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Capital Region International Airport Master Plan





Chapter 4

Aviation Activity Forecast

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4 Aviation Activity Forecast

4.1 Introduction

This chapter presents 20-year forecasts of expected aviation activity at the Capital Region International Airport (LAN or the Airport). These forecasts are used for evaluating the capability of the existing facilities to meet future demand. Aviation activity forecasting is an analytical and subjective process that provides the best estimates of order of magnitude traffic levels expected in the future. Unexpected changes in future local economic conditions, the dynamics of the commercial and general aviation industry, as well as economic and political changes within both the service area and the nation all contribute to the subjective nature of the forecasts developed in this chapter. Future facility improvements should be implemented as demand warrants rather than at set future values associated with time frames. This will allow the CRAA to respond to changes in demand, either higher or lower than the forecast, regardless of the year in which those changes happen.

This chapter will discuss projected activity levels for various key planning components (passenger enplanements, operations, and cargo) expected within the 20-year planning period from 2024 to 2043, as well as the methodology behind the forecast analysis. The forecast analysis concludes with an activity demand projection that is used to develop the airport facility requirements to meet future needs. The forecast will be presented in five- and ten-year increments beginning with the base year of 2023 outward to 2028, 2033, 2038, and 2043. To properly plan for the future development needs of the Airport, an understanding of the historical and potential for growth of passenger and operational (passenger, general aviation, and military) activity was carefully examined.

A key consideration in the development of aviation forecasts is how they compare with the FAA's Terminal Area Forecast (TAF). The TAF is an important planning tool generated and used by the FAA to meet its budget and planning needs and is provided as reference information to state and local entities, the aviation industry, and the public. Generally, the sponsor's forecast should be consistent with the TAF, meaning that the 5-year forecast should be within 10.0 percent of the TAF, and a 10-year forecast should be within 15.0 percent of the TAF. If these thresholds are exceeded, a review by FAA Airport Planning and Programming headquarters is typically necessary. It is important to understand that the FAA must approve the sponsor's forecasts before they can be used to prepare facility requirements in a master plan or before going forward with an environmental document requiring a forecast.

4.1.1 LAN at a National Level

At a national level, the National Plan of Integrated Airport Systems (NPIAS) classifies LAN as a non-hub primary commercial service airport, which means LAN has more than 10,000 annual enplanements, but accounts for less than 0.05 percent of all commercial passenger enplanements nationally. LAN also facilitates a significant amount of cargo and is Central Michigan's only United States (U.S.) Port of Entry, meaning it is not only ideal for domestic service but can also accommodate international passengers and cargo.

4.1.2 LAN at a State and Local Level

LAN is owned and operated by the Capital Region Airport Authority and is located in the middle of the state of Michigan. Not only does LAN provide domestic and international travel to its local community, but the airport plays an essential role in the transport of automotive and other crucial industry goods manufactured in the area.

4.1.3 Forecast Framework

The baseline year for this forecast is the LAN Fiscal Year (FY) 2023. This forecast document defines a FY as the period between July 1st of a year and June 30th of the following year. For example, FY 2023 is defined as the period between July 1st, 2022, through June 30th, 2023. Data results from these forecasts are compared to the Federal Fiscal Year (FFY) 2024 FAA TAF, which was published January 2024. The FFY is defined as the period from October 1st of a year and September 30th of the following year. The most current TAF provides projections from FFY 2023 through FFY 2050¹. The forecasts in this report provide data in FY format, except where otherwise identified.

4.2 Factors Affecting Aviation Demand

Aviation activity forecasts are generally influenced by a variety of qualitative and quantitative factors within the airport service area. These factors frequently include social and economic values and trends, as well as the cost of operating and utilizing air service at LAN, and the correlation that each of these factors has had historically with the ebbs and flows of aviation activity at LAN.

4.2.1 Local Socioeconomic Trends

Potential for growth in commercial and general aviation operations can often be quantified when compared with relevant local, state, and national socioeconomic indicator values and trends. For example, as regional manufacturing expands, so does employment associated with the growth in industry and the attraction of supporting commercial services. Similarly, establishing headquarters, national businesses, healthcare, and/or educational facilities can

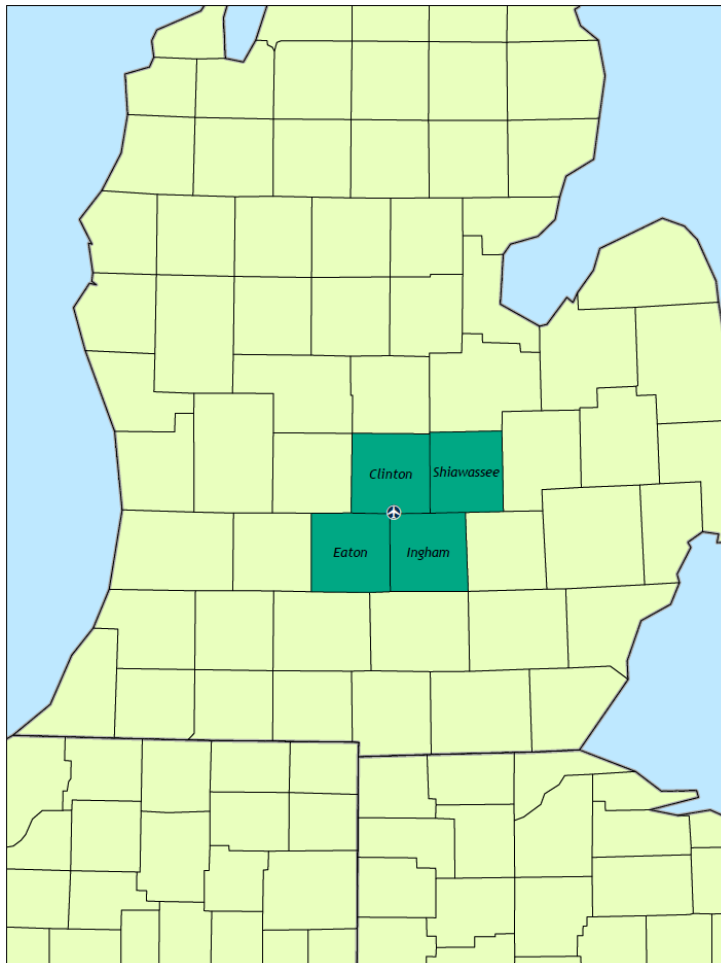
¹ Terminal Area Forecast (TAF). Terminal Area Forecast (TAF) | Federal Aviation Administration. (n.d.). https://www.faa.gov/data_research/aviation/taf

further drive the growth of population, jobs, and employment, and raise the associated income of the market area. The presence of business and industry provides the baseline for air service with growth in population, employment, income, and manufactured goods all potentially leading to expanding air commerce.

The 2023 Woods and Poole Economics, Inc. (W&P), economic and demographic data sets provide forecasted information on population, employment, personal income, per capita personal income (PCPI) and other socioeconomic factors within the airport's service area that for purposes of this analysis has been defined as the Lansing Metropolitan Statistical Area (MSA) that includes the four immediate counties within the proximity to the airport and the City of Lansing. These four counties include: Eaton, Clinton, Ingham, and Shiawassee counties.

Figure 4-1 illustrates the Lansing MSA location within the state of Michigan.

Figure 4-1
Map of the Lansing MSA



Source: RS&H, 2023

4.2.1.1 Population

Lansing is the state capital of Michigan and ranks fifth largest city in the state by population. It is also home to Michigan State University which has a total enrollment of a little more than 50,000 students. The population of Lansing has fluctuated throughout history with larger increases associated with the designation of Lansing as the state capital city and by becoming a center for automobile manufacturing.

Forecast annual population growth rates for the Lansing MSA are steady with a compounded annual growth rate (CAGR) of 0.2 percent from 2023-2043, which is higher than the overall growth rate expected for the state of Michigan that is forecasted at 0.04 percent. The Lansing MSA population is expected to grow at a slower rate than the rest of the U.S. over the 20-year planning period with a CAGR of 0.6 percent. **Table 4-1** depicts the forecasted population for the Lansing MSA, the remainder of the state, Michigan in total, and the whole U.S.

Table 4-1
Forecast – Population

Calendar Year	Population Forecast			
	Lansing MSA	Rest of Michigan	Michigan Total	U.S.
2023	542,366	9,505,424	10,047,790	335,547,000
2028	549,425	9,556,025	10,105,450	346,778,000
2033	555,576	9,584,104	10,139,680	357,682,300
2038	560,647	9,585,423	10,146,070	368,056,800
2043	564,882	9,566,708	10,131,590	378,098,400
CAGR 2023-2043	0.20%	0.03%	0.04%	0.60%

Source: Woods & Poole Economics, Inc.; RS&H Analysis, 2023

4.2.1.2 Employment

Historically, the trades with the highest employment within the Lansing MSA have been manufacturing, retail trade, and state and local government. These trades are still currently near the top of highest employment but there has been an increase in the fields of health care, finance, and insurance, to name a few. As time goes on and industries change, so will the top fields of employment. The largest employers in the Lansing MSA are the State of Michigan, Michigan State University and Sparrow Health System, followed by General Motors, Liberty National Life and Auto-Owners Insurance.²

² Lansing, Michigan Population 2023. (n.d.). <https://worldpopulationreview.com/us-cities/lansing-mi-population>

The employment forecast for the Lansing MSA between CY³ 2023 and CY 2043 is on par with the rest of Michigan with an CAGR of 0.6 percent. However, the growth rate for the Lansing MSA is lower than that of the U.S. which has an CAGR of 1.2 percent. This indicates that although the Lansing MSA is expected to experience growth in the job market, it may not grow as fast as other areas in the U.S.

The projected job market growth rate in the Lansing MSA likely results from a combination of factors including the diversification of the local economy, an increase in infrastructure development, and the rise of new industries such as e-commerce. It is important to note that these growth rates are only projections and may be subject to changes in economic conditions or other factors such as advances in technology and automation. **Table 4-2** depicts the forecasted employment totals for the Lansing MSA, remainder of the State, Michigan as a whole, and for the entire U.S.

Table 4-2
Forecast – Employment

Calendar Year	Employment Forecast			
	Lansing MSA	Rest of Michigan	Michigan Total	U.S.
2023	304,981	5,536,807	5,841,788	211,873,700
2028	318,190	5,776,253	6,094,443	226,839,600
2033	326,924	5,936,731	6,263,655	240,399,800
2038	334,332	6,071,694	6,406,026	253,729,500
2043	340,550	6,182,274	6,522,824	266,858,200
CAGR 2023-2043	0.6%	0.6%	0.6%	1.2%

Source: Woods & Poole Economics, Inc.; RS&H Analysis, 2023

4.2.1.3 Personal Income

During the planning period, the personal income CAGR for the Lansing MSA is projected to be 1.6 percent. This is a positive indicator, as it suggests that individuals in the Lansing MSA are likely to experience an increase in their personal income over the next two-decade period. However, this growth rate is slightly lower than the national average of 2.1 percent.

Meanwhile, the rest of Michigan is forecast to have a CAGR of 1.5 percent, which is lower than both the Lansing MSA and the national average. This could be due to fluctuations in the economic outlook for some of the industries located in Michigan. **Table 4-3** depicts the forecast

³ Calendar Year

of total personal income rates for the Lansing MSA, the remainder of the State, Michigan as a whole, and for the entire U.S.

Table 4-3
Forecast – Personal Income

Calendar Year	Personal Income (000's of 2012 Dollars)			
	Lansing MSA	Rest of Michigan	Michigan Total	U.S.
2023	\$22,875,574	\$458,657,526	\$481,533,100	\$18,563,689,000
2028	\$24,951,224	\$497,790,876	\$522,742,100	\$20,757,864,000
2033	\$27,121,339	\$536,663,561	\$563,784,900	\$23,112,464,000
2038	\$29,318,698	\$575,226,902	\$604,545,600	\$25,609,579,000
2043	\$31,523,262	\$613,022,338	\$644,545,600	\$28,247,361,000
CAGR 2023-2043	1.6%	1.5%	1.5%	2.1%

Source: Woods & Poole Economics, Inc.; RS&H Analysis, 2023

4.2.1.4 Per Capita Personal Income

Between the years CY 2023 and CY 2043, the per-capita personal income CAGR for the Lansing MSA is expected to be 1.4 percent, which is on par with the projected growth rate for the rest of Michigan and Michigan as a whole. However, the growth rate for the Lansing MSA is slightly lower than that of the U.S., which is forecasted to be at 1.5 percent. As stated above in **Section 4.2.1.3 Personal Income**, this could be due to fluctuations in the major industries located in the state of Michigan. Nevertheless, the projected growth rates for per-capita personal income in the Lansing MSA and the state as a whole indicate a positive trend that could translate to higher standards of living for residents in Michigan over the next two decades.

It is worth noting that changes in economic conditions, government policies, and other factors could impact the growth rates for per-capita personal income in the Lansing MSA, the rest of Michigan, and the U.S. as a whole. Nonetheless, the projected growth rates provide valuable insights into the potential trajectory of income growth in these regions. **Table 4-4** depicts the forecasted per-capita income for the Lansing MSA, remainder of the State, Michigan as a whole, and for the entire U.S.

Table 4-4

Forecast – Per Capita Personal Income

Calendar Year	Per Capita Personal Income (in 2012 dollars)			
	Lansing MSA	Rest of Michigan	Michigan Total	U.S.
2023	\$42,177	\$48,252	\$47,924	\$55,324
2028	\$45,413	\$52,092	\$51,729	\$59,859
2033	\$48,817	\$55,995	\$55,602	\$64,617
2038	\$52,294	\$60,011	\$59,584	\$69,581
2043	\$55,805	\$64,079	\$63,617	\$74,709
CAGR 2023-2043	1.4%	1.4%	1.4%	1.5%

Source: Woods & Poole Economics, Inc.; RS&H Analysis, 2023

4.2.2 Oil and Jet Fuel Prices

The association between jet fuel prices and aviation demand is complex and can be influenced by a range of economic, political, and environmental factors. Jet fuel prices are a critical factor in the aviation industry as they have a significant impact on airlines' operating costs and profitability. The demand for aviation fuel is driven by the level of air travel and the size of airline fleets. In general, jet fuel prices tend to fluctuate in response to global oil prices, geopolitical tensions, and market supply and demand conditions. At the start of the SARS-CoV-2 Novel Corona Virus Pandemic (COVID-19 Pandemic) in April 2020, when demand was at a record low, fuel prices reached a low price of \$1.03 per gallon.

However, the Russia-Ukraine conflict caused prices to rise dramatically, reaching its peak in CY 2022. Oil prices have fallen since then but remain elevated. When fuel prices are high, airlines may reduce their capacity or raise ticket prices to offset the increased costs. Conversely, when fuel prices are low, airlines may expand their operations or offer lower fares to attract more passengers.

