CHAPTER 3: AVIATION ACTIVITY FORECASTS

Introduction

The Aviation Activity Forecasts chapter of the Airport Master Plan analyzes current and future airport activity at the Pierre Regional Airport (PIR). Forecasting provides an airport with a general idea of the magnitude of growth, and fluctuations in activity anticipated over the forecast period. Forecasts are used to assist the Airport management in determining existing and planned future facility needs based on airport activity level estimates and projections. Forecasts attempt to develop a realistic estimate of future changes.

Forecasting efforts are based on a "snapshot" of both existing aviation trends and the local, regional, state, and national socioeconomic climate. As such, forecasting tends to be a dynamic element of airport master planning. Forecasts should be reviewed and updated when conditions change dramatically, to reflect the changed environment.

The forecasts developed for PIR will drive the planning, size, and sequencing of future facility development to meet future projected growth. Airport development, however, is demand-based driven by actual numbers rather than forecasts.

A technical review has been completed to thoroughly analyze and develop a probable aviation forecast using a variety of methods to help quantify potential aviation activity over the next 20 years.

This chapter includes aviation activity forecasts for the following primary elements:

- Passenger Enplanements
- Passenger Aircraft Operations
- Air Cargo
- Other Commercial Operations
- Based Aircraft
- General Aviation
- Military
- Critical Design Aircraft
- Peak Activity

Background

PIR has experienced a significant reduction in passenger enplanements since the last Master Plan was completed in 2008. Between 2008 and 2015, passenger enplanements decreased by more than 58 percent. However, passenger enplanements experienced a slight increase in 2016 and are showing further growth in the first half of 2017.

The declining enplanements were a result of a combination of factors including the loss of direct air service to Minneapolis and the unreliability of the existing air service to Denver. Most of the regional airlines have suffered from a skilled pilot shortage, which came because of the significant increase in the minimum number of hours to obtain an Air Transport Pilot certificate. Great Lakes Airlines, which served Pierre through mid-2016 with turboprop aircraft, was forced to cancel numerous flights due to the pilot shortage as were many other regional carriers. The unreliability of the existing service caused many potential passengers to look to alternative airports for their travel plans. ADI, which began serving Pierre in August 2016, flies the 50-seat Embraer ERJ-145 regional jet with Federal subsidies from the Essential Air Service (EAS) program. Passengers generally prefer jet aircraft over turboprop aircraft as they are typically more spacious and can fly above weather that turboprop aircraft would

typically have to fly around, increasing travel time and in some cases causing delays or flight cancellations.

Available data regarding airport operations (takeoffs and landings) is extremely limited since PIR doesn't have an airport traffic control tower (ATCT). The principal source of airport operations data is the FAA terminal area forecast (TAF), which "estimates" the numbers of PIR operations. Airport operations have also decreased since the last master plan based on the TAF data, decreasing from approximately 31,400 in 2008 to just over 27,000 in 2016. By contrast, PIR has experienced a steady increase in the regular use of corporate aircraft over the last several years because of growing local business activity.

Forecast Rationale

Forecasting airport demand is a critical step in airport development. It allows an airport to assess its ability to satisfy the projected needs of the aircraft and people it serves, and determine the approximate timing of necessary improvements by projecting airport user activity levels.

The Federal Aviation Administration (FAA) must approve forecasts developed for airport master plans and/or federal grants. It is the FAA's policy, listed in FAA AC 150/5070-6B, Airport Master Plans, that FAA approval of forecasts should be consistent with the Terminal Area Forecasts (TAF). Forecasts of operations and based aircraft developed within a Master plan are considered consistent with the TAF if they meet the following criteria:

1. Forecasts differ by less than 10 percent in the five-year forecast and 15 percent in the 10-year period, or
2. Forecasts do not affect the timing or scale of an airport project, or
3. Forecasts do not affect the role of the airport as defined in the current version of FAA Order 5090.3, Field Formulation of the National Plan of Integrated Airport Systems.

Forecasts considered to be *inconsistent* with the TAF require additional FAA review to confirm the planning assumptions and ensure the use of appropriate forecast methodologies. Approval can occur at the FAA local (Bismarck/Minneapolis) or regional (Chicago) level.

Furthermore, FAA Order 5090.3C states forecasts should be:

1. *Realistic;*
2. *Based on the latest available data;*
3. *Reflect the current conditions at the airport;*
4. *Supported by information in the study; and*
5. *Provide an adequate justification for the airport planning and development.*

The 2016 FAA TAF published in January 2017 is the TAF model used for this report and represents the latest data available when the forecasting effort for this study began.

Factors Affecting Forecasts

FAA provides general guidance in evaluating factors that affect aviation activity. FAA AC 150-5070-6B states:

> *"Planners preparing forecasts of demand or updating existing forecasts should consider socioeconomic data, demographics, disposable income, geographic attributes, and external factors such as fuel costs and local attitudes towards aviation."*

The following defining factors have been used to develop the PIR forecast:

1. Federal fiscal year 2016 (October 1, 2015 through September 30, 2016) has been used as the baseline year based on the availability of data when the forecasting effort began (July 2017).

2. FAA data from 2017 (where available) are used to validate forecast assumptions and update the forecast baseline.
3. The forecast period is 20 years encompassing years 2016 through 2036.
4. The most recent 2015 estimates and future projections of socioeconomic and demographic trends are used for the airport service area.
5. The core airport service area is considered to be the Pierre Micropolitan Statistical Area (MiSA) and includes all of Hughes and Stanley Counties, South Dakota.

The forecasts prepared for the airport assume an unconstrained scenario where facilities are available to meet demand. Any constrained forecasts prepared will be noted throughout the document. Time periods include short-term (5-year), mid-term (10-year) and long-term (20-year) resulting in forecasts for year 2021, 2026 and 2036. Forecasts may be developed using a composite of methodologies over the planning period.

Planning Activity Levels

The forecasts developed in this section will be translated into Planning Activity Levels (PALs) in future chapters to identify activity demand triggers for future facility improvements since aviation activity fluctuates due to unforeseen industry changes. By planning airport development around PALs, phases of construction/airfield development are based on triggering events and not necessarily based on a specific timeframe. Similarly, airfield development phases are implemented based on demand and not a specific period in time. This is a more realistic approach for planning demand-driven airport development due to the variability of forecasting and changing demand.

Forecasting Methods

Forecasts should not be considered predictions of the future but rather an educated projection of future activity. Some of the following forecasting methodologies applied for this analysis included trend analysis, market share analysis, and regression analysis.

Application of professional judgment represents a fine-tuning of a forecast based on the planner's experience with similar airports or specific knowledge of the unique characteristics of the local community and the local aviation environment. Professional judgment permits the inclusion of a broad range of relevant information into the forecasting process and is used to refine the results of the various forecasting methodologies.

TREND ANALYSIS

Trend analysis identifies historical growth patterns and projects those patterns into the future. Often, a trend line can be generated using a graph of the historical data to reveal an historical trend. That trend line can then be projected into the future to develop a forecast.

MARKET SHARE ANALYSIS

Market share analysis assumes a relationship between local and regional/national forecasts. The market share forecasting approach is a top-down methodology where airport activity is assumed to be tied to growth in some external measure (typically a regional, state, or national forecast).

REGRESSION ANALYSIS

Regression analysis is a statistical technique for estimating the relationships between one or more variables and a specific dependent variable. Regression analysis identifies the correlation between a known independent variable(s) (e.g., estimates and projections of population, income, etc.) and the dependent variable(s) (e.g., based aircraft or aircraft operations). The correlation between the dependent and independent variable is represented by the correlation coefficient, which is defined as the R^2 (R-squared) value. The range of values for the correlation coefficient is quantified as either a positive or negative value between +1.00 and -1.00 indicating a positive or negative relationship between the dependent and independent variable(s). Generally, a correlation coefficient greater than

0.8 is described as strong, whereas a correlation coefficient less than 0.5 is generally described as weak.

Socioeconomic Data & Forecasts

Specific information regarding the socioeconomic characteristics of the airport service area can provide useful insight into factors that can affect aviation activity at an airport. Commonly evaluated metrics include population, employment, income, gross regional product, and retail sales. Historic trends, current data, and forecasts are evaluated in this section in an effort to identify how various socioeconomic trends may influence the aviation activity forecasts at PIR. Forecast activity growth rates are used as a method to compare the airport service area to comparable growth rates within the region, state, and nationally.

The primary focus of the socioeconomic data and forecasts will be Hughes and Stanley Counties, South Dakota, which form the Pierre Micropolitan Statistical Area (MiSA). The City of Pierre is located within Hughes County; however socioeconomic parameters forecast for the Pierre Micropolitan Statistical area are used to reflect those that are representative of the airport service area.

