Chapter Two
AVIATION DEMAND FORECASTS

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Aviation Demand Forecasts

Facility planning begins with a definition of the demand that may occur over a specified period. For projection of demands at San Manuel Airport (E77), forecasts of aviation activity indicators are utilized. These forecasts provide the foundation from which aviation demand is translated into specific facility improvements needed by San Manuel Airport and the region it serves over the next 20 years.

Because of the cyclical nature of the economy, it is virtually impossible to predict with certainty year-to-year fluctuations in activity when looking as far as 20 years into the future. However, a trend can be established which delineates long term growth potential.

While a single line on a graph is often used to express the anticipated growth, it is important to remember that actual growth may fluctuate above and below this line. Forecasts serve as guidelines. Planning must remain flexible to respond to unforeseen facility needs. These facility needs may differ in response to a variety of external influences, including the changing types of aircraft and the nature of available facilities.

The following forecast analysis examines recent national and regional aviation trends and historical and current socioeconomic and demographic information to develop an updated set of aviation demand projections for San Manuel Airport. Analysis of these factors will ensure a comprehensive outlook for future aviation demand.

A note about September 11, 2001:

We are unable to present statistical information in this section with regard to the affect of 9/11 on aviation forecasts, since the Federal Aviation Administration (FAA) compiles this information, and it is unavailable at this time. While they may attempt to present an overview of the events in their annual publication in March 2002, it will not be entirely inclusive of year 2001 data since most of the statistical information will not be available until later in the year.

NATIONAL TRENDS

Each year, the FAA publishes its national aviation forecasts. Included in this publication are forecasts for air carriers, air taxi/commuters, general aviation, and military activities. The FAA 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 by the general public. The *Terminal Area Forecasts* (TAF), referenced in this report, uses the economic performance of the United States as a baseline indicator of future aviation industry growth.

GENERAL AVIATION

General aviation is defined as the portion of civil aviation which encompasses all facets of aviation except commercial and military operations. By most statistical measures, general aviation recorded its fifth consecutive year of growth (1994-2000). Following more than a decade of decline, the general aviation industry was invigorated by the passage of the General Aviation Revitalization Act in 1994 (federal legislation which limits the liability on general aviation aircraft to 18 years from the date of manufacture). This legislation sparked both an interest to renew the manufacturing of general aviation aircraft and a renewed optimism for the industry. The high cost of product liability insurance was a major factor in the decisions by many American aircraft manufacturers to slow or discontinue production of general aviation aircraft.

According to the General Aviation Manufacturers Association (GAMA), aircraft shipments and billings also grew for the sixth consecutive year in 2000, following 14 years of annual declines. In the first three quarters of 2000, general aviation aircraft manufacturers shipped over 2,000 units, a 16.3 percent increase over the same period in 1999. Shipments of piston aircraft and jets were up 13.8 and 15.1 percent, respectively. Turboprop shipments were up 36.3 percent during the first three quarters of 2000.

Both the number of active pilots and student pilot starts were estimated to be up in 2000 from the previous year. The total pilot population is an estimated 648,539 for 2000, up 2.1 percent over 1999. The estimated number of active student pilots for 2000 is 104,150, also up 2.1 percent from

1999. Student pilots are the future of general aviation and are a key factor impacting the general aviation industry.

Since most pilot training activities are conducted using general aviation aircraft, the increases in new pilot starts, along with increases in advanced training, are primary reasons for the resurgence in general aviation over the past years. These increases, combined with the increases in piston-powered aircraft shipments and aircraft production, are tangible evidence of the renewed vitality of the industry.

General aviation activity at towered airports declined slightly in 2000, after three consecutive years of growth. In 2000, general aviation operations totaled 39.9 million, a 0.5 percent decline following a 13.4 percent rise over 1996-1999. Most of the decline occurred in itinerant operations, down 0.8 percent. Between 1996 and 1999, local operations were up 17.4 percent, while remaining flat during 2000 at 17.0 million.

In 2000, the top 10 general aviation airports, as ranked by operations, accounted for 9.1 percent of general aviation activity at the combined 459 FAA/contract towers and 5.3 percent of total aircraft activity at towered airports. Two of the top 10 airports showing the fastest growth in general aviation operations are large hub commercial service airports (Minneapolis/St. Paul and Covington/ Cincinnati). This signifies the expansion of the general aviation fleet to include larger, more sophisticated turboprop and turbojet aircraft which require air traffic control services and airport facilities similar to commercial air carriers.

General aviation instrument operations have increased during six of the past seven years, with activity gains totaling 19.2 percent over the period. The number of general aviation aircraft handled at enroute traffic control centers also decreased slightly in 2000, but after eight consecutive years of increase, over which time general aviation activity increased 20.3 percent. These increases are consistent with the expanding fleet of sophisticated turboprop and turbojet aircraft in the general aviation fleet and the greater use of these aircraft for business/ corporate uses.

The most notable trend in general aviation is the continued strong use of general aviation aircraft for business and corporate uses. For 1999 (the most current year of data), business and corporate use of general aviation aircraft represented 22.7 percent of general aviation activity. Corporate hours were up 12.5 percent, while business hours increased 2.1 percent. This increase is consistent with the number of business jets delivered over recent years and is also supported by the increase in number of turbojet hours in corporate and business use - up 17.3 percent in 1999.

An equally striking industry trend is the continued growth in fractional ownership programs. Fractional ownership programs allow businesses and individuals to purchase an interest

in an aircraft and pay for only the time they use the aircraft. This has allowed many businesses and individuals, who might not otherwise, to own and use general aviation aircraft for business and corporate uses. Between 1993 and 2000, these companies had expanded their fleet and shareholders so that by the end of 2000, there were nearly 2,100 entities involved in fractional ownership of over 500 aircraft.

