2

Aviation Activity Forecasts

INTRODUCTION

The Charles M. Schulz–Sonoma County Airport (Airport) is one of six public-use airports in Sonoma County. It is the only commercial service airport[1] between the San Francisco Bay Area to the south, Sacramento to the east and Arcata-Eureka to the north. The Airport's primary service area has a population of over one million people[2] and includes Sonoma, Lake, and Mendocino counties, and parts of Marin and Napa counties.

Airport Role

The Airport, as the region's principal airport, serves many roles, including providing facilities for scheduled regional and mainline airline services. The *California Aviation System Plan* (CASP) designates the Airport as a *Primary Commercial Service Non-Hub* Airport. There are no *Primary Commercial Service Hub* airports in the region. The closest Primary Commercial Service Hub airports are the San Francisco, Oakland, and San Jose International Airports. The Sacramento International Airport is slightly more distant, but at times it can be more convenient for highway travel.

The Airport also serves a growing population of general aviation (GA) activities including corporate and business flying. For this reason, the Federal Aviation Administration's (FAA) National Plan of Integrated Airport Systems (NPIAS) currently classifies the Airport as a Commercial Service Non-Primary Airport. A strong potential exists for additional scheduled airline service, particularly in the form of new, quiet technology jet aircraft with up to 150passenger seats.[3]

The Airport also serves as a base of operations for local pilots, a place to conduct business, and a point of emergency access for the region. These Airport functions are discussed below:

A Base for Sonoma County and Local Area Pilots — With the longest runway of any of the Sonoma County airports and a precision instrument landing system, the Airport is the most convenient and reliable facility for the majority of GA pilots who live or work in the Sonoma County region.

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[1] A commercial service airport is a publicly-owned airport providing scheduled passenger service and having at least 2,500 passenger boardings (enplanements) each calendar year. Passenger boardings refer to revenue passenger enplanements on an aircraft in service in air commerce whether or not in scheduled service.

[2] Sonoma County, "*Air Service Market Opportunity with Charles M. Schulz—Sonoma County Airport*," June 2005. This represents 14 percent of the combined 7.25 million person San Francisco Bay Area and North Coast air passenger markets.

[3] On March 20, 2007, Horizon Air, a subsidiary of Alaska Airlines, instituted non-stop air service between STS and Los Angeles and STS and Seattle using 76-seat Q400 high-speed turboprop aircraft.

A Point of Air Access for Visitors to the Community —The Airport is the gateway to Sonoma County and the wine country communities, resorts and businesses in the area. Visitors are attracted to nearby wineries, resorts, golf courses, and other recreational and cultural attractions.

A Place to Conduct Business — The Airport is located reasonably close to local hotels and conference facilities, and has facilities for high end corporate and general aviation aircraft.

A Site for Emergency Community Access — Following such natural disasters as a major earthquake, fire, or flood, airports are often of critical importance as points of access into a community for emergency and disaster relief services. In addition, if local/regional surface access routes (i.e., highways, roads and rail lines) are rendered unusable or blocked, air transportation may be the only means of efficiently getting medical and relief supplies into the affected area. The Airport serves as a base for helicopter emergency medical services (HEMS) operations and for the aeromedical transfer of local hospital patients. One emergency air medical transport service (REACH)[4] is based at the Airport. The California Department of Forestry and Fire protection (Cal Fire) also maintains a fire attack base at the Airport for the suppression of wild land fires.

The Future

The catastrophic events of September 11, 2001, had a serious financial and operational impact on the nation's air transportation system. For the first time in U.S. history the entire civil aviation fleet, other than some law enforcement aircraft, was grounded for a period of several days. This caused changes in the Country's airport and air transportation systems that could not even have been imagined in the past. What these changes will ultimately entail can only be speculated on at this time, but it can be assumed that more restrictions, not fewer, will be imposed on civil aviation unless the threats to our national security are significantly diminished.

It is anticipated that in the future the Airport will remain as a commercial service airport and that it will continue to function as it has in the past, i.e., as a nonhub air carrier airport serving a limited range of scheduled mainline and regional airlines and a wide range of general aviation activities. Airport activities will continue to include scheduled passenger and regional airline operations, small package cargo operations, business/corporate general aviation, and personal general aviation activities. It is also anticipated that the Airport will experience only moderate growth over the long run. This growth will take place both in the numbers of based aircraft and in aircraft operations.

[4] REACH = Redwood Empire Air Care Helicopter. REACH Air Medical Services is headquartered in Santa Rosa and provides helicopter and airplane patient transportation for critically ill or injured patients. Since REACH's inception in 1987, the company has performed more than 25,000 air ambulance missions and has developed a specialty in serving pediatric and neonatal patients.

AVIATION INDUSTRY TRENDS

Of the many emerging trends in the aviation industry, two are of particular interest to the development of the Sonoma County Airport Master Plan project. These are airline industry trends and general aviation industry trends.

Airline Industry Trends

The U.S. commercial aviation industry consists of sixteen mainline air carriers that operate large passenger jets (more than 100 seats) and more than 30 regional/regional airlines that operate smaller piston, turboprop, and regional jet aircraft (of up to 100 seats).[5] Some of the regional/commuter airlines also fly aircraft with more than 100 passenger seats.[6] Immediately after the events of September 11, 2001, many mainline airlines grounded large numbers of their older, less fuel-efficient aircraft and delayed delivery of new aircraft. This condition continued through 2010 for many of the mainline carriers. The FAA estimates that there were 7,096 aircraft in the U.S. commercial airline fleet (including regional airlines) in 2010, a decrease of 126 aircraft from 2009.[7] Included in this number are 3,713 mainline airline passenger aircraft (over 100 seats), 2,577 regional airline aircraft (jets, turboprops and piston-engine), and 806 mainline air cargo aircraft. [8]

Over the past decade the commercial airline industry has suffered several major shocks that have led to reduced demand for air travel. These shocks include the terror attacks of September 11, skyrocketing prices for fuel, and a global recession. To manage through this period of extreme volatility, airlines fine-tuned their business models with the aim of minimizing financial losses. To lower operating costs, carriers eliminated unprofitable routes and grounded older, less fuel efficient aircraft. To increase operating revenues, carriers charged separately for services historically bundled in the price of ticket and initiated new services which customers were willing to purchase. The capacity discipline exhibited by the carriers and their focus on additional revenue streams bolstered the industry to profitability. Going into the next decade, there is cautious optimism that the industry has been transformed from one of a boom-to-bust cycle to one of sustainable profits.

As the economy recovers from the most serious economic downturn since the Great Depression, aviation will continue to grow over the long term. For the year 2010, mainline carrier passenger growth was up 0.1 percent while passenger growth for the regional carriers was up 5.0 percent. Passenger demand shows moderate to strong growth in 2011 with system Revenue Passenger Miles (RPMs) forecast to grow 4.9 percent (up 5.0 percent for mainline carriers and up 4.3 percent for regional carriers) as passenger enplanements increase 3.5 percent (up 3.5 percent for mainline carriers and up 3.4 percent for regional carriers). Growth is projected to slow slightly in 2012 with system RPMs and passengers increasing 4.3 and 3.4 percent, respectively, on a

[5] U.S. Department of Transportation, Federal Aviation Administration, "*FAA Aerospace Forecasts, Fiscal Years 2011-2031 (March 2011)*.

[6] These aircraft include the Embraer 190/195 family of regional jets capable of accommodating 106-118 passengers. JetBlue, for example, has ordered 100 Embraer 190s.

[7] U.S. Department of Transportation, op. cit.

[8] Ibid.

capacity increase of 3.8 percent. For the overall forecast period, system capacity is projected to increase an average of 3.6 percent a year. Supported by a growing U.S. economy and falling real yields, system RPMs are projected to increase 3.8 percent a year, with regional carriers (4.2percent a year) growing faster than mainline carriers (3.7 percent a year). System passengers are projected to increase an average of 2.8 percent a year, with regional carriers growing at the same rate as mainline carriers. By 2031, U.S. commercial airlines are projected to transport 1.3 billion enplaned passengers a total of 1.7 trillion passenger miles.

Outlook

The FAA expects commercial aviation activity to increase between now and 2031, with commercial air passenger totals exceeding 1 billion by 2021.[9] However, in the short term, this growth is expected to be tempered by some significant challenges, including the impact of the high costs of fuel on the industry's financial condition. Current trends suggest increased passenger demand among the low-cost carriers and the smaller regional airlines, as well as some recovery of passenger demand among the established legacy carriers. What this means for the Airport is that beyond the March 2007 start of service by Horizon Air, there is a significant possibility for additional scheduled air carrier service by other regional or mainline air carriers or a combination of both over the next several years. Over the longer term, with a developed air service area, some service by a mainline (legacy) airline might also be expected.

General Aviation Influences and Trends

The numbers of general aviation (GA) aircraft operations at an airport are influenced both by national and regional conditions, as well as by various circumstances specific to the individual airport. The downturn in the economy has dampened the near-term prospects for the general aviation industry, but the long-term outlook remains favorable. Major influences impacting the Sonoma County Airport and its GA operational activities include:

National Trends

The FAA uses numerous demand factors in forecasting general aviation trends. These demand factors are part of what determines the growth rates of general aviation at a national level. The following national demand factors for general aviation operations were taken from *FAA Aerospace Forecasts, Fiscal Years 2011-2031 (March 2011):*

- Total active general aviation aircraft fleet
- Total hours flown by aircraft type
- Total active pilots

All of the factors listed above have shown some growth, albeit slowed, through 2011. The growth of the active general aviation aircraft fleet is forecast to increase by an annual average rate of 0.9 percent through 2031, growing from an estimated 224,172 aircraft in 2010 to 270,920 in

[9] Ibid.

2031.[10] However, the more expensive, turbine-powered fleet (including helicopters) is projected to grow at an average rate of 3.0 percent annually through 2031, with the turbine jet fleet increasing at 4.2 percent a year. Single-engine piston aircraft (including helicopters) will continue to be the dominant aircraft in the GA fleet mix, but are expected to grow at only about 0.20 percent overall per year through 2031. Multi-engine piston aircraft are projected to grow at only 0.09 percent annually. Single-engine piston helicopter hours flown, projected at 2.9 percent annually, will offset the slower projected growth rates for single-engine piston propeller-driven aircraft and multi-engine piston propeller-driven aircraft.