Table 3-1 – Socioeconomic Projections

Parameter	2016	2021	2026	2036	CAGR
Total Population					
Pierre	14,008[1]	N.A.	N.A.	N.A.	N.A.
Pierre MiSA	22,241	22,707	23,130	23,694	0.317%
South Dakota	866,991	904,202	942,484	1,016,321	0.798%
United States	324,506,944	339,812,108	355,802,071	387,690,418	0.893%
Total Employment					
Pierre MiSA Area	17,465	18,775	19,733	21,229	0.981%
South Dakota	604,770	652,512	698,869	785,687	1.317%
United States	191,870,817	206,283,698	220,485,615	247,548,008	1.282%
Total Personal Income per Capita*					
Pierre MiSA Area	$47,070	$51,312	$54,833	$61,055	1.309%
South Dakota	$43,132	$46,501	$49,907	$56,043	1.318%
United States	$43,613	$47,080	$47,080	$56,840	1.333%
Gross Regional Product**					
Pierre MiSA Area	$1,273	$1,428	$1,554	$1,790	1.718%
South Dakota	$45,448	$50,915	$56,658	$68,953	2.106%
United States	$16,696,644	$18,684,023	$20,770,865	$25,231,510	2.086%
Total Retail Sales**					
Pierre MiSA Area	$4,361	$4,980	$5,608	$6,993	2.389%
South Dakota	$15,451	$16,703	$17,881	$20,281	1.369%
United States	$4,846,833	$5,261,518	$5,659,193	$6,487,724	1.469%

Source: Woods & Poole Economics (2016), U.S. Census, and KLJ Analysis.
CAGR = Compound Annual Growth Rate
1 = Population estimate as of July 1,
**= 2009 dollars*
***= millions of 2009 dollars.*

Population

Population is a basic indicator of the number of people who may use the airport. The City of Pierre experienced a 2.65 percent increase in population between 2010 and 2016. By comparison, the Pierre MiSA experienced a 3.80 percent increase in population during the same period according to the U.S. Census.

The population within the Pierre MiSA as indicated on **Table 3-1**, is projected to continue growing through 2036, albeit at a slower rate annually (0.317%) than was experienced from 2010 through 2015. It is not unreasonable to conclude that the City of Pierre will continue to experience population growth during this period. Population growth within the Pierre MiSA is forecast to be significantly lower than that for the state of South Dakota and the United States over that same period.

Employment

The Pierre MiSA has a diverse economy with major employers in state and federal government, health care (Avera St. Mary's Hospital), education (Pierre School District) and retail. These employers represent more than 5,000 people; the top employers are shown in **Table 3-2**.

Total employment within the Pierre MiSA is forecast to continue growing at just under one percent (0.98) percent annually over the next 20-years according to Woods & Poole data. Employment within the Pierre MiSA is forecast to lag somewhat both the state and nation over the next 20 years.

Table 3-2 – Major Employers

Employer	No. of Employees
State Government	2,380
Avera St. Mary's Hospital	450
Pierre School District	350
Wal-Mart	317
Federal Government	240
Morris Inc.	230
Oahe Incorporated	175
Avera Medical Associates Clinic	153
City of Pierre	142
BankWest	133
Menards	125
Pierre Indian Learning Center	115
Lynn's Dakotamart	93
Capital Area Counseling Services	92
Hughes County	90
Golden Living Center	75

Source: Pierre Economic Development Corporations (PEDCO, 2017) and KLJ Analysis.

Income

Per Capital Personal Income (PCPI) is also considered a factor that can significantly affect aviation activity. Individuals with greater disposable income typically have a higher propensity to use the time savings afforded by aviation, either as an owner/pilot, for aircraft chartering, or flying commercially.

PCPI within the Pierre MiSA is substantially higher than the national and state averages in 2016. PCPI in the MiSA is expected to grow at a somewhat slower annual rate than both the state and the U.S. However, the Pierre MiSA forecast per capita personal income is still projected to substantially exceed both the national and state PCPI levels over the next 20 years.

Gross Regional Product

Gross Regional Product (GRP) is a measure of the overall size of an economy as measured by the market value of all goods and services produced within a given geographic area, which in this case is the Pierre MiSA. This variable measures the economic vitality of the community and is another factor that can contribute to additional aviation activity. Markets that have more economic output represent a growing economy and typically generate greater demand for aviation services.

The forecast GRP growth rate for the Pierre MiSA is somewhat lower than both the statewide and national averages. This slower growth rate is representative of the low growth associated with the Agricultural sector of the Pierre MiSA that comprises the greatest share of the local economy.

Retail Sales

Increasing retail sales, similar to income, usually indicate people are able and willing to spend money for additional goods and services, including aviation services. Increasing retail sales are also an indicator of increasing disposable income, which results in people having greater confidence in job security. Job security provides the confidence needed for people to continue making additional purchases.

The rate of growth in retail sales for the Pierre MiSA is forecast to be significantly higher than both the statewide and national averages over the next 20 years. This growth may influence increasing demand for aviation activity throughout the Pierre MiSA.

Passenger Enplanements

Passenger airline enplanements represent the number of revenue passengers boarding commercial service aircraft that depart an airport. Enplanement figures are vital for project planning at commercial service airports because the numbers help determine the terminal building size and space requirements, and validate the airport's FAA classification and funding.

Passenger Demand

A number of air service studies have been developed for PIR over the years. These studies provide a history of the air service and historical passenger demand within the Airport's catchment area (the geographic area that has historically generated PIR's passenger demand). See **Figure 3-1**.

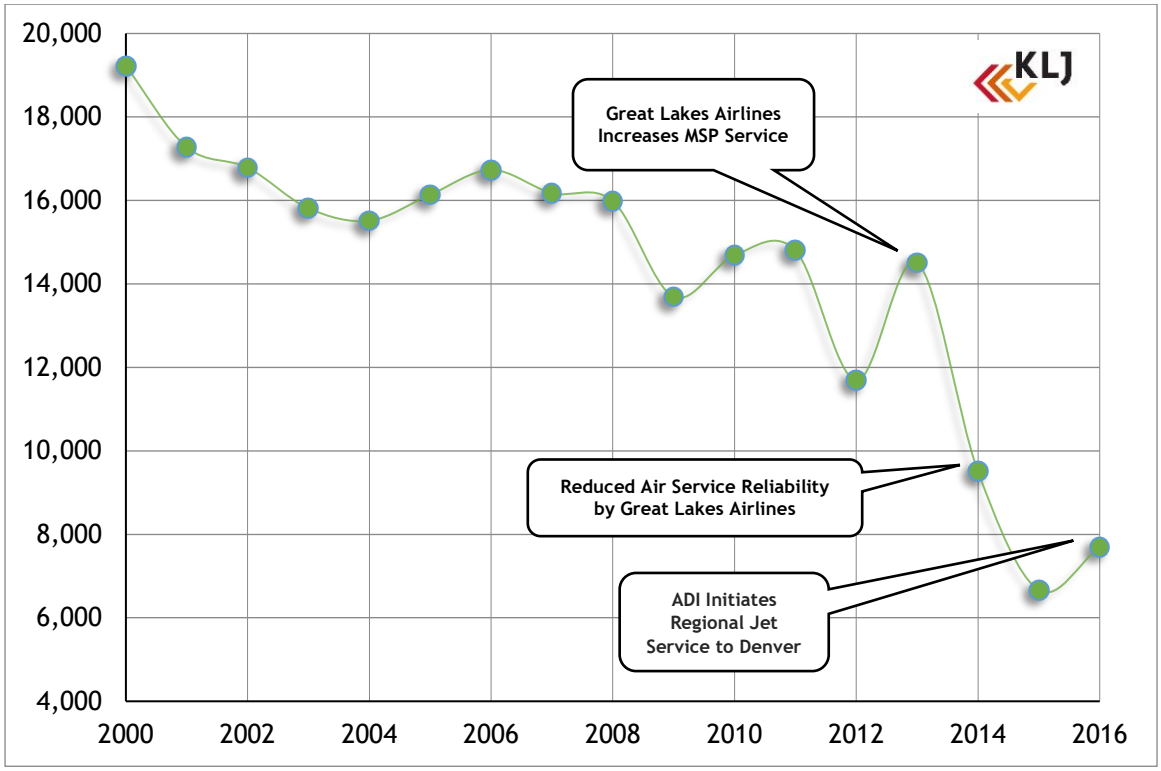
The 2012 air service study estimated PIR's 2013 catchment area population at 69,958 residents and noted that the population of the catchment area has remained relatively flat since 2002. This study also estimated the Airport's "true market" of combined origin and destination (O&D) passengers at 63,179 or 87 passengers per day to and from the catchment area, which represented an increase of 7,968 total O&D passengers over the prior study.

Historical Data

In summary, the air service study determined that PIR has been losing a significant portion (approximately 61 percent) of the O&D passengers in the catchment area to the Sioux Falls and Rapid City airports, with another three percent going to other airports. Lower airfares, non-stop service, aircraft (jet) service, and air service reliability have all contributed to the reduction in passenger activity at PIR. Of the total possible O&D trips generated within PIR's catchment area, PIR retains roughly 36 percent. In years past the airport retained as high as 51 percent of the total O&D passengers within the catchment area. **Figure 3-1** graphically depicts the Airport's historical passenger enplanements and **Table 3-3** tabulates the historical enplanement numbers.

The air service study concluded that PIR must recapture some of the passengers currently using alternative airports in order to achieve future growth in passenger activity.

Figure 3-1 – PIR Historical Enplanements



Source: FAA Air Carrier Activity Information System (2017)

FAA defines commercial passenger enplanements and operations in two categories: Air Carrier and Air Taxi/Commuter. Generally, air carrier activity is scheduled service in 60 seat or larger aircraft and commuter activity is scheduled service in aircraft with fewer than 60 seats. **Table 3-3** lists PIR's historical passenger enplanements.

Table 3-3 – PIR Historical Passenger Data

Year	Air Carrier	Commuter	TOTAL	Load Factor*
2001	0	18,381	18,381	N/A
2006	41	16,528	16,569	45.0%
2011	0	15,553	15,553	39.6%
2016	0	7,698	7,698	30.8%
2001-2016	*N/A*	*-7.98%*	*-7.98%*	*N/A*

Source: FAA Air Carrier Activity Information System (2017)
**Departure Load Factor in Calendar Year*

Aircraft load factors represent the percentage of seats on an aircraft that are occupied. Load factors historically have been decreasing due to both a decrease in passengers and an increase in available seats. Since ADI began service in August 2016, a peak monthly load factor to Denver of 65.7% was experienced in December 2016.

