APPENDIX B

UNCONSTRAINED FORECASTS

"UNCONSTRAINED" FORECASTS

Facility planning must begin with a definition of the demand that may reasonably be expected to occur at the facility over a specific period of time. For Livermore Municipal Airport, this involves forecasts of unconstrained aviation activity indicators through the year 2030. In this report, the unconstrained forecasts of based aircraft, based aircraft fleet mix, and annual aircraft operations will serve as the basis for facility planning.

Because aviation activity can be affected by many influences at the local, regional, and national levels, it is important to understand that forecasts are to serve only as reasonable planning guidelines, and planning must remain flexible enough to respond to unforeseen facility needs.

For facility planning purposes, it will be necessary to select a planning forecast for each of the aviation demand indicators at the airport. While this unconstrained planning forecast will provide an indication of the long term growth potential at the airport, actual growth potential may fluctuate above and below the selected planning forecast levels.

The resulting unconstrained forecast may be used for several purposes, including facility needs assessments, airfield capacity evaluation, and environmental evaluations. The forecasts will be reviewed and approved by the Federal Aviation Administration (FAA) to ensure that they are reasonable projections of unconstrained aviation activity. The intent is to permit the City of Livermore to make the necessary planning adjustments to ensure the facility meets projected demands in an efficient and cost-effective manner.

NATIONAL AVIATION TRENDS

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

The current edition when this chapter was prepared was FAA *Aerospace Forecasts - Fiscal Years 2008-2025*, published in March 2008. The forecasts use the economic performance of the United States as an indicator of future aviation industry growth. Similar economic analyses are applied to the outlook for aviation growth in international markets.

The market for general aviation products and services showed mixed results in 2007. Although total shipments and billings were up 4.2 percent and 15.2 percent respectively compared to 2006, piston aircraft shipments by U.S. manufacturers were down 4.9 percent. The increase in shipments and billings seen in the jet fleet was stimulated by growth in the U.S. and world economy.

The Office of Management and Budget (OMB) forecasts a slowdown in U.S. economic growth in FY 2008 followed by a rebound to more historic rates for the balance of the forecast. This slowdown in 2008 could result in some difficulties for the U.S. commercial aviation industry, but the return to historic rates after that should allow the industry to continue its growth.

GENERAL AVIATION

Following more than a decade of decline, the general aviation industry was revitalized with the passage of the *General Aviation Revitalization Act* in 1994, which limits the liability on general aviation aircraft to 18 years from the date of manufacture. This legislation sparked an interest to renew the manufacturing of general aviation aircraft due to the reduction in product liability, as well as renewed optimism for the industry.

As the demand for business jets has grown over the past several years, the current forecast assumes that business use of general aviation aircraft will expand at a more rapid pace than that for personal/sport use. The business/corporate side of general aviation should also continue to benefit from a growing market for new very light jets (VLJs).

In 2007, there were an estimated 225,007 active general aviation aircraft in the United States. **Exhibit A** depicts the FAA forecast for active general aviation aircraft. The FAA projects an average annual increase of 1.3 percent through 2025, resulting in 286,500 active aircraft. The more expensive and sophisticated turbine-powered fleet (including rotorcraft) is projected to grow at an average of 3.7 percent a year over the forecast period, with the turbine jet fleet increasing at 5.6 percent a year.

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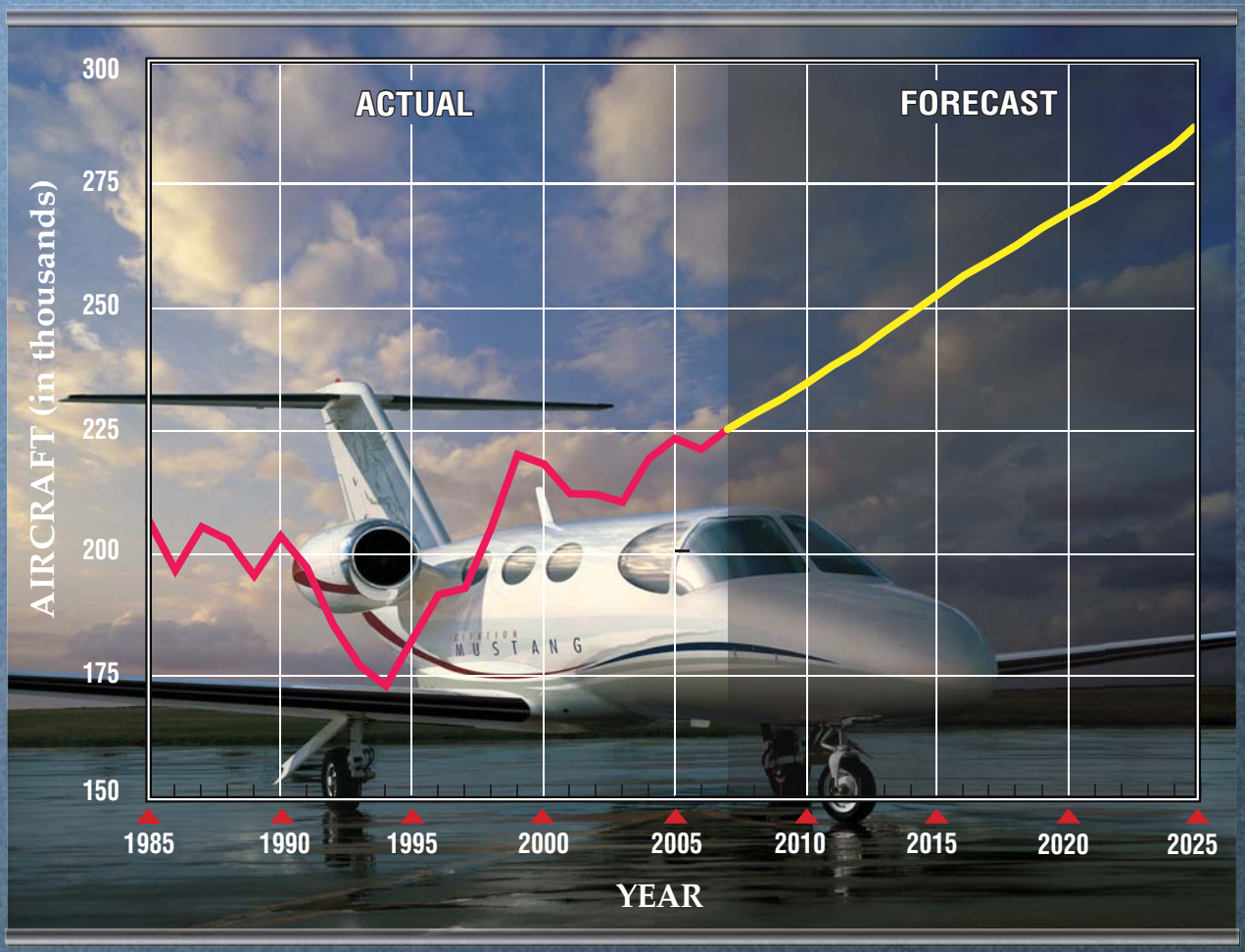
U.S. ACTIVE GENERAL AVIATION AIRCRAFT



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

Year	FIXED WING				ROTORCRAFT		Experimental	Sport Aircraft	Other	Total
	PISTON		TURBINE							
	Single Engine	Multi-Engine	Turboprop	Turbojet	Piston	Turbine				
2007 (Est.)	144.6	18.5	8.2	11.0	3.6	6.0	23.9	2.7	6.4	225.0
2015	145.6	17.2	9.3	19.8	6.2	7.3	29.7	10.5	6.5	252.3
2020	150.0	16.5	10.1	24.9	7.3	7.9	32.6	13.2	6.4	268.9
2025	157.4	15.6	10.8	29.5	8.3	8.6	35.2	14.7	6.4	286.5

Source: FAA Aerospace Forecasts, Fiscal Years 2008-2025.