After growing rapidly for most of the past decade, the demand for business jet aircraft has slowed over the past few years. While new product offerings, the introduction of very light jets, and increasing foreign demand have helped to drive this growth in the earlier part of the decade, the past few years have seen the hard impact of the recession on the business jet market. Despite the impact of the recession felt in the business jet market, the forecast calls for robust growth in the long term outlook, driven by higher corporate profits and continued concerns about safety/security and flight delays, increasing the attractiveness of business aviation relative to commercial air travel and predicts business usage of general aviation aircraft will expand at a faster pace than that for personal/recreational use.

Eclipse 500 **Cessna Mustang**

A **Very Light Jet (VLJ**) is an extremely small jet aircraft approved for single-pilot operation. With a maximum take-off weight of under 10,000 lbs., they are lighter than business jets and seat between three and five passengers plus one crew member. A number of designs are currently in development and will feature advanced avionics with glass cockpit technology. VLJs are intended to have lower operating costs than conventional jets, and will be able to operate from runways as short as 3,000 feet. The two jets shown above were certified in 2006. These new jets will be used by pilot/owners, air taxi charter, and corporate operations.

Contributing to the advancement of the general aviation industry is the "Small Aircraft Transportation System (SATS) Project," which is being conducted through a public-private partnership including NASA, the FAA, and the National Consortium for Aviation Mobility

[10] U.S. Department of Transportation, op. cit. Does not include light-sport aircraft. FAA projects an additional 14,000 light-sport aircraft to be in the GA fleet by 2017.

(NCAM) SATSLabs. The purpose of SATS is to enable expanded use of smaller airports and smaller aircraft for public transportation. It is designed to:

- Develop and evaluate the technologies that enable the following four operating capabilities:
  1. Higher volume operations in non-radar airspace and at non-towered airports.
  2. Lower landing minimums at minimally equipped landing facilities.
  3. Increase single-pilot crew safety and mission reliability.
  4. En Route procedures and systems for integrated fleet operations.
- Demonstrate the technical and operational feasibility of the four operating capabilities;
- Assess the economic viability of SATS and its impact on the National Airspace and Airport Infrastructure; and
- Provide technical operational, economic, and societal bases for further investment decisions by stakeholders, funders and users.

Starting in 2005, a new class of aircraft was created by the FAA and entered the GA fleet mix: "light-sport" aircraft (LSA). These aircraft evolved from and emulate the ultralight aircraft not currently included in the FAA's aircraft registry counts.[11] An anticipated 450 newly manufactured light-sport aircraft are projected to enter the active fleet on an annual basis until 2013 and 300 per year thereafter. The Aerospace Forecast assumed registration of 13,870 of these aircraft by 2031.

Total general aviation hours flown is projected to increase by 2.2 percent annually through 2031. Growth in the active general aviation pilot population is also anticipated with an annual increase of 0.4 percent over the 20-year forecast period, going from 485,660 pilots in 2010 to 527,660 in 2031.

By all indices, the growth rate of general aviation will be positive in the years ahead. Increases in the number of GA aircraft utilizing the Airport will mainly depend on the state of the economy at the national, state and local levels, the availability of federal Airport Improvement Program (AIP) grant funds, and the availability of key aviation facilities and services.

State Trends

The most recent state aviation activity forecasts are presented in the 1999 *California Aviation System Plan* (CASP), which covers the years from 1995-2020. The state's system plan includes all public use airports in California. The state forecast methodology allocates aviation activity in a top-down manner; the forecasts are distributed to respective geographic areas, then sub-areas and ultimately to individual airports. This System Plan is old. It obviously could not anticipate

[11] The FAA created the new rule for the manufacture, certification, operation, and maintenance of light-sport aircraft. Light-sport aircraft weigh less than 1,320 pounds (1,430 pounds for aircraft intended for operation on water) and are heavier and faster than ultralight vehicles and include airplanes, gliders, balloons, powered parachutes, weight-shift-control aircraft, and gyroplanes. This action is necessary to address advances in sport and recreational aviation technology, lack of appropriate regulations for existing aircraft, several petitions for rulemaking, and petitions for exemptions from existing regulations. The intended effect of this action is to provide for the manufacture of safe and economical certificated aircraft that exceed the limits currently allowed by ultralight regulation, and to allow operation of these aircraft by certificated pilots for sport and recreation, to carry a passenger, and to conduct flight training and towing in a safe manner.

the effects of 9-11 and the current recession on aviation. It is presented here because it is the most recent state document.

The State CASP forecasts a high and a low annual average growth rate for the numbers of based aircraft at the Airport. The high growth rate is 2.18% per year through 2010 and the low growth rate is 1.38% per year for the same period. The CASP based aircraft forecasts for the Airport were based on information contained in the Metropolitan Transportation Commission's 1994 "*Regional Aviation System Plan*." In terms of operational growth rates, the CASP projects an annual average increase in operations of 1.44% for the CASP high forecast and 1.04% for the low forecast.

Local Trends

As was noted in the 2005 air service market study prepared by Sonoma County,[12] the estimated population of the Airport's service area is over one million people. As Sonoma County and the North Coast region continue to grow, quality air service will be critical for the development of business and tourism. This service area is characterized as follows:

- 14.0 percent of the total consolidated Bay Area population
- 14.9 percent of households
- 14.3 percent of retail sales[13]
- 10.7 percent of the buying income[14]
- 10.2 percent of households with annual incomes of over $50,000[15]

An earlier survey to determine the air transportation needs of Sonoma and Marin Counties was also carried out by Tri-Star Marketing.[16] On the basis of interviews with eighteen businesses and organizations, it was determined that these entities alone would generate a total of over 60,000 round trip air passengers annually. The participants noted that reliable scheduled airline service to the Los Angeles area, San Diego, Chicago, Dallas and New York would fulfill their needs, and that they would use the Airport for the majority of their flights if service was available.

Historical Passenger Activity

Historically, various factors, principally fluctuations in airline service levels, have influenced passenger volumes at the Airport. **Table 2-1** sets forth the historical numbers of airline passengers served at the Airport from 1985 through 2010.

From Table 2-1 and Figure 2A it can be determined that for the period of 1985 to 1986 the Airport experienced almost a 188.5 percent increase in passengers served, growing from 7,200 total annual passengers[17] in 1985 to 20,770 passengers in 1986. From 1986-1987 the Airport

[12] Op. cit., June 2005.
[13] California State Board of Equalization, "*Taxable Sales in California-2004*" 3rd quarter data.
[14] Tri-Star Marketing Company, "*Air Service Study for Sonoma County Airport 2002."*
[15] Ibid.
[16] Tri-Star Marketing Company, "*Airline Service Study for Sonoma County Airport," (1998).*
[17] Total annual passengers are the sum of passengers getting on aircraft (enplaned passengers) and those getting off aircraft (deplaned passengers). The number of annual enplaned passengers is typically used as the measurement for facilities planning.

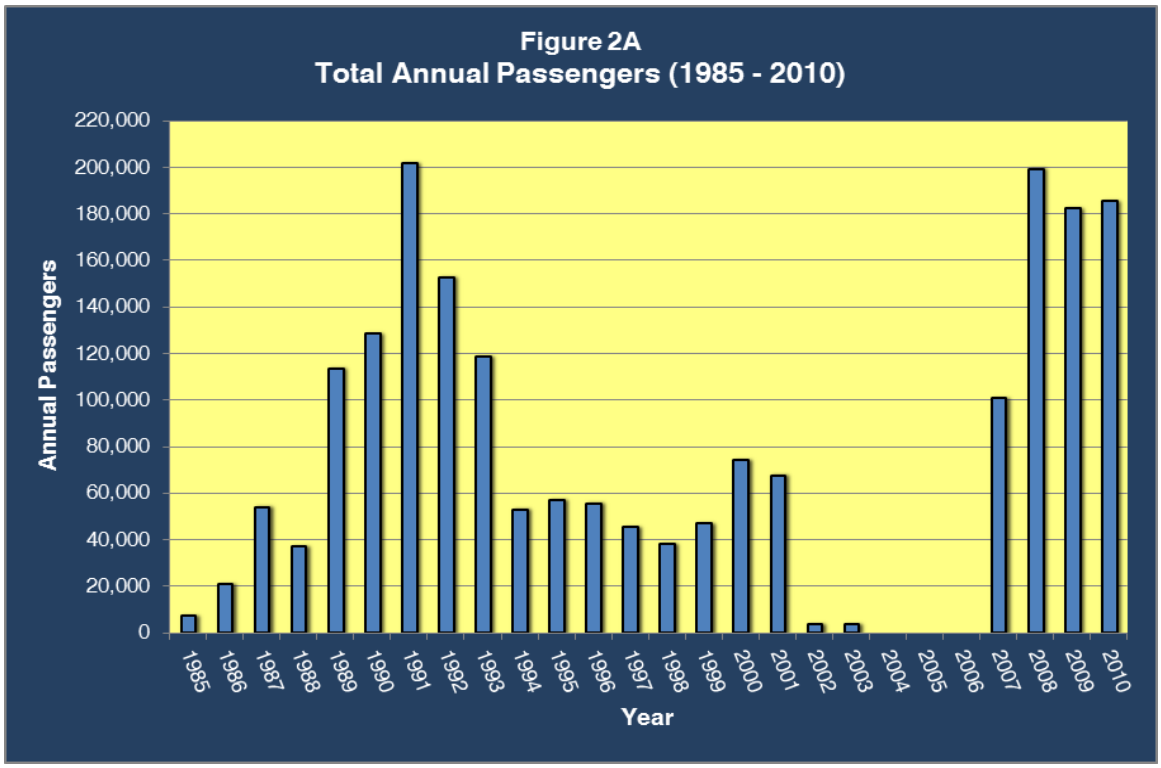
experienced a 160 percent increase in passengers, growing from 20,770 total passengers in 1986 to 54,016 passengers in 1987. From 1987 to 1988 total annual passengers declined by 31.6 percent, with only 36,966 passengers in 1988. In 1989 passenger levels began an upward trend, growing to 113,480 (a 207 percent increase over 1988 levels). Growth continued in 1990, but at a lesser rate (13.4 percent) to 128,376 passengers. This growth peaked in 1991 with 201,686 annual passengers (an increase of almost 57 percent over the previous year).

