



## **3.0 FORECAST**

### **3.1 Introduction**

Forecasts of aviation demand are among the most vital factors considered in the Master Planning process. The purpose of this chapter is to present aviation activity forecasts that will help formulate a plan to accommodate future aviation demand at the Central Colorado Regional Airport through 2021. These estimates of projected activity were used to determine the adequacy of existing facilities, the need for additional airport improvements and, in many instances, identify impacts the development would pose upon the local community. Forecasts are the primary sources for formulation of the Airport Capital Improvement Plan, which will be detailed in Chapter 5.

This chapter examines historical aviation activity trends and the socioeconomic factors affecting aeronautical growth in Chaffee County and the Town of Buena Vista. This analysis is utilized to prepare forecasts of aviation demand such as based aircraft, aircraft operations fleet mix, and annual operations. Identifications of the existing and future critical aircraft expected to use the airport during the planning period will be made to ascertain ultimate airport design standards. This forecast further defines the airport's continuing role in the FAA's *National Plan of Integrated Airport Systems (NPIAS)* and the *Colorado State Aviation System Plan (CASP)*.

### **3.2 Forecast Methodology and Assumptions**

This Master Plan Study for Central Colorado Regional Airport details the expansion capability of the airport and its ability to accommodate higher levels of demand. A number of factors are examined in developing the forecasts for the Central Colorado Regional Airport. These factors include the following:

- Historic aviation activity to determine past growth patterns.
- Correlation between past growth patterns in based aircraft with regional and state aircraft growth and countywide population growth.
- Correlation between past growth patterns in aircraft operations with based aircraft.
- Projections of growth patterns for the next twenty years.
- Purpose and use for which the forecast is developed.
- Relationship to other area airports
- Existing airport facilities and operations.
- FAA Terminal Area Forecast (TAF)



The methodology employed to complete the forecast of aviation activity at Central Colorado Regional Airport is a Share Analysis. This methodology is a “top down” approach to forecasting since forecasts of larger aggregates, such as based aircraft nationwide, are used to derive forecast for smaller areas such as individual airports. Historical shares or ratios for indicators of aviation activity at Central Colorado Regional Airport, compared to State and Regional totals are calculated and used as a basis for projecting future shares of the State and Regional totals for the Central Colorado Regional Airport. The basic assumption of this methodology is that the same factors will influence aviation demand as have affected it in the past.

### **3.3 Based Aircraft Projection**

Based aircraft are defined as aircraft stationed at an airport during a period of inactivity, stored in hangars or on the apron utilizing tie-downs. Total based aircraft at an airport is one good measure of general aviation demand. Preparation of a based aircraft forecast is a critical element in forecasting future aviation demand for the Central Colorado Regional Airport. Several factors influence where an aircraft owner chooses to base their aircraft. These include geographic location and convenience, adequate runway length, width, and strength, availability of tie-downs and hangar space.

The market share of aircraft based at the Central Colorado Regional Airport in comparison to historical total active aircraft in the FAA’s Northwest Mountain Region (ANM) and the State of Colorado was determined. The ratio was then applied to the FAA Terminal Area Forecast (TAF) for the ANM to determine projected based aircraft at Central Colorado Regional Airport. Historical data was provided by both FAA 5010-1 Forms and records supplied by Arkansas Valley Aviation FBO.

**Table 3-1** presents the historical information for 1991-2002. The table details total active aircraft in the United States, the FAA Northwest Mountain Region (ANM), the State of Colorado, and based aircraft at the Central Colorado Regional Airport. The ANM encompasses the States of Colorado, Idaho, Montana, Oregon, Utah, Washington, and Wyoming.

The State of Colorado’s market share of the FAA’s ANM active aircraft has averaged approximately 21.49 percent over the past ten years. In 2001, 19.73 percent or 4,212 of the based aircraft in the FAA ANM were located in Colorado. The market share of based aircraft at Central Colorado Regional Airport, as a ratio of the based aircraft in the State of Colorado and the FAA ANM, has shown a modest increase over the eleven-year period.

In 1991, Central Colorado Regional Airport maintained 0.40 percent share of based aircraft in the State of Colorado and 0.086 percent share of based aircraft in the ANM. By 2002, the market share increased to 0.49 in the state and to 0.1 percent of the ANM. In 1998, Central Colorado Regional Airport experienced its highest market shares of based aircraft in the state and at 0.48. During the





1991 through 2002 time frame based aircraft in Colorado increased from 3,711 in 1991, to 4,670 in 2001, representing average annual growth of 1.2 percent. Based aircraft at Central Colorado Regional Airport increased from 15 in 1991 to 23 in 2002, representing an average annual growth rate of 2.5 percent.

