CHAPTER 3: AVIATION FORECASTS

Introduction

The Aviation Forecasts chapter of the Airport Master Plan analyzes current and future airport activity at the Minot International Airport (MOT). Forecasting provides an airport with a general idea of the magnitude of growth, as well as fluctuations in activity anticipated over a 20-year forecast period. They assist the Airport in determining existing and future facility needs based on airport activity level estimates and projections. Forecasts attempt to develop a realistic estimate of future changes. When conditions dramatically change, forecasts should be reviewed and updated.

The forecasts developed for the Airport will be important to adequately plan, size, and sequence the development of future facilities necessary to meet projected growth. Development at airports, however, is demand-based from actual numbers rather than forecasts, meaning development may occur sooner or later depending on demand.

To thoroughly analyze and develop a probable aviation forecast, a technical review has been completed using several methods to help quantify the potential aviation activity over the next 20 years. The forecasts for this Airport Master Plan study were prepared by Trillion Aviation.

Forecast Rationale

Forecasting the demand for airport services is a critical step in the development of an airport.

It allows an airport to examine its ability to satisfy the needs of the aircraft and people it serves, and to determine the approximate timing of necessary improvements by projecting airport user activity levels.

Forecasts developed for airport master plans and/or federal grants must be approved by the Federal Aviation Administration (FAA). It is the FAA's policy, listed in Advisory Circular 150/5070-6B, Airport Master Plans, that FAA approval of forecasts at non-hub airports with commercial service should be consistent with the Terminal Area Forecasts (TAF). Master plan forecasts for operations, based aircraft, and enplanements are considered to be consistent with the TAF if they meet the following criteria:

1) Forecasts differ by less than 10% in the five-year forecast and by less than 15% 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.*

The TAF model used for this report is from the 2015 FAA TAF available in January 2016. This is latest data available when the forecasting effort began for this airport master plan.

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
5) Provide an adequate justification for the airport planning and development

Factors Affecting Forecasts

FAA provides general guidance in evaluating factors that affect aviation activity. FAA AC 150-5070-6B, *Airport Master Plans*, 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.*

For purposes of this forecast, the following defining factors have been used or considered:

1) Calendar year 2014 has been used as the base year for aviation forecast projections.
2) The most recent (2015) estimates and future projections of population, employment and income trends have been utilized.
3) 2015 results-to-date (traffic & scheduled operations) have been factored in.
4) The "core" catchment area for MOT has been developed using data from the Minot Micropolitan Statistical Area (MSA) as defined by the U.S. Office of Management and Budget (OMB). This includes Ward, Renville, and McHenry counties. This data is assumed to represent trends of other areas within the MOT catchment area including Bottineau and Mountrail counties.

The broader MOT passenger catchment area covers a larger region that encompasses part of northwest North Dakota, southeastern Saskatchewan and southwestern Manitoba, Canada. Network airlines are highly dependent upon the Minot MSA and to a degree activity in northwestern North Dakota. Allegiant Airlines generates traffic demand from these regions, in addition to Saskatchewan. A graphical depiction of the MOT catchment area is noted in **Exhibit 3-1**.

The forecasts prepared for the airport assume an unconstrained scenario where facilities are available for use to meet demand. Any constrained forecasts prepared will be noted throughout the document. Time periods include short-term (5-year), mid-term (10 and 15-year) and long-term (20-year), resulting in forecasts for year 2019, 2024, 2029 and 2034. Forecasts may be developed using a composite of methodologies over the planning period.

Because aviation activity fluctuates due to unforeseen changes to demand and the industry, the forecasts developed in this section will be developed into Planning Activity Levels (PALs) in future chapters to identify activity demand triggers for future facility improvements.

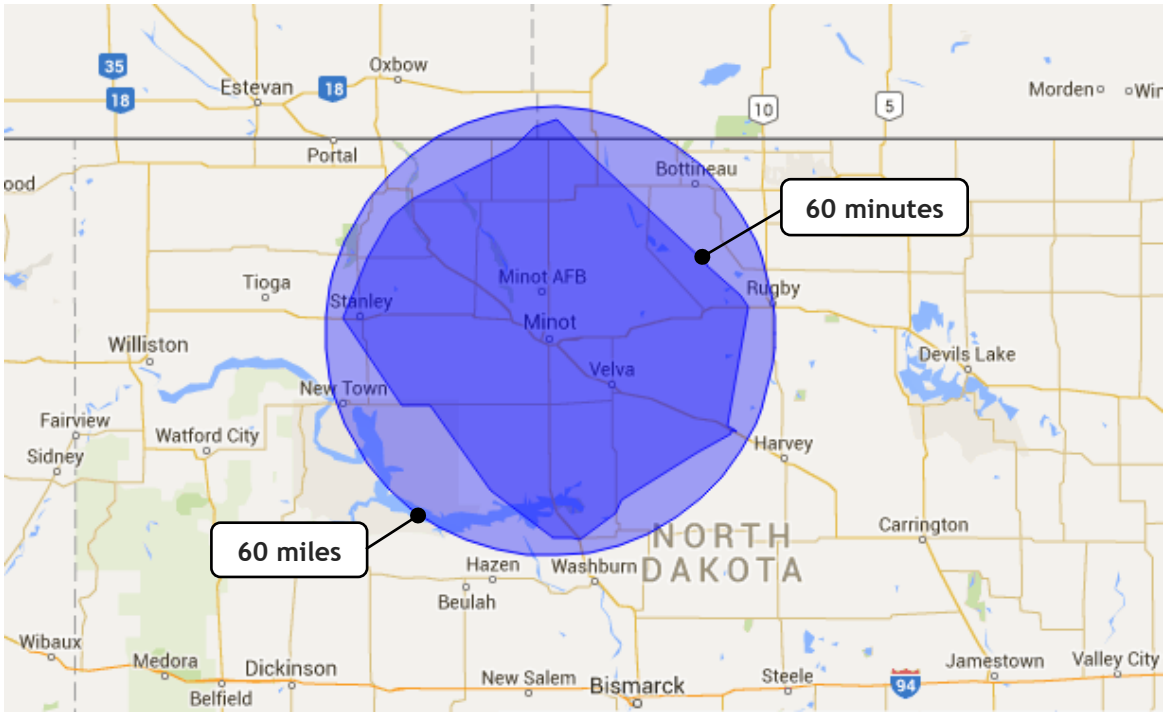
Please note the Minot Airport Traffic Control Tower (ATCT) is open daily from 7 a.m. to 10 p.m. FAA TAF records will only record flights operations that occur during this time period. In 2014, approximately 15 percent of the Instrument Flight Rules (IFR) traffic occurred when the tower was closed. Official forecasts submitted to the FAA will reflect ATCT operating hours. Facility requirements will be planned to accommodate total airport activity.

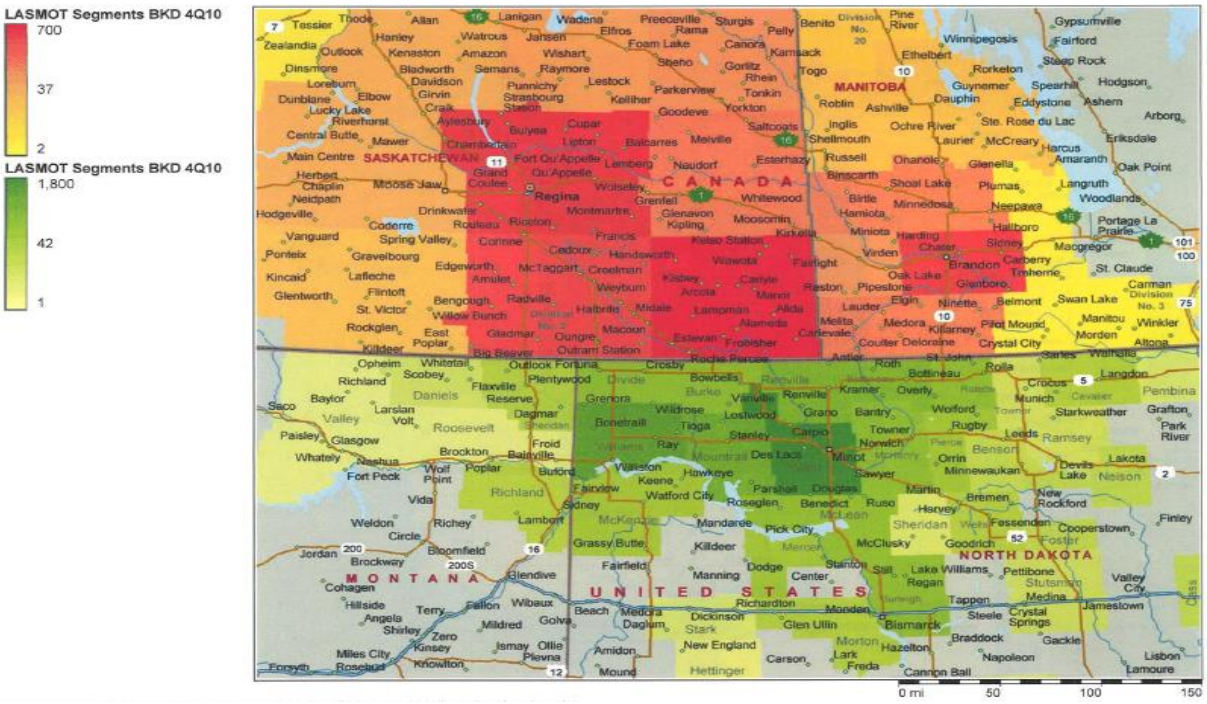
MOT Catchment Area Analysis

MOT's primary catchment area encompasses a roughly 60-minute drive from MOT. This area is depicted in the (green) area in the left hand map in **Exhibit 3-1**. This area is where the majority of MOT's air traffic originates, particularly with regard to network carriers Delta Air Lines and United Airlines. The right hand map on Exhibit 3-1 depicts a 60-mile range from MOT for reference. Within this core catchment area lies Minot's Micropolitan Statistical Area (MSA) which is defined as the counties of Ward, McHenry and Renville, North Dakota. These counties account for the majority of economic activity from MOT's catchment area. The Minot MSA's economic activity will be studied more closely in the next section.

MOT also draws traffic throughout the region, particularly toward Williston and into Saskatchewan. This is particularly true with regard to Allegiant Airlines. Allegiant offers very low air fares to popular leisure destinations of Phoenix-Mesa and Las Vegas from MOT. This has historically had the effect of drawing price-sensitive traffic, particularly from Canada. The bottom graphic within Exhibit 3-1 shows Allegiant Airlines booking volumes from the region flying from MOT to Las Vegas.

Exhibit 3-1 – Catchment Area (Core & Allegiant)





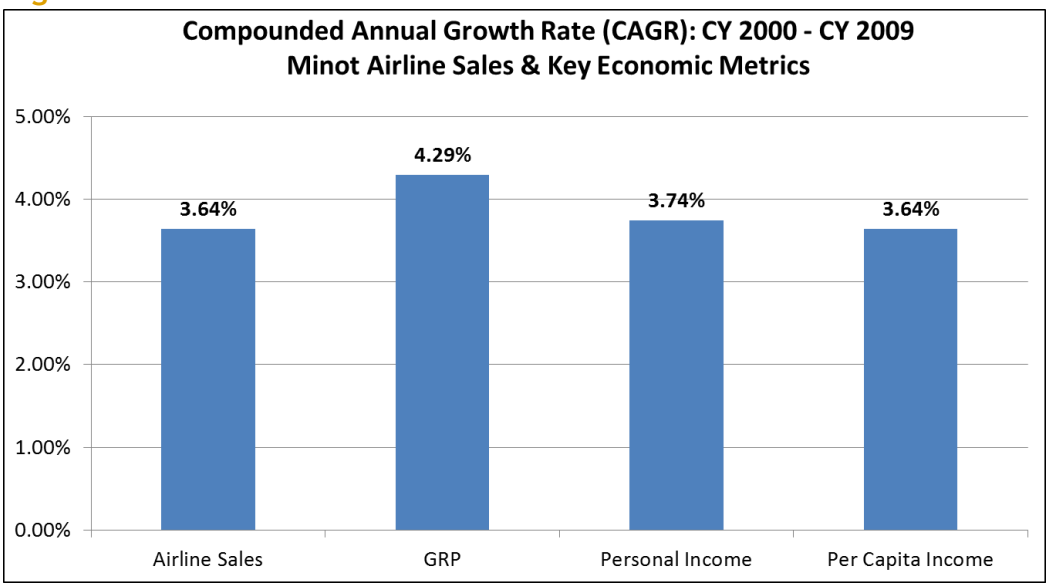
Source: Diio/Map Quest and Allegiant Airlines (4th Quarter 2010 for the MOT-LAS market)

Regional Economic Overview

Air travel demand is driven by economic activity and subsequent purchasing power. Hence Minot's future economic growth will largely determine future air travel demand. **Figure 3-1 - Minot Airline Demand and Economic Growth: 2000-2009** shows annual growth from 2000-2009 in terms of air travel spending (airline $ sales), Gross Regional Product (GRP), Aggregate Personal Income, and Per Capita Income. This time period was before the oil-generated boom that began in 2010.

As illustrated in **Figure 3-1**, there was a very close relationship between spending on airline travel and economic growth from 2000-2009. But, it should also be noted that during this same time period that the average paid air fare increased by 44%, while passenger volume declined by 4%. Increased demand was entirely absorbed by fare increases.

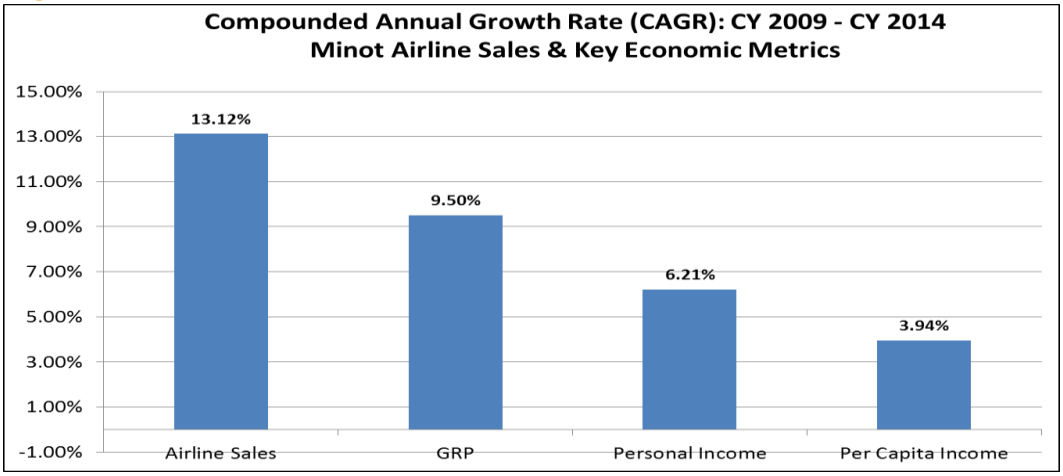
Figure 3-1 – Minot Airline Demand and Economic Growth: 2000-2009



Source: Woods & Poole Economics and U.S. DOT Airline Origin and Destination Survey (10% sample of airline tickets from reporting carriers reporting details of passengers transported)

Subsequent to 2009 and through 2014, the Minot economy exploded and simultaneously airline travel demand grew at an even faster pace. Minot is a major hub for several international energy/oil companies. Additionally, Minot has a large military presence with the Air Force Base that includes approximately 13,000 people and a workforce of approximately 7,400. Minot is also home to Minot State University, which has an enrollment of approximately 3,432 students with an academic staff of 172. Many analysts have projected major growth potential for drilling in the Bakken Basin, and some estimates project that as many as 12-24 billion barrels of oil may eventually be extracted from the basin, up significantly from the previous estimate of 4.0 billion barrels in 2008. While the majority of the drilling is west of Minot, the City will continue to serve as a regional economic hub for the oil industry and others. **Figure 3-2 – Minot Airline Demand and Economic Growth: 2009-2014** shows airline travel and economic growth from 2009-2014.

