

2.0 Forecasts of Aviation Demand

This aviation forecasting effort was conducted as part of the Master Plan Update (the Study) for the Rickenbacker International Airport (LCK). The forecasts were developed using the most recently available information and are referenced in later sections of this Study to determine short- and long-term facility requirements and to provide the preliminary justifications for recommended improvements. The forecasts are presented over a 20-year planning period and have a base year of 2016, which represented the most recent 12 months of available activity data, and extend through 2036. Although various forecasting efforts have been conducted over the course of LCK's history, this is the first comprehensive forecast since Allegiant initiated passenger airline service in late 2012. Also, the Columbus Regional Airport Authority (CRAA) and their partners have positioned LCK to be a key facility for handling international air cargo activity in a limited congestion environment unlike busier cargo gateways in Chicago, New York, Miami, and elsewhere. Organizations such as CRAA, the Federal government, Federal Aviation Administration (FAA), State of Ohio, Franklin County, City of Columbus, Mid-Ohio Regional Planning Commission (MORPC), and private entities have invested time and resources into creating a multi-modal transportation campus around LCK where cargo can quickly be connected by air, rail, and road. The investments have resulted in international cargo imports and exports continuing to grow year-to-year and new routes and air cargo handlers continuing to show an interest in LCK. As discussed in this chapter, the growth of worldwide e-commerce also has the potential to capture tremendous opportunities at LCK. Consequently, it was critical to develop updated forecasts of aviation demand that illustrate realistic expectations for future growth for all categories of activity (commercial airlines, domestic and international cargo, general aviation, and military).

The airport is one part of making the vision for the Rickenbacker area thrive as an inland port in Central Ohio. Key to that is being able to provide necessary facilities in a timely manner. This forecasting effort and subsequent analyses in this Study provide a proactive guide for CRAA to determine when, how, and where to develop facilities to continue to support the inland port. Since LCK serves all categories of aviation activity in very unique capacities, forecasts were first conducted for each category and then collectively evaluated. Emphasis was placed on air cargo because that is what drives much of the airport's long-term facility requirements (airfield facilities, building construction, roads, circulation, etc.). However, Allegiant's passenger service has also grown significantly since its inception at LCK. The demands of the passenger terminal building and apron, terminal loop road (John Circle Drive) and parking lots, and overall circulation are also important considerations—this is especially true when there is a high priority to focus on customer service and convenience. While the forecasts of aviation demand do not identify what development will be needed, they consider what could LCK realistically attract based on initiatives of the CRAA, industry trends, and local trends. As a part of Foreign-Trade Zone (FTZ) #138 that is administered by CRAA, the airport can capitalize on the continued growth of international imports and exports. All of this information was considered as part of the forecasts of aviation demand, as well as various opportunities mentioned throughout this chapter and Study.

For example, some interesting facts regarding activity at LCK in 2016 are listed below. Note that this list does not include Cincinnati/Northern Kentucky International Airport (CVG), which is located in Covington, Kentucky.

- Based on a review of the FAA's Traffic Flow Management System Counts (TFMSC) database, LCK was the only Ohio airport to receive Boeing 747-8 Freighter jet (747-8F) operations in 2016.
- LCK experienced more Boeing 747 jet (747-8F and other models) operations than all other airports in Ohio combined in 2016 (per the FAA's TFMS database).
- According to the FAA's All-Cargo Landed Weight records, LCK landed more air cargo than any other Ohio airport in 2015. And based on preliminary information from the U.S. Department of Transportation's (USDOT's) Bureau of Transportation Statistics (BTS), LCK also landed more cargo than any other Ohio airport in 2016.
- Based on preliminary information from the USDOT's BTS, LCK handled more Allegiant passengers and operations than any other Ohio airport in 2016.

The FAA's National Plan of Integrated Airport Systems (NPIAS) identifies LCK as a Primary Commercial Service Airport. As part of the NPIAS, the airport is eligible to receive annual Airport Improvement Program (AIP) entitlement funding for necessary facility improvements. CCAA receives annual AIP entitlement funding for both the airline passenger activities and landed cargo weights at LCK. According to FAA Order 5100.38D, Airport Improvement Program Handbook, passenger entitlements are calculated based on the number of enplaned or departing passengers each year, while cargo entitlements are "divided on a pro-rata basis according to an airport's share of total U.S. landed cargo weight." Therefore, the forecasts in this Study may be used to estimate the funding that will be available for CCAA to conduct improvements to LCK during the planning period.