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

Exhibit A
U.S. ACTIVE GENERAL AVIATION
AIRCRAFT FORECASTS

The number of active piston-powered aircraft (including rotorcraft) is projected to decrease from the 2006 total of 167,008 through 2008, and then increase gradually to 181,345 by 2025, which is an average annual growth rate of 0.5 percent. In addition, it is expected that the new, light sport aircraft and the relatively inexpensive microjets could erode the replacement market for traditional piston aircraft at the high and low ends of the market respectively.

Beginning in 2005, a new category of aircraft that was previously not included in the FAA's aircraft registry counts was created: light sport aircraft. At the end of 2006, a total of 1,273 aircraft were estimated to be in this category. The forecast assumes registration of 5,600 aircraft over a five-year period beginning in 2005. By 2025, a total of 14,700 light sport aircraft are projected to be in the fleet.

The number of general aviation hours flown is projected to increase by 3.0 percent yearly over the forecast period. Much of this reflects increased flying by business and corporate aircraft as well as a relatively small annual percentage increase in utilization rates for piston aircraft. Hours flown by turbine aircraft are forecast to increase 5.3 percent yearly over the forecast period, compared with 1.1 percent for piston-powered aircraft. Jet aircraft are forecast to account for most of the increase, with hours flown expanding at an average annual rate of 7.7 percent over the forecast period. The large increases in jet hours result mainly from the introduction of VLJs, as well as increases in the fractional ownership fleet and its activity levels.

SOCIOECONOMIC CHARACTERISTICS

For airport demand forecasting, socioeconomic characteristics are collected and examined to derive an understanding of the dynamics of growth within the study area. This information is essential in determining aviation service level requirements, as well as forecasting the number of based aircraft and aircraft activity at the airport. Aviation forecasts are typically related to the population base, economic strength of the region, and the ability of the region to sustain a strong economic base over an extended period of time.

POPULATION

The size and structure of the local communities and the service area that the airport supports are important factors to consider when planning airport facilities. These factors provide an understanding of the economic base that is needed to determine future airport requirements. Historical population totals, which were obtained from the U.S. Census Bureau, are presented in **Table A**.

TABLE A
Historical Population

Area	1998	2000	2008*	Average Annual Growth Rate (1998-2008)
City of Livermore	69,700	73,300	83,600	1.8%
Alameda County	1,409,200	1,443,700	1,543,000	0.9%
State of California	33,006,000	33,872,000	38,049,000	1.4%

Source: U.S. Census Bureau.
*Estimated on 1/1/2008 by the California Department of Finance.

According to the California Department of Finance, the state's current population for 2008 is estimated at 38 million. This is an increase of more than 5 million residents since 1998, which represents an average annual increase of 1.4 percent.

During this same time, Alameda County experienced a 0.9 percent annual increase in population, gaining nearly 134,000 residents. Alameda County's 825 square miles are located within one of the state's busiest urban centers, the San Francisco Bay Area. According to the California Department of Finance, the current estimated population of more than 1.5 million ranks Alameda as the seventh most populous county in California.

The City of Livermore's current population is estimated at 83,600, which is nearly 14,000 more residents than ten years ago. This represents an average annual growth rate of 1.8 percent, which is higher than both the county and the state over this same time.

Forecast population projections are presented in **Table B**. These projections were prepared by the California Department of Finance in July 2007. As shown in the table, the department projects the state's population to reach more than 49.2 million by 2030, which is an annual growth rate of 1.2 percent. Population in Alameda County is expected to grow at nearly half that rate (0.7 percent) during the same time, totaling more than 1.7 million residents by 2030.

TABLE B
Forecast Population

Area	2013	2018	2030	Average Annual Growth Rate (2008-2030)
Alameda County	1,583,000	1,640,200	1,791,700	0.7%
State of California	40,574,000	43,087,000	49,241,000	1.2%

Source: California Department of Finance (July 2007).

EMPLOYMENT

Analysis of a community's employment base can provide valuable insight to the overall well-being of the community. In most cases, the community make-up and health is significantly impacted by the availability of jobs, variety of employment opportunities, and types of wages provided by local employers. Civilian labor force data, which was obtained from the California Employment Development Department (EDD), is presented in **Table C**.

TABLE C
Civilian Labor Force Data

	1990	2000	2008*
Alameda County			
Civilian Labor Force	677,600	768,700	765,100
Employment	650,100	741,000	713,800
Unemployment	27,500	27,700	51,300
Unemployment Rate	4.1%	3.6%	6.7%
State of California			
Civilian Labor Force	15,168,500	16,857,500	18,555,800
Employment	14,294,100	16,024,300	17,146,800
Unemployment	874,400	833,200	1,409,000
Unemployment Rate	5.8%	4.9%	7.6%
United States			
Civilian Labor Force	125,840,000	142,583,000	156,300,000
Employment	118,793,000	136,891,000	146,867,000
Unemployment	7,047,000	5,692,000	9,433,000
Unemployment Rate	5.6%	4.0%	6.0%

Source: California Employment Development Department (EDD), data is not seasonally adjusted).
*As of July 31, 2008.

As shown in the table, Alameda County has a current unemployment rate of 6.7 percent, which is nearly double the unemployment rate in 2000. The State of California has an even higher unemployment rate of 7.6 percent, which is an increase from the 4.9 percent rate the state experienced in 2000. Meanwhile, the United States' current unemployment rate (6.0 percent) has also risen since 2000, but remains lower than that of both the state and the county.

Table D presents the major employers in Alameda County, several of which utilize Livermore Municipal Airport. The principal sectors that are producing jobs in the county are the healthcare industry (hospitals, physicians/surgeons, and pharmaceutical companies), education/universities, and law enforcement.

According to the *Association of Bay Area Governments*, the momentum for employment growth in Alameda County is expected to increase over the next few years in the services sector, namely healthcare services, which support the aging population. Most of the job growth in Livermore will be in the healthcare, education, and financial/professional services sectors.