Table 4-5 depicts the forecast oil and jet fuel prices during the forecast period.

Table 4-5

Forecast – Fuel and Oil Price

Calendar Year	Comparison of Fuel and Oil Price Projections (2022 Dollars)	
	Crude Oil Prices (Dollars per Barrel) ^(a)	Jet Fuel Prices (Dollars per Gallon)
2023	\$92.00	\$2.71
2028	\$89.00	\$2.50
2033	\$92.00	\$2.48
2038	\$95.00	\$2.37
2043	\$98.00	\$2.29
CAGR 2023-2043	0.3%	-0.8%

Note: (a) Brent Spot Price (rounded).

Source: U.S. Energy Information Administration, 2024; FAA Aerospace Forecast 2023-2043

4.2.3 Average Airfares

After labor, fuel is an airline's second-largest expense. Volatile prices of oil and jet fuel eventually end up affecting the consumer, which in this case comes in the form of increased airfares. Airfare prices are volatile and can change by the minute due to travel demand, available capacity, seasonality, airlines' costs and more. After airfares dropped significantly in CY 2020 due to the COVID-19 Pandemic, demand for travel began rebounding in CY 2023 and there is no indication of subsiding. The increase in travel is a welcome trend for the airline industry which struggled to maintain profits; however, the law of supply and demand ultimately affects the customer as more demand drives higher fuel prices. Around the U.S., airfares have risen recently, particularly over the past 18 months (CY 2022-23). Both the rising costs of aviation fuel and airline debt following the COVID-19 Pandemic shutdown have impacted average ticket prices and have caused them to steadily increase since the start of CY 2022.

Domestic airfare prices are expected to increase at a CAGR of 1.4 percent as depicted in **Table 4-6**.

Table 4-6
Forecast – Domestic Airfares

Calendar Year	Projected Domestic Fares (2010 Dollars)		
	FAA Adjusted Yield (cents) ^(a)	FAA Average Trip Length ^(b)	FAA Fare (dollars) ^(c)
FAA Baseline Scenario			
2023	15.66	937.0	\$146.73
2028	16.73	949.6	\$158.87
2033	17.63	962.2	\$169.64
2038	18.54	975.0	\$180.77
2043	19.57	988.0	\$193.35
CAGR 2023-2043	1.1%	0.3%	1.4%

Notes: (a) FAA forecast of domestic aviation activity; yield (extrapolated). (b) FAA forecast of domestic aviation activity; average trip length in miles (extrapolated). (c) FAA yield multiplied by average trip length and divided by 100.

Source: FAA Forecast 2023-2043; RS&H Analysis, 2023

4.3 Historical Aviation Activity Review

This section provides general information of the historical aviation activity levels at Capital Region International Airport including passenger enplanement activity, aircraft operations, and cargo activity. It will identify important trends and events that are likely to impact future air service demand at LAN.

4.3.1 Historical Passenger Enplanements

Since FY 2014, historical passenger activity at LAN has produced stages of growth as well as a few periods of decline. The Lansing MSA is home to the State Capital of Michigan and Michigan State University with several bodies of water nearby to attract visitors. LAN opened as an official international Port of Entry in 2009 which provided Customs and Border Protection services and a Federal Inspection Facility to accommodate both passengers and cargo in the local community. **Table 4-7** and **Figure 4-2** depict historical passenger activity at LAN back to FY 2014. Passenger traffic has been declining since FY 2014 as carriers reduced frequencies and stopped flying to certain destinations mainly caused by competition from nearby airports, pilot shortages and the COVID-19 pandemic.

Table 4-7

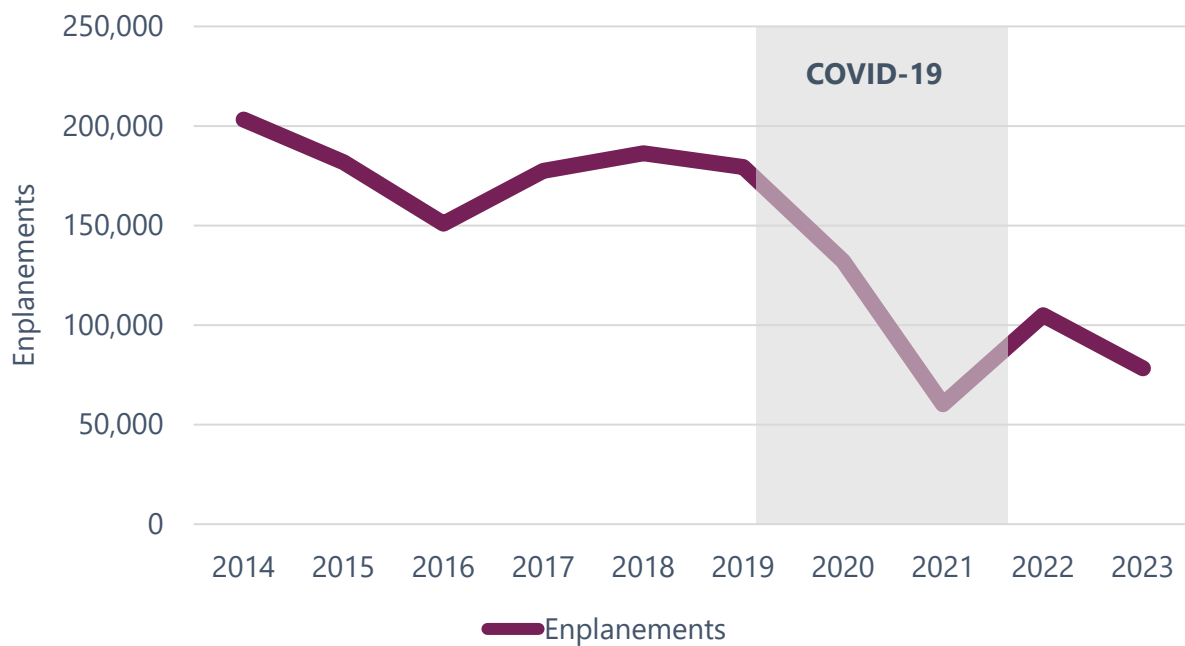
LAN Historical Enplanements

Fiscal Year	Historical Enplanements	Year-to-Year Increase/ Decrease
2014	203,218	
2015	181,741	-11%
2016	150,884	-17%
2017	177,503	18%
2018	186,241	5%
2019	179,412	-4%
2020	132,076	-26%
2021	60,230	-54%
2022	105,011	74%
2023	101,386	-3%
CAGR 2014-2023	-7.4%	

Source: Airport Records, 2023

Figure 4-2

LAN Historical Enplanements

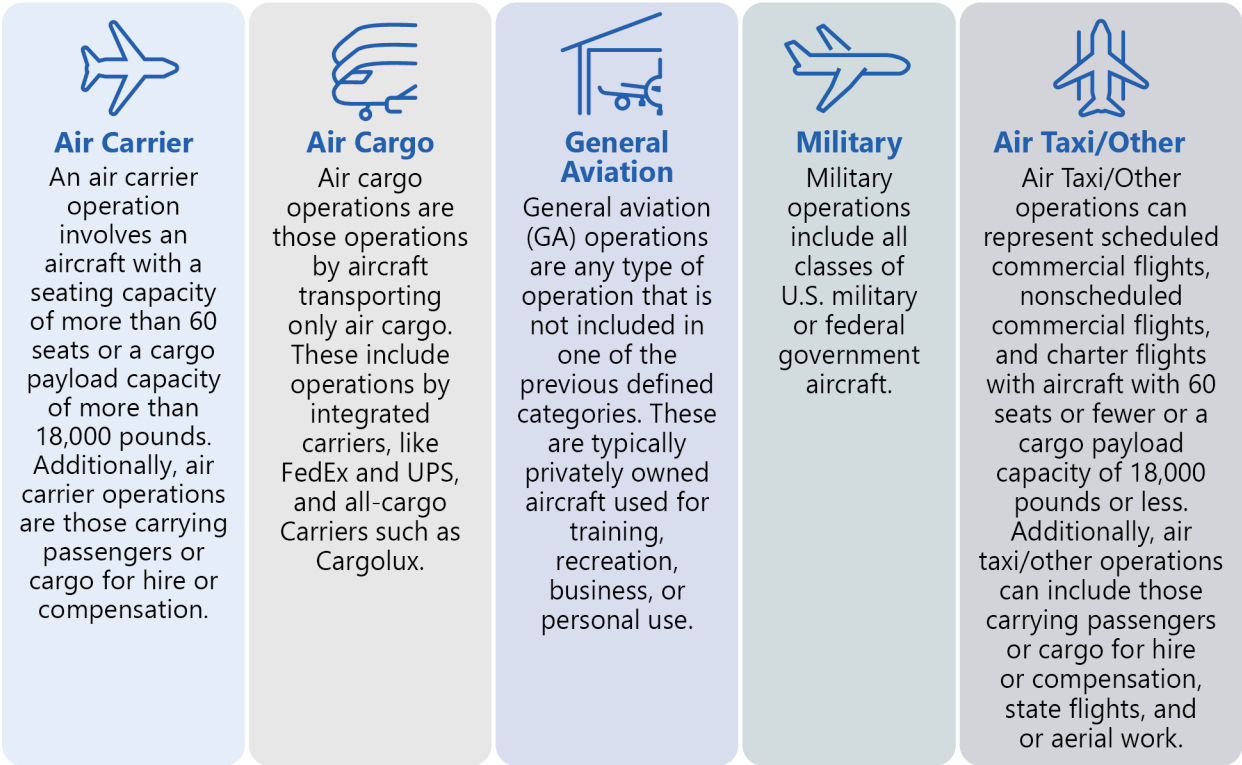


Source: Airport Records, 2023

4.3.2 Historical Aircraft Operations

An aircraft operation is defined as either a takeoff or a landing. Therefore, the typical flight consists of a landing and a takeoff for a total of two operations. The FAA records annual aircraft operations in the five categories shown in **Figure 4-3**.

Figure 4-3
Aircraft Operation Categories



Source: FAA OPSNET, 2023

LAN grew from an air mail/cargo airport in 1928, to a passenger service airport in 1929 to a flight instruction airport in 1934 with demand continuing to increase for other aviation activities. Once demand for air service peaked in the 1950's and 60's, passenger operations began to increase. In the early years of the new millennium airlines began to terminate service to some markets or suspend operations at LAN altogether which was likely driven by several economic factors (e.g., rising fuel prices, competition from nearby airports, decreasing demand, and/or economic recession) consequently reducing aircraft operations. The decreasing operations trend continued before flattening out in recent years where the average number of aircraft operations was near 32,000.

As shown in **Table 4-8** and **Figure 4-4** total aircraft operations at LAN have decreased at a CAGR of 2.1 percent from FY 2014 and FY 2023. Operations have natural fluctuations based on

current aviation trends such as airlines entering/leaving markets or seat up-gauging to accommodate more seats with less frequency. The COVID-19 pandemic is an example of how unanticipated events can have major impacts on the aviation industry and create ebbs and flows in commercial activity.

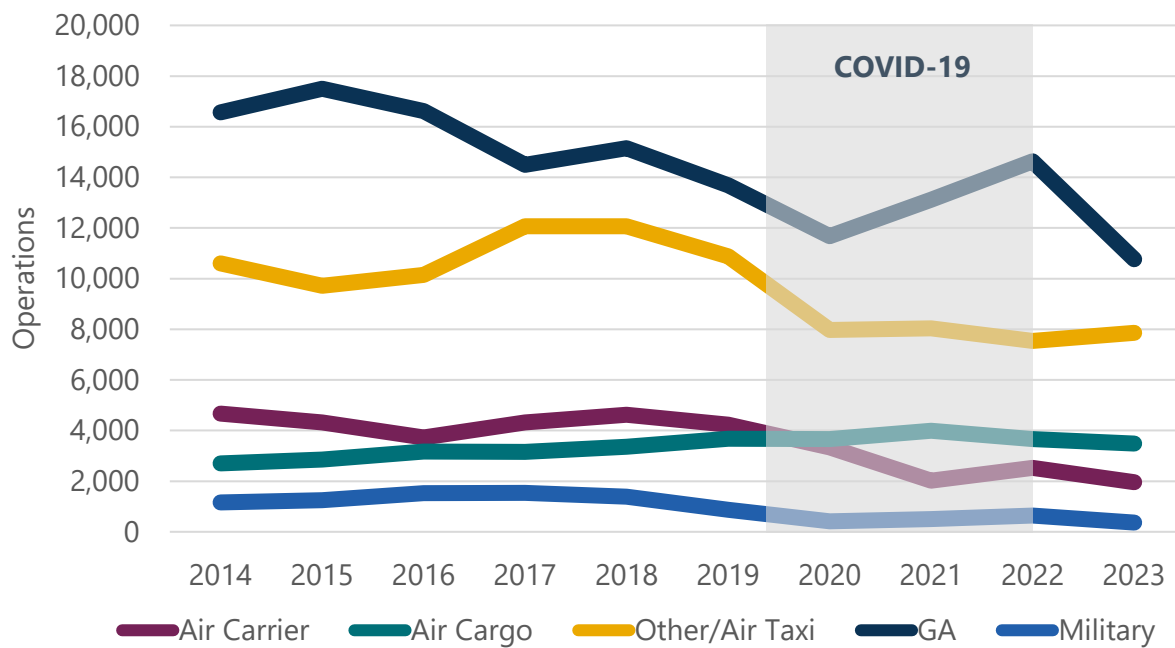
Table 4-8
LAN Historical Operations

Fiscal Year	Itinerant Operations					Local Operations		Total
	Air Carrier	Air Cargo	Other/Air Taxi ¹	GA	Military	GA	Military	
2014	4,668	2,702	10,598	12,734	1,107	3,831	54	35,694
2015	4,325	2,850	9,715	12,304	1,206	5,194	44	35,638
2016	3,724	3,176	10,146	12,098	1,471	4,522	56	35,193
2017	4,325	3,160	12,067	12,160	1,485	2,336	53	35,586
2018	4,626	3,353	12,061	12,293	1,341	2,859	52	36,585
2019	4,227	3,671	10,881	11,329	853	2,354	21	33,336
2020	3,330	3,659	7,966	9,144	387	2,531	24	27,041
2021	2,016	3,991	8,041	10,229	469	2,886	37	27,669
2022	2,522	3,657	7,539	11,525	629	3,113	16	29,001
2023	2,902	3,480	6,931	11,337	523	4,007	10	29,448
CAGR								
2014-2023	-4.2%	2.9%	-4.6%	-1.3%	-8.0%	0.5%	-17.1%	-2.1%

Source: Airport Records; OPSNET, 2023

Note: 1) All cargo operations defined by the FAA as air taxi are listed in the air cargo column.