After the 1991 peak, passenger volume began to decline, going from 201,686 passengers in 1991 to 152,598 in 1992 (a 24.3 percent decline). This decline continued into 1993 and 1994 with 118,568 (-22.3 percent) passengers in 1993 and 52,990 (-55.3 percent) passengers in 1994. In 1995 passenger volumes took a brief upward turn to 57,026 passengers (up 7.6 percent), but dropped back to 55,544 (-2.6 percent) in 1996. In 1997 and 1998 passenger volume continued to decline, with total passengers equaling 45,290 (-18.5 percent) in 1997 and 37,986 (-16.1 percent) in 1998. Passenger volume began to climb again in 1999 and 2000, going to 46,800 (23.2 percent) in 1999 and 74,172 (58.5 percent) in 2000. In 2002 and 2003 only minimal passenger activity was experienced, estimated by the FAA to be less than 3,600 passengers annually.[18] Scheduled passenger service was resumed in 2007 using new Bombardier Q-400 turbprops flown by Horizon Air. The first (partial) year of renewed airline service saw over 100,000 passengers. The next year almost 205,000 passengers were served; this was the historical peak. Unfortunately the global recession intervened and passenger volumes dropped 8.6 percent in 2009. Improving economic conditions supported an increase of 1.7 percent in 2010.

Table 2-1
Total Annual Passengers
(1985-2010)
Sonoma County Airport

Year	Passengers	% Change
1985	7,200	0.0%
1986	20,770	188.5%
1987	54,016	160.0%
1988	36,966	-31.6%
1989	113,480	207.0%
1990	128,376	13.4%
1991	201,686	57.1%
1992	152,598	-24.3%
1993	118,568	-22.3%
1994	52,990	-55.3%
1995	57,026	7.6%
1996	55,544	-2.6%
1997	45,290	-18.5%
1998	37,986	-16.1%
1999	46,800	23.2%
2000	74,172	58.5%
2001	67,614	-8.8%
2002	3,600	94.7%
2003	3,600	0.0%
2004	0	0.0%
2005	0	0.0%
2006	0	0.0%
2007	109,080	—
2008	204,734	87.7%
2009	186,014	-9.1%
2010	188,755	1.5%

[18] Federal Aviation Administration, APO TAF (Terminal Area Forecast) Enplanement data. 2003.



Aviation activity is also affected by many outside influences as well, such as population trends, business and tourism, discretionary income, energy and oil prices, and by the equipment and facilities available. Few industries have seen as much technological change as the aviation industry has since the first powered flight over one-hundred years ago. Major technological breakthroughs as well as regulatory and economic actions have resulted in erratic growth patterns and have had significant impacts upon activity at most airports. The Airport is no exception.

Airline Fleet Mix

The current mix of aircraft operating at the Airport ranges from small single-engine general aviation aircraft weighing less than 12,500 pounds up to and including, large business aircraft of 90,000 pounds and more (e.g. Gulfstream G550), and commercial airliners used as corporate aircraft weighing as much as 174,200 pounds (e.g. Boeing Business Jet 2 [BBJ2]).[19] This wide range of aircraft sizes and types is indicative of the requirements of the aviation community currently utilizing the Airport and is not expected to change significantly in the future, even with the reintroduction of scheduled airline service.

BBJ2

[19] The BBJ2's landing/takeoff weight at Sonoma County Airport is restricted to 150,000lbs or less due to runway bearing strength requirements.

From the preceding passenger activity information it seems apparent that annual passenger levels at the Airport were related not only to the availability of scheduled airline service, but to the type of equipment available and the diversity of destinations, as well. Scheduled airline activity at the Airport has included both regional turbofan jets and turboprop regional equipment. For example, the British Aerospace (BAe) 146 is a quiet technology 4-engine turbofan passenger jet that can carry between 82 and 128 passengers. The BAe-146 was used by United Airlines in its service to Los Angeles International Airport (LAX) from the Airport from 1989 to 1991. Variations of the BAe-146 are still being used today in regional jet service around the world, but few, if any, of these aircraft are still in service.[20] Future airline aircraft likely to see service at the Airport include regional jet (RJ) aircraft such as the Embraer (EMB) 170 or 190,[21] and/or the Bombardier CRJ-200 or CRJ-900.[22] In addition to regional jet aircraft, scheduled airline service could also include operations by Airbus A318/319[23] or B-737[24] aircraft.

EMB 170

CRJ 200

The Embraer (EMB) 120 Brasilia is representative of the type of twin-engine turboprop airliner used by United Express at the Airport in its previous service. The EMB–120 can carry up to 30 passengers. Currently airline operations at the Airport are the larger, 76-passenger Bombardier Aerospace DeHavilland DHC-8 Q400.[25] The long-term outlook on fleet mix is dependent on traffic growth and on-going technological advancements. Sustained traffic growth has been, and will continue to be, generated by affordable fares and the airline industry's ability to provide outlying communities with connections through major hubs. In the past, service has relied on service to SFO and LAX for connections to other airports. In the future, connections through SFO may not be as critical if alternative destinations for connecting flights become available. For example, LAX and SEA-TAC (Seattle-Tacoma International Airport) may afford airport passengers connections to Asia and the Pacific Rim. While Denver, Salt Lake City, Phoenix, or Las Vegas could become connecting points to the Midwest, East Coast, Southeast and Europe.

[20] The Avro RJ transport jet was developed from the BAE 146 short- to medium-range regional airliner. The three variants of regional jet are RJ70, RJ85 and RJ100, which have different cabin lengths, but complete engineering and operational commonality. The Avro RJ regional jet family has from 70 to over 100 seats. The first production aircraft was delivered in 1993 and production ceased in 2002.

[21] The EMB-170 is a 70-passenger regional jet and is the successor to Embraer's earlier 37 to 44-seat RJs. The EMB-190 is a stretched version of the EMB-170, capable of carrying up to 104-pasengers.

[22] The CRJ-200 is a 50-seat RJ. The CRJ-900 is a 75- 90-passenger derivative of the CRJ-700.

[23] The Airbus A318 is a 107-117 passenger jet. The A319 can accommodate 116 to 145 passengers.

[24] The Boeing B-737 is among the most successful of Boeing's airplanes. There are many versions of this aircraft in service today. Such service at STS would most likely entail the B-737-600/700 with a capacity of 110- to 149 passengers.

[25] The Q400 is quiet technology twin-engine turboprop airplane seating from 70- to 78 passengers.

MAINLINE / REGIONAL AIRLINE OPERATIONS FORECASTS

The *Sonoma County General Plan* 2020 contains an Air Transportation Element (ATE)[26] adopted in 2008 that continued policies established in the late 1980's designed to guide future growth and development of aviation activities and facilities in the County through the year 2020 in a manner consistent with the goals and policies established in other elements of the General Plan. The 2008 ATE contains assumptions first developed in the mid-1980's are now obsolete.

Bombardier Q400

Background to Forecasts

The Airport has had a long history of regularly scheduled airline service. However, there was a recent six-year break in airline service and a national recession started shortly after the resumption in service. Because of these circumstances none of the more traditional approaches[27]to projecting operational and passenger growth were regarded as being suited to the current situation. These historical circumstances warranted a more tailored approach to the forecasting of mainline[28]and regional airline[29] activities at the Airport. As a result, the existing level of service was projected through 2030 for two alternative commercial air service demand scenarios, i.e., (1) a Moderate Growth scenario (based on projections of the FAA's "Aerospace Forecast Fiscal Years 2006-2017") and (2) a Low Growth scenario (based on growth rates derived from FAA "Terminal Area Forecast (TAF) Enplanement Data."[30] Each of these scenarios were further broken down into two additional operational subsets reflecting a dominant "mainline airline" fleet mix (up to 14 average daily departures [ADD] by mainline airlines and 7 by regional airlines), and a "regional airline" dominant fleet mix (up to 14 ADD by regional airlines and 7 by mainline airlines) based on limitations published in the Sonoma County General Plan Air Transportation Element (ATE)[31]. The resultant forecasts are compared with the 2008 ATE limits at the end of this report.

[26] County of Sonoma, "Air Transportation Element," August 18, 1992.
[27] Methodologies such as Time-Series Analysis (R2), market Share of U.S. Domestic Enplanements, Enplanements per capita and Historical Growth Rate Projections did not lend themselves to this analysis due to the historically intermittent nature of air passenger service at the Airport.
[28] Mainline Airline is defined as one using jet aircraft with approximately 100 to 150 seats.
[29] Regional Airline is defined as one using turboprop or small jets with less than 99 seats.
[30] The FAA-based load factors and growth rates used in this forecast report were derived from data for airports of comparable size and operations, i.e., non-hub towered airports.
[31] Note that these forecasts were based upon the version of the ATE that existed in 2007. Currently proposed changes to the ATE would reduce the maximum number of daily Mainline Airline departures to seven.

Mainline and Regional Airline Forecasts

The two commercial air service scenarios, "Moderate Growth" and "Low Growth," each have two additional subsets for potential conditions after 2010. These are:

- Regional airline service dominant
- Mainline airline service dominant

The regional airline dominant scenario assumes that scheduled regional airlines, utilizing aircraft with an average capacity of 76 passenger seats, would use up to fourteen of the twenty-one average daily departure (ADD) slots allowed by the ATE. Scheduled mainline airlines would use no more than seven ADD slots (for a total of no more than 21 ADD).

The mainline airline dominant scenario assumes that scheduled airlines, utilizing aircraft with an average seating capacity of 101 passenger seats, would use up to fourteen of the twenty-one ATE allocated ADD slots. Regional airlines would use no more than seven of the twenty-one slots (for a total of 21 ADD).

