

Update Airport Layout Plan Chapter Three

Forecasts of Aviation Demand



Chapter Three – Forecasts of Aviation Demand

3.0 Introduction

The forecasts of aviation demand are the basis for determining airport facility requirements. These requirements are then used to plan airport development such as runways and taxiways, apron area, hangar space and selection of the appropriate airfield design standards. The forecasts establish the nature and magnitude of aeronautical activity and the associated need for airport development for the 20-year planning period. History has repeatedly demonstrated that airport utilization will vary significantly, depending upon the level of service provided for the public and regional economic conditions. Due to the highly elastic nature of the aviation industry, most aviation forecasts tend to follow trends rather than fluctuations in any given year.

Brief Economic Overview

The previous chapter provided an inventory of aviation activity and conditions salient to an analysis of future aviation activity, but additional information is noted here as background and supplemental.

The national economy started to decline in the summer of 2000 when manufacturing production dropped after numerous interest rate increases by the Federal Reserve Bank in an effort to combat inflation. Despite negative growth in other sectors of the economy, consumer spending kept the gross domestic product in a positive mode. It was predicted that the country would not enter a recession, and 2002 would bring positive growth. Contrary to the predictions

the nation entered a recession in March 2001. The economy recovered only to enter another recession in the end of 2007.

2008 brought many challenges for the nation's economy. Among these were rising interest rates and tightening credit conditions which caused a sharp decline in the housing market. The fourth quarter saw a dramatic decline in lending activity due largely to the turmoil in the financial markets. Energy prices also rose substantially throughout the first half of the year. With the number of lost jobs on the rise, consumer spending began to decline. The automotive industry suffered as sales fell to the lowest number in 16 years. The housing sector was also hit hard, as predicted both housing starts and residential investments experienced substantial declines throughout the year.

Economic growth forecast for 2009 was weak. Inflation was expected to decline and the unemployment rate to rise. 2008 and 2009 was predicted to be the slowest two year growth period since the early 1980's. As predicted, 2009 proved to be another challenging year, as unemployment numbers continued to climb reaching as high as 10 percent. Consumer confidence declined and spending reached a very low 0.7 percent for the first half of 2009. The housing sector continued to be very weak for the remainder of 2009. Vehicle sales were once again very poor, as they reached the lowest rate since the 1960's.

The federal government introduced the Car Allowance Rebate System at the beginning of the third quarter, in an attempt to boost the economy. This program, also known as cash for clunkers, boosted auto sales by nearly 2.0 million units from the previous quarter which helped real GDP grow slightly in the third quarter.

The nation's economy began to show positive growth in 2010 as the Gross Domestic Product increased in 48 states and the District of Columbia. This growth continued in the third and fourth quarters of 2011 at a rate of 1.8 percent and 3 percent respectively. The fourth quarter of 2011 saw the fastest growth since the second quarter of 2010. The national unemployment rate began a slow decline in 2011, and is reaching pre-recession levels. Personal incomes rose slightly in the fourth quarter of 2011 and consumer spending increased. Economic consensus predicts moderate growth in 2012-2013.

Aviation's growth had slowed following the terrorist attack of September 11, 2001, and again more recently with the spike in oil prices and the weak economy. After the terrorist attacks, air travel dropped as much as 50 percent but quickly bounced back to about 75 percent of normal. The current growth in the global economy is resulting in an increased demand for air travel. Industry growth over the next five years is expected to average 3.7 percent per year. As the economy continues to recover the airline industry predicts substantial growth with passenger miles more than doubling over the next 20 years.

Forecast Methodology

Projections of aviation activity may be prepared considering these and other data. Various projections are then considered in the formulation of a forecast. Forecast formulation is a subjective process concerning the extent to

which one projection, or a combination of several projections or prevailing or anticipated conditions, represents a reasonable estimate of future aviation activity.

Several statistical projection techniques are available for forecasting demand at the H.H. Coffield Regional Airport. These include regression, trend and market share.