While the fractional jet ownership industry is rapidly expanding, new attention has been given to the regulatory oversight of the industry. Presently, fractional jet providers operate under Federal Aviation Regulation (F.A.R.) Part 91 which governs general aviation aircraft. Industry pressure is for fractional ownership providers to operate under F.A.R. Part 135 which governs commercial operations for air carriers, air taxi, and air charter companies. Part 135 operators believe the fractional ownership providers benefit from the less restrictive F.A.R. Part 91 standards. The FAA commissioned a formal rulemaking committee to analyze regulatory requirements for the industry. Their report, released in Spring 2000, recommended that fractional ownership providers operate under a new subpart of F.A.R. 91. The FAA is now reviewing this recommendation. A formal rulemaking proposal could be made within a year.

Exhibit 2A, **U.S. Active General Aviation Forecasts**, depicts the FAA forecast for active general aviation aircraft in the United States. The FAA forecast predicts general aviation aircraft to increase at an average annual rate of 0.9 percent over the 13-year planning period for general aviation aircraft. General aviation aircraft are projected to increase from 219,464 in 1999 to 245,965 in 2012.

GENERAL AVIATION SERVICE AREA

The initial step in determining the general 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 recognized that aviation demand does not necessarily conform to political or geographical 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. As previously mentioned, San Manuel Airport is designated as a secondary airport by the SASP. The designation indicates that the airport provides basic general aviation services. The ability to provide services, or lack of it, therefore, is a factor in defining the service area for San Manuel Airport.

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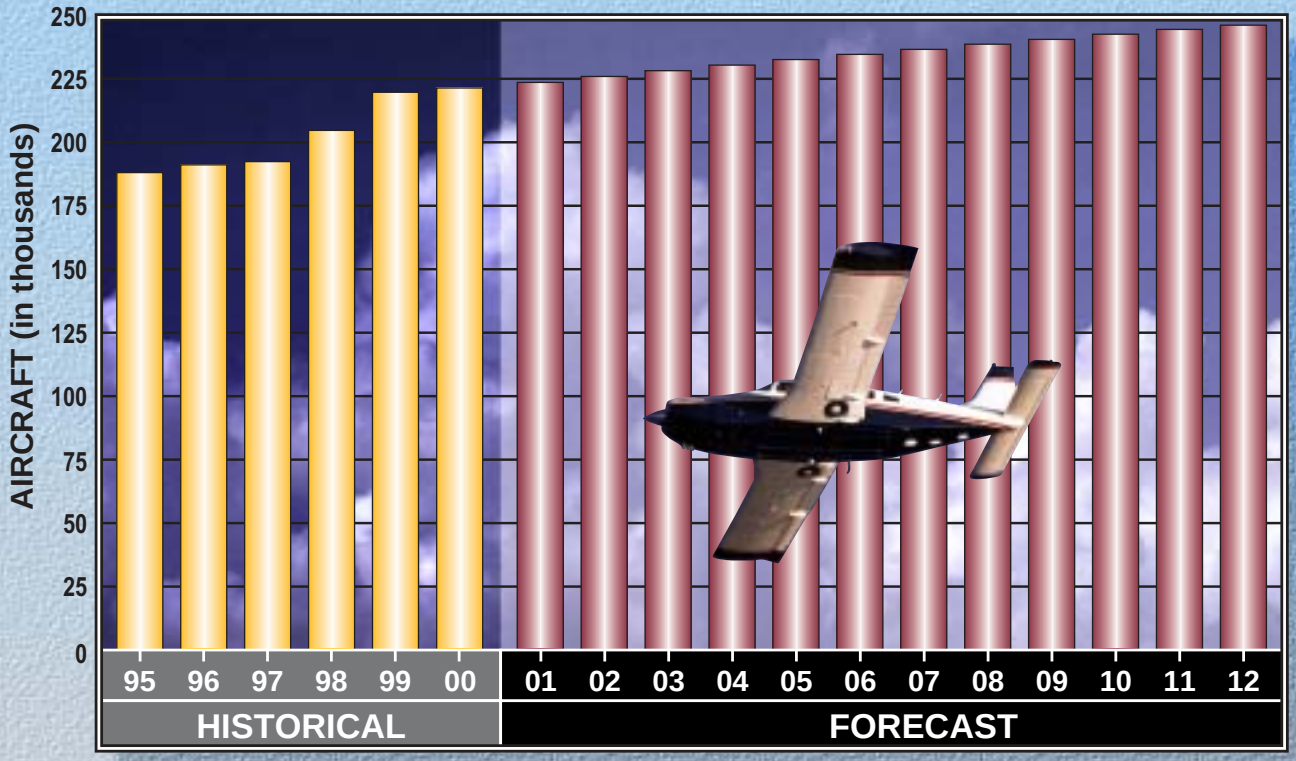
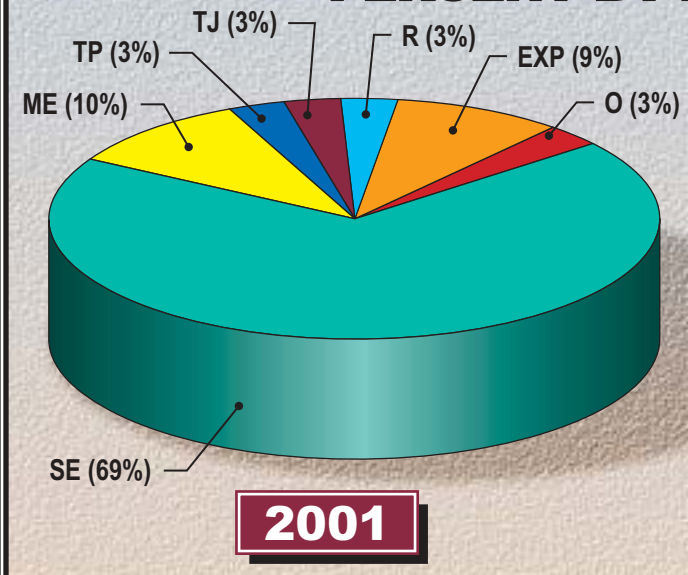
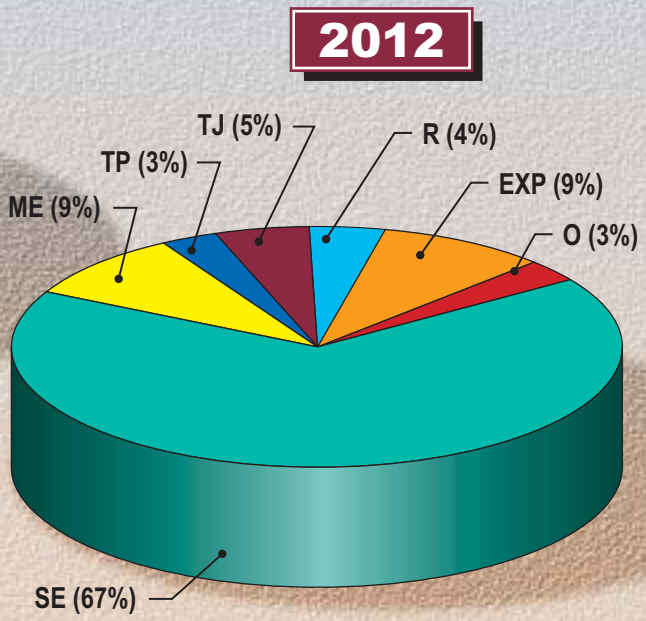
ACTIVE GENERAL AVIATION AIRCRAFT