2010 Baseline Conditions

The baseline conditions for all air service forecast scenarios are those that existed in 2010. These activity levels are presented in Table 2-2.

From the adjacent table it can be seen that total average daily departures (ADD) for the 2010 baseline condition is 6.0 ADD.[32] This is well within the proposed ATE limit of 21.0 ADD by 2020. The next step was to develop growth projections for the two scenarios for the period 2010 through 2030 in five-year increments.

Table 2-2
2010 Baseline Conditions

		Actual Activity Levels
SCHEDULED AIRLINE(S)	Average Daily Departures (ADD)	0
	Load Factor (101 seats X 75.6%)	0
	Enplaned Passengers Per Day	0
	Total Daily Mainline Passengers	0
	Total Annual Mainline Passengers	0
REGIONAL AIRLINE(S)	Average Daily Departures (ADD)	6.0
	Load Factor (74 seats X 57.2%)	42.3
	Enplaned Passengers Per Day	253.9
	Total Daily Regional Passengers	507.7
	Total Annual Regional Passengers	185,318
TOTALS	Average Daily Departures	6.0
	Annual Departures	2,190
	Annual Operations	4,380
	Daily Enplaned Passengers	507.7
	Annual Enplaned Passengers	92,659
	Total Annual Passengers	**185,318**

Scheduled Mainline Airline Dominant Forecasts and Assumptions

The mainline airline dominant forecast scenario assumes that the growth in commercial air service at the Airport between 2010 and 2030 would favor mainline airline operations. Two forecast scenarios (Moderate Growth and Low Growth) were developed for the scheduled mainline dominant scenario.

[32] For reference purposes the Horizon Air service to LAX and SEA-TAC beginning in March 2007 is the equivalent of 2.85 ADD.

Moderate Growth Scenario

Table 2-3 sets forth the assumptions derived for the moderate growth[33] scenario of the scheduled mainline dominant forecast. From this table it can be seen that the total average daily departures (ADD) through 2020 (9.38) are well within the proposed ATE 2020 limit of 21 ADD, as are the total annual operations (6,846 versus the ATE's Objective AT-5.1 of 15,200 annual airline service operations by 2020). Similarly, 2020 regional airline operations (2,920) are well under the ATE limit of 5,200, and 2020 mainline operations (3,925) are also well under the ATE's 10,000 annual operations limit. Similarly, the Year 2020 mainline passenger level of 301,696 would not exceed the ATE's limit of 523,000 annual passengers, but the 2020 regional passengers (157,563) would exceed the ATE's current limit of 50,000 annual passengers. Although overall well within the ADD slots allocated for commercial air service, the size and load factors of the regional airline aircraft anticipated to serve the Airport in 2020 are considerably larger than those assumed in the 2008 ATE.[34]

Table 2-3
Scheduled Mainline Dominant (Moderate Growth Scenario)

		2015	2020	2025	2030
MAINLINE AIRLINE(S)	Average Daily Departures (ADD)	4.60	5.38	6.17	7.22
	Annual Mainline Departures	1,679.00	1,962.61	2,252.05	2,635.30
	Annual Mainline Operations	3,358.00	3,925.21	4,504.10	5,270.60
	Boarding Load Factor (Based on 101 avg. seats X FAA LF growth rates)	76.36	76.86	77.27	77.57
	Enplaned Mainline Passengers Per Day	351.24	413.28	476.73	560.04
	Annual Enplaned Mainline Passengers	128,201.73	150,847.78	174,004.64	204,414.95
	Total Daily Mainline Passengers	702.48	826.56	953.45	1,120.08
	Total Annual Mainline Passengers	256,403.45	301,695.57	348,009.29	408,829.90
REGIONAL AIRLINE(S)	Average Daily Departures (ADD)	3.80	4.00	4.40	4.65
	Annual Regional Departures	1,387.00	1,490.00	1,606.00	1,697.25
	Annual Regional Operations	2,774.00	2,920.00	3,212.00	3,394.50
	Boarding Load Factor (Based on 76 avg. seats X FAA LF growth rates)	52.44	53.96	55.02	56.16
	Enplaned Regional Passengers Per Day	199.27	215.84	242.11	261.16
	Annual Enplaned Regional Passengers	72,733.55	78,781.60	88,368.54	95,324.35
	Total Daily Regional Passengers	398.54	431.68	484.21	522.33
	Total Annual Regional Passengers	145,468.56	157,563.2	176,737.09	190,648.70
TOTALS	Average Daily Departures	8.40	9.38	10.57	11.87
	Annual Departures	3,066	3,423	3,858	4,333
	Annual Operations	6,132	6,846	7,716	8,665
	Daily Enplaned Passengers	551	629	719	821
	Annual Enplaned Passengers	200,936	229,629	262,373	299,739
	Total Annual Passengers	401,872	459,259	524,746	599,479

[33] The moderate growth scenario is based on FAA TAF load factors and projected growth rates from the FAA's "Aerospace Forecast Fiscal Years 2006-2017"

[34] The ATE's assumptions in this regard are not consistent with current airline industry trends.

Low Growth Scenario

Table 2-4 sets forth the assumptions derived for the Low Growth[35] scenario of the scheduled mainline dominant forecast.

Table 2-4
Scheduled Mainline Dominant (Low Growth Scenario)

		2015	2020	2025	2030
MAINLINE AIRLINE(S)	Average Daily Departures (ADD)	4.60	5.24	5.75	6.36
	Annual Mainline Departures	1,679.00	1,912.60	2,098.75	2,321.40
	Annual Mainline Operations	3,358.00	3,825.20	4,197.50	4,642.80
	Boarding Load Factor (Based on 101 avg. seats X FAA LF growth rates)	76.36	76.86	77.27	77.57
	Enplaned Mainline Passengers Per Day	351.24	402.75	444.27	493.33
	Annual Enplaned Mainline Passengers	128,201.73	147,004.35	162,159.92	180,066.36
	Total Daily Mainline Passengers	702.48	805.50	888.55	986.66
	Total Annual Mainline Passengers	256,403.45	294,008.70	324,319.84	360,132.71
REGIONAL AIRLINE)S)	Average Daily Departures (ADD)	3.80	4.00	4.40	4.65
	Annual Regional Departures	1,387.00	1,460.00	1,606.00	1,697.25
	Annual Regional Operations	2,774.00	2,920.00	3,212.00	3,394.50
	Boarding Load Factor (Based on 76 avg. seats X FAA LF growth rates)	52.44	53.96	55.02	56.16
	Enplaned Regional Passengers Per Day	199.27	215.84	242.11	261.16
	Annual Enplaned Regional Passengers	2,733.55	78, 781.60	88,368.54	95,324.35
	Total Daily Regional Passengers	398.54	431.68	484.21	522.33
	Total Annual Regional Passengers	145,468.56	157,563.20	176,737.09	190,648.70
TOTALS	Average Daily Departures	8.40	9.24	10.15	11.01
	Annual Departures	3,066	3,373	3,705	4,019
	Annual Operations	6,132	6,746	7,410	8,037
	Daily Enplaned Passengers	551	619	686	754
	Annual Enplaned Passengers	200.93	225,786	250,528	275,391
	Total Annual Passengers	401,872	451,572	501,057	550,781

From the preceding table it can be seen that the total average daily departures (ADD) through 2020 (9.24) are well within the proposed ATE 2020 limit of 21 ADD, as are the total annual operations (6,746 versus the 2020 ATE's 15,200). Similarly, 2020 regional airline operations (2,920) are well under the ATE limit of 5,200, and 2020 mainline operations (3,825) are also well under the ATE's 10,000 annual operations limit. Similarly, the 2020 mainline passenger level of 294,008 would not exceed the ATE's limit of 523,000 annual passengers, but the 2020 regional passengers 157,563) would exceed the ATE limit of 50,000 annual passengers. Although overall well within the ADD slots allocated for commercial air service, the size and load factors of the regional airline aircraft anticipated to serve the Airport in 2020 are considerably larger than those assumed in the ATE.[36]

[35] The low growth scenario is based on FAA TAF load factors and projected TAF growth rates through 2020, and extrapolated for 2025 and 2030. The ATE's assumptions in this regard are not consistent with current airline industry trends.

Regional Airline Dominant Forecasts and Assumptions

This forecast scenario assumes that the growth in commercial air service between 2010 and 2030 will favor regional airline operations. Two forecast scenarios (Moderate Growth and Low Growth) were developed for the regional airline dominant scenario.

Moderate Growth Scenario

Table 2-5 sets forth the assumptions derived for the Moderate Growth[37] scenario of the regional airline dominant forecast. The following table sets forth the assumptions used in this scenario:

Table 2-5
Regional Airline Dominant (Moderate Growth Scenario)

		2015	2020	2025	2030
MAINLINE AIRLINES	Average Daily Departures (ADD)	3.3	3.55	4.10	4.65
	Annual Mainline Departures	1,204.50	1,295.75	1,496.50	1,697.25
	Annual Mainline Operations	2,409.00	2,591.50	2,993.00	3,394.50
	Boarding Load Factor (Based on 101 avg. seats X FAA LF growth rates)	76.36	76.86	77.27	77.57
	Enplaned Mainline Passengers Per Day	251.97	272.86	316.79	360.69
	Annual Enplaned Mainline Passengers	91,970.80	99,592.64	115,627.07	131,652.29
	Total Daily Mainline Passengers	503.94	545.71	602.67	659.33
	Total Annual Mainline Passengers	183,941.60	199,185.28	231,254.15	263,304.58
REGIONAL AIRLINE(S)	Average Daily Departures (ADD)	5.7	6.60	7.30	8.20
	Annual Regional Departures	2080.5	2,409.00	2,664.50	2,993.00
	Annual Regional Operations	4161.00	4,818.00	5,329.00	5,986.00
	Boarding Load Factor (Based on 76 avg. seats X FAA LF growth rates)	52.44	53.96	55.02	56.16
	Enplaned Regional Passengers Per Day	298.91	356.14	401.68	460.54
	Annual Enplaned Regional Passengers	109,101.42	129,989.64	146,611.45	168,098.85
	Total Daily Regional Passengers	597.82	712.27	803.35	921.09
	Total Annual Regional Passengers	218,202.84	259,979.28	293,222.90	336,197.7
TOTALS	Average Daily Departures	9.00	10.15	11.40	12.85
	Annual Departures	3,285	3,705	4,161	4,690
	Annual Operations	6,570	7,410	8,322	9,381
	Daily Enplaned Passengers	551.00	629	718	821
	Annual Enplaned Passengers	201,072	229,582	262,239	299,751
	Total Annual Passengers	402,144	459,165	524,477	599,502