Regression involves the use of historical data to identify a relationship between the selected dependent variable, such as based aircraft, and an independent variable. This relationship is then applied to projections of the independent variable to produce future values for the dependent variable.

Trend projection provides estimates of future values for aviation demand by determining an historic pattern of change and projecting that pattern into the future. The primary assumption of this methodology is that the same factors will influence future aviation demand as have affected it in the past. It is further assumed that effects will continue to be similar.

Market share projections involve a review of past activity as a percentage of activity in a larger regional, statewide, or national market or environment. These percentages, or market shares, are then applied to activity forecasts for the aviation demand to produce a market share projection.

Application of these statistical projection techniques require strong relationships with historical activity levels of aircraft operations and based aircraft. Strong relationships in this regard may not be particularly valuable for this forecasting effort because of a relatively small area population, economy and changing nature and role of the Airport.

Because of this, these analyses will be de-emphasized for upcoming forecasting efforts. A more subjective judgment of anticipated future aviation activity is necessary and will be employed.

The Forecasts of Aviation Demand are provided in increments of 5, 10, and 20 years over the 20-year planning period. These periods are also classified in phases; Phase I is the first five years, Phase II is the second five years, and Phase III is the last 10 years. Year 2013 is the base forecast year, while 2032 is the final forecast year.

Aeronautical forecasts necessary to determine airport facility requirements include:

1. Based Aircraft
2. Based Aircraft by Type
3. General Aviation Operations
4. General Aviation Operations by Type
5. Aircraft Operations Mix
6. Peak Period Aircraft Operations
7. Instrument Aircraft Operations.

3.1 Based Aircraft

Eight aircraft currently base at the H.H. Coffield Regional Airport. The Airport has some positive features, services the local pilot well and should continue to do so with improvements. National circumstances have slowed the growth of general aviation and the industry awaits a rebound. As general aviation demand continues into the future, pressure for continued growth and development at RCK may continue.

Based Aircraft Projections

Table 3-1 presents Based Aircraft projections using five years' worth of representative baseline data. Based aircraft values in the table are rounded, but percentage changes are not.

The Regression projection is a simple linear regression of the estimated historical number of based aircraft.

Milam County population data were regressed for the forecast periods and then historical-based aircraft data were projected from there to create the Population Regression Forecast.

The Market Share projection provides a forecast of locally-based aircraft applied to an anticipated percentage increase in the forecasts of the total active general aviation fleet via *FAA Aerospace Forecasts Fiscal Years 2012-2032*.

Historical Milam County Per Capita Personal Income (PCPI) data were regressed for the forecast periods and then historical based aircraft data were projected from there to create the PCPI Regression Projection.

The Historical Percentage Change projection applies past growth in based aircraft to each of the three horizon periods or phases, in consecutive five-year increments for the 20-year forecast period.

Data from FAA's Terminal Area Forecast (TAF) is noted in the TAF Adjusted projection. The TAF is FAA's own internal forecasting effort.

Projections on the following page shows that the Population and Market Share Projections and Adjusted TAF are slow growth scenarios, while the remaining projections, Population Regression, the Regression and especially the PCPI projection produce more robust results and show a greater increase in the number of based aircraft at end of every forecast period.