TABLE D
Major Employers
Alameda County

Employer Name	City	Industry
Alameda County Law Enforcement	Oakland	Law Enforcement
Alameda County Sheriff Department	Pleasanton	Law Enforcement
Alta Bates Medical Center	Berkeley	Hospitals
Alta Bates Summit Medical Center	Oakland	Hospitals
Bay Area Rapid Transit	Oakland	Transportation
Bayer Corp.	Berkeley	Drug Manufacturers
Brita Water Co.	Oakland	Bottled Water
California State University	Hayward	Universities/Education
Clorox Technical Center	Pleasanton	Commercial Physical Research
East Bay Water	Oakland	Utilities - Water & Sewage
Kaiser Foundation Hospital	Oakland	Hospitals
Kaiser Permanente Hospital	Hayward	Hospitals
Lawrence Berkeley National Lab	Berkeley	Physicians/Surgeons
Lawrence Livermore National Lab	Livermore	Laboratories – Testing
New United Motor Manufacturing	Fremont	Automobile Parts & Supplies
Novartis	Emeryville	Pharmaceutical Preparation
Novartis Vaccines & Diagnostics	Emeryville	Biological Products
Permanente Medical Group	Hayward	Physicians/Surgeons
Residential & Student Services Program	Berkeley	Universities/Education
Sandia National Laboratories	Livermore	Laboratories – Research & Dev.
Sheriff's Office Law Enforcement	Oakland	Law Enforcement
Transportation Department – California	Oakland	State Government
UC Berkeley Extension	Berkeley	Universities/Education
Washington Hospital Healthcare	Fremont	Hospitals
Western Digital	Fremont	Telecommunications Services

Source: California Employment Development Department (EDD).

FORECASTING APPROACH

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

Trend line/time-series projections are probably the simplest and most familiar of the forecasting techniques. By fitting growth curves to historical data and then extending them into the future, a basic trend line projection is produced. A general 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 direct relationship between two separate sets of historic data. Should there be a reasonable correlation between the data sets, further evaluation using regression analysis may be employed.

Regression analysis measures statistical relationships between dependent and independent variables, yielding a "correlation coefficient." The correlation coefficient (Pearson's "r") measures association between the changes in the dependent variable and the independent variable(s). If the "r^2" value (coefficient determination) is greater than 0.95, it indicates good predictive reliability. A value less than 0.95 may be used, but with the understanding that the predictive reliability is lower.

Market share analysis involves a historical review of the 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.

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

AIRPORT ROLE

Livermore Municipal Airport is classified in the National Plan of Integrated Airport Systems (NPIAS), as well as by the California Department of Transportation (Caltrans), as a reliever airport. Livermore Municipal Airport is one of three public-use airports in Alameda County and is the principal airport serving the Tri-Valley Region.

The Tri-Valley Region is comprised of three adjacent valleys – Amador, Livermore, and San Ramon. The valleys are located on the eastern side of the San Francisco Bay Hills and are home to the cities of Pleasanton, Livermore, Dublin, San Ramon, and the town of Danville.

Eleven public-use airports are located within a 30 nautical mile (nm) radius of Livermore Municipal Airport. Of the 11 airports within the 30 nm radius of Livermore Municipal Airport, four have longer runways. The closest public-use airport is Byron Airport, which is located approximately 12 nm northeast of Livermore Municipal Airport.

Several factors affect the decision to base at a given airport, including availability of hangars (and rates), services offered (including fuel), access to major highways, and instrument capabilities. Services provided at

many of the nearby airports include aircraft maintenance, aircraft rental/sales, flight training, aerial tours, fuel, pilot supplies, aircraft hangars, tie downs, courtesy transportation, and catering.

AVIATION ACTIVITY FORECASTS

The following forecast analysis examines each of the aviation demand categories expected at Livermore Municipal Airport. Each segment will be examined individually, and then collectively, to provide an understanding of the overall aviation activity at the airport through 2030.

The need for airport facilities at Livermore can best be determined by accounting for forecasts of future aviation demand. Therefore, the remainder of this chapter presents the forecasts for airport users and includes the following:

- GENERAL AVIATION
  - Based Aircraft
  - Based Aircraft Fleet Mix
  - Local and Itinerant Operations*
  - Peak Activity

* Includes air taxi and military categories

GENERAL AVIATION

General aviation encompasses all portions of civil aviation except commercial operations. To determine the types and sizes of facilities that should be planned to accommodate general aviation activity, certain elements of this activity must be forecast. These indicators of general aviation demand include based aircraft, aircraft fleet mix, and annual operations.

The number of based aircraft is the most basic indicator of general aviation demand. By first developing a forecast of based aircraft, the growth of other general aviation activities and demands can be projected. Aircraft basing at an airport are somewhat dependent upon the nature and magnitude of aircraft ownership in the local service area. As a result, aircraft registrations in the area were reviewed and forecast first.

Registered Aircraft Forecasts

Table E presents historical registered aircraft data for Alameda County since 1998. Historical data was obtained from *Aviation Goldmine CD* (1998-2000) and *Avantex Aircraft & Airmen CD* (2001-2007). The current number of registered aircraft for 2008 was obtained from the FAA.

Over the past ten years, the county's registered aircraft experienced an average annual growth rate of 1.1 percent, adding 151 additional aircraft. This is slightly lower than the national average of 1.6 percent annual growth rate for U.S. active general aviation aircraft during the same time. National growth coincides not only with the improved general economic conditions of the period, but also the *General Aviation Revitalization Act*, which was approved by Congress in 1994 and sparked new aircraft manufacturing.

TABLE E
Historical Registered Aircraft
Alameda County

Year	Alameda Co. Registered Aircraft	Annual Growth Rate
1998	1,249	-
1999	1,229	-1.6%
2000	1,315	7.0%
2001	1,375	4.6%
2002	1,376	0.1%
2003	1,395	1.4%
2004	1,382	-0.9%
2005	1,396	1.0%
2006	1,404	0.6%
2007	1,390	-1.0%
2008	1,400	0.7%

Source: Historical Registered Aircraft – Aviation Goldmine CD (1998-2000), Avantex Aircraft & Airmen CD (2001-2007), FAA (2008).

There are no recently prepared forecasts of registered aircraft to examine and compare. As a result, several projections of county registrations were developed. First, a time-series analysis of registered aircraft in Alameda County was prepared based upon the historic data gathered between 1998 and 2008. A regression analysis, which compared registered aircraft in Alameda County to the population, was also examined. However, because of the fluctuation in registered aircraft during this period, these analyses both yielded an r^2 value of 0.68. As previously mentioned, an r^2 less than 0.95 does not indicate good predictive reliability. Therefore, other methods were used to project registered aircraft.

One of these methods used to project registered aircraft in Alameda County considered the county's market share of U.S. active general aviation aircraft. This market share analysis compared the county's aircraft ownership trends versus national aircraft ownership trends. Over the past ten years, the county's market share fluctuated between a low of 0.56 percent in 1999 to a high of 0.67 percent in 2003. But overall, the market share has remained at 0.61 percent since 1998.

