Chapter 4
Forecasts of Aviation Demand

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PURPOSE AND SCOPE

Planning for the physical development of an airport necessitates the preparation of a well-documented forecast of aviation activity to be accommodated at the subject facility. Once the forecasting tasks of the planning process have been completed, the airport planner can then translate the projected activity levels into required facilities. The forecast then serves as a basis for determining the phased development of the facility components for the short (1 to 5 years), intermediate (6 to 10 years) and long-range (11 to 21 years) planning periods. The forecast developed for this study covers a 21-year period, with the final year of the forecast period being calendar year 2030.

This chapter presents the forecasts of general aviation activity for Whiteman Airport. General aviation (GA) is defined as all civil flying not classified as air carrier and includes a variety of activity such as personal flying, transport by corporate-owned aircraft, air taxi, law enforcement, an ambulance, and agricultural application. The GA forecast will present the basic forecast values of based aircraft and annual operations. These, plus other measures of activity developed from them, will represent the future traffic levels that must be accommodated at the airport, and for which facilities must be provided.

It is important to note that the forecasts of based aircraft represent unconstrained potential or "market-driven" demand, without consideration of the physical, safety, noise, regulatory, institutional, or political constraints that may preclude development of facilities to fully serve the demand.

The scope of the analyses included projections of:

- Total based general aviation aircraft
- The fleet mix of based aircraft (single engine piston, multi-engine piston, turboprop, business jet, and rotorcraft)
- Total annual aircraft operations, by type of aircraft (single engine piston, multi-engine piston, etc.), by type of operation (local versus itinerant), and by peak hour
- Projected annual fuel flowage

The latest FAA Terminal Area Forecast (TAF) was used as the basis for the forecasts presented herein as defined during the scoping of the project approach and it was deemed to be an efficient means to develop the forecast. The 2007 TAF Model was used, and includes actual data from 2006. The TAF provides forecasts from 2007 to 2025.

It is important to note that due to the uncertainties in the long-range aviation outlook, long-term forecasting is approximate in nature. However, an indication of trends is important since estimates can be made of facility costs, social costs and environmental impacts which an airport creates on the surrounding area. Thus, the purpose of the forecasting effort is to identify activity levels which then serve as planning tools.

SUMMARY OF FINDINGS

Assuming there are no physical, safety, regulatory, institutional, or political constraints which might preclude the development of facilities to fully serve potential demand, the number of general aviation aircraft based at Whiteman is expected to reach 874 by 2030, an increase of 262 aircraft (43 percent) over current (2008) levels. While this is a significant increase in based aircraft, it is important to note that facilities for approximately an additional 100 based aircraft will be available by the end of 2009.

- Aircraft operations are projected to increase from 93,200 in 2008 to 143,500 operations in 2030.
- Sales of 100 octane fuel are expected to increase from 245,931 gallons in 2007 to 372,600 gallons by 2030. Jet fuel sales are projected to total increase from 109,673 gallons in 2007 to 221,000 gallons by 2030.

PREVIOUS MASTER PLAN FORECAST

For background purposes this subsection presents the primary forecasts of the interest from the previous Master Plan that was completed in 1990. These are based aircraft and aircraft operations. It should be noted that the previous master plan covered a 20 year period ending in the year 2010.

Based Aircraft

The 1990 Master Plan forecast of based aircraft was developed using an econometric model in conjunction with the California Aviation System Plan (CASP). The forecast was unconstrained and based on a forecast of based aircraft for the market area identified for the airport (Los Angeles County). The forecast for the County was developed via the econometric model and was thus consistent with the CASP. The forecast of based aircraft for Whiteman resulted from the use of a CASP assignment model. This model estimated the airport which an aircraft owner chooses to base an aircraft considering such factors as accessibility, quality of services provided, price of services and aircraft performance characteristics.

The total number of based aircraft was then subdivided by aircraft type, giving consideration to historical based aircraft trends, aircraft types found in the airport's market area, plans of aircraft manufacturers, the airport's operational capability, and the availability and price of airport services. The forecast of based aircraft from the 1990 Master Plan is presented in Table 4-1.

