Chapter 2 – Forecast

2.1 Introduction

Aviation activity forecasts are the basis for determining the facilities needed to accommodate future aviation demand. For non-towered airports such as the Independence Municipal Airport (IMA), with a majority of operations conducted by aircraft weighing less than 12,500 pounds, the forecast process is not extensive. The forecast's purpose is to help develop a plan that accommodates aviation demand over the next 10 to 20 years while ensuring that facilities will be built only when they are needed and will not be built only to be abandoned, moved, or razed later within this timeframe.

The foundation for developing general aviation forecasts is the socioeconomic characteristics of a community. In general there is good correlation between population growth and employment activity with airport activity. For the purposes of the IMA forecasts, the main focus will be on the local and regional economies and to a much lesser extent (if any) on the state and national economies.

2.2 Socioeconomic Data and Trends

Population Data and Trends

Population data and trends for the City of Independence, Buchanan County, and the State of Iowa are presented in **Table 2-1**. According to data from the U.S. Census, the City of Independence's population was 5,966 persons in 2010. With a 0.7 percent growth during the 1990s and 0.8 percent decline during the 2000s, the city's population has remained essentially stable at approximately 6,000 persons over the past two decades. This holds true for Buchanan County as well with a relatively stable population of approximately 21,000 persons. By comparison, the State of Iowa population has grown at approximately 0.5 percent annually over this same 20-year period.

Per the *2010-2030 Iowa Aviation System Plan* (IASP), "…22 of Iowa's 99 counties experienced an overall increase in population between 2000 and 2009. Of the 22 counties that experienced growth, 12 counties grew at a rate greater than the 2.8 percent state average. Dallas County, located in central Iowa, experienced the greatest population increase, growing by 51.9 percent or 21,200 people. Of the 77 counties experiencing a decline in growth, Pocahontas County experienced the greatest decline of 15.2 percent or a decrease of 1,316 people." This assessment helps to place recent population trends of Buchanan County into a broader, county-level perspective; that is, the Buchanan County population has grown less than the state average.

According to the 2010 U.S. Census, Buchanan County measures 571.02 square miles whereas the City of Independence measures 6.08 square miles. In terms of area, the city represents slightly more than one percent of the county – contrasted against population where the city represents approximately 28 percent of the county. This helps to frame the population influence that the city has on the county.

Income Data and Trends

Over the most recent 10 year period of income data provided by the U.S. Census, growth of median household/family and per capita incomes for the City of Independence and Buchanan County have been positive. As summarized in **Table 2-1**, inflation-adjusted per capita incomes for have risen 1.8

and 2.7 percent annually for the City of Independence and Buchanan County, respectively. According to Federal Aviation Administration (FAA) Advisory Circular 150/5070-6B, *Airport Master Plans*, per capita income is an important demographic characteristic for it is a reflection of the level of disposable income, which is a good indicator of the propensity to travel and general aviation aircraft purchases and use.

Table 2-1. Population and Income Data

Year	Independence	Buchanan Co.	State of Iowa
Population			
1990	5,972	20,844	2,776,755
2000	6,014	21,093	2,926,324
2010	5,966	20,958	3,046,355
2011 (est.)	5,957	20,923	3,046,097
Annualized Change 1990-2000	0.07%	0.12%	0.54%
Annualized Change 2000-2010	-0.08%	-0.06%	0.41%
Median Household Income (See Note)			
2000	46,288	48,165	49,979
2010	46,589	51,961	48,872
Annualized Change	0.1%	0.8%	-0.2%
Median Family Income (See Note)			
2000	58,188	57,516	60,788
2010	61,332	61,421	61,804
Annualized Change	0.5%	0.7%	0.2%
Per Capita Income			
2000	26,191	23,306	24,913
2010	30,842	29,678	32,082
Annualized Change	1.8%	2.7%	2.9%

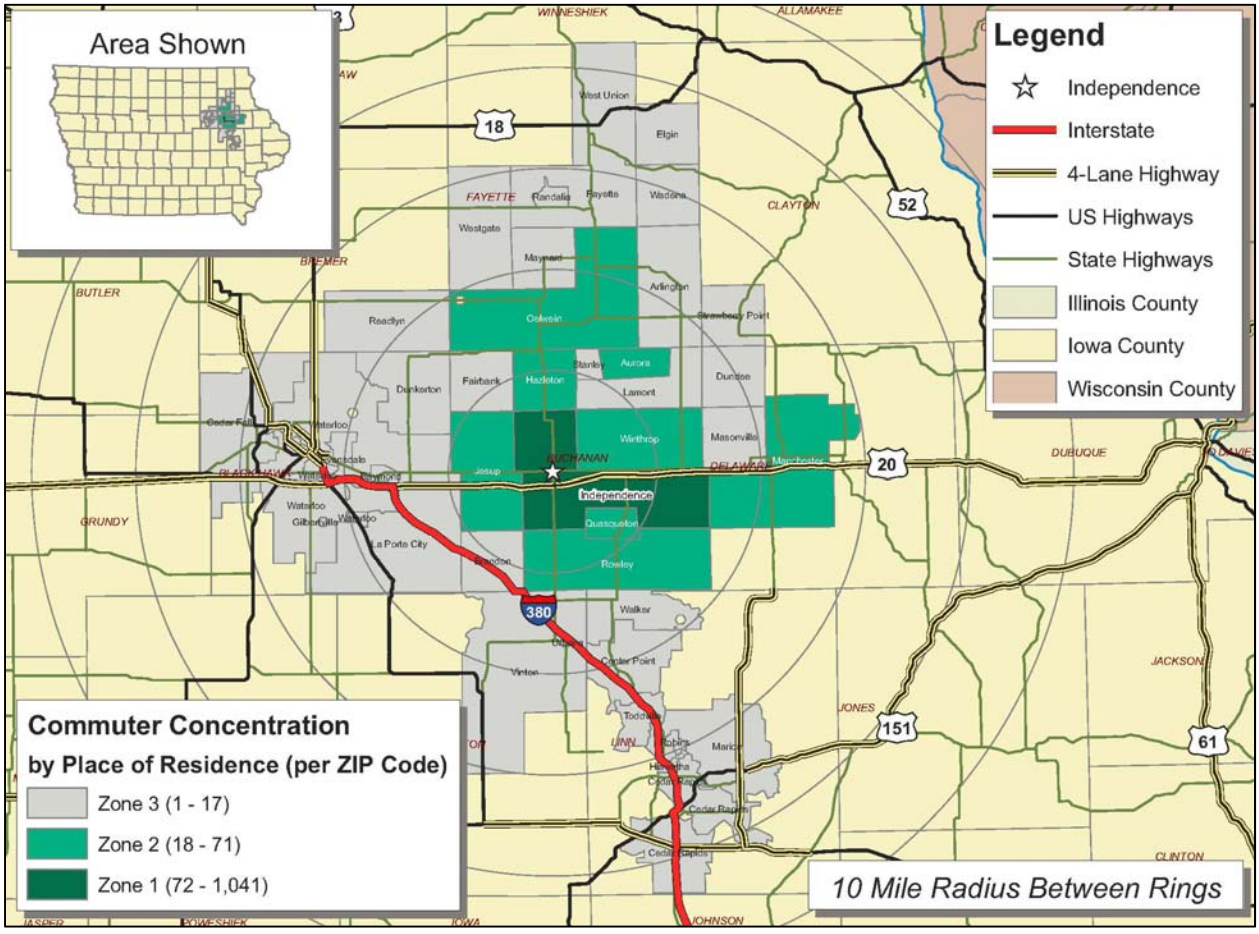
Source: American FactFinder (2010 and 2000 U.S. Census data), accessed 2/11/2013. Analysis by Snyder & Associates, Inc. Year 2000 dollars shown have been inflation-adjusted to 2010 dollars using the U.S. Bureau of Labor Statistics CPI inflation Calculator. Note: As defined by the U.S. Census, household income includes the income of the householder and all other individuals 15 years old and over in the household, whether they are related to the householder or not. Family Income includes the income of the householder and all other individuals 15 years old and over related to the householder. Because many households consist of only one person, median household income is usually less than median family income, which is the case in the data above.