Source: FAA Aerospace Forecasts, FY 2001-2012

PERCENT BY AIRCRAFT TYPE





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

San Manuel AIRPORT

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

The previous master plan defined the service area for San Manuel Airport as being a 15-mile radius with the airport as hub. This is most likely the case for those past years. General aviation airports, such as Marana Northwest Regional Airport (35 air-miles or one hour, 55 minutes driving time from San Manuel Airport) and Ryan Field (40 air-miles or two hours, seven minutes driving time from San Manuel Airport), have large fleets of based aircraft, with commensurate services: fuel, aircraft rental and instruction, and major airframe and powerplant repair service. Even the private field, La Cholla, 22 miles (38 minutes driving time) west of San Manuel, bases some 90 aircraft and supplies general services. Understandably, these airports have been more successful in attracting local general aviation due to their proximity to Tucson.

As development pressure in the north Tucson area, including Oro Valley and Catalina, has brought a larger market in terms of pilots and aircraft owners, so has this same development created impediments to access of area airport facilities. Both Marana Airport and Ryan Field have long waiting lists for hangar facilities, which can be as long as a three-year wait according to local sources. Tie-down facilities are available but at a price that equates to the demand ($26-$28 per month).

Likewise, distance (in terms of driving-time) can be a major factor in airport facility selection. At various times of the day, cross-town drive-time from north Tucson and areas farther north, such as Oro Valley and Catalina, to Marana Regional Airport or Ryan Field can greatly exceed the driving time to San Manuel Airport. Additionally, the driving experience of leaving the traffic congestion of Tucson for the open desert and mountain vistas along Highway 77 will add to the attraction of San Manuel Airport as a based aircraft facility. However, even with this appeal, there will still be the requirement by many aircraft owners for specific airside and landside facilities that are yet to be built at San Manuel Airport, including: hangars; instrument approach and nighttime operations capability; fuel; optimum runway length; and mechanic services. Currently, a waiting list for hangar facilities exists that contains 10 aircraft owners. Previously, the list contained 15 owners, with several opting to base at other airports when faced with a long wait for storage access. The extent to which the limitations of existing transportation routes to alternate airports will offset the lack of facilities at San Manuel Airport is difficult to gauge. This, and the time it takes to construct needed facilities, will to a large extent determine the service area for San Manuel Airport. It is projected that as facilities become available, the airport will capture an ever-increasing share of the service area, in essence “relieving” the Tucson area reliever airports. The increasing market will, in turn, fuel demand for San Manuel Airport facilities.

The service area for the near term is considered to be all of the tri-community area, encompassing Mammoth, San Manuel, and Oracle and an expanded area of coverage that extends across the southern edge of Pinal County and into northern Pima

County, including Catalina, Oro Valley, and north Tucson. Again, the extent of the need for facilities (and the extent to which San Manuel Airport can provide these) will determine the amount of capture of the service area, but it can be expected that San Manuel Airport will serve an ever-increasing share of the market.

LOCAL SOCIOECONOMIC FEATURES

The local socioeconomic conditions provide an important baseline consideration for preparing aviation demand forecasts. While in many cases local socioeconomic variables such as population, employment, and personal income cannot be relied upon to indicate the growth of aviation demand, these factors can provide an important indicator for understanding the dynamics of the general aviation service area and the specific trends in economic growth.

For this study, socioeconomic variables for Pinal and Pima Counties have been considered. County and state information was gathered from the Arizona Department of Economic Security and Woods and Poole Economics, Inc.: *The Complete Economic and Demographic Data Source.*

POPULATION

Table 2A summarizes various socioeconomic forecasts, including population estimates for Pinal and Pima Counties, as well as the state of Arizona and the United States. As shown in the table, each is expected to experience population growth over the next several decades. The Pinal County population is forecast to grow at the fastest pace, at an average annual growth rate of 2.3 percent, increasing from an estimated 179,727 in 2000 to 281,710 in 2020. By comparison, Pima County (including the Tucson area) is forecast to grow at an average annual growth rate of 1.7 percent from 843,746 in 2000 to 1,178,720 in 2020. The state is expected to grow at an average annual 2.1 percent over the forecast period. As Arizona is one of the fastest growing states in the United States, the forecast for the United States population is anticipated to grow at a slower pace than that of Arizona, at an average annual growth rate of 1.0 percent.

