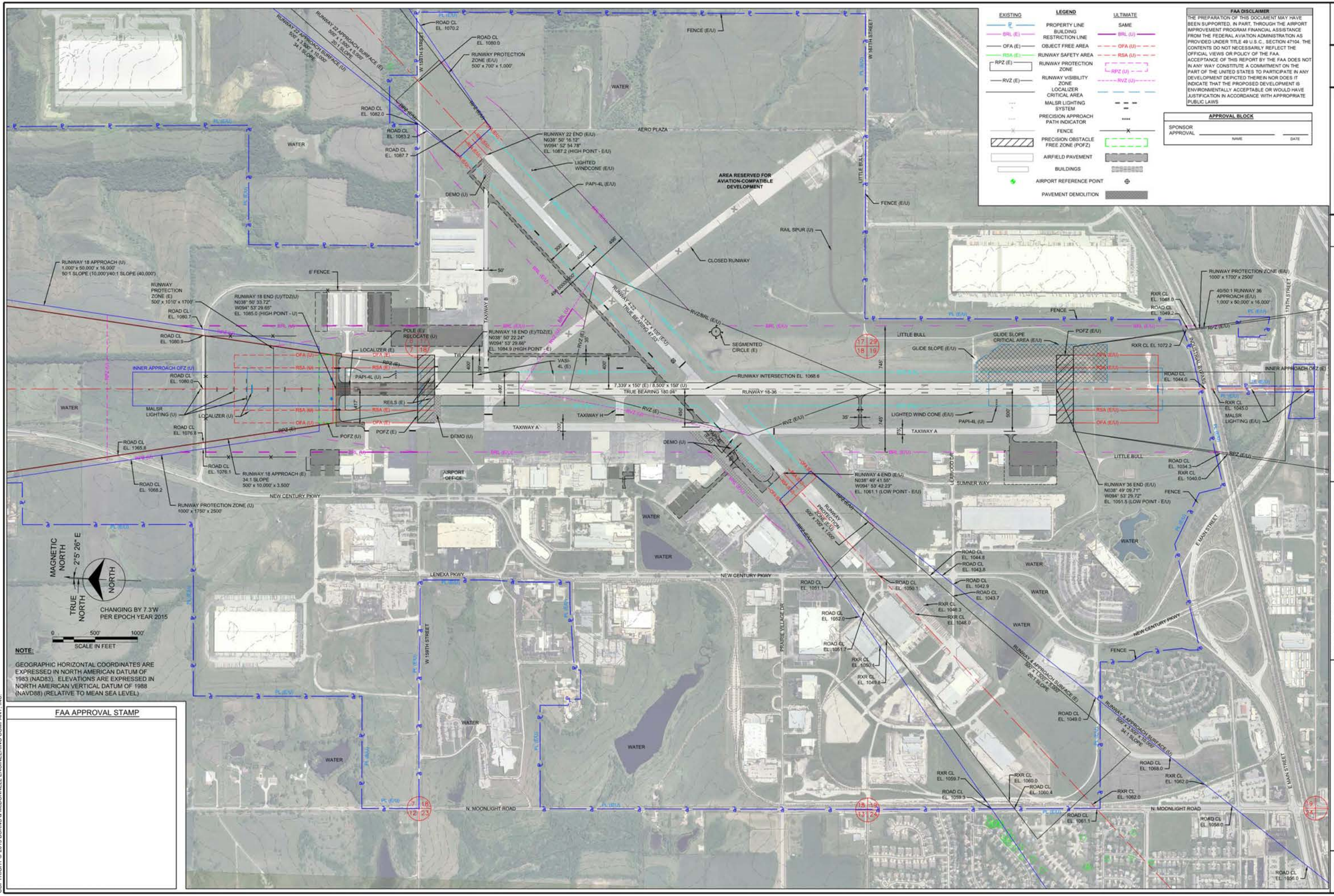
Appendix B

Airport Layout Plan and Aviation Forecast Data



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NEW CENTURY AIRCENTER
NEW CENTURY, KANSAS