Employment Data and Trends

The *2011 Buchanan County Laborshed Analysis* report was reviewed to gain a better understanding of the local workforce and industries. The purpose of the Laborshed Analysis report is to analyze underemployment, the availability and willingness of current and prospective employees to change employment within the workforce, current and desired occupations, wages, hours worked, and distance willing to commute to work. From this analysis, city and county officials can be better informed when making business decisions affecting the community.

A laborshed is defined as an area or region from which an employment center draws its commuting workers. The Buchanan County Laborshed is depicted in **Exhibit 2-1** and according to the Laborshed Analysis report it "…represents commuting patterns into Independence with the concentration per ZIP code represented in the legend. Those who are willing to change/accept employment within the Buchanan County Laborshed are willing to commute an average of 24 miles one way for employment opportunities."

Exhibit 2-1. Buchanan County Laborshed

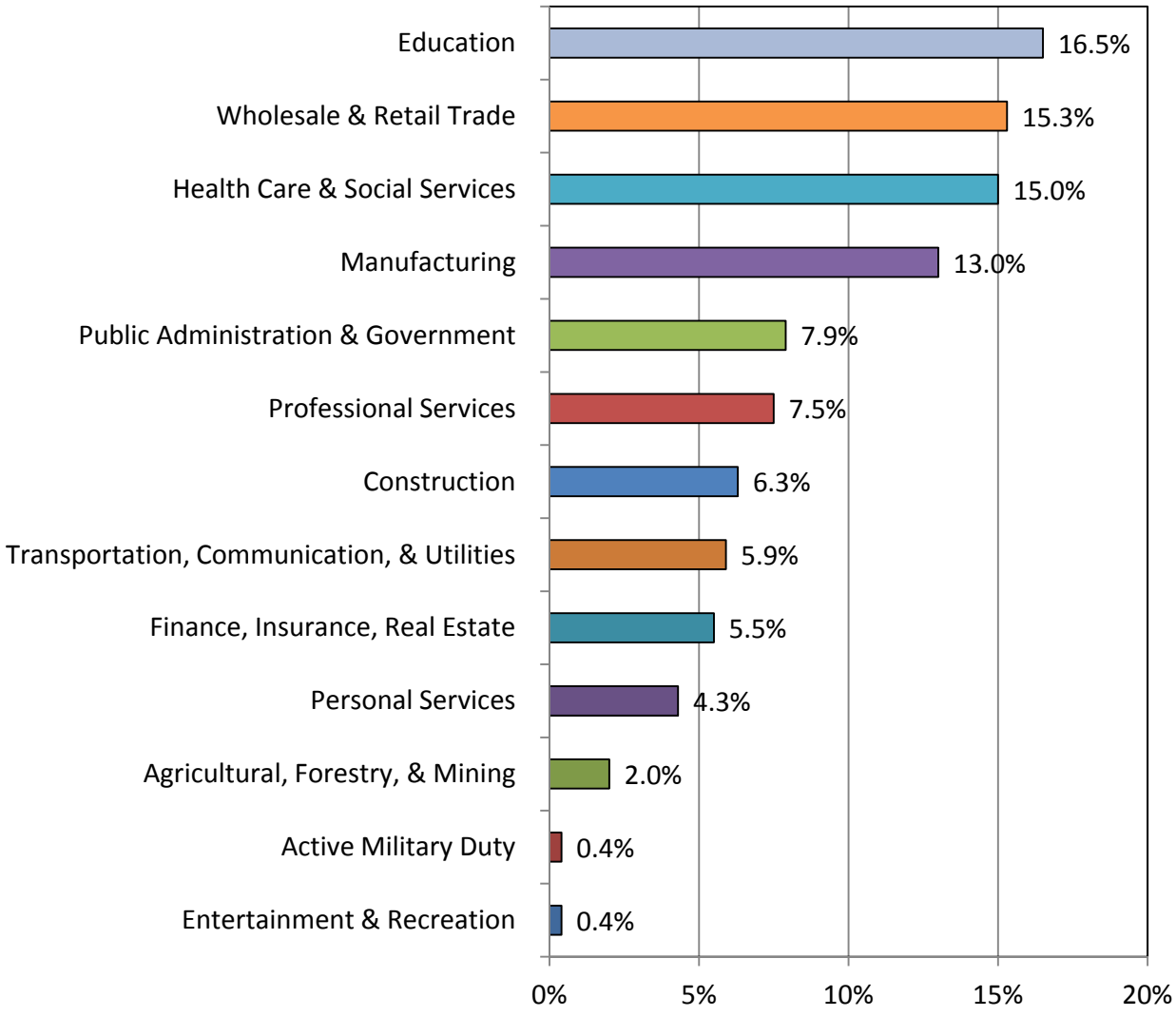


Source: 2011 Buchanan County Laborshed Analysis prepared by Iowa Workforce Development.

From **Exhibit 2-1**, the City of Independence draws employees from 40 miles spread across a seven-county region. These counties include Fayette, Clayton, Black Hawk, Buchanan, Delaware, Benton, and Linn. The heaviest concentration of employees is from Buchanan County with the next largest concentrations from Fayette County to the north and Delaware County to the east.

According to the Laborshed Analysis report, the industrial classifications of those employed within the laborshed is conveyed in **Exhibit 2-2**. From this information, the following four industries represent approximately 60 percent of the total number of employees within the laborshed: Education (16.5%), Wholesale & Retail Trade (15.3%), Health Care & Social Services (15.0%), and Manufacturing (13.0%). These industries are important generators of aviation activity, particularly the manufacturing and service industries which are typically the main drivers.

Exhibit 2-2. Industry Classification of Employed Persons, Buchanan County Laborshed



Source: 2011 Buchanan County Laborshed Analysis prepared by Iowa Workforce Development.

Using U.S. Census data for 2000 and 2010 provides a closer inspection of the top four industries of **Exhibit 2-2**, particularly within Buchanan County since this area is the primary source of employees for the laborshed. **Table 2-2** presents the industries within Buchanan County (as classified by the U.S. Census) and the percent of persons employed by those industries in 2000 and 2010. In this table, the top four industries from **Exhibit 2-2** are highlighted in bold.

Table 2-2. Industry Workforce (Labor) Changes in Buchanan County

Industry Rank and Name	2000	2010	Change
1. Manufacturing	**23.1%**	**17.9%**	**-5.2%**
2. Education , health care, and social services	**20.6%**	**23.1%**	**2.5%**
3. Retail trade	**12.2%**	**12.5%**	**0.3%**
4. Construction	7.8%	7.8%	0.0%
5. Agriculture, forestry, fishing/hunting, and mining	7.3%	6.7%	-0.6%
6. Transportation, warehousing, and utilities	4.5%	5.9%	1.4%
7. Professional Services (a)	4.4%	5.1%	0.7%
8. Other services, except public administration	3.9%	5.5%	1.6%