EMPLOYMENT

Employment forecast data for Pinal and Pima Counties, along with Arizona and the United States, are also presented in **Table 2A**. The table shows gains in employment for each over the forecast period. Forecast employment for Pinal County is projected to increase at annual average of 2.2 percent for the forecast period from 2000 to 2020. The remaining employment statistics are consistent with population growth trends, with Pima County forecast employment percentages slightly ahead of population growth, but lower than the State growth rate of 2.2 percent.

An examination of the employment sectors charted for Pinal and Pima Counties indicate that the leading

growth sectors (service and retail trade) are expected to contribute over 20,000 jobs to the overall economy of Pinal County by 2020 and over 100,000 jobs to Pima County for the same time period.

TABLE 2A
Population/Socioeconomic Forecasts
Pinal and Pima Counties, Arizona, United States

	2000	2005	2010	2020	Percent Annual Increase
Pinal County					
Population	179,727	208,070	232,120	281,710	2.3%
Employment	51,290	58,470	65,510	80,000	2.2%
PCPI	$13,503	$14,374	$15,354	$17,641	1.3%
Pima County					
Population	843,746	927,910	1,009,330	1,178,720	1.7%
Employment	444,120	489,070	536,090	634,250	1.8%
PCPI	$22,066	$23,480	$24,973	$28,314	1.3%
Arizona					
Population	5,130,632	5,817,550	6,456,350	7,774,830	2.1%
Employment	2,822,380	3,190,840	3,573,660	4,359,260	2.2%
PCPI	$23,260	$24,806	$26,535	$30,334	1.3%
United States					
Population	282,224,350	296,923,860	311,573,090	343,039,600	1.0%
Employment	167,465,310	178,141,490	189,453,080	213,959,130	1.2%
PCPI	$27,432	$28,961	$30,637	$34,312	1.1%

Source for historical Arizona, Pinal County. and Pima County population: Arizona Department of Economic Security
Source for remaining historical and forecast data: Woods and Poole, Inc.: CEDDS,2003

PER CAPITA PERSONAL INCOME (PCPI)

Table 2A also compares per capita personal income (adjusted to 1996 dollars) for Pinal and Pima Counties, the state of Arizona, and the United States. A comparison of the forecast in PCPI for the four geographic areas indicates a different story than the forecast of population and employment. The PCPI for each segment is expected to grow roughly the same. PCPI for Pinal County, Pima County, and the State of Arizona is projected to grow at 1.3 percent annually. The US PCPI is projected to grow at 1.1 percent annually.

FORECASTING APPROACH

The development of aviation forecasts proceeds through both analytical and judgmental processes. A series of mathematical relationships are tested to establish statistical logic and rationale for projected growth. However, the judgement of the forecast analyst, based upon professional experience, knowledge of the aviation industry, and an assessment of the local situation, is important in the final determination of the preferred forecast.

The most reliable approach to estimating aviation demand is through the utilization of more than one analytical technique. Methodologies frequently considered include trend line projections, correlation/regression analysis, and market share analysis.

It is important to note that one should not assume a high level of confidence in forecasts that extend beyond five years. Facility and financial planning usually require at least a 10-year preview, since it often takes more than five years to complete a major facility development program. However, it is important to use forecasts which do not overestimate revenue-generating capabilities or understate demand for facilities needed to meet public (user) needs.

A wide range of factors are known to influence the aviation industry and can have significant impacts on the extent and nature of air service provided in both the local and national markets. Technological advances in aviation have historically altered, and will continue to change, the growth rates in aviation demand over time. The most obvious example is the impact of jet aircraft on the aviation industry, which resulted in a growth rate that far exceeded expectations. Such changes are difficult, if not impossible, to predict and there is simply no mathematical way to estimate their impacts. Using a broad spectrum of local, regional, and national socioeconomic and aviation information, and analyzing the most current aviation trends, forecasts are presented in the following sections.

The following forecast analysis examines general aviation demand expected at San Manuel Airport over the next 20 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. These indicators of general aviation demand include:

- Based Aircraft
- Based Aircraft Fleet Mix
- Local and Itinerant Operations
- Aviation Peaking Activity

BASED AIRCRAFT FORECASTS

The number of based aircraft is the most elementary indicator of general aviation demand. By first developing a forecast of based aircraft, the growth of other aviation demand indicators can be projected. The rationale for forecasting general aviation activity is presented below.

Historical Based Aircraft

A cursory review of historically-based aircraft at San Manuel Airport reveals a small population of single engine aircraft that has risen slowly, but steadily, over the last five years. In 2000, members of the San Pedro Valley Pilots Association, with intentions of constructing T-hangars, began a list of aircraft owners desiring to base an aircraft at San Manuel Airport once facilities were in place. Although construction has not ensued, the list contains the names of persons wanting to base at least 13 aircraft that are still willing to wait for these facilities. Of these, 10 are firmly committed to basing at San Manuel Airport. The number of based aircraft also includes the four seasonal aircraft that base at San Manuel Airport each winter. Due to the impact of the addition of 10 based aircraft (those on the waiting list), all projections will include a one-time 10 aircraft spike in based aircraft during the short term planning period, thus assuming that the storage facilities will be constructed in the short term.