Table 4-1:
FORECAST OF BASED AIRCRAFT
CONTAINED IN 1990 MASTER PLAN

Aircraft Type	1995	2000	2005	2010
Single Engine	699	775	837	870
Multi-Engine	37	40	42	44
Helicopter	14	15	16	16
Total	750	830	895	930

Source: Whiteman Airport Master Plan. Hodges & Shutt. 1990.

Aircraft Operations

Development of the forecast for aircraft operations in the 1990 Master Plan, shown in Table 4-2, was determined as a function of the based aircraft. Using data developed by the Southern California Association of Governments (SCAG) an average number of general aviation movements per based aircraft was determined. The FAA's Terminal Area Forecast was also considered but figures were lower than those developed from SCAG data because the CASP forecast of based aircraft was unconstrained and reflected the projected effects of surrounding airport short falls. The FAA forecast lagged the master plan forecast by about three years.

Table 4-2:
FORECAST OF AIRCRAFT OPERATIONS
CONTAINED IN 1990 MASTER PLAN

Aircraft Type	1995	2000	2005	2010
Single Engine	188,800	222,700	252,000	273,700
Multi-Engine	5,000	5,900	6,400	9,500
Helicopter	1,200	1,400	1,600	1,800
Total	195,000	230,000	260,000	285,000

Source: Whiteman Airport Master Plan. Hodges & Shutt. 1990

Forecasts developed for the 1990 Whiteman Airport Master Plan have not been attained due to a number of reasons. The general aviation industry experienced a major decline in the 1980s and early 1990s. This was due to a number of reasons including high interest rates, past recession, high product liability costs, loss of the GI Bill for flight training, and increasing aircraft operating costs. During the late 1990s the industry displayed growth in terms of new aircraft deliveries (including single engine piston aircraft). The active pilot population also increased in 1998 for the first time in the 1990s which was in sharp contrast to previous years. The downward trend had appeared to halt.

The turnaround in the general aviation industry that began with the passage of the General Aviation Revitalization Act in 1994 encountered setbacks in 2002. The tragic events of September 11th and their aftermath impacted the demand for general aviation products and services, both negatively, and in some cases positively. The continued weak U.S. economy, declining industry profits, and increased corporate accountability, may account for a large part of the declining demand for general aviation aircraft in 2002. General aviation activity at FAA air traffic facilities was, for the most part, flat in 2002, declining less than one percent.

Business and corporate aviation continues to be a bright spot for the general aviation industry. Increased growth in fractional ownership companies and corporate flying has continued to expand the market for jet aircraft, though at reduced annual numbers. Numerous trade journal articles suggest that the fallout from September 11th has spurred interest in fractional or corporate aircraft ownership provided new growth opportunities for the on-demand charter industry.

FORECAST OF BASED AIRCRAFT

A based aircraft is one that is permanently stationed at an airport, usually by some form of agreement between the aircraft owner and airport management. This forecast value is used in developing projections of aircraft activity, as well as determining facility requirements for airport elements such as aprons and hangars.

As previously mentioned, the latest Terminal Area Forecast (TAF) was used as the basis to forecast based aircraft. The TAF provides forecasts of based aircraft for each region for the years 2007 through 2025. Utilizing the current TAF forecast of based aircraft at Whiteman, the trend through the year 2025 was extended to the year 2030. Estimates for the intermediate years of the 21-year planning period were

then interpolated from the long term trend line. The next step involved breaking down the total number of aircraft by aircraft type.