**Table 3-1**  
**Historical Based Aircraft**  
**Market Share**

	<b>U.S. Total</b>	<b>ANM Total</b>	<b>Colorado Total</b>	<b>Buena Vista Total</b>	<b>BV Share of Colorado Total</b>	<b>BV Share of ANM Total</b>	<b>Colorado Share of ANM</b>
1991	168,781	17,532	3,711	15	0.40%	0.086%	21.17%
1992	167,964	17,778	3,777	16	0.42%	0.090%	21.25%
1993	163,498	17,778	3,777	16	0.42%	0.090%	21.25%
1994	164,698	17,984	3,722	15	0.40%	0.083%	20.70%
1995	167,492	18,011	3,755	17	0.45%	0.094%	20.85%
1996	169,153	12,262	3,739	16	0.43%	0.130%	30.49%
1997	177,509	18,574	3,828	17	0.44%	0.09%	20.61%
1998	184,097	19,872	3,986	19	0.48%	0.10%	20.06%
1999	185,714	20,712	4,169	19	0.46%	0.09%	20.13%
2000	190,080	20,980	4,184	18	0.43%	0.09%	19.94%
2001	190,961	22,010	4,615	20	0.43%	0.09%	20.97%
2002	196,441	22,099	4,670	23	0.49%	0.10%	21.13%

Source: FAA Terminal Area Forecast

Forecasts of projected based aircraft growth at Central Colorado Regional Airport are presented in **Table 3-2**. The 2000 CASP forecast a 1.35 percent average annual growth in based aircraft in Colorado through 2018. The CASP forecast based aircraft at Central Colorado Regional Airport to increase at an average annual rate of 2.4 percent. The forecast of based aircraft over the next 20 years was projected by analyzing the historic market share of based aircraft at Central Colorado Regional Airport to the State of Colorado and ANM totals. Historic market shares have been relatively consistent during the past eleven years, and are forecast to continue moderate growth.

Total based aircraft at Central Colorado Regional Airport are forecast to increase to 48 by 2021. Forecast average annual growth rate for based aircraft at Central Colorado Regional Airport, is equal to historic growth rates during the period of 1991 to 2002, although there will be a significant spike expected due to the construction of additional hangar capacity.

The FAA TAF projects based aircraft in the State of Colorado to increasing by 1,248 based aircraft over the next twenty years, representing an average annual increase of 0.70 percent. The market share of aircraft in the State of Colorado based at Central Colorado Regional Airport is expected to



increase to 0.99 percent in 2021. This represents a significant jump due to the fact that the FBO expects to have as many as 36 based aircraft by the end of 2003 as a result of a hangar project along with other latent demand. Growth will resume a stable 1% increase through the end of the forecast period.

This forecast of based aircraft at Central Colorado Regional Airport was used as the base line for determination of an operations forecast based upon operations per based aircraft. The methodology is explained in the following section.

**Table 3-2  
Based Aircraft Projection**

	<b>U.S. Total**</b>	<b>ANM Total**</b>	<b>Colorado Total**</b>	<b>Buena Vista Total***</b>	<b>BV Share of Colorado Total</b>	<b>BV Share of ANM Total</b>	<b>Colorado Share of ANM Total</b>
2003	193,253	21,689	4,273	36	0.84%	0.17%	19.70%
2004	194,413	21,855	4,303	36	0.84%	0.16%	19.69%
2005	195,671	22,038	4,335	36	0.83%	0.16%	19.67%
2006	196,758	22,201	4,365	37	0.85%	0.17%	19.66%
2007	197,850	22,360	4,394	37	0.84%	0.17%	19.65%
2008	199,109	22,542	4,428	38	0.86%	0.17%	19.64%
2009	200,288	22,720	4,458	38	0.85%	0.17%	19.62%
2010	201,484	22,894	4,491	39	0.87%	0.17%	19.62%
2011	202,511	23,046	4,519	40	0.89%	0.17%	19.61%
2016*	211,358	24,340	4,759	44	0.92%	0.18%	19.55%
2021*	215,121	24,899	4,863	48	0.99%	0.19%	19.53%

Source: FAA Terminal Area Forecast; Washington Infrastructure Services, Inc.

