3 Forecasts of Aviation Activity

This chapter of the Master Plan Study presents the comprehensive forecast of aviation activity and demand at Blue Grass Airport (LEX or Airport) over the 20-year planning horizon (2022 through 2041). The forecast consists of projections for all categories of activity at the Airport, including passenger enplanements, air carrier operations and fleet mix, general aviation (GA) operations, based aircraft, air cargo operations, military operations, and peak activity levels.

The forecasts of aviation activity provide the Lexington-Fayette Urban County Airport Board (LFUCAB) with guidance to determine facility sizing and capacity recommendations, both airside and landside, that directly impact future development at the Airport. The forecasts will also facilitate the long-term strategic planning and development plans depicted on the updated Airport Layout Plan (ALP).

The developed forecasts account for the impacts of COVID-19 (COVID or Pandemic) and incorporate projected recovery levels based on industry trends and recent activity levels at LEX. The resulting preferred forecast was submitted to the Federal Aviation Administration (FAA) and received their approval.

The forecasts of aviation activity provide guidance to determine facility sizing and capacity recommendations, both airside and landside.

It is important to note that the historical and projected activity levels herein represent calendar year (CY) data (January through December), while the FAA's Terminal Area Forecast (TAF) is organized according to the FAA fiscal year (FY) data (October through September).

3.1 Forecast Categories

Aviation demand forecasts are prepared for a variety of aviation categories, which are determined based on the type and level of activity expected at an airport over the planning horizon. These categories vary in relevance depending on the size and category of an airport and the basic objectives of a specific master plan.

As previously discussed, this Study evaluated and projected commercial activity (enplanements, operations, and fleet mix), GA activity (operations and based aircraft), cargo activity, and military activity. A description of each is provided below.

- Commercial Enplanements – A revenue-paying passenger boarding an aircraft at a given airport
- Commercial Operations – Operations performed by aircraft designed to have a seating capacity of more than 60 seats or a maximum payload capacity of more than 18,000 pounds carrying passengers or cargo for hire or compensation. For this Study, commercial operations include scheduled air carriers and regional partners (including all 50-seat regional jet, 'RJ,' operations), as well as United States and foreign-flagged carriers.
- Commercial Fleet Mix – The grouping of aircraft performing commercial operations at the Airport. This includes 50-seat Regional Jets (RJs).
- GA Operations – Includes all segments of the aviation industry except commercial air carriers/regional/commuter service, scheduled cargo, and military operations
- GA Based Aircraft – Aircraft that spend more than six months of the year at a given airport and that have an agreement with that airport or a tenant for storage, that can perform takeoffs and landings, and that have a valid (current) FAA airworthiness certificate
- Cargo Operations – Comprised of freight, express, and airmail
- Military Operations – Activity performed by the United States military

3.2 Impacts of COVID-19 on the Aviation Industry

3.2.1 Coronavirus Impact Statement

In March of 2020, the United States' airline industry was performing exceptionally well prior to the onset of COVID-19. Major industry consolidation had occurred, airlines were exercising capacity discipline, revenue increased as opportunities to monetize ancillary services increased, oil prices were relatively low, and airlines were modernizing their fleets. All these factors collectively led to record passenger growth and profits. In 2019, the domestic airline industry served more than 400 million passengers, an all-time high. This progress was all put on a multi-year hold due to the impacts of COVID-19.

3.2.2 COVID-19 Impact on Commercial Aviation

Industry Impacts

As a result of the challenges the airline industry faced due to COVID-19, airlines modified their network strategies to take advantage of the limited segments of demand that existed in the marketplace. Legacy airlines retreated to their core profit-generating interior hubs while shrinking their coastal hubs and international gateways. All carriers shifted their networks to leisure-oriented markets, such as Florida, and several carriers started service to new cities altogether consisting of leisure-oriented markets or markets that had barriers to entry pre-COVID.

On the labor front, the airline industry offered tens of thousands of employees early retirement. As a result, an estimated 6,000+ pilots participated in early retirement during the pandemic. This action saved carriers a significant amount of money and helped them to survive the pandemic.

As a result of the strategic modifications by the airlines, widespread availability of vaccinations, and most states experiencing a decline in COVID-19 cases, a slow but steady resurgence in air travel has been occurring since mid-2020. The Airport has also participated in the resulting travel slump and build-back, as illustrated in **Figure 3-1**.

Figure 3-1
Lexington Year-Over-Year TSA Throughput

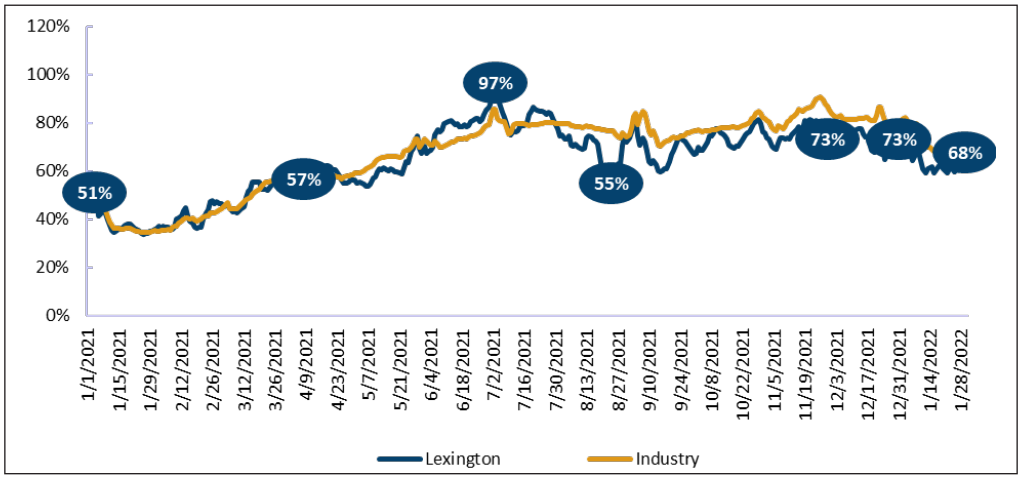


Chart presents percentage (%) of last year's TSA throughput.
Source: TSA Throughput data, Ailevon Pacific Consulting analysis, 2022.

Industry Recovery and Outlook

As of summer 2022, the aviation industry had restored approximately 93 percent of capacity compared to pre-COVID (2019). Airlines in the United States were reporting record levels of demand and revenues heading into the summer of 2022. A look at the capacity trend in **Figure 3-2** shows that the Airport is beginning to recover gradually.

Figure 3-2
Lexington vs. Industry – Capacity by Month

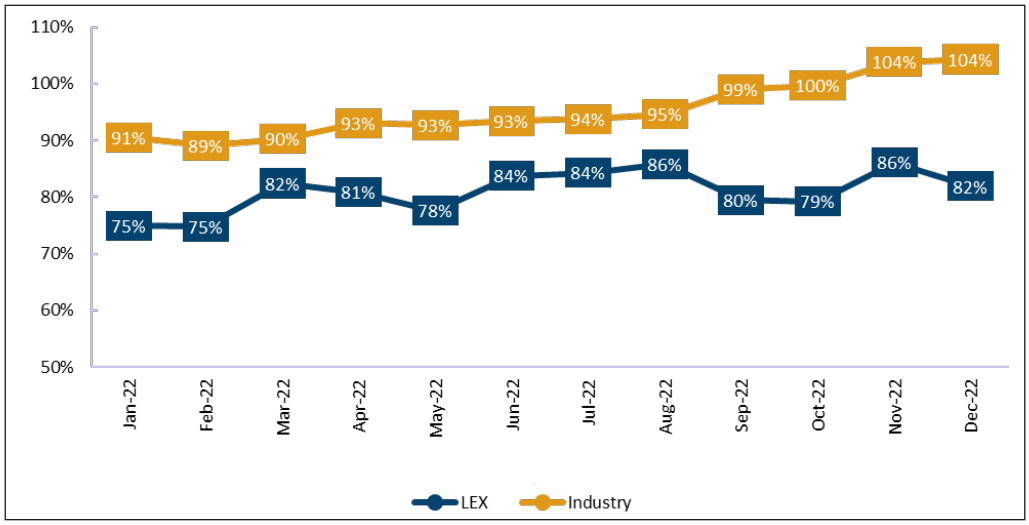


Chart depicts domestic departing seats as a percentage (%) of 2019.
Source: Cirium OAG schedule data via Diio Mi, Ailevon Pacific Aviation Consulting analysis, 2022.

Although demand is surging, two concerns have recently emerged that could serve as barriers to future growth. Fuel prices increased dramatically in the first and second quarters of 2022 to levels not seen in over five years. Fuel prices will likely remain elevated for the rest of 2022 and beyond. This puts notably higher costs into the equation of the airline planning process. Labor shortages are the other concern that has emerged. The shortages are wide-ranging, from ground personnel at airports to mechanics and pilots. The pilot shortage is the portion of the labor pool that is the most specialized and most likely to constrain growth in air service for the foreseeable future. The pilot shortage is expected to worsen in North America and globally in the coming years, as shown below in **Figure 3-3**.

The pilot shortage is the portion of the labor pool that is the most specialized and most likely to constrain growth in air service for the foreseeable future.

Figure 3-3
Predicted Pilot Shortage by Region and Year

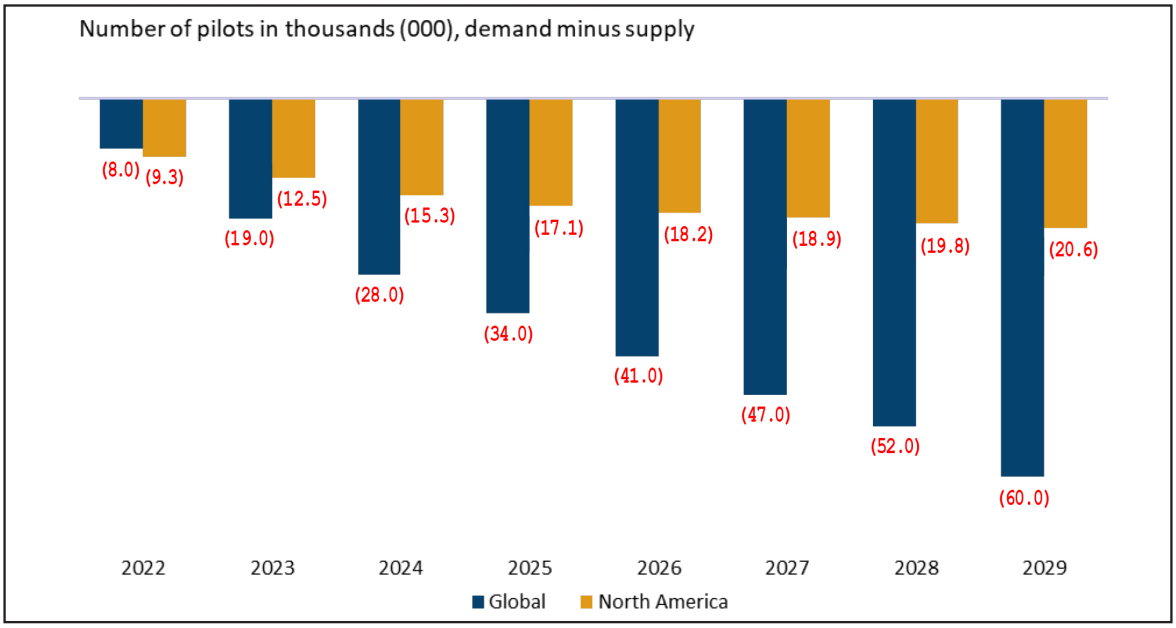


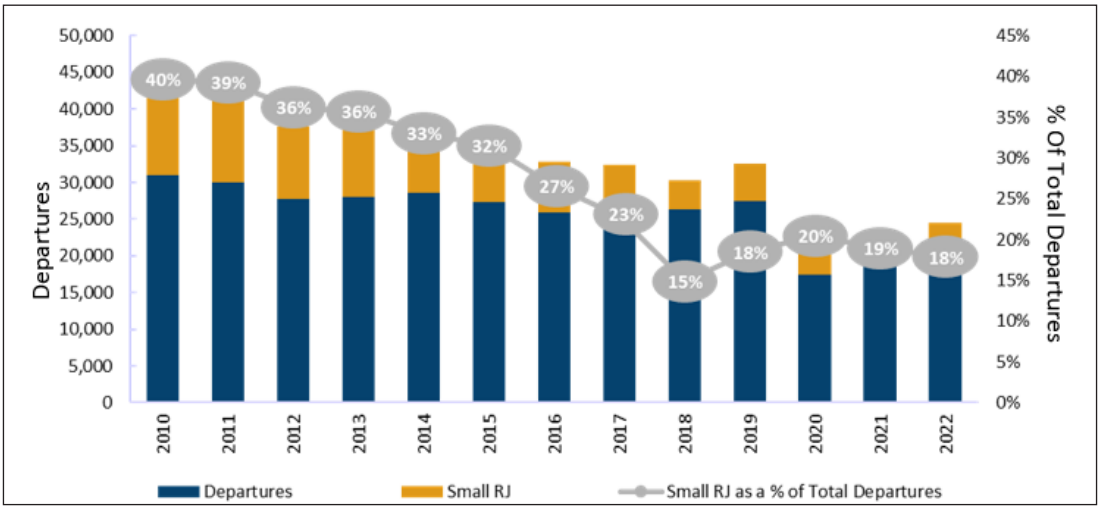
Chart depicts number of pilots in thousands (000), demand minus supply.
Source: OliverWyman.com, Skift Aviation Forum; Ailevon Pacific Aviation Consulting analysis, 2022.