9. A&E (b), recreation, and accommodation/food services	3.8%	2.7%	-1.1%
10. Public administration	3.7%	2.4%	-1.3%
11. Finance, insurance, and real estate	3.5%	5.3%	1.8%
12. Wholesale trade	**3.1%**	**3.2%**	**0.1%**
13. Information	2.1%	1.9%	-0.2%

Source: American FactFinder (2010 and 2000 U.S. Census data). Note (a): Professional, scientific, management, administrative, and waste management services. Note (b): Arts and entertainment.

What this table reveals is that the number of persons employed by top four industries has decreased by 2.3 percent over the last census decade. Naturally, the other nine industries have increased by 2.3 percent to maintain 100 percent industry classification coverage. The U.S. Census also reveals that from 2000 to 2010, the civilian employed population (age 16 and older) of Buchanan County has increased from 9,993 to 10,417 persons which is an annualized growth rate of 0.48 percent. Over this same time period, the City of independence's employed population grew from 2,820 to 2,862 persons or 0.15 percent per year.

One last note regarding population is extracted from the *2002 Independence Comprehensive Plan*, prepared by the Iowa Northland Regional Council of Governments (INRCOG). This plan projected a population of 6,228 persons for the year 2010 using an annual rate of increase of 0.18 percent. However, per 2010 U.S. Census data (available several years after the city's plan was completed), the population for the year 2010 was estimated at 5,966 persons. Based on this, the projected population

growth envisioned by the Comprehensive Plan did not materialize. Recognizing the differences between estimate and actual population and economic conditions, a new Comprehensive Plan will be prepared in 2014 according to city staff.

2.3 General Aviation Trends

National Aviation Trends - GAMA

In their *2012 General Aviation Statistical Databook & Industry Outlook*, the General Aviation Manufacturers Association (GAMA) indicated that "…[2012] performance across the different [airplane] segments was mixed. Turboprop shipments moved in a positive direction for the first time since the start of the recent economic difficulties. Piston airplane shipments and the jet segment were in negative territory." Although there are signs of economic recovery, in the end there was only a small increase in the total number of general aviation airplane shipments in 2012 over 2011. This is unfortunate as many "…in the industry had anticipated 2011 to be the year when the general aviation manufacturing industry would begin to recover", according to GAMA's *2011 General Aviation Statistical Databook & Industry Outlook* report.

In a February 12, 2013 press release, GAMA said that "While the 2012 shipment and billing data were mixed, the numbers don't reflect the amount of development work in progress in general aviation. The general aviation segment is poised for resurgence in the next few years as these new technologies certify and enter the market." Even with improving economic conditions, the fact remains that worldwide billing are still below the all time high of $21.9 billion recorded in 2007 and worldwide shipments of general aviation aircraft fell for a fourth year in a row since 2007. Statistics regarding aircraft manufacture in the United States in 2010, 2011, and 2012 as reported by GAMA are presented in **Table 2-3**.