Figure 4-4
LAN Historical Operations



Source: Airport Records; OPSNET, 2023

4.3.3 Historical Air Cargo

LAN plays a significant role in central Michigan moving cargo both domestically and internationally, recording over 62 million pounds in FY 2022. Most of the air cargo flowing in and out of LAN is transported by United Parcel Service (UPS) which presently operates most flights on McDonnell Douglas MD-11 and Airbus A300-600F aircraft⁴. These aircraft can carry large amounts of cargo per operation. There are other smaller cargo carriers that operate from LAN including Martinaire, Freight Runners Express, Ameriflight among others who fly the Embraer EMB-120, Cessna 208B Super Cargomaster, Swearingen 227 Metroliner, Beechcraft 1900, and the Beechcraft 99, among others.

Between FY 2014 and FY 2022, cargo operations and total air cargo tonnage at LAN grew at a CAGR of approximately 4.0 percent. The highest growth rates at LAN for cargo were experienced during the COVID-19 pandemic with a CAGR of 9.1 percent between FY 2020 and FY 2021 for cargo operations and 11.7 percent in cargo tonnage. This trend was not uncommon at airports across the globe as people were encouraged to remain home, and dependence on cargo shipping increased.

⁴ UPS has begun the retirement of their McDonnell Douglas MD-11 fleet in 2023 and is replacing them with the Boeing 767-300. LAN UPS McDonnell Douglas MD-11 operations are expected to fully transition to Boeing 767-300 aircraft by 4Q 2024.

As seen in **Table 4-9** and **Table 4-10** UPS and Ameriflight saw the highest growth in both operations and cargo tonnage between FY 2014 and FY 2022.

Table 4-9

LAN Historical Cargo Operations

Fiscal Year	Martinaire	UPS	Freight Runners Express	Ameriflight	Other	Total
2014	1,176	305	313	688	220	2,702
2015	1,197	313	311	844	185	2,850
2016	1,159	386	366	902	363	3,176
2017	1,150	597	382	910	121	3,160
2018	1,084	512	510	1,156	91	3,353
2019	1,051	601	571	1,418	30	3,671
2020	1,060	609	606	1,372	12	3,659
2021	1,074	587	608	1,673	49	3,991
2022	1,036	521	107	1,938	55	3,657
CAGR 2014-2022	-1.6%	6.9%	-12.6%	13.8%	-15.9%	3.9%

Source: Airport Records, 2023

Table 4-10

LAN Historical Cargo/Freight (000's lbs.)

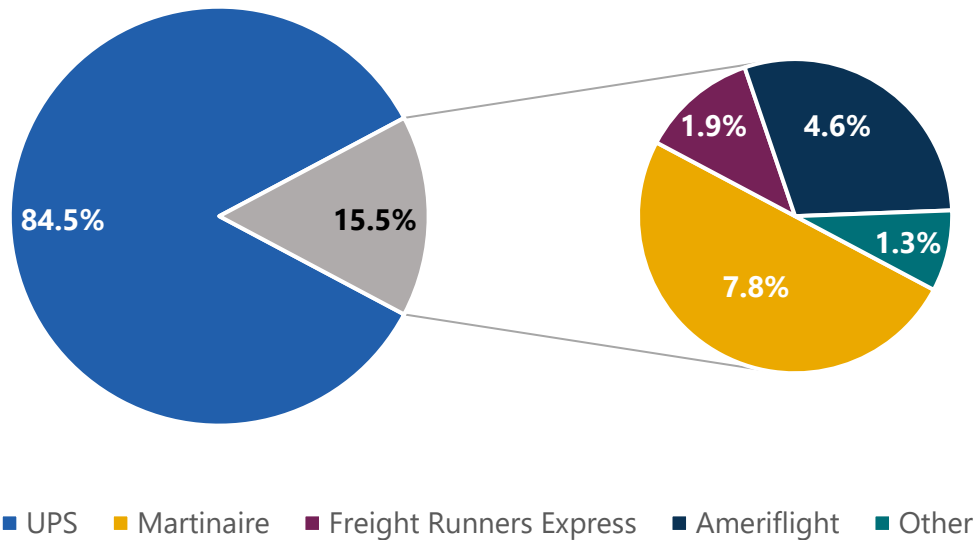
Fiscal Year	Martinaire	UPS	Freight Runners Express	Ameriflight	Other	Total
2014	2,706 lbs.	39,117 lbs.	1,161 lbs.	1,663 lbs.	872 lbs.	45,519 lbs.
2015	2,558 lbs.	39,054 lbs.	1,231 lbs.	1,862 lbs.	2,281 lbs.	46,987 lbs.
2016	2,460 lbs.	38,509 lbs.	1,220 lbs.	1,964 lbs.	2,567 lbs.	46,719 lbs.
2017	2,463 lbs.	41,514 lbs.	1,178 lbs.	2,030 lbs.	202 lbs.	47,387 lbs.
2018	2,169 lbs.	46,088 lbs.	1,050 lbs.	2,340 lbs.	205 lbs.	51,852 lbs.
2019	1,946 lbs.	50,123 lbs.	1,089 lbs.	2,777 lbs.	83 lbs.	56,018 lbs.
2020	1,699 lbs.	52,859 lbs.	1,010 lbs.	2,629 lbs.	21 lbs.	58,219 lbs.
2021	1,945 lbs.	58,316 lbs.	1,164 lbs.	3,426 lbs.	115 lbs.	64,965 lbs.
2022	1,835 lbs.	56,282 lbs.	233 lbs.	4,307 lbs.	148 lbs.	62,806 lbs.
CAGR 2014-2022	-4.7%	4.7%	-18.2%	12.6%	-19.9%	4.1%

Source: Airport Records, 2023

Note: Cargo quantities recorded in thousands of pounds.

As stated previously, UPS transports the majority of cargo through LAN. **Figure 4-5** displays the market share of cargo operators by tonnage between FY 2014 and FY 2022. This is anticipated to continue through the planning period.

Figure 4-5
LAN Cargo Market Share



Source: Airport Records; RS&H, 2023

4.4 Commercial Passenger Forecast

This section presents the assumptions, approach and results of the passenger activity forecasts for LAN for the period between FY 2023 through FY 2043 ("the Forecast Period"). All passenger activity forecast numbers for the airport are shown in FY unless otherwise noted. **Section 4.6** will compare the enplaned passenger forecast to the FAA TAF for FFY 2023.

The following data sources were used in this analysis:

- Historical and projected information on population, employment, and real income for the Lansing MSA from W&P.
- U.S. DOT OD1A domestic Origin & Destination (O&D) database for yield (airline revenue per passenger mile) and distance and historical originating traffic on a market-by market basis.
- U.S. DOT T-100 database to obtain outbound passenger data on a market by-market basis.

- Cirium Diio Mi market data on scheduled passenger operations to determine existing scheduled service and historical non-stop service.
- Economic stakeholder interviews.

4.4.1 The Big Picture

According to Michigan State University's Center for Economic Analysis, the Lansing MSA economy is expected to show continued growth after the COVID-19 pandemic, keeping pace with the U.S. economy.⁵ Employment is expected to grow, with professional and business services, leisure and hospitality, and manufacturing sectors projected to see the highest increases within the Lansing MSA.

In the near-term, employers in the Lansing MSA will likely continue to face labor shortages that have arisen post-COVID-19 pandemic. Inflation continues to strain household budgets at the national level, typically resulting in less disposable income and a lessened demand for leisure travel across the U.S. (and the world) for people who might otherwise choose Michigan as a travel destination. While not expected by most economists in the immediate future, a possible recession could also slow the rate of recovery of the Lansing MSA's businesses and present new economic challenges to LAN's air traffic.

To combat these challenges, the Lansing Economic Area Partnership (LEAP) created training programs to help generate a more dynamic workforce.⁶ These programs include Capital Area Michigan Works, LCC Business and Community Institute, and MSU Executive Development Training Programs that train current and future leaders in the Michigan area to help grow the local economy and attract talent. Training grants are also available to financially assist with these programs. In addition to the training programs, LEAP offers a variety of other programs to assist existing businesses and aspiring entrepreneurs in reaching their full potential. Successful programs would have a positive impact on the local economy.

These initiatives and investments along with economic challenges are considered in the forecast analysis.

4.4.2 Passenger Forecast Assumptions

The passenger forecasts are based on several key assumptions that were developed from information collected from discussions with Airport staff as well as industry knowledge and publications. This section describes the passenger forecast assumptions that were applied in this forecast. More detailed assumptions specific to a particular activity category are described in

⁵ Lansing-East Lansing. Center for Economic Analysis. (n.d.). <https://www.canr.msu.edu/cea/economic-forecast/lansing-east-lansing/>

⁶ Workforce. Lansing Economic Area Partnership. (n.d.). <https://www.purelansing.com/demographics/workforce/>

their respective sections. The following forecast assumptions (separated by category) were used in preparing the passenger forecasts:

General

- No new major economic downturn, such as the one that occurred in the Great Recession (CY 2008-CY 2011). Local, national, and international economies will periodically increase and decrease the pace of growth in accordance with business cycles. However, it is assumed that over the 20-year Forecast Period, the increase and decrease growth periods will offset each other so that the adjusted economic forecasts will be realized.
- The economies which comprise the Lansing MSA will grow in accordance with the W&P demographic and economic projections used for these forecasts.
- No nighttime curfews will take effect in LAN.
- Environmental regulations will not be so extreme as to significantly constrain air transportation.
- The FAA will successfully implement any required changes and improvements for the national airspace system to accommodate the unconstrained forecast of aviation demand.

Inflation

- The U.S. rate of inflation will continue to decline in CY 2024 and CY 2025 as the COVID-19 pandemic manufacturing and supply-chain imbalances begin to equalize and the aggregate supply and demand begin to balance.
- The Consumer Price Index (CPI)⁷ which measures inflation in the Lansing MSA has risen due to increased demand for consumer goods and manufacturing slowdowns related to the COVID-19 pandemic, will continue to follow national trends, and minimally affect the demand for air travel to and from Michigan.
- The U.S. economy will remain robust and despite temporary rising cost of airline tickets, rental cars, fuel, and good and services, the visitor and business travel industry will overcome these challenges.

COVID-19 Pandemic

- North American airlines will continue to lead the industry recovery.
- Expectations of an industry-wide passenger traffic recovery to CY 2019 pre-COVID-19 Pandemic levels are expected in CY 2024⁸.

⁷ Published by the U.S. Department of Labor Statistics

⁸ International Air Transport association (IATA)

- Lansing’s traveler related businesses, which were disproportionately impacted by COVID-19 Pandemic, will continue to recover and hotel occupancy and car rental tax revenue will continue to increase.
- Labor force shortages in the Lansing MSA will continue to recover through FY 2023 and into FY 2024.

Russia-Ukraine Conflict/Israel-Hamas Conflict

- The Russia-Ukraine conflict will not impact the long-term growth of air transport from Michigan to domestic destinations.
- U.S. consumer confidence and economic activity are not significantly impacted by the Russia-Ukraine Conflict and Israel-Hamas Conflict.

4.4.3 Background of Historical LAN Passenger Air Carrier Activity

To help explain the forecast approach, a background of the Airport’s historical passenger air carrier activity was prepared. This section provides context of the historical trends that have occurred at LAN and how they shaped the forecast of commercial passenger aviation activity.

4.4.3.1 LAN Historical Commercial Air Service

Since FY 2010, LAN has maintained consistent service from Delta Air Lines (Delta) mainly to Detroit Metropolitan Wayne County Airport (DTW) and Minneapolis-Saint Paul International Airport (MSP), the latter which was discontinued in FY 2020 prior the COVID Pandemic. American Airlines (American) began serving the Airport in FY 2016 with non-stop capital-to-capital service to Washington, DC, and added two daily departures to Chicago O’Hare International Airport (ORD) in FY 2017. United Airlines (United) was a long-term tenant in LAN with three daily services to ORD. However, United reduced services during the COVID Pandemic and stopped operating at LAN in FY 2022 when it simultaneously decided to cut numerous regional markets due to a reduction in available aircraft parked/stored during the COVID Pandemic and a reported shortage of pilots. In FY 2023, the first Ultra Low-Cost Carrier (ULCC), Avelo Airlines (Avelo), entered the LAN market with two weekly services to Orlando International Airport (MCO). In March 2024, at the time of creating this forecast, Breeze Airways announced⁹ twice-weekly service from LAN to Orlando, FL and Fort Myers, FL beginning in October 2024.