During the last decade, there has already been a decline in the number of smaller jets flying (especially the small 50-seat RJ aircraft), but the trend accelerated dramatically during COVID-19 and now looks unlikely to recover. Future RJ schedules are reduced each week. If trends continue, it is now likely that 2022 may feature fewer RJ operations than 2021—a year with much lower travel demand.

Historically, the Airport has had relatively high exposure to the 50-seat RJ. This exposure started to decline in 2021 and 2022 (see **Figure 3-4**) and is likely to continue into 2023 as carriers such as Delta Air Lines have announced they plan to no longer fly 50-seat jets by the end of 2023.

[Intentional Page Break]

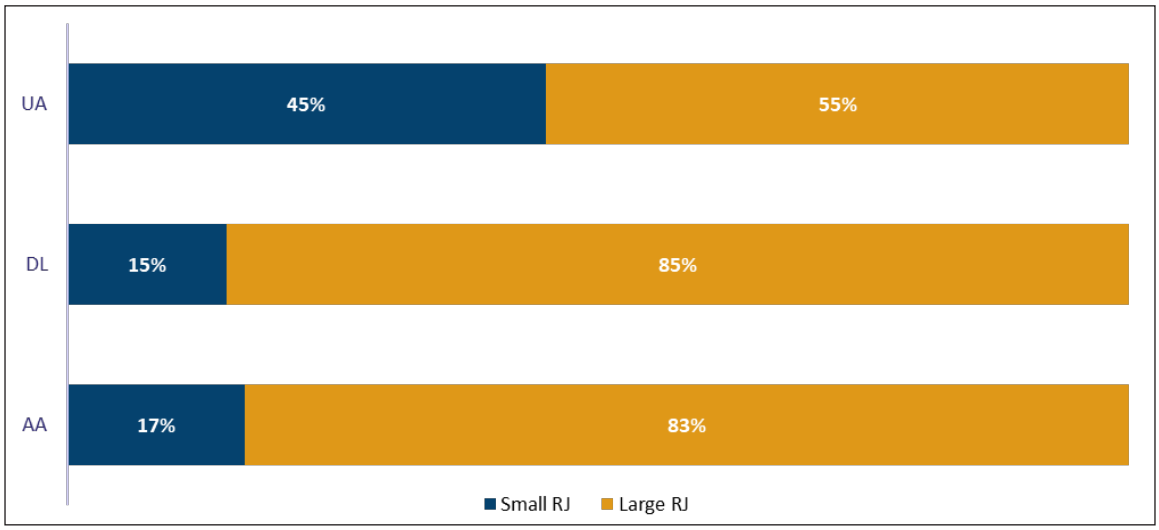
Figure 3-4
LEX Annual Departures by Aircraft Type



Source: Cirium OAG schedule data via Diio Mi, Ailevon Pacific Aviation Consulting analysis, 2022.

United Airlines (UA) has the largest exposure to 50-seat RJ aircraft. Nearly half of its RJ fleet contains 50 seats or less, as shown in **Figure 3-5**. This is a much higher proportion than American Airlines (AA) or Delta Air Lines (DL).

Figure 3-5
Regional Jet Seat Mix



AA – American Airlines, DL – Delta Air Lines, and UA – United Airlines.
Chart depicts 2021 RJ seat share by RJ type.
Note: Small RJ is 50 seats or less; large RJ is 65-76 seats.
Source: Schedule data via Diio Mi; Ailevon Pacific Aviation Consulting analysis, 2022.

The pilot shortage has started to impact ultra-low-cost carriers (ULCCs). Allegiant pulled back the planned summer schedule for 2022. Other ULCCs also announced reductions in their summer 2022 schedules and cited a shortage of pilots.

3.2.3 COVID-19 Impact on General Aviation

Industry Impacts

GA operations were not as impacted by the pandemic as commercial operators were. While travel and route restrictions were placed on the commercial industry, route restrictions were not placed on GA destinations; however, business and travel restrictions did impact itinerant GA travel, though recreational flying remained relatively stable throughout the pandemic. In addition, during 2020, GA pilots began assisting with COVID-19 relief efforts by aiding in delivering personal protective equipment to medical facilities.

As shown in **Figure 3-6**, GA aircraft shipment reports published by the General Aviation Manufacturers Association (GAMA) indicate that aircraft shipments in the United States declined from 2,670 aircraft in 2019 to 2,419 aircraft in 2020. In 2021, aircraft shipments improved by approximately 9.4 percent, with shipments totaling 2,646 aircraft.[1]

Figure 3-6
General Aviation Aircraft Shipments

Aircraft Shipments & Billings: Comparison of Last Three Full Years				
AIRPLANE SHIPMENTS	2019	2020	2021	% CH. 20-21
Piston Airplanes (*)	1,336	1,332	1,409	+58%
Turboprop Airplanes	525	443	527	+19.0%
Business Jets	809	644	710	+10.2%
TOTAL AIRPLANE SHIPMENTS	**2,670**	**2,419**	**2,646**	**+9.4%**
TOTAL AIRPLANE BILLINGS	**$23.5B**	**$20.0B**	**$21.6B**	**+7.6%**
HELICOPTER SHIPMENTS	2019	2020	2021	% CHANGE 20-21
Piston Helicopters (*)	179	142	181	+27.5%
Turbine Helicopters (*)	698	567	679	+19.8%
TOTAL HELICOPTER SHIPMENTS	**877**	**709**	**860**	**+21.3%**
TOTAL HELICOPTER BILLINGS	**$3.8B**	**$3.4B**	**$4.2B**	**+22.6%**

Source: General Aviation Manufacturers Association, 2022.

[1] General Aviation Manufacturers Association. *Aircraft Shipments & Billings: Comparison of Last Three Full Years*. https://gama.aero/facts-and-statistics/quarterly-shipments-and-billings/. Accessed 02 September 2022.

Impact at LEX

Similar to the national GA industry, GA activity at the Airport was not as heavily impacted as commercial activity. Based on data provided by the LFUCAB and collected via the FAA Operations Network (OPSNET), GA operations experienced a decrease of approximately 10.6 percent from 2019 to 2020. Although operations decreased at the beginning of the pandemic, GA activity increased in 2021 by approximately 27.6 percent, surpassing activity prior to the pandemic. The trends regarding GA activity levels at LEX are further discussed in **Section 3.9**.

3.3 Historical Aviation Activity Levels

A summary of historical activity levels at LEX (e.g., enplanements, operations, and based aircraft) is depicted in **Table 3-1**.

Table 3-1
Historical Activity Levels at LEX

Year	Based Aircraft	Operations							
		Enplanements	Air Carrier	Cargo	Itinerant GA	Local GA	Itinerant Military	Local Military	Total Operations
2011	106	533,987	25,186	254	35,181	5,381	1,191	170	67,363
2012	105	535,141	23,119	352	37,047	4,733	1,361	323	66,935
2013	110	538,610	23,159	221	34,521	5,069	1,441	309	64,720
2014	110	594,704	23,429	456	36,421	6,917	1,412	205	68,840
2015	94	607,251	23,361	356	38,801	5,277	1,436	264	69,495
2016	101	638,675	23,378	249	38,766	5,012	1,635	324	69,364
2017	105	637,934	23,801	218	39,244	6,959	1,727	353	72,302
2018	134	656,607	23,809	191	38,911	5,947	1,569	398	70,825
2019	144	708,154	24,605	194	41,651	8,592	1,480	221	76,743
2020	151	286,597	14,639	172	35,433	9,160	1,239	191	60,834
2021	165	464,169	17,288	127	44,276	12,611	1,789	74	76,165

Based aircraft from 2011 through 2020 were provided by the FAA 2021 TAF, while based aircraft in 2021 reflect those provided by Blue Grass Airport.
Source: Blue Grass Airport, FAA 2021 TAF, FAA Operations Network (OPSNET), Bureau of Transportation Statistics (BTS) T-100 data, CHA, 2022.

3.3.1 Historical Enplanements

The Airport's enplanements were relatively steady from 2011 through 2018, ranging between a low of 533,987 enplanements in 2011 and a high of 656,607 in 2018. In 2019, LEX experienced a record-high number of passenger enplanements at 708,154, or approximately 7.9 percent growth from the previous year (2018). As was the case with commercial service airports in the United States, the Airport experienced a drastic decrease in passenger enplanements in 2020 as a direct impact of COVID-19, resulting in changes in airline services. From 2019 to 2020, the Airport's enplanements decreased from 708,154 to 286,597 (approximately a 59.5 percent decrease).

In 2021, the Airport began recapturing passenger activity that was previously lost due to COVID-19 as airlines began increasing route frequencies and as the public became more comfortable with reinstating the use of public transportation. Enplanements increased by approximately 62.0 percent from 2020 to 2021, as approximately 42.1 percent of the reduced passenger activity was recovered. The Airport's historical passenger enplanements are depicted in **Table 3-1**.

3.3.2 Historical Operations

As shown in **Table 3-1**, the Airport's total aircraft operations were relatively steady from 2011 through 2018, ranging between 64,720 (in 2013) and 72,302 (in 2017). In 2019, operations reached a record peak with 76,743 operations before decreasing by approximately 20.7 percent to a nine-year historical low of 60,834 operations in 2020 due to COVID-19. In 2021, commercial, GA, and military operations each increased, with only freight operations having a slight decrease in activity. In 2021, the Airport's total number of aircraft operations (76,165) nearly made a complete rebound, as approximately 96.4 percent of the lost operations in 2020 were recovered. The increase in commercial travel can be partially attributed to the return of commercial services and routes that were previously reduced, while factors leading to the increase of GA operations could be attributed to an increase in disposable income within the Lexington-Fayette, Kentucky Metropolitan Statistical Area (MSA) and Commonwealth of Kentucky.

3.3.3 Historical Based Aircraft

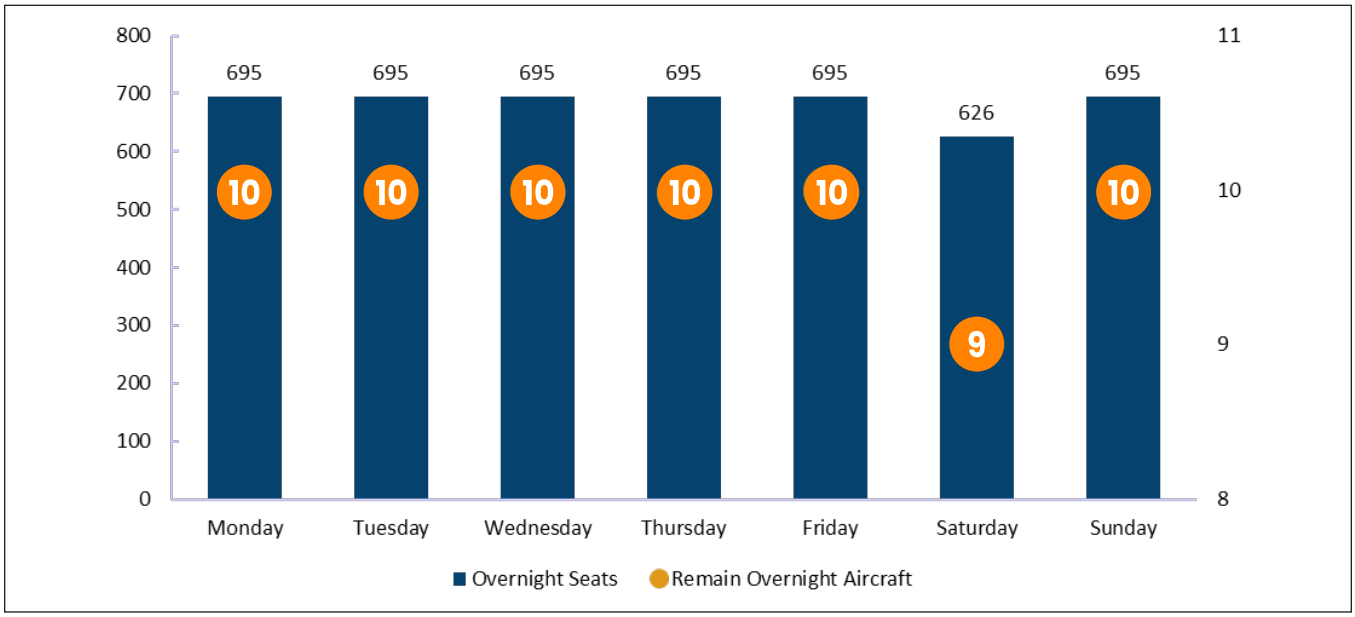
The Airport's number of based aircraft has experienced several periods of fluctuations between 2011 and 2021, as seen in **Table 3-1**. The number of based aircraft was lowest in 2015, at 94 aircraft, and highest in 2021, at 165 aircraft. In 2021, the 165 based aircraft consisted of 117 single-engine aircraft, 11 multi-engine aircraft, 28 jets, and nine helicopters.

3.4 Remain Overnight (RON) Activity at LEX & Non-Stop Service Destinations

3.4.1 RON Activity

As shown in **Figure 3-7**, LEX had 10 RON airline aircraft for six out of seven days per week in the summer of 2022.

Figure 3-7
Remain Overnight Aircraft



Lexington forecast for RON aircraft for July 2022 by day of week.
Source: Ailevon Pacific Aviation Consulting analysis, 2022.