Based on this historical data, two market share forecasts were then developed. First, a projection maintaining the 2008 market share constant through the planning period was developed and results in 1,873 registered aircraft by 2030. Second, a projection continuing with an increasing market share was developed to represent the overall trend since 1999 and yields 1,984 registered aircraft by 2030. These two market share forecasts are presented in **Table F**.

TABLE F
Registered Aircraft Market Share of U.S. Active General Aviation (GA) Aircraft
Alameda County

Year	Alameda County Registered Aircraft	U.S. Active GA Aircraft	Alameda County Market Share
1998	1,249	204,711	0.61%
1999	1,229	219,464	0.56%
2000	1,315	217,533	0.60%
2001	1,375	211,446	0.65%
2002	1,376	211,244	0.65%
2003	1,395	209,606	0.67%
2004	1,382	219,319	0.63%
2005	1,396	224,262	0.62%
2006	1,404	221,942	0.63%
2007	1,390	225,007	0.62%
2008	1,400	228,155	0.61%
Constant Market Share			
2013	1,504	245,090	0.61%
2018	1,611	262,460	0.61%
2030	1,873	305,200[1]	0.61%
Increasing Market Share			
2013	1,520	245,090	0.62%
2018	1,653	262,460	0.63%
2030	1,984	305,200[1]	0.65%

Source: Historical Registered Aircraft – Aviation Goldmine CD (1998-2000), Avantex Aircraft & Airmen CD (2001-2007), FAA (2008); Historical & Forecast U.S. Active GA Aircraft – FAA Aerospace Forecasts, Fiscal Years 2008-2025.
[1]Extrapolated

A forecast comparing the number of registered aircraft in Alameda County to the population was also developed. This forecast examined the historical registered aircraft as a ratio of 1,000 residents in the county. As shown in **Table G**, the California Department of Finance estimated the 2008 population for the county at 1,543,000 on January 1st. This equates to 0.91 registered aircraft per 1,000 residents. Overall, this ratio has risen slightly since 1998. Two projections were developed based on this data.

The first projection maintains a constant ratio projection and yields 1,626 registered aircraft by 2030. Next, an increasing ratio projection was developed to represent the historical trend and yields 1,702 registered aircraft by 2030. These two projections are presented in **Table G**.

TABLE G
Registered Aircraft Per 1,000 Residents
Alameda County

Year	Alameda County Registered Aircraft	Alameda County Population	Registered Aircraft Per 1,000 Residents
1998	1,249	1,409,200	0.89
1999	1,229	1,426,300	0.86
2000	1,315	1,443,700	0.91
2001	1,375	1,445,800	0.95
2002	1,376	1,467,900	0.94
2003	1,395	1,480,200	0.94
2004	1,382	1,492,500	0.93
2005	1,396	1,505,000	0.93
2006	1,404	1,517,600	0.93
2007	1,390	1,530,200	0.91
2008	1,400	1,543,000	0.91
Constant Market Share			
2013	1,437	1,583,300[1]	0.91
2018	1,488	1,640,200[1]	0.91
2030	1,626	1,791,700	0.91
Increasing Market Share			
2013	1,457	1,583,300[1]	0.92
2018	1,525	1,640,200[1]	0.93
2030	1,702	1,791,700	0.95

Source: Historical Registered Aircraft – Aviation Goldmine CD (1998-2000), Avantex Aircraft & Airmen CD (2001-2007), FAA (2008); Historical Population – U.S. Census Bureau; Forecast Population – California Department of Finance (1/1/2008).
[1]Interpolated

Another forecast method examined the historical growth rate of registered aircraft in Alameda County. As previously mentioned, registered aircraft grew at an average annual rate of 1.1 percent between 1998 and 2008. This growth rate was applied to the forecast years and yields 1,781 registered aircraft by the year 2030.

Table H and **Exhibit B** summarize the registered aircraft forecasts for Alameda County. For planning purposes, an average of each of the newly created forecasts has been selected as the planning forecast. This forecast results in 1,480 registered aircraft by 2013, 1,570 registered aircraft by 2018, and 1,790 registered aircraft by 2030. This represents an average annual growth rate of 1.1 percent, which is consistent with the county's historical trend over the past ten years.

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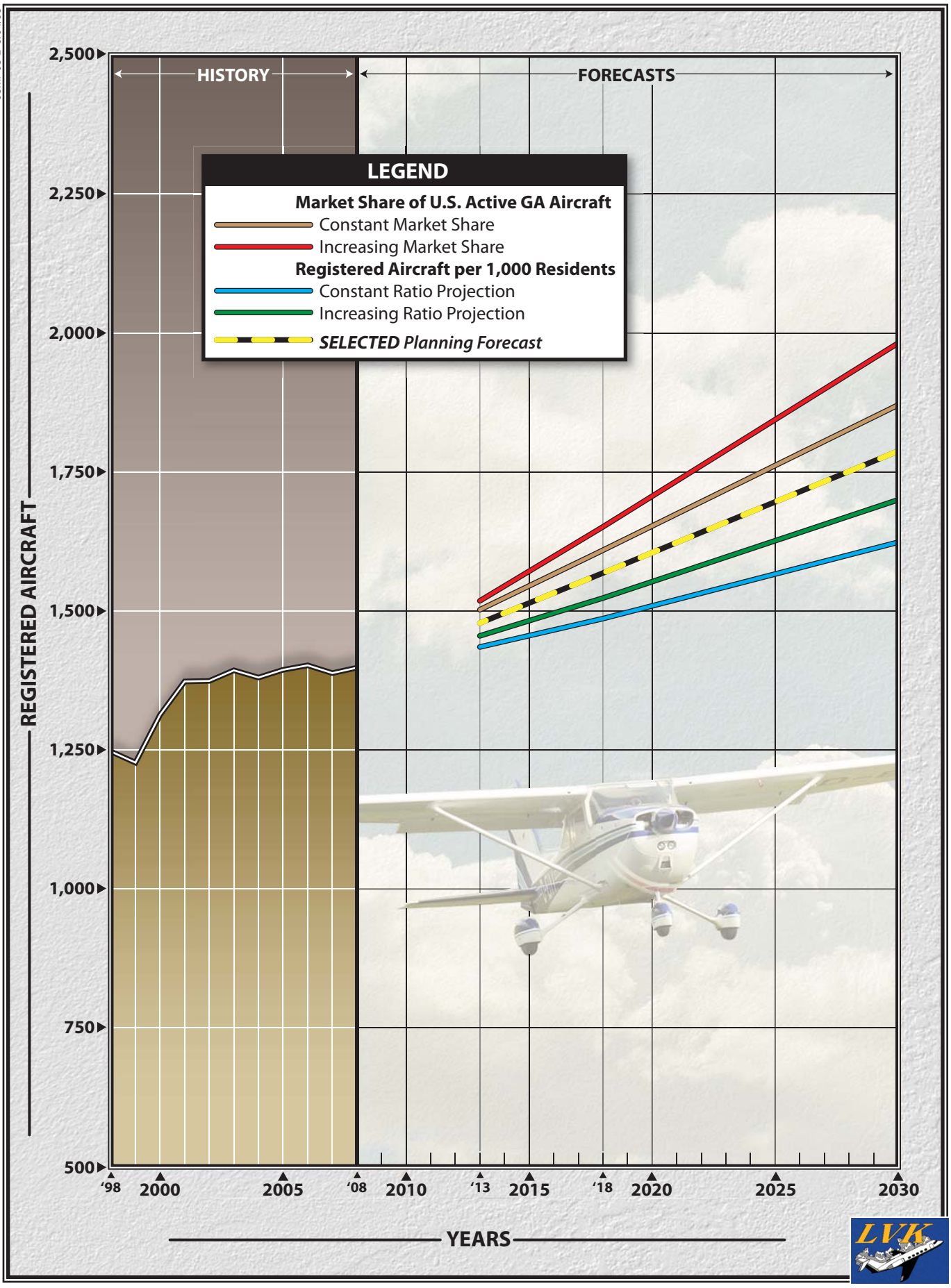