Forecasts

An updated forecast of enplaned passengers has been prepared after reviewing available data; a number of forecasting methodologies; and using professional judgment based on local and industry trends. The forecasts are unconstrained to represent the actual market demand regardless of available infrastructure, which means this is the projected demand that would occur even if required facilities are not available.

CONSIDERATIONS

The master plan forecast has been developed from professional judgment after reviewing airport, regional, and national trends and projections. Specific considerations regarding the characteristics of the PIR air service area/catchment area included:

- Historical and forecast population trends;
- Historical catchment area O&D passengers;
- PIR's share of historical catchment area O&D passengers;
- Initiation of regional jet service.

Forecasting involves assumptions and risk. If any of the demand considerations identified above significantly change or new demand factors are introduced, the forecasts should be reevaluated.

FORECAST METHODS

All of the typical forecasting methodologies were evaluated in an effort to establish a realistic enplanement forecast for PIR, including trend line, regression, and market share analysis. However, none of these forecasting methodologies resulted in a viable passenger enplanement forecast for PIR due to the relatively consistent decrease in passenger enplanements going back to the year 2000.

The passenger enplanement forecast was therefore developed based on the findings of the Air Service studies prepared for PIR. As noted previously, PIR historically has seen a dramatic decrease in the percentage of catchment area O&D passengers using the airport for their travel plans, with enplanements decreasing from approximately 51 percent of all catchment area O&D passengers to approximately 25 percent in 2016.

Each of three enplanement forecast scenarios is described below:

- **Low Forecast**: The low enplanement forecast is based on the expectation the Airport will not be able to recapture more of the overall catchment area enplanements going forward and the level of capture will remain around 25 percent throughout the planning period.
- **Preferred Forecast**: The preferred enplanement forecast was developed based on the expectation the increase in passenger enplanements experienced with the introduction of regional jet service by ADI in August 2016 will continue during the planning period. This results in PIR attracting an increasing share of the catchment area O&D passengers going forward. Ultimately in this forecast, PIR is expected to capture 50 percent of all catchment area O&D passengers by the end of the planning period, consistent with the airport's historical share of catchment area O&D passengers.
- **High Forecast**: The high enplanement forecast was developed based on the expectation the increase in passenger enplanements experienced with the introduction of regional jet service by ADI in August 2016 will continue and accelerate during the planning period. This results in PIR attracting an increasingly greater share of the catchment area O&D passengers beyond the highest levels experienced in the past.

PIR must work closely with the airline and the community to achieve the preferred enplanement forecast using marketing and incentives when and as feasible.

The proposed airport enplanement forecast is shown in **Table 3-4**, which presents the low, preferred, and high forecast range.

Table 3-4 – PIR Passenger Enplanement Forecast

Year	Passenger Enplanement Forecast		
	Low	Preferred	High
2016	7,698	7,698	7,698
2017	7,731	11,751	11,751
2018	7,764	12,111	12,422
2019	7,796	12,474	13,098
2020	7,828	12,838	13,778
2021	7,859	13,204	14,461
2022	7,890	13,570	15,148
2023	7,920	13,939	16,157
2024	7,950	14,309	16,535
2025	7,978	14,679	16,913
2026	8,006	15,051	17,292
2027	8,032	15,421	17,670
2028	8,057	15,792	18,048
2029	8,082	16,164	18,427
2030	8,105	16,534	18,804
2031	8,126	16,902	19,178
2032	8,145	17,268	19,548
2033	8,162	17,629	19,915
2034	8,177	17,989	20,279
2035	8,190	18,346	20,639
2036	8,201	18,698	20,994
CAGR	***0.32%***	***4.61%***	***5.14%***

Source: KLJ Analysis, 2017.

Passenger Aircraft Operations

Commercial aviation is the operation of an aircraft for hire to transport passengers or cargo. These operations can be scheduled or unscheduled. Commercial operations forecasts include aircraft operations and the classification of passenger enplanements. A Passenger Operation is a takeoff or landing of an aircraft with more than nine seats carrying commercial passengers on scheduled or unscheduled operations.

Commercial aircraft are defined as air carrier or air taxi/commuter according to the FAA definition. Air carrier aircraft provide scheduled passenger service in aircraft with more than 60 seats. Air taxi/commuter aircraft provide on-demand flights in aircraft with 60 or fewer seats or 18,000 or fewer pounds of cargo. These definitions apply to both passenger enplanements and commercial operations.

Historical Data

Table 3-5 shows a tabulation of the total historical FAA TAF commercial operations conducted at PIR since the year 2000. As noted above, air taxi/commuter aircraft provide on-demand flights in aircraft with 60 or fewer seats or 18,000 or fewer pounds of cargo while air carrier aircraft are those with more than 60 seats. These definitions apply to both passenger enplanements and commercial operations.

While the table indicates there were a fairly large number of air carrier operations from 2010 onward, these operations are incorrectly listed under “Air Carrier” and should be included with the Air Taxi/Commuter operations since PIR does not have aircraft operating with 60 or more seats.

Table 3-5– Historical Commercial Operations

Year	Air Carrier	Air Taxi/Commuter	Total
2010	2,920	3,390	8,320
2011	3,650	3,390	9,051
2012	3,650	3,390	9,052
2013	5,500	3,390	10,903
2014	5,500	3,390	10,904
2015	5,500	3,390	10,905
*2016**	*2,076*	*2,468*	*6,560*

Source: FAA Terminal Area Forecast - 2017;
**Data from the FAA TFMSC (IFR Flights Only) - 2017*

Forecasts

The commercial operations forecast for PIR is based on the fact the Airport is currently receiving EAS subsidies for the existing commercial service with the expectation the EAS operations will be replaced with a different EAS contract in mid-year 2018. Current service out of PIR consists of two, non-stop flights per day to Denver, CO on a 50-passenger Embraer 145 regional jet, one departure in the morning and the second later in the afternoon with return flights from Denver to Pierre.

The projected service is expected to retain the same flight schedule throughout the planning period with two departures per day during the week and one departure each on Saturdays and Sundays. Similarly, the Airport is expected to maintain 50-seat regional jet service throughout the planning period.

Table 3-6 – Passenger Airline Fleet Mix Forecast (Operations)

Seating Capacity	2016	2021	2026	2036
Air Taxi/Commuter (≤60 seats)				
Up to 9 Seats	0%	0%	0%	0%
10-39 Seats	64.5%	0%	0%	0%
40-60 Seats	35.5%	100%	100%	100%
Total Air Taxi/Commuter	**100%**	**100%**	**100%**	**100%**

Source: Form 41 Traffic Data: T-100 Domestic Segment - Bureau of Transportation Statistics, KLJ Analysis

The 2016 total operations also include flights from PIR to Watertown Airport as the existing commercial flight schedule is based on flights that originate in Watertown connecting through Pierre and on to Denver. The return flights from Denver operate in the same pattern, departing Denver for Pierre, and then continuing on to Watertown. The projected new service would originate and terminate in Pierre with no through service to or from Watertown; **Table 3-7** depicts the total enplanements forecasts.

Table 3-7 – Passenger Airline Flight Analysis Forecast

Metric	2016	2021	2026	2036
Air Taxi/Commuter (≤60 seats)				
Total Enplanements	7,698	13,204	15,051	18,698
Total Departures	1,038	730	730	730
Total Operations	2,076	1,460	1,460	1,460
Average Seats Per Departure	30.0	50.0	50.0	50.0

Source: Form 41 Traffic Data: T-100 Domestic Segment - Bureau of Transportation Statistics, FAA Terminal Area Forecast (January 2017), KLJ Analysis

Air Cargo

Transporting materials and goods is typically accomplished by air, truck, rail, water, or a combination of modes. Products that are high value, lightweight, and time sensitive typically drive air cargo demand. Cargo can be carried on dedicated airfreight aircraft or in the belly of commercial service aircraft.