The mix of based aircraft from the 1990 Whiteman Master Plan was initially applied to the forecast of total based aircraft. However, the 1990 Master Plan only projected single, twin-engine, and helicopters and therefore was not used as the basis for this forecast. The fleet mix was developed based upon discussions with County staff, air traffic control tower staff, airport tenants, and observations at the airport. Another consideration is that growth in traffic at Burbank and Van Nuys tends to benefit Whiteman, as pilots may seek to use less crowded facilities. The fleet mix was adjusted throughout the forecast period to represent realistic growth, based on input from County staff, air traffic control tower staff, airport tenants, and observations at the airport. The fleet mix at Whiteman is primarily comprised of single engine piston aircraft. Multi-engine piston, turboprop, and helicopters are assumed to remain at a constant level, and jets are anticipated to increase slightly as Burbank and Van Nuys increase in activity. The growth in jets is based upon Whiteman's proximity to Burbank and Van Nuys Airports. Additionally, should Burbank be successful in implementing a proposed curfew, some very light jet (VLJ) operators may move to Whiteman.

Based on the TAF, the potential number of general aviation aircraft based at Whiteman is expected to reach 984 by 2030, an increase of approximately 262 based aircraft from 2008 levels forecasted in the TAF. As seen in Table 4-3, single engine piston aircraft should account for the majority of demand or 892 aircraft by 2030. Multi-engine piston aircraft could account for another 44 aircraft, turboprop aircraft for 20, business jets and VLJs for 8, and 21 helicopters.

Table 4-3:
FORECAST OF BASED AIRCRAFT BY TYPE BASED ON LATEST FAA TERMINAL AREA FORECAST

Aircraft Type	2008	2009	2013	2018	2030
Single Engine Piston	652	674	710	757	882
Multi-Engine Piston	40	41	43	46	54
Turboprop	12	15	16	17	20
Turbine Jet	3	4	4	5	8
Helicopter	15	16	17	18	21
Total	**722**	**750**	**790**	**843**	**984**
Fleet Mix					
Single Engine Piston	90.3%	89.9%	89.9%	89.8%	89.6%
Multi-Engine Piston	5.5%	5.5%	5.5%	5.5%	5.5%
Turboprop	1.7%	2.0%	2.0%	2.0%	2.0%
Turbine Jet	0.4%	0.5%	0.5%	0.6%	0.8%
Helicopter	2.1%	2.1%	2.1%	2.1%	2.1%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Source: FAA Terminal Area Forecast, 2007; DMJM Aviation analysis.

Based on discussions with the County, it was learned that the actual number of based aircraft at Whiteman in August 2008 is 612 compared to the TAF forecast of 722. To reconcile the apparent discrepancy between the FAA assumptions and actual data, two forecast scenarios were developed:

- **TAF Forecast – Reconciled.** The TAF forecast was reduced by 110 aircraft, the difference between the TAF and County data, so that the starting point of projections corresponded to existing conditions. This results in a total of 874 based aircraft in 2030 (see Table 4-4).

- **TAF Forecast – Adjusted.** As mentioned in Chapter 3 a number of developments are planned or being constructed at Whiteman. These developments add approximately 100 additional aircraft parking spaces. Most, if not all developments, should be completed by the end of 2009. Whiteman presently has a waiting list of some 80 names. While this represents a substantial waiting list, it is noted that security deposits are not required, and therefore names on the waiting list do not represent firm commitments. The second scenario assumes that all developments are complete by the end of 2009 and primarily filled by existing based aircraft owners presently occupying tie-downs. The additional based aircraft storage space is assumed to attract five additional aircraft per year. Table 4-5 details the "Adjusted" forecast.

Table 4-4:
FORECAST OF BASED AIRCRAFT BY TYPE BASED ON LATEST FAA TERMINAL AREA FORECAST – RECONCILED

Aircraft Type	2008	2009	2013	2018	2030
Single Engine Piston	553	575	611	658	783
Multi-Engine Piston	34	35	37	40	48
Turboprop	10	13	14	15	17
Turbine Jet	3	3	3	4	7
Helicopter	13	13	15	15	18
Total	**612**	**640**	**680**	**733**	**874**
		Fleet Mix			
Single Engine Piston	90.3%	89.9%	89.9%	89.8%	89.6%
Multi-Engine Piston	5.5%	5.5%	5.5%	5.5%	5.5%
Turboprop	1.7%	2.0%	2.0%	2.0%	2.0%
Turbine Jet	0.4%	0.5%	0.5%	0.6%	0.8%
Helicopter	2.1%	2.1%	2.1%	2.1%	2.1%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Source: FAA Terminal Area Forecast, 2007; DMJM Aviation analysis.

