonwood Tiedown and Hangar Lease Records.

In 1980, according to TAF records, the estimated average number of operations per based aircraft was approximately 404; by 2001, this number rose to 485.

While this number of operations per based aircraft is higher than most GA airports, it is reasonable, due to the large number of training operations

(touch-and-go's) conducted at Cottonwood Municipal Airport. Embry-Riddle Aeronautical University (ERAU) located at Prescott's Ernest A. Love Field utilizes Cottonwood Municipal Airport as part of its flight training program. ERAU operations consist entirely of touch-and-go maneuvers. School officials estimate 2,800 operations annually between 1995 and 2000. ERAU voluntarily suspended operations at the Airport for the period of August 1998 to December 1999.

The projections of annual operations at Cottonwood Municipal Airport, which are summarized in **Table 2H**, have been prepared by examining the number of operations per based aircraft. For forecasting purposes, two forecasts of operations per based aircraft have been developed. First, a constant level of 485 operations per based aircraft was applied to forecast based aircraft. This results in an operational level of 33,950 in 2025. The second forecast, utilizes an increasing number of operations per based aircraft. It assumes an annual average increase of 2 percent in operations per aircraft and results in 54,600 total operations by 2025. Both of these operational totals are based on the planning forecast of 70 based aircraft at Cottonwood Municipal Airport.

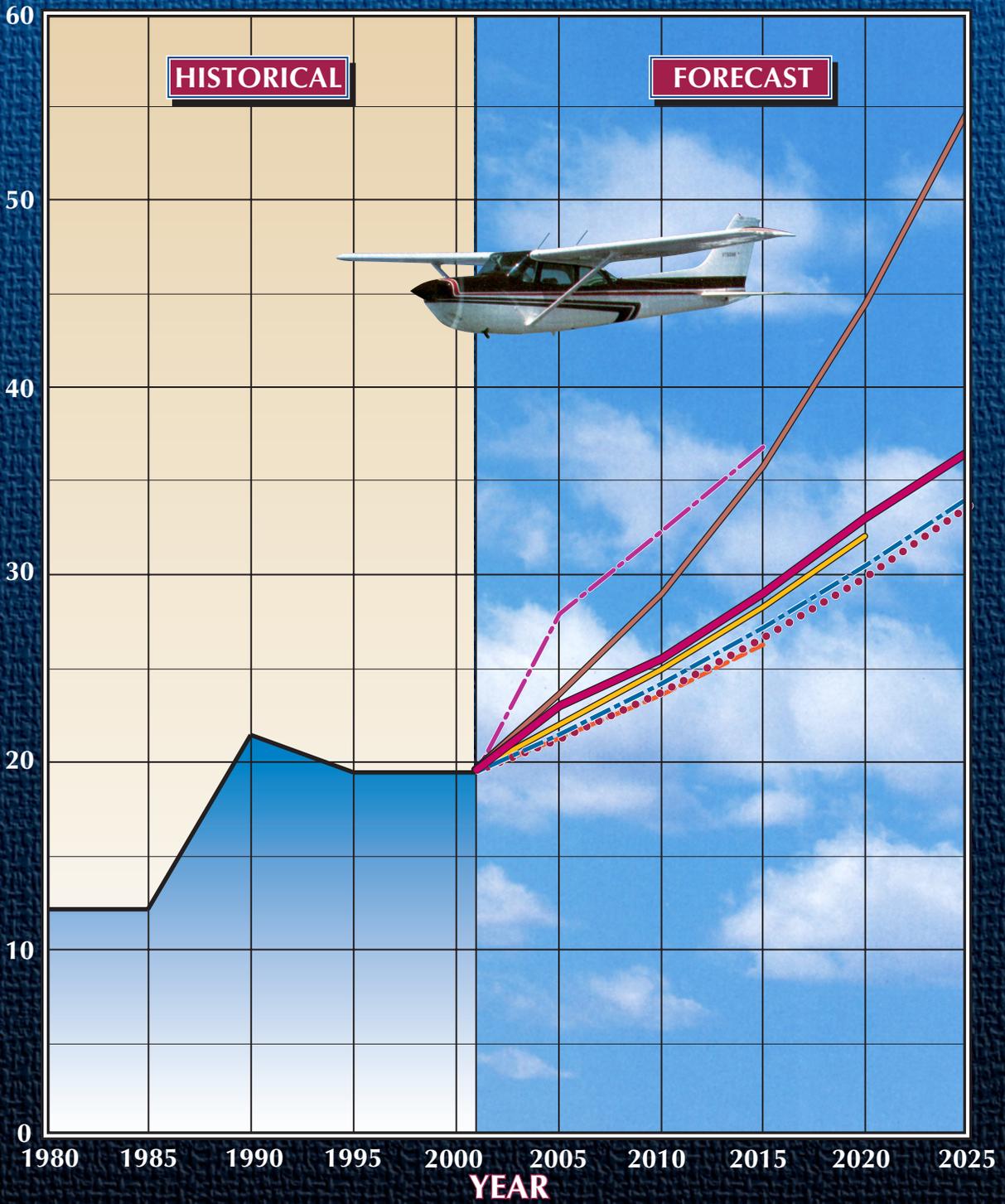
The third forecast method in the table uses the FAA's Projected 2.3 Percent Annual Increase (total operations) to project 33,500 operations by the year 2025. The 1993 Airport Master Plan estimated 36,800 operations for 2015. Finally, two additional operations forecasts are also shown in the table: the 1995 SANS forecasts annual

operations growing to 26,262 by the year 2015, while the 2000 "Draft" SANS projects 32,050 operations in 2020 for Cottonwood Municipal Airport. These additional forecasts, based on different variables, are provided to further define the operational "forecast envelope" of the current planning period.