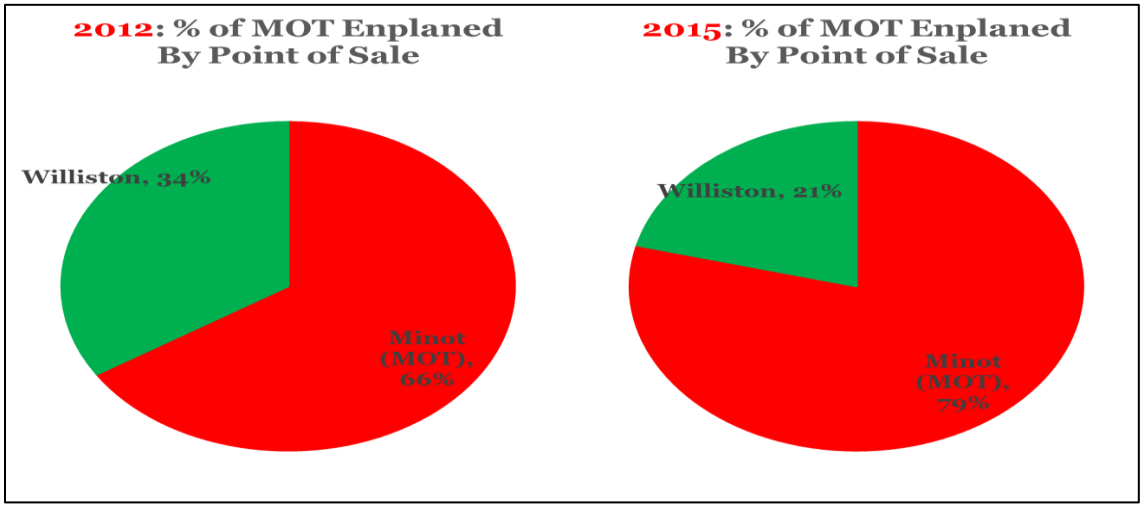
Figure 3-2 – Minot Airline Demand and Economic Growth: 2009-2014



Source: Woods & Poole Economics and U.S. DOT Airline Origin and Destination Survey (10% sample of airline tickets from reporting carriers reporting details of passengers transported)

During the 2009-2014 time period, air travel demand growth at MOT (airline sales grew 203%, average fare paid declined 3% and passenger volume grew 206%) far outpaced economic growth. This may indicate that air travel demand growth was possibly being supplemented from other regions. Some of this was due to transient oil industry employees that did not reside in Minot, including those from the Williston area, where much of the oil drilling was taking place. As recently as 2012, 34% of MOT's enplaned passenger base was coming from Williston as their airport had very little air service at that time. As Williston's air service has grown, more of this demand has shifted back to Williston. This trend is illustrated in **Figure 3-3 – Point of Sale for Minot (MOT) Origin Traffic**.

Figure 3-3 – Point of Sale for Minot (MOT) Origin Traffic



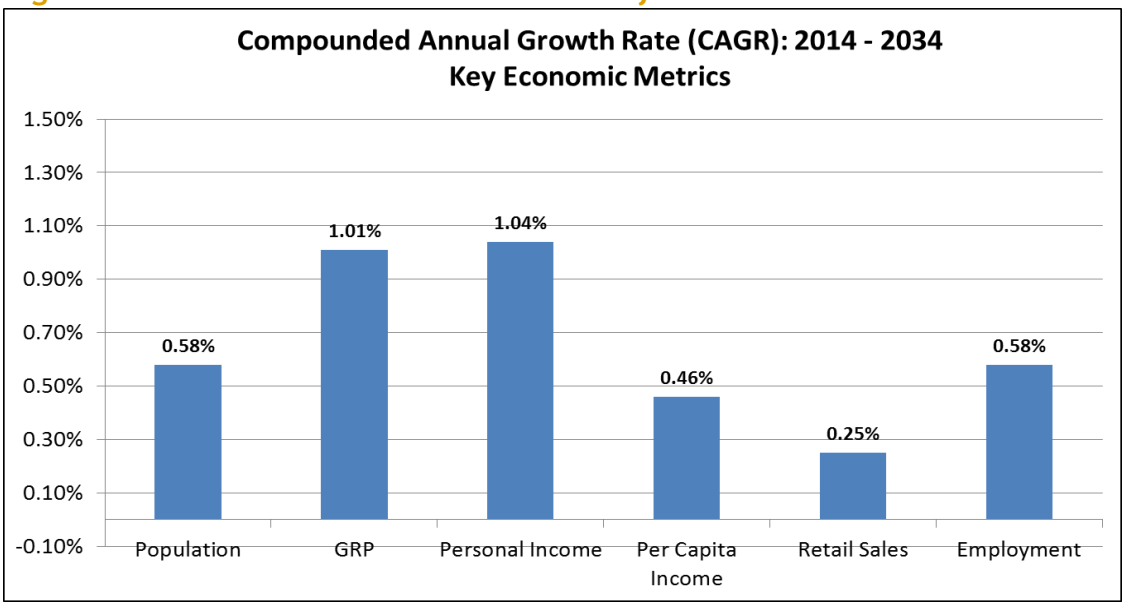
Source: Airlines Reporting Corporation (ARC). Bookings within 50 miles of MOT and 50 miles of Williston (ISN)
For time periods: September 2012 and September 2015

Earlier, economic and airline travel trends were illustrated for Minot for the time periods of 2000-2009 (pre-oil boom period) and 2009-2014 (post-demand boom). **Figure 3-4 – Forecasted Economic Growth from Minot MSA: 2014-2034** illustrates economic growth estimates for the next 20 years from the Minot MSA.

Oil prices during the peak oil boom period (2011-2014) were between $80 and $100 per barrel. Since mid-2014 oil prices have dropped to $40/barrel at the time these forecasts were prepared (late 2015). These forecasts assume that economic growth for the region will moderate versus the 2009-2014 boom period. Historical crude oil prices are shown in **Figure 3-9.**

These economic forecasts for the region will be highly dependent upon the price of oil going forward. If oil remains around the current $40/barrel level, economic growth from the region is likely to stagnate or decline, but if oil prices were to increase above $75/barrel for a prolonged period of time, it is likely that regional economic growth will increase sharply and air travel demand would likely increase with it. Many oil industry analysts believe that the $75/barrel price point is a key price point.

Figure 3-4 - Forecasted Economic Growth from Minot MSA: 2014-2034



Source: Woods & Poole Economics

With the exception of forecasted retail sales growth, growth estimates of key economic metrics are in an approximate, fairly tight range of 0.5% to 1.0% compounded annual growth (CAGR). While the growth of these key economic metrics would ordinarily result in increased airline travel, higher air fares are expected to cut into actual airline growth as industry capacity is constrained. Future forecasts will also need to consider the growth of the Williston Sloulin Field International Airport (ISN), given that part of MOT's traffic base has historically come from that region and plans for a new commercial service airport there. Other external considerations include the current weak Canadian dollar (0.70 CAD to 1.00 USD) impacting tourism and business activities in the United States.

Commercial Aviation Forecasts

Commercial aviation consists of civil aviation that involves operating an aircraft for hire to transport passengers or cargo. The forecast elements evaluated in this report applicable to MOT include:

- Passenger Airline Forecasts
- Air Cargo Forecasts
- Other Commercial Activity (Air Taxi)

Passenger Airline Forecasts

Passenger airline forecasts include passenger enplanements and operations. Passenger airline enplanements at an airport represent the number of revenue passengers boarding commercial service aircraft that depart an airport. An operation is a takeoff or a landing of an aircraft conducting a passenger carrying operation on a scheduled or unscheduled basis. As defined by FAA, passengers are carried in one of three commercial aircraft operations types:

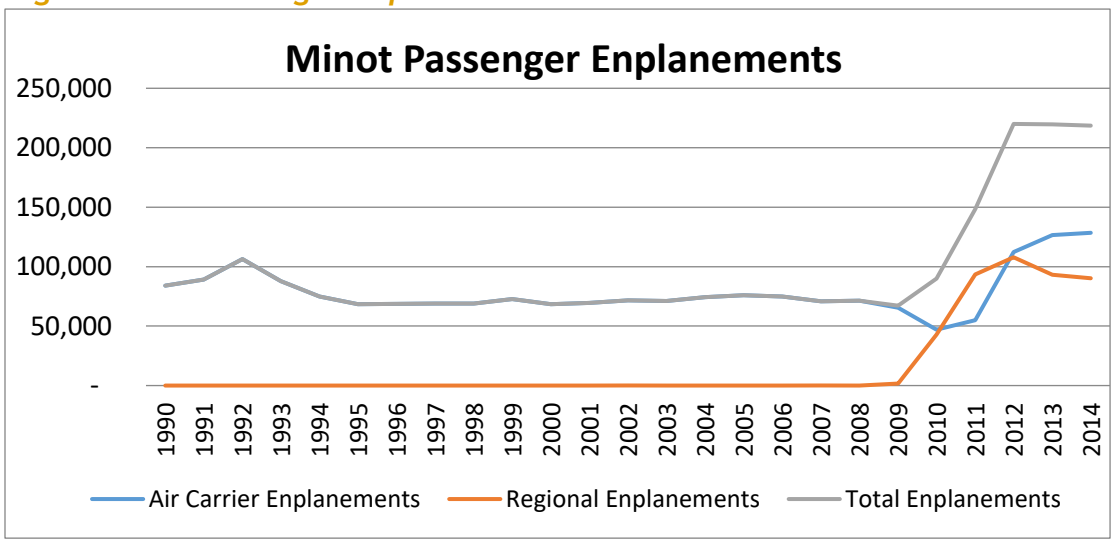
- Air carrier aircraft (scheduled service in more than 60 seat aircraft),
- Air taxi aircraft (scheduled service of four or fewer flights per week or on-demand service, in 60 or fewer seat aircraft), or
- Commuter "regional" aircraft (scheduled service of five or more round-trip flights per week on a route in 60 or fewer seat aircraft).

AIRPORT TRENDS

Enplanements

MOT experienced little growth in enplanements during the nearly 20-year period that ended in 2009. Then traffic exploded during the 3-year period through 2012, when enplaned passenger volume roughly tripled, to approximately 208,000 enplaned passengers per the FAA TAF measured from October 2011 to September 2012. Passenger volume stabilized for a 3-year period (2012-2014) with over 220,000 enplaned passengers. This growth in passenger volume has been driven by the well documented oil-generated economic boom from the region. The enplaned passenger CAGR from 1990 to 2014 has been 4.10% with all growth occurring since 2009.

Figure 3-5 – Passenger Enplanements

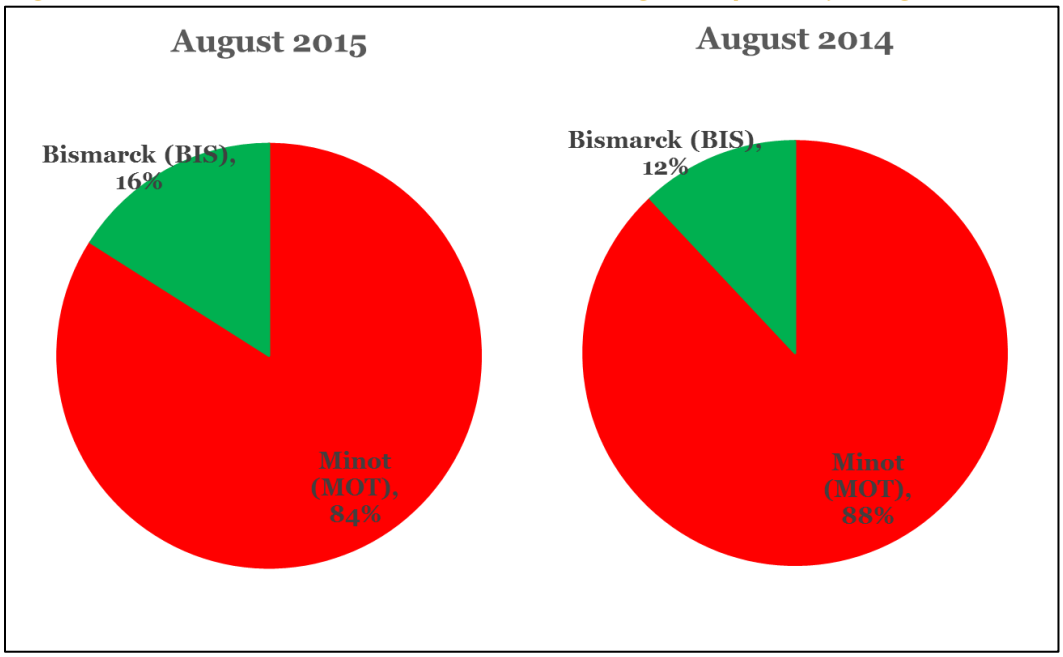


Source: FAA Terminal Area Forecast (July 2015), MOT Monthly Passenger Records, Bureau of Transportation Statistics (BTS) T-100.
NOTE: Calendar Year data. Complete CY 2015 data not available at the time this Forecast was prepared.

In 2015, as the price of oil has dropped from approximately $100/barrel to $40/barrel, oil drilling and exploration has largely come to a standstill. Subsequently, economic growth from the region has slowed considerably and airline traffic has declined sharply. For calendar year 2015, actual MOT enplaned passenger traffic was 182,872, a 17.7% year-to-year decline. Longer-term trends will largely be dictated by how the price of oil reacts.

In addition, through 2015 MOT was affected by the condition of the terminal and parking area during construction of the new terminal which opened in February 2016. It is believed that this encouraged regional passengers in some cases to at least partially base their travel decision upon airport facilities, particularly MOT's lack of adequate parking space, undersized terminal, and construction activities through 2015. The effect has been a slight increase in MOT's "leakage" as noted in **Figure 3-5 - Passenger Enplanements**. As can be seen, there has been a recent increase in Bismarck Municipal Airport's (BIS) retention of Minot area bookings, increasing from 12% to 16% during the past year alone.

Figure 3-6 – Minot Catchment Area Bookings: Airport of Origin



Source: Airlines Reporting Corporation (ARC). Bookings within 50 miles of MOT
For time periods: August 2014 and August 2015

Table 3-1 – MOT Passenger Enplanements

Year	Air Carrier*	Air Taxi/Commuter*	TOTAL
1990	84,110	0	84,110
1995	68,471	0	68,471
2000	68,550	9,329	74,879
2005	75,888	0	75,888
2010	46,990	42,920	89,909
2014	128,462	92,060	220,522
Historical CAGR	1.78%	-	4.10%

*Source: Bureau of Transportation Statistics (BTS) T100, Minot FAA TAF (July 2015) * Air Carrier/Air Taxi/Commuter is based on the operating certificate for the airline. Some regional airlines are categorized as Air Carrier and some as Air Taxi/Commuter. Because there is no consistency in how the airline type is determined, only the total has been found to be relevant.*

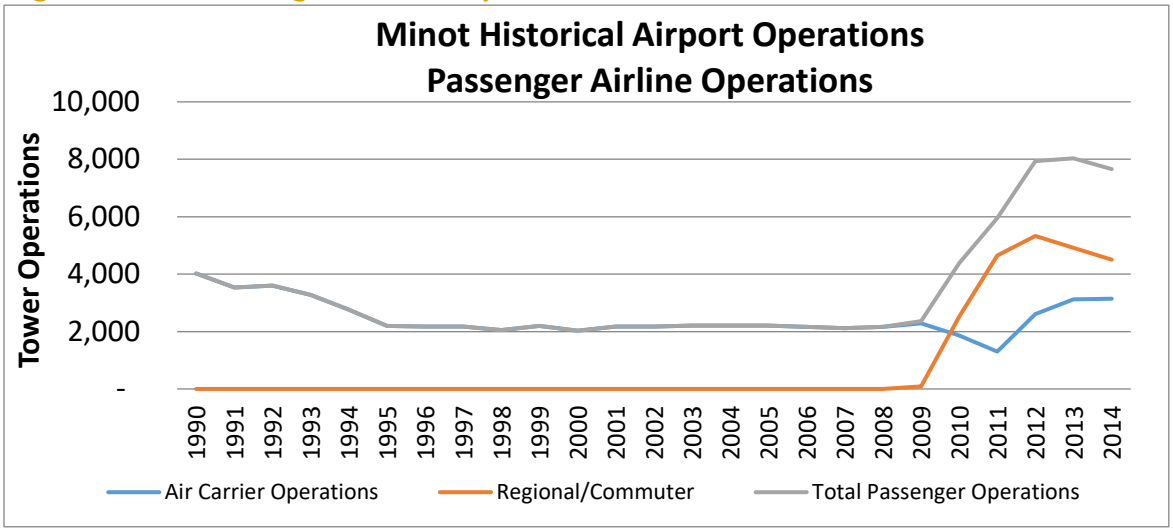
Historically through 2009, passenger enplanements at MOT had been almost exclusively carried by air carrier type aircraft, particularly by Northwest Airlines DC-9 aircraft. But, as Northwest retired that aircraft-type and the region started their growth period beginning in 2010, United Airlines added a mix of 50-seat regional aircraft into the market, serving Denver. Additionally, as Delta Air Lines (who acquired Northwest) grew their operation from MOT during this same time period, they also added a mix of 50, 69, and 76-seat regional jets. Delta also added some selected Airbus 319, A320, and MD-90 aircraft into the market in 2012-13. Allegiant Airlines has added larger MD-83/88 and subsequently

Airbus 319 aircraft into the market, resulting in additional air carrier growth. Frontier Airlines also flew scheduled Airbus 319 aircraft from MOT to Denver from November 2012 to January 2015. Finally, MOT has had unscheduled service, with Sun Country serving leisure destinations (primarily Laughlin, Nevada (IFP) over many years and Hess Corporation operating charter service to Houston (IAH). The Hess service started in 2011 and continues today, operating 2 weekly flights round-trip with 50-seat regional jets.

Operations

Overall commercial operations are tracked by FAA for all scheduled and unscheduled passenger and air cargo flights. A departure is a flight leaving the airport for another destination.

Figure 3-7 – Passenger Airline Operations



Source: Airport Traffic Air Activity System (Tower), Bureau of Transportation Statistics (BTS) T100 & Innovata (schedules)
NOTE: Calendar Year data. Complete CY 2015 data not available at the time this Forecast was prepared.

