CHAPTER 3
AVIATION DEMAND FORECAST

This chapter presents the forecast of aviation activity at Rocky Mountain Metropolitan Airport (Airport). The forecast period is approximately 20 years to 2030.

Forecasting future activity involves both analytical techniques and subjective considerations. Regardless of the methodology used, assumptions must be made about how internal and external forces might change in the future. Factors that can influence aviation activity levels include regulatory policy on the local, state, and national level, as well as technological innovations, aviation industry trends, and local fluctuations in population and employment.

The objective of forecasting is to develop a realistic identification and appraisal of the factors that influence aviation demand. Then their effect can be estimated in a rational manner and preparations can be made to smoothly and cost effectively accommodate their impact on airport facilities.

The forecasts presented herein provide projections for the years 2015, 2020, and 2030. These are approximately 5, 10, and 20-year estimates of aviation activity at the Airport. It is important, however, to view the projections independently of specific years and to consider the growth of activity as the trigger point, which influences the need for future airport facilities. If actual growth occurs faster than anticipated, the implementation schedule should be reassessed and accelerated as necessary. Similarly, slower than projected growth may warrant deferment of planned improvements to a later date. Actual activity growth should be frequently compared to projected growth, so schedule corrections can be identified and implemented.

The development of aviation demand forecasts for the Airport is presented in the following sections of this chapter:

- Historical Aircraft Operations
- Factors Affecting Future Aviation Demand
- Enplaned Passenger Forecast
- Aircraft Operations Forecast
- Instrument Operations Forecast
- Based Aircraft Forecast
- Based Aircraft by Type
- Annual Operations by Airport Reference Code
- Critical Aircraft Selection

3.1.1 Historical Aircraft Operations

This section presents a general overview of the historical trends in aviation activity elements at the Airport. An aircraft operation is defined as either a takeoff or a landing. For planning purposes, FAA records annual aircraft operations in the following four categories:

- **Air Carrier** - An air carrier operation involves an aircraft with a seating capacity of more than 60 seats or a cargo payload capacity of more than 18,000 pounds. Further, the aircraft must be carrying passengers or cargo for hire or compensation.

- **Commuter** - Commuter operations represent scheduled commercial flights for aircraft with 60 seats or fewer or a cargo payload capacity of 18,000 pounds or less. This category includes air taxi operations, which are nonscheduled commercial flights or those for-hire flights using aircraft with 60 or fewer seats or a payload capacity of 18,000 pounds or less.

- **Military** - Military operations are by all classes of military or Federal government aircraft.

- **General Aviation** - General aviation (GA) operations are any type of operation that is not included in one of the previous defined categories. These are typically privately owned fixed-wing and rotorcraft aircraft used for corporate business, training, recreation, or personal use.

Figure 3-1 presents an 18-year history of the Airport's annual aircraft operations in the four categories. Each category is discussed below.

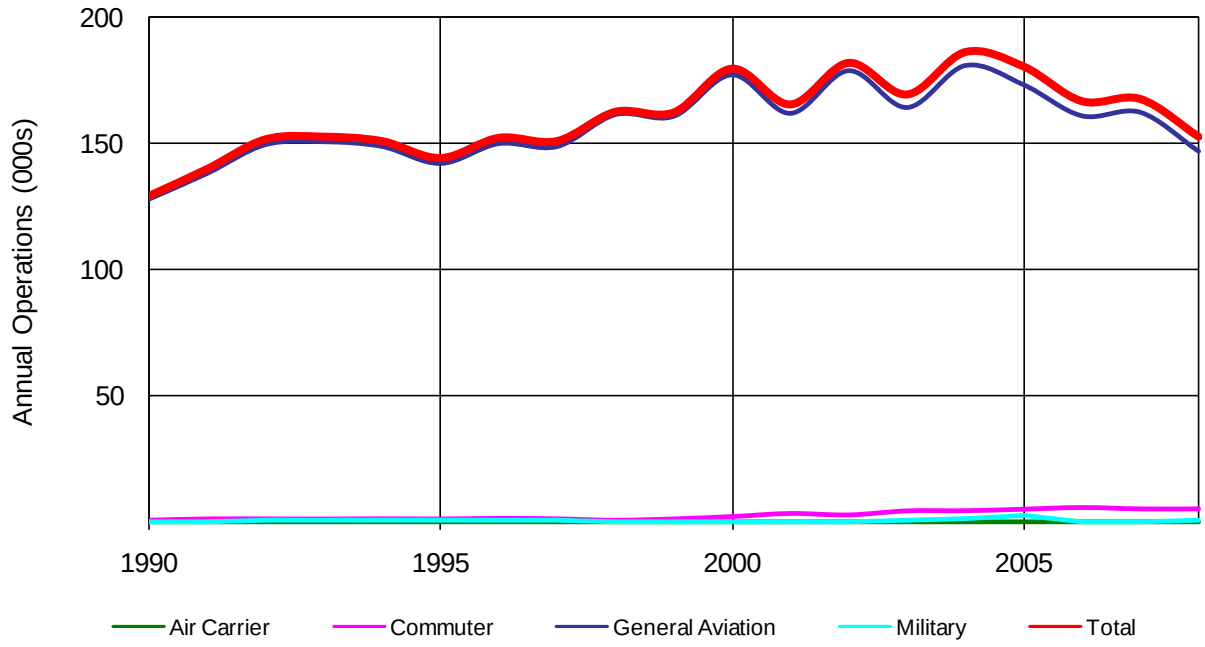
Air Carrier operations have fluctuated over the past 18-year period, ranging from 10 in 1990 to a high of 14 in 2005 and none in 2007. These infrequent air carrier operations are related to charter activities.

Commuter operations grew considerably from 1990 to 2006 at Rocky Mountain Metropolitan Airport, increasing from 920 operations to a peak of more than 5,600 in 2006. However, there was a national decline in the commuter operations category from 2006 through 2008. While there are many reasons why these operations may have declined over the past few years, it is likely that they have been impacted by the poor national economic conditions and high fuel prices.

The overwhelming majority of operations at the Airport are flown in the General Aviation category. As shown General Aviation operations have increased since 1990, on average, by less than one percent annually; however, prior to 2005 had shown steady growth of an average of 2.3 percent annually. During that period, General Aviation operations fluctuated with peaks in 2000, 2002, and 2004 and valleys in 2001 and 2003. The period between 2006 and 2008 is marked by a decline in activity. This decline corresponds to a period of weakening economic climate coupled with a sharp increase in fuel prices that most likely impacted demand in the aviation sector and at Metro.

Since 1990, annual military aircraft operations at the Airport have fluctuated from a few hundred to a few thousand. Recent activity levels have been higher than the previous years with 442 annual operations in 2006 and 869 in 2008. While the recent annual numbers are on the rise, it is not unusual for military aircraft operations counts to increase or decline by large margins as the Department of Defense alters its operational requirements.

