Chapter Two

FORECASTS

FORECASTS

An important factor when planning the future needs of an airport involves a definition of aviation demand that may reasonably be expected to occur in both the short term (five years) and long term (20 years). For a general aviation airport such as Cox Field Airport (PRX), forecasts of based aircraft and operations (takeoffs and landings) serve as the basis for facility planning.

The Federal Aviation Administration (FAA) has oversight responsibility to review and approve aviation forecasts developed in conjunction with airport planning studies. In the State of Texas, this responsibility has been granted to the Texas Department of Transportation - Aviation Division (TxDOT), which reviews such forecasts with the objective of comparing them to the FAA Terminal Area Forecasts (TAF) and the National Plan of Integrated Airport Systems (NPIAS). In addition, aviation activity forecasts are an important input to the benefit-cost analyses associated with airport development, and TxDOT reviews these analyses when funding requests are submitted.

As stated in FAA Order 5090.3C, Field Formulation of the National Plan of Integrated Airport Systems (NPIAS), dated December 4, 2004, forecasts should be:

- Realistic
- Based on the latest available data
- Reflect current conditions at the airport
- Supported by information in the study

- Provide adequate justification for airport planning and development

The forecast process for an Airport Master Plan consists of a series of basic steps that can vary depending upon the issues to be addressed and the level of effort required to develop the forecast. The steps include a review of previous forecasts, determination of data needs, identification of data sources, collection of data, selection of forecast methods, preparation of the forecasts, and evaluation and documentation of the results.

FAA Advisory Circular (AC) 150/5070-6B, *Airport Master Plans*, outlines six standard steps involved in the forecast process, including:

1) Obtain existing FAA and other related forecasts for the area served by the airport.

2) Determine if there have been significant local conditions or changes in the forecast factors.

3) Make and document any adjustments to the aviation activity forecasts.

4) Where applicable, consider the effects of changes in uncertain factors affecting demand for airport services.

5) Evaluate the potential for peak loads within the overall forecasts of aviation activity.

6) Monitor actual activity levels over time to determine if adjustments are necessary in the forecasts.

Aviation activity can be affected by many influences on the local, regional, and national levels, making it virtually impossible to predict year-to-year fluctuations of activity over 20 years with any certainty. Therefore, it is important to remember that forecasts are to serve only as guidelines, and planning must remain flexible enough to respond to a range of unforeseen developments.

The following forecast analysis for Cox Field Airport was produced following these basic guidelines. Existing and available forecasts are examined and compared against current and historic activity. The historical aviation activity is then examined along with other factors and trends that can affect demand. The intent is to provide an updated set of aviation-demand projections for Cox Field Airport that will permit the City of Paris to make planning adjustments as necessary to maintain a viable, efficient, and cost-effective facility.

SOCIOECONOMIC CHARACTERISTICS

A variety of historical and forecast socioeconomic data has been collected for use in various elements of this Master Plan. This information provides essential background information for use in determining aviation service level requirements. Aviation forecasts are related to the population base and

the economic strength of the region; therefore, it is necessary to have an understanding of the socioeconomic outlook for the airport service area. The primary service area for Cox Field airport, to be detailed later, is Lamar County. This is not to say aviation demand from points outside of Lamar County will not elect to utilize PRX; however, the largest share of aviation demand will come from Lamar County.

This section will present baseline statistical information related to socioeconomic indicators such as population, employment, and income. Detailed socioeconomic information was provided in the previous chapter. A summary of the data is presented in **Table 2A**. With this information, analysis will be undertaken to develop forecasts of future aviation that can be reasonably expected at Cox Field Airport.

TABLE 2A
Lamar County Socioeconomic Data

	1990	2010	AAGR	2015	2020	2030	AAGR
POPULATION DATA							
Total Population	44,034	49,635	0.60%	50,606	51,709	54,122	0.43%
Total Number of Households	16,898	20,228	0.90%	20,990	21,679	22,836	0.61%
EMPLOYMENT DATA							
Total Employment	23,359	31,089	1.44%	32,544	34,025	37,056	0.88%
Employer Earnings (millions)	$655	$947	1.86%	$1,035	$1,132	$1,353	1.80%
Gross Regional Product (millions)	$1,071	$1,506	1.72%	$1,630	$1,781	$2,126	1.74%
INCOME DATA							
Mean Household Income	$51,491	$63,105	1.02%	$66,716	$71,076	$81,895	1.31%
Per Capita Personal Income	$20,115	$26,210	1.33%	$28,211	$30,394	$35,331	1.50%
Total Personal Income (millions)	$886	$1,301	1.94%	$1,428	$1,572	$1,912	1.94%
Net Earnings (millions)	$557	$768	1.62%	$835	$911	$1,083	1.73%

Source: Population from Texas State Demographer and Woods & Poole CEDDS; Employment and Income from Woods & Poole CEDDS
Note: All financial figures adjusted to 1994 dollars

Population is one of the most important elements to consider when planning for the future needs of the airport. Several sources were examined for population data including the U.S. Census Bureau, the Texas State Data Center and Office of the State Demographer, the Texas Water Development Board, and Woods & Poole Economics Complete Economic Demographic Data Set (CEDDS) 2010. It is preferable to utilize local or regional data when it is available. Data from the Texas State Demographer and CEDDS were more recent and complete. As a result, these two sources were utilized for population trends.

Table 2A presents historical and forecast population, employment, and income data for Lamar County. The current population is approximately 49,635 people. Population is projected to reach 54,122 by 2030, increasing at an average annual growth rate (AAGR) of 0.43 percent. As can be seen from the table, the population growth rate for the county has been relatively weak since 1990, increasing at an AAGR of 0.60 percent.

Lamar County employment has experienced stronger growth, increasing by 1.44 percent AAGR between 1990 and 2010. Employment projections consider a slightly slower rate of 0.88 percent AAGR through 2030. At the same time, income growth, as measured in per capita personal income (PCPI), has been relatively strong, increasing by 1.33 percent between 1990 and 2010. Lamar County PCPI is projected to increase at an AAGR of 1.50 percent through 2030.

NATIONAL AVIATION TRENDS

Each year, the FAA updates and publishes a national aviation forecast. Included in this publication are forecasts for passengers, airlines, air cargo, general aviation, and FAA workload measures. The forecasts are prepared to meet the budget and planning needs of the constituent units of the FAA and to provide information that can be used by state and local authorities, the aviation industry, and the general public.

The current edition when this chapter was prepared was FAA *Aerospace Forecast - Fiscal Years 2010-2030*, published in March 2010. The forecasts use the economic performance of the United States as an indicator of future aviation industry growth. Similar economic analyses are applied to the outlook for aviation growth in international markets.

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

In the seven years prior to the events of September 11, 2001, the U.S. civil aviation industry experienced unprecedented growth in demand and profits. The impacts to the economy and aviation industry from the events of 9/11 were immediate and significant. The economic climate and aviation industry had been recovering until early 2008 when it became clear that an economic downturn was underway. High oil prices and an economic recession caused general aviation activity at FAA air traffic facilities to fall sharply in 2008, declining by 5.6 percent. The downturn in the economy has dampened the near-term prospects for the general aviation industry. As the U.S. and world economy recovers, general aviation demand is anticipated to rebound and grow.

According to the National Bureau of Economic Research, the U.S. economy entered into recession in December 2007. As the economic downturn gathered momentum, the new Administration and Congress passed the American Recovery and Reinvestment Act (ARRA) in February 2009, which was estimated to have a total fiscal

impact of $787 billion. Data shows that the recession "bottomed-out" in June 2009 and the freefall in economic activity tempered during the third quarter of 2009. The U.S. economy grew for the first time in the fourth quarter of 2009, with output increasing by 2.2 percent. Economic growth was expected to remain slow and without enough strength to end the decline in jobs until later in 2010. Sustained economic growth above three percent is not expected until 2011. Beyond 2015, U.S. real gross domestic product (GDP) growth slows to around 2.6 percent annually through the forecast period.

In 2009, there were an estimated 229,149 active general aviation aircraft in the United States. **Exhibit 2A** depicts the FAA forecast for active general aviation aircraft. The FAA projects an average annual increase of 0.9 percent through 2030, resulting in 278,723 active aircraft. Active piston-powered aircraft are expected to decline through 2017, then gradually increase to 172,613 by 2030 for an overall average annual increase of 0.2 percent. This is driven primarily by a 3.4 percent annual increase in piston-powered rotorcraft and growth in experimental and sport aircraft, as single engine fixed-wing piston aircraft are projected to increase at just 0.2 percent annually and multi-engine fixed-wing piston aircraft are projected to decrease by 0.8 percent per year. This is due, in part, to declining numbers of multi-engine piston aircraft and the expectation that the new, light sport aircraft and the relatively inexpensive very light jets (VLJ) will dilute or weaken the replacement market for piston aircraft.