\* Extrapolated growth based upon average annual growth rate for the last 10 years of the TAF.

\*\* Data derived from the FAA TAF

\*\*\*According to AVA, 36 Aircraft are expected by the end of 2003.

### 3.4 Aircraft Operations Projection

Aircraft activity is measured in operations, where a takeoff or landing is considered an operation. Each operation is categorized as either local or itinerant. A local operation is conducted by an aircraft flying in the local traffic pattern or within sight of the airport, or within local practice areas located inside a twenty-mile radius of the airport. "Touch-and-Go" training operations are also considered local operations. Itinerant operations are those performed by an aircraft with a specific origin and destination.

**Table 3-3** details historic totals of based aircraft and operations per based aircraft for the past seven years. During that time period Central Colorado Regional Airport has averaged 206.3 operations per based aircraft.





**Table 3-3**  
**Historic Operations per Based Aircraft**

	Operations per Based Aircraft		
	Based Aircraft	Operations	OPBA
1995	17	2,788	164.0
1996	16	3,559	222.4
1997	17	3,286	193.3
1998	19	4,045	212.9
1999	19	3,766	198.2
2000	18	3,095	171.9
2001	20	5,630	281.5
<b>Average 1995-2001</b>	<b>18</b>	<b>3,738</b>	<b>206.3</b>

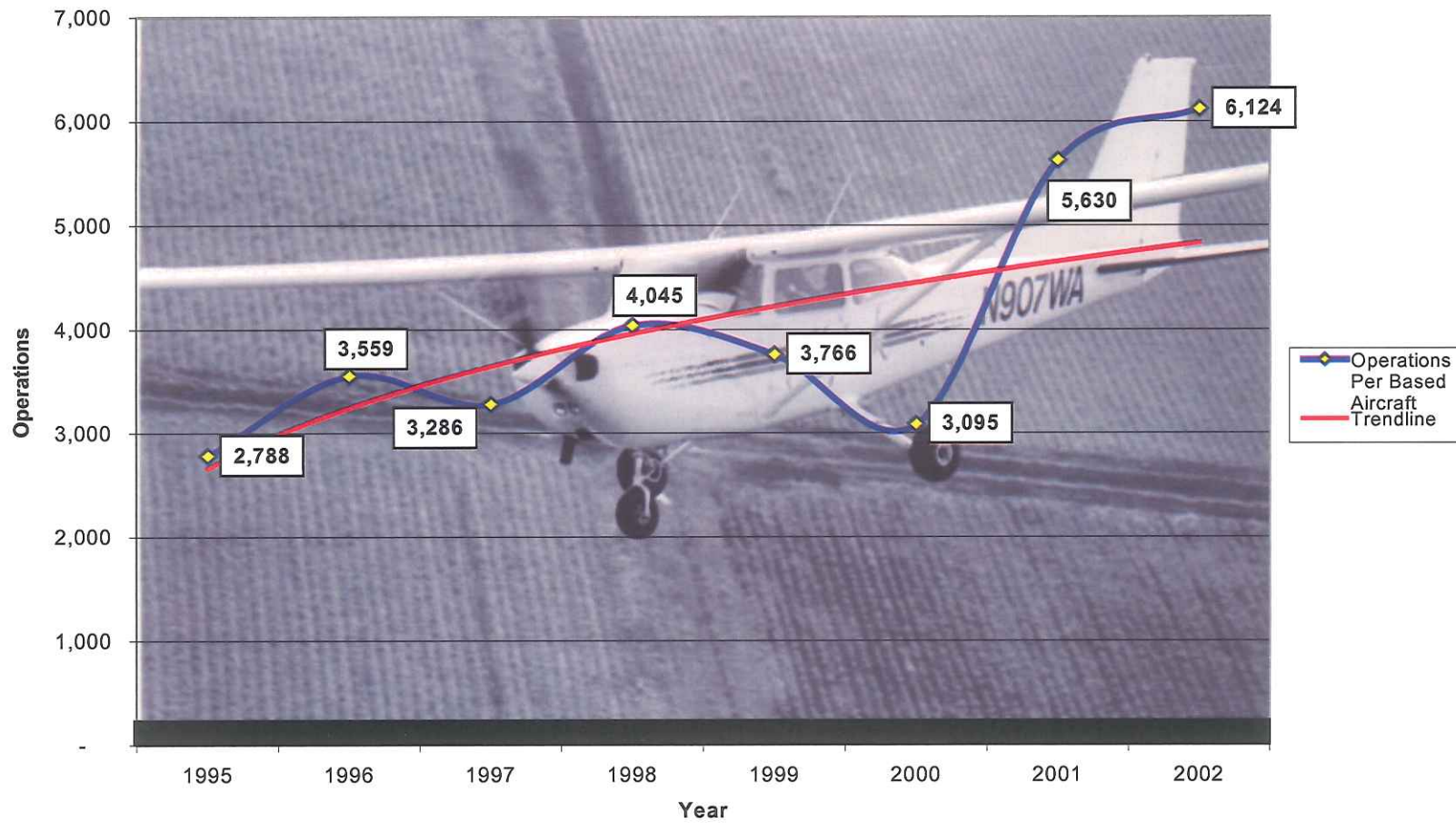
Source: FAA Terminal Area Forecast; 2000 Colorado System Plan