The preceding table shows that the total average daily departures (ADD) for 2020 (10.15) are well within the proposed ATE limit of 21 ADD, as are the total annual operations (7,410 versus the ATE's limit of 15,200). Similarly, 2020 regional airline operations (4,818) are within the 2020 ATE limit of 5,200 operations, while 2020 mainline operations (2,591) are about 30 26

[37] The moderate growth scenario is based on FAA TAF load factors and projected growth rates from the FAA's "Aerospace Forecast Fiscal Years 2006-2017".

percent of the ATE's 10,000 annual operations limit. The 2020 mainline passenger level of 199,185 is well within the ATE limit of 523,000 passengers, while the 2020 regional passengers 259,979) would clearly exceed the ATE's limits of 50,000 passengers.[38]

Low Growth Scenario

Table 2-6 sets forth the assumptions derived for the Low Growth[39] scenario of the regional airline dominant forecast:

Table 2-6
Regional Airline Dominant (Low Growth Scenario)

		2015	2020	2025	2030
MAINLINE AIRLINES	Average Daily Departures (ADD)	3.3	3.45	3.90	4.25
	Annual Mainline Departures	1,204.50	1,259.25	1,423.50	1,551.25
	Annual Mainline Operations	2,409.00	2,518.50	2,847.00	3,102.50
	Boarding Load Factor (Based on 101 avg. seats X FAA LF growth rates)	76.36	76.86	77.27	77.57
	Enplaned Mainline Passengers Per Day	251.97	265.17	301.33	329.66
	Annual Enplaned Mainline Passengers	91,970.80	96,787.21	109,986.73	120,327.36
	Total Daily Mainline Passengers	503.94	530.34	602.67	659.33
	Total Annual Mainline Passengers	183,941.60	193,574.43	219,973.46	240,654.72
REGIONAL AIRLINE(S)	Average Daily Departures (ADD)	5.7	6.55	7.00	7.55
	Annual Regional Departures	2080.50	2,390.75	2,555.00	2,755.75
	Annual Regional Operations	4,161.00	4,781.50	5,110.00	5,511.50
	Boarding Load Factor (Based on 76 avg. seats X FAA LF growth rates)	52.44	53.96	55.02	56.16
	Enplaned Regional Passengers Per Day	298.91	353.43	385.17	424.04
	Annual Enplaned Regional Passengers	109,101.42	129,004.87	140,586.32	154,773.94
	Total Daily Regional Passengers	597.82	706.88	770.34	848.08
	Total Annual Regional Passengers	218,202.84	258,009.74	281,172.64	309,547.89
TOTALS	Average Daily Departures	9.00	10.00	10.90	11.80
	Annual Departures	3,285	3,650	3,979	4,307
	Annual Operations	6,570	7,300	7,957	8,614
	Daily Enplaned Passengers	551.00	619	687	754
	Annual Enplaned Passengers	201,072	225,792	250,573	275,101
	Total Annual Passengers	402,144	451,584	501,146	550,203

[38] The ATE's assumptions in this regard are not consistent with current airline industry trends.
[39] The moderate growth scenario is based on FAA TAF load factors and projected growth rates from the FAA's "Aerospace Forecast Fiscal Years 2006-2017"

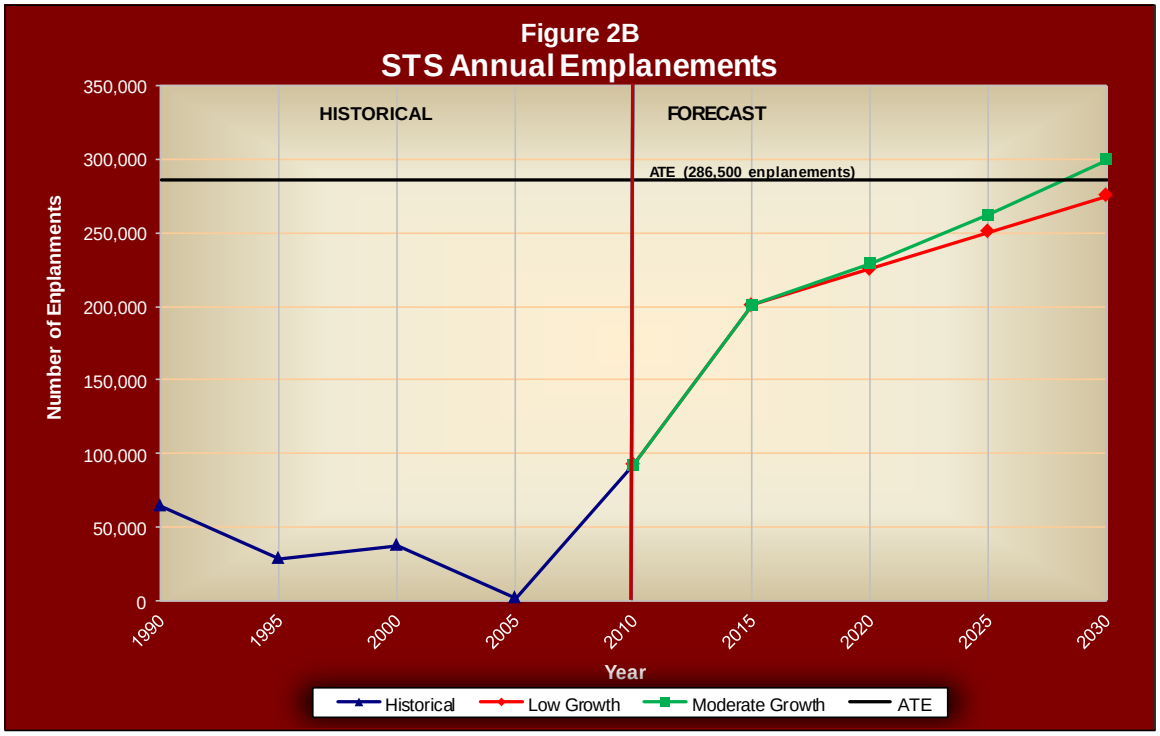
The preceding table shows that the total average daily departures (ADD) for 2020 (10.00) are well within the proposed ATE limit of 21 ADD, as are the total annual operations (7,300 versus the draft ATE's limit of 15,200). 2020 regional airline operations for 2020 (4,782) are slightly under the 2020 ATE limit of 5,200 operations, while 2020 mainline operations (2,519) are about 28.2 percent of the ATE's 10,000 annual operations limit. The 2020 mainline passenger level of 193,574 is well within the ATE limit of 523,000 passengers, while the 2020 regional passengers (258,010) would clearly exceed the ATE's limits of 50,000 passengers.[40] **Table 2-7** presents a summary of the above enplanements forecasts.

Table 2-7
Enplanement Forecasts Summary

Scenario	2010	2015	2020	2025	2030
Moderate Growth: Mainline Dominant	92,659	200,936	229,629	262,373	299,739
Moderate Growth: Regional Dominant	92,659	201,072	229,582	262,239	299,751
Low Growth: Mainline Dominant	92,659	200,936	225,786	250,528	275,391
Low Growth: Regional Dominant	92,659	201,072	225,792	250,573	275,101

Figure 2B is a graphical representation of the historical enplanements and forecast for Low Growth and Moderate Growth enplanements projections for the Airport.[41] As can be seen from the figure, neither the Moderate Growth scenario nor the Low Growth scenario would exceed the County's proposed ATE 2020 annual enplanement limit of 286,500 (or 573,000 annual passengers). The Moderate Growth scenario could exceed 286,500 annual enplanements around 2028 and the Low Growth scenario would not exceed this level during the 20-year forecast period.

[40] The ATE's assumptions in this regard are not consistent with current airline industry trends.
[41] Only the moderate growth and low growth scenarios are depicted because any differences between the airline dominant and regional airline dominant enplanement figures within these two scenarios are minor.



PREFERRED MAINLINE AND REGIONAL AIRLINE FORECASTS

This chapter has presented the methodologies and assumptions used to forecast a range of potential mainline and regional airline activities at the Airport. The next step should be to select one of the two forecast scenarios as the Master Plan's commercial air service forecast. To the extent possible, the selected forecast should correlate with the County's General Plan 2020 Air Transportation Element (ATE). However, as was discussed above, the 2008 adopted ATE had forecast certain activity levels for 2005 based on assumptions developed in the mid-1980's. Since then, many things have changed in the airline industry. The 15-passenger regional airliners and 50-passenger regional jets which form the basis for the 2008 ATE projections will not likely ever see substantial service at the Airport. In the 2008 update of the ATE, the County has retained the fleet mix and load factor assumptions used in the original ATE and projected these assumptions to 2020. This is not consistent with current commercial mainline trends. For these reasons the ATE assumptions need to be reevaluated.

Similarly, the definition of a regional airline set forth in the 2008 ATE is not consistent with current terminology. The 2008 ATE classifies any commercial aircraft used in scheduled intrastate service as a regional airline. This means that any aircraft, including those with as many as 150 passenger seats and capable of using the Airport, used in intrastate service would be classified as a regional airline. For reasons of consistency, the assumptions developed in the Sonoma County Airport Master Plan Update and the 2020 Sonoma County General Plan Update must be the same. The ATE requires consistency between the Sonoma County Airport Master Plan, including any assumptions or other information projected to the year 2020 that are consistent with the operational realities of the Airport and current airline trends. For purposes of this report, and to allow for a more conservative evaluation of the potential environmental impacts associated with master plan implementation, the Moderate Growth: Mainline Dominant Scenario is proposed as the Master Plan mainline and regional airline forecast (see **Table 2-8**).