The following elements are addressed as part of this forecasting effort:

- Forecasting Limitations
- Historical and Baseline Activity Analysis
- Factors and Opportunities Affecting Activity Levels (General)
- Airline Forecasts
- Cargo Activity
- Military Forecasts
- General Aviation Operations and Based Aircraft Forecasts
- Instrument Operations Forecast
- Peaking Forecasts
- Forecast Summary

2.1 Forecasting Limitations

Forecasting aviation activity is a complex process that considers a multitude of factors, both controllable and beyond an airport's control. Forecasts are not to be construed with predictions of the future, but rather an educated guess of future activity based on a variety of predictors, calculations, assumptions, and subjective judgment. The accuracy of the estimates decline as the planning term is extended, potentially as a result of unforeseen local or geopolitical events, natural disasters, and/or climatological events.

The FAA's forecast approval process typically constitutes an approval for planning purposes only, which allows the airport sponsor to depict projects that are consistent with the long-term growth expectations on the Airport Layout Plan (ALP) Drawing Set. In most cases, prior to issuing a grant, the FAA will require updated information demonstrating that a proposed project is justified by activity at the time, or by activity that would directly result from the implementation of the proposed project. This policy helps to ensure that funding is directed towards critical projects throughout the U.S.

2.2 Historical and Baseline Activity Analysis

Because LCK serves all sectors of aviation activity, there are several historical activity trends that must be analyzed to determine what the likelihood may be for growth during the planning period. It is also necessary to identify the baseline values from where all forecasts begin, which are the actual 2016 values for LCK as determined primarily from the following resources referenced throughout this chapter:

- Historical Activity Counts from the Airport Traffic Control Tower (ATCT)
- Historical Activity Records from CRAA
- FAA TFMSC Database
- FAA Terminal Area Forecast (TAF)
- USDOT Bureau of Transportation Statistics (BTS) Databases

A summary of the historical operations for LCK is presented in **Table 2-1 Historical ATCT Activity Counts (2001-2016)** and was obtained from historical activity counts from the ATCT for the period between 2001 and 2016. There are several different activity characteristics listed in the table that are broken down in further detail within this chapter, but this is the traditional way that activity is categorized by FAA and ATCT personnel. Below are definitions of the activity characteristics from the FAA's TAF Summary for Fiscal Years 2015-2040.

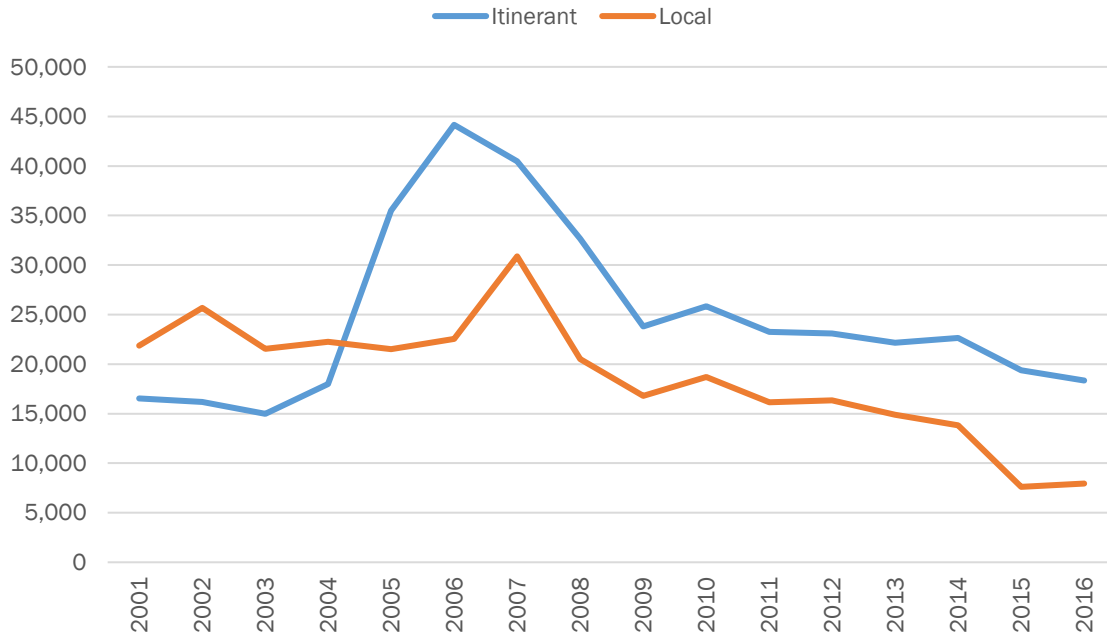
- **Local Operations** are conducted by aircraft operating in the traffic pattern or within sight of the tower, or aircraft known to be departing or arriving from flight in local practice areas, or aircraft executing practice instrument approaches at the airport.
- **Itinerant Operations** are all aircraft operations other than local operations. Essentially, these represent takeoffs and landings of aircraft going from one airport to another.
- **Air Carrier Operations** represent either takeoffs or landings of commercial aircraft with seating capacity of more than 60 seats.