Figure 3-1
HISTORICAL OPERATIONS



Fiscal Year	Commercial Service			General Aviation	Military	Total	Annual Increase (Decrease)
	Air Carrier	Commuter	Total				
1990	10	920	930	128,042	482	129,454	
1995	0	1,362	1,362	142,156	1,001	144,519	2.2%
2000	0	2,259	2,259	177,256	489	180,004	4.5%
2004	0	4,432	4,432	180,918	1,252	186,602	0.9%
2005	14	4,993	5,007	173,310	2,541	180,858	- 3.1%
2006	4	5,617	5,621	161,008	442	167,071	- 7.6%
2007	0	5,104	5,104	162,408	456	167,968	0.5%
2008	1	5,112	5,113	147,001	869	152,983	- 8.9%
Avg Annual Growth Rate							
1990 - 2005	2.3%	11.9%	11.9%	2.0%	11.7%	2.3%	
1990 - 2008	-12.0%	10.0%	9.9%	0.8%	3.3%	0.9%	

Source: 2008 FAA Terminal Area Forecast (TAF)

3.2 FACTORS AFFECTING FUTURE AVIATION DEMAND

Consideration of a community's economic character is particularly important to the determination of business travel and General Aviation activity levels. Before forecasting, several conditions and assumptions should be discussed in order to lay out the foundation of aviation demand at the Airport. A brief discussion on recent and projected economic trends and socio economic conditions will occur within this section. These variables are reviewed to determine what effect they may have on future aviation activity at the Airport.

3.2.1 Recent and Projected Economic Trends

The terrorist acts of September 11, 2001 resulted in a pronounced negative impact on the aviation industry due to increased security and perceived hassle of flying. All airports were negatively affected, some more than others. The initial result for the Airport was a moderate downturn with a recovery in late 2002.

The national recession that started in 2006/2007 has resulted in a negative economic situation. National trends indicate retail sales, consumer spending, and consumer confidence continue to drop, which has kept the national economy stagnated. While the severity and length of the recession is unknown, economists predict a return to growth sometime in 2010.

The overall trend from 1990 to 2005 for on-airport businesses has shown steady growth in activity. These businesses include: flight training, aircraft rentals, aircraft chartering, and aircraft sales. Further, there continues to be a waiting list and strong interest in additional aircraft hangar facilities.

Aviation fuel sales at an airport are correlated with demand. General Aviation users require Av Gas for piston aircraft and Jet A for turbine aircraft. Large turbine powered general aviation and charter service aircraft typically require Jet A fuel. In 1992, only 1.7 million gallons of fuel were sold and by 2008, 4 million gallons had been sold at Metro. This is a 6 percent average annual growth rate. This increase in demand demonstrates the ever increasing presence of larger turbine aircraft at the Airport and the overall increase in Airport activity.

3.2.2 Socio Economic Conditions

The Airport is considered an essential asset and is recognized as a critical component of the economic condition of the surrounding municipalities and their leaders. The overall attitude of the surrounding counties is to maintain a safe and efficient airport facility that supports regional transportation demands and the growth of aviation related businesses.

Socio economic indicators most often studied are population, employment, and gross sales. One of the key issues regarding the future growth of Jefferson County is that a new connector highway, the Northwest Parkway, is proposed to be constructed adjacent to the Airport. This portion of the

Northwest Parkway is the last remaining portion of roadway to connect the northern end of C-470 with the southern end and complete the highway loop, or beltway, around the Denver Metropolitan area. The Jefferson Economic Council, in conjunction with the Development Research Partners, conducted a study to explore the economic and fiscal impacts of developing the Northwest Corridor Area within Jefferson County over a 20-year period with and without the completion of the Northwest Parkway. This study provides relevant insight to the socio economic conditions immediately surrounding the Airport. The following summarizes the finding of the Northwest Corridor Study regarding population, employment, and gross sales in the region.

The northwest corridor of the Denver Metropolitan area surrounds the proposed location of the Northwest Parkway and extends out to included areas that would be developed as a result of the parkway. The study area extends from State Highway 58, I-70, and C-470 in the southern portion of Jefferson County north to U.S. 36 in the City and County of Broomfield, encompassing 3,345 acres.

The results of this study were that the economic and fiscal impacts would be nearly double with the construction of the roadway than without the roadway. The net economical impact of the development in the Northwest Corridor area is expected to reach $9 billion over the 20-year period without the new roadway. If the roadway is constructed, this figure is estimated to increase by 94 percent to 17.4 billion.

As this relates to population growth, this study utilized Denver Regional Council of Governments (DRCOG) Cycle 2, 2008 Land Use Data, which anticipates the Northwest Corridor area to grow in population from 155,521 in 2005 to 228,375 in 2030, which is a two percent average annual growth rate over twenty five years.

The Airport is situated within the northern quadrant of the study area – the area expected to have the highest impact by the highway. This northern subset of the study area extends north of West 80th Avenue to U.S. 36 in the City and County of Broomfield. As this relates to population growth, this subset of the study area is anticipated to grow from 53,974 individuals in 2005 to 103,795 individuals in 2030, which is a three percent average annual growth rate over twenty-five years.

3.2.2.1 Population Employment, and Gross Sales

The population in the Airport's service area has continued to demonstrate growth. According to the DRCOG, the population of Jefferson County and the surrounding counties of Adams, Boulder, Broomfield, and Denver increased from 1,474,159 individuals in 2000 to 1,628,529 individuals in 2008. The population is expected to increase to 2,229,202 individuals by 2030, which is a 1.4 percent annual growth rate.

According to DRCOG, the total employment for the counties adjacent to the Airport was approximately 1,123,358 persons in 2005 and is projected to be 1,689,603 persons in 2030. This represents an annual growth rate of 2.0 percent.

According to Gross Sales Reports provided to the state by each of these counties, every county has seen an increase in gross sales year after year. In 2000, total gross sales for the five counties were over $60 billion. In 2008, total gross sales increased to roughly $95 billion, an annual increase of 6 percent. Despite recent downward economic trends, overall socio economic indictors derived from examination of local historical trends and forecast conditions illustrate a positive outlook for the airport service area.

The variables discussed in this portion of the Master Plan play an important role in the future demands for aviation activity at the Airport. The Airport service area has experienced steady population, economic, and employment growth since the early 1990s. Prior to the economic recession that has softened consumer demand in nearly every sector, the Airport enjoyed stable long-term growth. It is not considered likely that factors specific to the Airport's service area have softened demand, but rather the national economy is the cause of reduced demand. Accordingly, this forecast may not be able to accurately predict the nature and timing of the recovery of the national economy and continued growth in demand for aviation services.