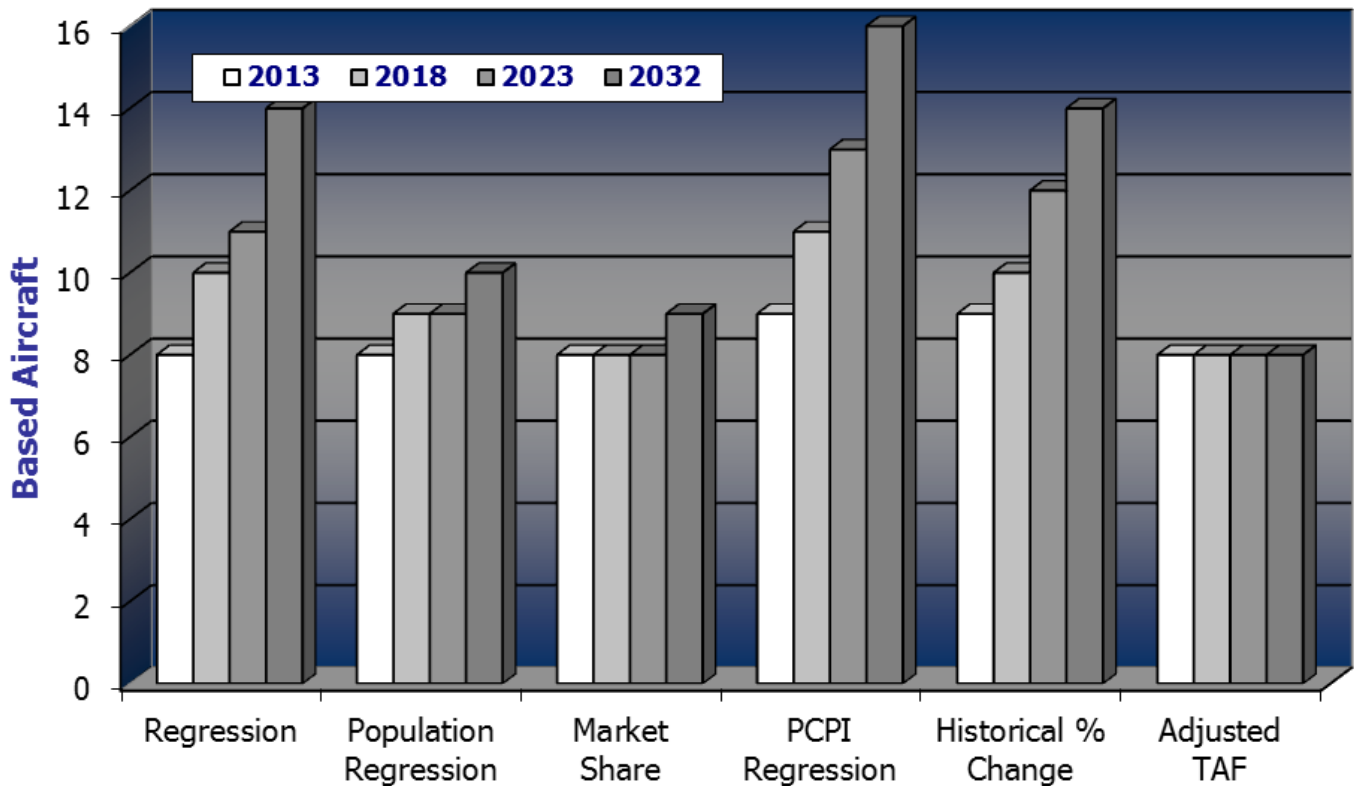
The average 20-year percentage change for these projections approximates 41 percent, statistically suggesting that the Airport could see additional three based aircraft by the year 2032.

But, forecast formulation from various activity projections necessarily requires subjectivity beyond pure statistical analysis.

Table 3-1
Based Aircraft Projections

Year	Regression	Population Regression	Market Share	PCPI Regression	Historical % Change	Adjusted TAF
2013	8	8	8	9	9	8
2018	10	9	8	11	10	8
2023	11	9	8	13	12	8
2032	14	10	9	16	14	8
<i>Annual % Change</i>	<i>2.52%</i>	<i>0.95%</i>	<i>0.6%</i>	<i>3.32%</i>	<i>2.13%</i>	<i>0%</i>
<i>Overall 20-year % Change</i>	<i>60%</i>	<i>25%</i>	<i>11%</i>	<i>102%</i>	<i>49%</i>	<i>0%</i>

**FIGURE 3-1
BASED AIRCRAFT PROJECTIONS**



It is seemingly logical and historically valid that no *substantial* growth in based aircraft should be expected based upon typical indicators of aviation activity, with the exception of Per Capita Personal Income. This projection seemingly skews the overall picture and suggests that the increase in area incomes may play a prominent role in the

future of the Airport, given the strong statistical relationship between disposable income and aviation activity. Also noteworthy are the natural resources extraction activities occurring in areas within the County, and more to the point, around RCK.