3.4.2 Non-Stop Service Destinations

The impact of COVID-19 was more severe on business markets than on leisure markets, thus resulting in a loss of service. Service lost at LEX included those destinations north of Lexington, such as Minneapolis/St. Paul (MSP), New York LaGuardia (LGA), and Washington DC (IAD). A map of the current (2024) scheduled and seasonal non-stop destinations for LEX is depicted in **Figure 1-4.**

3.5 Factors Influencing Activity at LEX

External factors that were included in the evaluation of passenger activity at the Airport included, but were not limited to, the following:

- Actual passenger enplanements indicate that the Airport's enplanements are on pace to recover in 2023.
- Socioeconomic growth in the Airport's catchment area and Lexington-Fayette, Kentucky MSA (i.e., population, per capital income, employment, etc.)
- The presence of a growing ULCC market at the Airport (e.g., Allegiant Air)
- Expected growth in future air service from an emerging ULCC Airline, as well as additional and returning routes via existing airlines (refer to **Section 3.4**)

3.6 Forecast Data Sources

Information factored into both the planning and forecasting efforts included commercial air carrier industry trends, airframe orders and retirement programs, cargo operational trends, GA operational trends, and anticipated changes in the Airport's operating aircraft fleet mix. The data and assumptions used to define baseline conditions and future activity trends were derived from the following data sources:

- Airport Management – Airport management representatives typically provide the most accurate historical data and future assumptions at an airport. This includes passenger and operational activity, facility needs, gate requirements, fleet mix transitions, and anticipated service growth.
- Ailevon Pacific Aviation Consulting – Ailevon Pacific Aviation Consulting provided insight and data regarding upcoming new and enhanced service routes and performed methodologies to project future enplanement activity at the Airport.
- Airline Management – Airline representatives provide insight on planned and future airline routes and airframe changes, which are directly factored into the assumptions and methodologies of the demand projections.
- FAA 2021 TAF[2] – TAF activity estimates are derived by the FAA from national estimates of aviation activity. These estimates are then assigned to individual airports based on multiple market and forecast factors. The FAA looks at local and national economic conditions, as well as trends within the aviation industry, to develop each forecast.
- FAA Traffic Flow Management System Counts (TFMSC) – The FAA's TFMSC contains air traffic activity and fleet mix data for the National Airspace System (NAS).
- FAA Operations Network (OPSNET) – This data system is maintained by the FAA and provides operation counts at towered airports within the NAS.

[2] The 'FAA 2021 TAF' was published in March 2022 and represents activity at LEX through 2020, with activity beyond 2020 representing the FAA's activity projections.

- Bureau of Transportation Statistics (Air Carriers: T-100) – The Bureau of Transportation Statistics (BTS), part of the Department of Transportation (DOT), provides statistical data relating to commercial aviation, multimodal freight activity, and transportation economics. The T-100 data contains market data reported by United States carriers, including the air carrier, flight origin and destination, equipment type and seat information, and number of enplaned passengers.
- Boeing Commercial Market Outlook (2022-2041) & Airbus Global Market Forecast (2022-2041) – These market outlooks provide information detailing future fleet mix transitions for commercial carriers, such as new aircraft entering the market and future equipment retirements.
- FAA Aerospace Forecast (FY 2022-2042) – This forecast provides an overview of aviation industry trends and expected growth for the commercial passenger air carrier and GA activity segments. National growth rates of enplanements, operations, and fleet mixes are provided over a 20-year forecast horizon. For forecast development purposes, the FAA Aerospace Forecasts were used as comparisons to determine the growth of the GA fleet. This forecast also provides insight into future air cargo growth trends on national and international levels.
- Woods & Poole Economics, Inc. – Woods & Poole Economics, Inc. is an independent firm specializing in developing long-term economic and demographic projections, utilizing more than 900 economic and demographic variables. The database includes every state, MSA, and county in the United States. For the purposes of this Study, data contained within the 2021 State Profile for Kentucky was utilized, which contained historical data through 2019 and projections from 2020 to 2050.

3.7 Socioeconomic Factors

The factors that have the greatest impact on the growth prospects of an airport are the socioeconomic characteristics (i.e., population, employment, and personal income per capita) present within the airport's catchment, or market area. For the purposes of this forecast, socioeconomic data was evaluated for the United States, the Commonwealth of Kentucky, the Lexington-Fayette, Kentucky MSA,[3] and the Airport's catchment area.

An airport's catchment area is defined as the locale in which an airport captures most of its users. To determine the catchment area, socioeconomic factors were evaluated to identify which airports the local population is most likely to use based on proximity to other airports in the region[4] with respect to drive time and demographics. The economic and demographic growth patterns for this area have significant impacts on future demand for the Airport's air service.

An airport's catchment area is defined as the locale in which an airport captures most of its users.

For the purposes of this Study, the Airport's primary catchment area consists of the following counties within Kentucky (KY): Anderson, Bath, Bourbon, Boyle, Bracken, Casey, Clark, Estill, Fayette, Fleming, Franklin, Garrard, Grant, Harrison, Henry, Jackson, Jessamine, Lincoln, Madison, Marion, Menifee, Mercer, Montgomery, Nelson, Nicholas, Owen, Pendleton, Powell, Robertson, Rockcastle, Scott, Shelby, Spenser, Washington, and Woodford counties.

In addition to the common demographic factors, activity within Lexington is driven by tourism. As such, changes in tourism activities impact employment rates and income per capita in the area around Lexington, as well as air carrier services at the Airport.

[3] The Lexington-Fayette, KY MSA consists of Bourbon, Clark, Fayette, Jessamine, Scott, and Woodford counties.
[4] Refer to Chapter 1, *Inventory*, Section 1.2.2 — Location and Service Area.

COVID-19 Disclaimer

Although 2019 represents the last year of historical socioeconomic data provided, Woods & Poole has continued to analyze the effects of COVID-19 on the economy and the impacts on the provided projections. Per Woods & Poole's 2021 State Profile for Kentucky, "COVID-19 itself does not appear to have made a quantifiable long-term economic impact that would affect United States economic growth beyond 2022 and through 2050."

3.7.1 Population

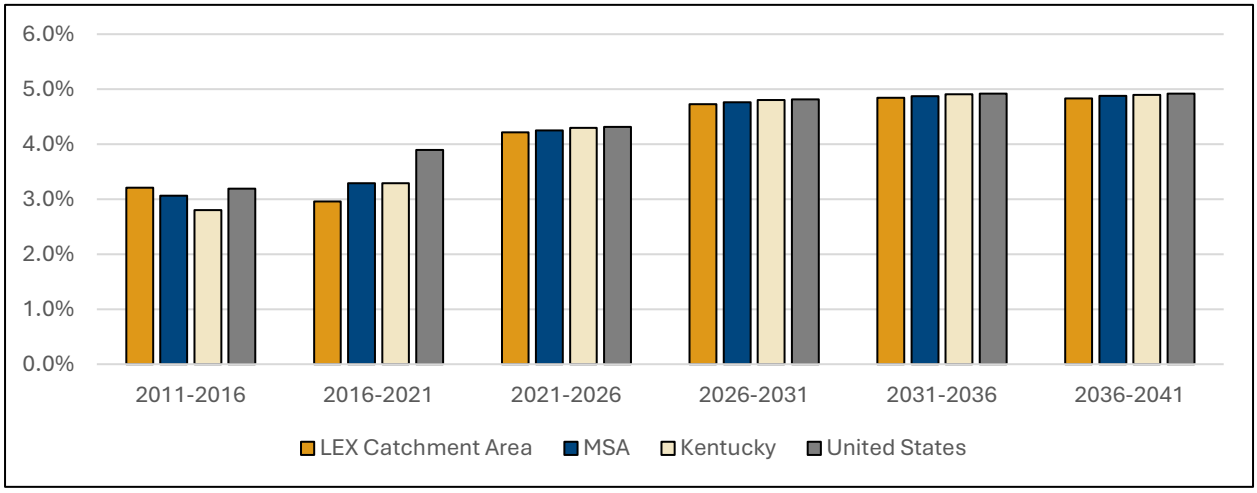
From 2011 through 2021, the Airport's catchment area, the Lexington-Fayette, Kentucky MSA, the Commonwealth of Kentucky, and the United States all experienced steady growth and are projected to continue steadily increasing throughout the forecast horizon. In 2021, the Lexington-Fayette, Kentucky MSA had a population of approximately 525,160, while the Airport's catchment area had a population of approximately 1,175,760 (approximately 26.1 percent of Kentucky's population of 4,503,104). The Compound Annual Growth Rate (CAGR) from 2011 to 2021 for the LEX catchment area was approximately 0.7 percent, which was below the CAGR for the MSA (0.9 percent) and above the CAGRs for the Commonwealth of Kentucky (0.3 percent) and the United States (0.6 percent). The population growth rate from 2021 through 2041 for the catchment area and the United States are equally projected, with CAGRs of approximately 0.6 percent, which is higher than the CAGR for the Commonwealth of Kentucky (0.4 percent) but lower than the MSA's CAGR of 0.8 percent. The higher growth rate of the MSA and catchment area in comparison to the Commonwealth of Kentucky indicates that the Airport is dependent upon resident travelers for passenger activity growth. See **Table 3-2** and **Figure 3-8**.

Table 3-2
Population (Historical & Projected)

Year	Airport's Catchment Area	5-Year CAGR	MSA (Lexington-Fayette, KY)	5-Year CAGR	Commonwealth of Kentucky	5-Year CAGR	United States	5-Year CAGR
2011	1,097,560	–	478,930	–	4,369,821	–	311,556,806	–
2016	1,139,747	0.8%	507,387	1.2%	4,438,182	0.3%	322,946,138	0.7%
2021	1,175,759	0.6%	525,156	0.7%	4,503,104	0.3%	332,219,513	0.6%
CAGR 2011-2021	**0.7%**	–	**0.9%**	–	**0.3%**	–	**0.6%**	–
2026	1,216,201	0.7%	548,368	0.9%	4,609,653	0.5%	343,776,826	0.7%
2031	1,255,516	0.6%	570,949	0.8%	4,709,854	0.4%	355,171,046	0.7%
2036	1,293,063	0.6%	592,506	0.7%	4,801,537	0.4%	366,230,596	0.6%
2041	1,328,253	0.5%	612,675	0.7%	4,882,816	0.3%	376,799,404	0.6%
CAGR 2021-2041	**0.6%**	–	0.8%	–	0.4%	–	0.6%	–
Growth Rate 2021-2041	**13.0%**	–	**16.7%**	–	**8.4%**	–	**13.4%**	–

Source: Woods and Poole Economics, Inc., CHA, 2022.

Figure 3-8
Population (Historical & Projected)



Depicts Five-Year CAGR.
Source: Woods and Poole Economics, Inc., CHA, 2022.

3.7.2 Employment

In 2020, the number of jobs within the Airport's catchment area decreased by approximately 4.2 percent, which could be a result of COVID-19. Despite a decrease in jobs the previous year (641,874 jobs in 2020), the number of jobs within the Airport's catchment area increased in 2021 to approximately 684,270, exceeding 2019's jobs by approximately 14,000. The Airport's catchment area jobs represented approximately 26.1 percent of all of Kentucky's jobs in 2021.

Like the Airport's catchment area, the MSA, Commonwealth of Kentucky, and the United States experienced a decrease in jobs in 2020, followed by increases in 2021 that exceeded the number of jobs available prior to COVID-19. The number of jobs prior to COVID-19 (2019) and in 2020 were as follows:

- Lexington-Fayette, Kentucky MSA
  - 2019 (361,873 jobs); 2020 (345,810 jobs)
- Kentucky
  - 2019 (2,572,461 jobs); 2020 (2,453,372 jobs)
- United States
  - 2019 (203,809,516 jobs); 2020 (191,619,466 jobs)

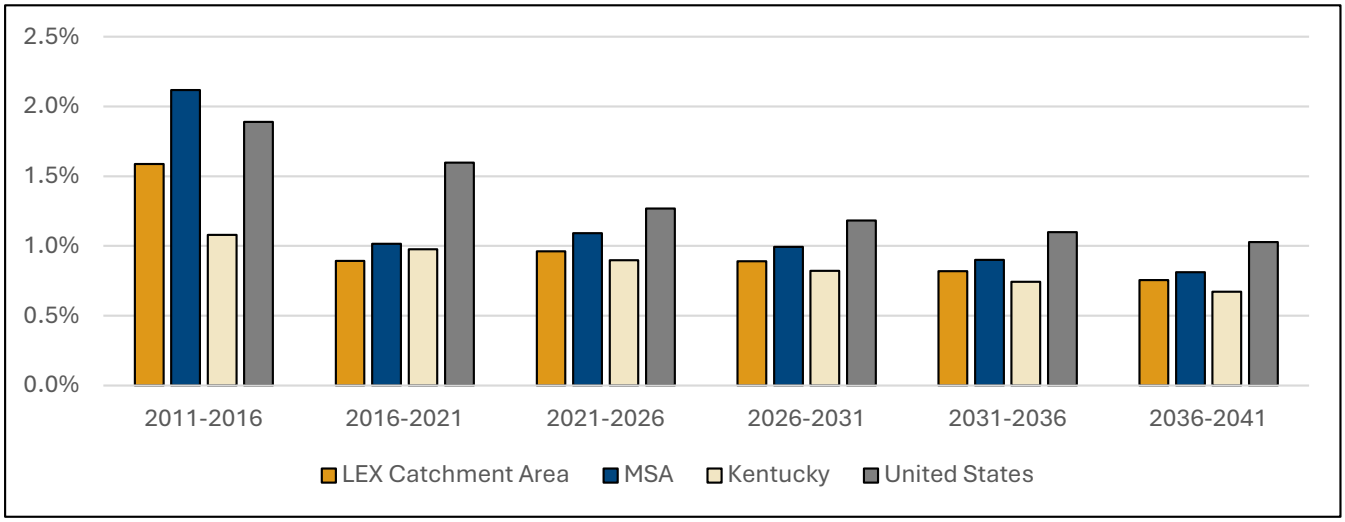
Table 3-3 and **Figure 3-9** present employment figures and CAGRs within the Airport's catchment area, MSA, Kentucky, and United States, which are each expected to steadily increase throughout the forecast horizon.