Table 2-3. General Aviation Aircraft Manufacturing Statistics, 2010-2012

Item	2010	2011	2012	2010-2011 Change	2011-2012 Change
Piston Aircraft Delivered	889	898	881	1.0%	-1.9%
Turboprops Delivered	368	526	580	42.9%	10.3%
Business Jets Delivered	767	696	672	-9.3%	-3.4%
Worldwide Shipments	2,023	2,120	2,133	4.8%	0.6%
Worldwide Billings	$19.7B	$19.0B	$18.9B	-3.6%	-0.5%

Source: GAMA 2012 General Aviation Statistical Databook & Industry Outlook. Turboprop deliveries for 2011 and 2012 include the agricultural segment. Deliveries of turboprop airplanes counted without agricultural airplanes were flat at 361 in 2012, virtually unchanged since 2010.

National Aviation Trends - FAA

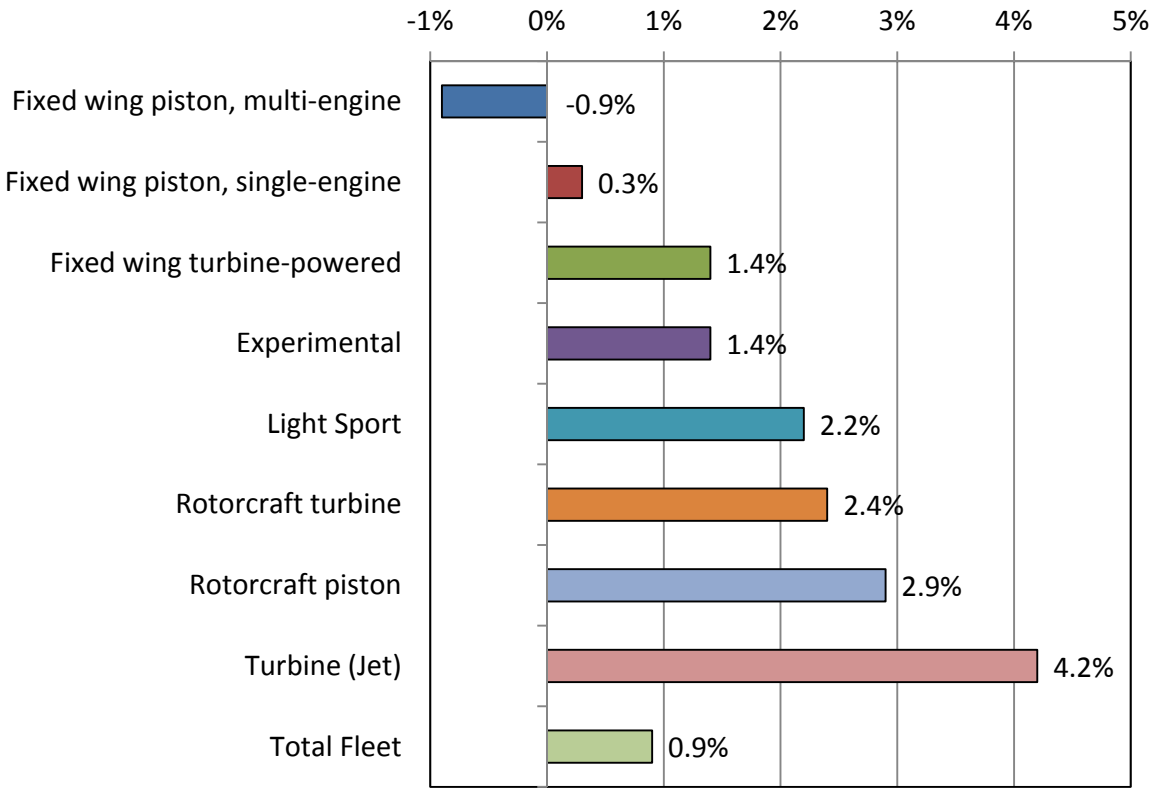
In their *Aerospace Forecast Fiscal Years 2011-2031* report, the FAA provides a recap of 2010 aviation activity at their air traffic control facilities. FAA facilities experienced their third straight year of decline in activity. Total 2010 activity at combined FAA and contract tower airports was 51.2 million operations, down 3.2 percent from 2009 and 25.4 percent below the peak activity level recorded in 2000. Additional detail regarding aviation activity includes the following:

- As carriers restrained capacity in response to weakened demand, commercial activity (the sum of air carrier and commuter/air taxi) at combined FAA and contract towers fell by 1.3 percent in 2010. Air carrier operations were down 1.4 percent while commuter/air taxi operations declined 1.1 percent. Commercial operations in 2010 were 15.4 percent lower than their peak in 2005.
- Non-commercial activity (the sum of general aviation and military) at combined FAA and contract towers fell by 4.6 percent in 2010, with general aviation activity (26.6 million operations) down 5.1 percent and military activity (2.6 million operations) up 0.9 percent. The decline in non-commercial activity is attributed to a lackluster economy and rising fuel prices. At the end of 2010, non-commercial aircraft activity was 31.8 percent below the activity in 2000.
- General aviation activity has declined in ten of the eleven years since 1999.

The FAA concludes that the downturn in the economy has dampened the near-term prospects for the general aviation industry, but the long-term outlook remains favorable. This is evidenced by FAA projected growth rates for general aviation aircraft categories conveyed in **Exhibit 2-3**. Overall, the FAA forecasts the GA fleet to grow 0.9 percent annually through Fiscal Year 2031 (the same growth rate used in their previous FY 2010-2030 forecast). The FAA maintains a projected decline in fixed wing, twin engine piston aircraft and very low growth in fixed wing, single engine piston aircraft numbers. Turboprop, helicopters, and light sport aircraft growth rates have been tempered slightly from the FY 2010-2030 forecast. With regard to business aviation, the FAA maintains the same 4.2 percent annualized growth rate used in the FY 2010-2030 forecast and makes the following assessment regarding that aircraft segment:

> *After growing rapidly for most of the past decade, the demand for business jet aircraft has slowed over the past few years...reflecting the hard impact of the recession…. [Despite this situation]…the forecast calls for robust growth in the long term outlook, driven by higher corporate profits and continued concerns about safety/security and flight delays, increasing the attractiveness of business aviation relative to commercial air travel…. [In addition, the forecast]…predicts business usage of general aviation aircraft will expand at a faster pace than that for personal/recreational use.*

Exhibit 2-3. FAA Forecast of GA Aircraft Growth for FY2011-2031



Source: FAA Aerospace Forecast FY 2011-2031, Table 27 Active General Aviation and Air Taxi Aircraft.