Johnson County Airport Commission

BURNS McDONNELL

checked by: R. CRAIN
designed by: A. SEE
drawn by: B. HEADY
date: MARCH 2016

AIRPORT LAYOUT DRAWING

Sheet 3 of 22

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BURNS McDONNELL

NEW CENTURY AIRCENTER AIRPORT LAYOUT PLAN UPDATE

Evaluation of Proposed Runway 18L-36R

CHAPTER 3 - AVIATION DEMAND FORECASTS

A. Introduction

The forecast of aviation demand was developed to evaluate whether the existing airport will accommodate the future needs based on projections of based aircraft and operations. These forecasts provided guidance for the timing of additional improvements to assist with the phased development of future airport needs. Forecasts were prepared for the following:

- Based aircraft
- Aircraft operations
- Fleet mix
- Annual instrument approaches

The aviation demand forecasts were developed in accordance with regional and national trends, as well as the findings from the airport inventory. The *FAA Aerospace Forecast Fiscal Years 2013-2033* was used to provide the national trends in aviation. Furthermore, the Terminal Area Forecast (TAF) and the FAA forecast models were used to compare the aviation demand forecasts generated for the airport.

B. Factors Affecting Aviation Activity

As a whole, aviation activity is generally affected by the economic health of the nation and growth in the employment sector. After growing rapidly for most of the past decade, and having slowed over the past few years, the most recent general aviation sales activity indicates cautiously optimistic results that the impact of the recession on the aircraft market may have come to an end, and demand for business activity is beginning to recover. The FAA Aerospace Forecasts call for robust growth in the long term outlook, driven by higher corporate profits and the growth of worldwide Gross Domestic Product (GDP). Additionally, continued concerns about safety, security, and flight delays keep business aviation attractive relative to commercial air travel. Industry experts report a significant portion of piston aircraft hours are used for business purposes. The FAA predicts business usage of general aviation aircraft will expand at a faster pace than that for personal and recreational use during the next 20 years.

1. Economic Characteristics

Overall, General Aviation (GA) has been greatly impacted by the slow economic recovery as well as the price of petroleum, which is a significant factor in the cost to operate aircraft. These factors have resulted in a decline in the operation levels of single-engine and twin-engine piston airplanes. Income spent on flight training and recreational flying has decreased, resulting in a reduction in aircraft deliveries and utilization rates (operations). GA aircraft operational costs can be expensive and uncertainty about the future has impacted the population's spending habits. At the same time, the industry has experienced an increase in the number of corporate jets and other business aircraft activity to help fill the void left by GA.

2. Aviation-Related Factors

Aviation demand is largely dependent upon economic and industry trends and conditions. Current economic conditions determine the likelihood for an individual or company to purchase a new aircraft. Business needs, coupled with technology and manufacturing practices, have played a key role in the aircraft purchase decision-making process. Aircraft designs are trending towards greater aerodynamic efficiency and lower fuel consumption, resulting in relatively lower operating costs compared to earlier aircraft designs. In addition, the performance and reliability of the newer turbine-powered aircraft have made owning and operating a jet more economical. Furthermore, fractional-ownership companies provide a cost-effective solution to gain the benefits of door-to-door air travel without the added expense of aircraft ownership.

C. Aviation Demand

Aviation demand is the process to assess the future needs of the airport and its facilities, based on current and historical based aircraft and operations, including aircraft type and function (fleet mix). Various techniques and methods may be utilized to determine the forecast of aviation activity at the airport. The results of this analysis are provided in Table 3-1.

1. Previous Studies

A master plan for IXD was conducted in 1988 and forecasted significant air cargo and commercial air passenger service operations to occur at IXD. At that time they anticipated annual operations to reach 179,000, putting the airport at 78% capacity. Consequently, substantial airfield

improvements were recommended, including the addition of a 7,500-foot parallel runway located 4,300 feet to the east of existing runway 18-36.