Between 1990 and 2014, passenger airline aircraft operations grew at a 2.72% CAGR. This increase was moderately below the 4.10% CAGR in enplaned passengers. This was due to higher load factors and the trend of larger aircraft operating from the market over time, particularly from the significant growth of Allegiant Airlines, who almost exclusively operates aircraft larger than 160 seats from MOT.

By analyzing 2014 FAA data, as many as 24% of passenger airline operations occur when the Tower is closed for early morning departures (before 7am) and late evening arrivals (after 10pm). Data presented in this section provides all operational data. FAA TAF data likely differs from actual MOT activity.

The most current annual (January 2015-December 2015) flight schedules were reviewed to determine the current scheduled passenger service fleet mix. The compiled schedules indicate a significant use of 50-seat regional jet aircraft with 63% of departures, followed by 28% of departures in 61 to 90-seat aircraft, 2% in 121 to 150-seat aircraft types, and 7% of departures in 151 seat or greater aircraft. There was a moderate increase in the mix of 50-seat flying in 2015, mostly from Delta downsizing aircraft on their Minneapolis-St. Paul flights as demand weakened during the year. The number of air carrier and commuter passenger airline operations was also reviewed from the time period since 1990. See **Table 3-2 – Passenger Airline Operations**.

Table 3-2 – Passenger Airline Operations

Year	Air Carrier	Commuter/Regional	TOTAL
1990	4,022	0	4,022[1]
1995	2,193	3,273	5,466[2]
2000	2,030	0	2,030
2005	2,205	0	2,205
2010	1,863	2,515	4,378
2014	3,147	4,508	7,655
Historical CAGR	*(1.02%)*	-	*2.72%*

Source: MOT Tower, Bureau of Transportation Statistics (BTS) T100, MOT TAF July 2015 & Innovata

Scheduled departure data was also further analyzed for operational trends over the past five years in **Table 3-3 – Passenger Aircraft Fleet Mix**. Departures in regional aircraft less than 40 seats are virtually non-existent as a result of regional airlines phasing out smaller turboprop aircraft. Departures in the 40 to 60-seat regional jets are the highest category at MOT with peaks achieved in 2011. For air carrier aircraft, the 61 to 90-seat aircraft types are increasing in use along with the introduction of 64 to 76-seat aircraft types. Most of the aircraft being flown in this fleet-type range are the 69-seat E170, 76-seat CR9 and E175 aircraft. Departures in 121 to 150-seat and 151+ seat aircraft-types have dramatically increased over the past five years due mostly to the growth of Allegiant Airlines. Allegiant has flown a mix of Airbus 319 and MD-83's at MOT.

Table 3-3 – Passenger Aircraft Fleet Mix

Seating Capacity	2010	2011	2012	2013	2014
Air Taxi/Commuter					
40-60 Seats	57.7%	78.7%	67.7%	61.5%	58.9%
Air Carrier					
61-99 Seats	41.4%	14.4%	17.4%	19.7%	28.8%
100-120 Seats	0.0%	0.0%	0.0%	0.0%	0.0%
121-150 Seats	1.0%	7.0%	5.0%	11.3%	5.6%
151+ Seats	0.0%	0.0%	9.9%	7.5%	6.7%

Source: Bureau of Transportation Statistics (BTS) T-100 Segment (All Carriers), Trillion Aviation Analysis
Note: Air Taxi/Commuter is 60 seats or less, Air Carrier is greater than 60 seats

PROPOSED FORECAST

A new Master Plan forecast of enplaned passengers and related metrics has been prepared using available data, incorporating several methodologies and professional judgment based on experience. The forecasts prepared are unconstrained and represent forecast demand.

Assumptions made for this Master Plan forecast include:

- The Minot MSA economy will grow in line with earlier noted "post-oil boom" projections.

[1] Continental was in the market for some of this time period with tagged flights between BIS-MOT-DEN which drove up operations considerably.
[2] Great Lakes Airlines served MOT from 1994-1998 contributing to some of the increase in operations. Also, in February 1995, Denver International Airport opened and Continental Airlines abruptly stopped operating Denver as a hub, reducing the seats through Denver drastically. The void left was filled by several contracted commuters flying smaller aircraft with more frequency in an attempt to match the lost seat capacity in the market. In 1994, Frontier Airlines also began serving North Dakota markets including Minot with new service as a reestablished carrier.

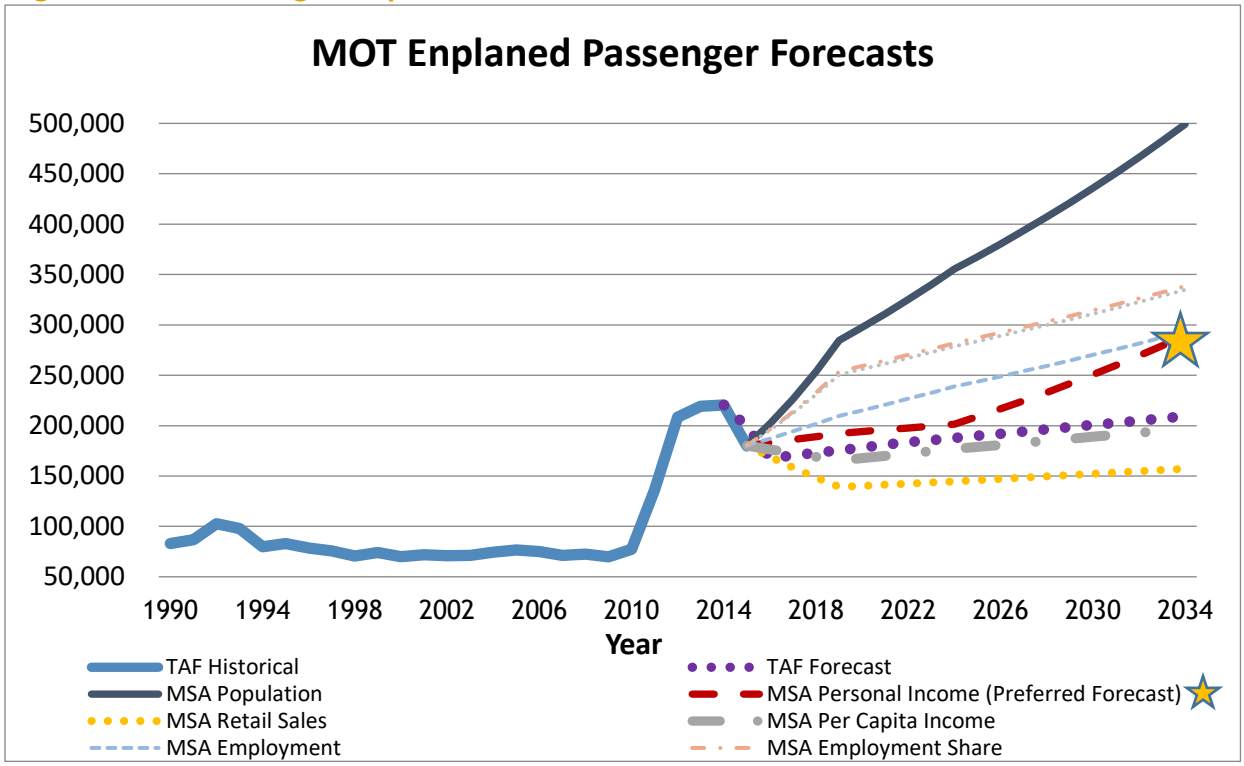
- Oil prices will stay at levels below which exploration will grow significantly ($75/barrel) through 2024. Beginning in the late 2020's oil prices will grow moderately and air travel demand will begin to grow at a faster rate.
- MOT enplaned passengers in 2015 will decline to approximately 182,000 (actual calendar year 2015 numbers were approximately 180,000).
- Enplanement demand will be met by the airlines through adding flight frequency, aircraft capacity, and airline destinations to meet the need at existing hub airports.
- The 50-seat regional jet aircraft type will be largely phased out by 2020. This is in line with SkyWest plans, who (including their wholly owned unit ExpressJet) operated 64% of all U.S. scheduled 50-seat regional jet flying in 2015. Other airlines are expected to follow.
- 50-seat regional jets will to some degree be replaced by larger regional jets in the 64, 69 and 76-seat range. Aircraft in this category include the CRJ-700, CRJ-900, E170 and E175 aircraft. The result will be larger aircraft and less frequency.
- While larger aircraft such as the 717-200 (113 seats) will be used as a partial replacement system-wide, this aircraft type is not assumed to be used at MOT.
- Network airlines United, American, and Delta are assumed to show little capacity growth over the next 20 years, particularly in smaller markets. It should be noted that these airlines, including mergers, have reduced U.S. seat capacity approximately 15% over the past 10 years.
- Allegiant Airlines has been among the fastest growing U.S. airlines over the past decade and this is assumed to continue. As a part of this, Allegiant is expected to grow their MOT operation, with new Orlando-Sanford and Los Angeles service over the next 20 years. This is consistent with dialogue that MOT has had with Allegiant in the past.
- Allegiant plans to phase out of the MD83/88 aircraft in the early 2020's and focus growth entirely with their Airbus fleet of aircraft. As a part of this fleet plan, Allegiant plans to focus their future growth with the Airbus 320 aircraft and de-emphasize the Airbus 319.

Airport Cooperative Research Program (ACRP) Synthesis 2: *Airport Aviation Activity Forecasting* demonstrates changes in the commercial airline industry have occurred in the last 25 years but have not been reflected in FAA definitions for air carrier, air taxi and commuter operations. The study notes the distinction between scheduled and unscheduled service to be most relevant. To be consistent with the industry trend of regional carriers operating larger aircraft for facility planning, a revised definition for air carriers as aircraft with 100 seats or more and regional/commuter/air taxi aircraft with less than 100 seats was proposed. This would more accurately separate traditional air carrier and regional airlines. However, the traditional 60 seat definition is used for this forecast to be consistent with current FAA forecast approval guidelines.

PREFERRED FORECAST

Various forecast methods and professional experience were used to develop a preferred forecast, which is based on the Minot MSA Personal Income regression. The preferred forecast yields 289,883 forecast total enplanements in year 2034 for a CAGR of 1.38 % versus 2014.

Figure 3-8 - Passenger Enplanements Forecast Methods



Source: Trillion Aviation Analysis, FAA Terminal Area Forecast (January 2016), Woods & Poole Economics

For 2034, the enplanements are to be entirely flown on air carrier aircraft (greater than 60 seat aircraft), as smaller aircraft in the 50-seat range are expected to be retired later this decade.

The traffic forecast shows traffic to not grow beyond current (2014) levels until after 2024. This assumes that the price of oil does not increase to above $75/barrel for a prolonged period of time. A price of $75/barrel is where most oil industry analysts' project that oil exploration is economical and will likely spur additional job growth.

Table 3-4 - Preferred Forecast Enplanements by Type

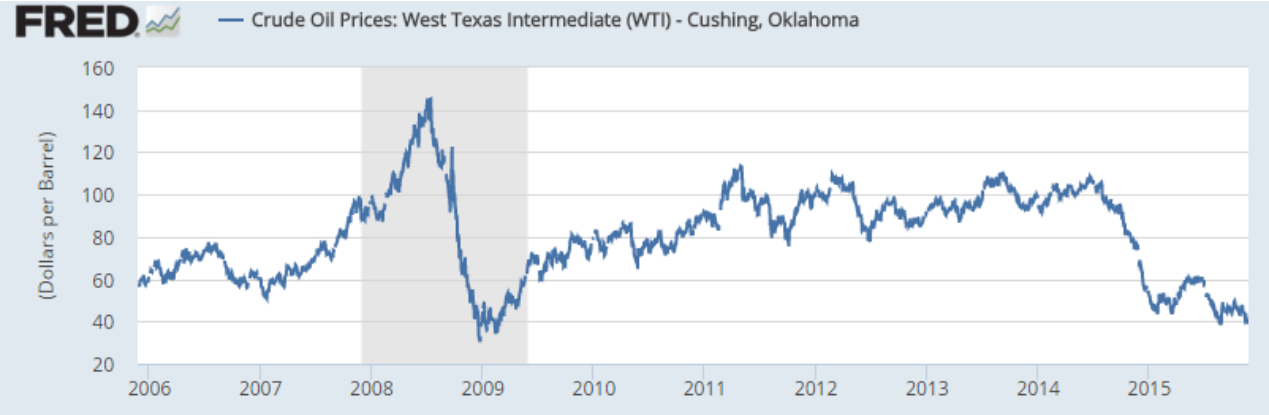
Enplanements	2014	2019	2024	2034	*CAGR*
Air Carrier (>60 seats)	128,462	118,256	201,574	289,769	*4.15%*
Regional (≤60 seats)	92,060	73,997	0	0	*(100.0%)*
TOTAL	**220,522**	**192,253**	**201,574**	**289,769**	***1.37%***

Source: Trillion Aviation Analysis

Forecasted passenger volumes are well below levels forecasted in 2012. While there are a variety of reasons for these changes, the primary issues are addressed below:

1) **Oil Prices**: The price of oil has dropped from roughly $110/barrel in 2012 to $40/barrel currently (**Figure 3-9 - Oil Price Trends**). The price of jet fuel has followed similar trends. Because of this, there has been a sharp reduction in regional economic growth and 2015 air travel demand has dropped sharply. Future economic growth from the region and subsequently air travel demand will be determined largely by the price of oil in the future.

Figure 3-9 – Oil Price Trends



Source: U.S. Energy Information Administration

2) **Williston Basin International Airport:** The development of a replacement airport in Williston, ND was not factored into the 2012 MOT forecast. At the time of the 2012 forecast, the future of the present Sloulin Field International Airport (ISN) in Williston was not known. Based upon airport infrastructure at the time, it was believed that ISN could only be served by turbo-prop aircraft, significantly limiting any ISN growth and forcing this air travel demand to MOT. For example, in CY 2014, ISN enplaned 116,119 passengers and 109,818 in CY 2015. Without upgraded regional jet service, the majority of these passengers would have utilized MOT. However, at continued higher oil prices and eventual economic growth, the new replacement airport is now forecasted to generate over 300,000 annual enplaned passengers by 2034. Without the new airport and runway as now planned, the majority of this traffic would have flown out of MOT.

3) **Strength of the U.S. versus Canadian Dollar:** Over the past few years, MOT has attracted a fair share of their passenger volume from Canadian travelers. The vast majority of these travelers have been on low fare carrier Allegiant Airlines for leisure travel. As the U.S. Dollar has strengthened over the past year, it has had the effect of increasing air fares for these travelers and is reducing air travel demand. As long as the U.S. currency remains relatively strong versus its Canadian counterpart, it will have a downward effect upon air travel demand for MOT and other points along the U.S. – Canadian border.

4) **Actual Experience During Growth Phase:** In 2012 when the original forecast was conducted, MOT had just begun their growth phase, with enplaned passenger numbers experiencing exponential growth. At this point, growth trends are more mature and are better understood. In particular, the relationship between oil prices and regional economic activity is more predictable. Airline fare revenue or "yields" that sustain airline service are drastically higher during peak oil boom activity. Finally, the aforementioned future of the Williston Airport is known and the effect of this upon MOT air travel demand can now be quantified – unlike in 2012.

AIRLINE FLEET MIX

The type of passenger service aircraft that utilize the airport defines the operations needed to serve the forecasted enplanements. Flight schedules for calendar year 2014 and 2015 were reviewed to develop an annual schedule and current aircraft fleet mix. Projected fleet mix is developed based on known industry trends. The phase-out of the 50-seat regional jet is significant to the overall fleet mix

at MOT as 59% of operated flights in 2014 were on this type of aircraft and 63% of scheduled operations in 2015.

Table 3-5 – Passenger Aircraft Fleet Mix

Seating Capacity	2014	2019	2024	2034
Less Than 40 Seats	0.0%	0.0%	0.0%	0.0%
40-60 Seats	58.9%	25.8%	0.0%	0.0%
61-99 Seats	28.8%	60.3%	77.9%	80.8%
100-120 Seats	0.0%	0.0%	0.0%	0.0%
121-150 Seats	5.6%	1.5%	0.0%	0.0%
150+ Seats	6.7%	12.4%	22.1%	19.2%

Source: Minot International Airport, Trillion Aviation Analysis, Bureau of Transportation Statistics (BTS) T-100 Segment (All Carriers)

Fiscal Year 2014 Enplanements and aircraft mix based upon Bureau of Transportation Statistics (BTS) T100 Report and verified by comparing to published schedules (Source: Innovata) for Calendar Year 2014.

Table 3-6 – Passenger Aircraft Forecast: Operations & Operating Seats shows aircraft details (aircraft operations and operating seats) from 2014 through 2034. As indicated earlier, there will be an overall trend toward larger aircraft, less operations, and moderate overall seat capacity growth during the forecast period.

The 50-seat regional jets (Canadair CRJ-200 and Embraer 145) are assumed to be almost entirely phased out by 2020, with no activity thereafter. The phasing out of the 50-seat regional jets will result in an increase in 69-seat (Embraer 170) and 76-seat jet flying (Embraer 175 and Canadair CRJ-900). The net result will be less operations from these aircraft types but at similar seat capacity levels as compared to today when much more 50-seat regional jet frequency exists.