- **Commuter/Air Taxi** operations are one category. Commuter operations include takeoffs and landings by aircraft with 60 or fewer seats that transport regional passengers on scheduled commercial flights. Air taxi operations include takeoffs and landings by aircraft with 60 or fewer seats conducted on unscheduled or for-hire flights. This category can be difficult to differentiate from air carrier and general aviation operations and was therefore broken up later in this chapter.
- **Itinerant General Aviation and Local Civil Operations** represent all civil aviation aircraft takeoffs and landings not classified as commercial.
- **Military Operations** represent takeoffs and landings by military aircraft. Operations are either itinerant or local flights.

The historical activity data in **Table 2-1 Historical ATCT Activity Counts (2001-2016)** and the summary of historical itinerant and local operations in **Figure 2-1 Historical ATCT Activity Counts (2001-2016)** are not as illustrative of the recent growth that has occurred in the air cargo and airline sectors at LCK. For example, **Table 2-2 Historical Activity by User Group (2001-2016)** and **Figure 2-2 Historical Activity by User Group (2001-2016)** illustrate historical activity by user group and **Table 2-3 Historical Air Cargo Activity (2001-2016)** and **Figure 2-3 Average Pounds Per Cargo Operation (2001-2016)** summarize historical cargo statistics (air cargo landings were assumed to equal departures). Shortly after CAA merged with the Rickenbacker Port Authority (RPA) in 2003, the passenger terminal opened and Southeast Airlines began service to several markets from LCK. The airline ceased operations shortly after starting and other airlines such as Pan Am, Hooters Air, and Direct Air also attempted service at LCK, but airline passenger activity did not start to pick up again until Allegiant began service at LCK in late 2012. Regarding air cargo, in the early 2000's companies like Express One International and Evergreen International used to conduct regular operations at LCK, but both companies eventually ceased operations due to financial difficulties. AirNet Express conducted thousands of annual air cargo operations out of LCK using smaller aircraft, but relocated to another airport in 2008. And similar to general aviation activity at airports throughout the country, LCK experienced a decline after the terrorist attacks on September 11, 2001 and due to sharp fuel price increases after Hurricane Katrina damaged Gulf Coast refineries in August 2005. These events and other factors are identified throughout this chapter to help better understand the historical activity trends at LCK and what the opportunities for future growth may be.

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Figure 2-1 Historical ATCT Activity Counts (2001-2016)



Sources: Historical activity records from CRAA and Michael Baker International, Inc., 2017.

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Table 2-1 Historical ATCT Activity Counts (2001-2016)

Year	Itinerant (IT Operations)					Local Operations (LOC)				Total
	Air Carrier/ Air Taxi	General Aviation	Military	Total IT	% Total	General Aviation	Military	Total LOC	% Total	
2001	5,834	7,556	3,159	16,549	43.09%	8,633	13,226	21,859	56.91%	38,408
2002	5,653	7,551	2,981	16,185	38.65%	12,379	13,308	25,687	61.35%	41,872
2003	5,455	7,006	2,523	14,984	41.04%	8,861	12,668	21,529	58.96%	36,513
2004	8,844	6,570	2,568	17,982	44.70%	7,382	14,867	22,249	55.30%	40,231
2005	28,102	5,010	2,381	35,493	62.27%	7,840	13,665	21,505	37.73%	56,998
2006	37,282	4,440	2,430	44,152	66.19%	7,596	14,954	22,550	33.81%	66,702
2007	32,762	5,403	2,300	40,465	56.72%	17,413	13,462	30,875	43.28%	71,340
2008	26,641	3,619	2,387	32,647	61.42%	5,405	15,098	20,503	38.58%	53,150
2009	17,429	4,138	2,239	23,806	58.66%	5,366	11,414	16,780	41.34%	40,586
2010	19,020	4,561	2,246	25,827	58.02%	5,403	13,286	18,689	41.98%	44,516
2011	17,293	3,850	2,124	23,267	59.02%	4,274	11,883	16,157	40.98%	39,424
2012	17,207	3,691	2,190	23,088	58.55%	4,550	11,798	16,348	41.45%	39,436
2013	18,385	2,244	1,515	22,144	59.79%	5,160	9,731	14,891	40.21%	37,035
2014	18,341	2,753	1,556	22,650	62.11%	4,901	8,917	13,818	37.89%	36,468
2015	14,663	3,020	1,707	19,390	71.80%	2,701	4,913	7,614	28.20%	27,004
2016	14,273	2,602	1,470	18,345	69.73%	2,824	5,138	7,962	30.27%	26,307
AAGR 2001- 2010	14.03%	-5.45%	-3.72%	5.07%	3.36%	-5.07%	0.05%	-1.73%	-3.32%	1.65%
AAGR 2010- 2016	-4.67%	-8.93%	-6.82%	-5.54%	3.11%	-10.25%	-14.64%	-13.26%	-5.31%	-8.39%