State Aviation Trends

Chapter 5 of the IASP presents statewide forecasts of based aircraft and aviation activity over the 2010 to 2030 period for the 117 airports contained in the state system plan. Using FAA forecast rates, based aircraft are forecast to grow from 2,809 to 3,603, which is an annualized growth rate of 1.41 percent. Total aircraft operations are forecast to increase at 1.40 percent a year from 940,360 to 1,203,400.

Local Aviation Trends

Statistics regarding historic and current based aircraft and operations are presented in **Tables 2-4 and 2-5**. The FAA's Terminal Area Forecast (TAF) for 2000 and 2005 is suspect given its significant divergence from the years before and after, that is, according to the FAA TAF data the IMA was relatively active in 1995 and 2010 but in the years between annual operations decreased although based aircraft numbers increased.

Table 2-4. Historic Based Aircraft and Annual Operations at the IMA, 1990-2010

Item	1990	1995	2000	2005	2010
Based Aircraft	**12**	**25**	**25**	**30**	**20**
Single Engine Piston (SEP)	11	21	22	23	19
Multi Engine Piston (MEP)	1	3	3	2	1
Business Jet (JET)	0	1	0	0	0
Helicopter (HELO)	0	0	0	1	0
Annual Operations	**3,900**	**8,024**	**5,750**	**5,635**	**9,100**
Percent SEP	92.2%	85.6%	n/a	n/a	n/a
Percent MEP	7.3%	10.7%	n/a	n/a	n/a
Percent JET	0.44%	3.8%	n/a	n/a	n/a
Percent HELO	n/a	n/a	n/a	n/a	n/a
Operations per Based Aircraft	**321**	**325**	**230**	**188**	**455**

Sources: 1990 per Iowa DOT (sound recorder); 1995 per the 1996 ALP Narrative Report prepared by Clapsaddle-Garber Associates, Inc.; and 2000, 2005, and 2010 per the FAA Terminal Area Forecast.

Table 2-5. Estimated 2012 Operations by Aircraft Type

Aircraft Type	Local Operations	Itinerant Operations	Total Operations	Percent of Total
Single Engine Piston (SEP)	4,800	970	5,770	63.4%
Multi Engine Piston (MEP)	250	500	750	8.2%
Turboprop (TP)	0	750	750	8.2%
Business Jet (JET)	0	500	500	5.5%
Helicopter (HELO)	250	1,080	1,330	14.6%
Total	5,300	3,800	9,100	100.0%

*Source: Analysis by Snyder & Associates, Inc. For simplicity, the values presented in **Table 2-4** have been rounded slightly from those presented in **Chapter 1, Inventory, Table 1-3**.*

2.4 Forecast of Aviation Demand

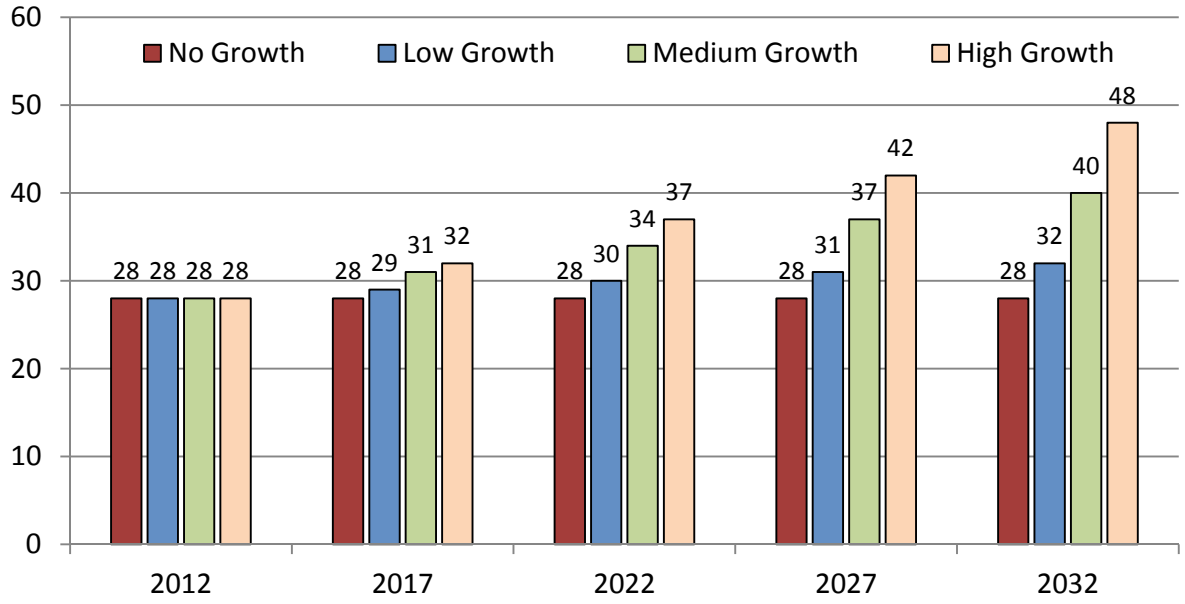
Several community elements must be in place in order for the IMA to continue to serve the local business community as part of the greater transportation network. These factors include growth of the population and growth of the local economy. There is strong evidence that the City of Independence and Buchanan County populations will remain stable over the near term. By extension, the labor force should remain stable to provide businesses with the workforce it needs to maintain current activity and as well as future growth. In addition, as seen over the last decade per capita incomes are on a positive track. This could bode well for local aviation as this demographic characteristic is historically a reliable indicator of travel tendencies and general aviation aircraft use and purchases.