In 1992, an Air Cargo Study was completed to determine the likelihood of attracting air cargo operations to IXD. The findings concluded that the probability of IXD attracting significant air cargo operations was unlikely.

A study was completed in 2001 to evaluate the likelihood of attracting airline service to IXD. The study was titled, "Feasibility of Attracting Scheduled Air Service." The study determined that attracting scheduled air service to IXD would be an expensive endeavor and it was highly unlikely that airlines would operate out of IXD.

The current master plan, completed in 2006, referenced both the Air Cargo Study and the Air Service Feasibility Study in their evaluation of forecasted operations. The master plan states that "commercial air service is extremely unlikely and air cargo operations may occur, but would be on a limited basis, if at all."

2. Forecast Assumption

Historical aviation activity showed IXD has been fairly consistent over the last 20 years with occasional fluctuations in based aircraft and operations. This study analyzed aviation activity for the previous ten years to establish a baseline. Over the past ten years, IXD has averaged 198 based aircraft, including the Army Reserves helicopters. Operations over the past ten years have averaged around 49,000. Since the 1988 master plan, there has been no significant increase in airline or air cargo operations at the airport.

Our forecasts are consistent with the findings of the Air Cargo Study, the Feasibility of Attracting Scheduled Air Service Study, and the current Airport Master Plan. Airline passenger service operations and significant air cargo operations are not likely to occur at IXD within the forecasted planning period. Therefore, airline service and air cargo service operations were not included in the forecasts of aviation demand at IXD.

3. Demand Forecast Methodology

Forecasts, by their nature, have a degree of uncertainty. They involve not only statistical analyses and various scientific methods, but also judgment, reliance on industry knowledge, and the forecaster's experience to incorporate industry trends not yet reflected in recent results. Given the volatility of the U.S. general aviation industry, it is understandable that each year's forecast would contain a certain degree of variance. FAA forecasters have built forecast models that provide a consistent and predictable pattern of results. Analysts who rely on these forecasts are then able to adjust for the predictable variance from actual results. The following provides a brief description of the methodologies used for IXD.

a) Regression Analysis

A regression analysis was used to determine a correlation between based aircraft, regional population, and income levels. The correlation of airport aviation activity to county population and per capita personal income was not considered substantial. As a result, this technique was not included in the forecast of based aircraft.

b) Historical Trend Analysis and Extrapolation

This technique measured future growth using historical trends. Due to an overall decrease in the number of based aircraft since 2003, the historical trend at IXD resulted in a forecast of 160 based aircraft. This method was included in the forecast of based aircraft (Table 3-1) but it does not support the future growth anticipated at the airport.

c) FAA Fleet Mix Growth

This technique utilizes fleet mix forecasted projections per the FAA Aerospace Forecast Fiscal Years 2013-2033. The FAA forecasts a 0.2% decrease in piston powered, single-engine airplanes over the planning period and a 0.6% decrease in multi-engine piston powered airplanes. Turbine powered aircraft are projected to increase at a rate of 2.8% for turbine-propeller airplanes and 3.5% for jet airplanes. This methodology resulted in a forecasted 207 aircraft at IXD over the 20 year planning period. See Table 3-1.

d) FAA Growth Rate

This method analyzes the FAA General Growth Rate, as published in *FAA Aerospace Forecasts Fiscal Years 2013-2033*. The active general aviation fleet was projected to increase at an average annual rate of 0.5% over the 20-year forecast period, growing from an estimated 220,670 in 2012 to 246,375 aircraft by 2033. This methodology resulted in 210 based aircraft over the 20 year planning period. See Table 3-1.

e) Terminal Area Forecasts (TAF)