3.3 ENPLANED PASSENGER FORECAST

An enplaned passenger forecast is the basis for determination of the future facilities needed to accommodate projected passenger demand. The Federal Aviation Administration prepares the Terminal Area Forecast (TAF), which is the official aviation activity forecast for all airports in the National Plan of Integrated Airport Systems (NPIAS). The TAF is the forecast of the overall national aviation system. This national forecast is then allocated to individual airports according to size and activity levels.

The Airport has not historically been a major location for commercial air passengers. Official FAA records have recorded zero annual passengers in most years; however, actual enplanements have varied over the last 20 years. Annual enplanement levels in the 1990s ranged from 0 to 156 enplanements. Annual enplanement levels since 2000 have ranged from 0 to 2,700 enplanements. The highest enplanement level was reached in 2008, when 2,700 nonscheduled/on-demand air carrier enplanements occurred. This recent climb in on-demand air carrier enplanements and the expectation that future commercial enplanements will occur is due to these three main reasons:

- The Airport is recognized as a place where executive business travelers can conveniently bypass the congested airspace and terminal traffic around Denver International Airport. Using the Airport for commercial flights can often reduce passenger drive time, aircraft operating costs, and be more efficient for passengers and airlines alike. That is, charter passengers from the northwest area of greater Denver can more easily use the Airport

rather than drive to Denver International. Further, the airline's costs can be substantially reduced.

- Denver Air Connection began daily direct non-scheduled/on demand flights from Metro to Grand Junction, CO in 2006. Denver Air Connection offers these services in a 19 seat Metroliner. This service provides benefits that executive business travelers have already discovered. Denver Air Connection can cost less per person than a full fare on most airlines departing from Denver International Airport or an executive charter operator. This is primarily due to the operating cost of a Metroliner and operating the aircraft as non-scheduled/on demand, which involves fewer federal regulations.

- With the University of Colorado only 12 miles away, collegiate sport teams utilize Metro for their air travel needs. For collegiate sports teams, either visiting opponents or away game travel, Metro's Airport is a convenient, consistent, and effective location for teams to reach their sporting activity.

The process of developing a preferred enplanement forecast is interpretive and is based on knowledge of local aviation trends and understanding of the factors that affect those trends. Therefore, the accuracy of the forecast depends greatly upon how well future trends are predicted and how these trends impact traffic at the Airport.

The current trend for Metro reflects the expectation of positive air service and passenger level growth following a long period of no activity or slow growth. Interviews with several nonscheduled/on-demand air carriers based at Metro support these assumptions and data collected suggests an average of 8 - 10 enplanements occurring each day on corporate charter type aircraft, as well as approximately 75 enplanements monthly during the seasonal athletic schedule of the University of Colorado.

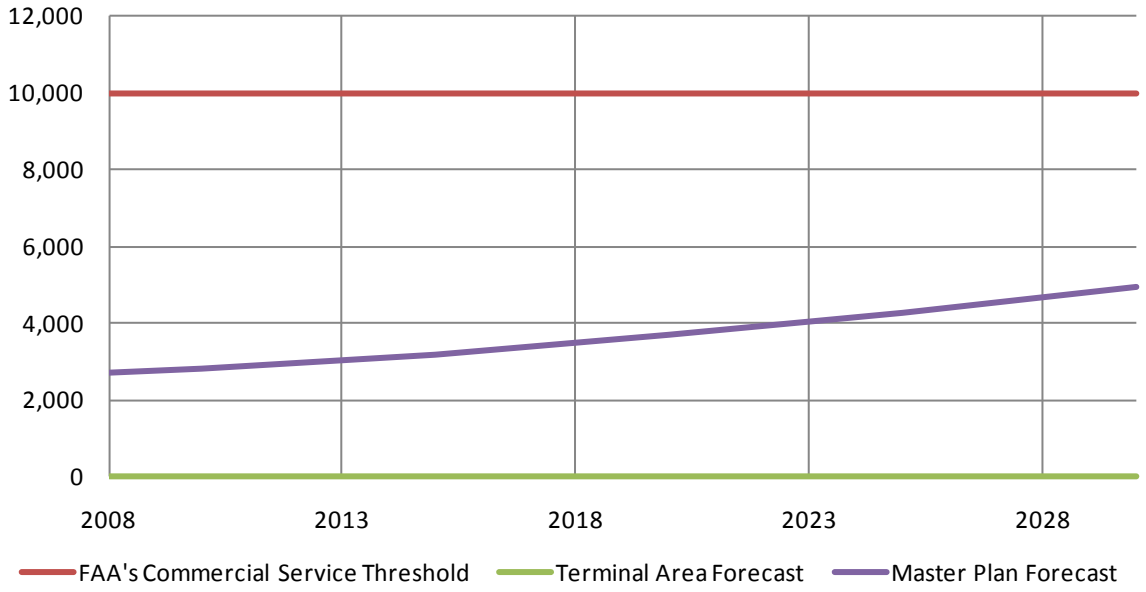
For the purpose of this study, the following scenario will serve as the basis for planning. There are a number of economic and socioeconomic trends that indicate that the basic character of the Airport service area has changed in a way that more readily supports and relies on nonscheduled/on-demand air travel. This change is becoming clear and is judged to be a fundamental and permanent shift in the character of the market. Therefore, the current trends scenario is most reflective of likely future conditions. Enplanements are projected to increase from roughly 2,700 annually in 2008 to approximately 4,900 in 2030. The preferred commercial enplanement forecast is shown in Figure 3-2.

It is important to note that, according to the FAA, a public-use airport enplaning less than 2,500 annual passengers is considered a General Aviation Airport. When enplanement levels reach 2,500, but less than 10,000 passengers annually the airport is considered a Non-Primary Commercial Service Airport. Over the 10,000 annual passengers level the airport is considered a Primary Commercial Service airport. At each of these levels the airport's "role" in the National Plan of Integrated Airport Systems (NIPAS) changes. This change in "role" can result in a dramatic shift in Federal project priorities and eligible funding under the Federal Airport Improvement Program (AIP).

Under the Federal Airport Improvement Program, development grants are provided through an entitlement program. Entitlement grants are apportioned to airports according to the number of enplaning passengers at that airport and priorities established by Congress. Under this program, commercial service airports are defined as those receiving scheduled passenger service of at least 2,500 or more annual enplanements. For funding purposes, airports are classified into primary, non-primary, reliever, and general aviation airports. Metro is a reliever airport, which is a subset of the general aviation category. As a reliever airport, Metro receives special funding considerations under the Federal Airport Improvement Program.

Metro is not expected to surpass the 10,000 annual passengers or begin to provide scheduled passenger service within the 20-year planning period. However, if this were to change, it is recommended that the airport re-evaluate its role within the NPIAS and any financial implications that it may cause.