RCK is well-suited to accommodate at least portions of this activity and aircraft from oil and gas companies are often noted at area airports. Natural resources companies and other businesses with corporate aircraft would likely visit with larger corporate aircraft if RCK were improved to accommodate their aircraft; accommodation primarily relates to runway length and strength in this instance. Like pavement strength, inadequate runway length may have discouraged larger corporate aircraft from visiting because those aircraft require longer runway lengths for effective operation. Other gas companies visit the area frequently but typically use the Austin area due to airfield inadequacies.

For these reasons, use of the Airport by larger, faster and more expensive aircraft is expected to increase over the next 20 years, especially relative to use by smaller piston-driven aircraft.

It is noteworthy that new based aircraft will likely come to the Airport when new hangars are built. And, when new hangars are built, be they T- or box-type, by either the City or a ground-leased tenant when demand is likely sufficient to fill the space. The result of this, as example, is that the based aircraft count will jump 50 percent when a new T-hanger is built and occupied, meeting or even exceeding forecast demand.

Based Aircraft Forecast By Type

Federal forecasts indicate that on a U.S. national basis, overall growth rates are expected to

approximate 0.6 percent annually. If this formula is applied to a projection, it would indicate that only one new aircraft could be expected to base at the airport over the next 20 years. This forecast may not accurately represent the complete economic picture, or potential for economic development.

Sufficient demand may very well exist for demand to not only exceed national aviation activity levels, but the economic projections. Based on extrapolations, and assuming that airfield upgrades will be completed in upcoming years, based aircraft numbers could increase slightly more than the projections would indicate, at least on a percentage basis, by the year 2032.

The actual increase in the numbers of forecasted aircraft is small, amounting to about one new based aircraft every few years.

The national trend toward larger, more sophisticated aircraft is a consideration for the forecast of based aircraft by type. Fractional jet ownership and its associated aircraft have, and are expected to constitute the fastest growing segment of the general aviation fleet according to FAA forecasts.

Private/business ownership of these aircraft is also noteworthy due to the significant decrease in acquisition costs, although national economic recovery and continued national regional strength in the natural resources market would seemingly be prerequisite for many business owners. These

Table 3-2

Based Aircraft Forecast by Type

Year	Single-Engine Piston	Multi-Engine Piston	Twin-Turbo Prop	Jet	Helicopter /Other	Total
2013	8	0	0	0	0	8
2018	9	1	0	0	0	9
2023	10	1	1	0	0	12
2032	11	1	1	1	0	14

factors are considered in the formulation of the based aircraft forecast by type and for purposes of this study and based on current information and circumstances, future based aircraft are shown in Table 3-2.

3.2 Aircraft Operations Forecasts

The RCK is an uncontrolled facility and good counts of aircraft operational activity are not available. In 2011, approximately 2,400 annual aircraft operations were estimated to be conducted. The number of aircraft operations has been stable, but slightly increasing in the past five years according to local pilots.

General aviation as an industry has struggled over the past few years and aircraft production and sales have declined in all categories of aircraft manufacture, including executive aircraft. Larger business and charter general aviation aircraft are expected to fly only slightly more hours on a national basis. However, it is anticipated that itinerant general aviation operations will continue to increase and that local operations will, as well.

General Aviation Operations Projections

Table 3-3 presents general aviation Aircraft Operations projections for RCK.

The Regression projection is a simple linear regression based on the estimated number of historical aircraft operations.