Table 2-8
Proposed Master Plan Mainline and Regional Airline Forecast
Scheduled Mainline Dominant (Moderate Growth Scenario)

		2015	2020	2025	2030
MAINLINE AIRLINE(S)	Average Daily Departures (ADD)	4.60	5.38	6.17	7.22
	Annual Mainline Departures	1,679.00	1,962.61	2,252.05	2,635.30
	Annual Mainline Operations	3,358.00	3,925.21	4,504.10	5,270.60
	Boarding Load Factor (Based on 101 avg. seats X FAA LF growth rates)	76.36	76.86	77.27	77.57
	Enplaned Mainline Passengers Per Day	3 51.24	413.28	476.73	560.04
	Annual Enplaned Mainline Passengers	128,201.73	150,847.78	174,004.64	204,414.95
	Total Daily Mainline Passengers	702.48	826.56	953.45	1,120.08
	Total Annual Mainline Passengers	256,403.45	301,695.57	348,009.29	408,829.90
REGIONAL AIRLINE(S)	Average Daily Departures (ADD)	3.80	4.00	4.40	4.65
	Annual Regional Departures	1,387.00	1,460.00	1,606.00	1,697.25
	Annual Regional Operations	2,774.00	2,920.00	3,212.00	3,394.50
	Boarding Load Factor (Based on 76 avg. seats X FAA LF growth rates)	52.44	53.96	55.02	56.16
	Enplaned Regional Passengers Per Day	199.27	215.84	242.11	261.16
	Annual Enplaned Regional Passengers	72,733.55	78,781.60	88,368.54	95,324.35
	Total Daily Regional Passengers	398.54	431.68	484.21	522.33
	Total Annual Regional Passengers	145,468.56	157,563.2	176,737.09	190,648.70
TOTALS	Average Daily Departures	8.4	9.38	10.57	11.87
	Annual Departures	3,066	3,423	3,858	4,333
	Annual Operations	6,132	6,846	7,716	8,665
	Daily Enplaned Passengers	551	629	719	821
	Annual Enplaned Passengers	200,936	229,629	262,373	299,739
	Total Annual Passengers	401,872	459,259	524,746	599,479

GENERAL AVIATION AND AIR TAXI FORECASTS

General aviation forecasts traditionally consist of two parts: based aircraft and aircraft operations. GA operations are further broken down into itinerant and local operations. Air Taxi operations are listed under itinerant operations.[42]

Based Aircraft Demand Factors

Current and future demand for based aircraft parking space in hangars, tiedowns, and transient parking at the Airport is influenced by a variety of factors. Some of these factors are national or regional in character; others are specific to the Airport. Each of these demand factors needs to be considered in the development of based aircraft forecasts for the Airport.

National Demand Factors

National influences on local based aircraft demand are significant in that they are external influences, largely beyond the direct control of the Airport or local community. These demand factors are part of what determines the growth rates of general aviation. The FAA *Aerospace Forecasts*, 2011-2031 cites the following national demand factors:

- Total active general aviation aircraft fleet
- Total hours flown by aircraft type
- Total active pilots

The overall growth of the active general aviation aircraft fleet is forecast to increase at an average annual rate of 0.9percent over the FAA's 20-year forecast period (2011-2031), with the number of active aircraft increasing from 224,172 in 2010 to 270,920 in 2031. The more sophisticated and expensive turbine-powered fleet is projected to grow at an average of 3.0 percent a year over the 20-year forecast period, with the turbine jet fleet increasing at 4.2 percent a year. Another new category of aircraft was created in 2005: Light Sport Aircraft. These aircraft evolved from and emulate ultralight and small aircraft not currently included in the FAA's aircraft registry counts.[43]At the end of 2009, a total of 6,547 active aircraft were estimated to be in this category. An anticipated 450 newly manufactured light sport aircraft are projected to enter the active national GA fleet on an annual basis through 2013 with an assumed registration of some 13,870 of these aircraft by 2031. The number of general aviation hours flown is projected to increase by 2.2 percent annually through 2031. The projected increase is reflective of increased flying by business and corporate aircraft. Hours flown by turbine aircraft are forecast to increase 3.7

[42] Operations are categorized as Itinerant, Local or Instrument Flight Rules (IFR). Itinerant means an operation is arriving from outside the traffic pattern or departs the airport traffic pattern. Local means an operation that stays within the traffic pattern airspace (non-itinerant). IFR means an operation that is conducted under Instrument Flight Rules. IFR operations are a sub-category of the total number of operations as they can be either local or itinerant. Total Operations = Itinerant Operations + Local Operations.

[43] The FAA created the new rule for the manufacture, certification, operation, and maintenance of light-sport aircraft. Light-sport aircraft weigh less than 1,320 pounds (1,430 pounds for aircraft intended for operation on water) and are heavier and faster than ultralight vehicles and include airplanes, gliders, balloons, powered parachutes, weight-shift-control aircraft, and gyroplanes. This action is necessary to address advances in sport and recreational aviation technology, lack of appropriate regulations for existing aircraft, several petitions for rulemaking, and petitions for exemptions from existing regulations. The intended effect of this action is to provide for the manufacture of safe and economical certificated aircraft that exceed the limits currently allowed by ultralight regulation, and to allow operation of these aircraft by certificated pilots for sport and recreation, to carry a passenger, and to conduct flight training and towing in a safe manner.

percent yearly through 2031, compared with 0.8 percent for piston-powered aircraft. Jet aircraft are anticipated to account for the greatest increase in hours flown, growing at an anticipated annual rate of 5.3 percent through 2031

Growth in the active general aviation pilot population (excluding air transport pilots) is projected to result in about 527,660 pilots in 2031, an increase of over 42,000 from 2009(an average annual increase of 0.4 percent over the FAA's 12-year forecast period). The FAA is also projecting nearly12,850 new sports pilots will be certified by 2031.

By all indices, the growth rate of general aviation will be generally positive in the long term, but, as noted above, certain sectors of general aviation will see decreases in the short term. For example, the number of piston-powered aircraft is projected to decrease from the 2009 total of 160,623 to 156,175 by 2018. Beyond 2018, active piston-powered aircraft are forecast to increase to 168,140 by 2031 – a 0.2 percent average annual increase over the forecast period. Single-engine and multi-engine piston-powered fixed wing aircraft are only anticipated to grow at 0.3 and 0.9 percent, respectively. In addition, the forecasts assume that new light sport aircraft could impact the replacement market for traditional piston aircraft.

State and Regional Demand Factors

Statewide forecasts have been established by the California Aviation System Plan (CASP) (1999). The System Plan includes all public use airports in California. The state's forecast methodology allocates aviation activity in a top-down manner; the forecasts are distributed to respective geographic areas, then sub-areas and ultimately to individual airports. The 1999 CASP projected that the Airport would have from 500 to 585 based aircraft by 2010.[44] There are currently 356 aircraft based at the Airport.

Demands Specific to Sonoma County Airport

Increases in the number of based aircraft at the Airport will mainly depend on decisions by individuals and businesses as to where to base their aircraft. Such decisions are influenced by the following local factors:

Nearby Airports—Six public-use airports are located in Sonoma County. The Airport is the only airport in the County offering airline service and precision approach capabilities. The Airport also has the longest runway (5,115 feet) in the County. It is also the closest airport to the County's largest city and county seat, Santa Rosa. The Airport also offers a comprehensive array of aeronautical services and facilities to the general aviation pilot community. These factors make the Airport a more convenient airport to base one's aircraft at if proximity to Santa Rosa's business and governmental services are a factor.

Airport Role—Currently, operational activity at the Airport includes significant use by corporate/business general aviation aircraft and personal general aviation aircraft. Its future role will be defined more by the reintroduction of scheduled mainline and/or regional airline service

[44] The 1999 CASP based aircraft forecast for STS was based on forecasts contained in the 1994 Regional Aviation System Plan prepared by the San Francisco Bay Area Metropolitan Transportation Commission.

than by changes in the volume of activity and the types of aircraft of the existing uses (i.e., fleet mix).In other words, the addition of scheduled mainline and/or regional airline service will not change the basic character of the Airport, but will add an additional component to the range of services offered.

Availability of Services—Existing facilities and services at the Airport are more comprehensive than at other Sonoma County airports. The Airport also has sufficient developable land to accommodate new and/or expanded aeronautical services.

Proximity to Nearby Industry—Commercial and industrial growth in the Sonoma County Region will have a positive effect on the Airport's aviation activity. As the Airport Business Park develops, users of business aircraft desiring easy access to the area are expected to make increasing use of the Airport.

Regional Population—Historically, there has been a weak correlation between population growth and based aircraft; it is not a significant factor in forecasting based aircraft at the Airport.

Demand for Hangar Space—Increasingly more sophisticated and expensive equipment is being added to aircraft. New aircraft are being manufactured with state-of-the-art avionics (electronic and navigational equipment) and existing aircraft have become more valuable. Hangars offer aircraft owners increased security and safety for their aircraft as well as protection from climatic conditions. There is interest in hangars for larger personal and corporate aircraft at the Airport.

Methodology

Considering the above demand factors and the FAA policy that GA activity forecasts should not deviate too much from published FAA forecast information, the following forecasts are derived primarily from information presented in the *FAA Aerospace Forecasts Fiscal Years 2011-2031* , and are supplemented by the FAA's 2010 *Terminal Area Forecast* (December2010).

Based Aircraft

As is common with many airports, reliable historical information on based general aviation aircraft is limited, and until recent, changes in data collection methods (even published information) was often derived from estimates. Based on information provided by the FAA, the number of aircraft based at the Airport reached a peak of 466 in the mid 1980s.[45]The trend since that time has been a slow decline in the total number of based aircraft. The apparent spike in based aircraft in 2007 to 415, indicated in FAA data sources, does not appear to have actually occurred. Airport records do not report the addition of 36 aircraft in that year. The decline in the number of based aircraft to around 350 is consistent with Airport records. Current Airport data indicates that of the 356 aircraft based at the Airport in 2010, 300were single-engine propeller (84.7%), 31were twin-engine piston (8.8%), 7 were turboprops (1.9%),11 (2.0%), were jets (3.1%), 5 were helicopters (1.4%), and 2 were motorized gliders (0.6%). **Figure 2C** depicts the historical trends in based aircraft at the Airport since 1985.