Exhibit B
ALAMEDA COUNTY REGISTERED
AIRCRAFT FORECAST SUMMARY

TABLE H
Registered Aircraft Forecast Summary
Alameda County

	2008	2013	2018	2030
Market Share of U.S. Active GA Aircraft				
Constant Market Share		1,504	1,611	1,873
Increasing Market Share		1,520	1,653	1,984
Registered Aircraft Per 1,000 Residents				
Constant Ratio Projection		1,437	1,488	1,626
Increasing Ratio Projection		1,457	1,525	1,702
1.1% Historical Growth Rate (1998-2008)		1,479	1,562	1,781
Selected Planning Forecast	**1,400**	**1,480**	**1,570**	**1,790**

Based Aircraft Forecasts

Having forecast the registered aircraft in Alameda County, based aircraft at Livermore Municipal Airport was examined. As previously mentioned, the number of based aircraft is the most basic indicator of general aviation demand at an airport. By first developing a forecast of based aircraft, the growth of aviation activities at the airport can be projected.

Table J presents the historical based aircraft at Livermore Municipal Airport over the past ten years, which was obtained from airport records. As shown in the table, there are currently 600 based aircraft at the airport. While the number of based aircraft has fluctuated in the past, this is an overall increase of 33 based aircraft since 1998, which represents an average annual growth rate of 0.6 percent over the ten year period.

TABLE J
Historical Based Aircraft
Livermore Municipal Airport

Year	Based Aircraft	Annual Growth Rate
1998	567	-
1999	560	-1.2%
2000	593	5.9%
2001	610	2.9%
2002	595	-2.5%
2003	599	0.7%
2004	596	-0.5%
2005	649	8.9%
2006	646	-0.5%
2007	642	-0.6%
2008	600	-6.5%

Source: Airport Records

Because of the fluctuations in based aircraft over the past ten years, time-series and regression analyses could not be performed, as they would not provide reliable projections. Instead, other methods have been utilized to project based aircraft.

The first method used to develop forecasts of based aircraft examined the airport's market share of registered aircraft in Alameda County, which is presented in **Table K**. The current 600 based aircraft at Livermore Municipal Airport represents 43 percent of the total aircraft registered in Alameda County. As shown in the table, the airport's market share has remained fairly consistent over the past ten years, fluctuating by only a few percentages. Therefore, a constant market share forecast was prepared and assumes the airport's market share will remain at 43 percent through the planning period, which yields 767 based aircraft by 2030.

TABLE K
Based Aircraft Market Share of Registered Aircraft (Alameda County)
Livermore Municipal Airport

Year	Livermore Based Aircraft	Alameda County Registered Aircraft	Based Aircraft Market Share
1998	567	1,249	45%
1999	560	1,229	46%
2000	593	1,315	45%
2001	610	1,375	44%
2002	595	1,376	43%
2003	599	1,395	43%
2004	596	1,382	43%
2005	649	1,396	46%
2006	646	1,404	46%
2007	642	1,390	46%
2008	600	1,400	43%
Constant Market Share			
2013	634	1,480	43%
2018	673	1,570	43%
2030	767	1,790	43%

Source: Historical Based Aircraft – Airport Records; Historical Registered Aircraft – Aviation Goldmine CD (1998-2000), Avantex Aircraft & Airmen CD (2001-2007), FAA (2008).

The population of Alameda County has also been used as a comparison with based aircraft. This forecast examined the airport's historical based aircraft as a ratio of 1,000 residents in the county and is presented in **Table L**. According to the California Department of Finance, the county's estimated population for 2008 is 1,543,000, which equates to 0.39 based aircraft per 1,000 residents. As shown in the table, this ratio has remained fairly consistent over the past ten years, varying only slightly. Therefore, a constant ratio projection was developed and yields 697 based aircraft by 2030.

TABLE L
Based Aircraft Per 1,000 Residents (Alameda County)
Livermore Municipal Airport

Year	Livermore Based Aircraft	Alameda County Population	Based Aircraft Per 1,000 Residents
1998	567	1,409,200	0.40
1999	560	1,426,300	0.39
2000	593	1,443,700	0.41
2001	610	1,445,800	0.42
2002	595	1,467,900	0.41
2003	599	1,480,200	0.40
2004	596	1,492,500	0.40
2005	649	1,505,500	0.43
2006	646	1,517,600	0.43
2007	642	1,530,200	0.42
2008	600	1,543,000	0.39
Constant Market Share			
2013	616	1,583,300[1]	0.39
2018	638	1,640,200[1]	0.39
2030	697	1,791,700	0.39

Source: Historical Based Aircraft – Airport Records; Historical Population – U.S. Census Bureau; Forecast Population – California Department of Finance (1/1/2008).
[1]Interpolated

Projections included in the FAA *Terminal Area Forecasts* (TAF), which was issued in December 2007, were also examined. The 2007 FAA TAF used a base year of 2006, with an estimated 604 based aircraft at Livermore Municipal Airport. The FAA projects 782 based aircraft at the airport by 2025 (although no justification is provided).

A summary of the based aircraft forecasts is presented in **Table M** and **Exhibit C**. The selected planning forecast is an average of the newly created forecasts developed by Coffman Associates and yields 620 based aircraft by 2013, 650 based aircraft by 2018, and 720 based aircraft by 2030. This represents an average annual growth rate of 0.8 percent, which is fairly consistent with the historical trend at the airport.