New models of business jets are also stimulating interest for the high-end market. The FAA expects the business segment to expand at a faster rate than personal/sport flying. Safety and security concerns combined with increased processing time at commercial terminals make business/corporate flying an attractive alternative. Turbine-powered aircraft (turboprop and jet) are expected to grow at an average annual rate of 3.1 percent over the forecast period. Even more significantly, the jet portion of this fleet is expected to grow at an average annual growth rate of 4.2 percent. The total number of jets in the general aviation fleet is projected to grow from 11,418 in 2009, to 27,035 by 2030.

Since the introduction of the twin-engine VLJ, its impact on the general aviation industry has been the source of much debate. The lower acquisition and operating costs of the VLJs were believed to have the potential to revolutionize the business jet market, particularly by being able to sustain a true on-demand air-taxi service. While initial forecasts called for over 400 aircraft to be delivered a year, events such as the recession along with the bankruptcy of Eclipse and DayJet have led the FAA to temper more recent forecasts. The introduction of the Embraer's Phenom 100 to the market has helped boost the turbine market. Despite that, the impacts of the recession have led to dampened expectations. VLJs are forecast to grow by 440 aircraft through 2013, then average 216 aircraft per year through the remainder of the forecast period.

Owners of ultralight aircraft began registering their aircraft as "light sport" aircraft in 2005. At the end of 2008, a total of 6,811 aircraft were estimated to be in this category. The FAA estimates this fleet will increase by approximately 825 aircraft per year until 2013, and then taper off to about 335 per year. By 2030, a total of 16,311 light sport aircraft are projected to be in the fleet.

Aircraft utilization rates are projected to increase through the forecast period. The number of general aviation hours flown is projected to increase at 2.5 percent annually. Similar to active aircraft projections, there is projected disparity between piston and turbine aircraft hours flown. Hours flown in turbine aircraft are expected to increase at 4.1 percent annually, compared with 1.1 percent for piston-powered aircraft. Jet aircraft hours flown are projected to increase at 6.1 percent annually over the next 20 years. The sport aircraft fleet is anticipated to experience a 5.9 percent average annual growth rate in hours flown through 2030.

The total general aviation pilot population is projected to increase by 52,000 in the next 20 years, reaching 501,875 in 2030, which represents an average annual growth rate of 0.5 percent. The student pilot population is forecast to increase at an annual rate of 0.8 percent, reaching a total of 86,050 in 2030. Growth rates for other pilot categories over the forecast period are as follows: recreational pilots remaining constant; private pilots increasing by 0.2 percent; commercial pilots increasing 0.5 percent; airline transport pilots increasing 0.6 percent; rotorcraft-only pilots increasing 1.6 percent; and glider-only pilots increasing 0.2 percent. The sport pilot is expected to grow significantly through 2030 at 7.2 percent annually.

Over the past several years, the general aviation industry has launched a series of programs and initiatives whose main goals are to promote and assure future growth within the industry. Several programs are intended to promote growth in new pilot starts and introduce people to general aviation. "Project Pilot," sponsored by the Aircraft Owners and Pilots Association (AOPA), promotes the training of new pilots in order to increase and maintain the size of the pilot population. The Experimental Aircraft Association (EAA) promotes the "Young Eagles" program which introduces young children to aviation by offering them a free airplane ride courtesy of aircraft owners who are part of the association. Over the years, programs such as these have played an important role in the success of general aviation and will continue to be vital to its growth in the future.

AIRPORT SERVICE AREA

The initial step in determining the general aviation demand for an airport is to define its generalized service area. The airport service area is determined primarily by evaluating characteristics of competing airports including location, capabilities, services, and relative attraction and convenience.

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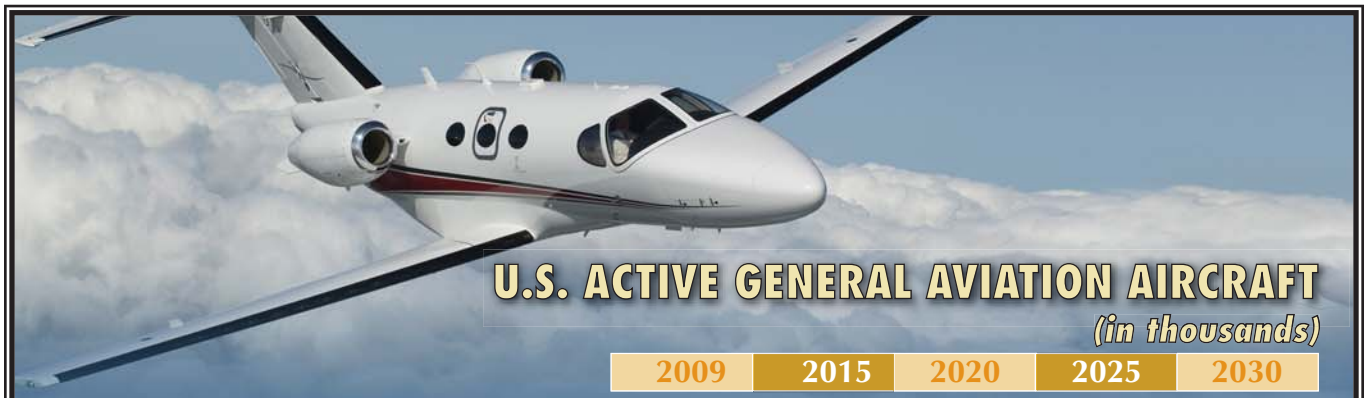
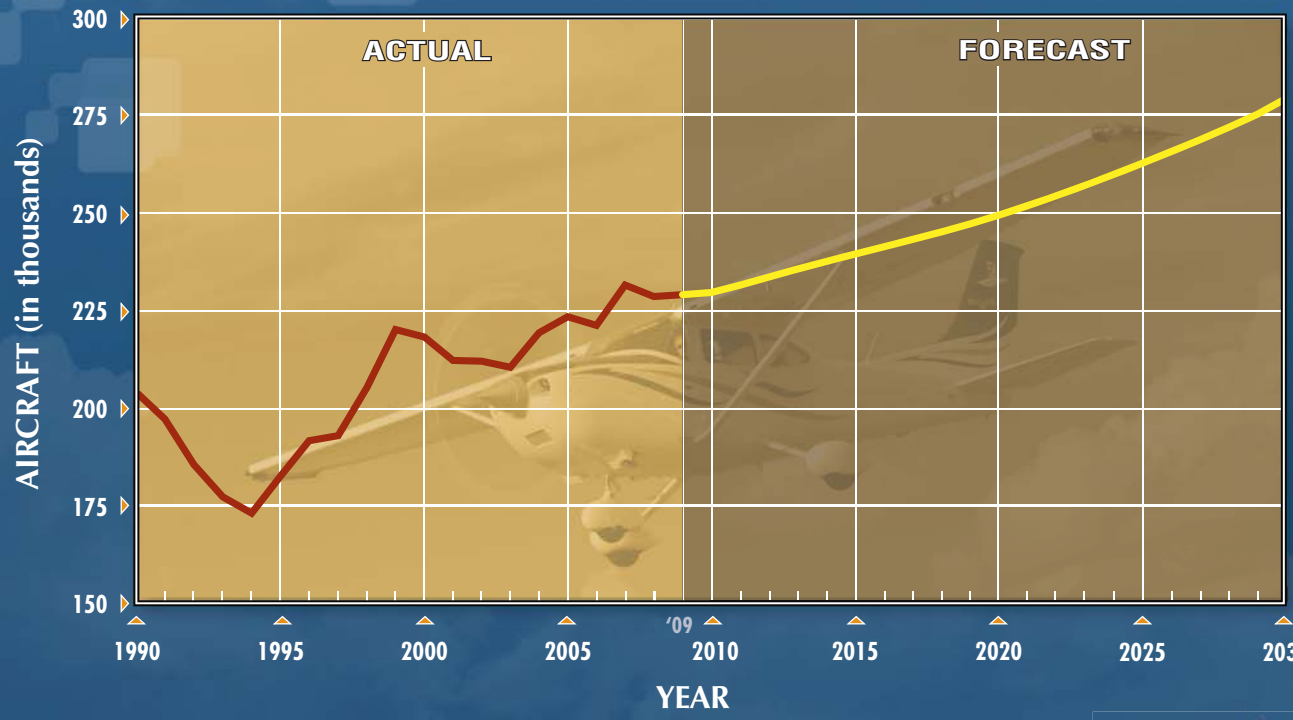


U.S. ACTIVE GENERAL AVIATION AIRCRAFT

(in thousands)

	2009	2015	2020	2025	2030
FIXED WING					
PISTON					
Single Engine	144.7	141.9	142	145.3	150.6
Multi-Engine	17.3	16.5	15.8	15.2	14.6
TURBINE					
Turboprop	9	9.8	10.5	11.3	12
Turbojet	11.4	14.5	17.9	22.1	27
ROTORCRAFT					
Piston	3.7	4.7	5.6	6.5	7.4
Turbine	6.6	7.8	8.8	9.8	10.8
EXPERIMENTAL	23.4	27	29.8	32.2	34.4
SPORT AIRCRAFT	7.3	11.6	13.3	14.8	16.3
OTHER	5.7	5.7	5.7	5.6	5.6
TOTAL	229.1	239.5	249.4	262.8	278.7



Source: FAA Aerospace Forecasts, Fiscal Years 2010-2030.