A ratio of based aircraft to aircraft operations is an established means of estimating future aircraft operational activity levels from the forecast of based aircraft previously presented.

The Operations per Based Aircraft projection reflects this methodology with a reasonable value of 500 operations per based aircraft, today's quotient.

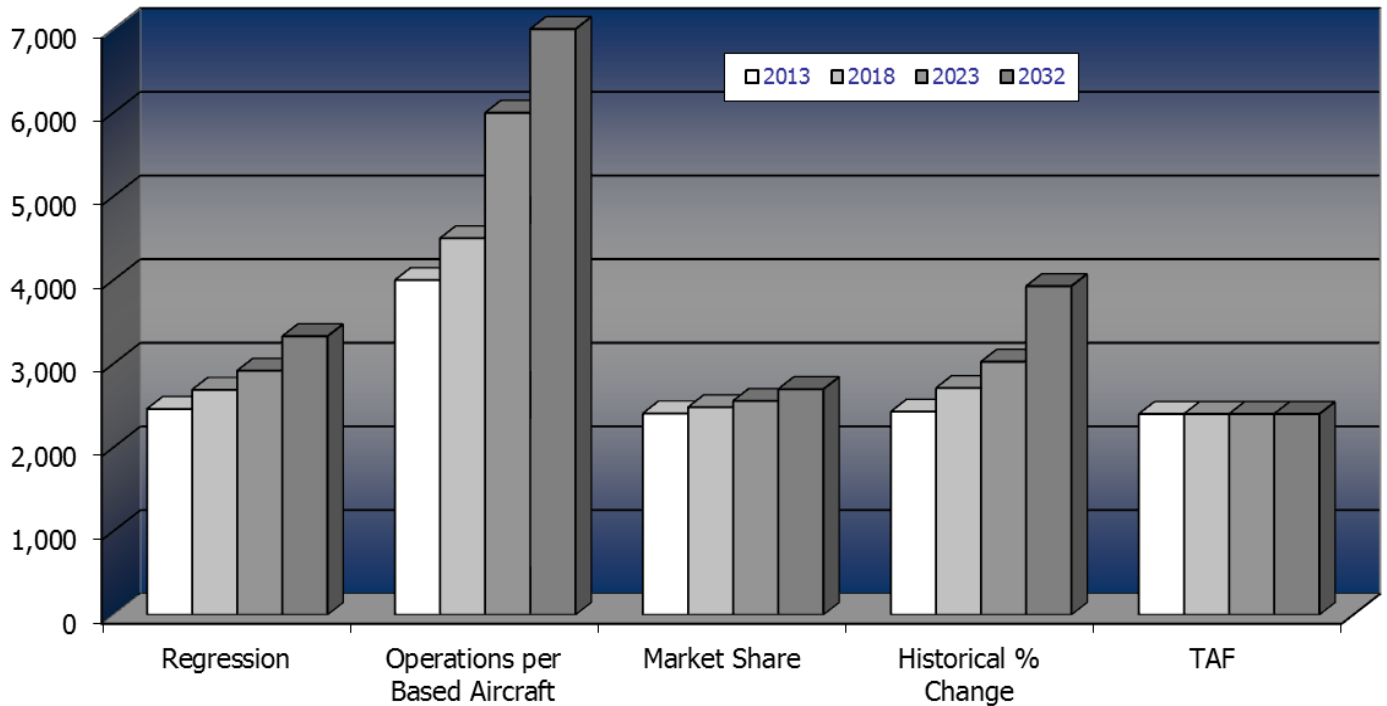
The Market Share projection provides a projection of aircraft operations applied to anticipated percentage increases in the forecasts of total hours flown from *FAA Aerospace Forecasts Fiscal Years 2012-2032*.

The Historical Percentage Change projection applies the percent increase in operations from the past five years to each of the three horizon periods or phases, in consecutive five-year increments for the 20-year forecast period.