Historical Data

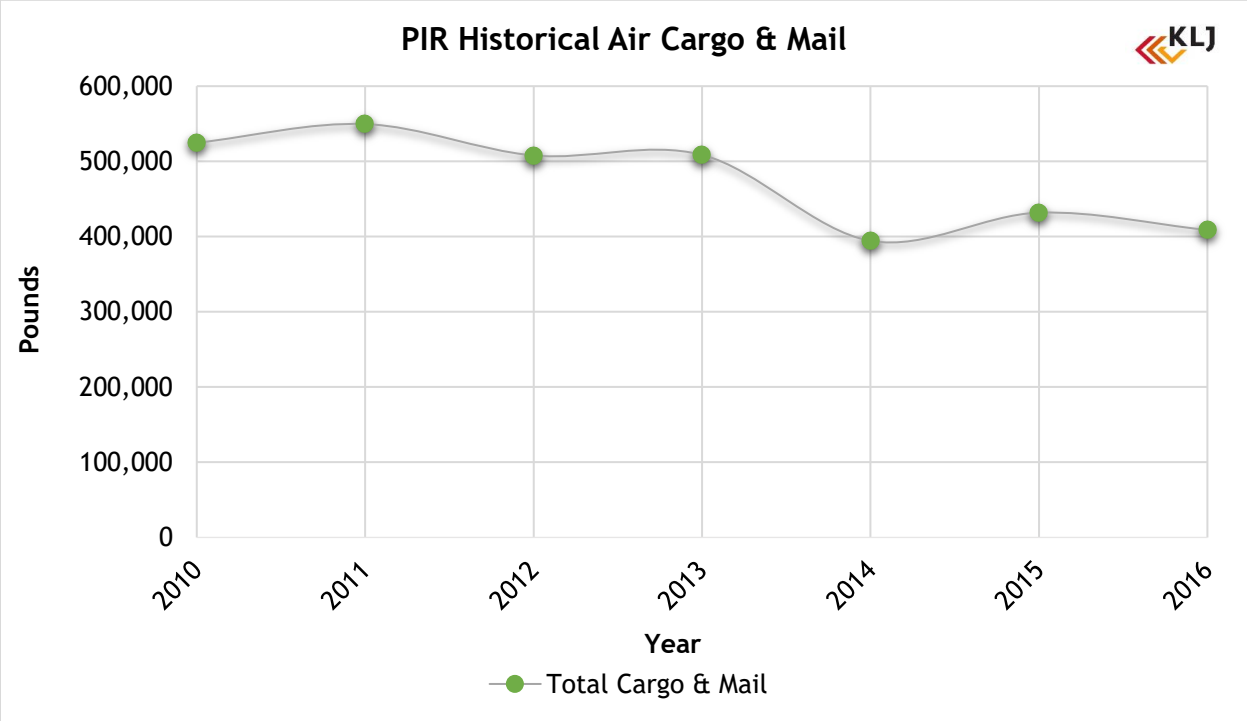
The total volume of air cargo enplaned and deplaned at PIR has declined since 2010, from almost 525,000 pounds in 2010 to a little more than 408,000 pounds in 2016. **Table 3-8** tabulates the Airport's breakdown of historical enplaned and deplaned air cargo while **Figure 3-2** graphically depicts the historical air cargo activity.

Table 3-8 – Historical Air Cargo Freight & Mail

Year	Enplaned Cargo Data (T100)			Deplaned Cargo Data (T100)		
	Enplaned Air Freight	Enplaned Air Mail	Total Enplaned Air Cargo	Deplaned Air Freight	Deplaned Air Mail	Total Deplaned Air Cargo
2010	131,429	14	131,443	393,252	0	393,252
2011	135,959	37	135,996	413,551	0	413,551
2012	137,054	0	137,054	370,789	0	370,789
2013	122,313	0	122,313	386,294	0	386,294
2014	124,732	0	124,732	269,635	0	269,635
2015	129,236	0	129,236	302,531	0	302,531
2016	125,513	0	125,513	283,216	0	283,216

Source: Form 41 Traffic Data: T-100 Domestic Segment - Bureau of Transportation Statistics

Figure 3-2 – Historical Air Cargo



Source: Form 41 Traffic Data: T-100 Domestic Segment - Bureau of Transportation Statistics

A variety of aircraft accommodate the air cargo operations at PIR, including the Cessna 208 Caravan, Cessna 310, Cessna 402, Cessna 404 Titan, the Piper Chieftan, and the Swearingen Merlin 4. In 2016 a total of 1,164 air cargo operations were performed, the majority of which were performed by the Piper Chieftan and Cessna 208 Caravan feeder aircraft in support of FedEx and UPS air cargo operations. These two aircraft totaled 1,136 operations in 2016 representing 97.6 percent of all air cargo operations.

Table 3-9 – Air Cargo Aircraft Fleet Mix & Operations

Aircraft Type	2016	Share
Air Taxi		
Cessna 208 Caravan	522	44.85%
Cessna 310	2	0.17%
Cessna 402	18	1.55%
Cessna 404	4	0.34%
Swearingen Merlin	2	0.17%
Piper Chieftan	614	52.75%
Other (Unspecified)	2	0.17%
Total Air Taxi	**1,164**	**100.00%**
Total Air Cargo Operations	**1,164**	**100.00%**

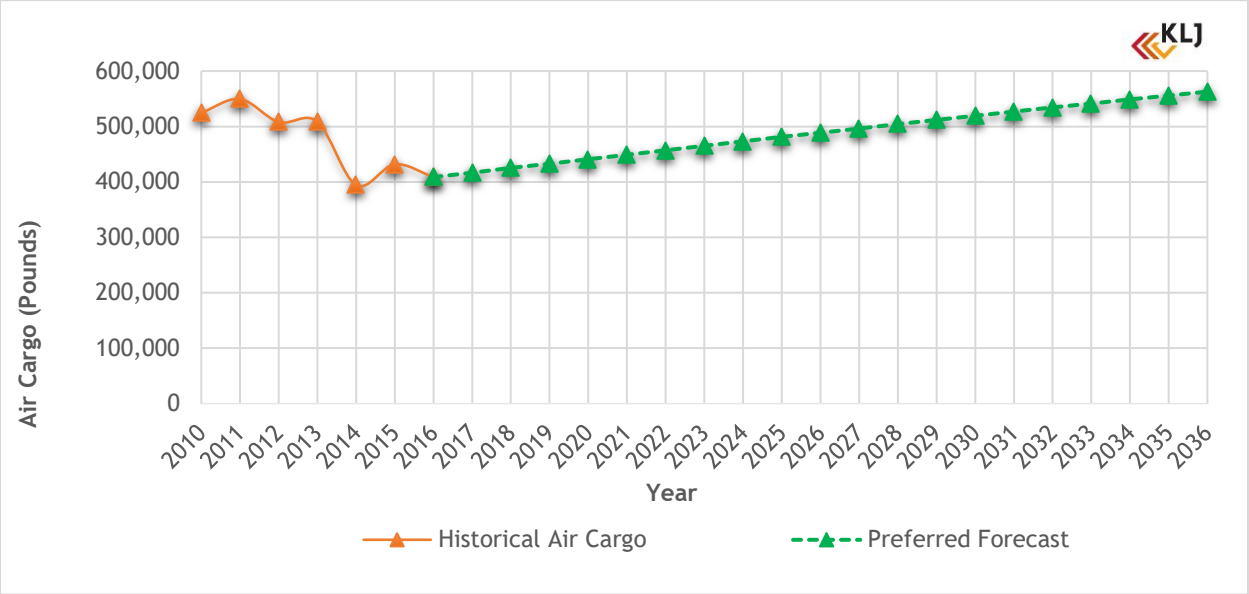
Source: FAA Traffic Flow Management System Counts (TFMSC).

Forecast

As noted previously, the volume of air cargo passing through PIR has declined since 2010. The specific reason for this decline is not readily apparent, although the air cargo industry as a whole has seen declines and slower growth both nationally and internationally since 2008. The local PIR economy however is extremely healthy with personal income exceeding the state average and a Gross Regional Product that is forecast to remain strong throughout the planning period.

The relationship between PIR's Gross Regional Product and enplaned and deplaned air cargo was evaluated to develop the Air Cargo forecast. This evaluation looked at the number of pounds of air cargo generated into and out of PIR for each dollar of gross regional product produced within the Micropolitan Statistical Area in 2016. In 2016, for every $1 million in gross regional product, the PIR MiSA generated 314.45 pounds of air cargo. This relationship was carried forward throughout the planning period. **Figure 3-3** graphically depicts the forecast air cargo activity and **Table 3-10** lists the total air cargo forecast for each horizon year. This forecast should be used for broad planning purposes.

Figure 3-3 – Total Enplaned and Deplaned Air Cargo Forecast



Source: Form 41 Traffic Data: T-100 Domestic Segment - Bureau of Transportation Statistics, KLJ Analysis

Table 3-10 – Air Cargo Forecast

Metric	2016	2021	2026	2036	CAGR
Total Enplaned & Deplaned Cargo	408,729	449,185	488,817	562,927	*1.59%*

Source: KLJ Analysis

OPERATIONS & FLEET MIX

The volume of existing and forecast air cargo passing through PIR is not expected to generate a significant number of additional air cargo operations during the planning period. The volume of air cargo carried on each flight into and out of PIR in 2016, based on the number of operations and the existing cargo volume would total a little more than 351 pounds of freight per flight. As the volume of air cargo increases, larger aircraft would typically be substituted for the existing smaller aircraft serving the PIR market. However, with a cargo payload of up to 1,800 pounds for the Chieftan and 3,185 pounds for the Cessna Caravans's now serving PIR, a move to larger aircraft is not likely in the foreseeable future. Similarly, the mix of aircraft serving PIR is not expected to see a significant change since these aircraft are all flying to either Sioux Falls, Fargo, or Aberdeen and this is not expected to change going forward since these airports are well within the range of the aircraft currently serving PIR. The total number of air cargo operations are therefore expected to remain constant throughout the planning period at 1,164 annually.

Other Air Taxi Operations

Background

Other Air Taxi operations involve aircraft used for on-demand passenger and cargo operations other than the commuter and air cargo carriers and would also include air ambulance operations. These operators provide for-profit service, typically unscheduled charter or air taxi flights operated under Federal Aviation Regulation (FAR) Part 135 using aircraft with nine or fewer seats. Corporations that operate their own aircraft for in-house business flights are classified as General Aviation. For purposes of consistency with FAA guidance, only itinerant (point-to-point) operations are evaluated.

PIR plays a significant role in supporting local businesses and the overall quality of life in Pierre and the surrounding areas of central South Dakota. Local businesses may charter aircraft for a variety of reasons, which supports the local economy. Local businesses and individuals may charter flights to other communities in South Dakota or surrounding states that are not served by the commercial operators or whose schedules don't meet their needs. PIR also provides a critical transportation link for government officials as the State Capital.

Historical Data

The FAA's Traffic Flow Management System (TFMS) was the source for all historical Air Taxi operations data. The "Other" air taxi operations included air ambulance operations and other charter operations. The 2016 air ambulance operations were derived from the TFMS data. The other charter air taxi operations were determined by subtracting the air cargo operations and the air ambulance operations from the total 2016 air taxi operations. In 2016, a total of 1,304 "Other" air taxi operations were performed.