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

PARIS TEXAS

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

The airport service area is a generalized geographical 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 to determine the size of a service area, as well as the quality of aviation facilities, distance, and other subjective criteria. Typically, the service area for a rural general aviation airport can extend up to 30 miles.

The proximity and level of service offered by other airports are largely the defining factors when describing the airport service area. A description of nearby airports was previously completed in Chapter One. Cox Field Airport is one of several airports in the region; however, it is the only public use airport located in Lamar County. Five other public airports are located within 30 nautical miles of PRX. Additionally, there are eight private use airports also located within 30 nautical miles of Cox Field Airport. As a result, aviation demand in the region is met by five public use airports and eight private use airports.

Cox Field Airport is the most substantial of all airports in the region. For example, Runway 17-35 is currently 6,002 feet long by 150 feet wide. This length and width exceeds all other regional airport facilities. Commerce Municipal Airport has a runway length of 5,909 feet; however, it is only 60 feet wide. As a result, this runway is not attractive to business jet users. Sulphur Springs Municipal Airport has a runway length of 5,001 feet, but it too is narrower, providing a width of 75 feet. With infrastructure improvements to the runway/taxiway system, Cox Field Airport could stand as the region's primary airport.

As the airport's level of attractiveness expands, so will its service area. If the attractiveness of the airport increases in relation to nearby airports, so too will the size of the service area. If facilities are adequate and rates and fees are competitive at Cox Field Airport, some level of general aviation activity might be attracted to the airport from surrounding areas.

In determining the aviation demand for an airport, it is necessary to identify the role of that airport. The primary role of Cox Field Airport is to serve the needs of general aviation operators in the region. General aviation is a term used to describe a diverse range of aviation activities which includes all segments of the aviation industry except commercial air carriers and the military. This includes recreational flying in single engine aircraft through corporate business jets and even charter cargo operators. In this capacity, Cox Field Airport should be developed and maintained to accommodate all general aviation aircraft seeking to base and/or operate there.

When discussing an airport service area, two primary demand segments need to be addressed. The first component is the ability to attract based aircraft. Almost universally, aircraft owners choose to base at an airport nearer their home or business. Convenience is the most common reason for basing in close proximity. The second segment is itinerant aircraft operations. In most cases, transient

aircraft operators will also elect to utilize airports nearer intended destinations. This, however, is highly dependent on the capability to accommodate the aircraft operator. As a result, a more attractive airport facility will be able to attract a larger portion of the regional itinerant aircraft operations.

Given these factors, the primary service area for Cox Field Airport includes all of Lamar County. The secondary service area extends into surrounding counties, especially those with limited airports and/or for areas nearer to PRX.

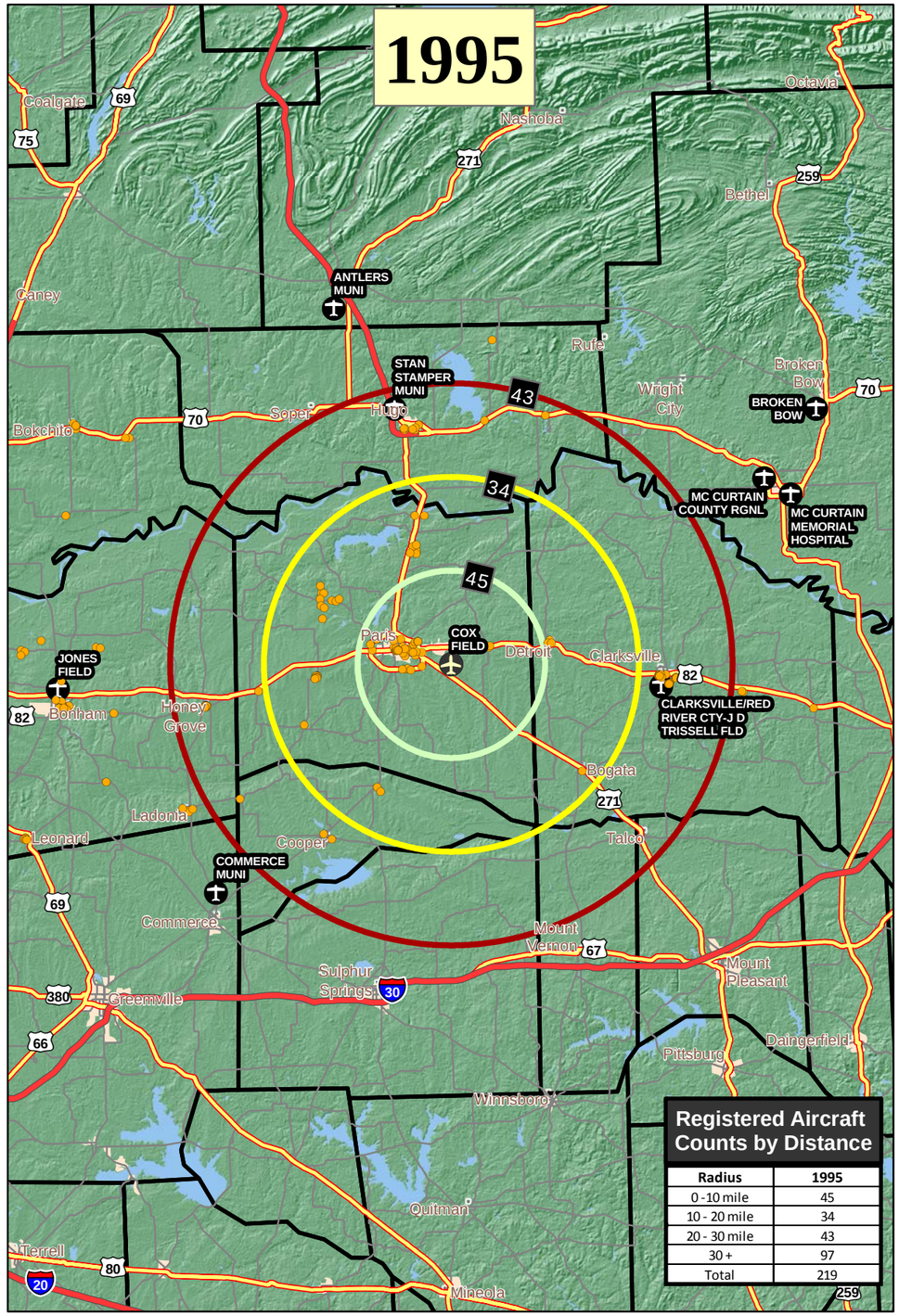
Exhibit 2B presents a historical and current depiction of the location of registered aircraft in the region for 1995 and 2009. This data was obtained from FAA records. Each dot on the exhibit depicts the location of residence for the registered aircraft owner. The exhibit also depicts three rings centered on PRX extending out with radii of 10, 20, and 30 statute miles. As indicated earlier, an airport such as Cox Field Airport can reasonably expect to draw aviation demand within 30 miles. In some cases, demand will be drawn from points farther.