Projecting annual operations by the number of operations per based aircraft is a methodology frequently used to forecast activity for general aviation airports. **Table 3-4** details indicators of historic activity and projections of future demand, which were used to develop forecasts of future activity for the Central Colorado Regional Airport.

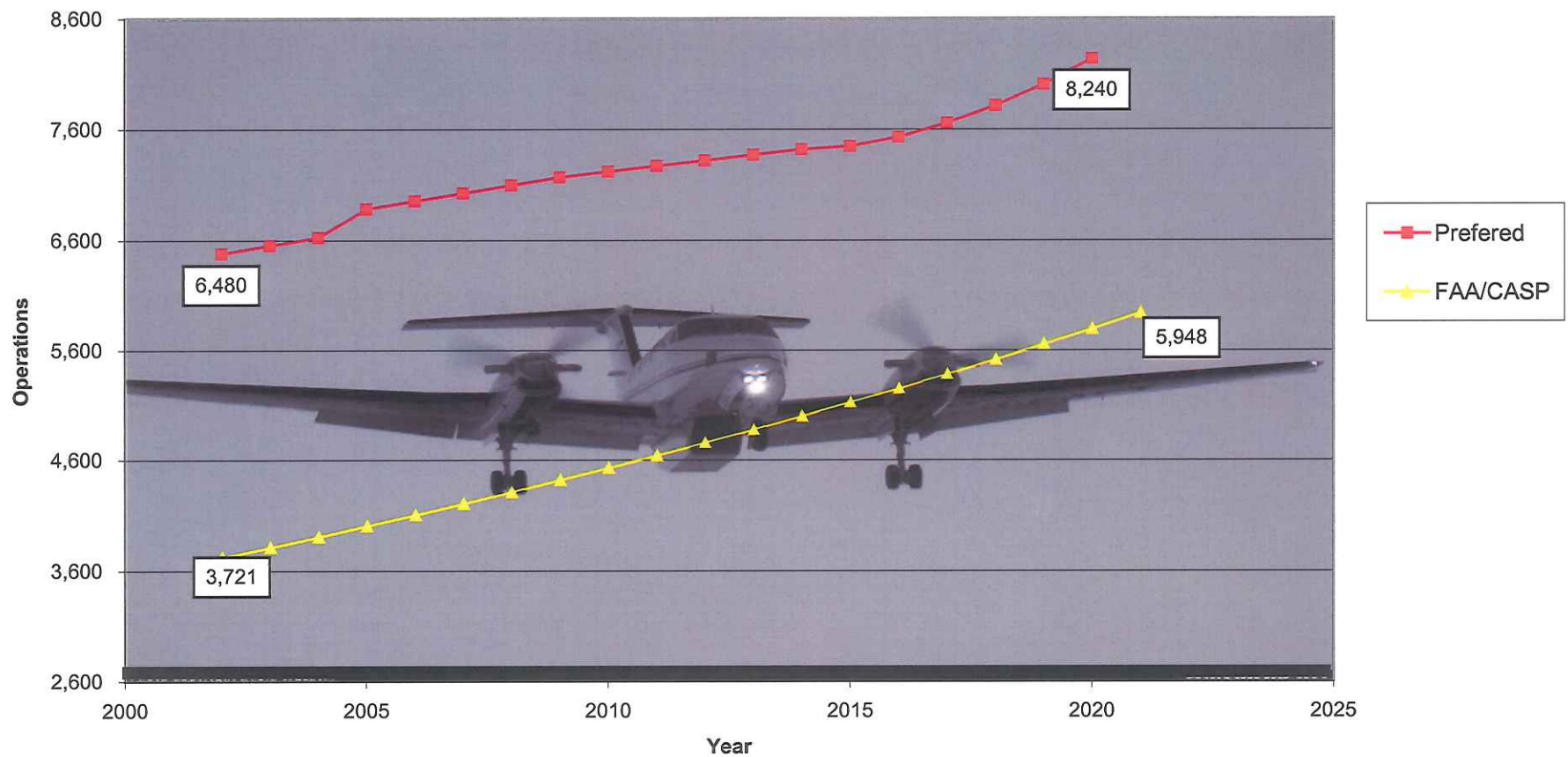
The projected forecast for the 2000 CASP was developed utilizing the historic average of operations per based aircraft for the Central Colorado Regional Airport. The CASP calculated a ratio of operations per based aircraft of 181.5 per year. A similar ratio of operations per based aircraft at Central Colorado Regional Airport was adopted by the FAA Terminal Area Forecast (TAF) to serve as the ratio of annual operations per based aircraft from 1999 through 2015.