Selection of a Growth Rate

From experience with preparation of numerous aviation forecasts for general aviation airports, a series of forecast scenarios have been prepared consistent with the methods established by the FAA for updating national forecasts. Using historic patterns of population and economic conditions and projecting these trends into the future, four based aircraft growth scenarios (based on regression analysis) have been developed. These four growth scenarios are explained below. Their affect on the future numbers based aircraft at the IMA is illustrated in **Exhibit 2-4**.

- **No Growth** forecast scenario assumes no change in based aircraft numbers over the forecast period. This is based on City of Independence and Buchanan County population trends since 1990. Although not considered to be a true reflection of based aircraft growth, this scenario nonetheless does serve as a baseline for which to compare other scenarios.
- **Low Growth** forecast scenario assumes the growth rate for based airplanes will be equal to the annualized rate of median family income for Buchanan County from 2000 to 2010. This is an averaged growth rate of 0.7 percent per year. Another alternative yet slightly lower growth rate considered for this scenario was 0.48 percent which is the annual change in the civilian employed population (age 16 and older) for Buchanan County from 2000 to 2010.
- **Medium Growth** forecast scenario proposes that based aircraft growth will occur at 1.8 percent annually which is the same rate of growth in per capita income witnessed by the City of Independence from 2000 to 2010. This is an optimistic, yet reasonable rate of growth.
- **High Growth** forecast scenario uses 2.7 percent per year as a based aircraft growth rate. This is the per capita income growth rate for Buchanan County over the last decade. Of the four forecast scenarios, the high growth scenario is the most aggressive. By comparison, this high growth rate is twice that of the State of Iowa's annual growth rate for aviation activity of 1.4 percent.

Exhibit 2-4. Forecast Scenarios of Based Aircraft



Source: Analysis by Snyder & Associates Inc.

After evaluating the various forecasts developed herein, the **Medium Growth** forecast scenario is recommended for use as the IMA activity forecast. Over the 20-year planning period, the number of based aircraft is forecast increase at an average rate of three per year – ultimately reaching a total of 40 by the year 2032.

Estimating Annual Operations

For non-towered airports such as the IMA, there continues to be debate regarding the total number of aircraft operations conducted. A key metric of airport activity is the number of operations per based aircraft (OPBA). This value can range widely from recreational airports that average as low as 250 OPBA to busy corporate-only airports that may have 450 OPBA or more. General guidelines presented in FAA Order 5090.3C "Field Formulation of the National Plan of Integrated Airport Systems (NPIAS)" can be followed to estimate aviation activity at the IMA. Per this document, the FAA recommends 250 OPBA for rural general aviation airports with little itinerant traffic, 350 OPBA for busier general aviation airports with more itinerant traffic, and 450 OPBA for busy reliever airports. In unusual circumstances, such as a busy reliever airport with a large number of itinerant operations, the number of OPBA aircraft may be as high as 750 OPBA.

In preparing the IASP, the Iowa DOT's Office of Aviation expanded on this metric to include based aircraft values. Airports with up to 30 based aircraft forecasted were assigned 250 OPBA, while airports with 31 to 99 based aircraft were assigned 350 OPBA. Airports with 100 or more aircraft were assigned 450 OPBA. Using these guidelines, the Iowa DOT estimated that with 29 based aircraft, there would be 7,200 annual operations conducted at the IMA in 2012.

However, from **Chapter 1, Inventory, Tables 1-2 and 1-3**, there were 28 based aircraft and an estimated 9,100 annual aircraft operations reported for 2012. Using these number, there were 325 annual operations conducted for each based aircraft. When subtracting out military aircraft operations, a metric of 287 OPBA results. Given that the IASP uses a top-down planning model, the

application of 250 OPBA slightly underreports activity at the IMA assuming the estimated 9,100 annual operations from the FAA 5010 Form are accurate. This assumption appears to be sound given the data presented earlier in **Table 2-4** shows that 1990 and 1995 airport activity produced 321 and 325 OPBS, respectively, which is in keeping with the aforementioned 2012 metric of 325 OPBA.

Recommended Forecast

A 20-year forecast of aviation activity at the IMA has been prepared and is presented in **Table 2-6**. Key points of this forecast are as follows:

- In the base year 2012 there are 28 based aircraft and 9,100 annual operations.
- Based aircraft are forecast to grow at an annualized rate of 1.8 percent from 28 to 40 over the forecast period, an increase of 12 aircraft.
- Annual operations are forecast to grow from 9,100 to 13,000 over the forecast period using a metric of 325 operations per based aircraft.
- Local and itinerant operations represent 58 and 42 percent of total aircraft operations, respectively. This percent split is held over the forecast period.
- As the number of military operations at a given airport is a function of national security policy, it is standard practice not to forecast these operations but to instead hold them constant over the forecast period. Military operations remain fixed at 1,080 annual operations. All military operations are conducted by aircraft from other military locations, that is, there are no local military operations.
- On average over the forecast period, operations by general aviation aircraft represent 89 percent of total operations, operations by military aircraft represent 10 percent of total operations, and air taxi operations remain steady at one percent of total operations.
- On average over the forecast period, piston aircraft flights represent the majority of airport operations at 72 percent, turboprop and business jet aircraft traffic makeup 16 percent of all operations, and helicopter operations represent 12 percent of total operations.