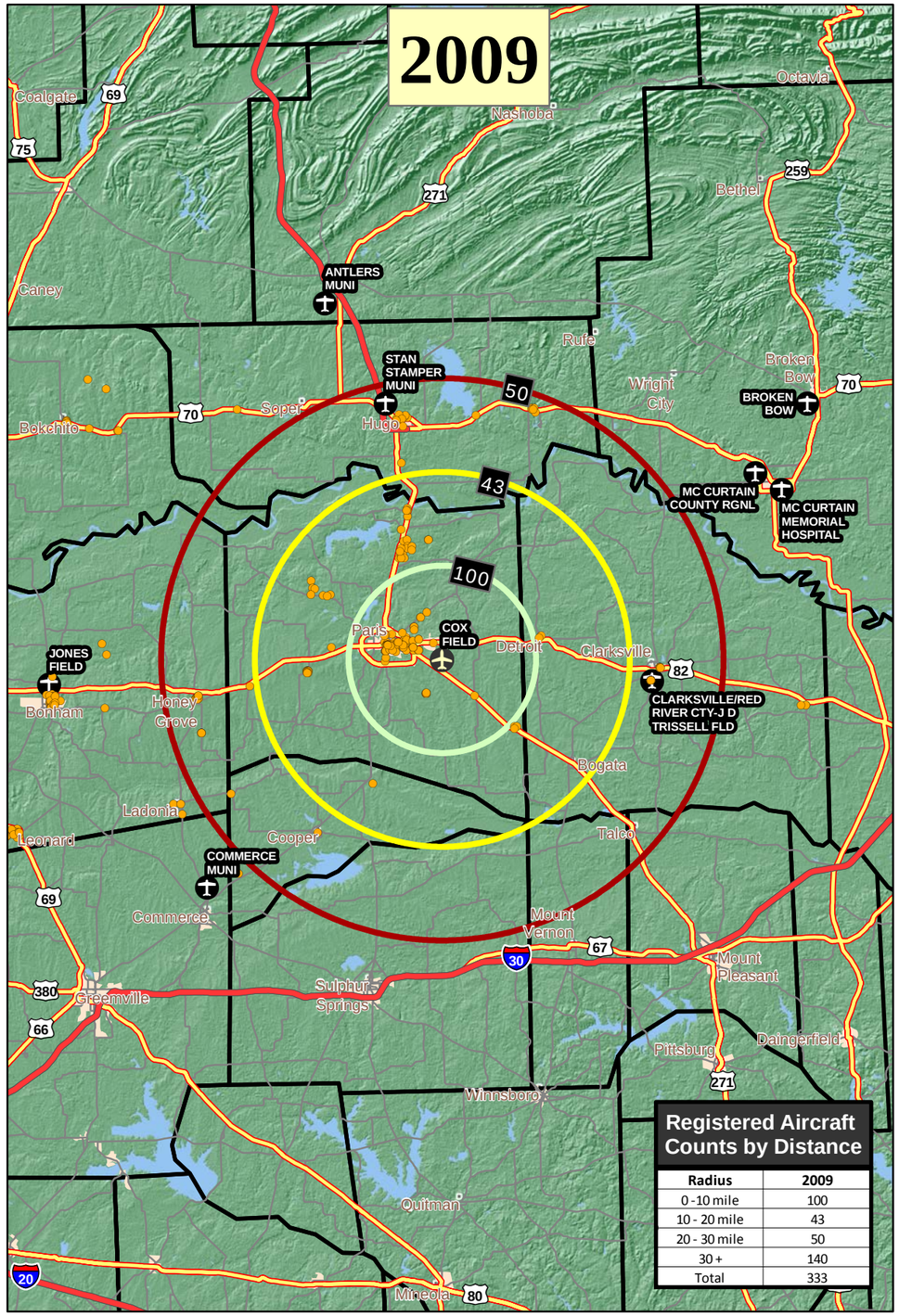
As depicted on the exhibit, all 141 registered aircraft in Lamar County are located within 20 miles of PRX. In fact, the majority of the county registered aircraft owners (100) reside (either home or business) within ten miles of Cox Field Airport. Another 41 aircraft are located between 10 and 20 miles from the airport. The 20- to 30-mile radius includes an additional 50 aircraft. Thus, there are 193 registered aircraft located within 30 miles of Cox Field Airport.

As previously discussed, for planning purposes, the primary service area for Cox Field Airport will be Lamar County. It is important to note that PRX could receive some demand from other contiguous counties; however, this demand will be sporadic and unpredictable as PRX does not have the capability of currently accommodating all of Lamar County's demand as will be outlined later in this chapter.

SWOT ANALYSIS

Generally, SWOT analysis is a strategic business planning technique used to identify strengths, weaknesses, opportunities, and threats associated with an action or plan. The SWOT analysis involves identifying an objective, action, or element and identifying the internal and external forces that are positively and negatively impacting that objective, action, or element in a given environment. In this study, the element to which SWOT is being applied is Cox Field Airport within the confines of the Master Plan. The SWOT analysis provides a continuous vision and direction for the development of the master plan. **Table 2B** is a matrix of the SWOT definitions.





Registered Aircraft 1995-2009

Cox Field
Paris, TX

Legend

- Registered Aircraft
- Cox Field
- Public Use Airport
- Limited Access
- Highways
- Secondary Roads
- Urban Area
- County Boundary

Buffer Radius

30 miles
20 miles
10 miles

0 7.5 15 22.5 30

Miles

Exhibit 2B
PARIS TEXAS REGISTERED AIRCRAFT LOCATION MAP

TABLE 2B
SWOT Definitions

	Helpful to the Airport	Harmful to the Airport
Internal (Attributes of the Airport and Market Area)	Strengths	Weaknesses
External (Attributes of the Industry)	Opportunities	Threats

In late fall of 2009, the Planning Advisory Committee (PAC) assembled for a Master Plan kick-off meeting. As described in the Introduction, this is a diversified group of airport stakeholders that includes representatives from the City of Paris, airport tenants, pilot associations, the Chamber of Commerce, as well as TxDOT-Aviation. A preliminary SWOT analysis was conducted with this group to identify key factors that might be addressed in the Master Plan. The following summarizes the SWOT analysis:

Strengths

- Sizable aviation infrastructure available
- Regionalized location
- Good regional surface transportation network
- Abundant land available for development
- Rural location with minimal encroachment
- Fixed base operator (FBO) has good reputation for quality services

Weaknesses

- Airfield pavement failing/poor condition
- Not enough hangars available to meet demand (hangar waiting list of 33)
- Drainage needs improvement

Opportunities

- Crosswind runway closures which could spur economic development on airport
- Ample land to develop additional hangar spaces to more than meet aviation demand in the region
- Most substantial aviation facility in the immediate region

Threats

- Continued lack of new hangar development could shift demand to other regional airports
- Growth of other regional airports
- Costs associated with needed airport infrastructure could limit capital improvements aimed at growth

AVIATION FORECAST METHODOLOGY

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

Beyond five years, the predictive reliability of the forecasts can diminish. Therefore, it is prudent for the airport to update the forecasts, reassess the assumptions originally made, and revise the forecasts based on the current airport and industry conditions. Facility and financial planning usually require at least a 10-year preview, since it often takes several 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 activity occurring 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. A recent example is the substantial growth in the production and delivery of business jet aircraft, which resulted in a growth rate that far exceeded expectations. Such changes are difficult to predict, but over time, reasonable growth trends can be identified. Using a broad spectrum of demographic, economic, and industry data, forecasts for Cox Field Airport have been developed. Several standard statistical methods have been employed to generate various projections of aviation demand.

Trend line projections are probably the simplest and most familiar of the forecasting techniques. By fitting growth curves to historical demand data, then extending them into the future, a basic trend line projection is produced. A basic assumption of this technique is that outside factors will continue to affect aviation demand in much the same manner as in the past. As broad as this assumption may be, the trend line projection does serve as a reliable benchmark for comparing other projections.

Correlation analysis provides a measure of a direct relationship between two separate sets of historic data. Should there be a reasonable correlation between the data, further evaluation using regression analysis may be employed.

Regression analysis measures the statistical relationship between dependent and independent variables yielding a "correlation coefficient." The correlation coefficient (Pearson's "r") measures association between the changes in a dependent variable and independent variable(s). If the r-squared (r^2) value (coefficient determination) is greater than 0.90, it indi-

cates good predictive reliability. A value below 0.90 may be used with the understanding that the predictive reliability is lower.

Market share analysis involves a historical review of airport activity as a percentage, or share, of a larger regional, state, or national aviation market. A historical market share trend is determined, providing an expected market share for the future. These shares are then multiplied by the forecasts of the larger geographical area to produce a market share projection. This method has the same limitations as trend line projections, but can provide a useful check on the validity of other forecasting techniques.

Utilizing these statistical methods, available existing forecasts, and analyst expertise, forecasts of aviation demand for Cox Field Airport have been developed. The remainder of this chapter presents the aviation demand forecasts and includes activity in two broad categories: based aircraft and annual operations.

GENERAL AVIATION FORECASTS

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

- Based Aircraft
- Based Aircraft Fleet Mix
- General Aviation Operations
- Air Taxi Operations
- Military Operations
- Peaking Operations
- Annual Instrument Approaches

The remainder of this chapter will examine historical trends and project future demand for these segments of general aviation activity at the airport.

BASED AIRCRAFT FORECAST

The number of based aircraft at the airport is the most basic indicator of general aviation demand. By developing a forecast of based aircraft, the needs of the airport can be forecast more accurately. One method of forecasting based aircraft at an airport is to examine local aircraft ownership, or aircraft registrations in the airport's service area. The primary service area for Cox Field Airport is Lamar County.

County Registered Aircraft

The owner of an aircraft is required to register that aircraft and receive a unique N-number to be prominently painted on the aircraft. The N-number is often referred to as the tail number since most aircraft have the number painted on the tail. This database of aircraft, maintained by the FAA, is available to the public. A review of this database can provide reliable historical information regarding the number and type of aircraft registered within the approximate airport service area. Utilizing this historical aircraft registration data, forecasts of future aircraft registrations can be

made. With a forecast of registered aircraft, a projection of aircraft based at PRX can then be made.

Aircraft registration data for Lamar County was obtained going back to 1993 and is presented in **Table 2C**. In 1993, there were 74 registered aircraft in the county, which grew to 141 by 2009. Over this 16-year time period, registered aircraft in Lamar County nearly doubled, growing by 67 aircraft, which equates to an aggressive AAGR of 4.11 percent. As a result, the county experienced an average of slightly more than four new aircraft registrations per year.