Sources: Historical activity records from CRAA and Michael Baker International, Inc., 2017.

Note: It was necessary to combine certain ATCT activity counts in 2015 and 2016 to illustrate the same format as previous years. The ATCT at LCK previously counted all activity by the categories in this table, but began counting activity differently in 2015. Therefore, it was necessary to estimate the split between itinerant and local operations for general aviation and military activity.

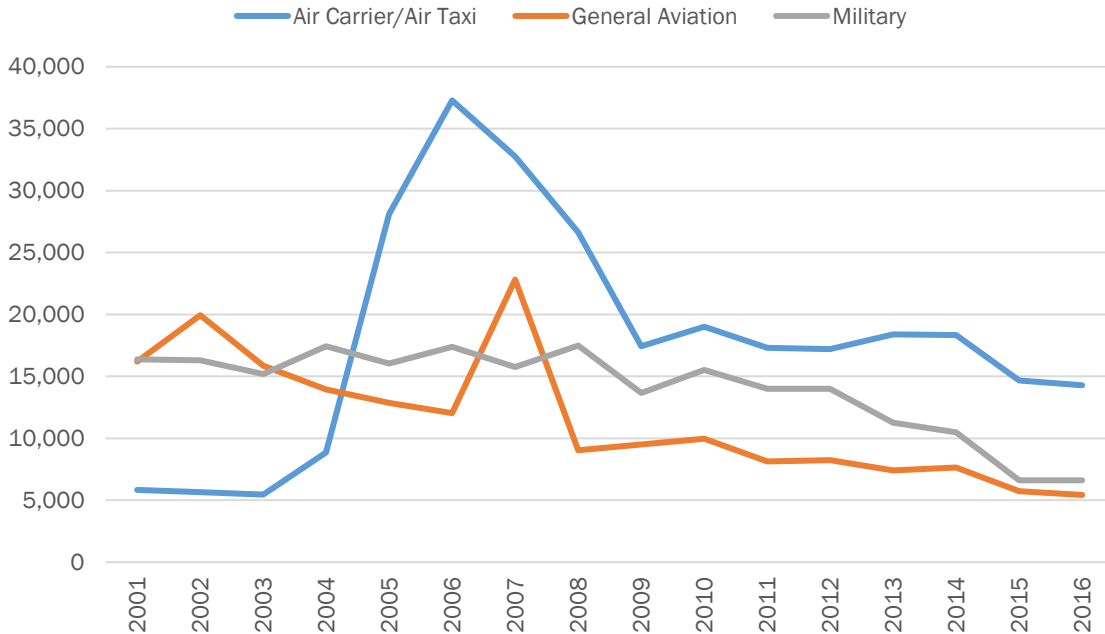
AAGR – Average Annual Growth Rate

Table 2-2 Historical Activity by User Group (2001-2016)

Year	Air Carrier/Air Taxi	General Aviation	Military	Total
2001	5,834	16,189	16,385	38,408
2002	5,653	19,930	16,289	41,872
2003	5,455	15,867	15,191	36,513
2004	8,844	13,952	17,435	40,231
2005	28,102	12,850	16,046	56,998
2006	37,282	12,036	17,384	66,702
2007	32,762	22,816	15,762	71,340
2008	26,641	9,024	17,485	53,150
2009	17,429	9,504	13,653	40,586
2010	19,020	9,964	15,532	44,516
2011	17,293	8,124	14,007	39,424
2012	17,207	8,241	13,988	39,436
2013	18,385	7,404	11,246	37,035
2014	18,341	7,654	10,473	36,468
2015	14,663	5,721	6,620	27,004
2016	14,273	5,426	6,608	26,307
AAGR 2001-2010	14.03%	-5.25%	-0.59%	1.65%
AAGR 2010-2016	-4.67%	-9.63%	-13.27%	-8.39%