Figure 3-2
ENPLANED PASSENGER FORECAST



Fiscal Year	Forecast	
	Terminal Area	Master Plan
2008	0	2,700
2010	0	2,800
2015	0	3,200
2020	0	3,600
2030	0	4,900
Avg Annual Growth Rate 2008-2030	0%	2.7%

Source: Reynolds, Smith and Hills, Inc., 2009; FAA Terminal Area Forecast (TAF), 2008

3.4 AIRCRAFT OPERATIONS FORECAST

Airfield activity at the Airport is measured and forecast according to annual aircraft operations, which are defined as an aircraft taking off or landing. This activity can have several impacts on a facility. For busy airports, especially large commercial service or reliever airports, capacity and delay issues can be significant. Operations can be a source of revenue for commercial service and General Aviation airports through the collection of landing fees and fuel sales. Finally, operations can indicate the type of facility that will be required in order to accommodate the aircraft or class of aircraft that is using the airport on a regular basis. Driven primarily by General Aviation demand for its facilities, the Airport will use this projection to identify demand for airfield design criteria selection and aircraft storage facility requirements.

3.4.1 Commercial Service Operations Forecast

For planning purposes, Commercial service operations come from either an Air Carrier or Commuter operator. The FAA defines an Air Carrier operation as an aircraft with a "seating capacity of more than 60 seats or a cargo payload capacity of more than 18,000 pounds". Further, the aircraft must be carrying passengers or cargo for hire or compensation. Commuter operations should also represent scheduled commercial flights for aircraft with 60 seats or fewer or a cargo payload capacity of 18,000 pounds or less. This category includes air taxi operations, which are nonscheduled commercial flights or those for-hire flights using aircraft with 60 or fewer seats or a payload capacity of 18,000 pounds or less.

The Commercial Service operations forecast was prepared using historical activity. Air carrier operations occur at the Airport infrequently and when they do occur, the operation is typically training related rather than carrier passenger related. The operations that are forecast within this planning period are anticipated to remain training related and as the FAA Terminal Area Forecast indicate.

As discussed, Metro does not have scheduled passenger services; however, air taxi operators do provide nonscheduled commercial flights. Therefore, the forecast of operations performed by commuter (Air Taxi) aircraft is a function of the number of seats on the aircraft used to serve the airport and the percentage of seats occupied in those aircraft. As shown in Table 3-1 total commercial service operations are projected to remain constant over the planning period, while enplanements are expected to increase by two percent annually. This is an increase in load factor or seat capacity rather than additional frequency.

Table 3-1
COMMERCIAL SERVICE OPERATIONS FORECAST

Fiscal Year	Forecast	
	Air Carrier	Commuter (Air Taxi)
2008	1	5,112
2010	1	5,112
2015	1	5,112
2020	1	5,112
2030	1	5,114
Avg Annual Growth Rate 2008-2030	0%	0%

Source: Reynolds, Smith, and Hills, Inc. 2009

3.4.2 Total General Aviation Operations Forecast

Figure *3-3* presents the forecast of total operations at the Airport for the combined elements of commercial service operations, military operations, and general aviation operations. Figure 3-3 provides the historical data for total operations at the Airport since 1990. Also shown are four forecasts; the previous Master Plan Study completed in 2000, the FAA Terminal Area Forecast, and two projections of this Master Plan – a high range and low range calculation.

Following the historical operations line in Figure 3-3, the 2000 Airport Master Plan is shown in the graph as the topmost line and the takeoff point reflects the assumption that followed the completion of the previous Master Plan. Operations were projected to be 209,200 in 2010 and increase at 1.8 percent annually to 268,100 operations in 2030.

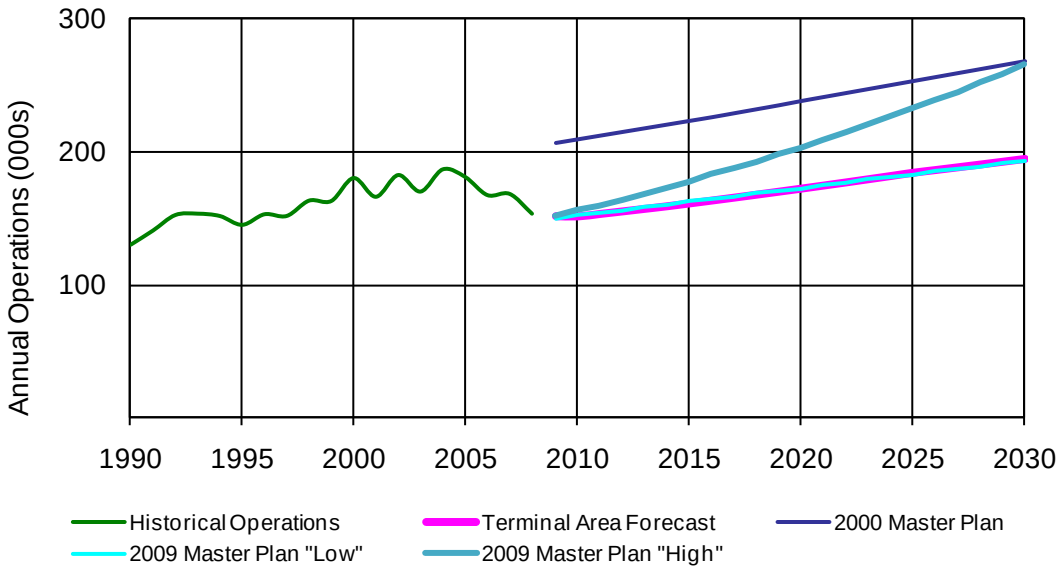
The 2008 FAA Terminal Area Forecast (TAF) estimates operations at the Airport to grow at an average annual growth rate of approximately 1.0 percent annually. In Figure 3-3, the TAF line shows the projection in 2010 to be 151,442 annual operations, which is lower than historical operations recorded in the base year (2008). According to the TAF, annual operations are estimated to be 151,442 in 2010 and grow to 194,823 in 2030.

The High Range scenario for operations projects the growth rate at 1.8 percent annually. This is the upper limits of this Master Plan's projections, which shows an estimated 2010 level of 155,600 annual operations growing to 265,200 in 2030. The growth rate results from a trend analysis approach that recognizes the 1990-2005 historical growth rate of 2.3 percent, adjusted to account for the recent downward trend between 2006-2008.

The Low Range scenario projects operations to grow at a modest rate similar to the average annual growth rate projected by the FAA in the TAF for the Airport. Operations are projected to increase at 1.0 percent annually, corrected to use historical data for the base year. This line show the lower limits of this Master Plan's projections for the forecast period, which show annual operations, estimated to be 151,900 in 2010 and grow to 193,300 in 2030.

The High and Low Range forecasts provide upper and lower limits for actual demand as it occurs. These forecast scenarios assume demand for aviation-related business and use for the Airport and its services will return to pre-recession levels. These scenarios are also dependent on the expectation of relatively robust socioeconomic conditions to return to the region after the recession, and that retail sales, consumer spending, and consumer confidence will recover. It also accounts for the uncertainty regarding the reversal of the current downward trend. This approach is taken in place of an attempt to forecast a continued downturn of an unknown duration followed by a recovery.