TABLE 2C
Historical Registered Aircraft
Lamar County, Texas

Year	Single Engine Piston	Multi-Engine Piston	Turboprop	Jet	Rotor	Unknown	Total
1993	67	5	0	1	1	0	74
1994	68	5	0	0	1	0	74
1995	66	6	0	0	2	0	74
1996	61	6	0	0	2	0	69
1997	55	7	0	0	1	0	63
1998	60	9	0	0	1	0	70
1999	71	6	2	0	1	0	80
2000	82	9	1	0	1	3	96
2001	85	9	3	1	1	3	102
2002	84	8	3	1	1	3	100
2003	90	8	3	2	1	0	104
2004	105	7	2	2	2	0	118
2005	111	7	1	1	2	0	122
2006	102	7	0	1	2	9	121
2007	111	7	0	1	3	9	131
2008	120	8	0	2	3	0	133
2009	127	8	0	3	3	0	141

Source: FAA Aircraft Registry Database; FAA Census of U.S. Civil Aircraft

Several forecasts of registered aircraft for the county have been developed and are presented on **Exhibit 2C**. The first simply considers the historical growth trend since 1993, which is 4.11 percent annually. Extending this trend out over the next 20 years yields a forecast of 329 registered aircraft by 2030. While it is possible that a 4.11 percent growth rate could continue over the next 20 years, it is not likely. National trends are for slower aircraft growth, and economic conditions are slowly recovering from a significant recession. As a result, slower and more reasonable two and three percent AAGR projections were developed, yielding 214 and 262 registered aircraft by 2030, respectively.

Several statistical trends and regressions were considered. For this type of analysis, an r^2 value is generated. This value is a measure of the statistical reliability of the analysis. Generally, r^2 values greater than 0.90 per-

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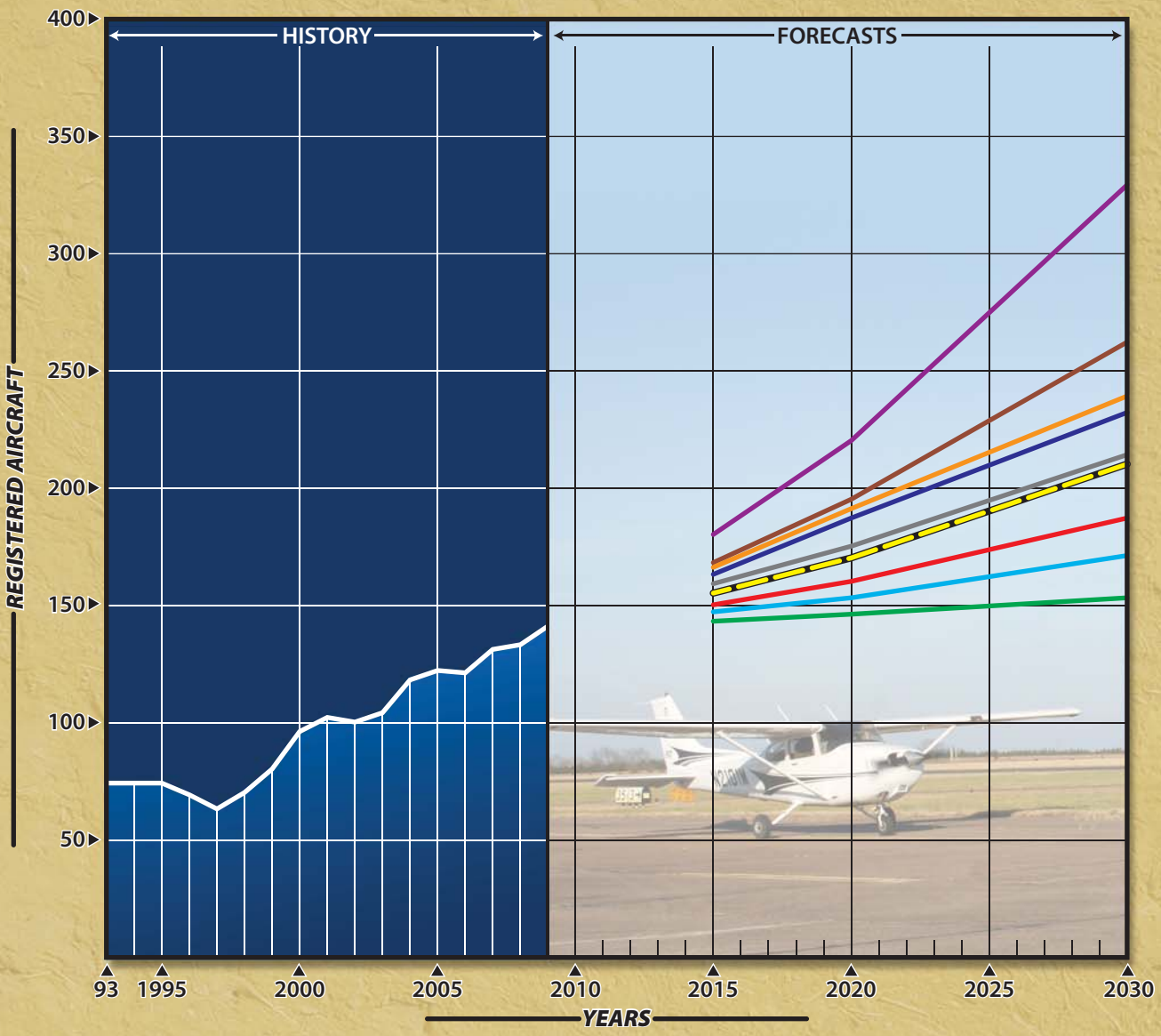

LEGEND		2015	2020	2030
	TIME SERIES ANALYSIS			
	1993-2009 ($r^2 = 0.91$)	166	191	239
	MARKET SHARE OF U.S. ACTIVE AIRCRAFT			
	Constant Share (at 0.0615%)	147	153	171
	Increasing Share (reaching 0.0672%)	150	160	187
	REGISTERED AIRCRAFT PER CAPITA (1,000 SERVICE AREA RESIDENTS)			
	Constant Share Ratio (maintaining 2.83)	143	146	153
	Increasing Share Ratio (increasing to 4.28)	163	187	232
	PERCENTAGE GROWTH MODELS			
	Historic AAGR of 4%	180	220	329
	AAGR 3%	168	195	262
	AAGR 2%	159	175	214
	SELECTED FORECAST	***155***	***170***	***210***

Exhibit 2C
LAMAR COUNTY REGISTERED
AIRCRAFT PROJECTIONS

cent indicate a strong correlation between variables and, therefore, a greater statistical reliability.

The first of these statistical analyses is a trend line projection in which a forecast is developed by statistically "fitting" an "average" line over the historical data and extending that line into the future. This method resulted in a fairly strong correlation with an r^2 value of 0.91. This forecast yields county aircraft registrations reaching 239 by 2030.

The next analysis utilized socioeconomic data for population and employment as independent variables and registered aircraft as the dependant variable. Unfortunately, the correlation between aircraft registration and socioeconomic growth was not strong. As a result, these forecasts did not yield an acceptable r^2 value and were not considered reliable for the purposes of this forecasting effort.

An additional forecast method utilizing population was used in which the number of aircraft registrations per 1,000 county residents was analyzed. Typically, strong growing population centers will experience a decreasing ratio of aircraft per 1,000 residents as more people than aircraft are locating to the area. For regionalized and rural populations, however, it is not uncommon for the ratio to be increasing. Such is the case for Lamar County as presented in **Table 2D**.

TABLE 2D
Registered Aircraft per 1,000 Lamar County Registered Aircraft

	Lamar County		
Year	**Population**	**Registered Aircraft**	**Ratio of Aircraft per 1,000 Residents**
1995	46,084	74	1.61
2000	48,604	96	1.98
2001	48,688	102	2.09
2002	49,431	100	2.02
2003	49,291	104	2.11
2004	49,919	118	2.36
2005	49,780	122	2.45
2006	49,787	121	2.43
2007	49,830	131	2.63
2008	49,861	133	2.67
2009	49,845	141	2.83
Constant Ratio Projection			
2015	50,606	143	2.83
2020	51,709	146	2.83
2030	54,122	153	2.83
Increasing Ratio Projection			
2015	50,606	163	3.23
2020	51,709	187	3.62
2030	54,122	232	4.28

Source: Population for Texas State Demographer; Registered Aircraft from FAA Records

First, a constant ratio projection of 2.83 aircraft per 1,000 residents yields 153 registered aircraft by 2030. It should be noted that this forecast will likely represent the lower end of the planning envelope as slow population growth projections for the county will likely be exceeded by registered aircraft growth. The increasing ratio projection yields 232 aircraft registrations for Lamar County by 2030. This forecast represents an extension of the historic ratio growth since 1993 and mirrors the trend line projection detailed earlier.