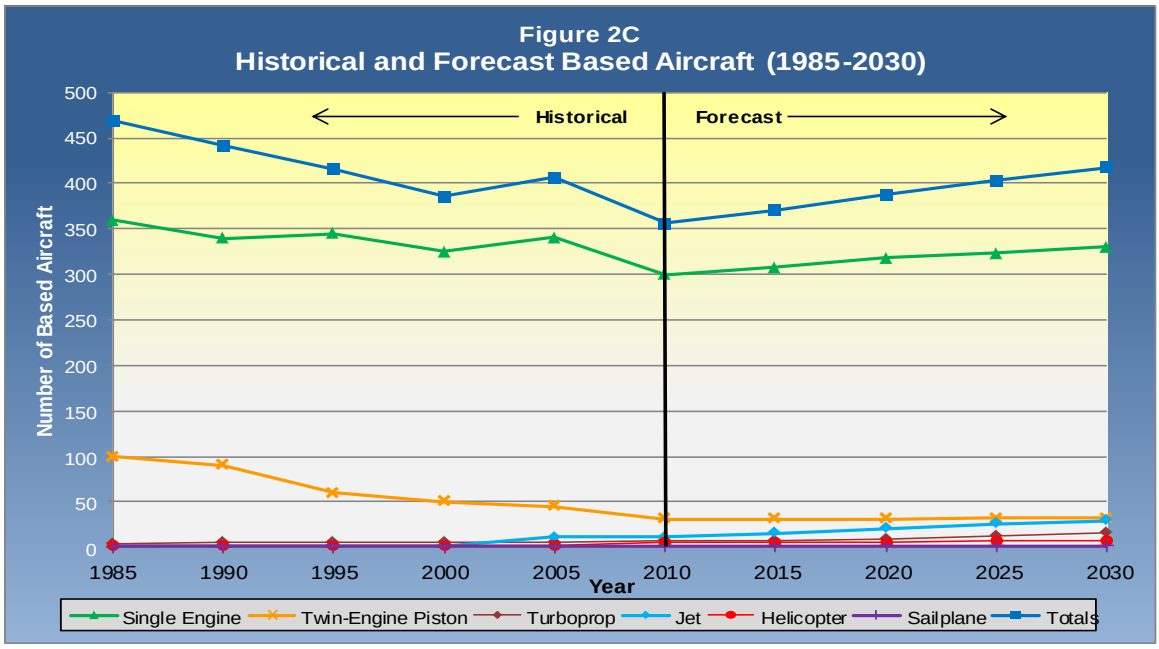
[45] Federal Aviation Administration, "APO Terminal Area Forecast Based Aircraft Data," (December 2006).

Based Aircraft Demand Conclusions

In recognition of the above-noted national, state, and local demand factors and FAA planning projections, the *Airport Master Plan* concludes that there is potential for an increase in the Airport's based aircraft population.[46] The plan projects that based aircraft at the Airport will increase by 62additional aircraft over the forecast period. Of these aircraft, some 30 are anticipated to be jets, including several VLJs. **Table 2-9** summarizes the *Master Plan's* forecast for future based aircraft for the Airport by aircraft classification. Figure2C compares the forecast data with historical based aircraft.

Table 2-9
Based Aircraft Forecast (2010 – 2030)

Aircraft Classification	2010	2015	2020	2025	2030
Single-Engine	300	308	318	323	330
Twin-Engine Piston	31	31	31	32	32
Turboprop	7	8	9	13	17
Jet	11	16	21	26	30
Helicopter	5	6	6	7	7
Sailplane (motorized)	2	2	2	2	2
Totals	356	371	387	403	418



[46] The forecasts of based aircraft are derived from the annual growth rates set forth for general aviation in the "FAA Aerospace Forecasts Fiscal Years 2006-2017," as follow: Single-engine piston (0.3%), multi-engine piston (0.1%), jet-turbine (4.0%). The FAA Aerospace Forecast projected an annual growth rate of 6.7% for piston-engine helicopters, but it is not believed that STS could attract that many additional helicopters, given that several of the helicopters "based" at STS are rotated between other airports. The FAA Aerospace Forecast growth rates were projected through *2030.*

General Aviation and Air Taxi Operations

The number of aircraft operations at an airport is influenced both by national and regional conditions and by various circumstances specific to the individual airport. Major influences impacting the Airport's general aviation and air taxi aircraft operations forecast include:

- **Facilities and Services Available**—Existing general aviation facilities and air taxi services at the Airport are satisfactory for the Airport's current level of activity. However, the two primary fixed base operators at the Airport (Kaiser Air-Santa Rosa Jet Center and Sonoma Jet Center) have both expressed an interest in expanding their operations and services in the future.

Fixed Base Operation

- **Air Taxi Services**—Historically, there have always been a significant number of air taxi operations at the Airport, including those by non-certificated airlines. In the future, particularly with the advent of on-demand air taxi services by the new light jets, air taxi operations are anticipated to increase.

- **Air Cargo Operations**—There are two basic types of air cargo and air freight carriers: integrated and non-integrated. An integrated air cargo carrier provides door-to-door pickup and delivery services using a combination of surface vehicles and aircraft. FedEx and UPS are examples of integrated air cargo carriers. FedEx and UPS provide air cargo services at the Airport with small, single-engine turboprop aircraft (Cessna 208B Caravans). Non-integrated air cargo carriers do not usually have the ground connections associated with the integrated carriers and typically handle heavier, bulkier cargo and freight using larger aircraft. There is no regular use of the Airport by non-integrated air cargo airlines.

Cessna Caravan

The FedEx air cargo service at the Airport is provided by West Air, Inc. and UPS is served by Martinaire, PLP. The two carriers average a total of 67 landings per month, bringing in an average of almost 14,000 pounds of cargo per month. Outbound cargo averages over 98,000

pounds per month. It is anticipated that air cargo volume will increase in the future, but operations will not increase significantly. This is primarily because as cargo volume increases, the carriers have the option of bringing in larger aircraft. These aircraft could include medium-sized twin-engine turboprops such as the ATR-42 or ATR-72 (42,000 – 48,500 pounds MGTOW).

One advantage of having service by the twin-engined cargo aircraft is that palletized or containerized cargo can be carried on these aircraft, as well as on similar-sized, or larger, commercial airliners as belly cargo.

ATR 42

ATR 72

- **CALFIRE Operations**—Flight training and fire suppression operations conducted by the California Department of Forestry and Fire Suppression (CALFIRE) are largely seasonal, but nonetheless contribute to overall military and governmental operations at the Airport.
- **Extent of Transient Aircraft Use**—Increased business, corporate, and industrial development within Sonoma County is expected to generate increased aircraft operations at the Airport. Larger general aviation aircraft, including turboprops and business jets, will generate much of this increased activity.
- **Number and Type of Based Aircraft**—The shift toward proportionately more complex single-engine and multi-engine airplanes, along with some VLJs and light sport aircraft at the Airport will tend to push operations counts upward more rapidly than the rate of based aircraft growth. Typically, complex aircraft are used more frequently and thus generate more operations per aircraft.

Methodology

As with the based aircraft forecasts, the annual operations forecasts consider the above demand factors and FAA policies guiding the preparation of activity forecasts at GA airports. The following forecasts are derived primarily from information presented in the FAA *Aerospace Forecasts Fiscal Years 2011-2031*, and are supplemented by the FAA's *2010Terminal Area Forecast* (December2010).

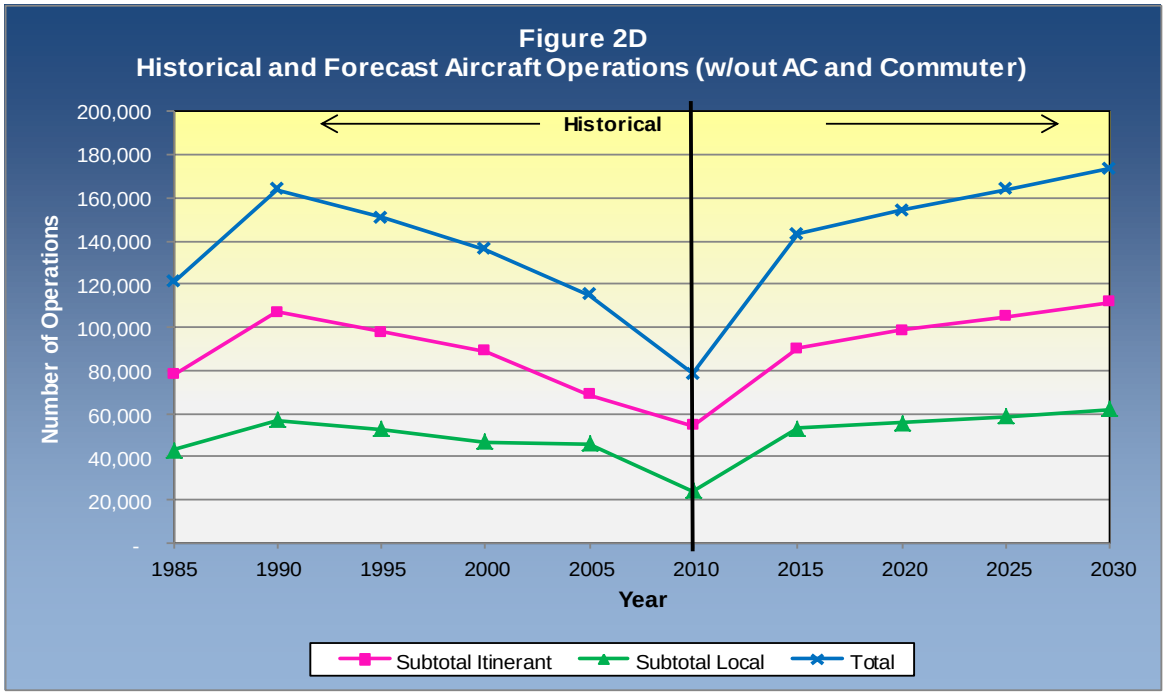
Annual Operations Demand Conclusions

Continued growth in annual aircraft operations at the Airport is anticipated. This growth in operations will be generated by the anticipated increase in air taxi activity and increased use by transient (not based at the Airport) corporate/business aircraft. The percentage split between itinerant general aviation and air taxi operations and local operations is projected to change only slightly by 2030. The current split is 69.4 percent of operations being itinerant and 39.6 percent local. By 2030, it is projected that 64.4 percent of all general aviation and air taxi operations will be itinerant and 35.6 percent will be local.