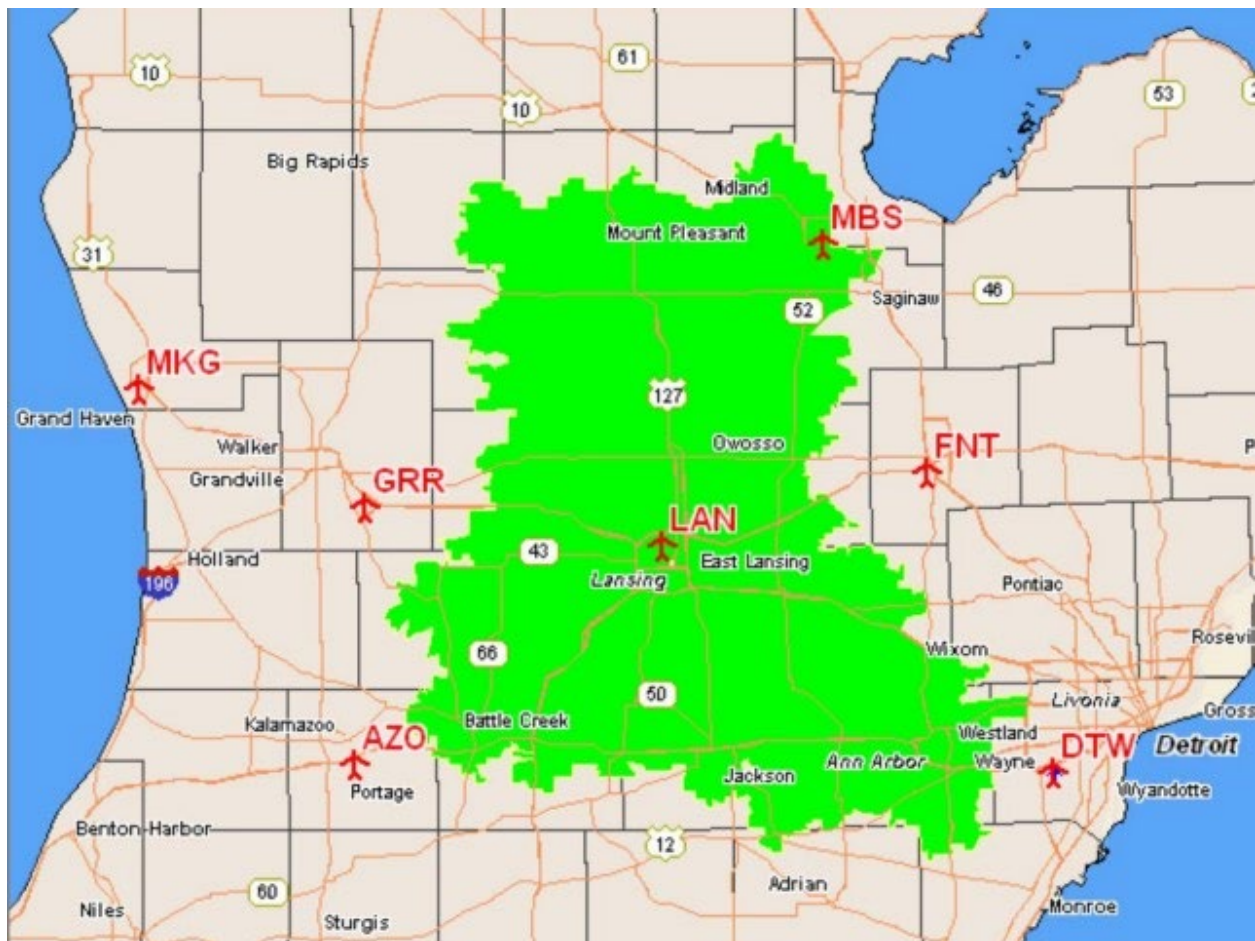
Despite competitive levels of service at the Airport, average fares have remained higher than at other peer airports¹⁰ (Peer Airports) in the central, west, and southeast regions of Michigan (see **Figure 4-6**). As can be seen in **Table 4-11** from FY 2016 through FY 2023, the average fares at

⁹ Fly Lansing, March 26, 2024, Retrieved from: <https://www.flylansing.com/about/news/breeze-airways-land-lansing-new-service-orlando-and-fort-myers-just-79-one-way>

¹⁰ Peer airports include Detroit Metropolitan Wayne County Airport (DTW), Flint Bishop International Airport (FNT), Kalamazoo/Battle Creek International Airport (AZO), MBS International Airport (MBS) and Grand Rapids Gerland R. Ford International Airport (GRR).

LAN were \$204.76, compared to \$168.79 at DTW (21.3% higher) and \$179.16 at Gerald R. Ford International Airport in Grand Rapids (GRR) (12.5% higher). Due to a higher number of frequencies, non-stop available markets, and more choice in airlines, DTW and GRR have historically been the two airports with the highest traffic leakage rates of passengers residing in the Lansing MSA. DTW is served by low-cost carrier (LCC) Southwest Airlines (Southwest), JetBlue Airways (JetBlue), and ULCC's Spirit Airlines (Spirit) and Frontier Airlines (Frontier). GRR is also served by Frontier, Southwest, and ULCC Allegiant Air (Allegiant). These airlines provide many non-stop destinations and competition against legacy network carriers like Delta and American, resulting in a significant reduction in average yields (average fare) at those airports.

Figure 4-6
LAN Peer Airports and Catchment Area



Source: LAN Leakage Study November 2014, Trillion Aviation

Table 4-11

LAN Historical Average Airfare Compared to Surrounding Airports

Year	Average Airfare Cost						% Diff DTW	% Diff GRR
	LAN	DTW	GRR	AZO	FNT	MBS		
2016	\$217.21	\$178.37	\$198.68	\$247.86	\$168.66	\$246.10	22%	9%
2017	\$203.14	\$168.13	\$192.87	\$231.81	\$162.38	\$247.36	21%	5%
2018	\$206.31	\$164.25	\$185.71	\$238.85	\$156.38	\$259.99	26%	10%
2019	\$209.29	\$166.56	\$177.47	\$228.77	\$158.03	\$248.41	26%	15%
2020	\$200.56	\$162.10	\$163.27	\$212.67	\$143.69	\$233.88	24%	19%
2021	\$154.32	\$119.99	\$128.63	\$170.20	\$104.74	\$194.75	29%	17%
2022	\$197.53	\$168.26	\$170.29	\$219.32	\$115.72	\$240.65	17%	14%
2023	\$224.58	\$200.99	\$202.09	\$230.38	\$127.70	\$277.18	12%	10%
Average	\$204.76	\$168.79	\$179.16	\$222.48	\$142.16	\$243.54	21%	13%

Source: Cirium Diio Market Data; RS&H, 2023

Airports leak passengers to other airports due to a variety of factors, but in the case of the Lansing MSA, passenger decisions on where to fly are influenced by a combination of economic and timing flexibility considerations. An air traffic leakage report from April 2023 prepared for LAN¹¹ showed that 64.0 percent of passengers living in the Lansing MSA were driving to DTW (92.6 miles) and 15.0 percent were driving to GRR (54.1 miles) to initiate their flights. These leakage numbers have only been growing historically. A leakage analysis conducted in 2014¹² indicated that DTW was capturing 54.5 percent of passengers from the Lansing MSA and GRR was capturing 8.3 percent. LAN's passenger retention rate from their MSA reduced from approximately 33.0 percent in FY 2014 to approximately 19.0 percent in FY 2023. Despite a high leakage rate to other airports in the region, LAN has consistently maintained industry competitive load factors. In FY 2023, the Airport achieved an average load factor of 76.9 percent, as can be seen in **Table 4-12**.

¹¹ Landrum & Brown, April 2023, LAN Leakage Report, sourced with ArcCorp data.

¹² Trillion Aviation, November 2014, LAN Leakage Study 2014

Table 4-12

LAN Historical Load Factor Compared to Surrounding Airports

Year	Load Factor (%)						% Diff – DTW	% Diff - GRR
	LAN	DTW	GRR	AZO	FNT	MBS		
2016	73	84	85	67	83	72	-13%	-16%
2017	72	84	83	71	82	72	-14%	-15%
2018	76	84	85	69	84	69	-10%	-12%
2019	76	84	82	71	86	79	-10%	-8%
2020	70	77	75	71	76	70	-9%	-7%
2021	58	54	65	52	67	53	7%	-12%
2022	70	79	85	79	85	80	-11%	-21%
2023	77	83	86	80	89	82	-7%	-12%
Average	73	80	81	70	81	72	-7%	-11%

Source: Cirium Diio Market Data; RS&H, 2023

4.4.4 Forecast Methodology

Considering LAN's high passenger leakage values previously presented and the historical fluctuations of passenger volumes, a market share approach is the most applicable approach to forecasting enplaned passenger traffic. The FAA requires that master plan forecasts be analyzed by at least one of three different methodologies. For this technical report, the three FAA-approved methodologies (regression analysis, trend analysis, and market share analysis) were conducted and compared. The regression and trend analyses did not provide statistically significant results, and therefore were not adopted as part of the forecast methodology and approach. See **Forecast Appendix A** - Documentation of Invalid Regressions and **Forecast Appendix B** - Documentation of Invalid Trend Analyses for invalid regression and trend results. The first step for the selected market share methodology began by gathering and analyzing historical enplaned passenger numbers for LAN, and its Peer Airports, from FY 2001 through FY 2023, and calculating each airport's percent share of the cumulative total enplanements for the region by fiscal year¹³.

Historically, LAN had a growing passenger market share trend among its Peer Airports, increasing from 2.5 percent to 3.5 percent between FY 2001 and FY 2005. After the end of the Great Recession in FY 2010, LAN's market share decreased to 1.4 percent but rebounded in FY 2013 to 2.6 percent as the result of new services offered by Allegiant. In FY 2016, Allegiant withdrew from LAN, but more importantly, GRR began to rapidly expand its market share

¹³ Total O&D enplanements were considered as total enplanements for Peer Airports LAN, AZO, MBS, GRR and FNT; for DTW, O&D enplanements (excluded connecting passengers) were used for the purposes of this forecast.

among the Peer Airports, growing at a CAGR of 7.9 percent between FY 2013 and FY 2019. During the same time period, LAN's CAGR declined to 3.9 percent. At GRR, Southwest began services in FY 2014, Frontier returned to the market in FY 2018 (after leaving in FY 2014), Allegiant expanded from one daily departure in FY 2014 to an average 3.5 daily departures in FY 2019, and network carriers American, Delta, and United all added frequencies between FY 2016 and FY 2019. From the period between FY 2016 and FY 2023, all Peer Airports experienced no significant growth or declines in their market shares except for GRR which grew from a 13.2 percent market share in FY 2016, steadily increasing to 16.3 percent in FY 2023 (see **Table 4-13**).

Table 4-13
LAN Peer Airport Historical Market Shares

FY	Peer Airport Market Shares						Total
	AZO	FNT	GRR	LAN	MBS	DTW	
2001	2.4%	2.8%	9.6%	2.5%	2.7%	80.0%	100.0%
2002	2.4%	3.3%	10.7%	2.6%	2.2%	78.8%	100.0%
2003	2.5%	5.0%	11.4%	2.8%	2.5%	75.9%	100.0%
2004	2.4%	6.1%	11.3%	3.1%	2.4%	74.6%	100.0%
2005	2.4%	5.9%	11.0%	3.5%	2.2%	75.0%	100.0%
2006	2.3%	5.7%	10.4%	3.1%	2.1%	76.4%	100.0%
2007	1.9%	5.0%	9.9%	2.6%	1.9%	78.6%	100.0%
2008	1.8%	5.4%	9.5%	2.2%	1.7%	79.4%	100.0%
2009	1.7%	5.5%	9.8%	1.9%	1.7%	79.4%	100.0%
2010	1.5%	5.8%	11.0%	1.4%	1.6%	78.7%	100.0%
2011	1.6%	5.4%	12.9%	1.9%	1.6%	76.5%	100.0%
2012	1.6%	5.0%	12.4%	2.5%	1.6%	77.0%	100.0%
2013	1.4%	4.5%	12.4%	2.6%	1.4%	77.7%	100.0%
2014	1.5%	4.9%	13.0%	2.3%	1.4%	77.0%	100.0%
2015	1.4%	4.6%	13.3%	2.0%	1.3%	77.4%	100.0%
2016	1.4%	4.1%	13.2%	1.6%	1.2%	78.6%	100.0%
2017	1.4%	3.7%	13.0%	1.7%	1.1%	79.0%	100.0%
2018	1.3%	3.6%	13.6%	1.7%	1.0%	78.7%	100.0%
2019	1.2%	2.7%	14.8%	1.6%	1.1%	78.6%	100.0%
2020	1.3%	2.8%	15.4%	1.5%	1.0%	77.9%	100.0%
2021	0.8%	3.1%	16.4%	1.0%	0.8%	77.9%	100.0%
2022	0.8%	2.9%	16.3%	1.0%	0.7%	78.2%	100.0%
2023	0.7%	2.6%	16.3%	1.0%	0.7%	78.7%	100.0%

Source: Airport Records; U.S. DOT T-100 Data

In order to estimate enplaned passengers for LAN, the second step was to project total enplaned passengers for the Peer Airports. Using the Peer Airports' CAGR from the 10-year period between FY 2014 and FY 2023 (2.4 percent), a projection was generated for the 20-year

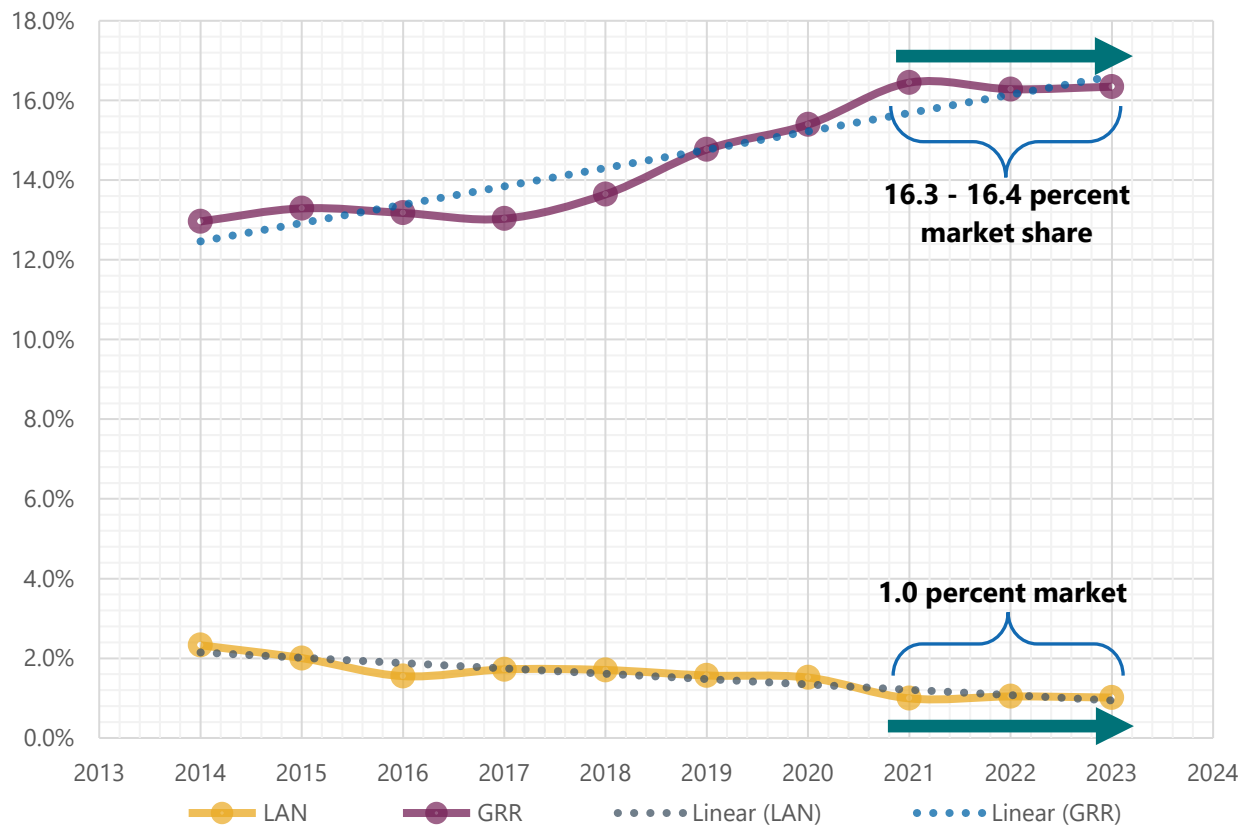
period between FY 2024 and FY 2043 grown at the same historical CAGR. Using this methodology, it is estimated that the total Peer Airport enplanements are projected to grow from approximately 11.0 million enplaned passengers in FY 2024 to 17.4 million in FY 2043 at a CAGR of 2.4 percent (see **Table 4-14**).