Table 4-5:
FORECAST OF BASED AIRCRAFT BY TYPE BASED ON LATEST FAA TERMINAL AREA FORECAST – ADJUSTED

Aircraft Type	2008	2009	2013	2018	2030
Single Engine Piston	553	580	629	681	828
Multi-Engine Piston	34	35	39	42	51
Turboprop	10	13	14	15	18
Turbine Jet	3	3	4	5	7
Helicopter	13	14	15	16	19
Total	**612**	**645**	**700**	**758**	**924**
		Fleet Mix			
Single Engine Piston	90.3%	89.9%	89.9%	89.8%	89.6%
Multi-Engine Piston	5.5%	5.5%	5.5%	5.5%	5.5%
Turboprop	1.7%	2.0%	2.0%	2.0%	2.0%
Turbine Jet	0.4%	0.5%	0.5%	0.6%	0.8%
Helicopter	2.1%	2.1%	2.1%	2.1%	2.1%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Source: FAA Terminal Area Forecast, 2007; DMJM Aviation analysis.

It should be noted that the number of based aircraft frequently varies during the course of a year. Airport records indicate month to month changes and thus the totals shown should be interpreted as an average for the year. Percentages of aircraft by type, or the fleet mix, is assumed to be the same in all three scenarios.

Selected Based Aircraft Forecast

The first scenario, TAF Forecast Reconciled, is selected as the based aircraft forecast for this master plan update. This forecast recognizes the difference in present day based aircraft from the TAF. While additional based aircraft facilities will be added from ongoing developments, it is anticipated that the new hangar facilities will provide hangars for based aircraft owners who currently store their aircraft on tie-downs. Since the hangar waiting list does not represent firm commitments, a sharp rise in based aircraft is not anticipated as facilities become available. Additionally, Whiteman tenants indicate that growth will be low to moderate.

Figure 4-1 graphically presents the TAF, TAF Forecast Adjusted, and TAF Forecast Reconciled based aircraft forecasts. The selected forecast – TAF Forecast Reconciled – is represented by a solid blue line.