Table 3-3
Employment (Historical & Projected)

Year	Airport's Catchment Area	5-Year CAGR	MSA (Lexington Fayette, KY)	5-Year CAGR	Commonwealth of Kentucky	5-Year CAGR	United States	5-Year CAGR
2011	604,945	–	317,156	–	2,368,199	–	176,091,617	–
2016	654,552	1.6%	352,189	2.1%	2,498,855	1.1%	193,378,928	1.9%
2021	684,271	0.9%	370,465	1.0%	2,623,334	1.0%	209,319,103	1.6%
CAGR 2011-2021	1.2%	–	1.6%	–	1.0%	–	1.7%	–
2026	717,856	1.0%	391,155	1.1%	2,743,219	0.9%	222,948,195	1.3%
2031	750,434	0.9%	411,004	1.0%	2,857,727	0.8%	236,437,342	1.2%
2036	781,715	0.8%	429,832	0.9%	2,965,493	0.7%	249,724,570	1.1%
2041	811,701	0.8%	447,578	0.8%	3,066,534	0.7%	262,828,819	1.0%
CAGR 2021-2041	**0.9%**	**–**	**0.9%**	**–**	**0.8%**	**–**	**1.1%**	**–**
Growth Rate 2021-2042	**18.6%**	**–**	**20.8%**	**–**	**16.9%**	**–**	**25.6%**	**–**

Source: Woods and Poole Economics, Inc., CHA, 2022.

Figure 3-9
Employment CAGR (Historical and Projected)



Depicts Five-Year Compound Annual Growth Rate (CAGR).
Source: Woods and Poole Economics, Inc., CHA, 2022.

3.7.3 Per Capita Personal Income

Per capita personal income (PCPI) is the measure of income calculated as the personal income of the residents of a given area divided by that area's resident population. Despite experiencing an approximate 4.2 percent decrease in jobs from 2019 to 2020, PCPI within the Airport's catchment area was relatively steady, experiencing only an approximate 0.3 percent decrease. However, the catchment area's PCPI CAGR from 2011 to 2021 was approximately 3.1 percent.

While the number of jobs in the Lexington-Fayette, Kentucky MSA, Commonwealth of Kentucky, and the United States decreased from 2019 to 2020, the PCPI in each area increased consistently through 2021.

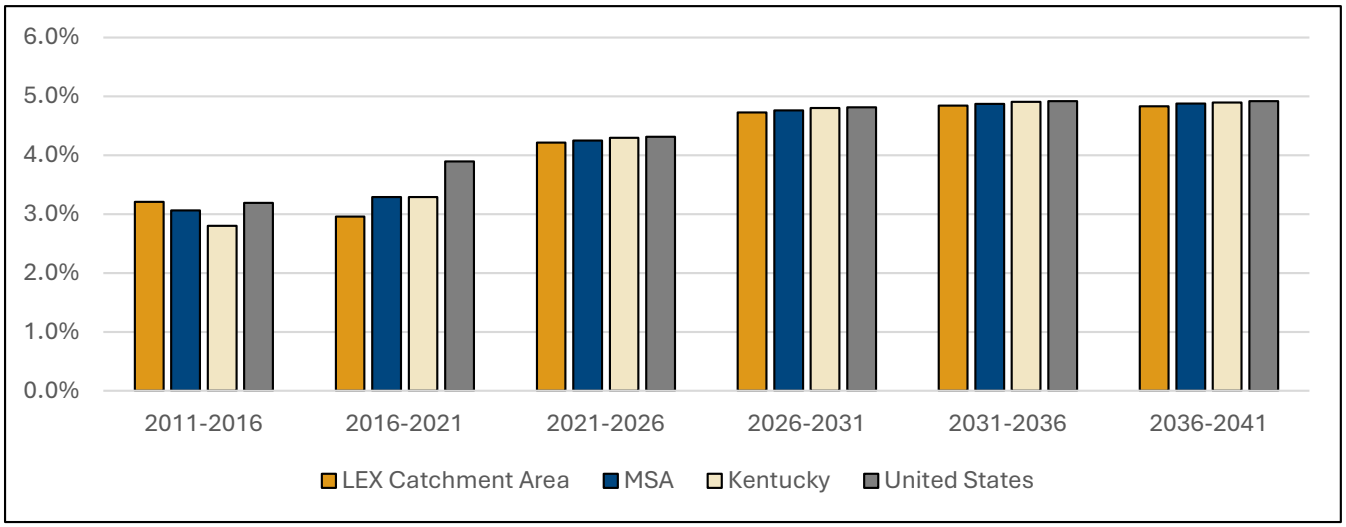
In 2021, the Airport's catchment area had an average PCPI of approximately $41,420, which was lower than that of the MSA, Commonwealth of Kentucky, and United States. The MSA had a PCPI of approximately $53,050, which was slightly higher than that of the Commonwealth of Kentucky ($46,745) but lower than that of the United States (approximately $60,540). **Table 3-4** and **Figure 3-10** present PCPI figures and CAGRs within the Airport's catchment area, MSA, Kentucky, and the United States, which are each expected to increase incrementally throughout the forecast horizon.

Table 3-4
Per Capita Personal Income (Historical & Projected)

Year	Airport's Catchment Area	5-Year CAGR	MSA (Lexington-Fayette, KY)	5-Year CAGR	Commonwealth of Kentucky	5-Year CAGR	United States	5-Year CAGR
2011	$30,576	–	$38,809	–	$34,624	–	$42,739	–
2016	$35,803	3.2%	$45,125	3.1%	$39,754	2.8%	$50,014	3.2%
2021	$41,421	3.0%	$53,047	3.3%	$46,745	3.3%	$60,536	3.9%
CAGR 2011-2021	**3.1%**	–	**3.2%**	–	**3.0%**	–	**3.5%**	–
2026	$50,915	4.2%	$65,328	4.3%	$57,681	4.3%	$74,774	4.3%
2031	$64,149	4.7%	$82,428	4.8%	$72,929	4.8%	$94,592	4.8%
2036	$81,257	4.8%	$104,569	4.9%	$92,670	4.9%	$120,277	4.9%
2041	$102,890	4.8%	$132,672	4.9%	$117,695	2.8%	$152,921	4.9%
CAGR 2021-2041	**4.7%**	–	**4.7%**	–	**4.7%**	–	**4.7%**	–
Growth Rate 2021-2042	**148.4%**	–	**150.1%**	–	**151.8%**	–	**152.6%**	–

Source: Woods and Poole Economics, Inc., CHA, 2022.

Figure 3-10
Per Capita Personal Income (Historical & Projected)



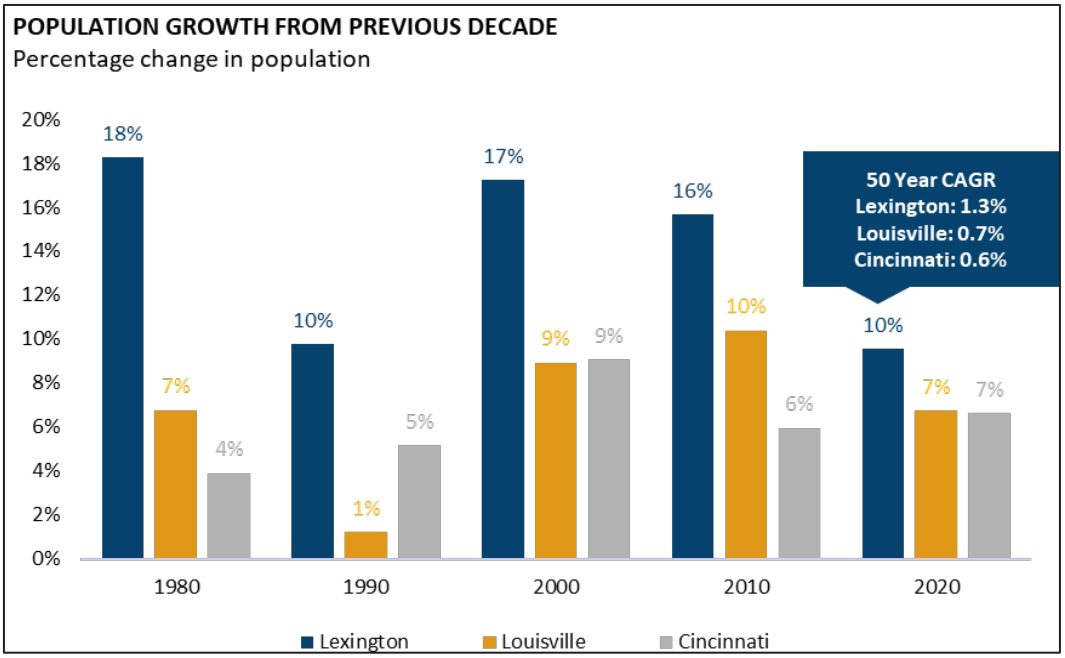
Depicts Five-Year Compound Annual Growth Rate (CAGR).
Source: Woods and Poole Economics, Inc., CHA, 2022.

3.7.4 Comparison to Regional Socioeconomics

Over the past 20 years, the Lexington-Fayette, Kentucky MSA has experienced both faster population and economic growth rates than either of its two largest peer MSAs (Louisville/Jefferson County, Kentucky-Indiana MSA and Cincinnati, Ohio-Kentucky-Indiana MSA). In the case of population growth, Lexington-Fayette, Kentucky MSA has experienced a growth rate double that of Louisville or Cincinnati, as shown in **Figure 3-11**. Economic output growth has been nearly a third higher in Lexington than in either Louisville or Cincinnati. Employment growth since 2000 has been stronger in Lexington than in either Louisville or Cincinnati. These factors support stronger enplanement growth for Lexington than for either Louisville or Cincinnati going forward into the decade of the 2020s.

[Intentional Page Break]

Figure 3-11
Population Growth (Comparing MSAs)



Source: US Census Bureau, Ailevon Pacific Aviation Consulting analysis, 2022.

The prime indicator of activity demand for a commercial service airport is the number of annual enplaned passengers, as enplanements drive passenger terminal sizing requirements

3.8 Commercial Activity Forecasts

To determine the facility sizing requirements necessary to adequately accommodate the current and future activity demand at the Airport, a forecast of annual enplaned passengers and annual commercial aircraft operations was developed. The prime indicator of activity demand for a commercial service airport is the number of annual enplaned passengers, as enplanements drive passenger terminal sizing requirements and, to a lesser extent, commercial carrier operations and fleet mix. This section provides the methodologies for the development of the Airport's commercial enplanements over the 20-year planning horizon (through 2041).

3.8.1 Commercial Enplanements Forecast

Enplanements are the primary measure of a commercial service airport's passenger activity and are key factors for terminal building and parking facility requirements. In addition to being an important trend-tracking tool for airport management, the FAA also uses an airport's reported annual enplanements to calculate Airport Improvement Program (AIP) passenger entitlement funding through an apportionment formula. For the purposes of this Study, forecasted enplanements serve as the basis for the Airport's facility requirements and financial projections. Several forecast methodologies and statistical analyses were utilized to provide a range of the Airport's potential passenger activity levels. From these projections, a recommended forecast was developed that represents the most reasonable projection of future activity based on existing data and current trends in passenger activity. Each of the analyzed methodologies, along with the accompanying enplanement forecasts, are described in the subsequent sections.

FAA Terminal Area Forecast (TAF)-Based Growth Scenarios

Two FAA TAF-based growth scenarios are described in the following paragraphs and summarized in **Table 3-5**.

FAA TAF-Based Compound Annual Growth Rate Scenario

The FAA TAF-based CAGR methodology assumed the FAA 2021 TAF's projected CAGR from 2021 to 2041 for enplanements and applied that assumption to actual airport-reported data. Per the FAA 2021 TAF, the Airport's 2021 enplanements were projected at 394,959; however, actual enplanements were 464,169. The TAF's CAGR from 2021 to 2041 of approximately 5.7 percent was applied to the actual 464,169 enplanements and projected through 2041 at a static 5.7 percent (approximate) each year. The result of this methodology projected 1,396,033 enplanements by 2041, with an overall CAGR of approximately 5.7 and a growth of approximately 200.8 percent. Although this forecast projection consists of growth throughout the forecast horizon, it was not chosen to represent the recommended enplanements. Using this methodology, enplanements would not recover to 2019 activity levels until 2029; however, based on recent activity, enplanements are foreseen to recover at a quicker rate than indicated in this scenario.

FAA TAF-Based Year-Over-Year Growth Scenario

The FAA TAF-based year-over-year methodology applied the FAA 2021 TAF's projected year-over-year growth rates from 2021 through 2041 for enplanements to actual airport-reported data. The year-over-year TAF growth rate was then applied to the actual enplanements in 2021 and projected through 2041, assuming the TAF growth rate for the respective years. Like the FAA CAGR scenario, the result of this methodology projected 1,396,033 enplanements by 2041; however, the rate of recovery of enplanements post-COVID-19 is more aggressive, with enplanements projected to recover to 2019 levels by 2023. By this method, the Airport's enplanements are expected to grow by approximately 200.8 percent from 2021 to 2041.

New passenger air service began at the Airport in October, and service expanded in November. It is important to note that the FAA's TAF does not account for the entrance of an additional carrier; thus, the TAF-based year-over-year growth scenario was not chosen to represent the Airport's recommended forecast because it is on the slightly conservative side.