The final forecast developed considered the Lamar County market share of all active aircraft in the United States as projected by the FAA *Aerospace Forecasts – Fiscal Years 2010-2030*. Since 1993, Lamar County registered aircraft has increased its market share of U. S. active aircraft as presented in **Table 2E**. This means that Lamar County registered aircraft have grown faster than U.S. active aircraft in general. As detailed in **Table 2E**, Lamar County held a 0.0418 percent market share in 1993 and increased to 0.0615 percent in 2009.

TABLE 2E
Lamar County Registered Aircraft Market Share of U. S. Active Aircraft

Year	Registered Aircraft	U.S. Active Aircraft	Market Share
1993	74	177,120	0.0418%
1994	74	172,935	0.0428%
1995	74	182,605	0.0405%
1996	69	187,312	0.0368%
1997	63	189,328	0.0333%
1998	70	205,700	0.0340%
1999	80	219,500	0.0364%
2000	96	217,533	0.0441%
2001	102	211,446	0.0482%
2002	100	211,244	0.0473%
2003	104	209,606	0.0496%
2004	118	219,319	0.0538%
2005	122	224,350	0.0544%
2006	121	221,939	0.0545%
2007	131	231,606	0.0566%
2008	133	228,668	0.0582%
2009	141	229,149	0.0615%
Constant Market Share Projection			
2015	147	239,522	0.0615%
2020	153	249,440	0.0615%
2030	171	278,723	0.0615%
Increasing Market Share Projection			
2015	150	239,522	0.0628%
2020	160	249,440	0.0643%
2030	187	278,723	0.0672%

Source: U. S. Active from FAA Aerospace Forecasts 2010; Registered Aircraft from FAA Records

Two forecasts were developed utilizing the market share with U.S. active aircraft. First, a constant share projection was developed extending the current share of 0.0615 percent through the forecast period. This projection yields 171 aircraft registrations for Lamar County by 2030. This forecast would go against the previous 16-year trend in which only three years in the entire period experienced a decrease over the previous year market share; however, current economic conditions and a slow recovery will likely slow the increasing market share trend. As a result, a continued increasing market share projection was also developed. The increasing share reaching 0.0672 percent by 2030 yields 187 registered aircraft by 2030.

The selected forecast is most reflective but slightly lower than the two percent AAGR projection and the trend line projection. While this forecast represents a slowing in the historic trend, it is very reasonable considering the national economic conditions. It should be noted that the general aviation industry as a whole often mirrors that of the economy. Currently, the country is moving out of a significant recession which has stunted general aviation activity and growth in general. A robust return to growth can be expected in the ten to 20 year range of the planning period.

TABLE 2F
Cox Field Based Aircraft Projections

Year	Lamar County Registered	PRX Based Aircraft	Market Share
1995	74	46	62.16%
2000	96	52	54.17%
2005	122	50	40.98%
2009	141	56	39.72%
Decreasing Share Projection			
2015	155	60	38.50%
2020	170	62	36.50%
2025	210	67	32.00%
Constant Share Projection (Selected Forecast)			
2015	155	62	39.72%
2020	170	68	39.72%
2025	210	83	39.72%
Increasing Share Projection			
2015	155	63	40.50%
2020	170	73	43.00%
2025	210	100	47.50%

Now that registered aircraft have been forecast for Lamar County, a based aircraft forecast for Cox Field Airport can be developed.

PRX Based Aircraft

The most difficult part of the based aircraft forecast is positively identify-

ing the current year based aircraft number. There are several reasons for this. First, historical records of based aircraft were not required by the FAA until 2008. Second, historical based aircraft records for the airport have not been actively maintained. A current based aircraft count was obtained from the City of Paris through existing lease records.

Current records indicate that 56 aircraft are based at the airport. City officials have indicated that this figure has remained unchanged for the past five years. The FAA's TAF presents a similar trend over the last 15 years, with a low of 46 aircraft in 1995 and a high of 52 aircraft in 2000.

The best method for forecasting based aircraft is to utilize a market share projection of the airport's service area registered aircraft. As previously noted, the airport's service area is Lamar County. **Table 2F** presents historical market share of Lamar County registered aircraft.

Interestingly, Lamar County's strong registered aircraft growth has not translated into strong based aircraft at Cox Field Airport. While the county registered aircraft increased by 67, PRX based aircraft increased by only ten. Obviously, PRX is the primary airport in Lamar County; however, it is not fully capable of accommodating the increase due to lack of hangar facilities. The airport maintains a hangar waiting list on which 33 aircraft currently reside. As a result, the historic market share has been decreasing, falling from 62.16 percent in 1995 to 39.72 percent in 2009.

Three market share projections were developed. First, a continued decreasing market share trend falling to 32 percent was developed. This projection yields 67 based aircraft at PRX by 2030. Next, a constant share projection of 39.72 percent yields 83 based aircraft by 2030. Finally, an increasing share projection reaching 47.5 percent yields 100 based aircraft by the end of the planning period.

Future based aircraft will be highly dependent upon the quantity and quality of airport facilities. It is very evident that a majority of the aircraft registered in Lamar County have elected to base at other public or private airports. While Cox Field Airport is sizable and has much to offer, it currently lacks available hangar spaces. It is very likely that the 33 aircraft on the waiting list would base at the airport if hangars were developed offering a reasonable lease rate. For planning purposes, however, consideration must be given to the limitations placed on sizable capital improvements, especially in a recovering economy.

A decreasing market share is only likely if the county continues to experience strong registered aircraft growth and Cox Field is not improved to provide additional hangar spaces. The City of Paris is committed to improving the airport. As a result, this projection appears low. The increasing market share forecast, however would be the result of significant infrastructure and hangar development at PRX. Significant capital costs will be required for airfield pavements. These costs could limit the availability of the city to support publicly spon-

sored hangar development. As a result, this projection will likely be at the high end of the planning envelope.

The constant market share projection represents a reasonable compromise between meeting regional aviation demand through moderate capital expenditures on airport infrastructure and hangars. The forecast equates to a projected two percent AAGR. The based aircraft forecast to be used for the remainder of this study, as shown on **Exhibit 2D**, will be 62 aircraft in 2015, 68 aircraft in 2020, and 83 aircraft in 2030.

BASED AIRCRAFT FLEET MIX PROJECTIONS

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 activity occurring at the airport. The growth areas in the national general aviation fleet are in turboprop and jet aircraft, as well as helicopters. Single engine piston-powered aircraft are forecast to grow slightly, while multi-engine piston aircraft are forecast to decrease slightly. Growth within each based aircraft category at the airport has been determined, in part, by comparison with national projections and consideration of local economic conditions. On the local level, an examination of the registered aircraft fleet mix for Lamar County was conducted and is presented in **Table 2C**.

Over the last 16 years, single engine aircraft have represented approximately 87.7 percent and have shown relatively steady growth. Multi-engine piston-powered aircraft have represented 7.7 percent over the period, but have greatly fluctuated between a high of 12.9 percent and 5.3 percent. Turboprops have not been a significant factor over the period and rotorcraft has experienced limited growth. Jet aircraft were not significant in the early part of the period, but ended 2009 with three aircraft.

Based in part on national and local fleet mix data, a forecast of the future based aircraft fleet mix at Cox Field Airport can be made. As presented in **Table 2G**, single engine piston-powered aircraft will continue to account for the vast majority of based aircraft at the airport. Over the course of the 20-year planning period, turboprops are forecast to grow as a percent of based aircraft, while jets and helicopters are to remain steady as a percentage of based aircraft. Single and multi-engine piston-powered aircraft are forecast to drop slightly as a percent of the mix, although single engine aircraft are projected to increase overall.

TABLE 2G
Based Aircraft Fleet Mix Forecast

Year	SEP	%	MEP	%	TP	%	J	%	R	%	Total
2009	46	82.1%	4	7.1%	0	0.0%	5	8.9%	1	1.8%	56
FORECAST											
2015	50	81.0%	4	7.0%	1	1.0%	6	9.0%	1	2.0%	62
2020	55	80.0%	4	6.0%	2	3.0%	6	9.0%	1	2.0%	68
2030	66	79.0%	4	6.0%	3	4.0%	8	9.0%	2	2.0%	83

ANNUAL OPERATIONS

Airport operations can be characterized as local or 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, operations at an airport will be further classified as general aviation, air taxi/other, air carrier, or military. Air taxi activity is generally considered on-demand service that includes charter and fractional activity operating under 14 CFR FAR Part 135. Air carrier operations are conducted by scheduled airlines or charter operations under 14 CFR FAR Part 121. By definition, this activity is itinerant in nature. Military activity can be both local and itinerant. Typically, itinerant operations increase with business and commercial use as business aircraft are used primarily to transport people from one location to another.

Cox Field Airport does not have an airport traffic control tower (ATCT). Due to the absence of an ATCT, official annualized operational counts are not available for PRX. The airport's FBO has provided daily operational count logs whenever available to monitor UNICOM transmissions. **Table 2H** presents the operational count provided by the FBO. It should be noted that these figures do not represent all operations, but provide a reasonable estimate for planning purposes.