Forecasting Rationale For Based Aircraft

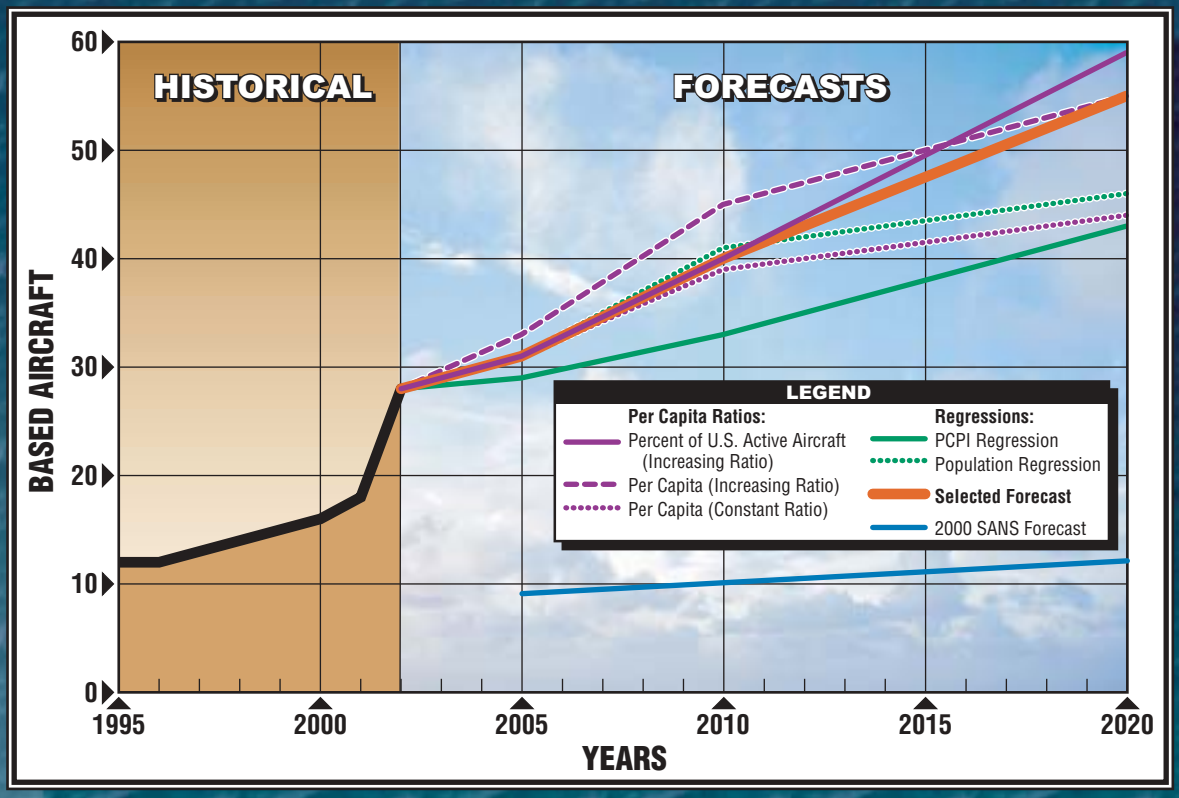
A summary of historical and forecast based aircraft is illustrated on **Exhibit 2B**, **Based Aircraft Forecast**. The projections depicted on the exhibit illustrate potential based aircraft at San Manuel Airport over the long term planning period.

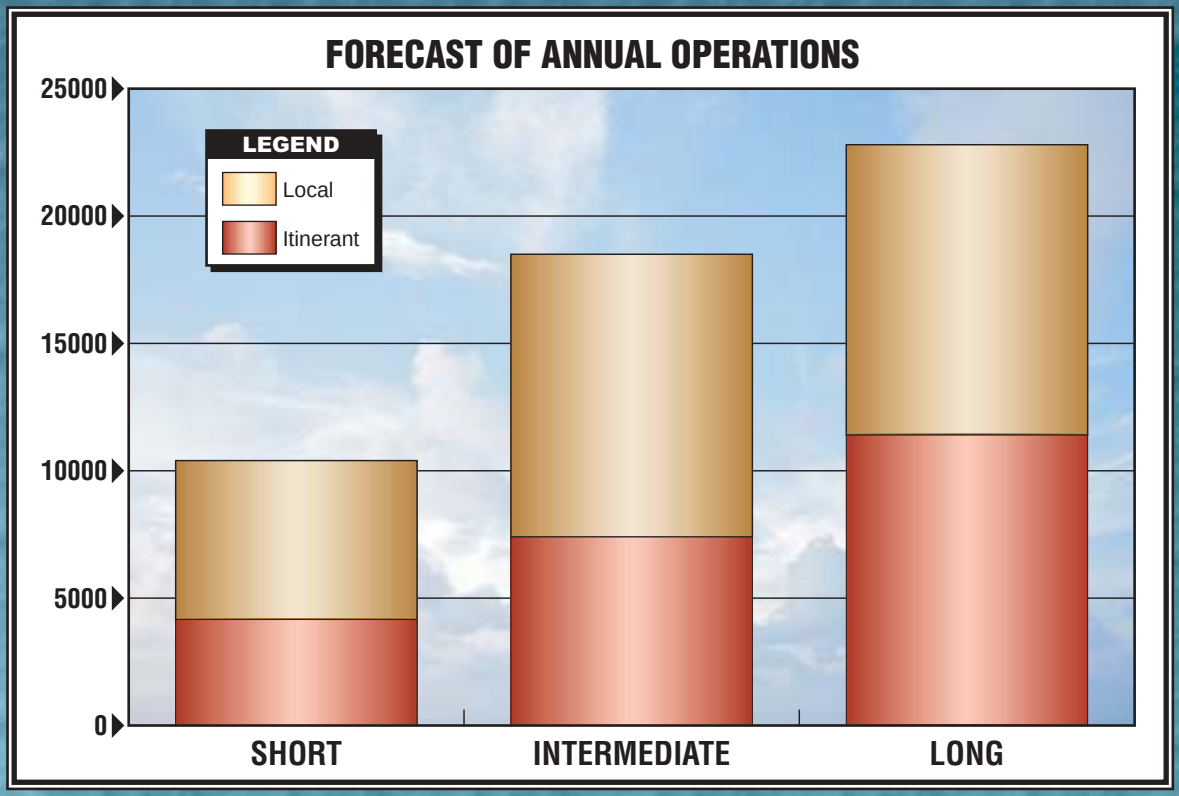
The first method for forecasting based aircraft for San Manuel Airport uses a trend line projection. The trend line is developed utilizing regression analysis, which attempts to average the high and low points. The acceptability of time series or regression analysis is based upon the correlation coefficient (Pearson's "r") which measures the association between changes in the dependent and independent variables. If the r-squared (r^2) value (coefficient of determination) is greater than 0.95, it indicates good predictive reliability. A value below 0.95 may be used with the understanding that the predictive reliability is lower.