Network airlines (Delta and United) are assumed to not increase gauge to any mainline aircraft, such as the Boeing 717 or Airbus 319, but to entirely rely on larger, aforementioned regional jets.

Another significant fleet change will be driven by planned Allegiant Airlines strategic shifts. In this forecast, by year 2019 it is assumed Allegiant would add a new route to Los Angeles in an MD-80 type aircraft as this is the base for this aircraft's operations. Allegiant plans to have retired all their MD-80 fleet types by the early 2020's. As a part of this fleet type change, Allegiant has indicated that they plan to shift MD-80 flying to an all Airbus fleet, with a heavy shift toward the larger Airbus 320 aircraft. Furthermore, given MOT's relatively longer-haul nature to all Allegiant focus cities (Las Vegas, Phoenix, West Coast and Florida), it is likely that Minot would be served with the relatively larger, more economical A320 aircraft in the long term.

The projected fleet mix from **Table 3-6** is combined with the enplanement forecasts to determine flight metrics including average seats per departure and enplanements per departure. The result will be relatively moderate seat capacity and passenger traffic growth, with load factors rising moderately, but with much higher passenger loads due to the significant increase in seats per departure – as noted in **Table 3-7 – Passengers Per Departure**.

Table 3-6 – Passenger Aircraft Forecast: Operations & Operating Seats

Aircraft Type	2014	2019	2024	2034
Canadair CRJ-200				
Operations	4,043	1,500	0	0
Operating Seats	202,139	74,996	0	0
Embraer E145				
Operations	465	0	0	0
Operating Seats	23,200	0	0	0
Embraer E170				
Operations	770	1,200	1,400	2,600
Operating Seats	54,010	82,768	96,562	179,330
Embraer E175				
Operations	1,105	1,500	1,000[3]	1,500
Operating Seats	83,754	113,936	75,957	113,936
Canadair CRJ-900				
Operations	328	800	1,200	1,800
Operating Seats	24,927	60,798	91,196	136,795
Airbus A319				
Operations	426	85	100	0
Operating Seats	60,376	12,047	28,346	0
MD-83/-88				
Operations	518	718	0	0
Operating Seats	85,988	119,188	0	0
Airbus A320				
Operations	0	0	1,020	1,400
Operating Seats	0	0	180,540	230,100
Total Operations	**7,655**	**5,804**	**4,720**	**7,300**
Total Operating Seats	**534,934**	**463,732**	**472,601**	**677,860**

Source: Trillion Aviation Analysis

Table 3-7 – Passengers Per Departure

Seating Capacity	2014	2019	2024	2034
Regional (≤60 seats)				
Average Seats Per Departure	50	50	-	-
Average Load Factor	80.9%	80.0%	-	-
Enplanements Per Departure	40.5	39.6	-	-
Air Carrier (60+ seats)				
Average Seats Per Departure	96.6	90.3	98.1	92.8
Average Load Factor	84.5%	83.5%	85.3%	85.5%
Enplanements Per Departure	81.6	75.4	83.6	79.4
Total				
Average Seats Per Departure	69.8	79.9	98.1	92.8
Average Load Factor	81.6%	82.9%	85.3%	85.5%
Enplanements Per Departure	57.0	66.3	83.6	79.4

Source: Trillion Aviation Analysis

[3] Aircraft Sizes are expected to rise and CRJ-200 are expected to be cut at this time. There were reductions in the E175 even though the cuts are just as likely to be among a variety of aircraft. The total operating seats accurately portrays the forecast for MOT.

PASSENGER AIRLINE OPERATIONS

Passenger airline operations are determined from the average enplanements per departure from the fleet mix determinations. An operation is considered an aircraft departure or an arrival.

Passenger airline operations will likely drop over the next 10 years, then by 2034 increase back to levels similar to 2014. This will be driven by the aforementioned industry trend of phasing out 50-seat regional jets and only partially replacing this flying with larger regional jets. The net effect will be relatively moderate seat capacity growth.

Table 3-8 – Passenger Airline Operations

Metric	2014	2019	2024	2034	*CAGR*
Departures					
Regional (≤ 60 Seats)	2,254	750	-	-	-
Air Carrier (> 60 Seats)	1,574	2,152	2,360	3,650	*4.3%*
Operations					
Regional (≤ 60 Seats)	4,508	1,500	-	-	-
Air Carrier (> 60 Seats)	3,147[4]	4,304	4,720	7,300	*4.3%*
Total Operations	**7,655**	**5,804**	**4,720**	**7,300**	*-0.2%*

Source: Trillion Aviation Analysis

SUMMARY

A summary of the preferred passenger aviation forecasts is provided in the table below. As noted earlier, it is expected that operations will drop, as larger aircraft replace 50-seat regional jets. Seat capacity is forecasted to grow moderately over the next 20 years, with much higher passenger loads on larger jets and slightly higher load factors.

Table 3-9 – Preferred Passenger Airline Forecasts Summary

	2014	2019	2024	2034
Enplaned Passengers				
Regional (≤ 60 Seats)	92,060	73,997	-	-
Air Carrier (> 60 Seats)	128,462	118,256	201,574	289,769
Total Enplaned Passengers	**220,522**	**192,253**	**201,574**	**289,769**
Avg. Seats/Departure	69.8	79.9	98.1	92.8
Avg. Load Factor	81.6%	82.9%	85.3%	85.5%
Operations				
Regional (≤ 60 Seats)	4,508	1,500	-	-
Air Carrier (> 60 Seats)	3,147	4,304	4,720	7,300
Total Operations	**7,655**	**5,804**	**4,720**	**7,300**

Source: Trillion Aviation Analysis

[4] Through examination of the air traffic data it appears that aircraft arrived before/after midnight at the beginning/end of the Federal Fiscal year due to either mechanical or weather related issues which resulted in an odd number of operations counted for the 12-month period beginning and ending at midnight.

COMMERCIAL PASSENGER AIRLINE TRAFFIC & CAPACITY UPDATE

This section is an update to the earlier completed forecast & analysis. The earlier noted work was done during the November-December 2015 time period. The section below, done in late April 2016, will analyze the most recently reported O&D data for 4Q15. It will also examine the most recent airline traffic and future scheduled capacity, focusing upon airline market share and recent trends.

Table 3-10 – Top 20 MOT O&D Markets (4Q15 vs 4Q13)

Top 20 MOT O&D Markets: 4Q15 vs 4Q13

			Q4 of 2015 (Daily, Directional)				% Change from Q4 of 2013		
Rank	Market	Code	Passengers	Psgr Share	Fare	Revenue	Passengers	Fare	Revenue
1	Las Vegas	LAS	83.2	17.3%	$98	$8,136	(16%)	(23%)	(36%)
2	Phoenix-Mesa	AZA	58.6	12.2%	$106	$6,181	7%	(21%)	(15%)
3	Denver	DEN	21.8	4.5%	$281	$6,127	(54%)	48%	(32%)
4	Minneapolis-St. Paul	MSP	19.9	4.1%	$258	$5,139	(30%)	1%	(29%)
5	Houston-Bush	IAH	14.0	2.9%	$261	$3,648	(31%)	(32%)	(53%)
6	Dallas-Fort Worth	DFW	9.3	1.9%	$276	$2,557	(49%)	(4%)	(51%)
7	Atlanta	ATL	9.2	1.9%	$269	$2,477	(31%)	(6%)	(35%)
8	Phoenix-Sky Harbor	PHX	9.1	1.9%	$221	$1,996	(36%)	4%	(34%)
9	Orlando	MCO	8.2	1.7%	$277	$2,262	(21%)	(12%)	(30%)
10	San Francisco	SFO	6.9	1.4%	$252	$1,738	(17%)	2%	(15%)
11	Seattle	SEA	6.0	1.3%	$261	$1,577	(32%)	1%	(32%)
12	Los Angeles	LAX	6.0	1.2%	$244	$1,462	(40%)	3%	(38%)
13	Kansas City	MCI	6.0	1.2%	$257	$1,532	(13%)	(6%)	(18%)
14	Washington Reagan	DCA	5.5	1.1%	$215	$1,187	12%	(11%)	(0%)
15	San Diego	SAN	5.3	1.1%	$264	$1,394	7%	8%	15%
16	Nashville	BNA	5.3	1.1%	$263	$1,382	30%	8%	41%
17	Portland	PDX	5.1	1.1%	$266	$1,366	(28%)	5%	(24%)
18	Chicago O'Hare	ORD	5.0	1.0%	$248	$1,247	(26%)	(5%)	(30%)
19	Detroit	DTW	4.8	1.0%	$268	$1,276	(24%)	(5%)	(28%)
20	San Antonio	SAT	4.7	1.0%	$326	$1,517	(19%)	(4%)	(22%)
	Sub-Total		293.6	61.0%	$185	$54,200	(23%)	(11%)	(31%)
	All Other		187.6	39.0%	$304	$56,926	(21%)	(6%)	(26%)
	Total		481.2	100%	$231	$111,126	(22%)	(8%)	(30%)

** Source: DOT 10% Coupon Sample (via Diio); the average fare paid & revenue are net taxes& fees*

MOT's top 20 markets are illustrated above in Table 3-10, comparing the most currently reported quarter 4Q15, as compared to 4Q13. The comparison over a 2-year was done, as this comparison best represents the period upon which MOT's oil-related traffic declines began in earnest.

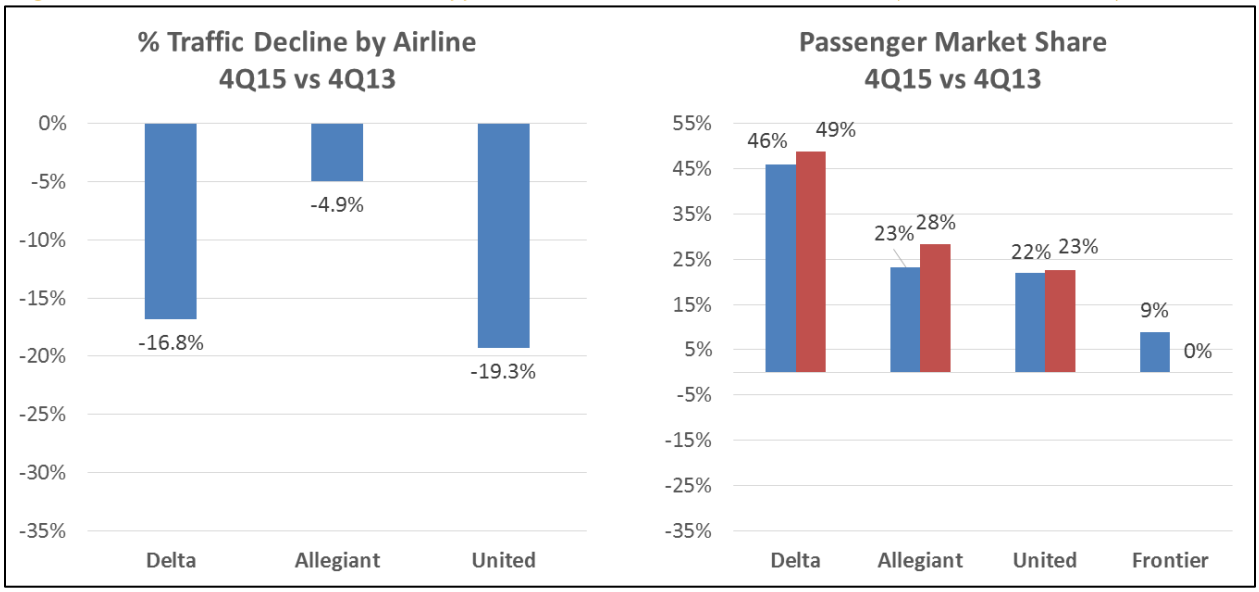
In aggregate, MOT's reported O&D traffic dropped 22% during this time period, with the average fare paid dropping 8%, resulting in a near 30% decline in airline revenue. The decline has been led by business markets, particularly "oil-centric" markets: Houston (IAH) traffic was down 31% & the average fare paid also dropped 32%. DFW traffic was down 49%.

Leisure-driven markets fared better, particularly those served by Ultra-Low Cost Carrier (ULCC) Allegiant Airlines: Phoenix-Mesa (AZA) traffic was actually up 7%, while Las Vegas (LAS) declined by a more moderate 16%. Also, the relative importance of Allegiant Airlines is evident in Table 3-10. Allegiant's two non-stop markets (AZA & LAS) alone accounted for almost 30% of MOT's O&D traffic for 4Q15.

Denver (DEN) traffic dropped by 54%, while the average fare paid increased 48%. The DEN result was due to ULCC Frontier Airlines exiting MOT in January of 2014. Other affected markets by Frontier Airlines exit from MOT were primarily on the west coast, as most of these markets have experienced moderate fare increases, while most other markets across the U.S. have seen lower MOT fares over the 2-year period.

The aforementioned changes in MOT's O&D traffic mix are also reflected in MOT's airline trends noted below in **Table 3-11**. Over the 2-year period, business-oriented carriers Delta Air Lines (-16.8%) and United Airlines (-19.3%) saw much larger traffic declines than Allegiant Airlines (-4.9%).

Figure 3-10 – MOT Airline Traffic Declines & Market Share (4Q15 vs 4Q13)

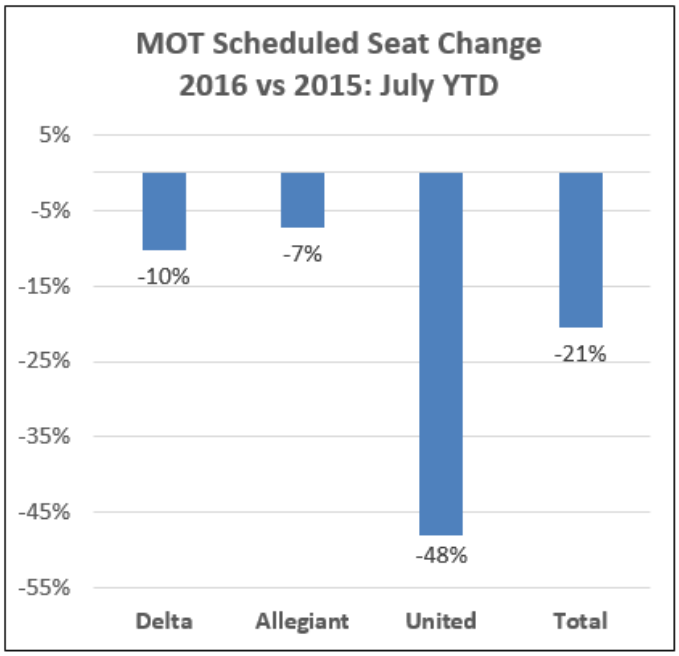


Source: DOT Report T-100

Currently (4Q15) Delta remains that largest airline at MOT, carrying about 49% of all traffic over its Minneapolis-St. Paul (MSP) hub. Allegiant is #2, carrying about 28% of onboard passengers, while United is #3, with a market share of 23%, operating via its Denver (DEN) hub. Going forward, it is most likely that Allegiant will continue to be MOT's growth airline, while network airlines Delta and United are more likely to stagnate or even shrink. This is consistent with their system trends.

Finally, looking forward, published airline schedules are final through July 2016 currently. Below in **Table 3-12**, these results are summarized. In February 2016, United pulled DEN service from 3 to 2 daily ERJ round-trips. This compares to 4 last year. Also Delta has eliminated some capacity and while Allegiant has reduced some selected seasonal capacity, their reductions are much less than those network airlines United and Delta.

Table 3-11 – MOT 2016 Capacity Change by Airline



* Source: Innovata

Air Cargo

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

AIRPORT TRENDS

MOT serves as a feeder for both FedEx and UPS, in addition to being a regional market for transporting bank documents and other on-demand cargo.