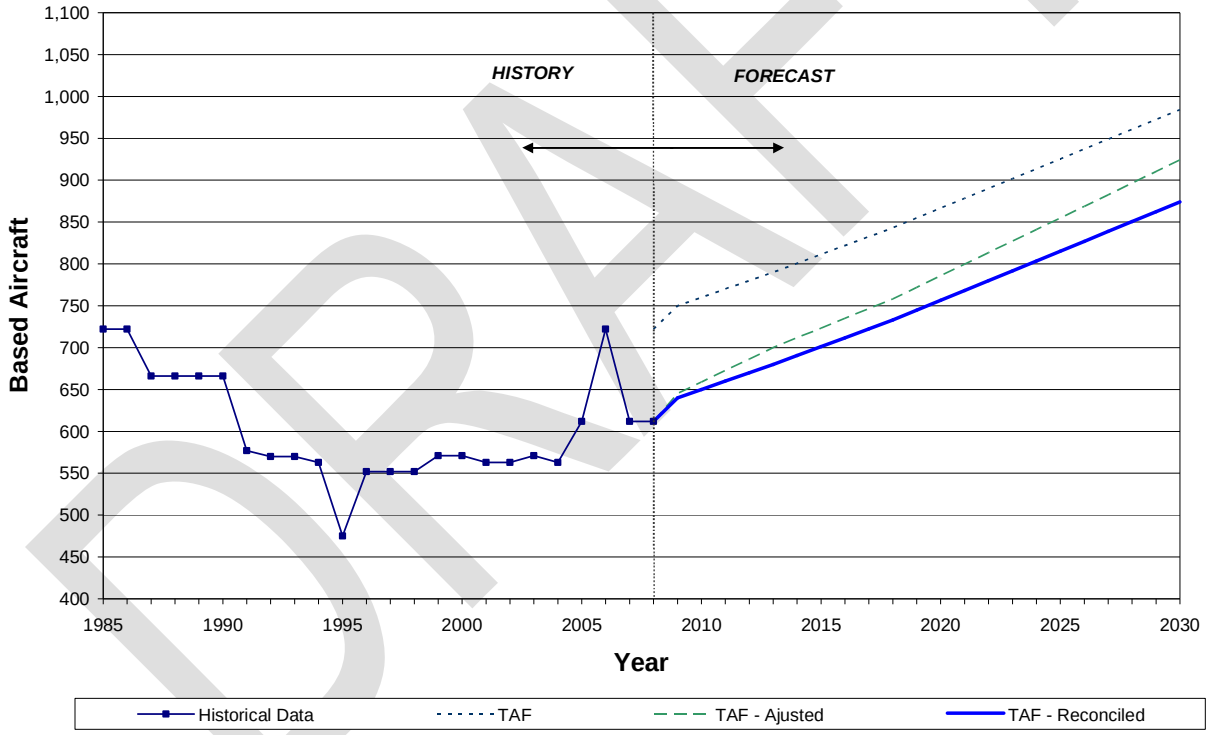

Figure 4-1
Based Aircraft Forecasts

FORECAST OF AIRCRAFT OPERATIONS

Annual Operations by Aircraft Type

An operation, or movement, is defined as either a takeoff or landing. Total annual operations were developed for the forecast years based on the current FAA forecasts available for the airport.[1] While the

[1]Terminal Area Forecasts FY 2007-2025. Federal Aviation Administration.

CASP also included projections of aircraft operations, the FAA Terminal Area Forecast was used since it is updated annually and therefore is more current. Similar to the development of based aircraft forecasts, the trend in operations projected by FAA through the year 2025 was extended to the year 2030 for use in the master plan update. Extension of the FAA trend indicates that aircraft operations will increase from current levels of approximately 93,200 to 143,500 in the year 2030.

Total annual aircraft operations and operations by type of aircraft were projected by using the TAF operations data and assigning operations by type of aircraft based upon Whiteman's fleet mix. Annual aircraft operations are projected to increase by an average of 2.4 percent annually, reaching 143,500 operations by 2030 (see Table 4-6).

Table 4-6:
PROJECTED AIRCRAFT OPERATIONS
WHITEMAN AIRPORT: 2009-2030

	Actual	Forecast		
Operations Category	**2007**	**2013**	**2018**	**2030**
Air Taxi Operations	0	4	4	4
Local Operations				
Single Engine Piston	36,970	46,600	49,200	56,520
Multi-Engine Piston	2,270	2,850	3,010	3,470
Turboprop	680	1,040	1,100	1,260
Turbojet	170	260	330	500
Helicopter	850	1,120	1,150	1,320
Itinerant Operations				
Single Engine Piston	47,060	54,710	60,140	71,930
Multi-Engine Piston	2,890	3,350	3,680	4,420
Turboprop	870	1,220	1,340	1,610
Turbojet	220	300	400	640
Helicopter	1,080	1,310	1,410	1,690
Military				
Local Operations	0	0	0	0
Itinerant Operations	140	140	140	140
Total Local Operations	40,900	51,900	54,800	63,100
Total Itinerant Operations	52,300	61,000	67,100	80,400
Total Operations	**93,200**	**112,900**	**121,900**	**143,500**

Source: DMJM Aviation analysis.

The breakdown of local and itinerant operations contained in the FAA forecast was used in this update. Itinerant operations are expected to account for a slight majority of aircraft operations at Whiteman Airport, reaching approximately 80,400, or 56 percent of total operations, by 2030. Local operations are projected to reach approximately 63,100 by 2030.