Figure 3-3
TOTAL OPERATIONS FORECAST



Fiscal Year	Historical Operations	Projected			
		FAA TAF	2000 Master Plan	2009 Master Plan Low	2009 Master Plan High
1990	129,454				
1995	144,519				
2000	180,004				
2004	186,602				
2005	180,858				
2006	167,071				
2007	167,968				
2008	152,983				
2010		151,442	209,200	151,900	155,600
2015		161,269	223,100	162,200	177,800
2020		172,433	238,100	172,600	203,200
2030		194,823	268,100	193,300	265,200
Avg Annual Growth Rate					
1990 - 2005	2.3%				
1990 - 2008	0.9%				
1990 - 2030		1.0%	1.8%	1.0%	1.8%

Source: 2008 FAA Terminal Area Forecast (TAF), RS&H, 2009

3.5 INSTRUMENT OPERATIONS FORECAST

An instrument operation is an arrival or a departure of an aircraft operating in accordance with an Instrument Flight Rules (IFR) flight plan. Instrument operations are used in part by the FAA to determine an airport's eligibility for enhanced instrument approach capability and additional navigations aids.

Historical and forecast instrument approach data for the Airport are presented in Table 3-2. Annual instrument approaches have increased from 6,326 in 1990 to 25,559 in 2008, representing an average annual increase of 8.1 percent during this period. Instrument operations are anticipated to increase at the pro-rated share that each component of total operations is anticipated to increase over the planning period. This results in an estimated 42,439 instrument operations in 2030.

Table 3-2
INSTRUMENT OPERATIONS FORECAST

Fiscal Year	Airport Operations	Instrument Operations
1990	129,454	6,326
1995	144,519	13,489
2000	180,004	19,728
2004	186,602	25,907
2005	180,858	26,899
2006	167,071	28,101
2007	167,968	26,626
2008	152,983	25,559
2010	155,682	24,909
2015	177,865	28,458
2020	203,209	32,513
2030	265,245	42,439
Avg Annual Growth Rate		
1990 - 2005	2.3%	10.1%
1990 - 2008	0.9%	8.1%
1990 - 2030	1.8%	4.9%

Source: 2008 FAA Terminal Area Forecast (TAF); Air Traffic Activity Data Systems (ATADS)

3.6 BASED AIRCRAFT FORECAST

Another measure of aviation activity is the number of based aircraft. This is defined as the count of aircraft permanently stored at an airport. Based aircraft categories include single-engine, multi-engine, jet, and rotorcraft.

The number of based aircraft is an important measure of an airport's activity and based aircraft determine revenues from tie-down and hangar leases. The number of existing and projected based aircraft is also needed to evaluate the size of the ramp, tie-down, and hangar areas. Additionally, a based aircraft could be the "critical" or design aircraft, which would dictate the minimum standards applied to the construction or improvement of an airport. Otherwise, the critical aircraft would be the airplane, or family of airplanes, that account for at least 500 annual itinerant operations at an airport. Itinerant operations are operations that originate at a different airport or operations that occur outside the local traffic pattern (typically 20 miles) of the airport. Operations by visiting aircraft, some flight training operations, and recreational flights to other airports are counted as itinerant operations.

Table 3-3 details historical based aircraft at the Airport from 1990 to 2008 along with national, regional, and state historical based aircraft information. This data comes from the FAA TAF. According to airport records, the actual number of based aircraft is 430, which establishes the starting point for this projection. The national, regional, and state TAF data shown in the table have been extrapolated and/or interpolated to match the forecast intervals for this projection.

Table 3-3
BASED AIRCRAFT

Fiscal Year	FAA Terminal Area Forecast				Master Plan Forecast
	National	Region	State	RMMA	
1990	164,396	17,420	3,849	408	408
1995	159,844	17,771	3,726	443	443
2000	182,128	20,861	4,157	460	460
2004	195,444	23,577	4,831	372	372
2005	199,630	24,005	5,033	372	372
2006	199,616	24,315	4,955	327	327
2007	202,084	25,502	5,040	327	327
2008	203,534	25,805	5,089	331	430
2010	206,709	26,336	5,182	341	439
2015	215,287	27,811	5,440	369	461
2020	224,632	29,352	5,712	399	485
2030	247,521	33,728	6,414	457	535
Avg Annual Growth Rate					
1990 - 2005	1.3%	2.2%	1.8%	- 0.6%	- 0.6%
1990 - 2008	1.2%	2.2%	1.6%	- 1.2%	0.3%
1990 - 2030	1.0%	1.7%	1.3%	0.3%	0.7%
2008 - 2030	0.9%	1.2%	1.1%	1.5%	1.0%

Source: 2008 FAA Terminal Area Forecast (TAF); Airport Records

The national General Aviation industry has experienced declines in certain measures of activity since the early 1980s, including new aircraft shipments, active fixed base operators, hours flown, etc.; however, national based aircraft have continued to show an average annual growth rate of approximately 1.2 percent from 1990 to 2008. The national forecast suggests based aircraft will continue to grow over the long term, yet at a slower pace of 1.0 percent from 2008 to 2030.

On the regional level, based aircraft growth has out preformed the national average. The FAA's Northwest Mountain Region includes the states of Colorado, Idaho, Montana, Oregon, Utah, Washington, and Wyoming. The FAA Northwest Mountain Region has had a based aircraft

historical average annual growth rate of 2.2 percent from 1990 to 2008. The regional forecast suggests based aircraft growth rate will continue to outperform the national average over the long term by 0.2 percent, an average annual growth rate of 1.2 percent from 2008 to 2030.

According to the TAF, the Airport's based aircraft have deceased over the same period resulting in an average annual reduction of approximately minus 1.2 percent from 1990 to 2008. The TAF does; however, forecast growth of based aircraft. The TAF indicates that based aircraft will grow from 331 in 2008 to 457 in 2030. This is an average annual growth rate of 1.5 percent, which is an increase of 126 based aircraft.

The element that should be consider here is the recent historical record of decline in based aircraft at the Airport since an all time high of 460 in 2000 to the present 430 in 2008. It is conceivable that the number of based aircraft did drop; however, a loss of 30 aircraft is highly unlikely over an 8-year period. Every indicator related to the Airport has shown growth over the same period such as, total airport operations, fuel sales, regional population, regional income, gross sales, etc. It is likely that the following two things occurred:

1) The Airport based aircraft number has actually been increasing for more than a one-year period, particularly given that the Airport has added T-hangars in recent years that have quickly filled, along with an active hangar waiting list, but the growth was not noted in the historical statistics.

2) The based aircraft did drop off in 2000, because, aircraft operators sold, retired or disposed of their aircraft. At which time the aircraft operator recorded a loss of based aircraft to the Airport. When that aircraft operation replaced, upgraded, or entering into fractional ownerships agreement, they neglected to record the change with the Airport.