4.4.4.1 Peer Airports Market Share Analysis

To determine LAN's market share of the Peer Airport's enplaned passenger forecast, an analysis of LAN's and GRR's historical market shares were analyzed. As previously stated, LAN's market share among the Peer Airports increased to 2.6 percent in FY 2013 after Allegiant initiated services. The Airport's market share, however, started to decrease steadily after FY 2013 and into the COVID-19 Pandemic until FY 2021 where the trendline flattened at 1.0 percent. LAN's market share has since stayed at 1.0 percent in FY 2022 and FY 2023. Conversely, GRR's market share among the Peer Airports grew continuously from FY 2017 through FY 2021 to a high of 16.4 percent and then also flattened, recording a 16.3 percent market share in FY 2022 and FY 2023. The growth in Peer Airport market share GRR experienced was driven by six years of LCC and ULCC Air Carrier entrants and expansion as previously discussed. However, with the advent of ULCC service at LAN in October 2022, and GRR achieving a critical point of passenger airline operational maturity, the market shares among Peer Airports for both facilities have stabilized. Although the historical market share loss at LAN was compounded by existing leakage to DTW, something the Airport was already experiencing, Peer Airport market shares for both LAN and GRR have reached an equilibrium, as depicted in **Figure 4-7**.

Aviation Activity Forecast

Figure 4-7
LAN and GRR Historic Peer Airport Market Share



Source: U.S. DOT T-100 Data

Given the unique market share patterns exhibited by LAN and GRR among the Peer airports, the enplaned passenger forecast projects the LAN market share to remain constant at 1.0 percent through FY 2043. See **Table 4-15** for forecasted market share analysis. As can be seen in **Table 4-16**, LAN is expected to grow from 108,702 enplanements in FY 2023 to 170,400 in FY 2043 at a CAGR of 2.3 percent.

As a validation exercise to support LAN's sustained 1.0 percent market share throughout the Forecast Period, the TAF for enplaned passengers for each individual Peer Airport was reviewed and converted into a market share percentage based on their aggregate amount for the Forecast Period between FY 2024 through FY 2043. For LAN, the TAF-based projected market share analysis shows the Airport maintaining a share between 0.8 and 0.9 percent of the total Peer Airport enplanement forecasts throughout the Forecast Period, further supporting the validity of the market share analysis conclusions.

Table 4-14

Forecast – Enplanements Market Share

	Fiscal Year	Enplaned Passengers			
		Peer Airports Combined	DTW	LAN	Total
Baseline	2023	2,170,264	8,429,711	108,702 ¹⁴	10,708,677
Forecast	2024	2,400,000	8,500,000	110,800	11,010,800
	2025	2,400,000	8,800,000	111,300	11,311,300
	2026	2,400,000	9,000,000	114,000	11,514,000
	2027	2,500,000	9,300,000	116,800	11,916,800
+5 Years	2028	2,500,000	9,500,000	118,500	12,118,500
	2029	2,600,000	9,700,000	121,400	12,421,400
	2030	2,700,000	9,900,000	124,300	12,724,300
	2031	2,700,000	10,200,000	127,400	13,027,400
	2032	2,800,000	10,400,000	130,500	13,330,500
+10 Years	2033	2,900,000	10,700,000	133,700	13,733,700
	2034	3,000,000	10,900,000	137,000	14,037,000
	2035	3,000,000	11,200,000	140,300	14,340,300
	2036	3,100,000	11,500,000	143,800	14,743,800
	2037	3,200,000	11,700,000	147,300	15,047,300
+15 Years	2038	3,300,000	12,000,000	150,900	15,450,900
	2039	3,400,000	12,300,000	154,600	15,854,600
	2040	3,400,000	12,600,000	158,400	16,158,400
	2041	3,500,000	12,900,000	162,300	16,562,300
	2042	3,600,000	13,200,000	166,300	16,966,300
+20 Years	2043	3,700,000	13,500,000	170,400	17,370,400
CAGR 2023-2043		2.7%	2.4%	2.3%	2.4%

Source: U.S. DOT T-100 Data; Airport Records; RS&H, 2024

¹⁴ Baseline enplaned passengers are in FFY2023.

Table 4-15

Forecast – Peer Airports Percent Enplanements Market Share

	Fiscal Year	Market Share		
		Peer Airports % Share	DTW % Share	LAN % Share
Baseline	2023	20.3%	78.7%	1.0%
Forecast	2024	21.8%	77.2%	1.0%
	2025	21.2%	77.8%	1.0%
	2026	20.8%	78.2%	1.0%
	2027	21.0%	78.0%	1.0%
+5 Years	2028	20.6%	78.4%	1.0%
	2029	20.9%	78.1%	1.0%
	2030	21.2%	77.8%	1.0%
	2031	20.7%	78.3%	1.0%
+10 Years	2032	21.0%	78.0%	1.0%
	2033	21.1%	77.9%	1.0%
	2034	21.4%	77.7%	1.0%
	2035	20.9%	78.1%	1.0%
+15 Years	2036	21.0%	78.0%	1.0%
	2037	21.3%	77.8%	1.0%
	2038	21.4%	77.7%	1.0%
	2039	21.4%	77.6%	1.0%
+20 Years	2040	21.0%	78.0%	1.0%
	2041	21.1%	77.9%	1.0%
	2042	21.2%	77.8%	1.0%
	2043	21.3%	77.7%	1.0%

Source: U.S. DOT T-100 Data; Airport Records; RS&H, 2024

4.4.5 Alternate Scenario

In addition to the baseline scenario, the LAN forecast also addressed an alternate scenario of annual enplaned passengers over the Forecast Period. For this approach, a set of design day schedules (DDS) were constructed to represent an alternate scenario of the passenger forecast. A peak day airline schedule was pulled from a Cirium Diio market schedule analysis for March 9, 2023, the Airport's peak day of air carrier operations in FY 2023 based on the FAA's OPSNET database. This base schedule was then calibrated by applying average historical load factors and annualized to reflect estimated annual volumes. This base DDS was then projected out 20-years to match the Forecast Period and future schedules were prepared for the milestone years of FY 2024, FY 2028, FY 2033, FY 2038, and FY 2043. Future schedules were developed using air service fundamentals as outlined in the Airport Cooperative Research Program (ACRP), *Guidebook for Preparing and Using Airport Design Day Flight Schedules*¹⁵. The alternate scenario assumed the addition of one Avelo leisure market (in addition to the current MCO route), the addition of two legacy airline markets, and the up-gauging of aircraft throughout the Forecast Period. In this alternate scenario, enplanements increase from 108,702 in FY 2023 to 188,100 in FY 2043 at a CAGR of 2.8 percent over the Forecast Period (see **Table 4-16**).

Table 4-16

LAN Forecast – Passenger Enplanement Scenarios

	Fiscal Year	Base Scenario	Alternate Scenario
Baseline	2023	108,702	108,702
Forecast	2024	110,800	125,500
	2025	111,300	135,500
	2026	114,000	139,600
	2027	116,800	141,000
+ 5 Years	2028	118,500	144,700
+ 10 Years	2033	133,700	159,000
+ 15 Years	2038	150,900	172,900
+ 20 Years	2043	170,400	188,100
Compound Annual Growth Rates			
2023 - 2024		1.9%	15.5%
2024 - 2033		2.1%	1.9%
2033 - 2043		2.5%	1.7%
2023 - 2043		2.3%	2.8%

Source: U.S. DOT; Airport Statistics; RS&H Analysis, 2023

¹⁵ Published by the National Academies Press, 2016

4.5 Aircraft Operations Forecast

As described in **Section 4.3.2**, there are five different FAA aircraft operation categories, each of which is dependent upon the user it serves. Forecasting the number of future operations needs to take this into account. The lingering impact of the COVID-19 Pandemic is still a large part of the forecast process because the aviation industry is just starting to return to pre-2019 numbers at the time of the writing. The forecasting methodology for each category is further analyzed in the following sections.

4.5.1 Passenger Operations Forecast

This section outlines the approach and methodology applied to prepare the passenger operations forecast for LAN. The different data components below were analyzed and used in the preparation of the passenger operations forecast.

- **Total Enplaned Passenger** – The base of the passenger operations forecast is the LAN enplaned passenger forecast based on the Peer Airport market share analysis as described in this report in **Section 4.4.4.1**
- **Average Load Factors (ALF)** – Historical ALFs were analyzed for the 24-year period from FY 2000 through FY 2023. The historical ALFs were obtained from U.S. DOT T-100 database to determine an established trend.
- **Average Seats Per Departure (ASPD)** – The ASPD was calculated historically for the 24-year period from FY 2000 through FY 2023. By dividing the total number of historical departing seats by the total number of historical departures, a 24-year trend of ASPD was calculated. The historical ASPD data was obtained from U.S. DOT T-100 database to determine an established trend or pattern similar to the one conducted for the ALF analysis (see **Table 4-17**).
- **Enplanements per Departure (EPD)** – EPD were calculated by multiplying average load factors by ASPD (ALF x ASPD).

The total enplaned passenger forecast was combined with projected ALFs and projected ASPD in a mathematical formula to derive a forecast of scheduled passenger operations. The mathematical formula expressed below is used to calculate total annual operations at LAN.

$$\frac{\text{Enplanements}}{(\text{ALF}) * (\text{ASPD}) = \text{EPD}} (2) = \text{Operations}$$

Passenger operations at the Airport decrease by -6.7 percent from FY 2023 to FY 2024 due to an increase in ASPD from 61 seats to 66 seats during the same period. This ASPD increase is a result of American’s removal of 50-seat aircraft from LAN in FY 2024. Passenger aircraft operations at LAN are projected to increase from 3,645 in FY 2023 to approximately 5,100 in FY 2043. This produces a CAGR of 1.7 percent over the Forecast Period (see **Table 4-18**).

Table 4-17

LAN Historical Average Seats per Departure FY 2000 – FY 2023

Fiscal Year	LAN Seats per Departure
2000	56
2001	64
2002	69
2003	61
2004	59
2005	63
2006	69
2007	72
2008	70
2009	69
2010	52
2011	59
2012	66
2013	68
2014	65
2015	65
2016	56
2017	53
2018	52
2019	52
2020	54
2021	52
2022	54
2023	61

Source: U.S. DOT T-100 Data; RS&H, 2024

Table 4-18

LAN Forecast – Passenger Operations

	Fiscal Year	Base Scenario	Alternate Scenario
Baseline	2023	3,645	3,645
Forecast	2024	3,400	3,800
	2025	3,400	4,100
	2026	3,400	4,200
	2027	3,500	4,300
+ 5 Years	2028	3,500	4,400
+ 10 Years	2033	4,000	4,800
+ 15 Years	2038	4,500	5,200
+ 20 Years	2043	5,100	5,700
Compound Annual Growth Rates			
	2023 - 2024	-6.7%	4.3%
	2024 - 2033	1.8%	2.6%
	2033 - 2043	2.5%	1.7%
	2023 - 2043	1.7%	2.3%

Source: U.S. DOT; Airport Statistics; RS&H Analysis, 2023

4.5.2 Air Cargo Operations Forecast

An air cargo operations forecast was developed using the following assumptions:

General Air Cargo Assumptions

- New aircraft types over the Forecast Period will be based on the fleet acquisition plans of the current cargo carriers serving LAN.
- There will be no new aircraft with capabilities beyond those currently in the planning or development stages.
- Since the forecast is unconstrained, the fleet mix projections are not limited by the existing number or length of runways or airfield configuration.

Various econometric approaches to calculate air cargo operations were considered in this forecast. The methodology selected was the growth rate of domestic total revenue ton miles (RTMs), as projected by the FAA, based on strong growth of domestic cargo after the Great

Recession which, at 4.1 percent from FY 2010 through FY 2022¹⁶, was followed by a sharp decline during the COVID-19 Pandemic. Industry changes including lower market demand/prices sharply reduced revenues forcing many all-cargo carriers to scale back operations, postpone aircraft investments, and reduce operating expenses. The U.S. air cargo industry is not expected to return to the high growth rates experienced in the previous decade, and the COVID-19 Pandemic has produced a market shift based on the data pre- and post- the COVID-19 Pandemic.

This forecast also took into consideration that, besides UPS, no other major cargo carrier would operate from LAN during the planning period. There is a large FedEx facility in Grand Rapids, Michigan, and given the proximity to LAN (approximately 70 miles), it is unlikely they would also begin operations from LAN. Similar assumptions were made for Amazon Air, who has close hubs at Fort Wayne International Airport (KFWA) and South Bend International Airport (KSBN).

Air cargo operations are projected to grow from 3,477 in FY 2023 to 5,200 in FY 2043 at a 2.0 percent annual growth rate. Like the passenger operations and enplanements forecast, an alternate scenario was also developed. The alternate scenario was projected based on the growth rates of FAA total RTMs for all-cargo carriers which produced a CAGR of 2.8 percent.

Table 4-19 summarizes the air cargo operations forecast.

¹⁶ Freight/express and mail revenue ton miles growth as per FAA Aerospace Forecasts Fiscal Years 2023 – 2043.

Table 4-19

LAN Forecast – Air Cargo Operations

	Fiscal Year	Baseline Scenario	Alternate Scenario
Baseline	2023	3,477	3,477
Forecast	2024	3,600	3,600
	2025	3,600	3,700
	2026	3,700	3,800
	2027	3,800	3,900
+ 5 Years	2028	3,900	4,000
+10 Years	2033	4,300	4,600
+15 Years	2038	4,700	5,300
+20 Years	2043	5,200	6,200
Compound Annual Growth Rate			
	2023 - 2024	3.5%	3.5%
	2024 - 2033	2.0%	2.8%
	2033 - 2043	1.9%	3.0%
	2023 - 2043	2.0%	2.9%

Source: US DOT; Airport Records; RS&H Analysis

4.5.3 Air Cargo/Freight Forecast in Pounds (lbs.)

The air cargo/freight forecast at LAN includes the handling of enplaned and deplaned air freight, express cargo, and mail. Air cargo is measured in thousands of pounds (lbs). LAN's location in central Michigan (providing convenient access to major highways and 90.0 percent of Michigan's population can be reached in 90 minutes) makes it a desirable location for integrated express cargo operations by UPS which handles the majority of cargo activity at the Airport. This type of cargo uses a hub-and-spoke system model similar to the one employed by the legacy air carriers. Smaller cargo carriers, such as Ameriflight, operate point-to-point cargo routes to smaller niche markets mostly within the Midwest region of the US. Historically, LAN cargo activity increased by 4.1 percent from FY 2014 through FY 2022, however, it declined 3.3 percent from FY 2022 through FY 2023, following the post COVID-19 Pandemic trend of the many of US non-hub airports.