Peak Hour Operations

In airport planning, the term peak hour actually refers to the peak hour of the average day in the peak month (ADPM) instead of a true peak. This is done to avoid an over-design of facilities that most often will not be used, except for those infrequent periods of extreme peaks. Thus, FAA recommends the peak hour of the ADPM for planning purposes. Peak hour forecasts for Whiteman Airport were developed from historical traffic data and input from the control tower personnel. Air traffic data for 2007 and 2008

indicates that the peak month represents 9.3 percent of annual traffic. The peak month occurred in a month having 30 days, therefore, the average daily traffic is obtained by dividing the peak month traffic by 30. The control tower estimates peak hour operations at approximately 47, which represents 16.2 percent of the current average day of the peak month. It should be noted that almost all operations during the peak hour are training (touch-and-go). For estimating future peak hour activity, the following characteristics will be used.

- Peak month = 9.3% of annual
- Average Day of Peak Month (ADPM) = Peak Month ÷ 30
- Peak Hour = 16.2% of ADPM

Table 4-7 summarizes the projections and as seen peak hour activity is expected to increase to over 70 operations by the end of the planning period.

Table 4-7:
FORECAST OF PEAK HOUR OPERATIONS

Item	2007	2013	2018	2030
Annual Operations	93,219	113,000	121,900	143,500
Peak Month (9.3% Annual)	8,707	10,510	11,340	13,350
Average Day Peak Month (ADPM)	290	350	378	445
Peak Hour of ADPM	47	57	61	72

Source: DMJM Aviation analysis.

FUEL FLOWAGE FORECASTS

Fuel flowage was projected using historic ratios of fuel flowage to annual operations. As noted in Table 4-8, sales of 100 octane fuel is expected to increase, from 245,931 gallons to 372,600 gallons between 2009 and 2030. This corresponds with the increase projected for single and multi-engine piston aircraft operations. Jet fuel sales are projected to increase from 109,673 gallons in 2009 to 221,000 gallons in 2030. This is based on the assumption that fuel sales will double with the expected growth in very light jets and other turbine traffic assumed to increase at the airport.

Table 4-8:
PROJECTED FUEL FLOWAGE
(Gallons)

Year	100 Octane	Jet A
2007	245,931	109,673
2013	294,000	162,000
2018	317,100	178,000
2030	372,600	221,000

Source: DMJM Aviation analysis.

COMPARISON OF FORECASTS

Comparison with Prior Forecast

The forecast developed for this master plan update reflects a significantly lower number of based aircraft and annual operations compared with those projections in the previous 1990 master plan. The forecast of this update projects a total number of based aircraft of 752 in the year 2013, with 805 estimated for the year 2018 (the midpoint of the planning period), and 946 in 2030. The original master plan estimated 930 based aircraft for the year 2010.

In addition, County data indicates that current (2007) operations at Whiteman are about 93,300, forecasted to increase to 112,900 in 2013. The previous master plan estimated 285,000 annual operations for the year 2010.

It is evident that traffic has not materialized at the airport as originally anticipated, which as previously discussed, is the result of numerous factors. Growth of general aviation throughout the region has not occurred due in part to a downturn in the economy, and factors such as aircraft costs due to manufacturer's costs, liability insurance, and fuel costs.

Comparison with California Aviation System Plan Forecast

The California Aviation System Plan (CASP) included a forecast for Whiteman Airport. CASP based aircraft forecasts are substantially lower than the previous master plan forecast and also the Terminal Area Forecast. The CASP 2010 based aircraft number is identical to the projected 2009 based aircraft levels of this master plan forecast. The CASP projects a much slower growth in based aircraft than this master plan forecast. Operations forecast for 2010 is relatively close to the Terminal Area Forecast. However, the CASP projects a decrease in operations to 2015, which is inconsistent with the TAF.

Comparison with Terminal Area Forecast

The forecast developed for this master plan are based on the 2007 Terminal Area Forecasts. As noted earlier, adjustments were made to the based aircraft, to reflect current based aircraft data available from the County. Considering the differences between the TAF and this forecast, and the ongoing developments at Whiteman, the current master plan forecast appears reasonable.