Considering based aircraft at San Manuel Airport between 1995 and 2001, Pinal County population regression analysis produces an r^2 value of 0.98. The projection has indicated an increase in aircraft for all projected years, consistent with population increase, and yields 31 aircraft for the short term, 41 aircraft for the intermediate term, and 46 aircraft for the long term.

Another regression analysis was performed using Per Capita Personal Income (PCPI) values for Pinal County. The relationship between PCPI and based aircraft over the same recording period (1995 to 2001) yields an r^2 output of 0.92, corroborating the statistical significance of the use of both population and PCPI for regression analyses. These results are graphed along with further analyses results on **Exhibit 2B**.

As depicted in **Table 2B**, **Per Capita Population Forecasts**, a market analysis approach was also used. In this type of analysis, comparisons are made involving based aircraft numbers





San Manuel AIRPORT

Exhibit 2B
FORECASTS

for the San Manuel Airport and the population statistics for Pinal County. The projections used for forecasting the based aircraft for the years 2005, 2010, and 2020 are indicated using both a constant share projection (or rate of growth of population that stays the same as the historical pattern) and an increasing share projection (where the same forecast population increases its share of the aircraft market). An increasing market share approach would be consistent with the projection that San Manuel Airport will draw more aircraft from the existing service area or from a wider service area.

TABLE 2B
Per Capita of Pinal County Population Forecasts
San Manuel Airport Forecasts

Year	San Manuel Airport Based Aircraft	Pinal County Population	Aircraft per 1,000 Population
1995	12	139,000	0.086
1996	12	144,150	0.083
1997	13	150,375	0.086
1998	14	157,675	0.089
1999	15	165,400	0.091
2000	16	179,727	0.089
2001	18	186,795	0.096
2002	28*	192,395	0.146
Constant Share Projection			
2005	30	208,070	0.146
2010	34	232,120	0.146
2020	41	281,710	0.146
Increasing Share Projection			
2005	33	208,070	0.159
2010	45	232,120	0.194
2020	55	281,710	0.195

Source (historical and forecast population): Woods and Poole, Inc.: CEDDS, 2001;
Historical Based Aircraft: Local Records
* Gain anticipated with new hangar construction.

Based on a current market share of 18 aircraft plus the one-time infusion of the 10 aircraft waiting to be based immediately per the 2002 population of 192,395 population, or 0.146 aircraft per 1,000, the constant share projections predict 30 based aircraft for 2005, 34 aircraft for 2010, and the projection of 41 for the year 2020. The increasing share analysis proposes a factor of 0.159 aircraft per 1,000 population is to be used to forecast based

aircraft for 2005, 0.194 aircraft per 1,000 for 2010, and increasing to 0.195 per 1,000 to be used for 2020. This yields a forecast of 33 based aircraft for the year 2005, 45 aircraft for 2010, and the projection of 55 for the year 2020.

Table 2C uses a forecast based upon San Manuel Airport's historical market share of the entire U.S. active aircraft fleet. The forecasts are projected at both constant and increasing growth rates. The forecast at a constant share was not included on **Exhibit 2B**, as the relatively flat line was rejected as too low. The projection at an increasing rate is included on the exhibit and depicts straight-line growth.

TABLE 2C
Based Aircraft as Percent of U.S. Active Aircraft
San Manuel Airport Forecasts

Year	San Manuel Based Aircraft	U.S. Active Aircraft	Percent of U.S. Active Aircraft
1995	12	188,100	0.0064%
1996	12	191,100	0.0063%
1997	13	192400	0.0068%
1998	14	204700	0.0068%
1999	15	219,500	0.0068%
2000	16	221,200	0.0072%
2001	18	223,500	0.0081%
2002	28	225,800	0.0124%
Constant Share Projection			
2005	29	232,500	0.0124%
2010	30	242,300	0.0124%
2020	33	264,300	0.0124%
Increasing Share Projection			
2005	31	232,500	0.0134%
2010	40	242,300	0.0165%
2020	59	264,300	0.0225%

Source (historical and forecast U.S. Active Aircraft): FAA Aerospace Forecasts, 2001-2012

These projections are somewhat optimistic beyond the short term, but they allow for consideration of increasing capture of general aviation as awaited hangar and navigational aids become available. Additionally, it appears that, as several forecasts are tied to population, the forecast based aircraft similarly taper off by the long term. Even as growth in Arizona, in general, and Tucson, in particular, may slow by the long term planning period, the FAA forecasts remain steady for general aviation. Therefore, a forecast has been selected that is a median forecast within the envelope presented

by the high and low forecasts for San Manuel Airport, yet in straight-line growth. For comparative purposes, the 2000 SANS projected based aircraft growing from 9 in 2005 to 12 in 2020.

In order to formulate a plan which will allow the sponsor, Pinal County, to develop facilities based upon demand, the following planning horizon activity milestones have been established for based aircraft:

- Short Term - 31
- Intermediate Term - 40
- Long Term - 55

BASED AIRCRAFT FLEET MIX PROJECTION

Knowing the aircraft fleet mix expected to utilize the airport is necessary to properly plan facilities that will best serve the level and type of activities occurring at the airport. The existing based aircraft fleet mix is comprised of single engine piston-powered aircraft.