Table 3-5
FAA TAF-Based Growth Scenarios (Enplanements)

Year	FAA 2021 TAF	FAA TAF-Based CAGR Growth	Year-Over-Year FAA TAF-Based Growth
2021	394,959	464,169	464,169
2026	890,735	611,267	1,046,822
2031	994,046	804,981	1,168,236
2036	1,093,985	1,060,085	1,285,688
2041	1,187,877	1,396,033	1,396,033
CAGR 2021-2041	**5.7%**	**5.7%**	**5.7%**
Growth Rate 2021-2041	**200.8%**	**200.8%**	**200.8%**

Source: FAA 2021 TAF, Bureau of Transportation Statistics (BTS) T-100 data, CHA, 2022.

Historical Trend Scenarios

Pre-COVID Historical Trends

In the pre-COVID historical trend scenarios, historical trends prior to the pandemic from 2011 to 2019 were determined and assumed throughout the forecast horizon. Three-year (2016 to 2019), five-year (2014 to 2019), and eight-year (2011 to 2019) trends were evaluated, with historical CAGRs of approximately 3.5 percent, 3.6 percent, and 3.6 percent, respectively. The pre-COVID historical trend scenarios were not chosen to represent the recommended forecast because they were all believed to be too conservative, as activity wasn't projected to surpass 2019 activity for at least 10 years using any of the scenarios.

COVID Historical Trends

In the COVID historical trend scenarios, activity during COVID was included in the analyses. A three-year (2018 to 2021), five-year (2016 to 2021), and 10-year (2011 to 2021) historical trend was evaluated, with historical CAGRs of approximately -10.9 percent, -6.8 percent, and -1.4 percent, respectively. Given the decreasing CAGRs, each analysis resulted in enplanements being projected to decrease steadily over the 20-year planning horizon. With the Airport and aviation industry already experiencing increases in activity in 2021 and with the additional service expected to be provided at the Airport via one or more ULCCs, its enplanements are more likely to steadily increase than decrease.

Table 3-6
Historical Trend Scenarios (Enplanements)

Year	Pre-Covid Historical Trend			Covid Historical Trend		
	3-Year Time Series	5-Year Time Series	8-Year Time Series	3-Year Time Series	5-Year Time Series	10-Year Time Series
2021	464,169	464,169	464,169	464,169	464,169	464,169
2026	551,344	552,717	553,732	260,392	337,344	432,762
2031	654,891	658,158	660,575	146,076	245,171	403,480
2036	777,884	783,712	788,035	81,946	178,182	376,179
2041	923,978	933,219	940,088	45,971	129,497	350,725
CAGR 2021-2041	**3.5%**	**3.6%**	**3.6%**	**-10.9%**	**-6.2%**	**-1.4%**
Growth Rate 2021-2041	**99.1%**	**101.1%**	**102.5%**	**-90.1%**	**-72.1%**	**-24.4%**

Source: Bureau of Transportation Statistics (BTS) T-100 data, CHA, 2022.

Regression Scenarios

The regression-based scenarios examined passenger activity to determine if a causal relationship exists between the passenger activity levels and the socioeconomic conditions prevalent during that period. Several different regression analyses were performed for each of the pre-determined periods. The socioeconomic factors that were analyzed included population, employment, and PCPI. The output of a regression analysis is the 'coefficient of determination,' or R^2 value, which ranges from 0 to 1.0. If the R^2 value of an analysis falls between 0.85 and 1.0, there is a strong statistical correlation;

if it falls below 0.85, there is less correlation. In other words, the higher the R^2 value, the stronger the correlation is between the variables.

As part of this Study, two separate periods were examined: a 10-year historical period (2011 through 2021) and pre-COVID (2011 through 2019). The results of each scenario are summarized in **Table 3-7**.

Regression Methodology 1: 10-Year Historical Period (2011-2021)

The first regression scenario looked at the relationships between socioeconomic conditions and passenger enplanements over a 10-year historical period (2011 through 2021). This period considered conditions prior to COVID, during peak COVID intervals, and during economic recovery over the past year.

- Population-Based Regression: R^2-value = 0.02
- Employment-Based Regression: R^2-value = 0.05
- Income-Based Regression: R^2-value = 0.09
- Population-Income-Based Regression: R^2-value = 0.73
- Employment-Income-Based Regression: R^2-value = 0.81
- Population-Employment-Income-Based Regression: R^2-value = 0.85

Regression Methodology 2: Pre-COVID (2011-2019)

The second scenario only examined conditions prior to COVID, as COVID greatly impacted the economy and enplanements.

- Population-Based Regression: R^2-value = 0.93
- Employment-Based Regression: R^2-value = 0.93
- Income-Based Regression: R^2-value = 0.95
- Population-Income-Based Regression: R^2-value = 0.95
- Employment-Income-Based Regression: R^2-value = 0.95
- Population-Employment-Income-Based Regression: R^2-value = 0.95

Regression Summary

In Regression Methodology 1, the population-employment-income-based regression was the only scenario with an R^2 value indicating a strong correlation between the Airport's enplanements and the socioeconomic factors within its catchment area. Although the R^2 value indicated a strong correlation between the socioeconomic factors and enplanements, the scenario resulted in an unrealistic trend of enplanements decreasing below zero.

The only other regression analysis indicating a strong correlation between the Airport's enplanements and its catchment area's socioeconomic factors was each of the scenarios within Regression Methodology 2. Of these six scenarios, the income-based regression was chosen to represent the Airport's high-growth enplanements forecast, with enplanements projected to reach approximately 2,086,488 in 2041. Given that LEX provides service to several leisure markets, it can be assumed that as disposable income increases, the number of leisure passengers would likely increase.

Table 3-7
Regression Scenarios (Enplanements)

Year	Population-Based	Employment-Based	Income-Based	Population-Income-Based	Employment-Income-Based	Population-Employment-Income-Based
Regression Scenario 1: 10-Year Historical Period (2011-2021)						
2021	464,169	464,169	464,169	464,169	464,169	464,169
2026	517,244	641,258	425,872	-76,819	347,050	168,544
2031	493,914	675,836	303,846	-1,198,184	-70,282	-560,176
2036	471,633	709,037	146,096	-2,892,478	-686,197	-1,653,580
2041	450,751	740,864	-53,379	-5,261,339	-1,532,509	-3,174,048
R^2 Value	**0.02**	**0.05**	**0.09**	**0.73**	**0.81**	**0.85**
CAGR 2021-2041	**-0.1%**	**2.4%**	**–**	**–**	**–**	**–**
Growth Rate 2021-2041	**-2.9%**	**59.6%**	**-111.5%**	**-1233.5%**	**-430.2%**	**-783.8%**
Regression Scenario 2: Pre-COVID (2011-2019)						
2021	464,169	464,169	464,169	464,169	464,169	464,169
2026	828,490	797,235	957,362	980,139	1,006,785	1,021,514
2031	930,332	878,263	1,244,859	1,301,217	1,358,993	1,395,986
2036	1,027,595	956,065	1,616,521	1,722,698	1,822,978	1,893,248
2041	1,118,752	1,030,647	2,086,488	2,261,591	2,417,344	2,533,878
R^2 Value	**0.93**	**0.93**	**0.95**	**0.95**	**0.95**	**0.95**
CAGR 2021-2041	**4.5%**	**4.1%**	**7.8%**	**8.2%**	**8.6%**	**8.9%**
Growth Rate 2021-2041	**141.0%**	**122.0%**	**349.5%**	**387.2%**	**420.8%**	**445.9%**

Source: Bureau of Transportation Statistics (BTS) T-100 data, CHA, 2022.

Air Service Scenarios

The air service scenarios included capacity levels and traffic, demand by month of year, and Remaining Overnight aircraft (RONs) by day of week for a peak month to gauge the facility requirements.

Sources included traffic data provided by the US Department of Transportation (USDOT), including T-100 and O&D Summary data, Cirium schedule data via Diio Mi, population data provided by the US Census Bureau, employment data provided by the Bureau of Labor Statistics (BLS), and Gross Domestic Product output data provided by the Bureau of Economic Analysis (BEA). Additional data can be found in **Appendix E**.

<u>Air Service Factors: Potential Growth Markets</u>

When looking at potential new markets and the frequency that drives the forecasted numbers, many permutations could happen. To guide the forecast, the below new markets in **Table 3-8** were used for each scenario.

Table 3-8
Potential Growth Markets

Scenario	2027	2032	2042
Medium-Growth Air Service Scenario	DEN 2x Weekly Seasonal	MIA Daily Seasonal (December-April)	MIA Daily Annual
	LAS 2x Weekly Annual	DEN 2x Weekly Annual	DEN Daily Annual
	PBI 2x Weekly Seasonal	IAH Daily	
	MCO 2x Weekly Seasonal		
	LGA Returns on Delta		
	EWR Returns on United		
	New ULCC Destination 2x Weekly		
Low-Growth Air Service Scenario	Only One NYC Market Comes Back	DEN Expands (April-October)	DEN Annual 2x Weekly
	DEN 2x Weekly Seasonal	LAS 2x Weekly Annual	MCO 2x Weekly (October-April)
		MCO 2x Weekly (December-April)	Another Annual ULCC Market
High-Growth Air Service Scenario	DEN 2x Weekly Seasonal	DEN 2x Weekly Annual	DEN Daily Annual
	LAS 2x Weekly Annual	LAX 2x Weekly Annual	MIA Daily Annual
	New Florida 2x Weekly Seasonal	MIA Daily Seasonal (October-April)	MCO 4x Weekly Annual/ Seasonal
	MCO 2x Weekly Seasonal	MCO 2x Weekly Annual	2 More ULCC Markets 2x Weekly/Annual
	LGA Returns on Delta	Another ULCC Market 2x Weekly	Another Legacy Hub 2x Daily Annual
	EWR Returns on United		
	New ULCC Destination 2x Weekly		
	IAH Daily Annual		
	MIA Daily Seasonal (December -April)		

DEN – Denver International Airport, EWR – Newark Liberty International Airport, IAH – George Bush Intercontinental Airport, LAS – Harry Reid International Airport, LAX – Los Angeles International Airport, LGA – LaGuardia Airport, MCO – Orlando International Airport, PBI – Palm Beach International Airport.

This table features a combination of restoring some service that the Airport previously had and new service that the Airport expects to capture in the future.

Source: Ailevon Pacific Aviation Consulting analysis, 2022.

Overview of Air Service Scenarios

The air service scenarios projected traffic and capacity demand trends for 5, 10, and 20 years into the future. The period from 2010 through 2019 (and to a lesser extent 2000 through 2019) was used as the period for forecasting traffic and capacity forecasts for the future. Three scenarios are presented: a low-growth air service scenario, a medium-growth air service scenario, and a high-growth air service scenario. These scenarios were driven by the growth rate the Airport experienced over the past decade (2010 through 2019). Each scenario assumed a different long-term demand growth rate. The air service scenarios have an elevated recovery level through 2024 to account for the impacts of COVID-19. From that point on, the growth rate levels out to more historically normal rates.

The annual growth rate for the medium-growth air service scenario is 2.5 percent. Note that the projections within the medium-growth air service scenario are identical to the FAA 2021 TAF. The low-growth air service scenario assumed a lower growth rate of 2.1 percent annual growth in enplanements. The high-growth air service scenario assumed a growth rate of 2.9 percent annual growth in enplanements.

The Airport's immediate and longer-term challenges, including COVID recovery, pilot shortages, and RJ aircraft fleet retirements, were also considered.

Air Service Methodologies

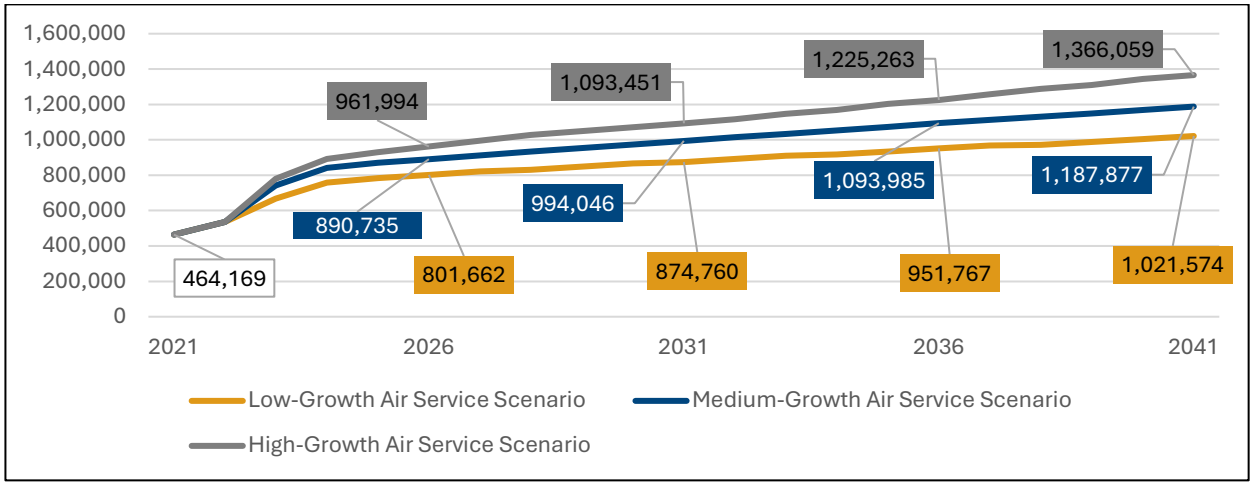
Each air service methodology estimated that the Airport will enplane approximately 536,335 passengers in 2022. This is a lower level than in 2019 (708,154 enplanements). The air service scenarios project that the Airport will enplane between 1,021,574 and 1,366,059 passengers in 2041. **Table 3-9** and **Figure 3-12** highlight these figures.