Table 2-6. Recommended Forecast

Item	Base Year	Forecast Year			
	2012	2017	2022	2027	2032
Based Aircraft	**28**	**31**	**34**	**37**	**40**
Single-engine Piston	26	28	30	32	34
Multi-engine Piston	1	2	2	2	2
Turboprop	0	0	1	2	2
Business Jet	0	0	0	0	1
Helicopter	1	1	1	1	1
Local Operations	**5,300**	**5,900**	**6,500**	**7,000**	**7,600**
Local GA	5,300	5,900	6,500	7,000	7,600
Local Military	0	0	0	0	0
Itinerant Operations	**3,800**	**4,180**	**4,550**	**5,030**	**5,400**
Itinerant GA	2,630	3,000	3,360	3,830	4,190
Itinerant Military	1,080	1,080	1,080	1,080	1,080
Itinerant Air Taxi	90	100	110	120	130
Total Operations	**9,100**	**10,080**	**11,050**	**12,030**	**13,000**
Total OPBA	325	325	325	325	325
GA Operations	8,020	9,000	9,970	10,950	11,920
GA OPBA	287	290	293	296	298

Source: Analysis by Snyder & Associates, Inc.

Peak Activity

Peak activity forecasts are used for airfield capacity analyses and for gauging the timing for future facility improvements. There are several peaking parameters typically used in airport planning. These are peak month, peak day, and peak hour.

Peak Month is the month in which the highest number of aircraft operations occurs. As a result of combined business, agricultural, and recreational traffic conducted during the summer months, August serves as the peak month for the IMA as validated by Walter Aviation. Typically, peaking at general aviation airports ranges greatly from 10 to 20 percent of annual operations. The low end of the range reflects a reasonable spread of aviation activity throughout the year. The high end of the

range is more common with lower activity airports that may have one or two special community events during the year that concentrates activity over a short period and skews the average. A representative peak month estimate for the IMA is 15 percent of annual operations.

Peak Day is usually calculated as the average day of the peak month. For forecast purposes, the Peak Month Average Week Day (PMAWD) is 30.4 or the value of 365 days divided by 12 months, as the future peak hour could shift between months having 30 or 31 days. However, assuming the peak month to be August, the average peak day of the peak month is 1/31 of the monthly operations.

Peak Hour is the most important of the peaking statistics. It is used to determine the operational capacity of the airport and to measure against aircraft delay. The statistic is important to calculate when new facilities, such as apron expansions, taxiway construction, or even new runways would need to be constructed. For non-towered general aviation airports, peak hour statistics often range from 9 to 15 percent of peak day operations. The more active an airport, the less peak hour represents daily activity. For the IMA, a peak hour estimate of 9 percent of the PMAWD will be used. **Table 2-7** represents the peaking forecasts.

Table 2-7. Peak Activity Operations

Forecast Year	Total Operations	Peak Month	Peak Day	Peak Hour
2012	9,100	1,365	44	4
2017	10,080	1,512	49	4
2022	11,050	1,658	53	5
2027	12,030	1,805	58	5
2032	13,000	1,950	63	6

Source: Analysis by Snyder & Associates, Inc.

Annual Instrument Operations

The number of annual instrument operations is a function of the capability of the airport and the sophistication of the instrumentation onboard the aircraft. The annual instrument operations forecast is the basis for determining requirements for upgraded instrument approaches. To determine the number of instrument operations, weather data provided by NOAA was examined[1]. The data reveals that 103,457 all-weather observations, 93,493 visual meteorological condition (VMC) observations[2], and 2,448 instrument meteorological condition (IMC) observations[3] were recorded. The comparison of IMC to all-weather observations suggests that weather conditions dictated the need for instrument

[1] Data obtained from NOAA's National Climate Data Center for Waterloo Regional Airport (ALO) for the 10-year period spanning 2003 to 2012.

[2] VMC are when visibility is 3 statute miles and the cloud ceiling is 1,000 feet above ground level.

[3] IMC are when visibility is between ½ and 3 statute miles and the cloud ceiling is between 200 and 1,000 feet above ground level.

operations about 2.4 percent of the time. Applying this percentage to the total operations in the base year yields 215 annual instrument operations. It is recognized that this estimate may significantly underestimate the number of actual instrument operations since it is common practice for pilots to file an IFR flight plan, especially high-end GA (i.e., turboprops and jets) operators, who file regardless of weather. It is estimated that of total operations conducted annually at the IMA, 15 percent are instrument operations. **Table 2-8** summarizes the forecast of annual instrument operations.

Table 2-8. Annual Instrument Operations

Forecast Year	Total Operations	Instrument Operations
2012	9,100	1,370
2017	10,080	1,510
2022	11,050	1,660
2027	12,030	1,800
2032	13,000	1,950

Source: Analysis by Snyder & Associates, Inc.

Comparing the Recommended Forecast and the FAA's TAF

The FAA Central Regional Airports Division is responsible for review and approval of the Forecast. When reviewing the forecast, the FAA must ensure that it is based on reasonable planning assumptions, uses current data, and is developed using appropriate forecast methods. After a thorough review of the forecast, FAA then determines if the forecast is consistent with its Terminal Area Forecast (TAF). Forecasts of passenger enplanements, based aircraft, and total operations are considered consistent with the TAF if they differ by less than 10 percent in the 5-year forecast period and by less than 15 percent in the 10-year forecast period.

Although forecasting of passenger enplanements is not required for the IMA, **Table 2-9** does compare based aircraft and total operations from the Recommended Forecast to those proposed in the TAF. The TAF reports that 20 aircraft are based at the IMA and that the number of based aircraft and total operations do not grow. In contrast, the recommended forecast projects a growth in based aircraft and total operations. As the two forecasts differ by more that the aforementioned thresholds, the recommended forecast is not considered to be consistent with the TAF.

However, it is recognized that the TAF does not correctly report the number of aircraft based at the IMA. If TAF based aircraft were updated to reflect current numbers, the two forecasts would be more in line (refer to **Table 2-10**). Yet despite this, the percent differences between the two still for the 10-year period still exceeds 15 percent. Nonetheless, due to the reasonableness of the recommended forecast, the TAF should be updated to reflect current based aircraft numbers and to include a positive growth rate of based aircraft and operations over the forecast period.