The TAFs were created for active airports in the NPIAS and developed by the FAA Forecast and Performance Analysis Division. These forecasts utilize a top-down approach, based on local and national economic conditions, as well as conditions within the aviation industry. The TAF is used to provide a comparison to other methodologies of forecasting. Despite the FAA's projection of decreasing single engine-piston aircraft, the TAF for IXD shows a 73% overall growth, increasing from 98 single engine-piston aircraft to 134 over the 20 year planning period. This aggressive increase in single engine-piston aircraft is believed to be unrealistic and was not used for the preferred forecast. See Table 3-1.

f) Master Plan

The master plan conducted in 2006 shows a very aggressive growth rate. The master plan estimates don't include the Army Reserve Helicopters based on the airfield so we can assume an additional 14 aircraft to their estimates of 185 based aircraft in 2004, 235 based aircraft in 2014, and 340 based aircraft in 2024. These estimates have already fallen short of actual numbers and are believed to be too aggressive for the planning horizon.

4. Preferred Forecast of Aviation Demand

The selection of the preferred forecast was established from the analysis of several alternative approaches to determine a reasonable expectation of future based aircraft at IXD. As seen in Table 3-1, the results of the analysis were widely varied, from losing 32 airplanes to gaining 148 airplanes.

The preferred forecast utilizes FAA forecasts but allows us to input variables based on airport specific realities. For IXD, we anticipate single-engine aircraft to decrease at a slower rate than

what the FAA predicts. We anticipate a slightly more aggressive increase in multi-engine, turbine-propeller airplanes than that of FAA Fleet Mix Projections; however, more in line with FAA TAF projections. Because of these assumptions, the preferred methodology of forecasted based aircraft is the result of the FAA Fleet Mix, adjusted for probable variables.

Table 3-1 Forecast of Based Aircraft

Year	Historical Trend	FAA Fleet Mix Growth	FAA General Growth Rate	FAA Fleet Mix Growth Adjusted	Master Plan	TAF	Preferred Forecast
2014	192	192	192	192	235	152	192
2019	184	194	196	197	270	166	197
2024	177	198	201	203	340	184	203
2034	160	207	210	217	N/A	224	217
Change	(32)	15	18	25	148	32	25

Source: Burns & McDonnell, 2014

D. Future Aviation Demand

1. Based Aircraft Fleet Mix

Table 3-2 provides the forecast of aircraft fleet mix, based on information gathered during the airport inventory phase. A gradual decline is expected by piston aircraft with increases in based turboprop and jet aircraft.

Table 3-2 Based Aircraft by Type

Year	Single Engine Piston	Multi-Engine Piston	Multi-Engine Turbo-Prop	Jet	Helicopters / Other	Total
2014	127	24	8	17	16	192
2019	126	23	12	20	16	197
2024	125	23	15	24	16	203
2034	124	21	22	34	16	217

Source: Burns & McDonnell, 2014

2. Annual Operations

Annual operations are divided between two general categories: Local and itinerant. In general, local operations occur within 25 miles of an airport. Itinerant operations are flights that travel beyond the 25-mile radius. The local to itinerant operational ratio has historically been approximately 45% to 55%, and is expected to be consistent throughout the 20 year planning period. It should be noted that local and itinerant operations can be performed by local based-aircraft or aircraft based at other airports.

Future annual operations were calculated by the aircraft utilization rate. This rate is calculated by dividing the annual operations by the total number of based aircraft. Using information gathered from historic trends, the utilization rate averaged 250. This rate was used to provide the baseline for future operational growth. Based on FAA Forecasts, the future utilization rate was calculated using the growth rate of 1.0%. The outcome of this analysis resulted in a forecast of 66,200 annual operations in 2034. See Table 3-4 for short and long-term annual operations forecast.