As discussed previously, the national trend is toward a larger percentage of sophisticated turboprop, jet aircraft, and helicopters in the national fleet. Growth within each based aircraft category at the airport has been determined by comparison with national projections (which reflect current aircraft production) and consideration of local economic conditions. The based aircraft fleet mix projection for San Manuel Airport is summarized in **Table 2D**.

Currently, single engine aircraft compose the largest segment of aircraft at San Manuel Airport. Future based aircraft mix will continue to be dominated by single engine aircraft but with an increasing percentage of turbine aircraft. The improvement of the airport, combined with a positive economic outlook, will promote increases in operations by higher-powered general aviation aircraft. For this reason, all aircraft types, including both turboprop and turbojet aircraft, have been forecast to increase. Although increasing consistently in numbers over the forecast period, single engine based aircraft percentages are forecast to represent less of the total mix in the future.

ANNUAL OPERATIONS

There are two types of operations at an airport: local and itinerant. A local operation is a takeoff 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 since business aircraft are used primarily to carry people from one location to another.

TABLE 2D
Fleet Mix Forecast
San Manuel Airport Forecasts

Type	2001	%	Short Term	%	Intermediate Term	%	Long Range	%
Single Engine	14	77.78%	26	81.00%	30	75.00%	40	72.00%
Multi-Engine	0	0.00%	2	7.50%	4	10.00%	8	14.00%
Turboprop	0	0.00%	1	4.50%	2	6.00%	6	10.00%
Jet	0	0.00%	0	0.00%	1	2.00%	1	2.00%
Helicopter	0	0.00%	0	0.00%	1	2.00%	1	2.00%
Other	4	22.22%	2	7.00%	2	5.00%	0	0.00%
Totals	18	100.00%	31	100.00%	40	100.00%	55	100.00%

Due to the absence of an airport traffic control tower (ATCT), actual operational counts are not available for San Manuel Airport. Instead, general estimates of aircraft operations are made based on periodic observations. The FAA 5010-1, *Airport Master Record Form*, has been consulted. However, the FAA 5010-1 form for 2000 is the only form available. The numbers for that year appear extremely low when consulting with local airport users. The San Pedro Valley Pilots Association has estimated the historical operations for this report.

Other frequent airport users include agricultural aircraft and local, state, and federal air taxi operators, both private and public in the past. BHP Billiton annually hired an agricultural flying service to spray the mine tailings pits to prevent leaching of the contaminants. These agricultural (ag) operations occurred for a one-month period, during which time several turbine engine Air Tractor 802 ag-planes take turns performing two air operations (takeoff and landing) every 10 to 15 minutes, 12 to 24 hours a day. These aircraft performed approximately 1,500 to 2,500 operations over the course of a month. These operations have been discontinued as the tails have been capped with topsoil.

San Manuel Airport is also the destination for a number of itinerant aircraft from various state and federal agencies, among them the U.S. Forest Service, U.S. Customs Service, and U.S. Army Aviation.

The U.S. Forest Service (USFS) maintains an aerial tanker support base at San Manuel Airport during the summer fire season. The USFS uses single engine aircraft such as the Air Tractor Thrush for "fire bombing" purposes. The USFS uses the airfield in response to range and mountain fires in the area, operating two to four times per hour per fire event which typically may last from one to six hours per day. The fire events occur two to four times per season on average.

The U.S. Customs Service (USCS) works in conjunction with the Drug Enforcement Agency (DEA), which performs airport surveillance and drug interdiction support. When using San Manuel Airport for training exercises, the joint forces simulate an interdiction, using a King Air and Citation II to make visual air contact with a Cessna 182 and follow it to the ground (San Manuel Airport). These exercises occur on a monthly basis.

The U.S. Army uses the airfield for training flights that include multiple takeoffs and landings per training episode. The Army flies the Bell helicopter Hueys and Cobras and Sikorsky Blackhawks, based at Marana Northwest Regional Airport, to practice approach and hovering activities at San Manuel Airport. These activities occur on a weekly to bi-weekly basis.

Air taxi operations include numerous flights involving local, state, federal, and private agencies concerned in one way or other with environmental issues. The location of San Manuel between the Galiuro Mountains and the Santa Catalina Mountains, with the natural trails and open space that exist there, draws many groups that study, or are otherwise attracted to, native desert ecosystems. Another natural attraction is the San Pedro River, a major river system that is monitored closely as many issues affect it, including water use by cities such as San Manuel. These groups have been observed flying both single and multi-engine aircraft into San Manuel Airport as it is the closest public airport available to these attractions.

Projections of annual operations have been developed with these reported operations in mind and by use of the recent report published by the Statistics and Forecast Branch of the FAA on the *Model for Estimating General Aviation Operations at Non-towered Airports Using Towered and Non-towered Airport Data*, July, 2001. The forecasts of operations for San Manuel Airport were computed with equation 15, recommended for use to estimate general aviation activity for non-towered airports. The equation is as follows:

$OPS = 775 + 241\ BA - 0.14\ BA^2 + 31{,}478\ \%\ in\ 100\ mi + 5{,}577\ (var1) + 0.001\ Pop\ 100 - 3{,}736\ (var2) + 12{,}121\ Pop\ 25/100.$

Where:

BA = Based Aircraft
BA^2 = Based Aircraft squared
% in 100 mi = % Based aircraft within a 100 mile radius
Pop 100 = Population within 100 miles
Var1 = Variable multiplier (either 0 or 1) determined by flight school operations
Var2 = Variable multiplier (either 0 or 1) determined by geographic location
Pop 25/100 = Population within 25 miles divided by population within 100 miles as a percent

The equation yielded a forecast of operations for the short, intermediate, and long terms, as shown in **Table 2E.**

An estimated percent of local versus itinerant operations is used to distinguish the type of operations at San Manuel Airport. Airports with higher

training operations (local operations) will have a higher operation per based aircraft ratio, whereas airports with a higher percentage of transient aircraft operations will have a lower ratio. San Manuel Airport currently has been determined to have a higher percentage of local operations, by approximately 3:2. This has been assumed from the fact that, although there are not a high number of training operations, the pilots association members fly actively. The percent of local versus itinerant operations has been judged to be approximately one-third higher also, in part, due to the ag operations performed and the designation of these as local operations. This percentage is forecast to change as growth at the airport attracts a higher number of itinerant aircraft. The operations split is projected to be 40 percent itinerant and 60 percent local operations through the intermediate term, gradually shifting to a 50-50 split in the long term projection.