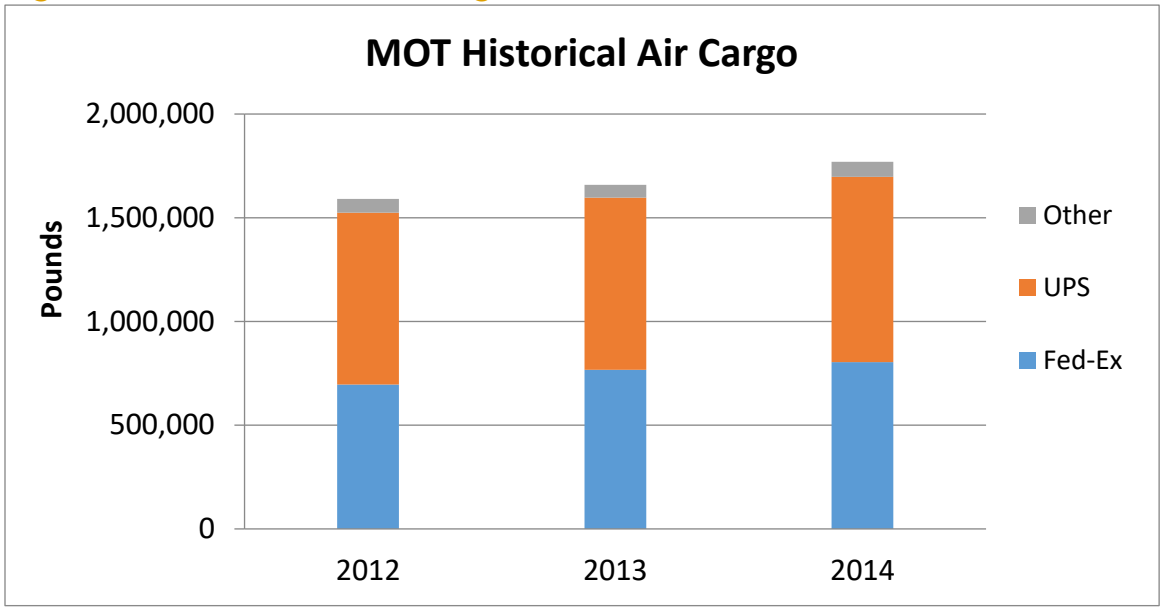
FedEx feeder air cargo service is operated by two airlines: 1) Corporate Air operating Cessna 208 Caravan (C208) aircraft to Grand Forks and Williston and 2) Mountain Air Cargo in December 2014 and throughout 2015 is operating four (4) ATR-42 turboprop aircraft flights per week to Grand Forks. This change to larger aircraft from C208s flown previously will be reflected in the forecast.

UPS service is operated by Encore Air Cargo, who operates a mix of Swearingen Metroliner aircraft (SW4, SW3) and Cessna Caravan 402 (C402) aircraft to Fargo, Sioux Falls, Williston, and Bismarck.

Banking checks service is operated by Pro Aire Cargo, who operates Cessna 310 (C310) aircraft to a variety of destinations, but with a focus to Bismarck, Mandan, and Minneapolis-Anoka County, MN.

MOT does not track freight and mail separately. Total poundage is reported to MOT by UPS and ProAire since 2012, while Federal Express data was obtained from USDOT report T100. UPS and ProAire do not report T100 data.

Figure 3-11 - Historical Air Cargo



Source: Minot International Airport, DOT Report T100

MOT's air cargo poundage has grown from 1.59 million pounds in 2012 to 1.77 million pounds in 2014. This translates to a 5.49% CAGR over the two-year period. From an airline perspective, UPS carried 894,040 pounds of freight in 2014, while Federal Express carried 803,854 pounds. The balance remaining can be attributed to banking and other cargo. For comparison purposes, Federal Express' annual freight poundage in 2003 (oldest full year data is available) was 581,981 pounds, as compared to 803,854 pounds in 2014. This works out to a 2.98% CAGR over the 11-year period.

MOT reports total air cargo processed in CY 2015 was 1.79 million pounds. Air cargo activity growth has stabilized but not declined during this "post-oil boom" period.

Table 3-12 - Historical Air Cargo Table

Year	Enplaned and Deplaned Air Cargo*	Operations
2008	N/A	2,860
2009	N/A	2,783
2010	N/A	2,838
2011	N/A	2,593
2012	1,590,871	2,413
2013	1,658,367	2,600
2014	1,770,194	2,712
Historical CAGR	*5.49%*	*(0.88%)*

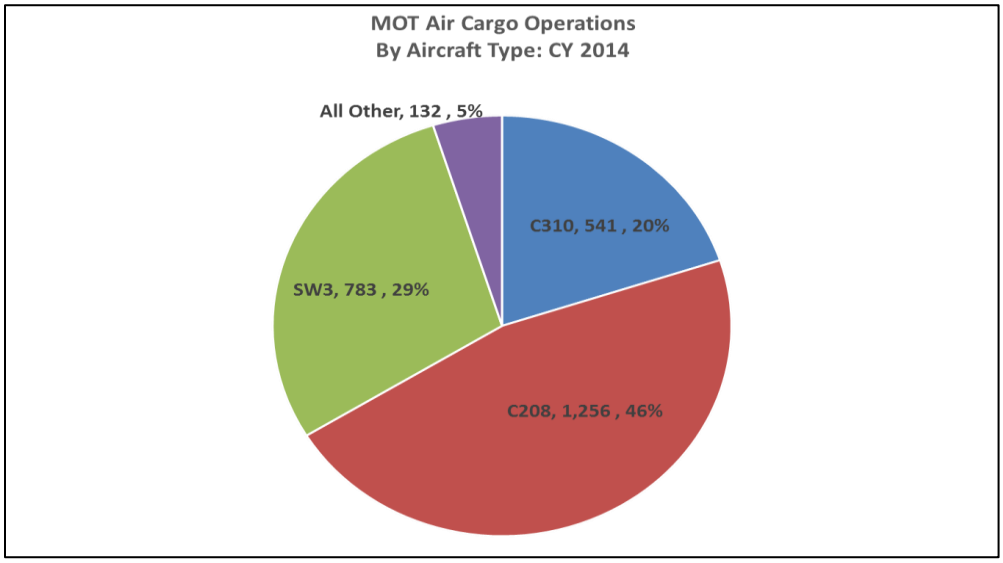
*Source: Minot International Airport, Tower Data and DOT Report T100; *weight in pounds*
Note: Operations only counted when MOT Tower is operational (7am - 10pm; daily)

Air cargo operations from MOT were obtained from Airport Tower data collected since 2008. Air Cargo operations have been relatively stable over the past six years, dropping from 2,860 operations in 2008 to 2,712 in 2014 or at a CAGR of -0.88%. This is a trend that has been generally experienced across the U.S., as more inexpensive ground transportation has to some degree replaced air transportation, particularly on shorter-haul cargo service operated with smaller aircraft. Based on 2014 IFR data, it is

estimated 5% percent of cargo operations occur when the local Tower is closed during early morning arrivals.

Figure 3-12 – Air Cargo Fleet Mix (CY 2014) illustrates the current air cargo fleet mix at MOT. The vast majority of operations are on SW3, C310, and C208 aircraft, with the majority (C208) operated by Federal Express feeder Corporate Air. Note that in 2015 Mountain Air upgraded to larger ATR-42 aircraft.

Figure 3-12 – Air Cargo Fleet Mix (2014)



Source: MOT Airport Traffic Control Tower Data

PROPOSED FORECAST

Freight

The recommended MOT forecast assumes slow growth over the next 20 years in poundage on both Federal Express (FedEx) and UPS. This forecast is generally consistent with recent trends although below longer-term Federal Express growth rates since 2003.

It is anticipated that the current (2015) fleet of aircraft (ATR-42, Cessna 208 Caravan, Cessna 310, and the Swearingen Metroliner III) operating at MOT will continue to operate in the future. It is assumed that cargo operations activity will continue to drop by 0.88% through 2024, as the trend of shifting toward ground transportation will continue, and then remain flat for the remaining 10 years of the forecast period. Air cargo poundage is expected to grow marginally to 1.86 million pounds by 2034, also continuing recent trends. The result will be higher cargo load factors, which has been an industry trend and comparable to what has occurred in the passenger airline industry over the past 20 years. The air cargo freight and operations forecast, which is relatively flat with some change in fleet mix, is provided in the following table.

Table 3-13 – Air Cargo Aviation Forecast Summary

Metric	2014	2019	2024	2034
Total Cargo Pounds	**1,770,194**	**1,792,432**	**1,814,950**	**1,860,838**
Total Operations	**2,725**	**2,595**	**2,483**	**2,483**
Cessna 208 Caravan	1,256	402	300	350
ATR-42	13*	800	850	850
Swearingen Metroliner III	783	749	717	717
Cessna 310	541	518	495	495
Other	132	126	121	121

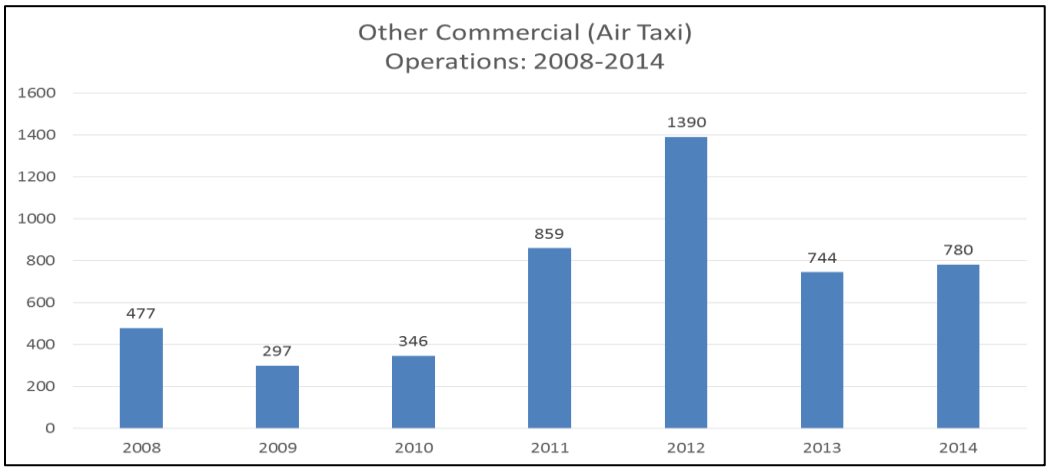
Source: Minot International Airport, FAA Traffic Flow Management System Counts (2014), Trillion Aviation Analysis
**417 operations in 2015*

Other Commercial Activity (Air Taxi)

OPERATIONS

Air taxi operating data was collected from MOT Airport Traffic Control Tower activity data from calendar year 2008 through 2014. Air taxi operations trends are illustrated in **Figure 3-13 – Air Taxi Operations**.

Figure 3-13 – Air Taxi Operations



Source: FAA Traffic Flow Management System

Air taxi annual operations have climbed from the 300 to 400 range during the pre-oil boom period of 2008-2010, to a peak of 1,390 in 2012, then falling back to the mid-700 range in 2013 and 2014. Based upon 2013-14 results, air taxi operations have doubled during the peak oil years. It is believed that a sizable share of air taxi operations has been driven by the oil industry over the past few years, as much of the increased activity has been charter flights to markets with heavy exposure to the oil industry or those that have been supplying labor (Louisiana, Alaska, and mountain region markets). At the time the forecasts were prepared no 2015 data was available. It is expected that going forward air taxi trends will closely follow oil industry (and price) trends from the region. It is estimated 7% of Air Taxi operations occur when the Tower is closed based on FAA data.

Commercial Forecast Summary

A summary of the commercial aviation forecasts is shown in the following table.

Table 3-14 – Commercial Forecast Summary

Metric		2014	2019	2024	2034	CAGR
Enplanements	**Air Carrier**	128,462	118,256	201,574	289,769	*4.2%*
	Commuter/Regional	92,060	73,997	-	-	-
	Total Enplanements	220,522	192,253	201,574	289,769	*1.4%*
Operations	**Air Carrier**	3,147	4,304	4,720	7,300	*4.3%*
	Commuter/Regional	4,508	1,500	-	-	-
	Air Cargo	2,712	2,595	2,483	2,483	*-0.4%*
	Air Taxi	777	500	300	750	*-0.2%*
Total	**Total Commercial**	**11,144**	**8,899**	**7,503**	**10,533**	***-0.3%***
	Avg. Seats/Operation	**69.8**	**79.9**	**98.1**	**92.8**	***1.4%***
	Average Load Factor	**81.6%**	**82.9%**	**85.3%**	**85.5%**	***0.2%***

Source: Trillion Aviation Analysis

In summary, MOT commercial activity is going to be driven by a reduction in total operations, but the average aircraft size is going to increase significantly, with overall seat capacity increasing. The result will be an increase in passenger traffic consistent with economic growth, with the entire increase occurring during the last 10 years of the forecast period, as the assumed increase in oil prices (and economic activity) takes place. It is also expected that much higher passenger loads (on larger aircraft) will take place with a small increase in the load factor. Finally, as airline capacity remains constrained, a good part of increased airline travel demand will be reflected in higher air fares. These trends are likely to occur across much of the U.S. over the next 20 years.

This forecast now takes into account a completed replacement airport at Williston. Should Williston not complete their new airport, capacity constraints at that airport would become severe, as the Sloulin Field International Airport (ISN) in its current state cannot accommodate anything larger than a 50-seat regional jet. As 50-seat regional jets are expected to be retired later this decade, the result would be that ISN could not handle the larger jets. This air traffic would then most likely be accommodated at MOT. In 2014, ISN had over 116,000 enplanements and the new replacement airport is forecasted to generate over 300,000 by 2034.

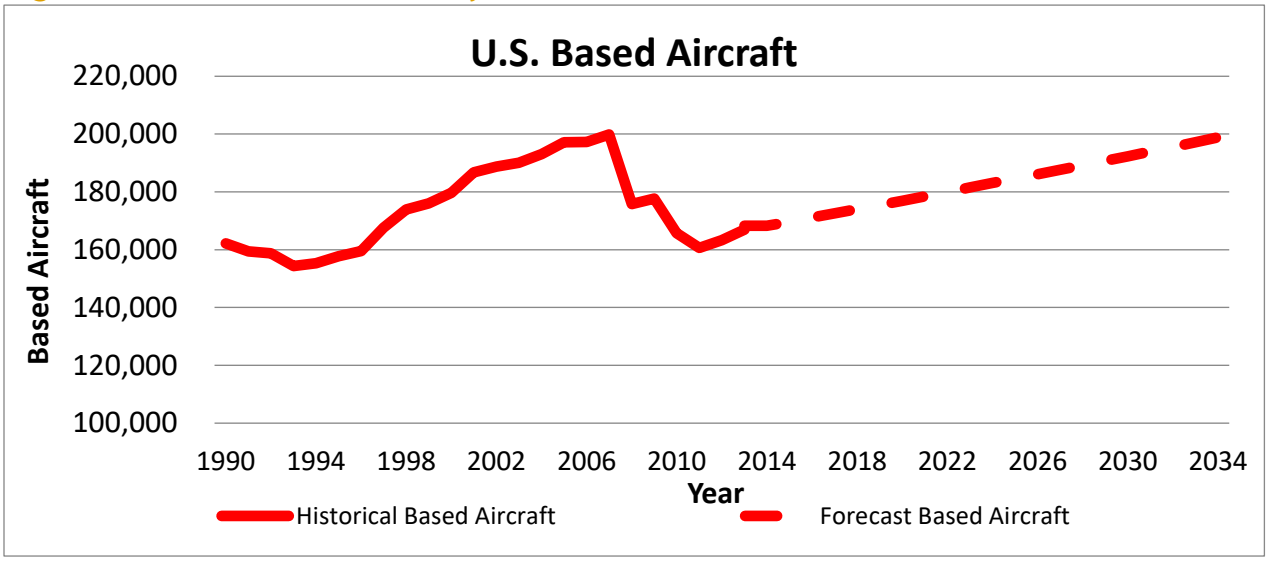
Other factors that will affect MOT commercial activity include the Canadian economy for leisure traffic. Airline routes will adjust to meet actual regional demands and potential “yields”.

Based Aircraft Forecasts

A based aircraft is an operational and airworthy aircraft based at the airport for a majority of the year. These are generally non-commercial general aviation and commercial air taxi aircraft.

The number of based aircraft is the count of aircraft that claim a specific airport as its home base. Civil (non-military) based aircraft at MOT are used primarily for general aviation (GA) and some Air Taxi (AT) operations. On a national basis, the FAA TAF reports based aircraft hit a 15-year low in 2011 after highs were achieved in 2007. The economic recession contributed to the number of based aircraft declining nearly 20% between 2007 and 2011. National forecasts show a modest growth rate of 0.88% annually over the next 20 years. However, despite decreased growth during economic downturns, the most recent economic recession demonstrates based aircraft sensitivity to the overall economy.