The FAA TAF illustrates a “no growth” scenario for Central Colorado Regional Airport where based aircraft and annual operations are unchanged since 1999. The TAF applies a ratio of operations per based aircraft of 181.5. This scenario was not selected as the “Preferred” forecast as a result of the “no growth” approach to future analysis of airport activity. The average ratio of OPBA during the past seven years at Central Colorado Regional Airport exceeds the FAA TAF by more than 12 percent. This level of historic activity is too high to be excluded from forecast of future aviation activity.

**Figure 3-1**  
**Historic Operations At**  
**Central Colorado Regional Airport**  
**1995-2002**



**Figure 3-2**  
**Forecast Annual Operations**  
**Central Colorado Regional Airport**  
**2003-2021**







Forecast scenarios presented in **Table 3-4** project a range of operations activity at Central Colorado Regional Airport that is likely to occur over the planning period. The “Preferred” forecast was developed utilizing a combination of previously identified operations per based aircraft. Therefore, this projection is based on average operations per based aircraft for the past seven years at Central Colorado Regional Airport, which equates to 206.3 operations per based aircraft. Utilization of the median figure is based on the fact that 2001 was the busiest year for operations at the airport since 1994, and the annual averages have been inconsistent. Due to the fluctuation in annual operations over the past seven years a linear trendline was developed to identify the general direction of growth in operations. The trendline reaches approximately 4,200 annual operations in 2001, which serves as the baseline for annual operations forecast through the planning period and is consistent with the ratio of 206.3 annual operations per based aircraft. Considering the large jump in based aircraft expected in 2003, the OPBA was scaled back in the near term and then gradually rises back to 206 OPBA at the end of the forecast period.

Forecast totals for operations per based aircraft at Central Colorado Regional Airport were held constant. The ratio of operations per based aircraft could increase with the development of a flight school or increased ratio of itinerant to local traffic. Development of a flight school would combine “touch-and-go” flight training activity to annual operations and ultimately increase operations per based aircraft. Increased itinerant traffic provides additional operations to annual totals, which are not flown by based aircraft, ultimately increasing the ratio of operations per based aircraft.

**Table 3-4**  
**Operations Projection (OPBA Method)**

	2000 Colorado State Aviation System Plan			Preferred Operations Forecast		
	Based Aircraft	Operations	OPBA	Based Aircraft	Operations	OPBA
2003	20	3,696	184.8	36	6,480	180
2004				36	6,552	182
2005				36	6,624	184
2006				37	6,882	186
2008	23	4,182	181.8	37	6,956	188
2011				40	7,220	190
2016				44	7,448	196
2018	29	5,353	184.6	46	7,839	201
2021				48	8,240	206

Source: OPBA for preferred forecast extrapolated by Washington Infrastructure Services; 2000 Colorado Aviation System Plan

**Table 3-5** presents the preferred forecast of operations including local, itinerant, military, and total operations. Military aircraft accounted for 539 itinerant operations in 2002, historically Central Colorado Regional Airport has not hosted itinerant military operations, with the majority of these operations being attributed to refueling the aircraft. Central Colorado Regional Airport has been





utilized as a high altitude helicopter testing facility for military helicopters. The testing of these helicopters is sporadic and varies in schedule and intensity for each testing period. Forecasting military operations is a difficult task. Military priorities and budgets can change at any time and create significant increases or decrease in operations. Construction of facilities to accommodate high altitude helicopter testing could increase demand and encourage a more regular schedule of helicopter testing.