Forecasts

Forecast "Other" air taxi operations were developed based on two scenarios. Each scenario included forecast air ambulance operations, which were calculated based on the population of the Pierre Micropolitan Statistical Area. One scenario also looked at the relationship between MiSA Government Employment from Woods & Poole and the remaining "Other" air taxi operations, while the second scenario calculated the relationship between the remaining "Other" air taxi operations and the MiSA Accommodations and Food Earnings data from Woods & Poole.

OPERATIONS

"Other" air taxi operations were determined by combining the forecast air ambulance operations with the other charter air taxi operations forecast developed from the relationship between those charter operations and the Woods & Poole MiSA Government Employment data; this forecast is shown below in **Table 3-11**. This methodology was chosen to reflect the historically solid foundation of the local/state government sector within the MiSA economy. The "Other" air taxi operations forecast developed using the Food and Accommodations sector is based on an "expectation" that tourism, which represents a significant element of the Food and Accommodations sector will experience significant growth over the next 20 years. Government employment will not change dramatically in the future while growth in tourism is much more dependent on economic variables beyond the control of the local and state community and therefore much less predictable.

"Other" air taxi operations based on the relationship between charter operations and the Woods & Poole MiSA Government Employment data are forecast to increase from approximately 1,300 in 2016 to just under 1,890 operations by the end of the planning period.

Table 3-11 – Other Commercial Operations Forecast

Metric	2016	2021	2026	2036	*CAGR*
Air	594	606	618	633	*0.32%*
Other Air	710	864	1,006	1,248	*2.86%*
TOTAL	**1,304**	**1,470**	**1,624**	**1,881**	***1.85%***

Source: KLJ Analysis
Note: Some numbers may not add up due to rounding

Based Aircraft

A based aircraft is an operational and airworthy aircraft identifying PIR as its home airport for the majority of the year.

Historical Data

Historical based aircraft data for PIR is extremely limited as historical airport records of total based aircraft are unavailable. The only continuous source of based aircraft data is the FAA TAF. Unfortunately, the TAF data are suspect since the numbers of based aircraft show fluctuations with dramatic sudden increases, remaining unchanged for long periods of time, and then showing dramatic sudden decreases in the based aircraft numbers that do not appear realistic.

Forecast Data

During the Inventory element of this master plan update a census of existing based aircraft was undertaken. This census resulted in a count of 63 based aircraft. Given the lack of reliable historical data, the forecast effort is based on the actual based aircraft numbers developed during the Inventory. The preferred forecast for based aircraft and fleet mix is shown in **Table 3-12.** The growth in based aircraft is attributable to the forecast economic vitality of the MiSA and increasing employment over the planning period.

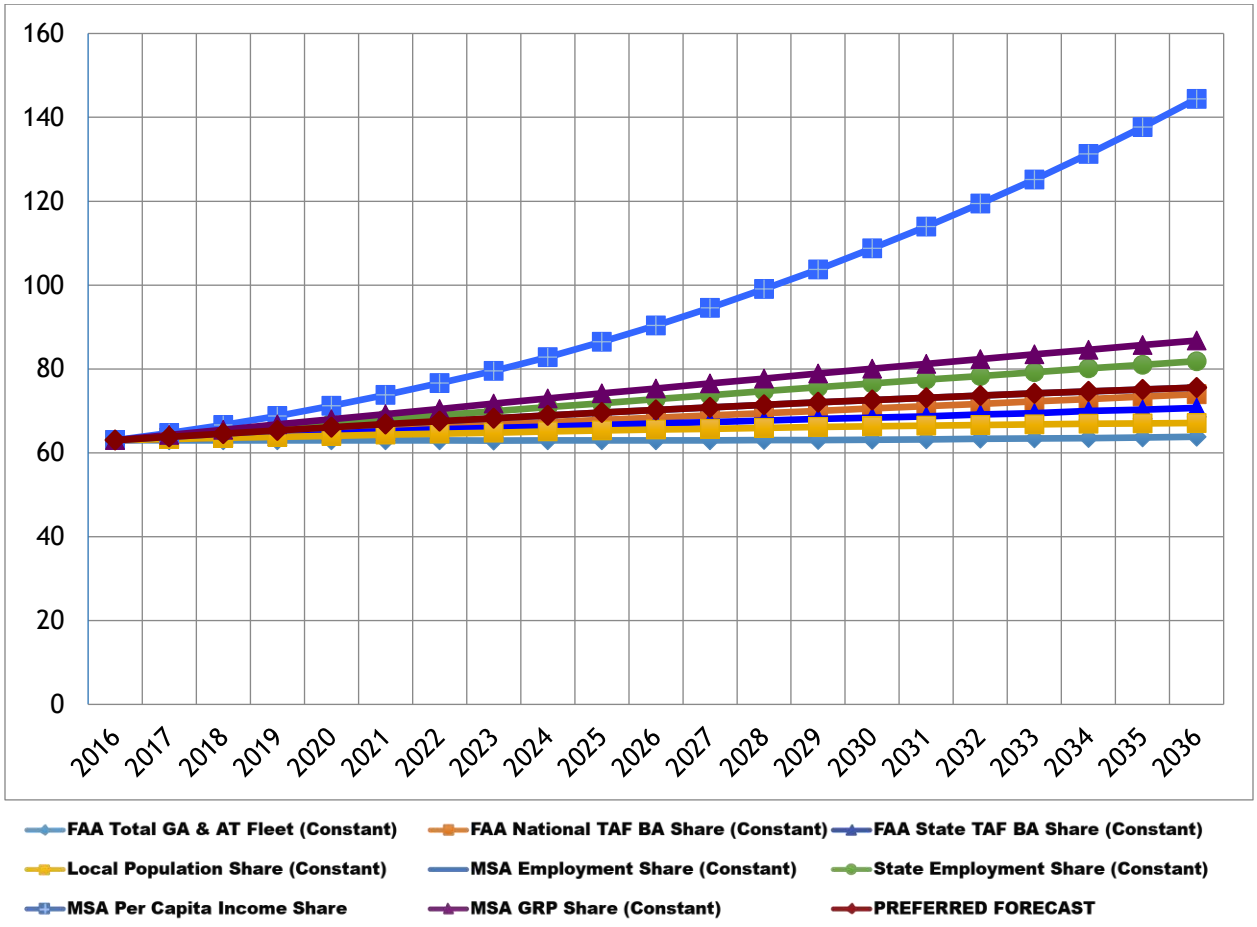
The changing fleet mix reflects a trend toward a mix that includes more business class aircraft and more closely approaches the trend in fleet mix forecast by FAA.

Table 3-12 – Based Aircraft Forecast

Metric	2016	2021	2026	2031	2036	*CAGR*
Single-Engine	47	48	49	49	49	0.22%
Multi-Engine	14	16	17	19	20	1.90%
Jet	1	2	3	4	5	7.85%
Helicopter	1	1	1	1	2	-
Ultralight/Other	0	0	0	0	0	-
Total Based Aircraft	**63**	**67**	**70**	**73**	**76**	***0.91%***

Source: KLJ Analysis. CAGR = Compounded Annual Growth Rate

Figure 3-4 – Based Aircraft Forecasting Methods



Source: KLJ Analysis

General Aviation

General Aviation (GA) is non-commercial aviation activity not classified in another category. At non-towered airports like PIR, FAA estimates operations and classifies them as civil/GA local or GA itinerant. Combined these include all types of general aviation operations.

Aircraft that remain in the local traffic pattern and stay within a 20–mile radius of the airport are classified as performing local operations. These operations typically include practice landings, touch-and-go operations, practice approaches and maneuvering within the local area in non-military aircraft. Local operations are usually performed by recreational and flight training aircraft.

Itinerant operations are performed by aircraft arriving from or departing to outlying airports (20 miles or more). Itinerant operations are conducted in all types of aircraft.

Historical Data

Historical GA Local operations data are solely based on estimates provided in the FAA TAF since no detailed GA operations counts have been maintained for PIR. The TAF data going back to the year 1990 show very little change over the course of a number of years, increasing from approximately 8,000 in 1990 to 10,000 in 2001, then holding steady through 2012 before declining to 7,500 in 2013 and remaining at that level through 2016. Realistically, aircraft operations of any kind would see fluctuations over the course of time. Therefore, the TAF data serve solely as a baseline going forward.

The forecast of GA local operations focused on establishing the operations per based aircraft (OPBA). The estimated 2016 total GA local operations were divided by the number of existing based aircraft to develop an estimate of the existing local OPBA. In 2016 there were 119 local GA operations per based aircraft.

Itinerant general aviation operations data are also based on the FAA TAF since no detailed records of itinerant operations are available from any other source. The historical TAF data estimated the airport had 17,000 itinerant GA operations in 1990, maintaining that level through the year 2000, when itinerant GA operations were estimated to have decreased to approximately 15,000 per year. The TAF estimated GA itinerant operations at the 15,000 operations level through 2016 with an expectation the Airport would maintain that operational level throughout the remainder of the planning period.

Forecast

GA LOCAL

Forecast general aviation local operations were developed using the OPBA methodology. The OPBA methodology evaluated two options 1.) where the existing 2016 OPBA were carried forward throughout the planning period at a constant rate; and 2.) a second approach that escalated the OPBA throughout the planning period from 119 in 2016 to 143 in 2036. This increasing rate of OPBA reflects the historically strong economy of the Pierre MiSA and the Woods & Poole forecast of continued economic growth during the planning period. **Table 3-13** presents a comparison of the forecast Local GA operations based on the constant and increasing OPBA methodologies, the FAA TAF and the Preferred Local operations total.