Figure 3-14 – U.S. Based Aircraft

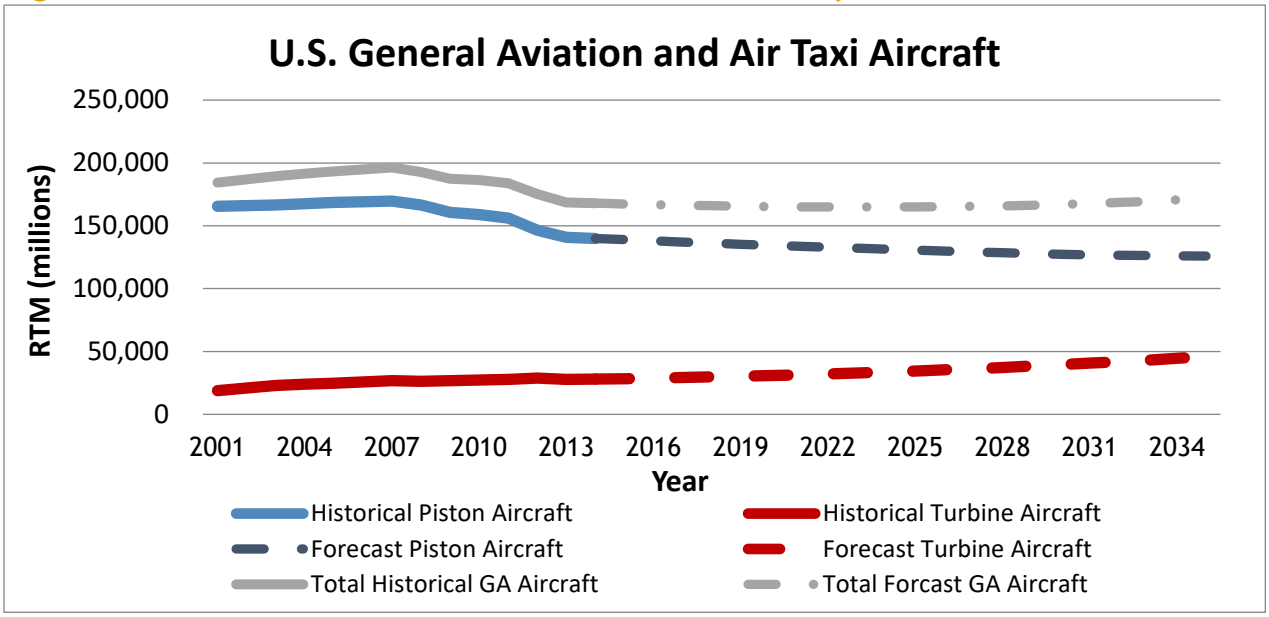


Source: FAA Terminal Area Forecast

Nationally, the total number of GA and AT active aircraft has cumulatively increased by 1.4% since 2000. Events affecting the number of aircraft include increased security regulations since 9/11, the economic downturn of the early 2000s, and the recession of the late 2000s. Aircraft types are evolving to include more turboprop and turbojet aircraft and fewer multi-engine piston aircraft, which can affect aircraft ownership costs.

Within the GA and AT activity category there has been increased demand for the use of turbine powered aircraft. These aircraft include turboprop and turbojet aircraft primarily used for corporate business travel. More operators are using GA aircraft for travel to save travel time and cost. The number of turbine aircraft has increased an average of 4.3% annually. Helicopter, experimental and light sport aircraft (new aircraft category since 2006) have seen steady increases. Conversely, the number of piston powered aircraft has decreased 1.0% annually. These aircraft types are used for recreational and flight training purposes. Decreases can be attributed to higher ownership costs, increased fuel prices, economic downturns, and both an aging and decreasing pilot population. Multi-engine piston aircraft have particularly seen a reduction with decreases of 2.5% annually. These aircraft types are being replaced by newer technology turboprop aircraft for business travel.

Figure 3-15 - U.S. General Aviation and Air Taxi Aircraft

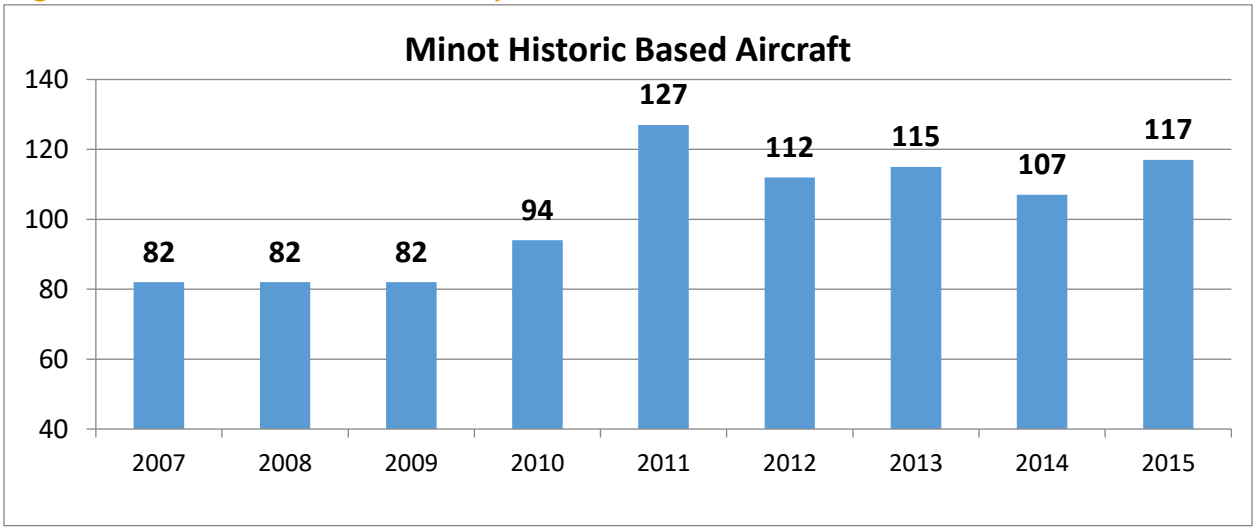


Source: FAA Aerospace Forecasts (2015-2035)

In 2015, the total based aircraft reported at MOT was 117 according to airport records. Of these, 104 were single engine, seven (7) were twin engine, one (1) was a helicopter, and five (5) were business jets. In 2014, there were 107 based aircraft, of which 95 were single engine, seven (7) were twin engine, one (1) was a helicopter, and four (4) were business jets.

Many of these aircraft are stored in inexpensive hangars and in some cases, even outside on the apron. Availability for hangar space is low in the area and this may limit actual based aircraft growth in the future. Forecasts assume MOT will have the facilities needed to accommodate the demand.

Figure 3-16 - Minot Based Aircraft



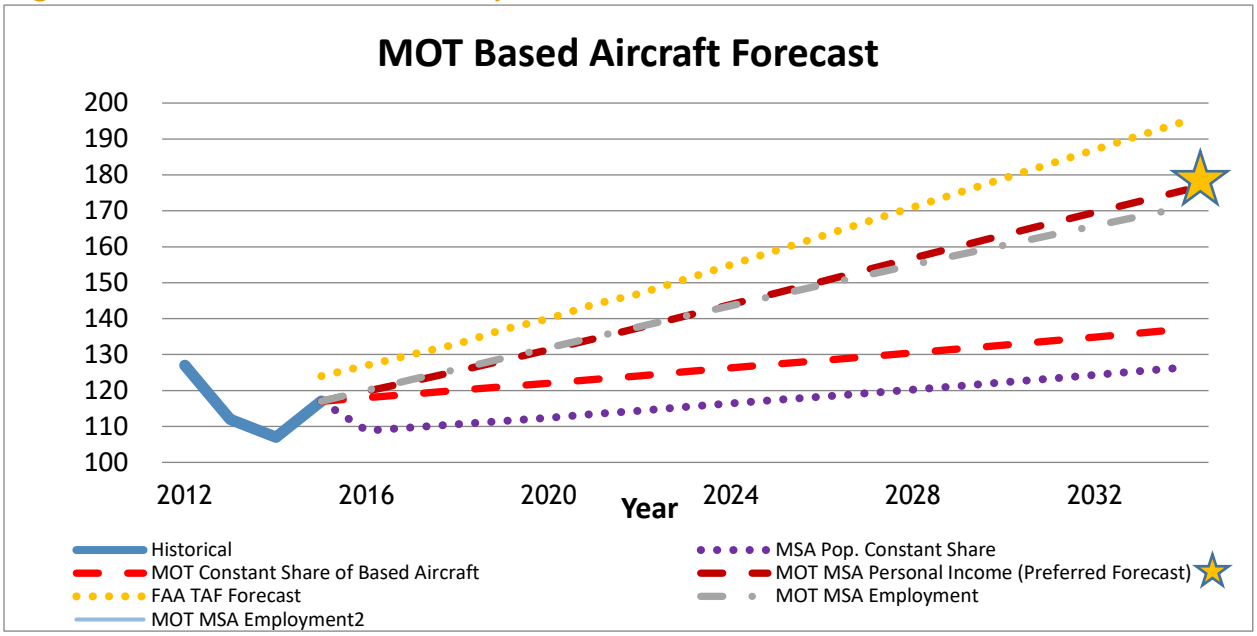
Source: MOT Airport Records;

Based Aircraft Forecasts

Based aircraft forecasts measure the number of aircraft that claim MOT as their home airport. Forecast methodologies evaluated include time series (trend), regression, and market share analysis. Data used included based aircraft data from airport records, FAA TAF, FAA Aerospace Forecasts, and demographic and socioeconomic data.

The 2015 FAA TAF published for Minot reports 121 based aircraft with a future growth rate of 2.17% annually. Based aircraft figures vary from source to source. Airport records show 107 based aircraft in 2014 and 117 in 2015. Airport reported based aircraft will be used for forecast purposes.

Figure 3-17 - Minot Based Aircraft Forecast Methods



Source: FAA Terminal Area Forecast, Trillion Aviation Analysis

To forecast based aircraft at Minot for the next 20 years, the following was used: 1) National Active GA share at MOT, 2) MOT MSA personal income regression, and 3) MOT MSA Employment regression.

MOT MSA Personal Income was chosen as the preferred forecast. The forecast is for 176 based aircraft at MOT by 2034. The 20-year CAGR is 2.52%. This forecast is below the TAF forecast of 186 based aircraft by 2034, but is consistent with forecasted economic and enplaned passenger growth.

Table 3-15 - Based Aircraft Forecast

Metric	2014	2019	2024	2034	CAGR
Total Based Aircraft	107	128	144	176	2.52%

Source: Trillion Aviation Analysis

As MOT and the industry see more turboprop and turbojet aircraft, the airport's based aircraft fleet mix will also change. It is forecast that multi-engine aircraft types will increase at a faster rate than single-engine aircraft, based on turboprop and turbojet trends.

Table 3-16 – Minot Based Aircraft Fleet Mix Forecast

Metric	2014	2019	2024	2034	CAGR
Single Engine*	95	108	115	132	*1.01%*
Multi-Engine*	7	13	18	30	*7.55%*
Jet	4	6	9	13	*6.07%*
Helicopter	1	1	1	1	*0.00%*
Other	0	0	0	0	*0.00%*
Total Based Aircraft	**107**	**128**	**144**	**176**	***2.52%***

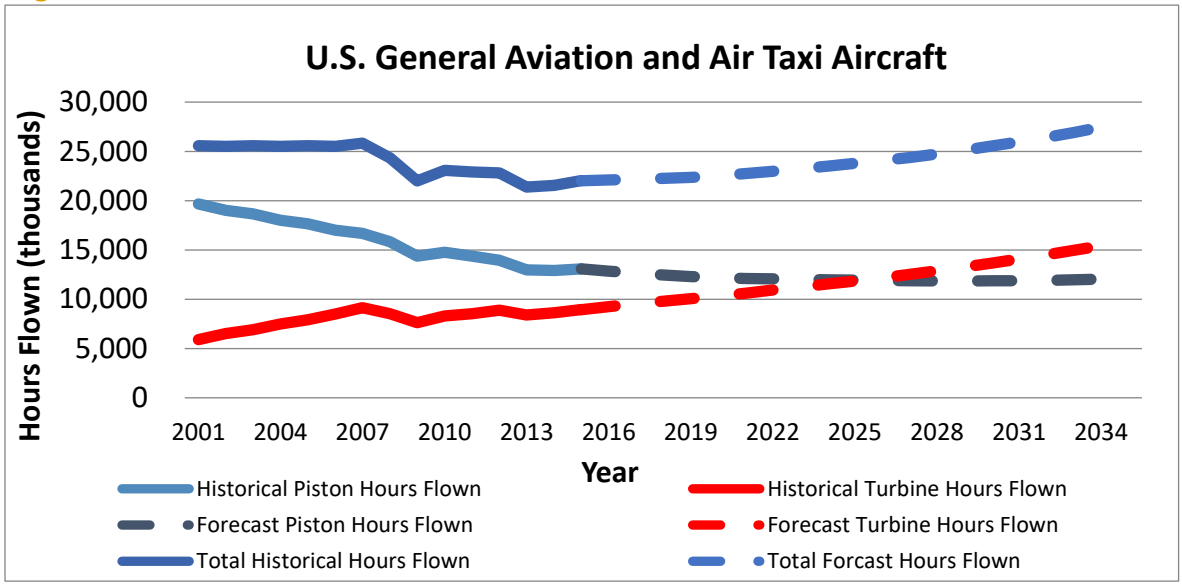
*Source: Trillion Aviation Analysis; * includes both piston and turboprop-driven aircraft for FAA reporting purposes*

General Aviation Operations Forecast

Historic Aviation Activity & Trends

General aviation (GA) is defined as aviation activities other than for commercial purposes. These are typically recreational or private transport flights. Nationally, the number of general aviation and air taxi hours flown has decreased by 18% since 2000. This downturn can be attributed to the economic downturn of the early 2000s, the recession of the late 2000s, and increasing operating costs driven by fuel prices.

Figure 3-18 – U.S. General Aviation and Air Taxi Hours Flown



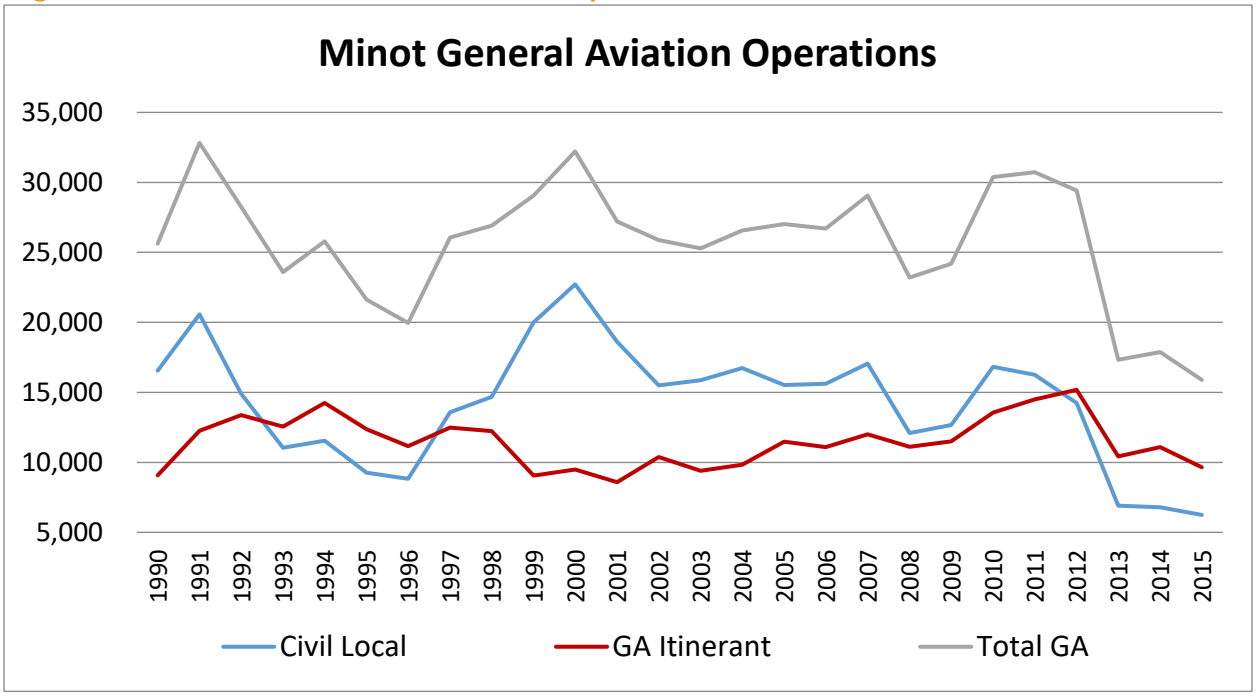
Source: FAA Aerospace Forecasts (2015-2035)

The trend of strong growth in corporate aircraft and steady or decreased use of piston aircraft is expected to continue over the planning period. This forecast may fluctuate with new unleaded fuel engines potentially reducing the cost of flying. The number of turbojet aircraft is expected to increase 3.5% annually with hours flown increasing at a 4.3% rate. Larger corporate GA aircraft types are forecasted to grow in number and activity levels. Piston aircraft are expected to decrease at a rate of 0.3% annually with activity decreasing at a 0.5% annual rate. This decrease can be attributed in part to upgrades to new aircraft types, but also in part due to the increased cost of flying and activity sensitivity to economic conditions.

MOT experienced stable GA operations from 1990 through about 2012, although since 2012, results have dropped sharply. Interestingly this drop-off coincides with the boom in commercial operations and

oil exploration. In calendar year 2015 GA local operations dropped to 6,243 with GA itinerant operations decreasing to 9,650. This reflects a 45% reduction in activity from 2012. Combined annual MOT aviation fuel sales in 2015 are approximately 35% less than 2012 which validates the reduction in activity. Updated 2015 data provides an updated baseline for GA forecasts at MOT.