According to the historic ratio of local to itinerant operations at Central Colorado Regional Airport has translated to a 69 to 31 percent share of local to itinerant traffic. The same ratio of local to itinerant traffic was applied to the forecast of future operations.

**Table 3-5**  
**Operations Projection by Type**

	Itinerant Operations				Local Operations			Total
	Air Taxi & Commercial	GA	Military	Total	GA	Military	Total	
2003	0	1,959	50	2,009	4,021	450	4,471	6,480
2004	0	1,981	50	2,031	4,071	450	4,521	6,552
2005	0	2,003	50	2,053	4,121	450	4,571	6,624
2006	0	2,083	50	2,133	4,299	450	4,749	6,882
2011	0	2,188	50	2,238	4,532	450	4,982	7,220
2016	0	2,259	50	2,309	4,689	450	5,139	7,448
2021	0	2,504	50	2,554	5,236	450	5,686	8,240

Source: Washington Infrastructure Services; Arkansas Valley Aviation

### 3.5 Fleet Mix Projection

The forecast of operations by aircraft type is critical in determining the needs of the airport in accordance with FAA design standards for future airport development. The current aircraft fleet mix primarily consists of single engine aircraft and helicopters, although the considerable percentage of itinerant traffic is comprised of twin engine turboprop and a limited number of jet aircraft. *FAA Advisory Circular 150/5300-13, Airport Design*, defines aircraft by approach category and design group. These components form the Airport Reference Code (ARC). The ARC is a coding system used to relate airport design criteria to the aircraft intended to operate at the airport.

The ARC consists of two components relating to the airport design aircraft. The first component represented by capital letters A through E, is the aircraft approach category and relates to the speed of the aircraft during a landing approach. The second component is represented by a Roman Numeral, is the airplane design group, which relates to the wingspan of the airplane. Generally, aircraft approach speed applies to runways and runway-related facilities. Airplane wingspan primarily relates to separation criteria involving taxiways and taxilanes.



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Aircraft approach category is a grouping of aircraft based on 1.3 times their stall speed in their landing configuration at their maximum certified landing weight. The categories are as follows:

<u>Approach Category</u>	<u>Approach Speed Range</u>
Category A.....	Speed less than 91 knots
Category B.....	91 knots or more but less than 121 knots
Category C.....	121 knots or more but less than 141 knots
Category D.....	141 knots or more but less than 166 knots
Category E.....	Speed 166 knots or more
Note: One knot (nautical miles per hour) equals approximately 1.15 statute miles per hour.	

<u>Airplane Design Group</u>	<u>Wingspan Range</u>
Group I.....	Up to but not including 49 feet
Group II.....	49 feet up to but not including 79 feet
Group III.....	79 feet up to but not including 118 feet
Group IV.....	118 feet up to but not including 171 feet
Group V.....	171 feet up to but not including 214 feet
Group VI.....	214 feet up to but not including 262 feet

The 1992 Master Plan identified the ARC as B-II, with a critical aircraft being the Beech King Air C90-1. The Airport Manager/ FBO has maintained records of total operations from 1995 through 2001. The historical data is presented in **Table 3-6**, along with the estimated fleet mix for 2002 through 2021.

The 1995–2000 General Aviation Activity and Avionics Survey (GAAAS) conducted by the FAA stated that the average annual growth rate for single engine piston driven aircraft equaled 1.4 percent, multi-engine piston driven aircraft 5.0 percent, turboprop aircraft 2.5 percent, and jet aircraft 7.4 percent during the study period. Single engine aircraft accounted for more than 78 percent of the national general aviation fleet in 2000. Jet aircraft in the general aviation fleet is growing at an average annual rate, which is 6 percent greater than single engine aircraft.