Table 3-9
Air Service Scenarios (Enplanements)

Year	Low-Growth Air Service Scenario	Medium-Growth Air Service Scenario	High-Growth Air Service Scenario
2021	464,169	464,169	464,169
2026	801,662	890,735	961,994
2031	874,760	994,046	1,093,451
2036	951,767	1,093,985	1,225,263
2041	1,021,574	1,187,877	1,366,059
CAGR 2021-2041	**4.0%**	**4.8%**	**5.5%**
Growth Rate 2021-2041	**120.1%**	**155.9%**	**194.3%**

Source: Ailevon Pacific Aviation Consulting analysis, Bureau of Transportation Statistics (BTS) T-100 data, 2022.

Figure 3-12
Air Service Scenarios (Enplanements)



The projections within the medium-growth air service scenario are identical to the FAA 2021 TAF.
Source: Ailevon Pacific Aviation Consulting analysis, Bureau of Transportation Statistics (BTS) T-100 data, 2022.

Air Service Summary

The air service scenarios project that the Airport can expect somewhere between 1,021,574 and 1,366,059 enplanements by 2041, up from an expected 536,335 enplanements in 2022 that was projected under each scenario. Given Lexington's faster-growing population growth, regional Gross Domestic Product, and employment growth both during the periods 2000 to 2009 and 2010 to 2019, the Airport is in a strong position to continue its stronger growth rate than nearby peer airports.

The Airport's largest challenges to continued strong growth are expected to include pilot shortages, a reduction in the number of RJ aircraft (especially 50-seat aircraft), and the local and global economic outlook regarding the severity of the business cycle and oil prices.

The long-term trend of aircraft "up gauging" by US airlines and the advancing age of the RJ aircraft fleet presents a potential opportunity for the Airport. Airlines are rapidly retiring 50-seat aircraft, and there are no true replacement aircraft in the manufacturing or development pipeline; however, hundreds of mainline narrowbody aircraft are on order at large carriers for both new growth and to replace RJ aircraft fleets.

In terms of airlines and destinations, there are limited opportunities to establish legacy carrier service to new hubs, with the most likely being Denver International Airport (DEN) or Dulles International Airport (IAD) via United Airlines and/or Miami International Airport (MIA) via American Airlines. Reinstating service to previously discontinued markets such as Minneapolis-Saint Paul International Airport (MSP) via Delta Air Lines, Newark Liberty International Airport (EWR) and George Bush Intercontinental Airport (IAH) on United, and LaGuardia Airport (LGA) on Delta (or perhaps American) remain a possibility; however, pilot shortages may likely limit these opportunities until no earlier than 2023.

There are exciting opportunities with ULCCs. JetBlue's offer to purchase Spirit Airlines (made in July 2022) could open opportunities as the new carrier(s) will have many new aircraft arriving. Breeze Airways is continuing to expand into new market areas, while Avelo Airlines also seeks new opportunities that could include new destinations in the west and south.

The Airport has an opportunity to reduce market leakage. There should be enough growth to expect an increase in destinations, RONs, and early morning departing seats. Thus, facilities planning should be prepared to accommodate the traffic that is likely to materialize.

Enplanements Summary

For the purposes of this Study, the high-growth air service scenario was chosen to represent the recommended enplanements forecast, while the low-growth air service scenario was chosen to represent the low-growth enplanements forecast. A summary of the recommended enplanements forecasts and the FAA 2021 TAF are presented in **Table 3-10**.

Recommended Enplanements Summary

After evaluating each scenario, the high-growth air service scenario was chosen to represent the Airport's recommended enplanements forecast, as this forecast was qualitative in nature. This forecast encompassed local economic and airline industry trends, as well as anticipated and announced changes in service routes specific to the Airport. Historical activity, fleet mix, and changes in load factors were also incorporated within this forecast scenario. The comparison of the recommended enplanements forecast versus the FAA 2021 TAF is found in **Section 3-12**. See Appendix B for the complete 20-year forecast.

Low-Growth Enplanements Summary

To provide a range of potential passenger activity levels, the low-growth air service scenario was chosen to represent the low-growth forecast. This forecast was chosen to represent the low growth for enplanements because it still accounts for new service and market growth but at a slower, more conservative growth rate than the recommended forecast.

High-Growth Enplanements Summary

To further provide a range of potential passenger activity levels, the pre-COVID income-based regression scenario was chosen to represent the high-growth commercial enplanements forecast, which represents growth beyond the recommended enplanements forecast. This forecast scenario will serve as the basis for future facility planning when examining facility requirements.

Table 3-10
Enplanements Summary

Year	FAA 2021 TAF	Low-Growth Enplanements Forecast	Recommended Enplanements Forecast	High-Growth Enplanements Forecast
		Low-Growth Air Service Scenario	High-Growth Air Service Scenario	Pre-COVID Income-Based Regression Scenario
2021	394,959	464,169	464,169	464,169
2026	890,735	801,662	961,994	957,362
2031	994,046	874,760	1,093,451	1,244,859
2036	1,093,985	951,767	1,225,263	1,616,521
2041	1,187,877	1,021,574	1,366,059	2,086,488
CAGR 2021-2041	**5.7%**	**4.0%**	**5.5%**	**7.8%**
Growth Rate 2021-2041	**200.8%**	**120.1%**	**194.3%**	**349.5%**

Source: FAA 2021 TAF, Ailevon Pacific Aviation Consulting analysis, Bureau of Transportation Statistics (BTS) T-100 data, CHA, 2022.

3.8.2 Commercial Operations Forecast

In addition to determining projected passenger enplanements, a commercial operations forecast was developed to further determine the facility sizing requirements necessary to adequately accommodate the Airport's current and future activity demand. Commercial aircraft operations influence the requirements for the passenger terminal and airside infrastructure. Departure seats were projected by evaluating known returning activity and 'new' activity announcements. Load factors (LF) were also considered when determining future departure seats, as well as industry trends regarding changes in fleet mix. For the purposes of this forecast, it was assumed that arrival seats would equal departure seats. To project commercial operations, total annual seats (departure and arrival seats) available by aircraft type were divided by the average number of aircraft seats per departure. Departure seats and seats both ways are presented in **Table 3-11**.

Table 3-11
Commercial Related Projections

Year	LF	Recommended Enplanements	Departure Seats	Seats Both Ways
2021	71.0%	464,169	653,666	1,307,332
2026	83.2%	961,994	1,156,799	2,313,598
2031	80.0%	1,093,451	1,366,248	2,732,496
2036	81.2%	1,225,263	1,509,255	3,018,510
2041	84.0%	1,366,059	1,625,896	3,251,792
CAGR 2021-2041	**–**	**5.5%**	**4.66%**	**4.66%**
Growth Rate 2021-2041	**–**	**194.3%**	**148.73%**	**148.73%**

LF – Load Factor.
Source: Ailevon Pacific Aviation Consulting, Bureau of Transportation Statistics (BTS) T-100 data, CHA, 2022.

The average seats per departure is expected to continue increasing, as depicted in **Table 3-12**. As airlines retire small RJ aircraft fleets and as many of the mainline jets now on order are for larger-gauge aircraft, such as the 190-seat A321, the Airport should continue to see this trend accelerate.

As part of this Study, recommended and high-growth commercial operations forecasts were developed. When developing the high-growth commercial operations forecast, it was assumed that load factors, departure seats, and seats both ways would remain unchanged from the recommended forecast. **Table 3-12** summarizes those forecasts.

Table 3-12
Commercial Operations Forecasts

Year	Recommended Commercial Operations Forecast			High-Growth Commercial Operations Forecast		
	Operations	Passengers Per Departure	Average Seats Per Departure	Operations	Passengers Per Departure	Average Seats Per Departure
2021	17,288	54	76	17,288	54	76
2026	21,608	89	107	27,924	69	83
2031	24,080	91	113	30,332	72	90
2036	25,741	95	117	31,016	79	97
2041	27,168	101	120	31,102	88	105
CAGR 2021-2041	**2.3%**	**3.2%**	**2.3%**	**3.0%**	**2.5%**	**1.6%**
Growth Rate 2021-2041	**57.1%**	**87.3%**	**58.3%**	**79.9%**	**63.6%**	**38.3%**

Source: Blue Grass Airport (LEX), Ailevon Pacific Aviation Consulting, Bureau of Transportation Statistics (BTS) T-100 data, CHA, 2022.

3.8.3 Commercial Fleet Mix

The commercial aircraft fleet mix projections are a function of the scheduled commercial passenger air carriers that operate or are expected to operate at the Airport during the forecast period. Industry trends (i.e., aircraft acquisitions, aircraft phase-outs, retirements, route demand, etc.) and forecasted enplanement levels influence a carrier's aircraft type and level of operations. This data was coupled with the projected commercial air carrier operations to determine the number of annual departures by aircraft category to the greatest extent practical. The operational fleet mix forecast provided in this section is a practical planning tool for developing airside and terminal development initiatives. When projecting the Airport's future commercial fleet mix, it was important to identify the market trends driving airline fleet mixes.

According to the Boeing Commercial Outlook (2022 through 2041), a 10-year forecast was developed, indicating that overall aircraft deliveries were approximately 7.6 percent lower than was predicted prior to the pandemic. Over the next 20 years, Boeing predicts that single-aisle passenger aircraft will be the highest in demand through 2041, making them approximately 70 percent of their future deliveries. Per the Airbus Global Market Forecast (2021 through 2040), Airbus is projected to deliver approximately 6,580 passenger aircraft domestically between 2022 and 2041, comprised of approximately 86.9 percent single-aisle aircraft and approximately 13.1 percent widebody aircraft. This is reflected at the airport, as an increase in narrow-body aircraft such as the A320, B737, CRJs, and ERJ-175s is expected.

The Airport's projected commercial fleet mix operations by Aircraft Approach Category (AAC) and Airplane Design Group (ADG) are presented in **Table 3-13**.

Table 3-13
Commercial Fleet Mix Operations

AAC & ADG		2021	2026	2031	2036	2041
Subtotal by AAC	A	0	0	0	0	0
	B	0	0	0	0	0
	C	17,158	21,369	23,814	25,456	26,867
	D	130	239	266	285	301
Subtotal by ADG	I	0	0	0	0	0
	II	9,170	9,033	7,360	7,868	8,304
	III	8,108	12,563	16,706	17,859	18,848
	IV	10	12	14	14	16

Commercial fleet for 2021 is estimated based on the percent make-up reported via BTS T-100 data.

Source: FAA Operations Network (OPSNET), Bureau of Transportation Statistics (BTS) T-100 data, FAA Traffic Flow Management System Counts (TFMSC), CHA, 2022.

3.9 General Aviation (GA) Forecasts

GA includes all segments of the aviation industry except commercial air carriers/regional/commuter service, scheduled cargo, and military operations. GA represents the largest percentage of civil aircraft in the United States and accounts for most operations handled by towered and non-towered airports. GA activities include flight training, sightseeing, recreational, aerial photography, law enforcement, and medical flights, as well as business, corporate, and personal travel via air taxi charter operations. GA aircraft encompass a broad range of types, from single-engine piston aircraft to large corporate jets, as well as helicopters, gliders, and amateur-built aircraft.

GA operations are further categorized as either itinerant or local operations. Local operations are those performed by aircraft that remain in the local traffic pattern or within a 20-mile radius of the tower. Local operations are commonly associated with training activity and flight instruction, including touch-and-go operations. Itinerant operations are arrivals or departures other than local operations, performed by either based or transient aircraft that do not remain in the airport traffic pattern or within a 20-nautical mile radius.

3.9.1 Based Aircraft Forecast

The FAA provides multiple methodologies to be used to forecast GA based aircraft. To determine the Airport's most reasonable scenario, it was necessary to compare and eliminate those forecasts that did not support the key factors and variables that comprise the specific direction of the Airport and its market. This section provides the methodologies that were analyzed for the development of the Airport's GA based aircraft forecast.

FAA Aerospace Forecast Analysis

In the FAA Aerospace Forecast methodology, annual fleet mix growth projections, provided in the FAA Aerospace Forecasts (FY 2022 through 2042), were used to project the number of based aircraft throughout the forecast period. This methodology assumed that the Airport's GA based aircraft would grow at the FAA's projected national rate and maintain their respective share of fleet and operations throughout the forecast period, as shown in **Table 3-14**. The FAA Aerospace Forecast indicates that piston aircraft (single- and multi-engine) will continuously decrease. Additionally, jet aircraft and helicopters are projected to increase their presence at airports.

The Airport's based aircraft are primarily comprised of piston aircraft, with jets and helicopters representing the smallest groupings. Founded on these national projected trends, and as shown in **Table 3-15**, the Airport's single- and multi-engine-based aircraft would decrease by approximately 16.8 percent and 6.8 percent, respectively. Conversely, jet aircraft and helicopters would both increase by approximately 67.9 percent and 35.7 percent, respectively.

While the Airport may experience a slight shift in based aircraft mix as jets replace piston aircraft, it is not likely that the shift away from single-engine aircraft will be as aggressive as indicated using this methodology; therefore, this scenario was **not** chosen to represent the Airport's future based aircraft.

Table 3-14
FAA Aerospace National GA Fleet Growth Rates

Year	Single-Engine	Multi-Engine	Turboprop	Jet	Helicopter
CAGR 2021-2026	-0.9%	-0.6%	-0.1%	3.0%	1.4%
CAGR 2026-2031	-1.0%	-0.4%	0.3%	2.8%	1.6%
CAGR 2031-2036	-0.9%	-0.3%	0.6%	2.5%	1.6%
CAGR 2036-2041	-0.8%	-0.2%	1.1%	2.2%	1.5%

FAA Aerospace Forecast (2022-2042)—Table 28 (Active General Aviation and Air Taxi Aircraft) is provided in Appendix D of this Study.
Source: FAA Aerospace Forecast (2022-2042), CHA, 2022.