It is projected in this analysis that based aircraft at the Airport will grow at a similar rate as the State of Colorado (1.1 percent annual growth). This projection begins at the verified 430 based aircraft, rather than the 331 the TAF suggests. The projection carries a 1.0 percent growth rate out to 2030. This is believed to be a conservative estimate considering: 1) the average annual growth rate since 1990 shows a negative growth rate; 2) the current economic conditions, and 3) the explanation for the recent drop in based aircraft. Relative to the TAF, which indicates a growth rate of 0.5 percent higher, the difference with this forecast can be attributed to the base year value difference of 99 aircraft (430 actual vs. 331 TAF). The result of the forecast is an increase of 105 based aircraft over the planning period, as shown in Table 3-3.

3.7 BASED AIRCRAFT BY TYPE

The based aircraft projection has been further broken down by type of aircraft. The TAF recognizes five key subcategories of aircraft for forecasting purposes: Single Engine, Multi Engine, Turboprop, Jet, and Helicopter.

Table 3-4 projects the breakdown of based aircraft by type at the Airport. It is assumed that the local based aircraft fleet mix would generally trend toward national fleet mix averages with the exception of rotorcraft. Therefore, single-engine piston aircraft are expected to continue to dominate the based aircraft fleet, while multi-engine and jet aircraft are projected to increase at a higher rate.

Table 3-4
FORECAST BASED AIRCRAFT BY TYPE

		Planning Activity Level		
	2008	**1**	**2**	**3**
Based General Aviation Aircraft				
Single Engine	343	366	356	425
Multi- Engine	19	20	21	23
Turbo- Prop	16	17	17	19
Jet	38	43	45	50
Helicopter	14	15	16	18
Total General Aviation Based Aircraft	430	461	455	535
Hangar Space				
T-Hangar Needed	326	347	339	403
T-Hangar Available	181	181	181	181
Additional T-Hangars Needed	145	166	158	222
Conventional Hangar Needed	68	75	78	87
Conventional Hangar Available	70	70	70	70
Additional Conventional Hangars Needed	0	5	8	17

Sources: Airport Records and RS&H 2009

In terms of growth rates, the largest percentage gains will be made in the jet category, which is consistent with current national and local aviation trends. However, the data is easily misleading when the values are so small. In actuality, over a 22 year period the projection calls for the addition of only 12 jets. The largest percentage of aircraft that will lead to the overall total in 2030 of 535 aircraft will be in the single engine piston category.

As concluded in the 2000 Airport Master Plan, the Airport will remain in a viable place to capture a share of regionally based jets due to the Metro's attractiveness for corporate travel and business activities. This projection assumes the national economy will recover in the 20-year forecast period

and overall aviation activity will increase at the Airport. Further, consideration was given to the waiting list of 77 primarily small single engine aircraft (with a wingspan less than 49 feet and a approach speed less than 91 knots) as of October 2008. The owners of these aircraft have expressed an interest in basing their aircraft at the Airport, once hangar space becomes available.

The key to extracting the proper conclusions from this analysis is to ensure contingency plans are in place to accommodate a jump in based aircraft. Land should be set aside for constructing hangars in advance and a source of local match funds should be identified for the construction of additional infrastructure such as new aprons, taxiways, utilities, and access roads to support based aircraft activity. This issue of providing space for future expansion will be addressed in subsequent chapters of this study.

3.8 ANNUAL OPERATIONS BY AIRPORT REFERENCE CODE

Another important element of forecasting airport growth is to identify the types of aircraft that are expected to operate at the facility over time. Being able to anticipate this trend and have plans in place to accommodate the demand, when it materializes, is crucial for effective planning.

The Airport Reference Code (ARC) is a coding system developed by the FAA to relate airport design criteria to the operational and physical characteristics of the airplane types that will operate at a particular airport. The ARC has two components relating to the airport design aircraft. The first component, depicted by a letter, is the aircraft approach category and relates to aircraft approach speed. The second component, depicted by a Roman numeral, is the airplane design group and relates to airplane wingspan. In the case of Design Group I, an additional designation of "small aircraft only" relates to aircraft with gross weights of 12,500 pounds or less. Generally, aircraft approach speed applies to runways and runway length related features. Airplane wingspan primarily relates to separation criteria and width-related features.

Airports expected to accommodate single-engine airplanes normally fall into Airport Reference Code A-I or B-I. Airports serving larger general aviation and commuter-type planes are usually Airport Reference Code B-II or B-III. Small to medium-sized airports serving air carriers are usually Airport Reference Code C-III, while larger air carrier airports are usually Airport Reference Code D-IV or D-V. A review of the existing Airport Reference Codes for each system plan airport shows:

The elements that comprise the Airport Reference Code (ARC) are:

Aircraft Approach Category. A grouping of aircraft based on 1.3 times the aircraft stall speed in landing configuration at the maximum certificated landing weight. The categories are as follows:

Category A: Speed less than 91 knots.

Category B: Speed 91 knots or more but less than 121 knots.

Category C: Speed 121 knots or more but less than 141 knots.

Category D: Speed 141 knots or more but less than 166 knots.

Category E: Speed 166 knots or more.

Airplane Design Group (ADG). A grouping of airplanes based on wingspan or tail height. Where an airplane is in two categories, the most demanding category is used. The groups are as follows:

Group I: Up to but not including 49 feet (15 m) wingspan or tail height up to but not including 20 feet.

Group II: 49 feet (15 m) up to but not including 79 feet (24 m) wingspan or tail height from 20 up to but not including 30 feet.

Group III: 79 feet (24 m) up to but not including 118 feet (36 m) wingspan or tail height from 30 up to but not including 45 feet.

Group IV: 118 feet (36 m) up to but not including 171 feet (52 m) wingspan or tail height from 45 up to but not including 60 feet.

Group V: 171 feet (52 m) up to but not including 214 feet (65 m) wingspan or tail height from 60 up to but not including 66 feet.

Group VI: 214 feet (65 m) up to but not including 262 feet (80 m) wingspan or tail height from 66 up to but not including 80 feet.