Table 3-3
Aircraft Operations Projections

Year	Regression	Operations Per Based Aircraft	Market Share	Historical % Change	TAF
2013	2,460	4,000	2,407	2,428	2,400
2018	2,689	4,500	2,480	2,710	2,400
2023	2,917	6,000	2,556	3,025	2,400
2032	3,329	7,000	2,697	3,928	2,400
<i>Annual % Change</i>	<i>1.65%</i>	<i>3.95%</i>	<i>0.6%</i>	<i>3.25%</i>	<i>0%</i>
<i>Overall 20-year % Change</i>	<i>35%</i>	<i>75%</i>	<i>12%</i>	<i>70%</i>	<i>0%</i>

**FIGURE 3-2
AIRCRAFT OPERATIONS PROJECTIONS**



Data from FAA's Terminal Area Forecast is noted in the TAF Projection.

The Market Share and TAF projections show slow/no growth scenarios while the others produce more robust, seemingly reasonable growth. These latter projections seems the most likely from a statistical perspective given the circumstances discussed in the previous section.

The average 20-year percentage change for these projections approximate 38 percent, statistically suggesting that the Airport could see

3-4,000 aircraft operations by the year 2032. But again, forecast formulation from various activity projections necessarily requires subjectivity beyond pure statistical analysis.

Aircraft Operations Forecast by Type

It is estimated that the number of future aircraft operations will be approximately 8,500 around the final study year of 2032.

Table 3-4 shows the forecast of Aircraft Operations by Type for each of the three

Table 3-4
Aircraft Operations Forecast by Type

Year	Single-Engine Piston	Multi-Engine Piston	Jet	Helicopter /Other	Total
2013	2,460	30	4	6	2,500
2018	3,522	50	8	20	3,600
2023	4,800	120	50	30	5,000
2032	8,110	220	120	50	8,500

planning periods within the 20-year horizon of this planning effort. National trends toward increased operational hours were previously discussed and expected improvements to RCK are considerations for the forecast of general aviation operations by type.

Note that multi-engine aircraft activity, in both the piston and turbine categories are expected to increase at a faster rate than the single-engine

occurs, future traffic will follow these national trends, with the exception of air taxi activity. A potential exists, based on the previous discussions, for an increase in the number of these types of operations. The forecast mix of operations is presented in Table 3-5.

Peak Period Operations Forecast

Existing and future airport facilities should be designed and constructed not for an average

Table 3-5
Forecast Mix of Aircraft Operations

Year	Local Operations	% Local Operations	Itinerant Operations	% Itinerant Operations	Total Operations
2013	1,750	70	750	30	2,500
2018	2,340	65	1,220	35	3,600
2023	3,000	60	2,000	40	5,000
2032	4,675	55	3,825	45	8,500

category. This is due to a continuing trend toward larger aircraft, servicing of the City business needs, anticipated aviation improvements in the near future and continuing life flight accommodation.

This forecast is justified due to the circumstances previously noted in the based aircraft analysis.

Forecast Mix of Operations

An itinerant operation is defined as any aircraft operation other than a local operation. The 70/30 percent local/itinerant mix is dis-similar to the national average local/itinerant mix, averaging 48 percent local and 52 percent itinerant general aviation. It is assumed that as future basing

day's aircraft activity and not for the busiest day, but for activity somewhere in between.

Established FAA methodologies are reflected in Table 3-6 to estimate peaking characteristics. Peak day is defined as the average number of operations per day during the most active month. In FAA's Southwest Region and at RCK, the most active month normally accounts for approximately 10 percent of total annual operations and approximately 15 percent of the peak day operations occur during the peak hour.