Figure 3-19 – Minot General Aviation Operations Breakdown



Source: FAA MOT TAF Forecast (July 2015)
Note: Operations only counted when MOT Tower is operational (7am – 10pm; daily)

Forecasts

CIVIL LOCAL OPERATIONS

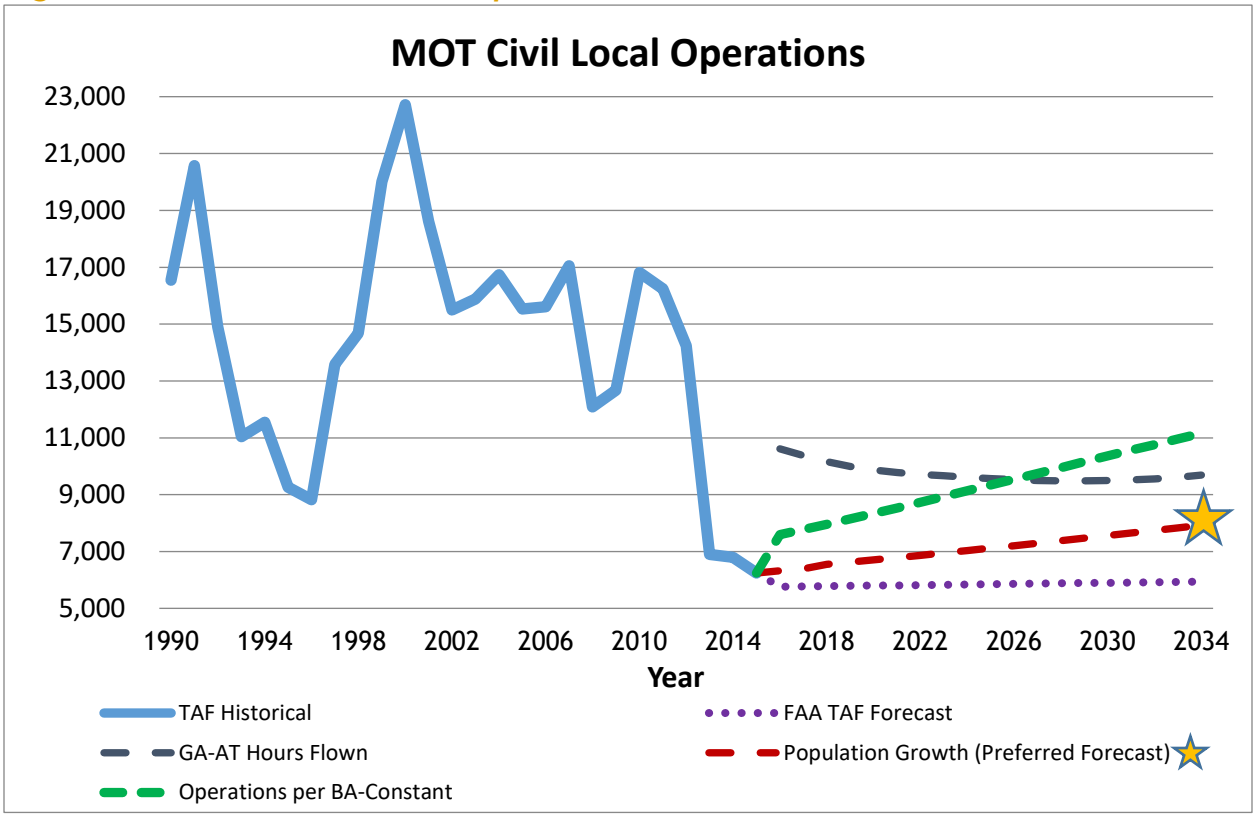
A local operation is defined as a takeoff or landing of a flight conducted within 20 miles of an airport. These operations typically include practice landings, touch-and-go's, practice approaches and maneuvering in the local area. Civil local operations are usually conducted by recreational and flight training aircraft.

Civil local operations have been volatile over the past 24 years, with a precipitous decline taking place in 2013 and 2014 – counter intuitively, during a time period when the regional economy was in a high growth mode. It is believed that the 2013-14 decline occurred because of commercial congestion, which caused aircraft owners moving to nearby general aviation airports – primarily Mohall, where hangars were also available. Additionally, some traffic started flying directly into Stanley, Tioga, and especially Williston.

Several forecast methods were evaluated to estimate future operations. Most were discounted, due to most recent economic growth metrics differing from local operations trends. The most viable models were Operations per Based Aircraft (BA) and Trend Analysis, particularly Population Trend Analysis.

The preferred forecast methodology is based upon Population Growth. This forecast results in 7,831 local operations by 2034.

Figure 3-20 - Minot Civil Local Operations Forecast Methods



Source: FAA Terminal Area Forecast (January 2016), Trillion Aviation Analysis
Note: Operations only counted when MOT Tower is operational (7am - 10pm; daily)

This method yields an average annual growth rate of 1.20% over the 20-year forecast period. This growth rate is consistent with forecasted economic growth from the region. It is also close to the 1.37% forecasted growth rate for enplaned passengers over the next 20 years.

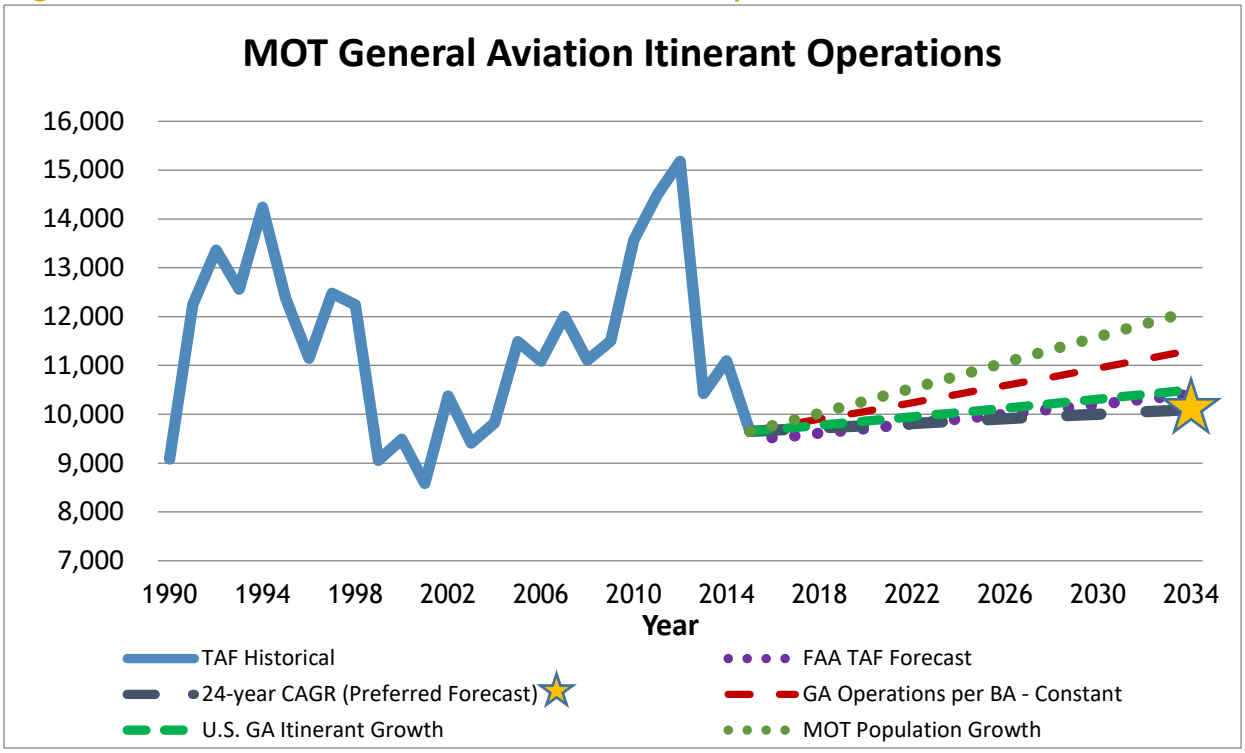
GA ITINERANT OPERATIONS

An itinerant operation is defined as a takeoff or landing of a flight conducted beyond 20 miles of an airport. GA itinerant operations are conducted by all types of aircraft. General aviation itinerant operations, as with local operations, declined sharply in 2013 and 2014. While GA Itinerant operations were volatile over the past 25 years, in aggregate over this time GA itinerant operations grew at a 0.24% CAGR.

As with civil local operations, GA itinerant operations have been affected by commercial congestion, in conjunction with the availability of hangar space at nearby GA airports. Tied to this, more GA activity has also been flying into other regional GA airports.

Several forecast methods were evaluated to estimate future operations including trend analysis, share analysis, and regression analysis. Trend analysis reviewed trends over the past 25 years, while share analysis reviewed historical GA itinerant operations, population growth trends, total U.S. GA and AT hours flown, total U.S. GA itinerant operations, MSA population, and MSA employment. Regression analyses were also reviewed, although regression models were found to be unreliable.

Figure 3-21 - Minot General Aviation Itinerant Operations Forecast Methods



Source: FAA Terminal Area Forecast (January 2016), Trillion Aviation Analysis
Note: Operations only counted when MOT Tower is operational (7am - 10pm; daily)

The preferred forecast is based upon the 25-year rate of growth of 0.24%. While this growth rate is comparable to forecasted population growth over the next 20 years, it is below forecasted enplaned passenger growth of 1.37%. At 10,101 forecasted operations, it is near the TAF forecast and is near the mid-range over the past 25 years.

Fleet Mix

The overall general aviation operations fleet mix combines local and itinerant operations using MOT tower data. It is estimated actual 24-hour daily GA operations are up to 8% greater than these figures using 2014 FAA data. Turboprop operations make up the majority of forecast general aviation operations at MOT with approximately 39% followed by turbojet at 25%.

Table 3-17 - Total Local and GA Itinerant Operations Fleet Mix Forecast

Metric	2014	2019	2024	2034	CAGR
Single Engine Piston	4,399	4,075	4,155	4,433	*0.04%*
Multi-Engine Piston	1,884	1,671	1,779	1,898	*0.04%*
Turboprop	6,818	6,327	6,439	6,871	*0.04%*
Turbojet	4,410	3,935	4,165	4,444	*0.04%*
Helicopter	209	196	199	211	*0.04%*
Other	166	166	157	168	*0.04%*
Total Operations	17,886	16,370	16,894	18,025	*0.04%*

Source: Minot International Airport Tower Data, Trillion Aviation Analysis
Note: Operations only counted when MOT Tower is operational (7am - 10pm; daily)

General Aviation Forecast Summary

A summary of the civil local and general aviation itinerant forecasts is shown in the following table.

Table 3-18 – General Aviation Operations Forecast Summary

Metric	2014	2019	2024	2034	CAGR
Local Operations	6,790	6,627	7,034	7,925	*0.78%*
Itinerant Operations	11,096	9,743	9,860	10,100	*-0.47%*
Total Operations	**17,886**	**16,370**	**16,894**	**18,025**	*0.04%*
Local Share	38%	40%	42%	44%	-
Itinerant Share	62%	60%	58%	56%	-

Source: Trillion Aviation Analysis
Note: Operations only counted when MOT Tower is operational (7am – 10pm; daily)

Military Operations

Proposed Forecast

Military missions are difficult to predict but the local base is expected to remain at Minot for the foreseeable future. Local and itinerant military operations are forecast to remain steady. Total operations are forecast to remain at 1,796 for the planning period. Itinerant operations make up about 73% of the total with local operations at 27% based on historical trends.

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 operate at least 500 annual operations at the airport to be considered "regular" use by FAA for improvements to be justified for FAA funding.

Existing

As supported by the 2014 and 2015 FAA Traffic Flow Management System Counts (TFMSC) data, the overall existing critical design aircraft is a MD-83 aircraft with regular service to MOT. The critical design airplane has an FAA Airport Reference Code (ARC) of D-III made up of FAA Aircraft Approach Category (AAC) D with approach speed up to 166 knots and Airplane Design Group (ADG) III with a wingspan up to 118 feet. The design aircraft has an FAA Taxiway Design Group (TDG) classification of 4 and a maximum takeoff weight (MTOW) of 166,000 pounds.

Table 3-19 – Existing Critical Design Aircraft

Aircraft Type	IFR Operations		AAC	ADG	TDG	MTOW
	CY 2014	CY 2015				
Boeing MD-83/88	545	532	D	III	4	166,000
Boeing 737-700/-800	31	38	D	III	3	174,200
CRJ-200	4,105	3,989	D	II	3	53,000
Airbus A319/A320	446	180	C	III	3	166,400
CRJ-900	352	996	C	III	3	84,500
Embraer E-170	1,820	1,009	C	III	3	79,300
E-135/-145/-145EX	764	930	C	II	2	53,100
Total AAC-D	**4,681**	**4,559**				
Total ADG-III	**3,218**	**2,767**				
Total TDG-4	**545**	**532**				
Design MTOW	**166,000 lbs.**					

Source: FAA Traffic Flow Management System Counts, KLJ Analysis
MTOW = Maximum Takeoff Weight (pounds), AAC = FAA Aircraft Approach Category, ADG = FAA Airplane Design Group, TDG = FAA Taxiway Design Group. Aircraft operations exceeding FAA regular use threshold are shown in Green.

The existing critical design aircraft fleet for air cargo operations is a FAA ARC B-II, TDG-2 aircraft such as the Swearingen Metroliner III with a MTOW of 16,000 pounds. This aircraft type conducted 901 annual operations at MOT in 2015. It should be noted the ATR-42 aircraft (FAA ARC B-III, TDG-2, MTOW 36,800 pounds) has regular service to MOT and conducted 417 operations at MOT in 2015.

The existing critical design fleet for other commercial and general aviation is a FAA ARC B-II, TDG-2 turbojet airplane with a MTOW up to 60,000 pounds. These aircraft are turboprop or business jet aircraft types. A common design aircraft is a Cessna Citation 680 Sovereign business jet. In 2015 there were 1,284 aircraft operations at MOT classified by FAA as business jet aircraft according to TFMSC data. Of those, approximately 650 operations were in specific aircraft classified by FAA as 75 percent of the general aviation business jet fleet. There were approximately 300 annual operations in larger business jet aircraft that would generally identify in the 100 percent of fleet category. Other aircraft were not classified.

Future

Based upon analysis developed earlier in this chapter, the future critical design aircraft fleet mix for MOT is presented in **Table 3-18**. It is forecast the future design aircraft at MOT will evolve to an ARC C-III, TDG-3 aircraft in the long-term (10+ years). A representative airplane is the Airbus A-320 with a maximum takeoff weight of 166,400 pounds.

Table 3-20 – Future Critical Design Aircraft

Aircraft Type	Design	2014	2019	2024	2034
Boeing MD-83/88	ARC D-III, TDG-4	545	718	0	0
Boeing 737-700/-800	ARC D-III, TDG-3	31	40	50	80
CRJ-200	ARC D-II, TDG-3	4,105	1,500	0	0
Airbus A319/A320	ARC C-III, TDG-3	446	85	1,120	1,400
CRJ-700/-900	ARC C-III, TDG-3	352	800	1,200	1,800
Embraer E-170/-175	ARC C-III, TDG-3	1,820	2,700	2,400	4,100
E-135/-145/-145EX	ARC C-II, TDG-2	764	0	0	0
ATR-42	ARC B-III, TDG-2	13*	800	850	850
	Total AAC-D	**4,681**	**2,258**	**0**	**0**
	Total AAC-C	3,382	3,585	**4,720**	**7,300**
	Total ADG-III	**3,231**	**5,143**	**5,620**	**8,230**
	Total TDG-4	**545**	**718**	**0**	**0**
	Total TDG-3	6,754	5,125	**4,770**	**7,380**

Source: Trillion Aviation/KLJ Analysis
*MTOW = Maximum Takeoff Weight (pounds), AAC = FAA Aircraft Approach Category, ADG = FAA Airplane Design Group, TDG = FAA Taxiway Design Group. Aircraft operations exceeding FAA regular use threshold are shown in Green. *417 operations in 2015*

The future critical design aircraft fleet for air cargo operations is expected to evolve to an ATR-42 turboprop aircraft. This aircraft is classified as a FAA ARC B-III, TDG-2 aircraft with an MTOW of 36,800 pounds. This aircraft is expected to exceed 500 annual operations within the next 5 years.

The future critical design fleet for other commercial and general aviation is expected to continue to be a FAA ARC B-II, TDG-2 turbojet airplane through the next 5 years. In the long-term the critical aircraft fleet may evolve to larger "100 percent of fleet" aircraft category, which may justify FAA ARC C-II design standards. Occasional larger ARC C-III or D-III aircraft may still utilize MOT. At this time no change to the regular-use general aviation fleet mix is expected.

Annual Instrument Approaches

Annual instrument approaches (AIAs) are defined as an approach to an airport conducted in actual instrument meteorological conditions. For purposes of this definition, an approach initiated when the observed visibility is less than 3 miles or the cloud ceiling[5] is less than the decision altitude over the final approach fix (3,400 feet above mean sea level for MOT) is considered an instrument approach. Actual AIA figures for MOT are no longer tracked by the local Air Traffic Control Tower but are a required element to an FAA forecast.

According to FAA Traffic Flow Management System Data, total Instrument Flight Rules (IFR) arrivals to MOT in CY 2014 was 8,477 operations. This is 74.6% of all tower-recorded arrivals and is expected to remain constant. Local weather conditions are then reviewed. A total of 15% of the hourly weather observations are in conditions requiring an actual instrument approach to be initiated.