Table 3-15
FAA Aerospace Forecast Analysis (LEX GA Based Aircraft)

Year	Single-Engine	Multi-Engine	Turboprop	Jet	Helicopter	Total
2021	117	11	0	28	9	165
2026	112	11	0	32	10	164
2031	106	10	0	37	10	164
2036	101	10	0	42	11	165
2041	97	10	0	47	12	167
CAGR 2021-2041	**-0.9%**	**-0.4%**	**–**	**2.6%**	**1.5%**	**0.1%**
Growth Rate 2021-2041	**-16.8%**	**-6.8%**	**–**	**67.9%**	**35.7%**	**1.1%**

Source: FAA Aerospace Forecast (2022-2042), Blue Grass Airport, CHA, 2022.

FAA TAF-Based Growth Scenarios

FAA TAF-Based Compound Annual Growth Rate Scenario

The FAA TAF-based compound annual growth rate scenario assumed the FAA 2021 TAF's projected CAGR from 2021 through 2041 for the Airport's based aircraft and applied that assumption to actual airport-reported data. Per the FAA 2021 TAF, based aircraft in 2021 at LEX were projected at 154 aircraft; however, using this methodology, the TAF's CAGR of approximately 2.5 percent was applied to the actual 165 based aircraft and projected through 2041 at a static 2.5 percent each year. The result of this methodology projected 271 based aircraft by 2041, for an overall growth rate of approximately 64.2 percent.

Although this forecast projects consistent growth throughout the forecast horizon, it was **not** chosen to represent the recommended based aircraft. While the Airport is expected to experience an increase in based aircraft, it is not likely that the growth will be as aggressive as indicated under this forecast methodology.

FAA TAF-Based Year-Over-Year Growth Scenario

The FAA TAF-based year-over-year growth scenario methodology assumed the FAA 2021 TAF's projected based aircraft year-over-year growth from 2021 through 2041 for the Airport and applied that assumption to actual airport-reported data. The year-over-year TAF growth rate for the Airport's based aircraft was applied to the actual 165 based aircraft and projected through 2041, assuming the TAF growth rate for the respective years. The result of this methodology projected 186 based aircraft by 2041, for an overall growth of 13.0 percent. Given that historically the Airport's based aircraft have fluctuated and consistent with recent growth activity from 2019 to 2021 (approximately 13.2 percent), **the FAA TAF-based year-over-year growth scenario was chosen to represent the preferred based aircraft forecast**.

Table 3-16
FAA TAF-Based Growth Scenarios (GA Based Aircraft)

Year	FAA 2021 TAF	FAA TAF-Based CAGR Growth	Year-Over-Year FAA TAF-Based Growth
2021	154	165	165
2026	159	187	170
2031	164	211	176
2036	169	239	181
2025	158	182	169
2041	174	271	186
CAGR 2021-2041	**2.5%**	**2.5%**	**0.6%**
Growth Rate 2021-2041	**13.0%**	**64.2%**	**13.0%**

Source: FAA 2021 TAF, Blue Grass Airport, CHA, 2022.

Recommended Based Aircraft by Type

To project the Airport's future based aircraft by type, national based aircraft and projected trends regarding future GA fleet mix were considered, as well as the Airport's fleet mix activity trends. The projected breakdown is depicted in **Table 3-17**.

Table 3-17
Recommended General Aviation Based Aircraft Forecast (By Aircraft Type)

Year	Single-Engine	Multi-Engine	Helicopter	Jet	Recommended GA Based Aircraft
2021	117	11	9	28	165
2026	119	11	9	31	170
2031	122	12	10	32	176
2036	124	12	10	35	181
2041	127	12	10	37	186
CAGR 2021-2041	**0.4%**	**0.4%**	**0.5%**	**1.4%**	**0.6%**
Growth Rate 2021-2041	**8.5%**	**9.1%**	**11.1%**	**32.1%**	**12.7%**

Source: FAA 2021 TAF, Blue Grass Airport, CHA, 2022.

3.9.2 General Aviation Operations Forecast

Like commercial operations forecasts and GA based aircraft forecasts, more than one methodology exists that can be used to forecast GA operations that determines the most plausible and reasonable scenario.

Historical Trend Scenario

The historical growth scenario was a time trend analysis that utilized the Airport's historical activity as a metric to provide future growth projections. From 2011 through 2021, the Airport experienced fluctuations in GA activity, ranging between a low of 39,590 operations in 2013 and a high of 56,887 operations in 2021. The 10-year historical CAGR (approximately 3.4 percent) was applied to 2021 actuals and assumed throughout the forecast horizon, resulting in an overall growth of 96.7 percent, as presented in **Table 3-18**.

Due to the fluctuations in historical GA operations, it cannot be assumed that operations will reflect past trends; therefore, this scenario was **not** chosen to represent the Airport's preferred GA operations forecast.

Table 3-18
Historical Trend Scenario (General Aviation Operations)

Year	Itinerant	Local	Total GA Operations
2021	44,276	12,611	56,887
2026	52,434	14,935	67,369
2031	64,232	18,295	82,527
2036	76,067	21,666	97,733
2041	87,087	24,805	111,892
CAGR 2021-2041	**3.4%**	**3.4%**	**3.4%**
Growth Rate 2021-2041	**96.7%**	**96.7%**	**96.7%**

Source: FAA Operations Network (OPSNET), Cirium DOT data via Diio Mi, CHA, 2022.

FAA TAF-Based Compound Annual Growth Rate Scenario

The FAA TAF-based compound annual growth rate GA operations scenario assumed the FAA 2021 TAF's projected CAGR from 2021 to 2041 for GA itinerant and local operations, and then independently applied those assumptions to actual airport-reported itinerant and local GA activity data. From 2021 to 2041, the FAA 2021 TAF projected itinerant GA operations and local GA operations to have a CAGR of approximately -0.03 percent and 0.5 percent, respectively.

The results from applying these growth assumptions are shown in **Table 3-19**. This scenario was **not** chosen to represent the Airport's future GA operations, as it was believed to be too conservative.

Table 3-19
TAF-Based Compound Annual Growth Rate Scenario (GA Operations)

Year	Itinerant	Local	Total
2021	44,276	12,611	56,887
2026	44,201	12,924	57,125
2031	44,126	13,246	57,372
2036	44,051	13,576	57,627
2041	43,976	13,914	57,890
CAGR 2021-2041	**-0.03%**	**0.5%**	**0.1%**
Growth Rate 2021-2041	**-0.7%**	**10.3%**	**1.8%**

Source: FAA Operations Network (OPSNET), Cirium DOT data via Diio Mi, CHA, 2022.

Operations Per Based Aircraft Scenario

The Operations Per Based Aircraft (OPBA) scenario is a straightforward forecasting methodology that assumes the total number of annual operations is representative of the number of aircraft based at the Airport. These operations are typically performed by jet and turboprop aircraft based at the Airport, as well as flying charter and corporate aviation operations.

When projecting the Airport's operations using OPBA for LEX, it was assumed that OPBA would remain static throughout the forecast period at levels consistent with actual activity in 2021 (349 operations per based aircraft OPBA). When applying the OPBA of 345 to the preferred based aircraft forecast, GA operations were projected to grow by approximately 0.6 percent annually, as shown in **Table 3-20**.

Historically, local operations accounted for an average of approximately 22.2 percent of all GA operations, which can often be linked to based aircraft activity. Given the high makeup of local activity, it can be assumed that based aircraft will drive the Airport's GA operations at LEX; therefore, **this scenario was chosen to represent the preferred GA operations forecast**.

Table 3-20
Operations Per Based Aircraft (General Aviation Operations)

Year	GA Operations	Based Aircraft	OPBA
2021	56,887	165	345
2026	58,611	170	345
2031	60,679	176	345
2036	62,403	181	345
2041	64,127	186	345
CAGR 2021-2041	**0.6%**	**0.6%**	**0.0%**
Growth Rate 2021-2041	**12.7%**	**12.7%**	**0.0%**

Average Compound Annual Growth Rate (CAGR).
Source: FAA Operations Network (OPSNET), Cirium DOT data via Diio Mi, CHA, 2022.

As shown in **Table 3-21**, projected GA operations were further broken down and categorized as either itinerant or local. To project the percent split of activity, future operations were projected to retain the same split as 2021 operations: approximately 77.8 percent itinerant and 22.2 percent local.

Table 3-21
Recommended General Aviation Operations Forecast (Itinerant vs. Local)

Year	Itinerant	Local	Total
2021	44,276	12,611	56,887
2026	45,618	12,993	58,611
2031	47,227	13,452	60,679
2036	48,569	13,834	62,403
2041	49,911	14,216	64,127
CAGR 2021-2041	**0.6%**	**0.6%**	**0.6%**
Growth Rate 2021-2041	**12.7%**	**12.7%**	**12.7%**

Average Compound Annual Growth Rate (CAGR).
Source: FAA Operations Network (OPSNET), Cirium DOT data via Diio Mi, CHA, 2022.

3.10 Air Cargo Activity Forecast

While the Airport does not have scheduled cargo services, cargo operators have utilized them over the last ten years; therefore, it was necessary to evaluate the impact this activity may potentially have on the Airport. As previously shown in **Table 3-1**, annual cargo activity from 2011 to 2021 ranged between 127 and 456 operations, for an average of approximately 254 operations. Since this activity is not scheduled, it was assumed that the Airport will continue to receive the average number of cargo operations, or 254 operations, throughout the forecast horizon. See **Table 3-22**.

Table 3-22
Cargo Operations Forecast

Year	Cargo Operations
2021	127
2026	254
2031	254
2036	254
2041	254
CAGR 2021-2041	**3.5%**
Growth Rate 2021-2041	**99.7%**

Source: Bureau of Transportation Statistics (BTS) T-100 data, CHA, 2022.

3.11 Military Activity Forecast

Military operations have slightly fluctuated over the last decade; however, unlike other types of operations, historical trends in military activity levels are not representative of future activity. Rather, military operations are a function of military decisions, national security priorities, and budget pressures; therefore, military operations are not projected in the same manner as other operations at the Airport.

During the baseline year (2021), the Airport serviced 1,863 military operations (1,789 itinerant and 74 local). For the purposes of this forecast, projected military operations were assumed to remain static at the baseline year levels throughout the forecast horizon, which is presented in **Table 3-23**.

Table 3-23
Military Operations Forecast

Year	Itinerant Military	Local Military	Total
2021-2041	1,789	74	1,863

Source: FAA Operations Network (OPSNET), CHA, 2022.

Like military operations, the standard methodologies used for determining GA-based aircraft cannot be applied when determining military-based aircraft. Thus, military-based aircraft are assumed to remain static. Currently, the military has no based aircraft stationed at the Airport; therefore, it was assumed that no military-owned aircraft would be based at the Airport during the forecast period.

3.12 Recommended Forecast Summary

Table 3-24 presents a summary of the recommended aviation activity forecasts for air carrier activity (enplanements and operations), GA activity (operations and based aircraft), cargo activity, and military activity levels, as detailed in the previous sections. The recommended forecasts will be used as the basis for the Airport's future planning analyses.

Table 3-24
Recommended Forecast Summary

Year	Based Aircraft	Enplanements	Operations						
			Air Carrier	Cargo	Itinerant GA	Local GA	Itinerant Military	Local Military	Total
2021	165	464,169	17,288	127	44,276	12,611	1,789	74	76,165
2026	170	961,994	21,608	254	45,618	12,993	1,789	74	82,336
2031	176	1,093,451	24,080	254	47,227	13,452	1,789	74	86,876
2036	181	1,225,263	25,741	254	48,569	13,834	1,789	74	90,261
2041	186	1,366,059	27,168	254	49,911	14,216	1,789	74	93,412
CAGR 2021-2041	**0.6%**	**5.5%**	**2.3%**	**3.5%**	**0.6%**	**0.6%**	**0.0%**	**0.0%**	**1.0%**
Growth Rate 2021-2041	**12.7%**	**194.3%**	**57.1%**	**99.7%**	**12.7%**	**12.7%**	**0.0%**	**0.0%**	**22.6%**

Source: Blue Grass Airport, FAA Operations Network (OPSNET), FAA Traffic Flow Management System Counts (TFMSC), Bureau of Transportation Statistics (BTS) T-100 data, US DOT T-100 data, Ailevon Pacific Aviation Consulting analysis, CHA, 2022.

3.12.1 Recommended Forecast vs. FAA 2021 TAF

Per FAA requirements, for Master Plan forecasts to be approved, the forecast should be within 10 percent of the TAF in the first five years and 15 percent in 10 years—as set forth by the FAA in AC 150/5070-6B, *Airport Master Plans*. **Table 3-25** details the recommended forecast of enplanements, commercial operations, and total airport operations (all activity types) compared to the FAA 2021 TAF forecast.

When comparing the Master Plan's projected enplanements to the FAA 2021 TAF, enplanements are projected to be within the FAA's acceptable ranges with a difference of approximately eight percent in five years and ten percent in ten years. Commercial operations and total operations are also projected to be within FAA parameters in five and 10 years when comparing the Master Plan forecast to the FAA 2021 TAF.

The full recommended enplanements, operations, and based aircraft forecasts can be found in **Appendix B**. In accordance with FAA requirements, a summary of forecasted levels and growth rates, as well as operational factors, are included in **Appendix C**.

As a planning tool for the Airport, a low-growth and high-growth enplanements range (summarized in **Section 3.8.1**) and a high-growth commercial operations forecast (summarized in **Section 3.8.2**) were also selected.