Table 4-9 shows the three forecasts prepared by others along with the selected forecast for this master plan update. Comparisons of the selected forecast and the TAF are also included. As seen in the table, based aircraft forecasts are within 11 percent of the TAF, and operations forecasts are identical. Figures 4-2 and 4-3 depict the various based aircraft and operations forecasts, respectively, described above.

Table 4-9:
COMPARISON OF FORECASTS

Item	Year						
Based Aircraft	**2005**	**2008**	**2010**	**2013**	**2015**	**2018**	**2030**
Previous Master Plan	895	N/A	930	N/A	N/A	N/A	N/A
California Aviation System Plan	N/A	N/A	640	N/A	650	N/A	N/A
Terminal Area Forecast (TAF)	612	722	760	790	812	843	984
Master Plan Update	N/A	612	N/A	680	N/A	733	874
Master Plan Forecast Percent Above (Below) TAF	**N/A**	**85%**	**N/A**	**86%**	**N/A**	**87%**	**89%**
Annual Aircraft Operations	**2005**	**2007**	**2010**	**2013**	**2015**	**2018**	**2030**
Previous Master Plan	260,000	N/A	285,000	N/A	N/A	N/A	N/A
California Aviation System Plan	N/A	N/A	127,000	N/A	103,000	N/A	N/A
Terminal Area Forecast (TAF)	102,382	100,418	106,485	112,941	116,830	121,914	143,533
Master Plan Update	N/A	93,214	N/A	113,000	N/A	121,900	143,500
Master Plan Forecast Percent Above (Below) TAF	**N/A**	**100%**	**N/A**	**100%**	**N/A**	**100%**	**100%**

Sources: Hodges & Shutt. 1990; California Aviation System Plan. 1998; FAA Terminal Area Forecast. 2007; DMJM Aviation.