Table 3-13 – General Aviation Local Operations

Year	FAA TAF Operations	Steady Local OPBA Operations	Increasing Local OPBA Operations	Preferred Forecast Operations
2016	7,500	7,500	7,500	7,500
2021	7,500	7,955	8,220	8,220
2026	7,500	8,361	9,006	9,006
2036	7,500	8,995	10,795	10,795
CAGR	**0.00%**	**0.91%**	**1.84%**	**1.84%**

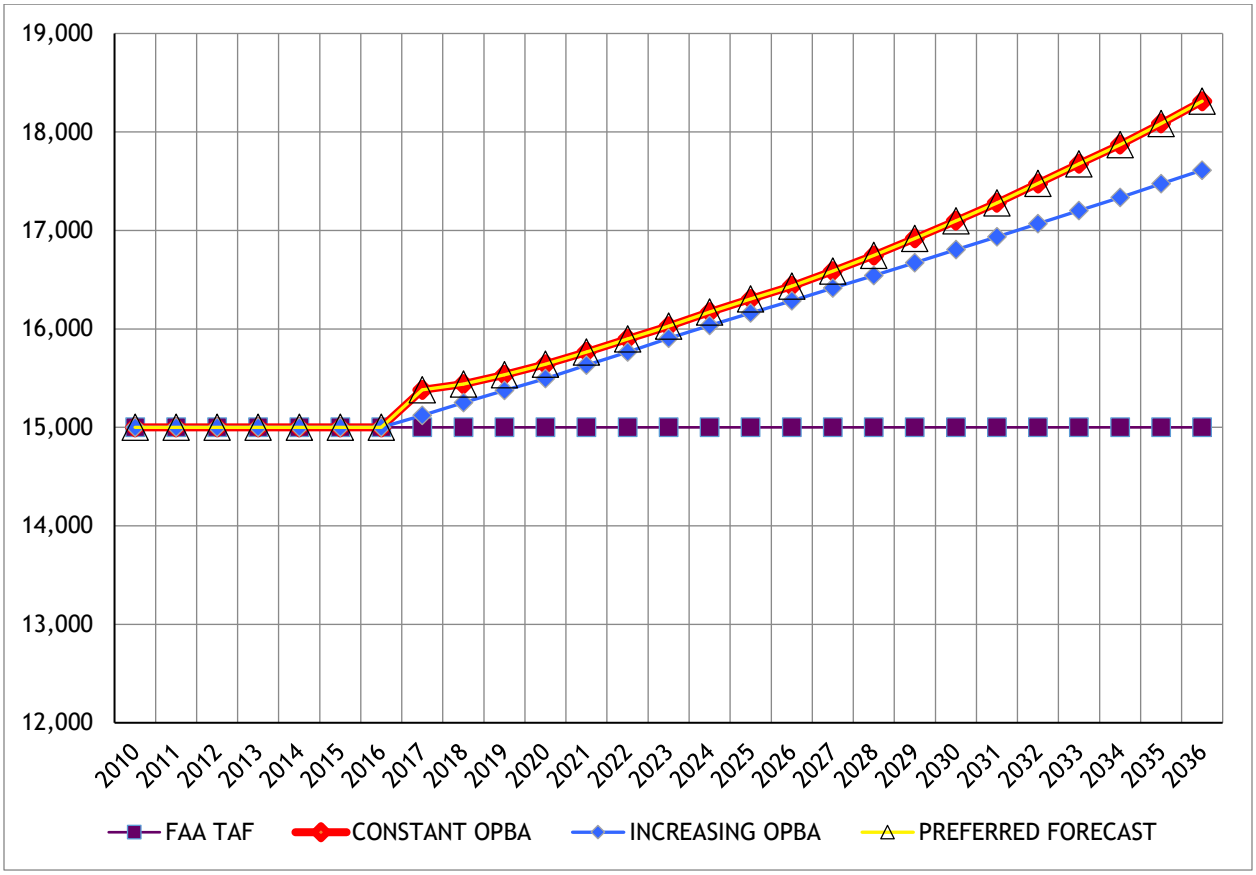
Source: FAA TAF 2017, KLJ Analysis

The Preferred Local operations forecast is based on the increasing OPBA approach, which is representative of the economic vitality of the MiSA resulting in an increased propensity to fly. The increasing OPBA methodology represents a compound annual growth rate of approximately 1.84 percent.

GA ITINERANT

Two approaches were used in developing the Itinerant GA operations forecast. The first calculated the relationship between "Total GA and Air Taxi Hours" flown in the FAA Aerospace Forecast while the second calculated PIR's 2016 Itinerant OPBA and developed the Itinerant GA operations based on the assumption future itinerant GA operations would maintain a constant level of OPBA throughout the planning period. **Figure 3-5** graphically depicts the forecast Itinerant GA operations and the Preferred Itinerant operations forecast, which is based on the relationship between FAA forecast "Total GA and Air Taxi Hours" flown; **Table 3-14** shows the forecasts in tabular form.

Figure 3-5 – GA Itinerant Forecasting Methods



Source: FAA TAF 2017, KLJ Analysis

Table 3-14 – General Aviation Itinerant Operations Forecast

Year	Constant OPBA	Share Analysis	Preferred GA Itinerant Operations Forecast
2016	15,000	15,000	15,000
2021	15,631	15,766	15,766
2026	16,285	16,435	16,435
2036	17,612	18,312	18,312
CAGR	**0.81%**	*0.92%*	*0.92%*

Source: KLJ Analysis. CAGR = Compounded Annual Growth Rate

Military

Military activity is extremely unpredictable by nature and a meaningful military operations forecast is difficult to develop. Therefore, it is assumed the military will maintain its most recent operational levels at PIR as tabulated in **Table 3-15**.

Table 3-15 – Military Operations Forecast Summary

Metric	2016	2021	2026	2036	*CAGR*
Itinerant Military Operations	100	100	100	100	*0.00%*
Local Military Operations	0	0	0	0	*0.00%*
Total Operations	**100**	**100**	**100**	**100**	***0.00%***

Source: KLJ Analysis, CAGR.

Operations Summary

The total annual operations forecast for PIR is summarized in the following table (**Table 3-16**), including a breakdown between operations types.

Table 3-16 – Total Operations Forecast Summary

Metric	2016	2021	2026	2036	CAGR
Commercial Operations					
Commuter Operations	2,076	1,460	1,460	1,460	*-1.31%*
Air Cargo Operations	550	550	550	550	*0.00%*
Other Air Taxi Operations	1,918	2,084	2,238	2,495	*1.32%*
Total Commercial Operations	4,544	4,094	4,248	4,505	*-0.04%*
General Aviation Operations					
GA Local Operations	7,500	8,220	9,006	10,795	*1.84%*
GA Itinerant Operations	15,000	15,766	16,435	18,312	*0.95%*
Military Operations	100	100	100	100	*0.00%*
Total Operations	**27,144**	**28,180**	**29,789**	**33,712**	***1.09%***

Source: KLJ Analysis.

Fleet Mix

The overall airport operations fleet mix combines commercial and general aviation operations using estimated percentages.

When determining a fleet mix of aircraft at a non-towered airport, information is typically limited to what the sponsor sees or the specific aircraft based on the airfield. Most operations conducted under IFR are tracked by FAA at airports that have Instrument procedures. However this data does *not* cover those aircraft operating under VFR or outside a radar environment. Interpolation and estimation is required in order to quantify VFR flights. Most corporate general aviation aircraft and commercial aircraft operate under IFR. Data for PIR was collected through a Freedom of Information Act (FOIA) request of the FAA's TFMS database.

TFMS data was used to determine an overall estimated fleet mix. Specifically, this data was used to determine the percentages (shares) of aircraft types using the airport under IFR. These shares were then applied to the existing and future PIR airport operations.

TFMS data was evaluated for the years 2012 through 2016. The aircraft fleet mix identified in the following table is used for itinerant flights conducted under IFR. Aircraft operations data from 2012-2016 were analyzed and the aircraft types were ranked based on 2016 operations. The top 20 aircraft types moved forward to help establish an overall IFR fleet mix. It is estimated about 35 percent of all PIR operations are conducted under IFR.

Table 3-17 – TFMS Data Fleet Mix (2016)

Aircraft ID	Type	Operations
BE190	Turboprop	1,152
BE20	Turboprop	1,138
BE9L	Turboprop	966
E145	Jet	929
P28A	Multi Engine Piston	789
C208	Turboprop	526
PC12	Turboprop	135
C560	Jet	120
C441	Jet	95
BE36	Single Engine Piston	86
C56X	Jet	84
B350	Turboprop	81
C525	Jet	79
C172	Single Engine Piston	66
LJ45	Jet	64
C414	Multi Engine Piston	63
SR22	Single Engine Piston	62
C550	Jet	56
C750	Jet	56
H25B	Jet	55
E55P	Jet	51
	Total Top 20 Sample	**6,653**
	Turboprop (61.5%)	4,093
	Jet (24.3%)	65
	Piston (14.2%)	417
	Total 2016 IFR Operations	**5,170**

Source: FAA Traffic Flow Management System (TFMS), KLJ Analysis

The data table above represents only a sample of IFR operations. The majority of VFR operations are conducted in single-engine and multi-engine piston aircraft. Estimated fleet mix percentages are then developed for all commercial, local and itinerant airport operations conducted under IFR and VFR. Modifications have been made based on available local data, local user projections, broader industry trends and professional judgment to account for anticipated future fleet mix changes. The overall estimated fleet mix share breakdown is presented in **Table 3-18**.