Table 3-6
Peak Period Forecast

Year	Total Operations	Peak Month Operations	Peak Day Operations	Peak Hour Operations
2013	2,500	250	8	1.3
2018	3,600	360	12	1.8
2023	5,000	500	17	2.5
2032	8,500	850	28	4.2

Forecast Summary of Aircraft Operations by ARC, Runway End and Planning Year

The final forecast of this chapter is a forecast of aircraft operations with the following of subject:

1. Planning Years:
 - ✓ 2013, 2018, 2023, 2032
2. Runway Ends:
 - ✓ Runway 17, 35
3. Airport Reference Code/Class:
 - ✓ A & B-I Small
 - ✓ A & B-II Small
 - ✓ A & B-II Business
 - ✓ C & D-II Corporate
 - ✓ C & D-II Large Corporate.

With respect to Airport Reference Code/Class above, note that:

- *A & B-I Small* forecasts all aircraft types weighing less than 12,500 pounds, with approach speeds up to 121 knots, and wingspans up to 49 feet, inclusive.

Example aircraft include:

- ✓ Cessna 152, 172, 210, 206, 414, 441
- ✓ Piper Cub, Arrow, Comanche, Saratoga
- ✓ Beechcraft Bonanza, Duke
- ✓ Cirrus, Mooney, Diamond, Glasair
- ✓ Helicopters, Ultralights.

- *A & B-II Small* forecasts all aircraft types weighing less than 12,500 pounds, with approach speeds up to 121 knots and wingspans up to 79 feet, inclusive.

Example aircraft include:

- ✓ Cessna 441, Mustang
- ✓ Beechcraft King Air 90/100, Premier
- ✓ Embraer Phenom, Eclipse 500.

- *A & B-II Business* forecasts all aircraft types weighing greater than 12,500 pounds, with approach speeds up to 121 knots and wingspans up to 79 feet, inclusive.

Example aircraft include:

- ✓ Cessna Citation 550, 650, Sovereign
- ✓ Dassault Falcon 20, 50, 200
- ✓ Hawker 400, 850XP.

- *C & D-II Corporate* forecasts all aircraft types weighting up to 60,000 pounds, with approach speeds up to 166 knots and wingspans up to 79 feet, inclusive.

Example aircraft include:

- ✓ Cessna Citation X
- ✓ Bombardier
- ✓ Challenger 300, 605
- ✓ Lear 35, 45, 60, 85 (Weight Excepted)
- ✓ Dassault Falcon 900, 2000.

- *C & D-II Large Corporate* forecasts all aircraft 60,000 pounds or greater, with approach speeds up to 166 knots and wingspans up to 79 feet, inclusive.

Example aircraft include:

- ✓ Bombardier Global Express, Challenger
- ✓ Gulfstream II, III, 550, 650
- ✓ Falcon 7X
- ✓ Hawker Horizon.

This forecast is found in Table 3-7 on the following page.

Table 3-7

Forecast Summary of Aircraft Operations by ARC/Weight, Runway End and Planning Year

Forecast 2013	17	35	Total
A & B-I Small	1,090	1,170	2,260
A & B-II Small	85	100	310
A & B-II Business	25	30	55
C & D-II Corporate	0	0	0
C & D-II Large Corporate	0	0	0
2013 Total	1,200	1,300	2,500
Forecast 2018	17	35	Total
A & B-I Small	1,488	1,736	3,224
A & B-II Small	125	165	290
A & B-II Business	35	45	80
C & D-II Corporate	2	4	6
C & D-II Large Corporate	0	0	0
2018 Total	1,650	1,950	3,600
Forecast 2023	17	35	Total
A & B-I Small	2,087	2,463	4,550
A & B-II Small	180	195	375
A & B-II Business	25	30	55
C & D-II Corporate	8	12	20
C & D-II Large Corporate	0	0	0
2023 Total	2,300	2,700	5,000
Forecast 2032	17	35	Total
A & B-I Small	3,650	4,085	7,735
A & B-II Small	260	295	700
A & B-II Business	60	85	145
C & D-II Corporate	30	35	65
C & D-II Large Corporate	0	0	0
2032 Total	4,000	4,500	8,500