[5] Cloud ceiling for counting an instrument approach is based on the decision altitude for the airport's approaches (e.g. 3,400' AMSL for the 'FONAD' Fix on the MOT ILS RWY 30 and RNAV RWT 30 Instrument Approach Procedures). This is different than instrument meteorological conditions which is 1000' above ground level.

Table 3-21 – Annual Instrument Approach Forecast

Metric	2014	2019	2024	2034	CAGR
Annual Operations	30,826	27,065	26,293	29,694	*-0.52%*
Itinerant Operations	22,718	19,120	17,941	20,451	*-0.52%*
Itinerant Arrivals	11,359	9,560	8,970	10,225	*-0.52%*
% IFR Itinerant Operations	74.6%				-
IFR Approaches	8,477	7,132	6,692	7,628	*-0.52%*
Instrument Approach Weather	15%				-
Annual Instrument Approaches	**1,272**	**1,070**	**1,004**	**1,144**	***-0.52%***
AIA as % of Itinerant Arrivals	***11.2%***				***0.00%***

Source: National Climatic Data Center, FAA Air Traffic Activity Data System (ATADS), Trillion Aviation Analysis

Total AIAs for MOT are actually forecast to decrease from 1,272 currently to an estimated 1,144 at the end of the planning period.

Peak Activity

Peak periods evaluated include the peak month, design day, and design hour characteristics for passenger enplanements and airport operations. The results of the peak activity forecasts will be used to determine the airport facility requirements. The methodology developed is derived from Airport 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.

Local data used includes these aviation forecasts, FAA Air Traffic Activity Data System (ATADS), as well as MOT monthly flight schedules for Calendar Years 2012-2015 and activity reports provided by the airport.

Commercial Airlines

PEAK MONTH

The peak month of passenger airline activity was determined by reviewing the prior three years of monthly passenger enplanement figures for the airport. This method evaluates historic patterns of passenger activity to identify the peak month. The peak month was determined to be December 2014 with 9.29% of the annual enplanements for Calendar Year 2014, which is consistent with other calendar years reviewed. Note that passenger peak in December was driven by Allegiant Airlines traffic and their use of relatively larger 166-seat MD-83 jets.

The peak month of commercial airport operations was determined by reviewing the prior three years of commercial monthly airport operation figures from the Air Traffic Control Tower. This method evaluates historic patterns of airport operations activity to identify the peak month. The peak month was determined to be October 2014 with 9.09% of operations.

Table 3-22 – Peak Month Commercial Airline Activity Forecast

Metric	2014	2019	2024	2034
Annual Enplanements	220,522	192,253	201,574	289,769
Peak Month Enplanements (9.29%)	20,486	17,860	18,726	26,920
Annual Passenger Airline Operations	7,655	5,804	4,720	7,300
Peak Month Operations (9.09%)	696	528	438	664

Source: Trillion Aviation Analysis, Minot International Airport Activity Reports, Control Tower Data and Innovata (via Diio)

DESIGN DAY

The average peak weekday during the peak month is considered the design day. Design day activity is determined by evaluating actual flight schedules rather than using a pure average or an individual daily peak. Reviewing the average day during the peak month allows for planning for a peaking period rather than a single event which may cause overestimating. Peak days occur on weekdays for the sample periods at MOT.

To estimate design day passenger volume, scheduled passenger departing seat schedules were analyzed. For the peak enplaned passenger month (December 2014), there were 25,219 departing seats scheduled on passenger airlines during the month. The average week during this peak month had 5,820 departing seats. The peak day during this month was on Mondays, typically with 1,105 departing seats, when Allegiant Airlines schedules two 166-seat MD-83 jet departures. The peak design day is calculated at 18.99% of the average week (1,105/5,820).

For the peak operations period, both total commercial operations and scheduled passenger flight schedules were analyzed. For commercial activity, the peak day was 42, for a design day percentage of 17.95%. When analyzing passenger airline schedules, the average weekly departure count during this month was 78, with a high of 82 and a low of 75. The peak day during the month was again on Mondays, with 13 scheduled passenger airline departures. The result is that based upon scheduled passenger operations the peak design day would be 16.67% of the average week. The enplanements and operations forecast for the design day is summarized below.

Table 3-23 – Design Day Commercial Airline Activity Forecast

Metric	2014	2019	2024	2034
Peak Month Enplanements	20,486	17,860	18,726	26,920
Avg. Week Peak Month Enplanements	4,728	4,122	4,322	6,213
Design Day (18.99%) Enplanements	898	783	821	1,180
Peak Month Operations	696	528	438	664
Avg. Week Peak Month Operations	161	122	101	153
Design Day (17.95%) Operations	29	22	18	27

Source: Trillion Aviation Analysis, Minot International Airport Activity Reports, Control Tower Data

DESIGN HOUR

The design hour is based on the flight schedules during a design day. Using the terminal planning guidance from ACRP Report 25, peak hour assumes passengers arrive to the airport 60 minutes prior to departure and remain at the airport up to 60 minutes after arrival. The December 2014 flight schedule was used to review a rolling peak in 10 minute intervals.

To estimate design hour enplaned passengers, departing seats will be analyzed. MOT's scheduled passenger departures are very "peakish", with the majority of the departures taking place during the early morning or evening hours. The early morning is primarily driven by network airlines "originator" flights (although Allegiant has one flight), with the majority of evening activity on larger Allegiant Airlines jets.

As noted earlier, during peak days (Mondays), 1,105 departing seats were scheduled from MOT. Of this, 333 departing seats or 30.14% take place during the 1 hour and 35-minute window from 6:15 to 7:35 am where four flights depart. Likewise, during the evening 2-plus hour window, from 6:13 to 8:27 pm, there are 382 departing seats scheduled, or 34.57%. This 34.57% will be used as the design hour estimate for enplaned passengers.

To estimate design hour deplaned passengers, scheduled passenger arriving seats will be analyzed. While arriving seats are in general more spread out during the day, there is a peak window during which two large (166-seat) Allegiant Airlines jets arrive within a 1 hour and 30-minute block. Of the 967 arriving seats during the peak Mondays, 408 arrive during this window from 6:17 to 7:47 pm. Hence, 42.19% is calculated as the design hour percentage to estimate deplaned passengers.

Scheduled passenger operations are much more spread out than is seat activity. Scheduled passenger departures peak at 13 daily departures. The peak time period for departures is during the 6:00 to 7:35 am window. During this time period, there are 4 daily departures or 30.77% of daily passenger departures.

An analysis of commercial operations shows that there are 12 operations during the peak time period consistent with ACRP Report 25 guidelines, which is also 30.77% of design day operations. The passenger and operations forecast for the design hour are summarized in the following table.

Table 3-24 – Design Hour Commercial Activity

Metric	2014	2019	2024	2034
Peak Month Design Day Enplanements	898	783	821	1,180
Design Hour Enplanements (34.57%)	310	271	284	408
Design Hour Deplanements (42.19%)	379	330	346	498
Design Day Operations	29	22	18	27
Design Hour Operations (30.77%)	9	7	6	9

Source: Trillion Aviation Analysis

Design hour passenger activity determinations are especially important for terminal space planning. This will be evaluated further in the Facility Requirements chapter.

General Aviation (GA) Peaking Tendencies

PEAK MONTH

The peak month of general aviation operations was determined by reviewing the prior three years of monthly airport operations figures from the Minot Airport Traffic Control Tower. This method evaluates historic patterns of airport operations activity to identify the peak month. The peak month was determined to be August 2014 with 10.7% of the annual general aviation operations for calendar year 2014.

Table 3-25 – Peak Month GA Operations Forecast

Metric	2014	2019	2024	2034
Annual	17,886	16,370	16,894	18,025
Peak Month (10.7%)	1,914	1,752	1,808	1,929

Source: 2015 FAA TAF, MOT Airport Traffic Control Tower records and Trillion Aviation Analysis

DESIGN DAY

Using the August 2014 Air Traffic Control Tower peak data in conjunction with the FAA TAF, the top 10 peak days consist of an average of 92 daily operations. The average of the top 10 days in the peak month will be considered the design day. This consists of 4.82% of the monthly operations.

Table 3-26 – Design Day GA Operations Forecast

Metric	2014	2019	2024	2034
Peak Month	1,914	1,752	1,808	1,929
Design Day (4.82%)	92	84	87	93

Source: 2015 FAA TAF, MOT Airport Traffic Control Tower records and Trillion Aviation Analysis

DESIGN HOUR

The design hour is based on the average hourly operations during a design day. Based upon other Upper Midwest airports and analysis of MOT Tower records, it was determined that approximately 20% of total daily activity would be a good estimate. Using the design hour methodology developed, the design hour operations forecast is then developed and identified below.

Table 3-27 – Design Hour GA Operations Forecast

Metric	2014	2019	2024	2034
Design Day	92	84	87	93
Design Hour (20.0%)	18	17	17	19

Source: 2015 FAA TAF, MOT Airport Traffic Control Tower records and Trillion Aviation Analysis

Total Airport Operations

PEAK MONTH

The peak month of total airport operations was determined by reviewing the prior three years of monthly airport operations figures from the Airport Traffic Control Tower. This method evaluates historic patterns of airport operations activity to identify the peak month. The peak month was determined to be August 2014 with 9.27% of the annual operations for calendar year 2014, consistent with the calendar year periods evaluated in this forecast effort. Peak month airport operations forecast based on the three year historic operations peak outlined in the following table.

Table 3-28 – Peak Month Total Operations Forecast

Metric	2014	2019	2024	2034
Annual Operations	30,826	27,065	26,293	29,694
Peak Month (9.27%)	2,857	2,509	2,437	2,753

Source: Trillion Aviation Analysis, MOT Airport Traffic Control Tower records

DESIGN DAY

Using the August 2014 Airport Traffic Control Tower peak data, the top 10 peak days consist of an average of 117 daily operations. The average of the top 10 days in the peak month will be considered the design day. This consists of 4.10% of the monthly operations.

Table 3-29 – Design Day Total Operations Forecast

Metric	2014	2019	2024	2034
Peak Month	2,857	2,509	2,437	2,753
Design Day (4.10%)	117	103	100	113

Source: Trillion Aviation Analysis, MOT Airport Traffic Control Tower records

DESIGN HOUR

The design hour is based on the average hourly operations during a design day. To determine this figure, the average hourly operations were reviewed for the peak month, August 2014.

Table 3-30 – Design Hour Total Operations Forecast

Metric	2014	2019	2024	2029
Design Day	117	103	100	113
Design Hour	20	17	17	19

Source: Trillion Aviation Analysis, MOT Airport Traffic Control Tower records

Forecast Summary

The FAA templates to compare the proposed forecasts to the 2015 FAA Terminal Area Forecast (published January 2016) follow. The Aviation Forecasts were approved by the FAA on January 19, 2017 for use in this master planning effort.

Please note actual total airport operations are greater than what is identified in the following tables. Available MOT Tower data (7am – 10pm) was used as the baseline for all operations forecasts except for passenger commercial operations. Actual airport operations may be up to 15% greater based on IFR flight plan data.

Figure 3-22 – FAA Forecast Approval Letter

U.S. Department
of Transportation
Federal Aviation
Administration

Federal Aviation Administration
Bismarck Airports District Office
2301 University Drive, Building 23B
Bismarck, ND 58504

January 19, 2017

Mr. Rick Feltner, Airport Director
Minot International Airport
305 Airport Road, Suite 216
Minot, ND 58703

Minot International Airport
Minot, North Dakota
Approval of Master Plan Forecast

Dear Mr. Feltner:

The aviation forecast contained in the attached Table 3-32 spreadsheet from the Minot International Airport master plan comparing the airport planning forecast and FAA TAF Forecast dated April 2016 has been approved.

The Federal Aviation Administration concurs with the use of the forecast contained in the above referenced table for the remainder of your current master planning efforts.

If you have any questions, comments or concerns, please contact me at 701-323-7383.

Sincerely,

Scott Brownlee, Community Planner
Dakota-Minnesota Airports District Office
Bismarck Office

cc: NDDOT Aeronautics
KLJ

Table 3-32 - Airport Master Plan Forecast Comparison

Minot International Airport (MOT)
Airport Planning versus FAA TAF Forecast

	Year	Airport Forecast	2016 FAA Terminal Area Forecast (TAF)	AF/TAF % Difference
Passenger Enplanements				
Base Yr.	2014	220,522	220,522	0.0%
Base Yr. + 5 Years	2019	192,253	175,558	9.5%
Base Yr. + 10 Years	2024	201,574	187,866	7.3%
Base Yr. + 15 Years	2029	241,643	198,577	21.7%
Base Yr. + 20 Years	2034	289,769	209,472	38.3%
Compounded Annual Growth Rate (CAGR)		1.4%	-0.3%	
Total Operations				
Base Yr.	2014	30,826	30,966	-0.5%
Base Yr. + 5 Years	2019	27,065	25,353	6.8%
Base Yr. + 10 Years	2024	26,193	24,599	6.5%
Base Yr. + 15 Years	2029	27,577	25,325	8.9%
Base Yr. + 20 Years	2034	29,694	26,073	13.9%
Compounded Annual Growth Rate (CAGR)		-0.2%	-0.9%	
Based Aircraft				
Base Yr.	2014	107	121	-11.6%
Base Yr. + 5 Years	2019	128	137	-6.6%
Base Yr. + 10 Years	2024	144	155	-7.1%
Base Yr. + 15 Years	2029	160	175	-8.6%
Base Yr. + 20 Years	2034	176	195	-9.7%
Compounded Annual Growth Rate (CAGR)		2.5%	2.4%	

Table 3-31 – Airport Master Plan Forecast Summary

Minot International Airport: Master Plan Forecast

						CAGR*			
	2014	2019	2024	2029	2034	2019	2024	2029	2034
Passenger Enplanements									
Air Carrier	128,462	118,256	201,574	241,643	289,769	-1.6%	4.6%	4.3%	4.2%
Commuter	92,060	73,997	0	0	0	-4.3%	-	-	-
Total	220,522	192,253	201,574	241,643	289,769	-2.7%	-0.9%	0.6%	1.4%
Operations									
Itinerant									
Air Carrier	3,147	4,304	4,720	5,658	7,300	6.5%	4.1%	4.0%	4.3%
Commuter	4,508	1,500	0	0	0	-19.8%	-	-	-
Air Cargo	2,712	2,595	2,483	2,378	2,273	-0.9%	-0.9%	-0.9%	-0.9%
Air Taxi	777	500	300	300	300	-8.4%	-9.1%	-6.1%	-4.6%
Total Commercial	11,144	8,899	7,503	8,336	9,873	-4.4%	-3.9%	-1.9%	-0.6%
General Aviation	11,096	9,743	9,860	9,979	10,100	-2.6%	-1.2%	-0.7%	-0.5%
Military	478	478	478	478	478	0.0%	0.0%	0.0%	0.0%
Total Itinerant	22,718	19,120	17,841	18,793	20,451	-3.4%	-2.4%	-1.3%	-0.5%
Local									
General Aviation	6,790	6,627	7,034	7,466	7,925	-0.5%	0.4%	0.6%	0.8%
Military	1,318	1,318	1,318	1,318	1,318	0.0%	0.0%	0.0%	0.0%
Total Local Operations	8,108	7,945	8,352	8,784	9,243	-0.4%	0.3%	0.5%	0.7%
Total Operations	30,826	27,065	26,193	27,577	29,694	-2.6%	-1.6%	-0.7%	-0.2%
Annual Instrument Approaches	1,272	1,070	1,004	1,074	1,144	-3.4%	-2.3%	-1.1%	-0.5%
Peak Hour Operations	20	17	17	18	19	-3.2%	-1.6%	-0.7%	-0.3%
Enplaned Air Freight (Lbs. in 000s)	1,770	1,792	1,815	1,838	1,861	0.2%	0.3%	0.3%	0.3%
Based Aircraft									
Single Engine	95	108	115	120	132	2.6%	1.9%	1.6%	1.7%
Multi-Engine	7	13	18	27	30	13.2%	9.9%	9.5%	7.5%
Turbojet	4	6	9	12	13	8.4%	8.4%	7.5%	6.1%
Helicopter	1	1	1	1	1	0.0%	0.0%	0.0%	0.0%
Other	0	0	0	0	0	0.0%	0.0%	0.0%	0.0%
Total	107	128	144	160	176	3.6%	3.0%	2.7%	2.5%
Operational Factors									
Average Aircraft Size									
Air Carrier	97	90	98	99	100	-1.3%	0.2%	0.9%	0.2%
Commuter	50	50	-	-	-	0.0%	-	-	-
Total	70	66	98	99	100	-1.2%	3.4%	4.1%	1.8%
Enplaned Load Factor									
Air Carrier	84.5%	83.5%	85.3%	85.2%	85.0%	-0.2%	0.1%	0.2%	0.0%
Commuter	80.9%	80.0%	-	-	-	-0.2%	-	-	-
Total	81.6%	82.9%	85.3%	85.2%	85.0%	0.3%	0.4%	0.3%	0.2%
GA operations per based aircraft	104	76	68	62	57	-6.0%	-4.1%	-2.0%	-2.9%

Table 3-32 – Airport Master Plan Forecast Comparison

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