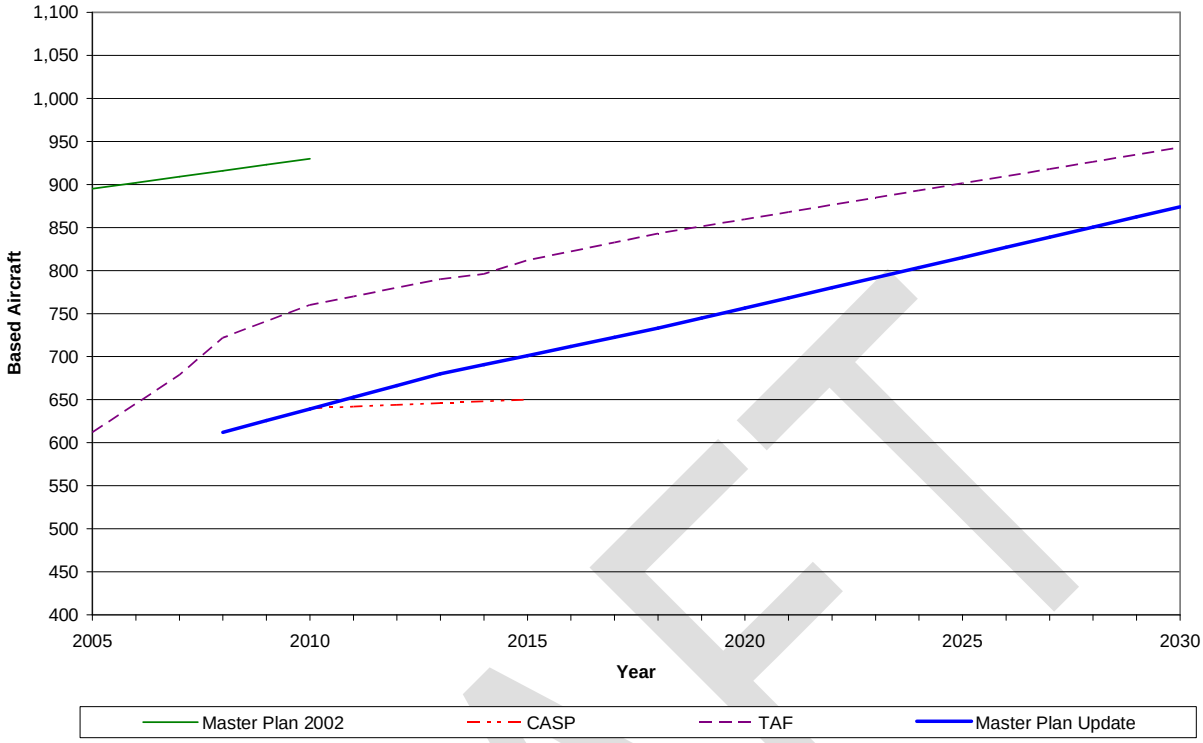

Figure 4-2
Comparison of Based Aircraft Forecasts

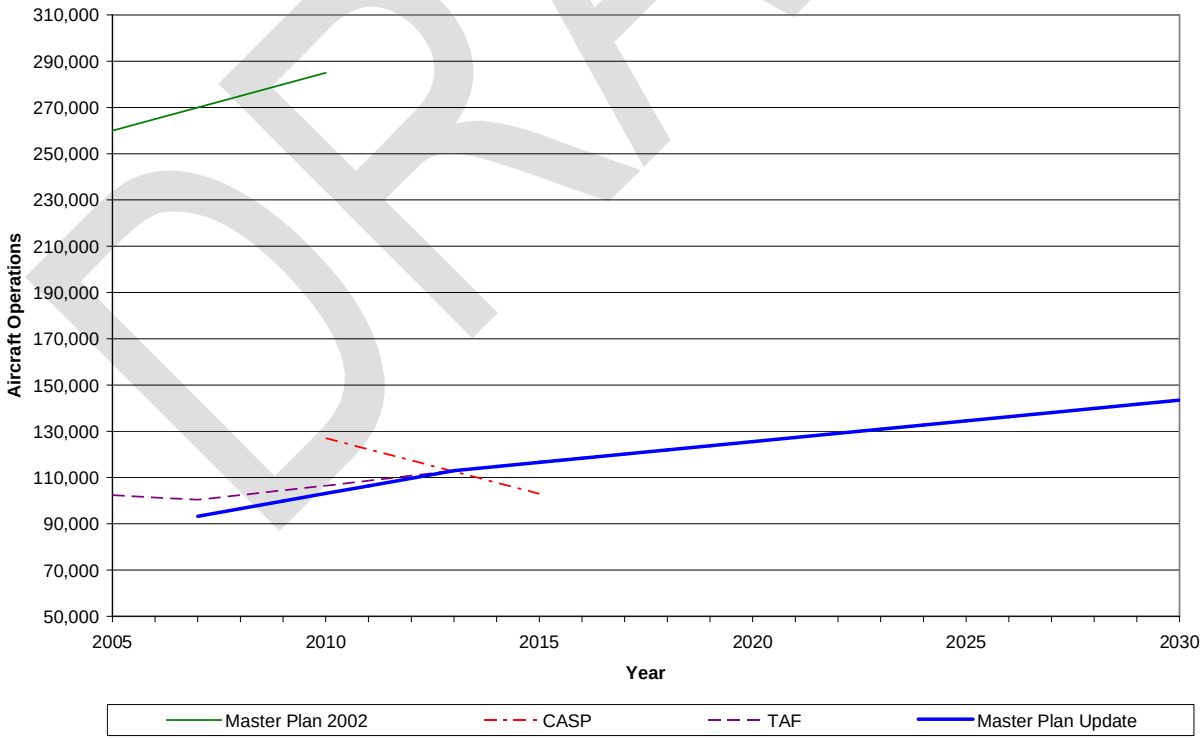

Figure 4-3
Comparison of Aircraft Operations Forecasts