The planning forecast was arrived at by analyzing and comparing these varied methodologies, and then weighing the results along with several other factors influencing growth both on and around the Airport. Together these forecasts, including the planning forecast, represent the "forecast envelope." **Exhibit 2C** presents the planning forecast and "forecast envelope" for Cottonwood Municipal Airport. For clarity, neither the 1993 Master Plan forecast nor the 1995 SANS forecast is depicted on the exhibit, as they are both undergoing updates.

The expected continuing growth of Cottonwood and the surrounding communities, along with potential new airport tenants and businesses (development of Cottonwood Airpark), and increased business and corporate aircraft activity, has the potential of contributing to additional airfield activity, thus increasing the number of annual operations at the Airport. The planning forecast accounts for this additional activity, as well as subsequent activity resulting from increased numbers of based aircraft at the airport. The planning forecast projects operations to grow at approximately 2.6 percent annually for a total of 36,500 operations at Cottonwood Municipal Airport by the year 2025.

ANNUAL OPERATIONS (in thousands)



LEGEND

- Constant Number of Operations per Based Aircraft
- Increasing Number of Operations per Based Aircraft
- FAA's Projected 2.3 Percent Annual Increase
- 1993 Master Plan
- 1995 Arizona SANS
- 2000 "Draft" Arizona SANS
- Planning Forecast



TABLE 2H
Comparative Annual General Aviation
Operations Forecast Summary
Cottonwood Municipal Airport

	2005	2010	2015	2020	2025
Constant Number of Operations per Based Aircraft (485 Annually)	21,825	24,250	27,160	30,555	33,950
Increasing Number of Operations per Based Aircraft (+2 percent per year)	23,625	29,000	35,840	44,540	54,600
FAA's Projected 2.3 Percent Annual Increase	21,260	23,820	26,690	29,900	33,500
1993 Master Plan	27,900	32,300	36,800	N/A	N/A
1995 Arizona SANS (State Aviation Needs Study)	21,278	23,578	26,262	N/A	N/A
2000 "Draft" Arizona SANS	22,003	24,942	28,273	32,050	N/A
<i>Planning Forecast</i>	<i>23,000</i>	<i>25,500</i>	<i>29,000</i>	<i>33,000</i>	<i>36,500</i>

Although business and corporate use of the Airport is expected to increase in the future, it is assumed that the current 55 percent local and 45 percent itinerant split of operations will remain the same throughout the planning period. The projection of local and itinerant operations are summarized in the table at the end of this chapter.

PEAKING
CHARACTERISTICS

Many airport facility needs are related to the levels of activity during peak periods. The periods used in developing facility requirements for this study are as follows:

- ***Peak Month*** - The calendar month when peak aircraft operations occur.
- ***Design Day*** - The average day in the peak month. Normally this indicator is easily derived by

dividing the peak month operations by the number of days in a month.

- ***Busy Day*** - The busy day of a typical week in the peak month. This descriptor is used primarily to determine apron space requirements.
- ***Design Hour*** - The peak hour within the design day. This descriptor is used primarily in airfield demand/capacity analysis, and in determining terminal building and access road requirements.

Actual operational information is not available to directly determine peak aviation activity at the airport; therefore, peak period forecasts have been determined according to trends experienced at similar airports across the country. Typically, the peak month for activity at general aviation airports approximates 10-12 percent of the

airport's annual operations. Peak month operations have been estimated as 11 percent of annual operations. The forecast of busy day operations at the airport was calculated as 1.25 times

design day activity. Design hour operations were calculated as 13.0 percent of design day operations. **Table 2J** summarizes peak activity forecasts for Cottonwood Municipal Airport.

	2005	2010	2015	2020	2025
Annual Operations	23,000	25,500	29,000	33,000	36,500
Peak Month	2,530	2,805	3,190	3,630	4,015
Design Day	84	94	106	121	134
Busy Day	105	118	133	151	168
Design Hour	11	12	14	16	17

COMMERCIAL AIR SERVICE POTENTIAL

Scheduled airline service has never been provided to Cottonwood Municipal Airport. The increasing population along with the expanding economic development of Cottonwood and the surrounding area have the potential to attract air service. Considering Cottonwood's proximity to Phoenix, any potential airline service would likely be commuter/regional type airline service serving Phoenix-Sky Harbor International Airport.