Sources: Historical activity records from CRAA and Michael Baker International, Inc., 2017.
 AAGR – Average Annual Growth Rate

Figure 2-2 Historical Activity by User Group (2001-2016)



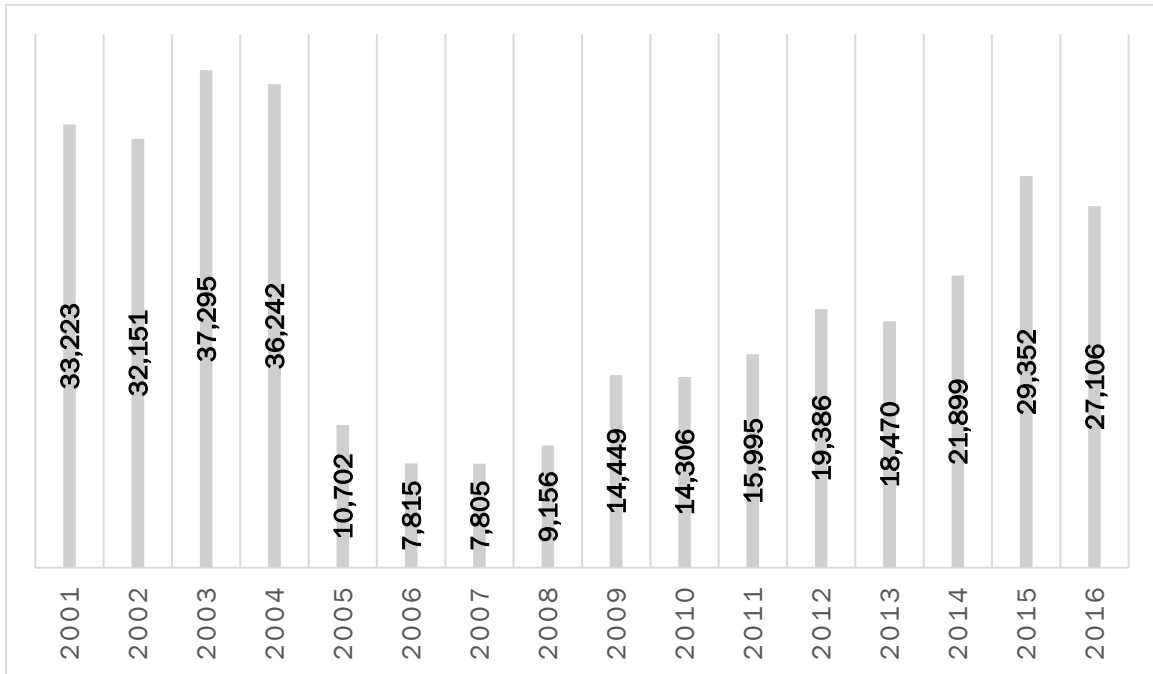
Sources: Historical activity records from CRAA and Michael Baker International, Inc., 2017.

Table 2-3 Historical Air Cargo Activity (2001-2016)

Year	Pounds	Metric Tons	Landings	Total Cargo Ops	Pounds Per Op
2001	213,360,995	96,779	3,211	6,422	33,223
2002	218,945,356	99,312	3,405	6,810	32,151
2003	204,675,711	92,839	2,744	5,488	37,295
2004	215,926,925	97,943	2,979	5,958	36,242
2005	248,917,975	112,907	11,629	23,258	10,702
2006	250,748,061	113,737	16,043	32,086	7,815
2007	220,529,131	100,030	14,128	28,256	7,805
2008	199,814,163	90,634	10,912	21,824	9,156
2009	158,450,106	71,872	5,483	10,966	14,449
2010	153,793,913	69,760	5,375	10,750	14,306
2011	146,164,909	66,299	4,569	9,138	15,995
2012	157,373,170	71,383	4,059	8,118	19,386
2013	153,670,161	69,704	4,160	8,320	18,470
2014	171,422,618	77,756	3,914	7,828	21,899
2015	198,596,025	90,082	3,383	6,766	29,352
2016	202,159,519	91,698	3,729	7,458	27,106
AAGR 2001-2010	-3.57%	-3.57%	5.89%	5.89%	-8.94%
AAGR 2010-2016	4.66%	4.66%	-5.91%	-5.91%	11.24%