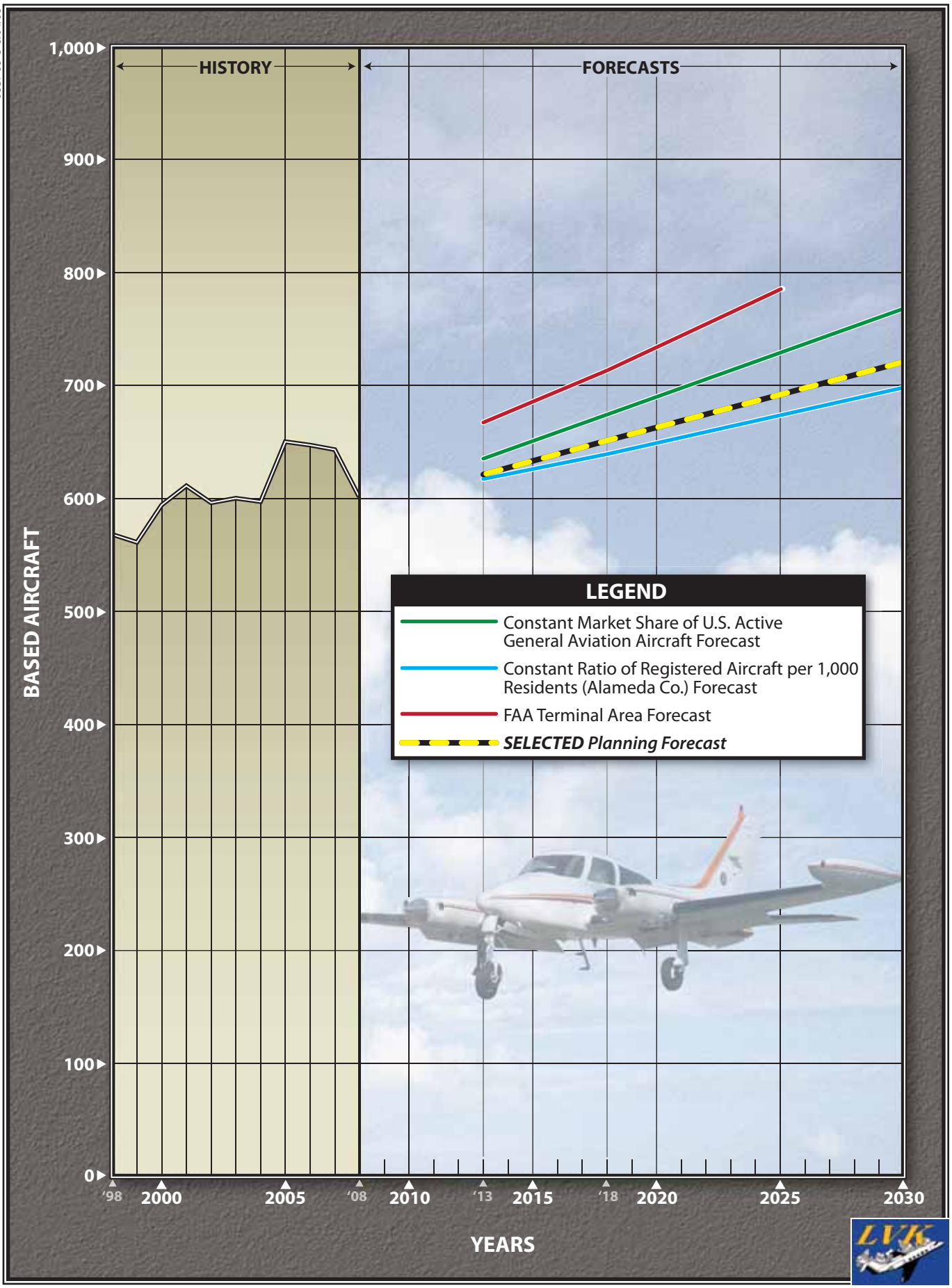

Exhibit C
BASED AIRCRAFT
FORECAST SUMMARY

TABLE M
Based Aircraft Forecast Summary
Livermore Municipal Airport

	2008	2013	2018	2030
Market Share of Registered Aircraft (Alameda Co.)				
Constant Market Share Projection		634	673	767
Based Aircraft Per 1,000 Residents (Alameda Co.)				
Constant Ratio Projection		616	638	697
2007 FAA *Terminal Area Forecast*		666	712	N/A
Selected Planning Forecast	**600**	**620**	**650**	**720**

Based Aircraft Fleet Mix

According to airport records, the fleet mix consists of the following: 552 single engine aircraft, 39 multi-engine aircraft, six jets, and three helicopters. While the number of general aviation aircraft basing at Livermore Municipal Airport is projected to increase, it is important to know the fleet mix of the aircraft expected to use the airport. This will ensure the placement of proper facilities in the future.

The national trend in general aviation is toward a greater percentage of larger, more sophisticated aircraft as part of the national fleet. While an increase in single engine aircraft can be expected, their percentage of the total fleet mix will likely decrease. Meanwhile, the percentage of multi-engine and jet aircraft is projected to increase slightly by the end of the planning period. Only a slight increase in the number of helicopters is projected at Livermore Municipal Airport. The fleet mix projections are shown in **Table N**.

TABLE N
Based Aircraft Fleet Mix
Livermore Municipal Airport

Year	Total	Single Engine	Multi-Engine	Jets	Helicopters
2008	600	552	39	6	3
Percentage Share					
2008	100.0%	92.0%	6.5%	1.0%	0.5%
FORECAST					
2013	620	564	43	9	4
2018	650	579	53	13	5
2030	720	620	73	20	7
Change	+120	+68	+34	+14	+4
Percentage Share					
2013	100.0%	91.0%	7.0%	1.4%	0.6%
2018	100.0%	89.0%	8.2%	2.0%	0.8%
2030	100.0%	86.0%	10.2%	2.8%	1.0%

Source: Historical Based Aircraft – Airport Records.

GENERAL AVIATION OPERATIONS

General aviation operations are classified by the airport traffic control tower (ATCT) as either local or itinerant. A local operation is a take-off or landing performed by an aircraft that operates within sight of the airport, or which executes simulated approaches or touch-and-go operations at the airport. Itinerant operations are those performed by aircraft with a specific origin or destination away from the airport. Generally, local operations are characterized by training operations. Typically, itinerant operations increase with business and commercial use, since business aircraft are not typically used for large scale training activities.

Table P summarizes historical general aviation operations at Livermore Municipal Airport since 1997. This data was obtained from tower records. As shown in the table, general aviation operations at Livermore Municipal Airport have fluctuated from a high of 251,625 in 1999 to a low of 168,719 in 2005. Overall, the airport has experienced a negative growth rate of 2.6 percent over the past ten years. However, a turnaround took place in 2006 and 2007, when general aviation operations increased by 2.7 percent and 3.6 percent respectively.

TABLE P
Historical General Aviation Operations
Livermore Municipal Airport

Year	Itinerant	Local	Total	% Change
1997	87,396	146,422	233,818	N/A
1998	90,251	146,082	236,333	1.1%
1999	92,378	159,247	251,625	6.5%
2000	87,062	147,136	234,198	-6.9%
2001	86,690	129,131	215,821	-7.8%
2002	90,641	131,164	221,805	2.8%
2003	80,070	109,815	189,885	-14.4%
2004	81,380	117,990	199,370	5.0%
2005	74,423	94,296	168,719	-15.4%
2006	72,567	100,695	173,262	2.7%
2007	74,480	104,977	179,457	3.6%

Source: Airport Records.