The decision for an airline to enter a market is purely a business decision based on the potential passenger market. As the Airport has no history of air service, estimating the air passenger market in Cottonwood Municipal Airport's service area is difficult. However, an examination of similar airports and communities with existing commercial air service could provide an indication of the potential

passenger market in Cottonwood and the surrounding area.

Two communities located near Cottonwood which currently offer scheduled airline service are Prescott and Flagstaff. **Table 2K** compares the population of these communities to the number of annual enplanements (a person boarding a scheduled airline flight) at each airport in 1998, 1999, 2000, to arrive at a ratio of enplanements per 1,000 residents.

According to the table, for both Flagstaff and Prescott, the number of enplanements per 1,000 residents has declined annually since 1998. This can be attributed to a reduction in the number of daily flights offered at each of these airports.

Prescott is included in the Federal Essential Air Service (EAS) program. Under this program, a subsidy is paid to the airline serving Prescott to guarantee regular service and reduce

ticket prices. Considering Prescott's proximity to Phoenix (less than 90 minutes north), the EAS subsidy likely increases the number of annual airline enplanements by ensuring regular airline service. The number of enplanements per 1,000 residents in Prescott, as opposed to Flagstaff, is

lower because a large number of airline passengers in Prescott choose to drive to Phoenix instead of using Prescott's airport. In Flagstaff, the number of enplanements is considerably higher due to the extended drive time to Phoenix.

City	Year	Enplanements	Population	Enplanements per 1,000 Residents
Flagstaff	1998	38,487	59,945	652
	1999	33,385	60,880	549
	2000	33,978	62,710	542
Prescott	1998	7,844	34,610	227
	1999	5,725	35,785	160
	2000	5,543	36,975	150

The ratio of enplanements per 1,000 residents in Cottonwood Municipal Airport's service area is likely to be lower than in Flagstaff and Prescott, since the communities comprising the service area are closer to Phoenix, plus Prescott is part of the EAS program. The total population of the eleven communities comprising the Airport's service area is approximately 30,700. Assuming a ratio of 100 enplanements

per 1,000 residents, equates to an existing air passenger market of approximately 3,070 annual passengers for the Cottonwood Municipal Airport service area. Applying this ratio to forecast population provides an indication of the potential air passengers for the Airport's service area through 2025. Potential air passengers for Cottonwood Municipal Airport are summarized in **Table 2L**.

Year	Forecast Population	Enplanements per 1,000 Residents	Potential Air Passengers
2005	33,383	100	3,338
2010	38,507	100	3,851
2015	43,480	100	4,348
2020	48,305	100	4,831
2025	52,754	100	5,275

The most important factors in creating and sustaining scheduled air service are the frequency of service and air fare prices. Competitive air fares would attract travelers who might otherwise choose to drive to regional airports for frequency of service and efficiency.

The proximity of Cottonwood Municipal Airport to other air carrier airports, along with the existing airport conditions (lack of sufficient runway length, adjacent land uses, no passenger terminal facilities, etc.), are seen as the primary factors limiting the potential for scheduled air service. Although the community might be able to attract air service, it is likely that a large number of potential air passengers would still elect to drive to Phoenix rather than flying directly from Cottonwood Municipal Airport. Jet service, lower fares and the greater numbers of flights offered by Phoenix-Sky Harbor International Airport could be the deciding factors for the potential air traveler.

The *Arizona Rural Air Service Study (August 1999)* by the Arizona Department of Transportation, Aeronautics Division focused on improving air service to 10 Arizona airports with existing scheduled passenger service and three other airports which once supported air service. In this study, Cottonwood Municipal Airport was not considered to receive air service. Instead, the focus was on nearby airports such as Prescott,

Flagstaff, and Sedona. As previously discussed, both Prescott and Flagstaff currently provide scheduled passenger service, and Sedona once did.

Attracting scheduled air service would require considerable commitment on the part of the City of Cottonwood. Dependent on the type of air service to be offered, the Airport might need to pursue FAR Part 139 certification from the FAA. Part 139 certification requires Airport Rescue and Firefighting personnel and equipment be available at the Airport. Other necessary airport improvements would include increased runway length, a dedicated passenger terminal facility, terminal apron, and additional auto parking. In addition, the City of Cottonwood would likely need to provide marketing and/or subsidies to attract scheduled air service to the Airport.

FORECAST SUMMARY

This chapter has outlined the various aviation demand levels anticipated over the planning period. The next step in the master plan is to assess the capacity of existing facilities to accommodate forecast demand and determine which facilities will need to be improved to meet these demands. This will be examined in the next chapter -- Chapter Three, Aviation Facility Requirements. **Table 2M** presents a summary of the aviation forecasts developed for Cottonwood Municipal Airport.

TABLE 2M
Aviation Forecast Summary
Cottonwood Municipal Airport

	2005	2010	2015	2020	2025
Annual Operations					
Itinerant Operations	10,350	11,475	13,050	14,850	16,425
Local Operations	<u>12,650</u>	<u>14,025</u>	<u>15,950</u>	<u>18,150</u>	<u>20,075</u>
Total Annual Operations	23,000	25,500	29,000	33,000	36,500
Based Aircraft	45	50	56	63	70