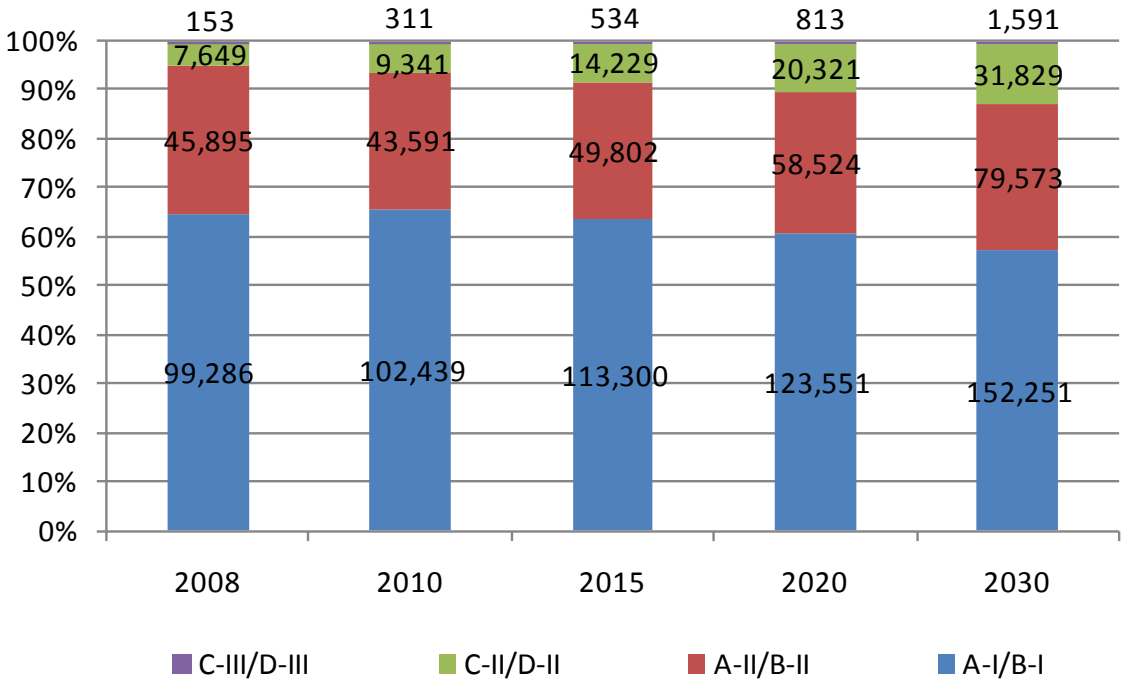
Figure *3-4* provides the forecast of aircraft operations by ARC for the years 2008 through 2030 at Metro. In order to illustrate the data, a chart of the percentage of total operations is also included.

Two key conclusions can be reached from this projection. First is that the growth in the A-I/B-I segment will be nominal and account for a decreasing share of the total operations, which mirrors the nationwide trend in the utilization of small piston powered aircraft.

The second conclusion is that by mid way through the forecast period, there are projected to be over 500 annual itinerant operations by aircraft in the C-III/D-III segment. This level will trigger the need to meet additional FAA airport design criteria. This is a demand-oriented requirement and this trend should be monitored closely to determine the best timing to begin the upgrades necessary to safely accommodate this forecasted demand.

Trends over the past 20 years show that larger corporate jets are either operating at the Airport or operators of these aircraft are requesting information from the Airport staff relative to the facility's ability to accommodate their aircraft.

Figure 3-4
PERCENTAGE OF TOTAL OPERATIONS BY AIRPORT REFERENCE CODE



	A-I/B-I	A-II/B-II	C-II/D-II	C-III/D-III	Total
2008	99,286	45,895	7,649	153	152,983
2010	102,439	43,591	9,341	311	155,682
2015	113,300	49,802	14,229	534	177,865
2020	123,551	58,524	20,321	813	203,209
2030	152,251	79,573	31,829	1,591	265,245

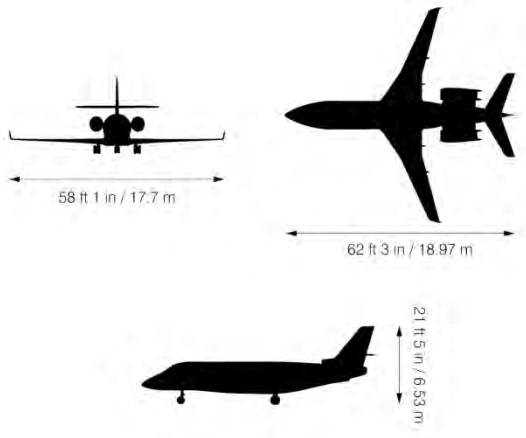
Source: Reynolds, Smith and Hills, 2009

3.9 CRITICAL AIRCRAFT SELECTION

Prior studies have concluded that the "critical" aircraft for the Airport is the Gulfstream Business jet family (G-II, G-III, and G-IV), specifically the Gulfstream 200 (G-II). The existing critical aircraft for Rocky Mountain Metropolitan airport is depicted below in Figure 3-5.

New models to the Gulfstream Jet family are the G350, G450, G500, G550, and G-650. There are two Gulfstream Business Jets (G-IIs) based at the airport. Recently, a third Gulfstream Business Jet (G550) was ordered by a local firm and it is expected to be based at the airport upon delivery. The G-II has a wingspan of 68.8 feet and an approach speed of 141 knots, which places this aircraft in the C-II/D-II family of aircraft. These new generations of business jets have larger wingspans, which place these aircraft in the C-III/D-III family of aircraft. It is anticipated that the Gulfstream family will remain the critical aircraft for the near future because this family of corporate aircraft is so widely used.

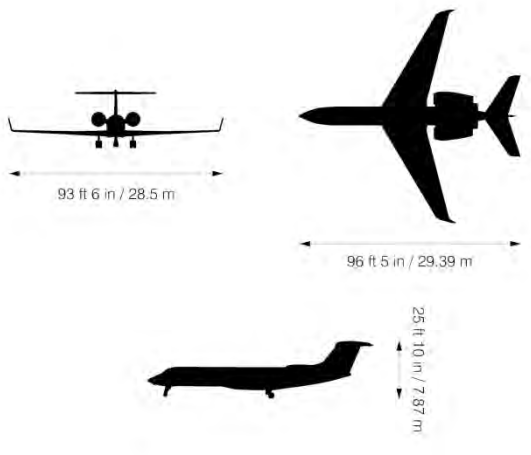
Figure 3-5
EXISTING (2009) CRITICAL AIRCRAFT – GULFSTREAM 200



Source: Gulfstream Aerospace Corporation, 2008

As shown in Figure 3-5 , by the end of the forecast period, aircraft in the C-III/D-III classification weighing less than 150,000 pounds, such as the Gulfstream V/Gulfstream 550, will exceed the threshold of 500 annual itinerant operations, the minimum frequency used to determine the critical aircraft selection. The future critical aircraft for Rocky Mountain Metropolitan airport is depicted in Figure 3-6. The design impact these aircraft bring to airfield improvements and necessary upgrades to accommodate this classification of airplane, are discussed in detail in the following chapter.

Figure 3-6
FUTURE (2015) CRITICAL AIRCRAFT – GULFSTREAM 550



Source: Gulfstream Aerospace Corporation, 2008

3.10 COMPARISON TO FAA FORECASTS

Forecasts prepared in a master plan are reviewed by the FAA and compared to FAA TAF projections. FAA Order 5090.3C provides guidance on the FAA review process and states that the FAA will find a locally developed airport planning forecast acceptable if it meets any of the following three conditions for a general aviation and reliever airport.