Table 3-18 – Fleet Mix Share Breakdown

Metric	2016	2021	2026	2031	2036
Single-	30%	28%	26%	24%	22%
Multi-Engine	15%	15%	15%	15%	15%
Turboprop	34%	35%	36%	37%	37%
Jet	20%	21%	22%	23%	25%
Helicopter	1%	1%	1%	1%	1%
Ultralight/Ot	0%	0%	0%	0%	0%

Source: KLJ Analysis, CAGR = Compounded Annual Growth Rate

The total annual operations are prorated by the estimated fleet mix share percentage to yield the operational fleet mix forecast shown in **Table 3-19**.

Table 3-19 – Total Operations Fleet Mix Forecast

Metric	2016	2021	2026	2031	2036
Single-Engine Piston	8,143	7,891	7,745	7,590	7,417
Multi-Engine Piston	4,072	4,227	4,468	4,744	5,057
Turboprop	9,229	9,863	10,724	11,701	12,474
Jet	5,429	5,918	6,554	7,274	8,428
Helicopter	271	282	298	316	337
Ultralight/Other	0	0	0	0	0
Total Operations	**27,144**	**28,180**	**29,789**	**31,624**	**33,712**

Source: KLJ Analysis

Critical Design Aircraft

The critical design aircraft is identified as the most demanding aircraft or family of aircraft to regularly use the airport. A critical design aircraft type or family must perform at least 500 annual operations at the airport to be considered "regular" use by FAA for improvements and to be eligible for FAA funding. The methodology identified in FAA AC 150/5000-17, Critical Aircraft and Regular Use Determination was used for this analysis.

Existing

The existing critical design aircraft operating at PIR is the Embraer 145 regional jet, based on the data presented in **Table 3-20**. This table lists those "large" aircraft that operated at PIR in 2016 based on the TFMS data.

Table 3-20 – Existing Critical Design (Large) Aircraft

MAKE	MODEL	ENGINE TYPE	AAC	ADG	2016
Beechcraft	1900D	Turboprop	B	II	1,152
Beechcraft	Super King Air 350	Turboprop	B	II	81
Cessna	Citation II	Jet	B	II	56
Embraer	Phenom 300	Jet	B	II	51
Beechcraft	Super King Air 300	Turboprop	B	II	38
Dassault	Mystère 900	Jet	B	II	28
Dassault	Mystère 50	Jet	B	II	26
Cessna	Citation CJ3	Jet	B	II	25
Cessna	Citation CJ4	Jet	B	II	22
Fairchild (1)	Merlin 4 / Metro 2	Turboprop	B	II	16
Dassault	HU-25 Guardian	Jet	B	II	16
Fairchild Dornier	Dornier 328JET	Jet	B	II	10
Embraer	EMB-120	Turboprop	B	II	8
Fairchild (1)	Merlin 3	Turboprop	B	II	8
Dassault	Falcon 2000	Jet	B	II	8
Gulfstream Aerospace	Gulfstream G280	Jet	B	II	6
British Aerospace	Hawker 1000	Jet	B	II	4
Swearingen	SA-26 Merlin 2	Turboprop	B	II	2
Cessna	Citation II SP	Jet	B	II	2
TOTAL B-II					**1,559**
ATR	ATR-42-300	Turboprop	B	III	2
TOTAL B-III					**2**
Embraer	ERJ-145	Jet	C	II	929
Cessna	Citation 10	Jet	C	II	56
British Aerospace	Hawker 800	Jet	C	II	55
Cessna	Citation Sovereign	Jet	C	II	48
Bombardier	Challenger 300	Jet	C	II	34
Bombardier	Challenger 650	Jet	C	II	32
Embraer	EMB-135	Jet	C	II	28
Cessna	Citation III	Jet	C	II	16
Gulfstream Aerospace	Gulfstream G100	Jet	C	II	10
Gulfstream Aerospace	Gulfstream G200	Jet	C	II	8
Learjet	70	Jet	C	II	10
Learjet	75	Jet	C	II	10
Bombardier	Challenger 350	Jet	C	II	6
TOTAL C-II					**1,242**
Bombardier	Sentinel	Jet	C	III	6
TOTAL C-III					**6**
Cessna	Citation Ultra	Jet	D	II	120
Cessna	Citation Excel	Jet	D	II	84
Gulfstream Aerospace	Gulfstream 4	Jet	D	II	27
Canadair	CRJ-100	Jet	D	II	4
TOTAL D-II					**235**
Gulfstream Aerospace	Gulfstream 5	Jet	D	III	26
TOTAL D-III					**26**
TOTAL LARGE AIRCRAFT Operations					3,068

Source: KLJ Analysis, FAA Traffic Flow Management System (TFMS) Data at PIR. IFR = Instrument Flight Rules, AAC = Aircraft Approach Category, ADG = Airplane Design Group). Green cells exceed FAA's regular use threshold.

Figure 3-6 – Existing Critical Design Aircraft Family

Embraer ERJ-145 (C-II)

Hawker 800 (C-II)

Photography Source: Airliners.net

Future

The future critical design aircraft is forecast to transition from an Aircraft Approach Category AAC-C to AAC-D large turbojet airplane. The Airplane Design Group will remain ADG-II and Taxiway Design Group TDG-2. Example aircraft types include the Bombardier CRJ-200 Regional Jet (53,000 lbs.) and Gulfstream IV (74,600 lbs.). The existing EAS contract at PIR is subject to renewal in 2018. The airport is expected to receive stand-alone air service with a new carrier operating the CRJ-200 aircraft, replacing the current ERJ-135 operations. The initiation of service with the CRJ-200 will result in the change to the critical design aircraft. Projected operations of the CRJ-200 are expected to be comparable to the current operating schedule with 4 flights per day during the week (2 arrivals and 2 departures daily) and one flight each on the weekends (1 arrival and 1 departure daily) representing 24 operations per week. Over the course of a full year, this operating schedule will represent a total of 1,248 D-II operations per year, which far exceeds the FAA threshold of 500 annual operations for the critical design aircraft. Providing further justification to the future critical aircraft being D-II the airport currently has 235 operations by aircraft in the D-II category (Cessna Ultra and Gulfstream IV) and is forecasted to increase to 318 over the planning period. The CRJ-200, Cessna Ultra and Gulfstream IV fall within Taxiway Design Group 2.

Figure 3-7 – Future Critical Design Aircraft Family

Bombardier CRJ-200 (D-II)

Gulfstream IV (D-II)

Photography Source: Airliners.net

All critical aircraft operations should be closely monitored as changes in flight schedules and business operations may result in changes to airport use, aircraft type, and operational frequency.

The design aircraft identified is the most critical family of aircraft using the airport, however particular portions of the airport may be restricted to less demanding design aircraft. These aircraft-specific standards will be evaluated in **Chapter 4: Facility Requirements**.

Peak Activity

Periods of peak demand are determined in order to determine airport "busy periods" and are used in the Facility Requirements to determine if the existing facilities can accommodate the demand generated during those peak periods. Peak time periods evaluated include the peak month, design day, and design hour. Peak activity is important when sizing of facilities. Peak periods are defined in FAA AC 150/5060-5, *Airport Capacity and Delay*, and include:

- **Peak Month:** The calendar month when peak operations occur;
- **Design Day**: The average day in a peak month (peak month / 31);
- **Busy Day**: The busy day of a typical week in a peak month (Design Day + 10 percent);
- **Design Hour**: The peak hour within the design day (10 percent of Busy Day).

The methodology for developing peak activity periods is derived from Airports Cooperative Research Program (ACRP) Report 25: *Airport Passenger Terminal Planning and Design*, which emphasizes the use of design periods to forecast use patterns rather than individual absolute peak periods.

Passenger Airline Activity

This analysis provides an estimate of peak passenger activity for planning purposes. Actual airline flight scheduling is based on passenger demand and individual airline requirements, which can make it difficult to exactly identify specific peak hours in the future.

PEAK MONTH

The peak month for operations at PIR is October, which is when the peak hunting season occurs. Historical enplanement data indicates that 11% of the total annual enplanements occur in this month.

DESIGN DAY

Design day data is presented in **Table 3-21**, where daily activity is averaged over 31 days during the peak month with a 10% peak increase added.

Table 3-21 – Peak Month, Design Day Passenger Airline Activity Forecast

Metric	2016	2021	2026	2036
Passenger Airline Enplanements				
Annual	7,698	13,204	15,051	18,698
Peak Month	847	1,452	1,656	2,057
Average Day	27	47	53	66
Design Day	30	52	59	73
Passenger Airline Operations				
Annual*	2,076	1,460	1,460	1,460
Peak Month	173	122	122	122
Average Week	44	24	24	24
Design Day	4	4	4	4

Source: KLJ Analysis.

** Total annual 2016 operations included Great Lakes Airlines, which ceased service. Peak month, week, and design day operations are based on operations after Great Lakes ceased service.*

DESIGN HOUR

The design hour is typically based on the flight schedules during a design day. Using the terminal planning guidance from ACRP Report 25, peak hour assumes passengers arrive at the airport 60 minutes prior to departure and remain at the airport up to 60 minutes after arrival. PIR currently has four flights per day with a morning arrival and departure and an afternoon arrival and departure. The airport experiences a design hour during both the morning and afternoon periods. Peak period calculations are presented in **Table 3-22**.