The SASP concurs in its projections of increased aircraft utilization and the number of general aviation hours flown statewide. This projected trend supports future growth in annual operations at San Manuel Airport. For comparative purposes, the 2000 SANS projected annual operations growing from 1,096 in 2005 to 1,495 in 2020.

TABLE 2E
General Aviation Operations Forecast
San Manuel Airport

Year	Itinerant	Local	Total	Based Aircraft	Operations per Based Aircraft
1995	1,200	3,800	5,000	12	417
1996	1,200	3,800	5,000	12	417
1997	1,200	3,800	5,000	13	385
1998	1,200	3,800	5,000	14	357
1999	1,200	3,800	5,000	15	333
2000	500	1,300	1,800	16	113*
2001	3,500	5,300	8,800	18	489
GENERAL AVIATION OPERATIONS FORECAST					
Short Term	4,160	6,240	10,400	31	336
Intermediate Term	7,400	11,100	18,500	40	463
Long Term	11,400	11,400	22,800	55	415

* Based on partial year of operations due to runway closure.
The historical based aircraft and aircraft operations have been estimated by the San Pedro Valley Pilots Association.

AIR TAXI

Air taxi consists of aircraft involved in on-demand passenger or small parcel transport. Typical services that qualify as air taxi operations are charter, air ambulance, and small package services.

Although not strictly "public" air taxi operations, private business aircraft operations serve to provide the same function as air taxi aircraft. For the purpose of estimating air taxi operations and the annual instrument approaches upon which these are based, private business aircraft have been included in these calculations.

These operations are representative of future Part 135 air taxi operations. A conservative estimate of air taxi defined operations would be approximately 50 percent of total itinerant operations for the airfield. The calculations are summarized in **Table 2G**.

MILITARY ACTIVITY

Projecting future military use of an airport is complicated by the fact that local missions may change with little notice. However, existing operations and aircraft mix may be confirmed for their impact on facility planning. As explored previously, there are several military agencies that use the airport. These numbers have been estimated and included in the forecast summary.

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. This indicator is easily derived by dividing the peak month operations by the number of days in the month.
- **Busy Day** - The busy day of a typical week in the peak month.
- **Design Hour** - The peak hour within the design day.

Without an airport traffic control tower, adequate operational information is not available to directly determine peak general aviation operational activity at the airport. Typically, the peak month for activity at general aviation airports approximates 10 to 15 percent of the airport's annual operations. For planning purposes, peak month operations have been estimated as 13 percent of annual operations. Based on peaking characteristics from similar airports, the typical busy day was determined by multiplying the design day by 20 percent of weekly operations

during the peak month, or 1.4. Design hour operations were determined using 20 percent of the design day operations.

The general aviation peaking characteristics are summarized in **Table 2F**, **Peak Operations Forecast**.

TABLE 2F
Peak Operations Forecasts
San Manuel Airport

	2001	Short Term	Intermediate Term	Long Term
Annual Operations	8,800	10,400	18,500	22,800
Peak Month	1,144	1,352	2,405	2,964
Busy Day	53	63	112	138
Design Day	38	45	80	99
Design Hour	8	9	16	20

ANNUAL INSTRUMENT APPROACHES

An instrument approach as defined by the FAA is "an approach to an airport with the intent to land by an aircraft in accordance with an Instrument Flight Rule (IFR) flight plan, when visibility is less than three miles and/or when the ceiling is at or below the minimum initial approach altitude." Annual instrument approaches (AIAs) are included in forecasting for purposes of defining certain navigational aid requirements. There are currently no approach facilities at San Manuel Airport. However, with proposed future facilities installation, estimates for annual instrument approaches (AIAs) have been made for the intermediate and long term planning periods.

With good weather conditions locally, it has been assumed that a total of 10 percent of the annual Part 135 approaches would be performed AIAs. The AIAs have been summarized in **Table 2G**, **Forecast Summary**.

SUMMARY

This chapter has outlined the various aviation demand levels anticipated for approximately the next 20 years at San Manuel Airport. Long term growth at the airport will be influenced by many factors, including: the local economy; the need for a viable aviation facility in the immediate area; and trends in general aviation at the local and national levels.

The next step in the master planning process will be to assess the capacity of existing facilities, their ability to meet forecast demand, and to identify changes to the airfield and/or landside facilities which will create a more functional aviation facility. The aviation demand forecasts for San Manuel Airport through the long term planning horizon are summarized in **Table 2G**.

TABLE 2G
Forecast Summary
San Manuel Airport

	2001	Short Term	Intermediate Term	Long Term
OPERATIONS				
Itinerant				
Air Taxi	1750	2080	3700	5700
General Aviation	1250	1,580	3,200	5,200
Military	500	500	500	500
Total Itinerant	3,500	4,160	7,400	11,400
Local				
General Aviation	5300	6,240	11,100	11,400
Military	0	0	0	0
Total Local	5,300	6,240	11,100	11,400
TOTAL OPERATIONS	8800	10,400	18,500	22,800
AIA'S	NA	NA	370	560
BASED AIRCRAFT	18	31	40	55