Based on historical aviation activity, a trend analysis was performed for LAN air cargo lbs. from FY 2014 through FY 2023. A line of best fit was established with the following trend equation:

$$y = 2578.6x + 40493$$

$$R^2 = 90.1\%$$

The growth rates for the trend equation were applied to LAN's historical data which grew cargo lbs. from 60,749 in FY 2023 to 108,000 in FY 2043 at a CAGR of 2.9 percent. See **Table 4-20**.

Table 4-20
LAN Forecast – Cargo/Freight (000 lbs.)

	Fiscal Year	Baseline Scenario
Baseline	2023	60,749 lbs.
Forecast	2024	63,100 lbs.
	2025	65,500 lbs.
	2026	67,900 lbs.
	2027	70,300 lbs.
+ 5 Years	2028	72,700 lbs.
+ 10 Years	2033	84,700 lbs.
+ 15 Years	2038	96,700 lbs.
+ 20 Years	2043	108,000 lbs.
Compound Annual Growth Rate		
	2023 - 2024	3.9%
	2024 - 2033	3.3%
	2033 - 2043	2.5%
	2023 - 2043	2.9%

Source: Airport Records; RS&H Analysis, 2024

4.5.4 General Aviation Forecast

General Aviation (GA) is an important component of aviation activity at LAN accounting for over 40 percent of total operations. Nationally, personal, and recreational GA has been in decline while corporate and business-related GA has been increasing. Like other aviation sectors, GA experienced a steep decline in activity early in the COVID-19 pandemic, however, demand began to recover for this sector in the second half of CY 2020, much faster than for passenger airlines. Domestic and international business jet operations in April 2020 were nearly 75 percent below CY 2019 levels, but by June 2020 had recovered to levels approximately 24 percent below those in June 2019, and by December 2020 were only about 12 percent lower than the prior year's level of activity.¹⁷ Demand for business aviation has rebounded in part due to increased demand from corporate executives and individuals able to pay for alternatives to scheduled commercial passenger service during the COVID-19 pandemic.

¹⁷ FAA data via General Accountability Office ("GAO"), 2022

GA is a very cyclical aviation activity and is closely related to fuel price fluctuations and economic trends. LAN has experienced trends similar to national trends in recent years. The forecast of GA operations at LAN is presented in **Table 4-21** and was developed considering a market share analysis of U.S. general aviation activity, measured by fixed wing, piston operated general aviation hours flown. Similar to the national trend, GA operations are projected to decrease by 0.7 percent at LAN throughout the Forecast Period.

Air taxi operations are projected within the GA forecast category. The FAA defines Air Taxi as “an aircraft designed to have maximum seating capacity of 60 seats or less or a maximum payload capacity of 18,000 pounds or less, carrying passengers or cargo for hire or compensation.” In this section, it is important to note that the Air Taxi baseline number (8,461 operations) does not include passenger commercial operations flown by American on 50-seat Bombardier CRJ-200s or commercial cargo operations operated by carriers including Martinaire, Freight Runners, Ameriflight and AvFlight. These cargo air carriers operate fleets of aircraft under a payload capacity of 18,000 lbs. including the Cessna 208B, Beechcraft 1900 and SAAB 340. The Air Taxi forecast was projected using the FAA’s fixed wing, turbine forecast of Air Taxi hours flown. Similar to the national trend, GA operations are projected to increase by 2.2 percent at LAN throughout the Forecast period.

Table 4-21

LAN Forecast – GA Operations

	Fiscal Year	Baseline Scenario		Alternate Scenario	
		GA	Air Taxi*	GA	Air Taxi*
Baseline	2023	16,136	8,461	16,136	8,461
Forecast	2024	16,200	8,500	16,200	9,000
	2025	16,100	8,700	16,200	9,700
	2026	16,000	8,900	16,200	10,300
	2027	15,900	9,100	16,200	11,000
+ 5 Years	2028	15,700	9,300	16,200	11,700
+10 Years	2033	15,100	10,500	16,200	12,900
+15 Years	2038	14,500	11,800	16,200	14,000
+20 Years	2043	14,000	13,000	16,200	15,100
Compound Annual Growth Rate					
2023 - 2024		0.4%	0.5%	0.4%	6.4%
2024 - 2033		-0.8%	2.4%	0.0%	4.1%
2033 - 2043		-0.8%	2.2%	0.0%	1.6%
2023 - 2043		-0.7%	2.2%	0.0%	2.9%

Note: *Air cargo operations defined by the FAA as air taxi are not included in the GA forecast.

Source: FAA; Airport Records; RS&H Analysis, 2024

4.5.5 Military Forecast

Table 4-22 presents the forecast of military aircraft operations at LAN. Military operations at LAN have declined since CY 2018 as the result of a realignment of aircraft and other resources by the Michigan Air National Guard (ANG). Military operations are related to national and international political and institutional factors rather than local economic conditions and are therefore difficult to forecast using traditional approaches. Consequently, military operations are assumed to remain constant at the FFY 2023¹⁸ level of activity.

¹⁸ FFY used because the military aircraft forecast was developed by the FAA.

Table 4-22

LAN Forecast – Military Operations

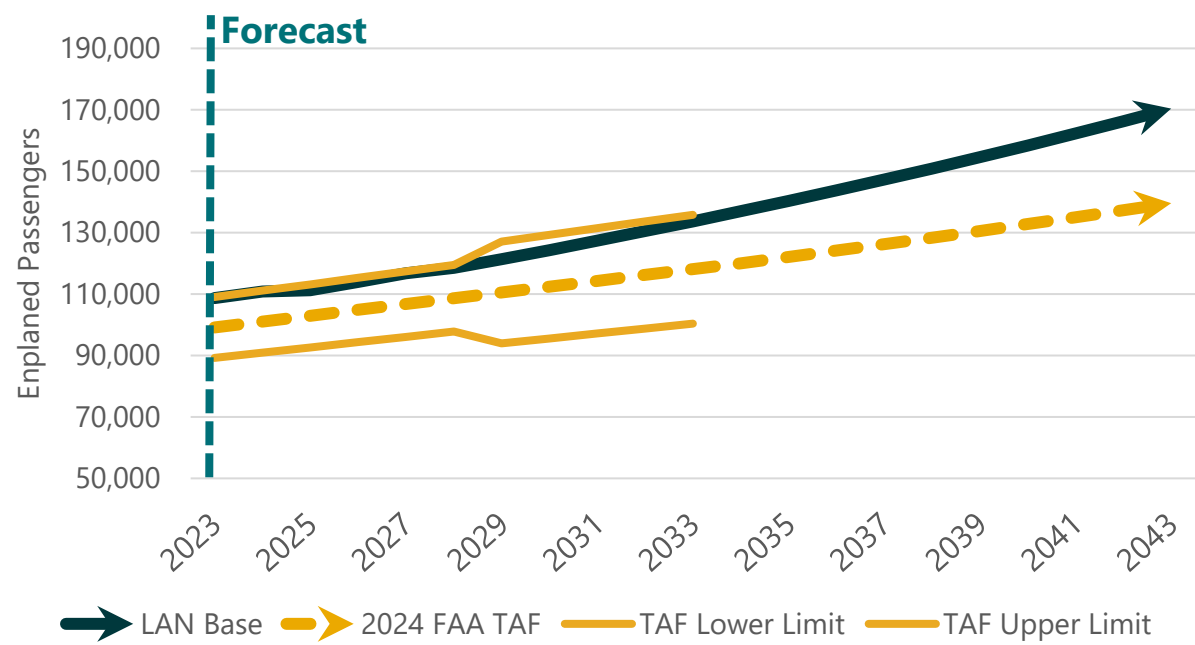
	Fiscal Year	Baseline Scenario	Alternate Scenario
Baseline	2023	506	506
Forecast	2024	500	500
	2025	500	600
	2026	500	600
	2027	500	600
+ 5 Years	2028	500	700
+10 Years	2033	600	700
+15 Years	2038	600	700
+20 Years	2043	600	700
Compound Annual Growth Rate			
	2023 - 2024	-1.2%	-1.2%
	2024 - 2033	2.0%	3.8%
	2033 - 2043	0.0%	0.0%
	2023 - 2043	0.9%	1.6%

Source: FAA; RS&H Analysis, 2024

4.6 Comparison of Enplaned Passengers to the TAF

The FAA has oversight responsibility to review and approve an aviation forecast developed in conjunction with an airport planning study. The FAA reviews individual forecasts with the objective of comparing them to its national TAF and the NPIAS. As previously mentioned in **Section 4.1**, the FAA must approve sponsor forecasts before they can be used to prepare facility requirements in a master plan or before going forward with an environmental document that requires a forecast. The FAA uses a 10.0 percent differential threshold for the first five years and a 15.0 percent threshold for the subsequent five-year period in approving non-FAA forecasts as the basis for master plans and environmental studies. If these stated thresholds are exceeded, the FAA Region office in which the airport is located, will forward the forecasts to FAA headquarters for review. As shown in **Figure 4-8** and **Table 4-23**, the base enplaned passenger forecast for LAN remains within the FAA TAF through the planning period.

Figure 4-8
LAN Forecast – Enplanements Compared to the FAA TAF



Source: U.S. DOT; Airport Records; RS&H Analysis, 2024

Table 4-23
LAN Forecast – Enplanements Compared to the FAA TAF

	Fiscal Year	2023 Master Plan Update		2024 TAF Enplanements ¹⁹	Difference Base Scenario vs TAF	Percent (%) Diff w/ TAF ²⁰
		Base Scenario	Alternate Scenario			
Baseline	2023	108,702	108,702	99,140	9,562	9.6%
Forecast	2024	110,800	125,500	101,078	9,722	9.6%
	2025	111,300	135,500	102,870	8,430	8.2%
	2026	114,000	139,600	104,881	9,119	8.7%
	2027	116,800	141,000	106,740	10,060	9.4%
	2028	118,500	144,700	108,629	9,871	9.1%
+ 5 Years	2028	118,500	144,700	108,629	9,871	9.1%
+ 10 Years	2033	133,700	159,000	118,092	15,608	13.2%
+ 15 Years	2038	150,900	172,900	128,365	22,535	17.6%
+ 20 Years	2043	170,400	188,100	139,604	30,796	22.1%
Compound Annual Growth Rates (CAGR)						
2023 - 2024		1.9%	15.5%	2.0%		
2024 - 2033		2.1%	1.9%	1.7%		
2033 - 2043		2.5%	1.7%	1.7%		
2023 - 2043		2.3%	2.8%	1.7%		

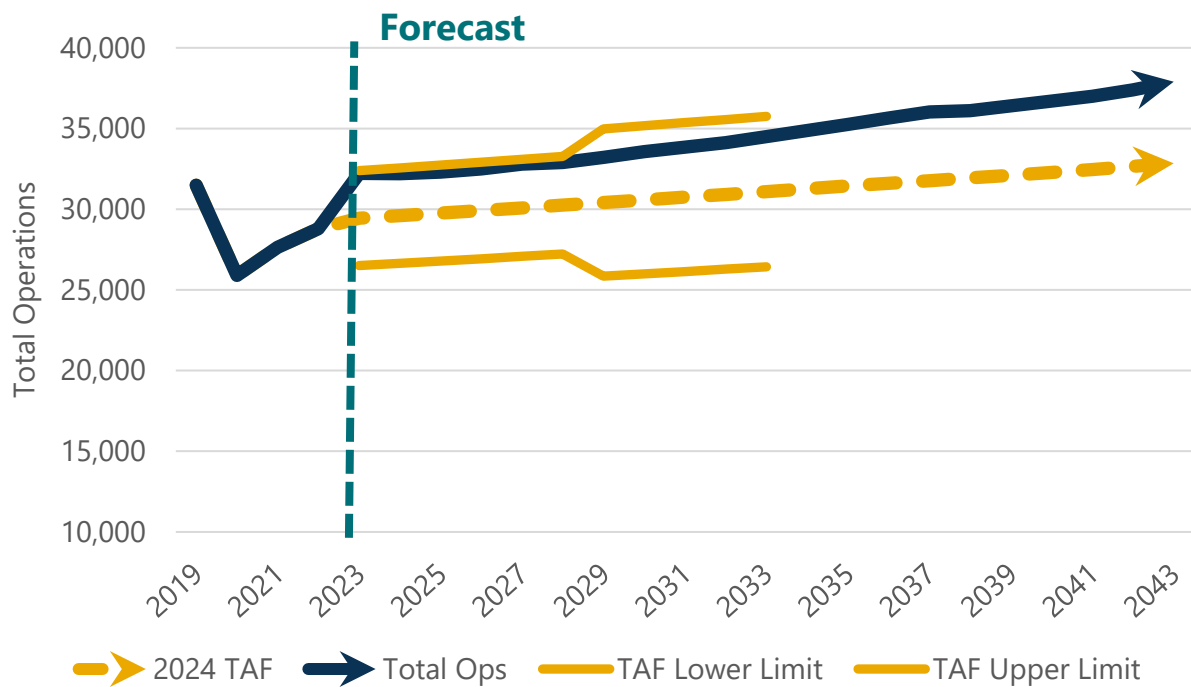
Source: US DOT; Airport Records; RS&H Analysis, 2024

¹⁹ FAA TAF and 2023 LAN baseline are in FFY.
²⁰ 2024 TAF enplanements are compared to the LAN 2023 Master Plan Update Base Scenario.

4.7 Comparison of Total Aircraft Operations to the FAA TAF

The FAA has oversight responsibility to review and approve the aviation forecast developed in conjunction with airport planning studies. The FAA reviews individual forecasts with the objective of comparing them to its national TAF and the NPIAS. As previously mentioned in **Section 3.1** of this chapter, the FAA must approve sponsor forecasts before they can be used to prepare facility requirements in a master plan or before going forward with an environmental document that requires a forecast. The FAA uses a 10.0 percent differential threshold for the first five years and a 15.0 percent differential threshold for the subsequent five-year period when approving non-FAA forecasts as the basis for planning and environmental studies. If these stated thresholds are exceeded, the FAA Region office in which the airport is located, will forward the forecasts to FAA headquarters for review. The total operations for LAN in the planning period track within the FAA required threshold. See **Figure 4-9** and **Table 4-24**.