Table 3-3 Annual Operations

Year	Based Aircraft	Utilization Rate	Local Operations (45%)	Itinerant Operations (55%)	Total
2014	192	260	21,600	26,400	48,000
2019	197	263	23,300	28,500	51,800
2024	203	276	25,200	30,700	55,900
2034	217	305	29,800	36,400	66,200

Source: Burns & McDonnell, 2014

3. Operations by Fleet Mix

The aircraft operational fleet mix was used to determine the type of aircraft expected to use the facility in the future, which influences the airport design and configuration. The aircraft mix was determined from information gathered from current and historical operations for IXD. Table 3-4 illustrates the anticipated aircraft mix operations for the airport. The future critical aircraft is expected to be in the ARC D-II family.

Table 3-4 Fleet Mix Forecast

Designation	Existing	Short Term (0-5 years)	Mid Term (6-10 years)	Long Term (11-20 years)
	Aircraft Approach Category			
A	42,480	44,548	45,838	53,622
B	3,120	4,274	5,870	7,282
C	2,160	2,590	3,634	4,634
D	240	389	559	662
	Aircraft Design Group			
I	43,200	45,584	48,074	55,608
II	4,608	6,009	7,602	10,327
III	192	207	224	265

Source: Burns & McDonnell, 2014

4. Annual Instrument Approaches

Annual Instrument Approaches (AIA) were estimated based on the percentage of instrument-rated pilots[1], percentage of time the airport experiences Instrument Meteorological Conditions[2] (IMC), and the number of itinerant operations at the Airport. Table 3-5 outlines the calculations to determine the AIA count for IXD.

Table 3-5 Estimated Annual Instrument Approaches

Year	Itinerant Operations	Instrument[1] Rated Pilots	Percent[2] Instrument Conditions	Annual Instrument Approaches
2014	26,400	51.0%	10.0%	1,430
2019	28,500	51.6%	10.0%	1,493
2024	30,700	52.3%	10.0%	1,560
2034	36,400	53.6%	10.0%	1,733

Source: Burns & McDonnell, 2014

[1] FAA Aerospace Forecast FY 2013-2033
[2] NOAA Climatic Data (Sedalia National Aviation Center)

5. Critical Aircraft

The critical aircraft is the largest airplane, or group of airplanes, within a design group category conducting at least 500 annual operations. The critical aircraft is evaluated in regard to wingspan, weight, and approach speed. The Challenger 600 and the Sabreliner 65 are both based at IXD and fall into the C-II category of aircraft. Combined, these two aircraft complete over 500 annual operations per year. A Learjet 60 is also based at the airport and is a D-I aircraft. It falls shy of the 500 annual operations; however, more D category aircraft are anticipated to utilize the airport as operations increase over the forecasted planning period. Table 3-6 outlines the future critical aircraft for IXD.

Table 3-6 Critical Aircraft Characteristics

Aircraft Type	ARC Code	Wingspan	Approach Speed	Takeoff Distance	Maximum Takeoff Weight
Bombardier Challenger 600	C-II	61.8'	125 Knots	5,700'	41,250 lbs.
Sabreliner 65	C-II	50.5'	124 Knots	5,450'	24,000 lbs.
Learjet 60	D-I	43.9'	149 Knots	5,360'	23,500 lbs.

Source: Airport Records of Based Aircraft; October 2001 Airport Newsletter-Central Region: www.faa.gov

E. Summary

Table 3-7 provides a brief summary of the aviation demand forecasts.

Table 3-7 Aviation Demand Forecasts Summary

	2014	2019	2024	2034
Based Aircraft				
Single-Engine (Piston)	127	126	125	124
Multi-Engine (Piston)	24	23	23	21
Multi-Engine (Turbo-Prop)	8	12	15	22
Jet	17	20	24	34
Helicopter/Other	16	16	16	16
Total	192	197	203	217
Annual Operations				
Itinerant Operations	26,400	28,500	30,700	36,400
Local Operations	21,600	23,300	25,200	29,800
Total Operations	48,000	51,800	55,900	66,200
Annual Instrument Approaches	1,430	1,493	1,560	1,733

Source: Burns & McDonnell, 2014