Forecasts of annual general aviation operations were developed by examining the number of operations per based aircraft. The base number of 179,457 general aviation operations equates to 300 operations per based aircraft, which is consistent with airports of this size. Holding this ratio constant through the planning period yields 216,000 annual general aviation operations by 2030, which equates to an average annual growth rate of 0.8 percent.

Projections included in the *FAA Terminal Area Forecast* (TAF), which was

issued in December 2007, were also examined. The 2007 FAA TAF used a base year of 2006, with an estimated 171,266 annual general aviation operations at Livermore Municipal Airport. The FAA TAF projects 193,500 annual general aviation operations by 2013 and 207,000 annual general aviation operations by 2018. FAA TAF forecasts were not provided past 2025.

A summary of the general aviation operations forecasts is presented in **Table Q** and **Exhibit D**. The operations per based aircraft was chosen as the selected planning forecast and represents a 0.8 percent average annual growth rate throughout the planning period. Historically, itinerant operations were estimated to account for approximately 40 percent of total general aviation operations, while local operations were estimated to account for approximately 60 percent. It is expected these percentages will remain the same throughout the planning period.

TABLE Q
General Aviation Operations Forecast Summary
Livermore Municipal Airport

	2007	2013	2018	2030
2007 FAA *Terminal Area Forecast*		193,500	207,000	N/A
Constant Ratio of Operations Per Based Aircraft Projection[1]	**179,475**	**186,000**	**195,000**	**216,000**

[1]Selected Planning Forecast.

Peaking Characteristics

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

- **Peak Month –** The calendar month when peak activity occurs.
- **Design Day –** The average day in the peak month. This indicator is derived by dividing the peak month activity by the number of days in the month.
- **Busy Day –** The busy day of a typical week in the peak month.
- **Design Hour –** The peak hour within the design day.

It is important to realize that only the peak month is an absolute peak within the year. Each of the other periods will be exceeded at various times during the year. However, each provides reasonable planning standards that can be applied without overbuilding or being too restrictive.

Typically, the peak month for general aviation operations represents between 10 and 12 percent of the airport's annual operations. Review of historical data at Livermore Municipal Airport determined the peak months to represent 10 percent of annual op-

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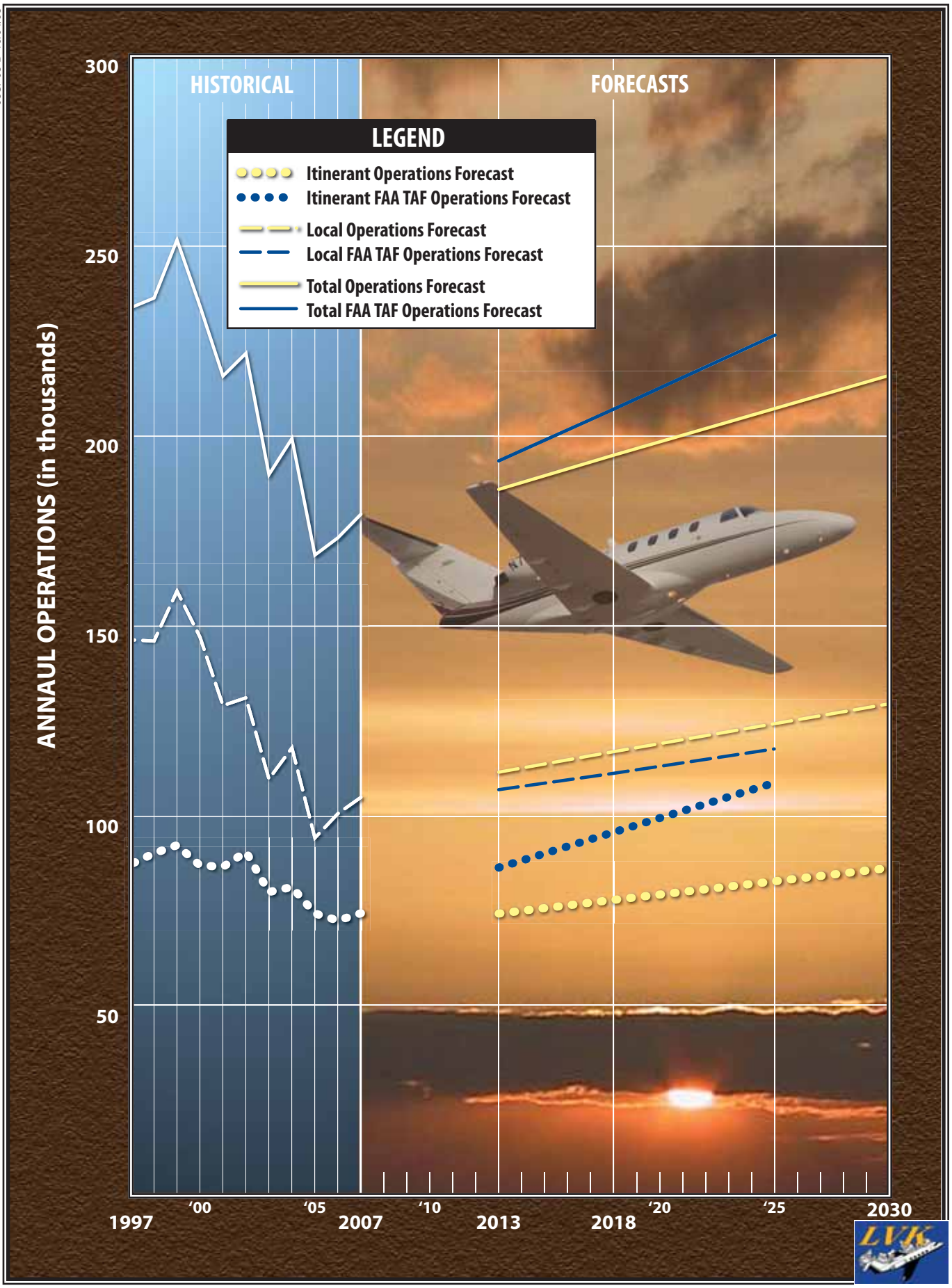


Exhibit D
GENERAL AVIATION
OPERATIONS FORECAST

erations. This equates to 17,946 operations for the peak month of the base year. Forecasts of peak month activity have been developed by applying this percentage to the forecasts of annual operations.

Design day operations were calculated by dividing the total number of operations in the peak month by the number of days in the month. The design hour is projected as 15 percent of the design day operations. Busy day operations were calculated as 1.25 times the design day activity. **Table R** summarizes the general aviation peak activity forecasts for Livermore Municipal Airport.