Figure 4-9
LAN Forecast – Total Operations Compared with FAA TAF



Source: 2024 FAA TAF; RS&H Analysis, 2024

Table 4-24
LAN Forecast – Total Operations Forecast Compared to FAA TAF

	2023 Master Plan Update							2024 TAF Operations	Difference Base vs TAF	Percent (%) Diff w/ TAF ²¹
	Fiscal Year	Passenger	Air Taxi	General Aviation	Cargo	Military	Total Forecast Operations			
Baseline	2023	3,645	8,461	16,136	3,477	506	32,225	29,448	2,777	9.4%
Forecast	2024	3,400	8,500	16,200	3,600	500	32,200	29,604	2,596	8.8%
	2025	3,400	8,700	16,100	3,600	500	32,300	29,762	2,538	8.5%
	2026	3,400	8,900	16,000	3,700	500	32,500	29,922	2,578	8.6%
	2027	3,500	9,100	15,900	3,800	500	32,800	30,084	2,716	9.0%
	2028	3,500	9,300	15,700	3,900	500	32,900	30,249	2,651	8.8%
+ 5 Years	2028	3,500	9,300	15,700	3,900	500	32,900	30,249	2,651	8.8%
+ 10 Years	2033	4,000	10,500	15,100	4,300	600	34,500	31,089	3,411	11.0%
+ 15 Years	2038	4,500	11,800	14,500	4,700	600	36,100	31,936	4,164	13.0%
+ 20 Years	2043	5,100	13,000	14,000	5,200	600	37,900	32,843	5,057	15.4%
Compound Annual Growth Rates (CAGR)										
2023 - 2024		-6.7%	0.5%	0.4%	3.5%	-1.2%	-0.1%	0.5%		
2024 - 2033		1.8%	2.4%	-0.8%	2.0%	2.0%	0.8%	0.5%		
2033 - 2043		2.5%	2.2%	-0.8%	1.9%	0.0%	0.9%	0.6%		
2023 - 2043		1.7%	2.2%	-0.7%	2.0%	0.9%	0.8%	0.5%		

Source: 2024 FAA TAF; RS&H Analysis, 2024

²¹ 2024 TAF enplanements are compared to the LAN 2023 Master Plan Update Base Scenario.

4.8 Based Aircraft Forecast

The 2024 FAA TAF forecasted LAN to increase from 65 to 85 based aircraft throughout the twenty-year planning period. At the time of this writing, the airport maintained a based aircraft record that was the same as TAF records. The Airport has continued to stay current in the National Based Aircraft Inventory Program (NBAIP). In 2023 it reported 65 civil based aircraft at LAN with 4 helicopters, 32 single-engine, 17 multi-engine, and 12 jet aircraft recorded. These numbers were used as the baseline for the based aircraft forecast.

While several classical forecasting techniques, such as a socio-economic regression model, can be attempted while forecasting based aircraft, no such model was deemed suitable. Therefore, the local socio-economic trends were not considered as viable indicators for forecasting. For LAN, the FAA Aerospace Forecast was determined as the best indicator of future levels for use in forecasting based aircraft.

The FAA Aerospace Forecast (FY 2023 – FY 2043) is a comprehensive 20-year forecast of both commercial and general aviation (GA) activity. For the purposes of this chapter, only GA fleet data was analyzed. The total number of general aviation aircraft within the U.S. is projected to increase over the next 20 years annually by 2.0 percent. Turboprop, turbojet, rotorcraft, experimental, and light sport aircraft are projected to spur growth in the general aviation sector through the next 20 years while single- and multi-engine piston (SEP and MEP, respectively) fleets are expected to decrease. Aging aircraft fleets, unfavorable pilot demographics, increasing aircraft ownership costs, and the lack of available lower cost alternatives are accelerating the decline of piston aircraft. The number of turbine-powered GA aircraft is expected to grow by over 13,000 between 2023-2043 while the number of light-sport aircraft is forecast to nearly double by 2043.

A share analysis using the FAA Aerospace Forecast was conducted to generate a based aircraft forecast at LAN. **Table 4-25** details the growth forecast of each based aircraft type currently based at LAN over the 20-year Forecast Period. As shown, the number of turbojet aircraft is anticipated to increase by eight over the Forecast Period, which correlates with the 2.7 percent growth rate forecasted for the national fleet of turbojets in the United States. The number of helicopters will increase slightly by one while single-engine and multi-engine piston aircraft will decrease by the end of the planning period. The total number of based aircraft at LAN is forecasted to increase to 69 by 2043.

Table 4-25

LAN Forecast – Based Aircraft

	Fiscal Year	SEP	MEP	Jet	Helicopter	Total
Baseline	2023	32	17	12	4	65
Forecast	2024	32	17	12	4	65
+5 Years	2028	31	17	14	4	66
+10 Years	2033	29	16	16	5	66
+15 Years	2038	28	16	18	5	67
+20 Years	2043	28	16	20	5	69
Compound Annual Growth Rate						
	2023-2028	-0.9%	-0.4%	3.1%	1.5%	0.2%
	2028-2033	-0.8%	-0.3%	2.8%	1.5%	0.1%
	2033-2043	-0.6%	-0.1%	2.4%	1.5%	0.4%
	2023-2043	-0.7%	-0.2%	2.7%	1.5%	0.3%

Source: Airport Records; FAA Aerospace Forecast Fiscal Years 2023-2043; RS&H Analysis, 2023

4.9 Critical Aircraft

The FAA requires identification of existing and future critical/design aircraft for airport planning purposes. The term critical aircraft and design aircraft can be used interchangeably. The critical aircraft is the most demanding aircraft, or grouping of aircraft, using the airport regularly. Regular use is specifically defined in AC 150/5000-17, *Critical Aircraft and Regular Use Determination*, as 500 total annual operations, not counting touch-and-go landings.

Three parameters are used to classify the critical aircraft: Aircraft Approach Category (AAC), Airplane Design Group (ADG), and Taxiway Design Group (TDG). The AAC, depicted by a letter, relates to aircraft landing speeds. The ADG, depicted by a Roman numeral, relates to airplane wingspan and tail height. The TDG, classified by number, relates to the outer-to-outer main gear width and the distance between the cockpit and main gear²². These parameters serve as the basis for design and construction of airport infrastructure. An accurate critical aircraft determination helps ensure facilities are developed to meet proper needs of each portion of the airport.

The 2006 LAN Airport Layout Plan (ALP) lists the existing and future critical aircraft category for Runway 10R-28L, Runway 10L-28R, and Runway 6-24 shown in **Table 4-26**. The aircraft identified were related to commercial service airlines and cargo operators serving LAN at the

²² TDG was not introduced until 2012 and therefore not included within the 2006 Critical Aircraft Determination Table.

time, and what was forecasted to operate in the future considering industry trends in the replacement of aircraft.

Table 4-26
2006 Master Plan Critical Aircraft Determination

	Representative Aircraft	AAC	ADG
Runway 10R-28L			
Existing Critical Aircraft	Boeing 757-300	D	IV
Future Critical Aircraft	Boeing 757-300	D	IV
Runway 10L-28R			
Existing Critical Aircraft	Variety of B-I aircraft	B	I
Future Critical Aircraft	Variety of B-I aircraft	B	I
Runway 6-24			
Existing Critical Aircraft	Variety of B-II aircraft	B	II
Future Critical Aircraft	Variety of B-II aircraft	B	II

Source: 2006 LAN Master Plan

Per AC 150/5000-17, *Critical Aircraft and Regular Use Determination*, each runway should have a specific critical aircraft designation based on documented aeronautical activity. The following subsections detail the critical aircraft analysis for Runway 10R-28L, Runway 10L-28R, and Runway 6-24 based on available FAA aircraft characteristic data²³.

4.9.1 Runway 10R-28L Critical Aircraft

Runway 10R-28L is the primary runway at LAN. The current critical aircraft at LAN was determined via examination of FAA Traffic Flow Management System Counts (TFMSC)²⁴ data and discussions with ATC personnel. As shown in **Table 4-27**, it was determined the critical aircraft for Runway 10R-28L is currently the Boeing (Douglas) MD-11 which is a D-IV-6 aircraft. The Boeing (Douglas) MD-11 is predominantly used by the United Postal Service (UPS) and is the most demanding aircraft found to have 500 or more annual operations at LAN.

With UPS starting to phase out the Boeing (Douglas) MD-11 and replacing it with the Boeing 767-300F, the future critical aircraft for Runway 10R-28L at LAN has been identified as the Boeing 767-300F (C-IV), as noted in **Table 4-27**. This is based on the expectation that UPS will continue operations through the planning period. In addition, the commercial service aircraft 737-800 (D-III), CRJ-900 (D-III), and CRJ-200 (D-II) operating at LAN all have an AAC of D.

²³ Aircraft classifications determined using FAA Aircraft Characteristics Database effective October 2023, Retrieved from: https://www.faa.gov/airports/engineering/aircraft_char_database.

²⁴ TFMS data only includes IFR operations and excludes VFR operations or IFR operations where the flight plan was cancelled prior to arrival.

Therefore, when combined the most demanding regular use aircraft on Runway 10R-28L, maintains the existing designation of a D-IV runway.

4.9.2 Runway 10L-28R Critical Aircraft

Runway 10L-28R is the parallel runway to the main runway at LAN. Though it has a width of 75 feet, which meets the design standard for a B-II aircraft, the length and weight bearing capacity are better suited to accommodate B-I aircraft. Based on operations data and recorded observations made by ATC, the existing critical aircraft for Runway 10L-28R is a B-I type aircraft, such as a Beech 58. Improvements to increase design standards for Runway 10L-28R are not anticipated in the planning horizon so the future critical aircraft should remain a B-I. See **Table 4-27** for Runway 10L-28R design aircraft determination.

4.9.3 Runway 6-24 Critical Aircraft

Runway 6-24 is the crosswind runway at LAN. It was originally constructed to accommodate C-III aircraft, but due to a reevaluation of Runway Safety Area's (RSA) launched by the FAA in 1999, it was determined that Runway 6-24 no longer met design standards as a C-III runway, downgrading the runway to a B-II. Due to this downgrade, Runway 6-24 can no longer accommodate the commercial service aircraft currently in operation at LAN.

TFMSC and CountOps²⁵ data for calendar year 2022 was used to determine the most demanding aircraft for Runway 6-24. Based on the data, the current critical aircraft remains a B-II. The data did not indicate a single aircraft type meeting the FAA definition of "regular use", so the determination was made by grouping aircraft with similar operational performance and/or physical dimensions. Traffic on Runway 6-24 is projected to remain consistent throughout the forecast period so the future critical aircraft for Runway 6-24 is B-II (see **Table 4-27**).

²⁵ CountOps is an FAA automated systems that provides hourly counts of air traffic activity. Standards for this system are outlined in FAA Order 7210.3 Chapter 12.

Table 4-27

LAN Critical Aircraft Determination

	Representative Aircraft	AAC	ADG	TDG
Runway 10R-28L				
Existing Critical Aircraft	Boeing Douglas MD-11	D	IV	6
Future Critical Aircraft	Boeing 767-300 & 737-800	D	IV	5
Runway 10L-28R				
Existing Critical Aircraft	Variety of B-I aircraft	B	I	1A
Future Critical Aircraft	Variety of B-I aircraft	B	I	1A
Runway 6-24				
Existing Critical Aircraft	Variety of B-II aircraft	B	II	2
Future Critical Aircraft	Variety of B-II aircraft	B	II	2
Terminal Area Apron				
Existing Critical Aircraft	Boeing 737-800	D	III	3
Future Critical Aircraft	Boeing 737-800	D	III	3

Source: RS&H Analysis, 2023

In addition to identifying a design aircraft for each runway at LAN, a design aircraft was identified for the terminal area apron. Though the Boeing 737-800 does not meet the FAA regular use requirement (500 annual operations), with over 450 forecasted operations, it is critical to construct the commercial service apron taxiway and taxiway connectors to safely accommodate this aircraft (see **Table 4-27**).

4.10 Forecast Summary

Table 4-28 presents a summary listing of the aviation demand forecasts at LAN. These projections are used in the following chapters of the Master Plan to assess the capacity of existing facilities and determine facility expansions or improvements needed to satisfy future activity levels.

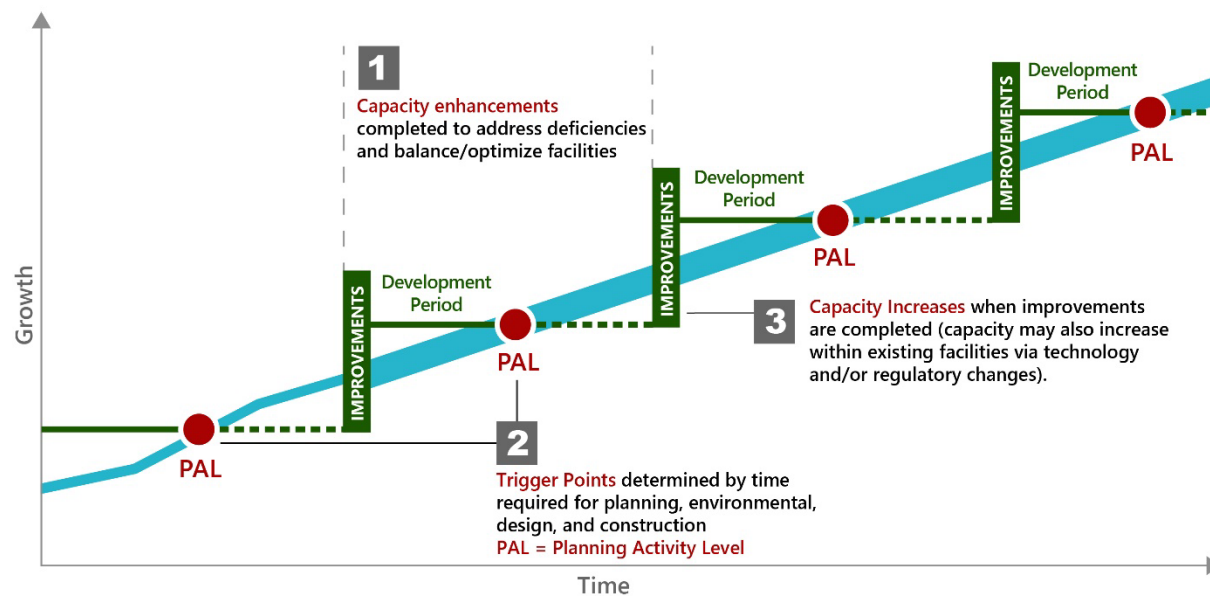
4.10.1 Planning Activity Levels

Historical precedent demonstrates that airport activity levels can be heavily influenced by unanticipated events resulting in changes to airport facilities. Predicting precisely what years these events may occur would prove challenging, to say the least. Therefore, it is prudent to begin detailed planning, design, and construction of a new facility only when levels of activity or demand are reached that warrant these actions. Under this practice, planning for the improvement is based on materialized demand milestones rather than an estimated calendar date.

These demand milestones are known as Planning Activity Levels (PAL)s which act as triggers for detailed airport facility planning and future investment. It is possible for a PAL trigger to occur sooner or later than the forecast year associated with that level of forecast activity. For planning purposes, the subsequent three PALs (defined as PAL 1, PAL 2, and PAL 3) correspond to the base case forecast years (Base Year+5 years, Base Year+10 years, and Base Year+20 years).