TABLE 2H
Historical Airport Operations
Cox Field Airport

Month	2003	2004	2005	2006	2007	2008	2009
Jan	600	490	500	480	390	380	456
Feb	450	450	400	380	415	400	358
Mar	500	450	430	415	370	380	356
Apr	600	550	505	530	525	500	354
May	575	550	575	530	500	512	460
Jun	580	700	605	700	502	420	464
Jul	800	580	550	650	400	340	374
Aug	750	650	575	630	625	550	540
Sep	775	400	525	450	500	404	404
Oct	750	700	615	600	455	600	496
Nov	520	515	550	575	600	505	552
Dec	625	600	550	500	405	300	322
Annual	7,525	6,635	6,380	6,440	5,687	5,291	5,136

Note: Operational count are not absolute totals, only those logged by FBO

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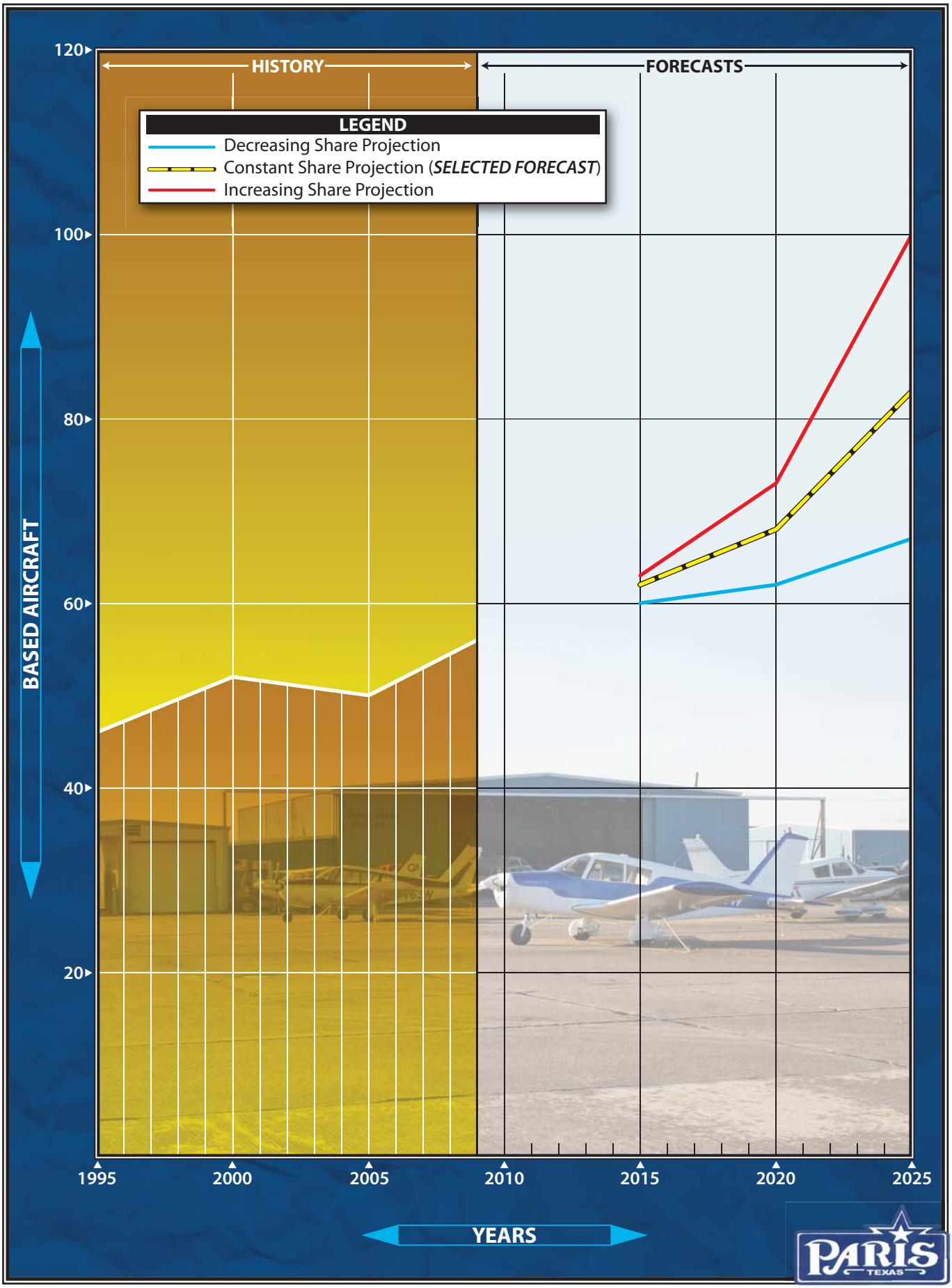

Exhibit 2D
BASED AIRCRAFT PROJECTIONS

As noted in the table, annual operations have been generally declining since 2003. The FBO operational count in 2003 was 7,525, which decreased to 5,136 in 2009. This trend would be reasonable given the economic recession and high fuel costs experienced over the period.

For another historical reference, historical aircraft operations for the airport have been recorded by the FAA on the 5010-1, *Airport Master Record Form*. Similar to based aircraft records, total annual operations have varied, estimated to range between 13,392 in 2000 and 8,050 in 2009.

General Aviation Operations

In attempts to quantify more reliably than simply estimating airport operations, TxDOT established an operations monitoring system. The goal of this program was to ultimately establish a model that will provide more accurate counts. The TxDOT model indicates that for reliever airports, annual operations can range between 300 and 500 operations per based aircraft. The higher figure represents a highly utilized facility in a large metropolitan area with high numbers of based aircraft and FBOs. For general aviation airports, the figure is 300 operations per based aircraft.

Utilizing the FBO and FAA 5010 estimates, the 300 operations per based aircraft figure appears to be high, as detailed in **Table 2J**. In 2009, the operational estimate and based aircraft resulted in an operation per based aircraft ratio of 134. Projections of future general aviation operations considered an increasing ratio of 150 for 2015, 200 for 2020, and 250 for 2030. This forecast yields 20,900 general aviation operations by 2030. This forecast exceeds the FAA TAF projections as the TAF projects a flat growth through the planning period.

TABLE 2J
General Aviation Operations Forecast
Cox Field Airport

Year	Based Aircraft	Itinerant	Local	Annual	Operations per Based
2000	52	7,500	5,200	12,700	244
2001	48	3,810	6,166	9,976	208
2002	52	2,800	6,166	8,966	172
2003	52	3,810	6,166	9,976	192
2004	50	3,810	6,166	9,976	200
2005	50	2,500	6,000	8,500	170
2006	56	2,500	5,000	7,500	134
2007	56	2,500	5,000	7,500	134
2008	56	2,500	5,000	7,500	134
2009	56	2,500	5,000	7,500	134
FORECASTS					
2015	62	3,700	5,600	9,300	150
2020	68	5,400	8,100	13,500	200
2030	83	8,400	12,500	20,900	250

Source: FAA TAF and FBO records

It should be noted that the forecast presents local operations as 60 percent of total general aviation operations. A 60 percent local and 40 percent itinerant operational mix is very common for general aviation airports similar to PRX. Paris has flight training available, and aircraft from other regional airports utilize PRX for flight training.

Air Taxi Operations

The air taxi category includes aircraft involved in on-demand passenger charter, fractional ownership aircraft operations, small parcel transport, and air ambulance activity. While not typically a large percentage of total airport operations, air taxi operations are generally conducted via more sophisticated aircraft ranging from multi-engine piston aircraft up to large business jet aircraft. As a result, it is important to factor these types of operations.

General estimates of air taxi operations have been collected from the FAA TAF and are presented in **Table 2K**. As presented, air taxi operations have been estimated to range between a high of 300 to a low of 140 annually. These figures are typical of regionalized airports and are supported by independent flight data obtained though Airport IQ. Airport IQ logs all aircraft that depart from or arrive at an airport via an instrument flight plan. If the plan is not completed and closed on the ground after landing or if an aircraft departs the airport under visual flight rules and later opens a flight plan mid-air, the operation is not logged for the airport. Air taxi operations have been forecast to increase through the planning period, reaching 1,000 annually by 2030. This operational level is conducive of a regionalized and strong economy, as currently exists and is forecast to continue for Lamar County.

TABLE 2K
Air Taxi and Military Operations Forecast
Cox Field Airport

	Itinerant			Local
Year	**Air Taxi**	**Military**	**Subtotal**	**Military**
2000	250	442	692	0
2001	150	480	630	0
2002	225	500	725	0
2003	150	480	630	0
2004	150	480	630	0
2005	140	390	530	0
2006	150	250	400	0
2007	300	250	550	0
2008	300	250	550	0
2009	300	250	550	0
FORECAST				
2015	400	500	900	250
2020	500	500	1,000	250
2030	1,000	500	1,500	250

Source: FAA TAF

Military Operations

At some general aviation airports, military operations can be common. Cox Field Airport does not experience regular military operations; however, military aircraft do utilize the airport. The FAA TAF forecasts 250 itinerant military operations annually through 2030; however, this forecast will consider twice that amount annually. The TAF does not include any local military operations and this forecast will include a small amount of 250 annually as noted in **Table 2K**.