As the national general aviation fleet acquires additional jet aircraft the fleet mix of aircraft operating at Central Colorado Regional Airport will also evolve. Addition of jet aircraft to the general aviation fleet mix over the next twenty years will likely result in increased jet operations at Central Colorado Regional Airport. However, it is not anticipated that the fleet mix at Central Colorado Regional Airport will change as rapidly as national projections. Table 3-6 shows forecast operations by aircraft type. Forecast operations for 2021 show single engine aircraft totaling 5,341 operations, multi-engine aircraft accounting for 1,200 operations, turboprop aircraft reaching 118 operations, and jet aircraft equaling 102 operations. Comparative average annual growth rates forecast by aircraft type for Central Colorado Regional Airport and the GAAAS are detailed in **Table 3-7**. This forecast projects an average annual growth rate of 1.9 percent for single engine aircraft is greater than the GAAAS growth rate of 1.4 percent. Multi engine aircraft are anticipated to average 3.1 percent growth annually, turboprop aircraft 2.3 percent, helicopter operations to hold steady at present levels, and jet





aircraft 7.1 percent. Except for single engine aircraft, forecast growth rate for these types of aircraft are below national average annual growth rates.

**Table 3-6**  
**Annual Operations by Fleet Mix**

	Single Engine	Multi Engine	Turboprop	Helicopter	Jet	Total
Historical				*		
1995	2,203	494	56	*	8	2,788
1996	2,847	644	59	*	9	3,559
1997	2,629	585	61	*	11	3,286
1998	3,236	732	64	*	13	4,045
1999	3,013	671	67	*	15	3,766
2000	2,476	531	70	*	18	3,095
2001	4,898	634	74	*	24	5,630
2002	3,679	652	76	609	24	6,124
Forecast						
2003	5,094	681	73	609	23	6,480
2004	5,134	702	75	609	32	6,552
2005	5,152	742	77	609	44	6,624
2006	5,344	786	79	609	64	6,882
2011	5,595	816	92	609	108	7,220
2016	5,694	904	103	609	138	7,448
2021	6,106	1,245	118	609	162	8,240

Source: Washington Infrastructure Services; Arkansas Valley Aviation; \*=data not available

Based upon the forecast operational data jet aircraft are not forecast to exceed 500 annual operations during the planning period. Multi engine and turboprop aircraft combine to total more than 500 annual operations in 2002, the majority of these aircraft are within the B-II ARC classification. The current critical aircraft ARC is B-II, this classification should remain B-II although the critical aircraft should be changed to the Citation CJ2. **Table 3-8** details historical and forecast, based aircraft by type through 2021.





**Table 3-7**  
**Growth Rate Comparison**  
**General Aviation Activity & Avionics Survey**

	<b>2003 Airport Master Plan Update</b>	<b>GAAAS</b>
Single Engine Piston	1.4%	1.4%
Multi Engine Piston	3.1%	5.0%
Turboprop	2.3%	2.5%
Helicopter	Maintain Current Level	Not Reported
Jet	7.4%	7.4%
All Aircraft	2.8%	2.5%

Source: Washington Infrastructure Services; GAAAS 1995-2000

**Table 3-8**  
**Based Aircraft by Type**

	<b>Single Engine</b>	<b>Multi Engine</b>	<b>Turboprop</b>	<b>Helicopter</b>	<b>Jet</b>	<b>Total</b>
<b>Historical</b>						
1996	12	4				16
1997	14	3				17
1998	16	3				19
1999	17	2				19
2000	16	2				18
2001	18	2				20
2002	18	2			1	23
<b>Forecast</b>						
2003	31	3			2	36
2004	31	3			2	36
2005	31	3			2	36
2006	31	3			3	37
2011	32	4	1		3	40
2016	32	5	3		4	44
2021	33	7	4		4	48

Source: Washington Infrastructure Services

### 3.6 Summary

Recommendations for facility improvements presented in *Chapter 4, Facility Requirements* are based upon the preferred forecast growth in aviation activity presented in this chapter. Forecasts of future aviation activity were developed using the Share Analysis methodology, which analyzes historic growth patterns, relationship of based aircraft and operations per based aircraft (OPBA) with local and State aviation growth. This forecast concluded that based aircraft will increase from 23 in 2002 to 48 in 2021. General aviation operations are projected to increase from 6,124 in 2002 to 8,252 in 2021. The ARC of B-II will remain during the planning period with the Citation CJ2 as the critical aircraft. Should business jet activity exceed forecast activity levels, the airport ARC classification should be reviewed. Forecast activity levels for Central Colorado Regional Airport are incorporated into analysis of future facility requirements in the following chapter.