Figure 4-10 diagrams the process of planning, designing, and constructing facility improvements based on reaching PALs, and demonstrates how they align with the growth projected in a forecast.

Figure 4-10
Planning Activity Levels Diagram



Source: RS&H, 2023

Table 4-28
LAN Forecast Summary

	Base Year 2023	Milestone Years			CAGR				FAA TAF Comparison - % above or (below) TAF		
		2028	2033	2043	2023-2028	2023-2033	2033-2043	2023-2043	2028	2033	2043
		PAL 1	PAL 2	PAL 3					PAL 1	PAL 2	PAL 3
Total Enplanements	108,702	118,500	133,700	170,400	1.7%	2.1%	2.5%	2.3%	9.1%	13.2%	22.1%
Operations											
Passenger	3,645	3,500	4,000	5,100	(0.8%)	0.9%	2.5%	1.7%	2.0%	7.7%	19.7%
Cargo	3,477	3,900	4,300	5,200	2.3%	2.1%	1.9%	2.0%	FAA TAF includes cargo within Air Taxi		
General Aviation	16,136	15,700	15,100	14,000	-0.5%	-0.7%	-0.8%	-0.7%	2.3%	(1.6%)	(8.8%)
Air Taxi	8,461	9,300	10,500	13,000	1.9%	2.2%	2.2%	2.2%	(15.0%)	(8.7%)	2.3
Military	506	500	600	600	(0.2%)	1.7%	0.0%	0.9%	(6.2%)	12.6%	12.6%
Total Operations	32,225	32,900	34,500	37,900	0.4%	0.7%	0.9%	0.8%	8.8%	11.0%	15.4%
Based Aircraft											
Single Engine	32	31	29	28	(0.9%)	(0.8%)	(0.6%)	(0.7%)	Forecast By Aircraft Type Not Included in FAA TAF		
Multi-Engine	17	17	16	16	(0.4%)	(0.4%)	(0.1%)	(0.2%)			
Turbojet	12	14	16	20	3.1%	3.0%	2.4%	2.7%			
Helicopter	4	4	5	5	1.5%	1.5%	1.5%	1.5%			
Total Based Aircraft	65	66	66	69	0.2%	0.2%	0.4%	0.3%	(6.3%)	(12.0%)	(18.8%)

Source: RS&H Analysis, 2024
Note: FAA TAF includes air cargo operations within the air taxi category therefore creating a large difference with the forecast in that category.

Forecast Appendix A - Documentation of Invalid Regressions

Forecast Appendix A - Documentation of Invalid Regressions

In the Lansing MSA, there are numerous economic factors which support the trends of the Airport's aviation activity. Those trends, however, proved to be inconsistent with the historical enplaned passenger patterns exhibited by the Airport from FY 2001 through FY 2023. A group of univariate and multivariate regressions were conducted for the Lansing MSA using socioeconomic factors to project the Airport's enplanement activity. The independent variables used in these regressions include population, total personal income, and employment. The independent variables were correlated with the Airport's historical enplaned passengers (the dependent variable) for the timeframe of FY 2001 through FY 2023. After running multiple regression equations, the output produced did not generate statistically significant results. The following tables include the regression historical dependent and independent variables and the univariate and multivariate regressions outputs. All the regressions are invalid as shown by the adjusted R Squares and independent variable coefficients with incorrect signs which are highlighted in green.

Lansing Enplaned Passenger Regression								
Historical Data for Dependent (Enplaned Passengers) and Independent Variables								
FISCAL YEAR	US DOMESTIC YIELD	EARNINGS (2012)	POPULATION	PCPI (2012)	EMPLOYMENT	DUMMY	PERSONAL INCOME (2012)	ENPLANED PASSENGERS
2000		14,405,353,000	520,449	35,069	306,464	1	18,251,418,000	236,027
2001	160.00	14,540,313,000	524,067	35,282	305,759	2	18,490,164,000	226,065
2002	151.00	14,654,957,000	527,582	34,760	303,962	3	18,338,852,000	203,669
2003	150.00	14,499,790,000	530,834	34,540	304,316	4	18,335,240,000	233,079
2004	143.00	14,372,010,000	534,758	34,254	302,525	5	18,317,826,000	281,002
2005	128.00	14,049,417,000	535,500	33,831	299,192	6	18,116,623,000	338,957
2006	156.00	14,084,203,000	536,188	33,938	300,258	7	18,197,413,000	301,065
2007	162.00	13,852,621,000	536,230	34,133	301,650	8	18,303,163,000	261,600
2008	175.00	13,574,279,000	535,161	34,465	296,430	9	18,444,434,000	227,761
2009	187.00	12,989,850,000	533,857	33,856	282,692	10	18,074,243,000	165,908
2010	208.00	13,483,660,000	534,902	34,847	282,885	11	18,639,568,000	123,124
2011	202.00	13,332,105,000	535,936	34,925	285,894	12	18,717,786,000	166,714
2012	201.00	13,138,330,000	535,668	34,849	284,716	13	18,667,345,000	218,771
2013	188.00	13,328,038,000	536,080	34,697	286,931	14	18,600,292,000	227,473
2014	198.00	13,401,499,000	537,334	35,415	290,480	15	19,029,826,000	203,218
2015	199.00	13,928,096,000	537,897	36,863	293,687	16	19,828,401,000	181,741
2016	217.00	14,283,073,000	540,720	37,521	296,895	17	20,288,609,000	150,884
2017	203.00	14,526,680,000	543,042	37,857	299,461	18	20,558,189,000	177,503
2018	206.00	14,736,363,000	542,428	38,497	300,869	19	20,881,760,000	186,241
2019	209.00	14,913,250,000	542,683	39,266	298,755	20	21,308,909,000	179,412
2020	201.00	14,996,189,000	540,979	42,681	283,456	21	23,089,758,000	132,076
2021	154.00	15,411,264,000	527,954	44,543	290,963	22	23,516,859,000	60,230
2022	198.00	15,693,571,000	540,870	41,649	300,300	23	22,526,711,000	105,011
2023	198.59	15,834,570,000	542,366	42,177	304,979	24	22,875,572,000	101,368
CAGR FY 2000-2023	0.94%	0.41%	0.18%	0.81%	-0.02%	N/A	0.99%	-3.61%

Regression 1: Univariate Regression (Earnings)

INVALID

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.421038027
R Square	0.17727302
Adjusted R Square	0.139876339
Standard Error	60933.36387
Observations	24

ANOVA					
	df	SS	MS	F	Significance F
Regression	1	17600292844	17600292844	4.74034	0.040470956
Residual	22	81683246312	3712874832		
Total	23	99283539157			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	696864.4846	230670.9652	3.021032509	0.00628	218482.1824	1175246.787	218482.1824	1175246.787
EARNINGS (2012)	-3.51895E-05	1.61625E-05	-2.17723242	0.04047	-6.87085E-05	-1.67054E-06	-6.87085E-05	-1.67054E-06

Regression 2: Univariate Regression (Population)

INVALID

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.23267389
R Square	0.054137139
Adjusted R Square	0.011143373
Standard Error	65334.31939
Observations	24

ANOVA					
	df	SS	MS	F	Significance F
Regression	1	5374926766	5374926766	1.25919	0.273903586
Residual	22	93908612391	4268573290		
Total	23	99283539157			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	1581250.982	1235111.301	1.28024979	0.21379	-980213.0812	4142715.04	-980213.0812	4142715.044
POPULATION	-2.587712525	2.306062765	-1.1221345	0.2739	-7.370193986	2.19476894	-7.370193986	2.194768937

Regression 3: Univariate Regression (Personal Income)

INVALID

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.76426324
R Square	0.584098299
Adjusted R Square	0.565193677
Standard Error	43323.40999
Observations	24

ANOVA					
	df	SS	MS	F	Significance F
Regression	1	57991346384	57991346384	30.8971	1.37829E-05
Residual	22	41292192773	1876917853		
Total	23	99283539157			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	744945.8968	99265.50844	7.504579471	1.7E-07	539081.8323	950809.9614	539081.8323	950809.9614
PERSONAL INCOME (2012)	-2.79801E-05	5.03374E-06	-5.55851732	1.4E-05	-3.84195E-05	-1.75408E-05	-3.84195E-05	-1.75408E-05

Regression 4: Univariate Regression (Population and Dummy)

INVALID

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.858842585
R Square	0.737610586
Adjusted R Square	0.712621118
Standard Error	35221.03652
Observations	24

ANOVA					
	df	SS	MS	F	Significance F
Regression	2	73232589465	36616294732	29.5169	7.92385E-07
Residual	21	26050949692	1240521414		
Total	23	99283539157			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	-3524556.43	959121.9894	-3.67477388	0.00141	-5519159.798	-1529953.063	-5519159.798	-1529953.063
POPULATION	7.207809372	1.816481851	3.968005168	0.0007	3.430228566	10.98539018	3.430228566	10.98539018
DUMMY	-11224.05294	1517.582782	-7.39600704	2.8E-07	-14380.0391	-8068.06677	-14380.0391	-8068.06677

Regression 5: Univariate Regression (Employment and Dummy)
INVALID
SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.744421553
R Square	0.554163448
Adjusted R Square	0.511702824
Standard Error	45911.00645
Observations	24

ANOVA					
	df	SS	MS	F	Significance F
Regression	2	55019308376	27509654188	13.0512	0.000207178
Residual	21	44264230781	2107820513		
Total	23	99283539157			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	-19254.9035	379817.188	-0.05069519	0.96005	-809127.9861	770618.1791	-809127.9861	770618.1791
EMPLOYMENT	0.998946101	1.262896854	0.790995795	0.43779	-1.627391681	3.625283883	-1.627391681	3.625283883
DUMMY	-6483.384962	1424.342936	-4.55184268	0.00017	-9445.468252	-3521.301672	-9445.468252	-3521.301672

Regression 6: Multivariate Regression (Per Capita Personal Income and Employment)
INVALID
SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.837191248
R Square	0.700889186
Adjusted R Square	0.672402442
Standard Error	37604.95167
Observations	24

ANOVA					
	df	SS	MS	F	Significance F
Regression	2	69586758963	34793379482	24.604	3.135E-06
Residual	21	29696780193	1414132390		
Total	23	99283539157			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	-4501.653476	306945.8085	-0.01466596	0.98844	-642830.4064	633827.0995	-642830.4064	633827.0995
PCPI (2012)	-15.78454616	2.459612056	-6.41749422	2.3E-06	-20.89958945	-10.66950288	-20.89958945	-10.66950288
EMPLOYMENT	2.630534171	0.983512076	2.674633322	0.01418	0.585208842	4.675859501	0.585208842	4.675859501

Regression 7: Multivariate Regression (Personal Income and Employment with Dummy)

INVALID

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.823047896
R Square	0.677407839
Adjusted R Square	0.629019015
Standard Error	40017.55329
Observations	24

ANOVA					
	df	SS	MS	F	Significance F
Regression	3	67255447727	22418482576	13.9993	3.79584E-05
Residual	20	32028091429	1601404571		
Total	23	99283539157			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	-19327.05877	331061.2375	-0.05837911	0.95403	-709908.6989	671254.5814	-709908.6989	671254.5814
EMPLOYMENT	2.689405002	1.259252815	2.135714902	0.04525	0.062649659	5.316160345	0.062649659	5.316160345
DUMMY	770.9682733	2903.224649	0.265555844	0.7933	-5285.052224	6826.98877	-5285.052224	6826.98877
PERSONAL INCOME (2012)	-3.00866E-05	1.08843E-05	-2.76421408	0.01197	-5.27909E-05	-7.38229E-06	-5.27909E-05	-7.38229E-06

Regression 8: Multivariate Regression (PCPI and Employment with Dummy)
INVALID
SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.837248224
R Square	0.700984588
Adjusted R Square	0.656132276
Standard Error	38527.46318
Observations	24

ANOVA					
	df	SS	MS	F	Significance F
Regression	3	69596230779	23198743593	15.6287	1.80388E-05
Residual	20	29687308377	1484365419		
Total	23	99283539157			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	-325.7506491	318791.1014	-0.00102183	0.99919	-665312.3354	664660.8341	-665312.3354	664660.8341
PCPI (2012)	-15.44615777	4.928990256	-3.13373672	0.00523	-25.72785128	-5.164464266	-25.72785128	-5.164464266
EMPLOYMENT	2.582396305	1.174088093	2.199491095	0.03977	0.133291459	5.031501151	0.133291459	5.031501151
DUMMY	-186.7584845	2337.944159	-0.0798815	0.93713	-5063.624543	4690.107574	-5063.624543	4690.107574

Regression 9: Multivariate Regression (Earning, Population, PCPI, and Employment with Dummy)
INVALID
SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.87989066
R Square	0.77420756
Adjusted R Square	0.71148744
Standard Error	35290.4394
Observations	24

ANOVA					
	df	SS	MS	F	Significance F
Regression	5	76866067080	15373213416	12.3438	2.67689E-05
Residual	18	22417472076	1245415115		
Total	23	99283539157			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	-4757010.7	2040592.164	-2.33119129	0.03157	-9044135.731	-469885.6258	-9044135.731	-469885.6258
EARNINGS (2012)	-6.283E-05	5.0323E-05	-1.248515975	0.22784	-0.000168554	4.28956E-05	-0.000168554	4.28956E-05
POPULATION	7.95540043	3.294658403	2.414635892	0.02661	1.033579979	14.87722089	1.033579979	14.87722089
PCPI (2012)	14.4875333	16.89760603	0.857371942	0.40251	-21.01301965	49.98808622	-21.01301965	49.98808622
EMPLOYMENT	4.10141226	2.470350854	1.660254962	0.11418	-1.088602292	9.291426819	-1.088602292	9.291426819
DUMMY	-12634.589	5706.319247	-2.214139833	0.03997	-24623.12062	-646.0568726	-24623.12062	-646.0568726

Forecast Appendix B - Documentation of Invalid Trend Analyses

Forecast Appendix B - Documentation of Invalid Trend Analyses

A trend analysis studies enplaned passenger activity at an airport over an annual historical period. Trend analysis data can provide insights into the performance of an airport and indicate how economic shocks or other external events, such as the COVID-19 Pandemic, impact passenger volumes over time. A trend analysis was conducted on historical enplaned passengers at LAN and the Peer Airports to analyze the regional growth of airports in geographical proximity. The results of the trend analysis were invalid because a statistically significant fit could not be established by the trend equation for historical enplanement activities at LAN and the Peer Airports between FY 2004 and FY 2023 (20 years). All the trend analyses shown below are invalid due to low coefficient of determination (R squared) values.