Peaking Operations

Many aspects of facility planning relate to levels of peak activity. For example, the appropriate size of a terminal building can be estimated by determining the number of people that could reasonably be expected to use the facility at a given time. The following planning definitions apply to the peak periods:

- **Peak Month** -- The calendar month when peak aircraft operations occur.
- **Design Day** -- The average day in the peak month.
- **Busy Day** -- The busy day of a typical week in the peak month.
- **Design Hour** -- The peak hour within the design day.

It is important to note that only the peak month is an absolute peak within a given year. All other peak periods will be exceeded at various times during the year. The peak period forecasts represent reasonable planning standards that can be applied without overbuilding or being too restrictive.

With the availability of the FBO's monthly records of operations, certain peak periods can be reasonably estimated. The peak month between 2003 and 2009 ranged between 9.64 percent and 11.64 percent of total annual operations. The average peak month for the period represents 10.7 percent of annual operations. Thus, the forecast for peak month operations assumes 10.7 percent of annual operations.

The design day was then calculated by dividing the peak month operations by 30. The busy day has been estimated at 40 percent higher than the average day in the peak month and was calculated by multiplying the design day by 1.4. Design hour operations were calculated at 17.5 percent of design day operations. Peak period information is detailed on **Exhibit 2E**.

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." To qualify as an instrument approach, aircraft must land at the airport after following one of the published instrument approach procedures in less than visual conditions. Forecasts of annual instrument approaches (AIAs) provide guidance in determining an airport's requirements

for navigational aid facilities such as an instrument landing system (ILS). It should be noted that practice or training approaches do not count as annual AIAs.

During poor weather condition, pilots are less likely to fly and rarely would perform training operations. As a result, an estimate of the total number of AIAs can be made based on a percent of itinerant operations, regardless of the frequency of poor weather conditions.

In the future, Cox Field Airport will be increasingly utilized by larger and more sophisticated aircraft. Also, the increased availability of low-cost navigational equipment could allow for smaller and less sophisticated aircraft to utilize instrument approaches. National trends indicate an increasing percentage of instrument approaches given the greater availability of approaches at airports with global positioning system (GPS) and the availability of more cost-effective equipment. AIA projections are presented on **Exhibit 2E**. The projection considers AIAs totaling two percent of all itinerant operation in 2015 and increasing to four percent by 2030.

TERMINAL AREA FORECAST COMPARISON

The FAA annually updates the TAF for all active airports in the NPIAS. These forecasts include projections for annual aircraft operations, based aircraft, and enplaned passengers when applicable. The TAF is utilized to meet the budget and planning needs of FAA and provide information for use by state and local authorities, the aviation industry, and the general public.

At the time of this study, the 2009 FAA TAF for Cox Field Airport was utilized, which provided static forecasts for total operations and based aircraft. The actual number of based aircraft according to airport management is approximately 11 percent higher than the 2009 base year TAF (56 vs. 50). Airport forecasts show a two percent growth rate in based aircraft through the planning period resulting in 62 aircraft by 2015, 68 aircraft by 2020, and 83 aircraft by 2030. The TAF shows no growth in based aircraft. When comparing the Master Plan forecasts for based aircraft to the five- and ten-year TAF periods, they are 19 percent and 25 percent higher, respectively.

Regarding annual aircraft operations, an increase is projected in the Master Plan due to a forecasted increase in based aircraft throughout the planning period. The TAF provides static forecasts for total operations (8,050) through the long term planning period while only accounting for 50 based aircraft. The Master Plan projects 10,450 annual operations by 2015, 14,750 operations by 2020, and 22,650 annual operations by year 2030. As a result, the five- and ten-year Master Plan forecasts for annual operations exceed the TAF by 23 percent and 45 percent, respectively.

09MP11-2E-04/12/10

	2009	2015	2020	2030
BASED AIRCRAFT				
Single Engine	46	50	55	66
Multi-Engine	4	4	4	4
Turboprop	0	1	2	3
Jet	5	6	6	8
Helicopter	1	1	1	2
TOTAL BASED AIRCRAFT	***56***	***62***	***68***	***83***
ANNUAL OPERATIONS				
Itinerant				
Air Taxi	300	400	500	1,000
General Aviation	2,500	3,700	5,400	8,400
Military	250	500	500	500
Total Itinerant Operations	***3,050***	***4,600***	***6,400***	***9,900***
Local				
General Aviation	5,000	5,600	8,100	12,500
Military	0	250	250	250
Total Local Operations	***5,000***	***5,850***	***8,350***	***12,750***
TOTAL ANNUAL OPERATIONS	**8,050**	**10,450**	**14,750**	**22,650**
ANNUAL INSTRUMENT APPROACHES	N/A	138	256	495
PEAKING OPERATIONS				
Peak Month (10.7% of annual)	861	1,118	1,578	2,424
Busy Day	40	52	74	113
Design Day	29	37	53	81
Design Hour	5	7	9	14

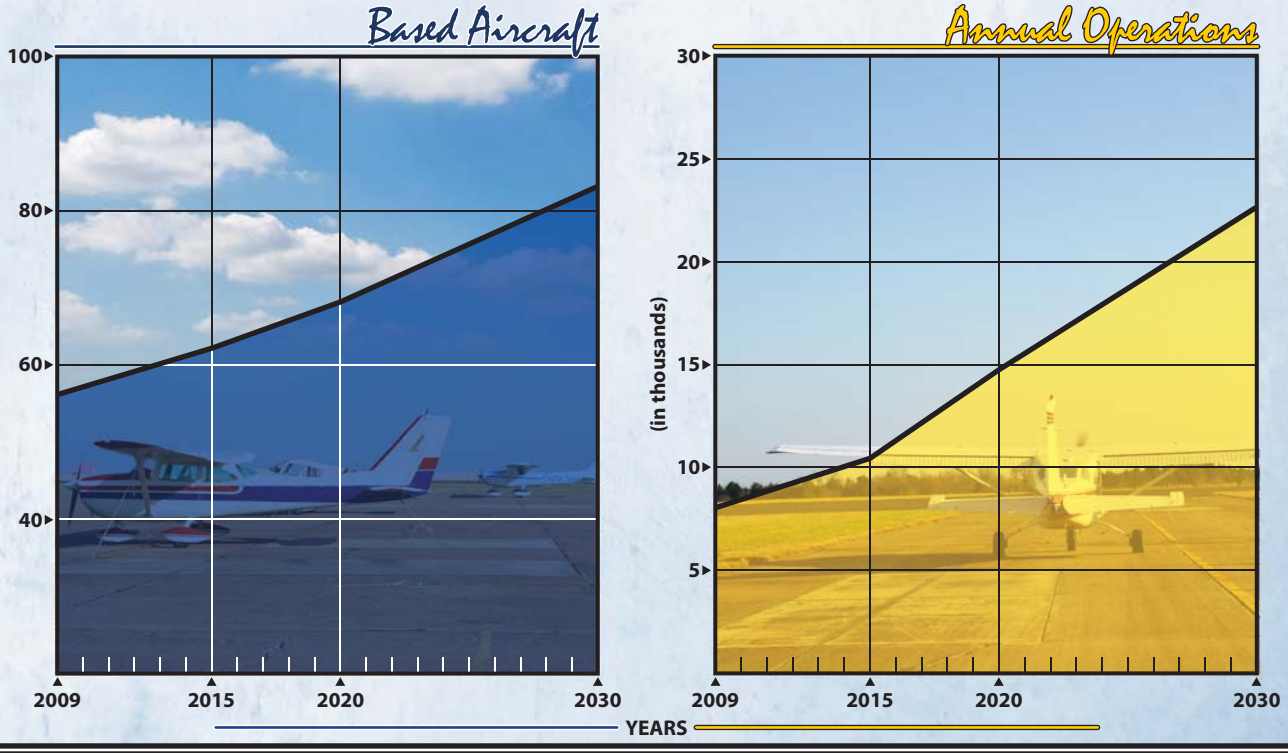

Exhibit 2E
FORECAST SUMMARY

SUMMARY

This chapter has provided demand-based forecasts of aviation activity at Cox Field Airport over the next 20 years. An attempt has been made to define the projections in terms of near and long term expectations. Elements such as local socioeconomic indicators, anticipated regional development, and historical aviation data as well as national aviation trends were all factored when determining future conditions.

The next step in the master planning process will be to assess the capacity and adequacy of existing facilities, as well as to identify changes to the airfield and/or landside facilities which will create a more functional aviation facility. A summary of aviation forecasts is depicted on **Exhibit 2E**.