1. The forecast differs less than 10 percent in the five-year forecast period and 15 percent in the 10 year period
2. The forecast activity levels do not affect the timing or scale of an airport project
3. The forecast activity levels do not affect the role of the airport as defined in FAA Order 5090.3C

Table 3-5 provides the comparison to the FAA's 2008 Terminal Area Forecast. It should be noted that in an effort to stay consistent with the analysis conducted throughout this chapter, using a base year of 2008 and forecasting out 22-years to 2030, the actual comparison was done at 7-year, 12-year, and 22-year planning increments. This unusual approach was done to be consistent with other planning studies already produced within the Airport's vicinity, such as the Northwest Corridor Area Study. This 22-year planning effort may make this forecast effort easier to compare with other studies conducted by agencies that have forecast expected growth within the area.

To illustrate the FAA acceptance conditions at the 5-year and 10-year planning increments, this master plan forecasts:

- 168,636 total operations in 2013. The TAF indicates 157,170 total operations. The difference between the Master Plan forecast and the TAF forecast is 7.3 percent within the five-year forecast period. This is less than a 10 percent difference.
- 192,664 total operations in 2018. The TAF indicates 167,873 total operations. The difference between the Master Plan and the TAF forecast is 14.8 percent within the 10-year forecast period. This is less than a 15 percent difference.

The 5-year and 10-year forecasts are within the FAA's acceptable range versus the TAF forecasts. In addition, the forecast activity level will not affect the timing or scale of any scheduled airport project or the current role of the Airport. Table 3-6 provides a summary listing of the aviation demand forecasts at the Airport. The summary table provides all of the forecast elements that the FAA requires in the reporting of facility demand projections. Specific reporting categories that are presented in Table 2-5, but not discussed in this chapter include the split of local operations versus itinerant operations. For this projection, the split between those operations that are training flights or remain within 15 miles of the airport, and those that are arriving at the Airport from another airport, will remain constant over the planning period. The other element is the Operations Per Based Aircraft (OPBA) metric. This methodology can be used to correlate projected operations at

facilities without control towers. OPBA also can establish or confirm the correlation between the number of based aircraft to the number of operations.

These projections are used in the next chapter of the Master Plan to assess the capacity of existing facilities and determine facility expansions or improvements needed to satisfy future demand levels.

Table 3-5
COMPARISON TO FAA TERMINAL AREA FORECAST

Description	Year	Master Plan Forecast	TAF	AF/TAF (% Difference)
Enplanements				
Base yr.	2008	2,700	0*	-
Base yr. + 5yrs.	2013	3,000	0	-
Base yr. + 7yrs.	2015	3,200	0	-
Base yr. + 10yrs.	2018	3,400	0	-
Base yr. + 12yrs.	2020	3,600	0	-
Base yr. + 22yrs.	2030	4,900	0	-
Total Operations				
Base yr.	2008	152,983	152,983	0.0%
Base yr. + 5yrs.	2013	168,636	157,170	7.3%
Base yr. + 7yrs.	2015	177,865	161,269	10.3%
Base yr. + 10yrs.	2018	192,664	167,873	14.8%
Base yr. + 12yrs.	2020	203,209	172,433	17.8%
Base yr. + 22yrs.	2030	265,245	194,823	36.1%
Based Aircraft				
Base yr.	2008	430	331	29.9%
Base yr. + 5yrs.	2013	452	358	26.3%
Base yr. + 7yrs.	2015	461	369	24.9%
Base yr. + 10yrs.	2018	475	387	22.7%
Base yr. + 12yrs.	2020	485	399	21.6%
Base yr. + 22yrs.	2030	535	457	17.1%

NOTE: TAF data is on a U.S. Government fiscal year basis (October through September).
* Enplanements not forecast in TAF.

Source: 2008 FAA Terminal Area Forecast (TAF); Reynolds, Smith and Hills 2009

Table 3-6
FORECAST SUMMARY

AIRPORT NAME: Rocky Mountain Metropolitan Airport

Specify base year: 2008

A. Forecast Levels and Growth Rates

	2008 Base Yr. Level	2010 Base Yr. + 2yr.	2015 Base Yr. + 7yrs.	2020 Base Yr. + 12yrs.	2030 Base Yr. + 22yrs.	Average Annual Compound Growth Rates: 2008 Base Yr. Level	2015 Base Yr. + 7yrs.	2020 Base Yr. + 12yrs.	2030 Base Yr. + 22yrs.
Passenger Enplanements									
Air Carrier	0	0	0	0	0	0.0%	0.0%	0.0%	0.0%
Commuter (Non-scheduled/On-Demand)	2,700	2,800	3,200	3,600	4,940	3.7%	3.5%	2.9%	4.1%
Total Enplanements	**2,700**	**2,800**	**3,200**	**3,600**	**4,940**	**3.7%**	**3.5%**	**2.9%**	**4.1%**
Operations									
Itinerant									
Air carrier	1	1	1	1	1	0.0%	0.0%	0.0%	0.0%
Commuter/air taxi	5,112	5,112	5,112	5,112	5,114	0.0%	0.0%	0.0%	0.0%
Total Commercial Operations	5,113	5,113	5,113	5,113	5,115	0.0%	0.0%	0.0%	0.0%
General aviation	42,882	43,665	50,098	57,448	75,438	1.8%	2.2%	2.5%	2.6%
Local									
General aviation	108,618	110,534	126,284	144,278	188,324	1.8%	2.2%	2.4%	2.5%
Total Operations	**152,983**	**155,682**	**177,865**	**203,209**	**265,245**	**1.8%**	**2.2%**	**2.4%**	**2.5%**
Instrument Operations	25,559	24,909	28,458	32,513	42,439	-2.5%	1.5%	2.0%	2.3%
Based Aircraft									
Single Engine (Nonjet)	343	349	366	386	425	1.7%	0.9%	1.0%	1.0%
Multi Engine (Nonjet)	19	19	20	21	23	0.0%	0.7%	0.8%	0.9%
Turboprop	16	16	17	17	19	0.0%	0.9%	0.5%	0.8%
Jet Engine	38	41	43	45	50	7.9%	1.8%	1.4%	1.3%
Helicopter	14	14	15	16	18	0.0%	1.0%	1.1%	1.1%
Total Based Aircraft	**430**	**439**	**461**	**485**	**535**	**2.1%**	**1.0%**	**1.0%**	**1.0%**

B. Operational Factors

	Base Yr. Level	Base Yr. + 2yr.	Base Yr. + 7yrs.	Base Yr. + 12yrs.	Base Yr. + 22yrs.
Operations per based aircraft	356	355	386	419	496

Source: 2008 FAA Terminal Area Forecast (TAF); Reynolds, Smith and Hills 2009