Table 3-22 – Peak Period Passenger Airline Activity Forecast

Metric	2016	2021	2026	2036
Airline Passengers				
Design Day Enplanements	30	52	59	73
Design Hour Enplanements	15	26	30	37
Design Hour Deplanements	15	26	30	37
Design Hour Passengers	30	52	60	74
Passenger Airline Operations				
Design Day	8	4	4	4
Design Hour (25.0%)	2	1	1	1

Source: KLJ Analysis.
Note: Some numbers may not add up due to rounding

Airport Operations

Peaking tendencies for total airport operations were reviewed for preferred airport activity forecasts. **Table 3-23** tabulates the Airport's peak operations activity.

Table 3-23 – Peak Period Total Airport Operations Forecast

Metric	2016	2021	2026	2031	2036
Total Airport Operations					
Annual	27,144	28,180	29,789	31,624	33,712
Peak Month	4,072	4,227	4,468	4,744	5,057
Design Day	135.7	140.9	148.9	158.1	168.6
Busy Day	156.1	162.0	171.3	181.8	193.8
Design Hour	9.8	10.1	10.7	11.4	12.1

Source: KLJ Analysis.

Forecast Summary

The following page, **Table 3-24**, shows the forecasts contained in this chapter.

Forecast Summary

Table 3-24 – Aviation Activity Forecast Summary

	Activity Levels					Average Annual Compound Growth Rates			
A. Forecast Levels	**2016**	**2021**	**2026**	**2031**	**2036**	**0-5 Years**	**0-10 Years**	**0-15 Years**	**0-20 Years**
Passenger Enplanements									
Air Carrier	0	0	0	0	0	-	-	-	-
Commuter	7,698	13,204	15,051	16,902	18,698	11.39%	6.93%	5.38%	4.54%
TOTAL ENPLANEMENTS	7,698	13,204	15,051	16,902	18,698	11.39%	6.93%	5.38%	4.54%
Operations									
Itinerant									
Air Carrier	0	0	0	0	0	-	-	-	-
Commuter/Air Taxi	4,544	4,094	4,248	4,386	4,505	-2.06%	-0.67%	-0.24%	-0.04%
Total Commercial	4,544	4,094	4,248	4,386	4,505	-2.06%	-0.67%	-0.24%	-0.04%
General Aviation	15,000	15,766	16,435	17,279	18,312	1.00%	0.92%	0.95%	1.00%
Military	100	100	100	100	100	0	0	0	0
Total Itinerant Operations	19,644	19,960	20,783	21,764	22,917	0.32%	0.57%	0.69%	0.77%
Local									
Civil	7,500	8,220	9,006	9,860	10,795	1.85%	1.85%	1.84%	1.84%
Military	0	0	0	0	0	-	-	-	-
Total Local Operations	7,500	8,220	9,006	9,860	10,795	1.85%	1.85%	1.84%	1.84%
TOTAL OPERATIONS	27,144	28,180	29,789	31,624	33,712	0.75%	0.93%	1.02%	1.09%
Annual Instrument Approaches	454	437	460	484	509	-0.77%	0.12%	0.42%	0.57%
Peak Hour Operations	9.8	10.1	10.7	11.4	12.1	0.75%	0.93%	1.02%	1.09%
Cargo/Mail (Pounds)	408,729	449,185	488,817	526,781	562,927	1.50%	1.60%	1.57%	1.59%
Based Aircraft									
Single Engine	47	48	49	49	49	0.53%	0.42%	0.32%	0.22%
Multi Engine	14	16	17	19	20	2.25%	2.13%	2.01%	1.90%
Turbojet	1	2	3	4	5	12.45%	10.30%	8.88%	7.85%
Helicopter	1	1	1	1	2	0	0	0	100
Other	0	0	0	0	0	-	-	-	-
TOTAL BASED AIRCRAFT	63	67	70	73	76	1.19%	1.09%	1.00%	0.91%
B. Operational Factors	**2016**	**2021**	**2026**	**2031**	**2036**	**2021**	**2026**	**2031**	**2036**
Average Aircraft Size (seats)									
Commuter	30.0	50.0	50.0	50.0	50.0	0.00%	0.00%	0.00%	0.00%
Average Enplaning Load Factor									
Air Carrier	45.1%	40.8%	43.9%	46.9%	50.0%	-1.99%	-0.28%	0.26%	0.51%
GA Operations per Based Acft.	357	359	362	371	385	0.10%	0.14%	0.26%	0.38%

Source: KLJ Analysis. Note: Some figures are rounded

Forecast Comparison with FAA TAF

Proposed aviation activity forecasts must be reviewed and approved by the FAA. A forecast is consistent with the FAA TAF if the proposed activity is within a certain tolerance of the official TAF forecast. If the proposed forecast is inconsistent with the TAF, differences must be resolved for the forecast to be adopted by the FAA. Key activity measures reviewed include passenger enplanements, based aircraft, and total operations. The 2016 FAA TAF issued January 2017 is used for comparison.

PASSENGER ENPLANEMENTS

The airport's proposed forecast of enplanements is not **consistent** with the FAA TAF for the 10-year forecast horizon. As mentioned previously the forecasts for enplanement are based on several factors including the following:

1. 2016 numbers for the TAF are not correct based on current FAA ACAIS data;
2. New EAS service anticipated in 2018; this new service will drive enplanement growth;
3. 2017 enplanement data show the airport is on track to break 11,000 enplanements this year;
4. The TAF shows no growth over the planning period.

Table 3-25 – Passenger Enplanements vs. FAA TAF

Metric	2016	2021	2026	2031	2036	CAGR
PIR Enplanement Forecast	7,698*	13,204	15,051	16,902	18,698	*4.54%*
2017 FAA TAF	5,282	5,282	5,282	5,282	5,282	*0.00%*
Difference	45.74%	149.97%	184.94%	220.00%	254.00%	-
Allowable Difference	10.0%	10.0%	15.0%	-	-	-
Consistent with FAA TAF?	-	**NO**	**NO**	-	-	-

*Source: KLJ Analysis, FAA Terminal Area Forecast (January 2017), CAGR = Compounded Annual Growth Rate, *actual enplanement numbers based on FAA ACAIS database*

BASED AIRCRAFT

The airport's proposed forecast of based aircraft is **not consistent** with the FAA TAF for any of the forecast horizon years since the TAF shows NO based aircraft at PIR over the next 20 years. An inventory of aircraft based at PIR was conducted as part of this master plan update and the FAA web site, https://www.basedaircraft.com/ has been updated (as of September 2017) to reflect the current PIR based aircraft count.

Table 3-26 – Based Aircraft vs. FAA TAF

Metric	2016	2021	2026	2031	2036	CAGR
PIR Based Aircraft Forecast	63	67	70	73	76	*.091%*
2017 FAA TAF	0	0	0	0	0	*0.00%*
Difference	0.0%	0.0%	0.0%	0.0%	0.0%	-
Allowable Difference	-	10.0%	15.0%	-	-	-
Consistent with FAA TAF?	-	**NO**	**NO**	-	-	-

Source: KLJ Analysis, FAA Terminal Area Forecast (January 2017), CAGR = Compounded Annual Growth Rate

TOTAL OPERATIONS

The airport's proposed forecast of total operations is **consistent** with the FAA TAF for the 10-year forecast horizon. The unconstrained forecast for facility planning purposes yields 29,789 operations, 5.4 percent less than the FAA TAF at the end of the planning period.

Table 3-27 – Total Operations vs. FAA TAF

Metric	2016	2021	2026	2031	2036	CAGR
PIR Operations Forecast	27,144	28,180	29,789	31,624	33,712	*1.09%*
2016 FAA TAF	31,490	31,490	31,490	31,490	31,490	*0.00%*
Difference	-13.80%	-10.51%	-5.40%	0.43%	7.06%	-
Allowable Difference	-	10.0%	15.0%	-	-	-
Consistent with FAA TAF?	-	**NO**	**YES**	-	-	-

Source: KLJ Analysis, FAA Terminal Area Forecast (January 2017), CAGR = Compounded Annual Growth Rate

COMPARISION SUMMARY

Below is the comparison summary between the current FAA TAF (2016) and the airport master plan numbers.

Table 3-28 – Comparing Airport Forecast to FAA TAF

Metric	Year	Airport Forecast	2016 FAA TAF	AF/TAF % Difference
Passenger Enplanements				
Base Year	2016	7,698	5,282	45.74%
Base Year + 5 Years	2021	13,204	5,282	149.97%
Base Year + 10 Years	2026	15,051	5,282	184.94%
Base Year + 15 Years	2031	16,902	5,282	220.00%
Base Year + 20 Years	2036	18,698	5,282	254.00%
Growth Rate		*4.54%*	*0.00%*	
Based Aircraft				
Base Year	2016	63	0	0.0%
Base Year + 5 Years	2021	67	0	0.0%
Base Year + 10 Years	2026	70	0	0.0%
Base Year + 15 Years	2031	73	0	0.0%
Base Year + 20 Years	2036	76	0	0.0%
Growth Rate		*0.91%*	*0.00%*	
Total Operations				
Base Year	2016	27,144	31,490	-13.80%
Base Year + 5 Years	2021	28,180	31,490	-10.51%
Base Year + 10 Years	2026	29,789	31,490	-5.40%
Base Year + 15 Years	2031	31,624	31,490	0.43%
Base Year + 20 Years	2036	33,712	31,490	7.06%
Growth Rate		*1.09%*	*0.00%*	

Source: KLJ Analysis, FAA Terminal Area Forecast (January 2017), CAGR = Compounded Annual Growth Rate

Forecast Approval

The FAA approved the aviation forecasts prepared in this chapter on *September 12, 2017* for use in this master planning effort.