Table 2-10 summarizes the Master Plan forecasts[47] of future annual general aviation and air taxi aircraft operations for the Airport. The Master Plan forecast projects that total annual aircraft operations will increase from the 2010 level of 78,497 to 173,785 in the year 2030. Figure 2D provides a comparison of historical and forecast aircraft operations (not including mainline or regional airline operations).

Table 2-10
Aircraft Operations Forecast (2005 – 2030)

Operations by Aircraft Class	2010	2015	2020	2025	2030
Itinerant					
Air Taxi	5,791	5,991	6,432	6,907	7,413
GA	45,243	75,788	82,261	86,757	88,716
Military/Government	267	380	390	400	410
Subtotal	54,510	90,189	98,573	105,014	111,869
Local					
GA	23,971	52,952	55,763	58,724	61,842
Military/Government	14	68	70	72	74
Subtotal	23,987	53,020	55,833	58,796	61,916
Totals	78,497	134,209	154,406	163,810	173,785



[47] For itinerant air taxi and general aviation operations the forecast uses the December 2006 FAA APO TAF growth rates through 2025 and projected to 2030. Because military/government aircraft operations have not been a significant factor at the Airport in recent years, a constant growth rate of 0.5% per annum was used in the forecast. For local GA operations the December 2006 FAA APO TAF rates were used through 2025 and projected for 2030.

Instrument Operations

Instrument operations are those operations conducted by aircraft under instrument flight rules (IFR) in both visual meteorological conditions (VMC) and instrument meteorological conditions (IMC). Virtually all scheduled mainline and regional airline operations are conducted under instrument flight rules. With a precision instrument landing system on Runway 32 and nonprecision instrument approaches to Runway 14, the Airport experiences a significant number of instrument operations. From a low of 9,816 instrument operations in 1985, annual instrument operations peaked in 1990 with almost 21,000 such operations. Between 1990 and 2005 instrument operations fluctuated up and down, but decreased to 7,621 by 2010.The FAA Aerospace Forecast for Fiscal Years 2011-2031 anticipates general aviation instrument operations to grow at an annual rate of 1.5 percent per year through 2031. Military activity is expected to remain constant at its 2010 level throughout the forecast period.

Table 2-11 presents the annual instrument operations forecast for the Airport (note that these operations are not added to the total operations). Overall, instrument operations at the Airport are projected to grow from 7,621 in 2010to 35,723 in 2030. This is due in part to the return of regularly scheduled mainline and regional airline operations, and the introduction of the new very light jets (VLJs).

Table 2-11
Annual Instrument Operations

	Instrument Operations				
	2010	2015	2020	2025	2030
Mainline Airline	0	3358	3,925	4,504	5,271
Regional Airline	1,650	2,774	2,920	3,212	3,395
Air Taxi	1,719	3,164	3,721	4,377	5,148
General Aviation	4,222	13,429	15,796	18,580	21,854
Military/Government	20	55	55	55	55
Subtotals	**7,621**	**22,780**	**26,417**	**30,728**	**35,723**

Total Operations

Table 2-12 consolidates the operational, passenger and based aircraft forecasts described in Tables 2-8 and 2-10.

Forecast Comparison

Table 2-13 compares the above Master Plan operational forecasts with the projected operational activity levels for the Airport as set forth in the adopted "*Comprehensive Land Use Plan for*

Sonoma County (CALUP 2010)"[48] and the draft "*Sonoma County General Plan 2020, Air Transportation Element* (Draft ATE 2020)."[49] From Table 2-13 it can be determined that the Master Plan forecast data for 2010 and 2020 are significantly less than as projected by the CALUP 2010 and Draft ATE 2020 in all cases.

Table 2-12
Consolidated Summary of Airport Master Plan Forecasts

ANNUAL AIRCRAFT OPERATIONS	2010	2015	2020	2025	2030
Itinerant Operations					
Mainline Airline	0	3,358	3,925	4,504	5,271
Regional Airline	3,406	2,774	2,920	3,212	3,394
Air Taxi	267	380	390	400	410
General Aviation	45,243	75,788	82,261	86,757	88,716
Military/Government	267	380	390	400	410
Subtotals	50,157	82,680	89,886	95,273	98,201
Local Operations					
General Aviation	23,971	52,952	55,763	58,724	61,842
Military/Government	14	68	70	72	74
Subtotals	23,987	53,020	55,833	58,796	61,916
Total Operations	78,497	134,209	154,406	163,810	173,785
Instrument Operations					
Mainline Airline	0	3,358	3,925	4,504	5,271
Regional Airline	1,650	2,774	2,920	3,212	3,395
Air Taxi	1,719	3,164	3,721	4,377	5,148
General Aviation	4,222	13,429	15,796	18580	21,854
Military/Government	20	55			55
Subtotals	7,621	22,780	26,417	30,728	35,723
Annual Enplanements					
Mainline Airline Passengers	0	128,202	150,848	174,005	204,415
Regional Airline Passengers	92,659	72,734	78,781	88,368	95,324
Total Annual Enplanements	92,659	200,936	229,629	262,373	299,739
Annual Passengers					
Mainline Airline Passengers	0	256,403	301, 696	348,009	408,830
Regional Airline Passengers	185,318	145,469	157,563	176,737	190,649
Total Annual Passengers	185,318	401,872	459,259	524,746	599,479
Based Aircraft					
Single-Engine	300	308	318	323	330
Twin-Engine Piston	31	31	31	32	32
Turboprop	7	8	9	13	17
Jet	11	16	21	26	30
Helicopter	5	6	6	7	7
Sailplane (motorized)	2	2	2	2	2
Totals	356	371	387	403	418

[48] Sonoma County Airport Land Use Commission, January 2001.
[49] Sonoma County Permit and Resource Management Department. January 2006.

As can be determined from Table 2-13 the draft ATE 2020 projects 387 based aircraft at the Airport by 2020. For general aviation and air taxi operations the CALUP 2010 projected 210,000 operations by 2010. The actual count was less than 80,000such operations for 2010. The ATE 2020 projects 154,406operations by 2020. For mainline and regional operations the CALUP 2010 projected 15,000 such operations in 2010, while only 3,406 of these operations actually occurred. The draft ATE2020 projected projects 9,490 mainline and regional airline operations in 2020 which matches the Master Plan forecast. In terms of total operations, the CALUP 2010 projected 225,000 operations by 2010, but just 78,497 such operations actually occurred. For 2020, the draft ATE 2020 projects 154,406 total annual operations which match the Master Plan forecast.

Table 2-13
Forecast Comparison Data

	2010	2020	2030
BASED AIRCRAFT			
2007 Airport Master Plan	**356**	**387**	**418**
Draft ATE 2020		387	
ANNUAL OPERATIONS			
GA and Air Taxi			
2011 Airport Master Plan	**78,497**	**154,406**	**173,785**
CALUP 2010	210,000		
Draft ATE 2020		154,406	
Mainline and Regional			
2011 Airport Master Plan	3,406	9,490	8,665
CALUP 2010	15,000		
Draft ATE 2020		9,490	
TOTAL ANNUAL OPERATIONS			
2007 Airport Master Plan	**78,497**	**154,406**	**173,785**
CALUP 2010	225,000		
Draft ATE 2020		154,406	

AIRFIELD CAPACITY

An airport's airfield capacity is generally measured in terms of the number of aircraft operations the runway and taxiway system can accommodate in an hour or over a year. Calculations of airfield capacity, particularly annual capacity, are dependent on various physical and operational factors. Hourly capacity and annual service volume (ASV) are estimated using the FAA's "Airport Capacity and Delay Model" and FAA Advisory Circular (AC) 150/5060-5 "*Airport Capacity and Delay*," (Change 2). This model uses information concerning airfield layout, meteorological conditions, runway use, aircraft fleet mix, percent arrivals, percent touch-and-go operations and exit taxiway locations.

Annual Service Volume

Annual Service Volume (ASV) is used to assess the overall adequacy of the airfield design, including the number and orientation of runways. As the number of annual operations increase and approach an airport's ASV, the average amount of operational delay also increases.When annual operations equal the ASV, the average delay is 1 to 4 minutes per operation. When the number of annual operations exceeds the ASV, severe congestion occursand the average delay per operation increases significantly. The FAA considers delays of 6 minutes or more to be significant.

Based on the information contained in AC 150/5060-5, "Airport Capacity and Delay,"the airfield capacity (expressed as ASV) for the Airport is 230,000 annual operations.[50] This level of activity is over 32 percent higher than the 173,785 total annual operations forecast for 2030. The FAA recommends consideration of capacity enhancements when annual operations reach 60 percent of ASV, or, in this case, 138,000 operations. Based on the above operational forecasts, this could occur before 2015.

Hourly Capacity

This is the maximum number of aircraft operations that can be accommodated on an hourly basis. The FAA's airport capacity model provides weighted measures of the airfield's hourly capacity for both VFR and IFR operations. The VFR capacity of the Airport runway system is 77 operations per hour, and the IFR capacity is 57 operations per hour. At 182,102 annual operations, aircraft may expect delays from 0.7 minutes to 2.2 minutes per operation, and from 127 minutes to 400 minutes of delay annually. This is not considered to be a significant amount of delay by the FAA.

[50] The 2006 FAA APO TAF also uses this number as a measure of ASV for STS.