Table 3-25
FAA Appendix C: Comparing Airport Planning and TAF Forecasts

Specified Base Year: 2021	Year	Master Plan Forecast (MPF)	FAA 2021 TAF	MPF/FAA 2021 TAF (% Difference)
Passenger Enplanements				
Base yr.*	2021	464,169	394,959	17.5%
Base yr. + 5 yrs.	2026	961,994	890,735	8.0%
Base yr. + 10 yrs.	2031	1,093,451	994,046	10.0%
Base yr. + 15 yrs.	2036	1,225,263	1,093,985	12.0%
Specified Base Year: 2021	**Year**	**Master Plan Forecast (MPF)**	**FAA 2021 TAF**	**MPF/FAA 2021 TAF (% Difference)**
Commercial Operations				
Base yr.*	2021	17,288	9,584	80.4%
Base yr. + 5 yrs.	2026	21,608	23,062	-6.3%
Base yr. + 10 yrs.	2031	24,080	26,434	-8.9%
Base yr. + 15 yrs.	2036	25,741	28,346	-9.2%
Total Operations				
Base yr.*	2021	76,165	71,417	6.6%
Base yr. + 5 yrs.	2026	82,336	81,138	1.5%
Base yr. + 10 yrs.	2031	86,876	84,370	3.0%
Base yr. + 15 yrs.	2036	90,261	86,973	3.8%

*Master Plan forecast data depicts calendar years, while the FAA TAF depicts fiscal year data.
Source: Blue Grass Airport, FAA Operations Network (OPSNET), FAA Traffic Flow Management System Counts (TFMSC), Bureau of Transportation Statistics (BTS) T-100 data, US DOT T-100 data, Ailevon Pacific Aviation Consulting analysis, CHA, 2022.

3.13 Peak Activity Levels

Airports experience peaks in total operations and passengers (total passengers, enplanements, and deplanements) that drive demand for various areas of airport infrastructure. An understanding of peak month-average day (PMAD) and peak hour is necessary to properly plan, size, and design passenger terminal facilities. The peak month, PMAD, and peak month-peak hour forecasts are key elements in defining the future facility requirements needed to accommodate above-average utilization levels (or peak activity).

The peak month is the calendar month of the year when the highest level of passenger activity and operations typically occur. PMAD is simply the total operations or passengers divided by the number of days in the peak month. To provide the necessary metrics for the demand/capacity analysis, PMAD was projected for the following:

- Commercial operations
- Total airport operations (all users)
- Enplanements, deplanements, and total passengers

To determine peak hour during the PMAD, FAA TFMSC hourly data and airline schedules were examined. For the purposes of this Study, the 15 minutes prior and 15 minutes following the peak hour were included to represent the likely demand placed on the terminal facility. This additional 30 minutes is known as the 'surge factor', which accounts for passengers arriving at the Airport early for their flight and for schedule slippage and delays.

Each peak element must be presented separately:

- Peak commercial air carrier operations – Define the demand for airside facilities (gates and ramp)
- Peak hour airport operations – Determine runway capacity and airfield needs
- Peak enplanements, deplanements, and total passengers – Direct impact on the terminal (e.g., ticketing and baggage claim) and landside (e.g., access roads and parking) facilities

Terminal facilities are generally designed to accommodate enplanements on the PMAD rather than the absolute peak level of activity. A review of the Airport's historical enplanements and operations, as well as upcoming airline schedules, was performed to identify the peak month for commercial activity.

3.13.1 Peak Commercial Operations Forecast

In 2021, the Airport's peak commercial operations occurred in July. To estimate PMAD, peak month commercial operations (1,794) were divided by 31, the number of days in July. The percent share of peak month and PMAD operations was assumed to remain static throughout the forecast horizon, or at approximately 10.4 percent and 3.2 percent, respectively.

To determine the average number of commercial operations occurring during the peak hour, scheduling data was examined, revealing the Airport experiences approximately eight commercial operations during that period (5:30 pm to 7:00 pm). For the purposes of this forecast, it was assumed that future peak-hour commercial operations would maintain its 2021 percent of PMAD activity, approximately 13.8 percent. The Airport's peak commercial operations forecast is presented in **Table 3-26.**

Table 3-26
Peak Commercial Operations Forecast

Year	Annual Commercial Operations	Peak Month Percent	Peak Month Commercial Operations	PMAD Percent	Peak Month Average Day	Peak Hour Percent	Peak Hour
2021	17,288	10.4%	1,794	3.2%	58	13.8%	8
2026	21,608	10.4%	2,242	3.2%	72	13.8%	10
2031	24,080	10.4%	2,499	3.2%	81	13.8%	11
2036	25,741	10.4%	2,671	3.2%	86	13.8%	12
2041	27,168	10.4%	2,819	3.2%	91	13.8%	13

Source: Blue Grass Airport, FAA Operations Network (OPSNET), Ailevon Pacific Aviation Consulting analysis, CHA, 2022.

3.13.2 Peak Airport Operations (All Users)

Although peak commercial operations in 2021 occurred in July, peak total operations (combined air carrier, general aviation, cargo, and military) occurred in October. To estimate PMAD airport operations, peak month operations (7,859) were divided by the number of days in October (31).

To determine the average number of total operations occurring during the peak hour, FAA TFMSC hourly data was examined. In October 2021, the Airport experienced an average of 20 airport operations during its peak hour for total operations, occurring at 10:00 am, 3:00 pm, 4:00 pm, and 5:00 pm. The peak operations forecast is illustrated below in **Table 3-27.**

Table 3-27
Peak Operations (All Users)

Year	Annual Airport Operations	Peak Month Percent	Peak Month Airport Operations	PMAD Percent	Peak Month Average Day	Peak Hour Percent	Peak Hour
2021	76,165	10.3%	7,859	3.2%	254	7.9%	20
2026	82,336	10.3%	8,496	3.2%	274	7.9%	22
2031	86,876	10.3%	8,964	3.2%	289	7.9%	23
2036	90,261	10.3%	9,313	3.2%	300	7.9%	24
2041	93,412	10.3%	9,639	3.2%	311	7.9%	25

Source: FAA Operations Network (OPSNET), FAA Traffic Flow Management System Counts (TFMSC), CHA, 2022.

3.13.3 Peak Enplanements, Deplanements, and Total Passengers

In 2021, the peak month for passenger enplanements was October; however, the peak month for deplanements and total passengers was July. To estimate PMAD, peak month enplanements (54,915), peak month deplanements (55,516), and peak month passengers (110,431) were divided by the number of days in the respective peak month, or by 31 days. To determine the average activity levels in the peak hour, scheduling data was evaluated. The October schedule was utilized due to the new service that began in October 2022, via Avelo Airlines.

Typical peak hours for passenger activities are as follows:

- Enplanements – 4:15 pm to 5:45 pm
- Deplanements – 7:15 pm to 8:45 pm
- Total Passengers – 3:30 pm to 5:00 pm

Peak enplanements, deplanements, and total passenger forecasts are depicted in **Table 3-28**, **Table 3-29**, and **Table 3-30**, respectively.

Table 3-28
Peak Enplanements Forecast

Year	Enplanements	Peak Month Percent	Peak Month Enplanements	PMAD Percent	Peak Month Average Day	Peak Hour Percent	Peak Hour
2021	464,169	11.8%	54,915	3.2%	1,771	18.0%	319
2026	961,994	11.8%	113,812	3.2%	3,671	18.0%	661
2031	1,093,451	11.8%	129,364	3.2%	4,173	18.0%	751
2036	1,225,263	11.8%	144,959	3.2%	4,676	18.0%	842
2041	1,366,059	11.8%	161,616	3.2%	5,213	18.0%	939

Source: Bureau of Transportation Statistics (BTS) T-100 data, Ailevon Pacific Aviation Consulting analysis, CHA, 2022.

Table 3-29
Peak Deplanements Forecast

Year	Deplanements	Peak Month Percent	Peak Month Deplanements	PMAD Percent	Peak Month Average Day	Peak Hour Percent	Peak Hour
2021	465,043	11.9%	55,516	3.2%	1,791	21.7%	389
2026	961,994	11.9%	114,841	3.2%	3,705	21.7%	805
2031	1,093,451	11.9%	130,534	3.2%	4,211	21.7%	915
2036	1,225,263	11.9%	146,270	3.2%	4,718	21.7%	1,025
2041	1,366,059	11.9%	163,078	3.2%	5,261	21.7%	1,143

Source: Bureau of Transportation Statistics (BTS) T-100 data, Ailevon Pacific Aviation Consulting analysis, CHA, 2022.

Table 3-30
Peak Total Passengers Forecast

Year	Passengers	Peak Month Percent	Peak Month Passengers	Percent of Peak Month	Peak Month Average Day	Peak Hour Percent	Peak Hour
2021	929,212	11.9%	110,431	3.2%	3,562	16.8%	597
2026	1,923,988	11.9%	228,654	3.2%	7,376	16.8%	1,236
2031	2,186,902	11.9%	259,900	3.2%	8,384	16.8%	1,405
2036	2,450,526	11.9%	291,230	3.2%	9,395	16.8%	1,574
2041	2,732,118	11.9%	324,695	3.2%	10,474	16.8%	1,755

Source: Bureau of Transportation Statistics (BTS) T-100 data, Ailevon Pacific Aviation Consulting analysis, CHA, 2022.

3.14 Critical Aircraft and Airport Reference Code

The foundation of facility planning and design of federally obligated airports are based on the specifications and dimensional requirements of the critical aircraft, making the critical aircraft an important component of the airport planning process. Per FAA AC 150/5000-17, Critical Aircraft and Regular Use Determination, the critical aircraft is the most demanding aircraft type, or grouping of aircraft with similar characteristics, that make regular use[5] of an airport.

The FAA classifies airports and runways by Airport Reference Codes (ARC) based on their existing and planned operational capabilities. ARC is an airport designation representing the Aircraft Approach Category (AAC) and Airplane Design Group (ADG) of the aircraft that the airfield is intended to accommodate on a regular basis (at least 500 annual operations). The ARC is used for planning and design only and is not intended to prohibit aircraft that may be able to operate safely.

3.14.1 Current Critical Aircraft and Airport Reference Code

To determine the Airport's current critical aircraft, FAA TFMSC and Bureau of Transportation Statistics operational data were evaluated to identify trends by AAC category and ADG grouping. **Table 3-31** presents the grouped operations. As shown, the Airport experienced more than 500 annual operations by 'Category D' and 'Group III' aircraft in 2021; therefore, based on the analysis of TFMSC operations data, D-III represents the Airport's current ARC and current group of aircraft with similar characteristics, or the current critical aircraft grouping. A B737-800 is an example of a D-III aircraft currently operating at the Airport.

Table 3-31
Airport Operations by AAC and ADG (2021) – All Users

AAC & ADG 2021		All Users
Subtotal by AAC	A	5,218
	B	11,276
	C	21,064
	D	756
Subtotal by ADG	I	9,022
	II	20,652
	III	8,618
	IV	22

*The totals shown within this table only include those reported via BTS T-100 data and TFMSC (those with filed flight plans).
Source: FAA Traffic Flow Management System Counts (TFMSC),

Bureau of Transportation Statistics (BTS) T-100 data, GARAA, CHA, 2022.

When looking at the critical aircraft individually for each runway, the Runway Design Code (RDC) determination for Runway 4-22 is D-III, with a B737-800 representing the critical aircraft. Runway 9-27 is currently identified as a B-II runway, with a King Air 350 representing the runways' critical aircraft.

[5] Regular use is defined as an aircraft or grouping of aircraft with more than 500 annual operations, including both itinerant and local operations, but excluding touch-and-go operations; an operation is a takeoff or landing.

3.14.2 Future Airport Reference Code

When projecting future aircraft groupings, it was assumed that operations would retain the percent makeup by user class (i.e., commercial, GA, cargo, and military) from 2021. As shown in **Table 3-32**, the Airport's future ARC is predicted to remain at D-III, with the B737-800 representing an aircraft within the future critical aircraft family.

Table 3-32
Airport Operations Forecast by AAC and ADG – All Users

AAC & ADG		2026	2031	2036	2041
Subtotal by AAC	A	17,618	18,235	18,750	19,265
	B	33,256	34,375	35,307	36,240
	C	29,645	32,371	34,246	35,891
	D	1,817	1,896	1,957	2,016
Subtotal by ADG	I	29,139	30,129	30,954	31,779
	II	38,963	38,321	39,689	40,985
	III	14,163	18,353	19,545	20,573
	IV	71	73	73	75

Source: FAA Traffic Flow Management System Counts (TFMSC), Bureau of Transportation Statistics (BTS) T-100 data, GARAA, CHA, 2022.

This grouping and aircraft (D-III, B737-800) represent the projected critical aircraft and RDC for Runway 4-22. The AAC category and ADG grouping for Runway 9-27 is anticipated to initially remain at B-II; however, the runway's critical aircraft is anticipated to shift from a King Air 350 to a jet in the future. LFUCAB owns WestLEX General Aviation Services, which is going to start accommodating jet traffic in the forecast period. A new 80' x 240' (19,200 square-foot) hangar is currently under construction on the west side, potentially pushing some of the B-II jets from the primary runway (Runway 4-22) to Runway 9-27. The runway will remain at B-II until there is a need to improve Runway 9-27 to accommodate commercial service traffic on a temporary condition, which will be discussed in later chapters. At that time, the AAC category and ADG grouping for Runway 9-27 is anticipated to increase from a B-II to C-II, with a Challenger 300 representing the future critical aircraft. This increase, which will be further discussed and evaluated when examining facility requirements, is probable based on the plan for FBO expansion with a new 100' x 240' (24,000 square-foot) hangar and a new fuel farm facility accommodating Jet-A on the west side of the airfield which is anticipated to result in increased corporate aviation activity and C-II aircraft, per the Airport.

A detailed list of Category C and D aircraft (historical and projected) can be found in **Appendix F**. A summary of the Airport's recommended forecast for passenger enplanements, based aircraft, and specific airport operations is provided in **Appendix B**.

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