TABLE R
General Aviation Peak Period Forecasts
Livermore Municipal Airport

	Base Year	FORECASTS		
	2007	**2013**	**2018**	**2030**
Annual	179,457	186,000	195,000	216,000
Peak Month (10.0%)	17,946	18,600	19,500	21,600
Design Day	598	620	650	720
Busy Day	748	775	813	900
Design Hour (15%)	90	93	98	108

AIR TAXI OPERATIONS

Air taxi operations are those conducted by commuter airlines and general aviation aircraft filing flight plans under C.F.R. Part 135. **Table S** presents historical air taxi operations at Livermore Municipal Airport over the past ten years. As shown in the table, air taxi operations at the airport have fluctuated from a high of 2,553 in 1998 to a low of 281 in 2000, averaging 1,500 annual operations during the past ten years. This average was used as a base number for projecting future air taxi operations. Based upon the FAA's projected growth in this category, annual air taxi operations at Livermore Municipal Airport are estimated to grow by 100 operations per year, resulting in 3,800 annual air taxi operations by 2030.

TABLE S
Air Taxi Operations Forecasts
Livermore Municipal Airport

Year	Air Taxi Operations
1997	2,400
1998	2,553
1999	1,200
2000	281
2001	816
2002	1,466
2003	1,618
2004	1,750
2005	1,554
2006	1,584
2007	1,612
Avg.	*1,500*
FORECASTS	
2013	2,100
2018	2,600
2030	3,800

Source: Airport Records.

MILITARY

Military activity accounts for a small portion of the operational traffic at Livermore Municipal Airport. **Table T** presents the history of military operations since 1997. Similar to air taxi operations, military operations at the airport have fluctuated over the past ten years. Because of this, military operations were also forecast as a constant for the planning period. This constant is an average of the activity experienced over the past ten years and yields 300 annual military operations through the planning period.

TABLE T
Military Operations Forecasts
Livermore Municipal Airport

Year	Itinerant	Local	Total
1997	72	52	124
1998	125	6	131
1999	186	36	222
2000	136	6	142
2001	150	50	200
2002	178	4	182
2003	439	10	449
2004	559	206	765
2005	186	24	210
2006	78	2	80
2007	325	330	173
Avg.	*230*	*70*	*300*
FORECASTS			
2008	230	70	300
2013	230	70	300
2030	230	70	300

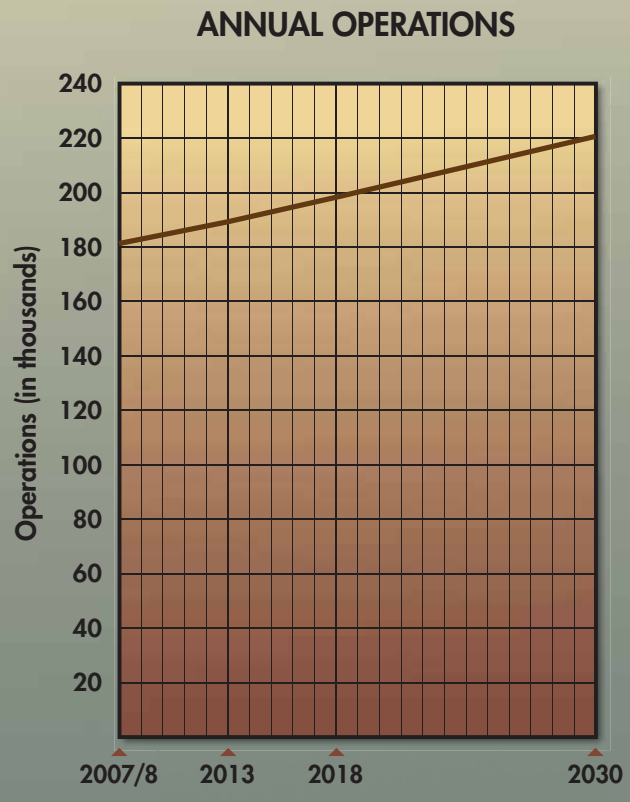
Source: Airport Records.

SUMMARY

This chapter has provided forecasts for each sector of aviation demand anticipated over the planning period. **Exhibit E** presents a summary of the unconstrained aviation forecasts developed for Livermore Municipal Airport. The next step in the study assesses the constraints that may impact growth potential. This is considered a preliminary draft until submitted and approved by the FAA. Once approved by the FAA, a detailed operational fleet mix will be developed for subsequent noise analysis.

08SP05-E-9/10/08

	BASE YEAR	FORECASTS		
	2007/2008	2013	2018	2030
OPERATIONS				
Itinerant				
General Aviation	74,480	74,400	78,000	86,400
Air Taxi	1,500	2,100	2,600	3,800
Military	230	230	230	230
Total Itinerant	**76,210**	**76,730**	**80,830**	**90,430**
Local				
General Aviation	104,977	111,600	117,000	129,600
Military	70	70	70	70
Total Local	**105,047**	**111,670**	**117,070**	**129,670**
Total Operations	**181,257**	**188,400**	**197,900**	**220,100**
BASED AIRCRAFT				
Single-Engine	552	564	579	620
Multi-Engine	39	43	53	73
Jets	6	9	13	20
Helicopters	3	4	5	7
Total Based Aircraft	**600**	**620**	**650**	**720**



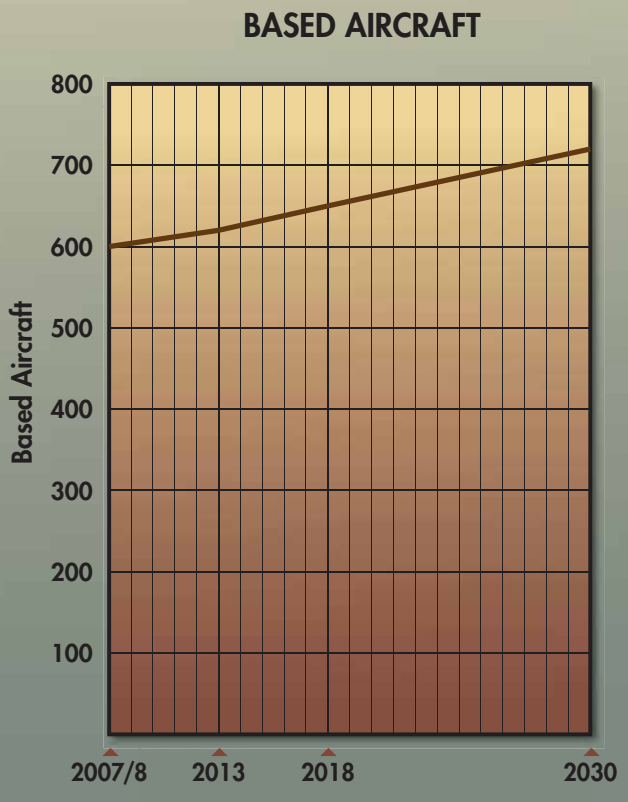


Exhibit E
FORECAST SUMMARY