Table 2-9. Comparison of Recommended Forecast and FAA TAF

Year	Recommended Forecast	"Updated" FAA TAF	Percent Difference	FAA Tolerance
Based Aircraft				
2012 Base Year	28	20	28.6%	n/a
2017 Base Year +5	31	20	35.5%	10%
2022 Base Year +10	34	20	41.2%	15%
2027 Base Year +15	37	20	45.9%	n/a
Total Operations				
2012 Base Year	9,100	9,100	0.0%	n/a
2017 Base Year +5	10,080	9,100	9.7%	10%
2022 Base Year +10	11,050	9,100	17.6%	15%
2027 Base Year +15	12,030	9,100	24.4%	n/a

Source: FAA TAF, accessed 2/21/2013. Analysis by Snyder & Associates, Inc.

Table 2-10. Comparison of Recommended Forecast and "Updated" FAA TAF

Year	Recommended Forecast	"Updated" FAA TAF	Percent Difference	FAA Tolerance
Based Aircraft				
2012 Base Year	28	28	0.0%	n/a
2017 Base Year +5	31	28	9.7%	10%
2022 Base Year +10	34	28	17.6%	15%
2027 Base Year +15	37	28	24.4%	n/a
Total Operations				
2012 Base Year	9,100	9,100	0.0%	n/a
2017 Base Year +5	10,080	9,100	9.7%	10%
2022 Base Year +10	11,050	9,100	17.6%	15%
2027 Base Year +15	12,030	9,100	24.4%	n/a

Source: FAA TAF, accessed 2/21/2013. Analysis by Snyder & Associates, Inc.

Updating the Recommended Forecast

Recognizing that current socioeconomic conditions of the community and region could change over time, it is recommended that the IMA aviation forecast be reviewed and compared with actual airport activity levels on an annual basis. A new master plan update is warranted if the number of actual based aircraft (or operations) differs from the forecast by more than 10 percent within the next five years.

2.5 Design Aircraft Analysis

The frame of reference for airport planning criteria is established by the largest aircraft or "family" of aircraft that uses the airport on a regular basis, i.e., at least 500 itinerant operations per year. The single aircraft or family of aircraft meeting this criterion is commonly referred to as the airport's design aircraft. The FAA has established detailed guidance for specifying airport needs based upon an airport's design aircraft.

The key parameter for airport design is the Airport Reference Code (ARC) of the most demanding or critical aircraft expected to operate at the airport. The ARC is comprised of two components, the first of which is a letter that denotes the Aircraft Approach Category (AAC), which is the aircraft's approach or landing speed. The second component, depicted by a Roman numeral, is the Airplane Design Group (ADG) and relates to the aircraft's wingspan. **Table 2-11** summarizes the ARC categories for aircraft. It should be noted that the ARC is used for planning and design only and does not limit the aircraft that may be able to operate safely on the airport.

Table 2-11. FAA Airport Reference Code

Aircraft Approach Category (AAC)	Aircraft Approach Speed (kts.)	Airplane Design Group (ADG)	Aircraft Wingspan (ft.)
A	Less than 91	I	Less than 49
B	91 to less than 121	II	49 to less than 79
C	121 to less than 141	III	79 to less than 118
D	141 to less than 166	IV	118 to less than 171
E	166 and greater	V	171 to less than 214
		VI	214 to less than 262

Source: FAA AC 150/5300-13A, Airport Design.

At the IMA, operations within the ARC B-I, B-II, C-I, and C-II categories are driven by itinerant aircraft visiting the airport. Most aircraft are twin engine turboprop such as the Beechraft King Air series and business jet aircraft within the Cessna Citation family of aircraft. These aircraft are classified in the ARC B-I/B-II categories. Larger aircraft that visit the IMA include the Falcon 50 (ARC B-II) and the Learjet 35A (ARC C-I). Based on discussions with Walter Aviation, there does not appear to be any ARC C-II or larger aircraft that currently visit the airport. The forecast of total, local, and itinerant operations by ARC is summarized in **Table 2-12**.

Table 2-12. Recommended Forecast of Operations by FAA Airport Reference Code

Forecast Year	A-I	B-I	B-II	C-I	C-II	Helo	Total Operations
2012							
Local	*5,000*	*50*	*0*	*0*	*0*	*250*	*5,300*
Itinerant	*1,290*	*620*	*800*	*10*	*0*	*1,080*	*3,800*
Total	**6,290**	**670**	**800**	**10**	**0**	**1,330**	**9,100**
2017							
Local	*5,550*	*100*	*0*	*0*	*0*	*250*	*5,900*
Itinerant	*1,550*	*660*	*880*	*10*	*0*	*1,080*	*4,180*
Total	**7,100**	**760**	**880**	**10**	**0**	**1,330**	**10,080**
2022							
Local	*6,075*	*100*	*75*	*0*	*0*	*250*	*6,500*
Itinerant	*1,778*	*710*	*970*	*12*	*0*	*1,080*	*4,550*
Total	**7,853**	**810**	**1,045**	**12**	**0**	**1,330**	**11,050**
2027							
Local	*6,500*	*100*	*150*	*0*	*0*	*250*	*7,000*
Itinerant	*2,108*	*760*	*1,070*	*12*	*0*	*1,080*	*5,050*
Total	**8,608**	**860**	**1,220**	**12**	**0**	**1,330**	**12,030**
2032							
Local	*7,025*	*100*	*225*	*0*	*0*	*250*	*7,600*
Itinerant	*2,316*	*810*	*1,180*	*14*	*0*	*1,080*	*5,400*
Total	**9,341**	**910**	**1,405**	**14**	**0**	**1,330**	**13,000**

Source: Analysis by Snyder & Associates, Inc.

From the information presented above, there is sound justification for assigning the current design aircraft as the B-II family given that more than 500 itinerant operations are being conducted annually by such aircraft (referring to the highlighted boxes in **Table 2-12**). Although there are no C-II aircraft operations, it is recommended that the IMA maintain its C-II classification given the significant federal and local investments made recently to reconstruct the airfield to C-II airport design standards. These improvements (specifically the reconstruction of the runway from 4,000' x 75' to 5,500' x 100'), allow the IMA to accommodate C-I and C-II aircraft. Lastly, maintaining the C-II classification into the future is a targeted need according to the Iowa Aviation System Plan.