Sources: Historical activity records from CRAA and Michael Baker International, Inc., 2017.
 AAGR - Average Annual Growth Rate

Figure 2-3 Average Pounds Per Cargo Operation (2001-2016)

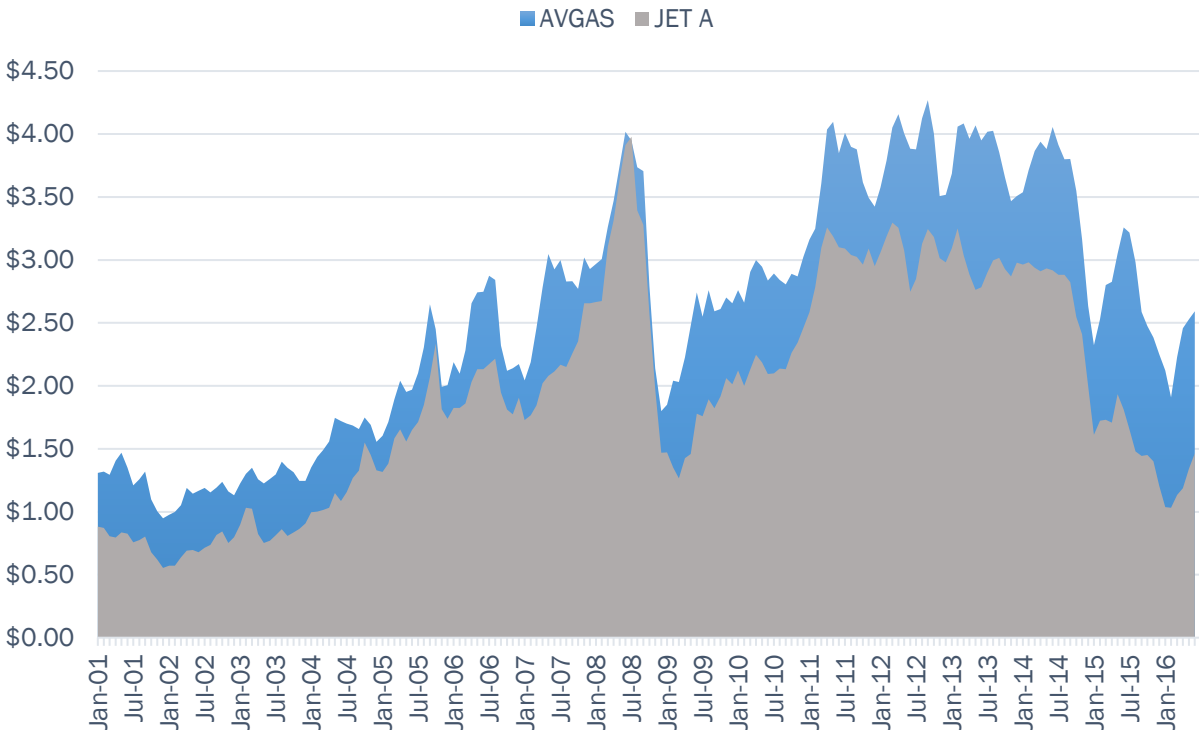


Sources: Historical activity records from CRAA and Michael Baker International, Inc., 2017.

2.3 Factors and Opportunities Affecting Activity Levels (General)

This section describes past and present trends that may influence activity levels at LCK. As part of any forecasting effort, the FAA recommends the identification of historical factors that represented turning points for the U.S. aviation industry such as the terrorist attacks on September 11, 2001, sharp fuel price increases after Hurricane Katrina damaged Gulf Coast refineries in August 2005 (refer to **Figure 2-4 U.S. Aviation Gasoline Wholesale/Resale by Refiners (2001-2016)**), and the economic recession of the late 2000s. In October 2016, Hurricane Matthew also produced airline cancellations at LCK and temporary relocations of military jets from their home bases to LCK to avoid poor weather. Although many of those events were impossible to predict, their resulting consequences had considerable impacts on aviation activity throughout the U.S. Local trends are also important because they provide airport-specific information that can be used to support the selection of preferred forecasts. General trends evaluated in this section include economic conditions and the FAA’s Next Generation Air Transportation System (NextGen) initiatives. Other trends are presented as part of the individual forecast elements in this chapter.

Figure 2-4 U.S. Aviation Gasoline Wholesale/Resale by Refiners (2001-2016)

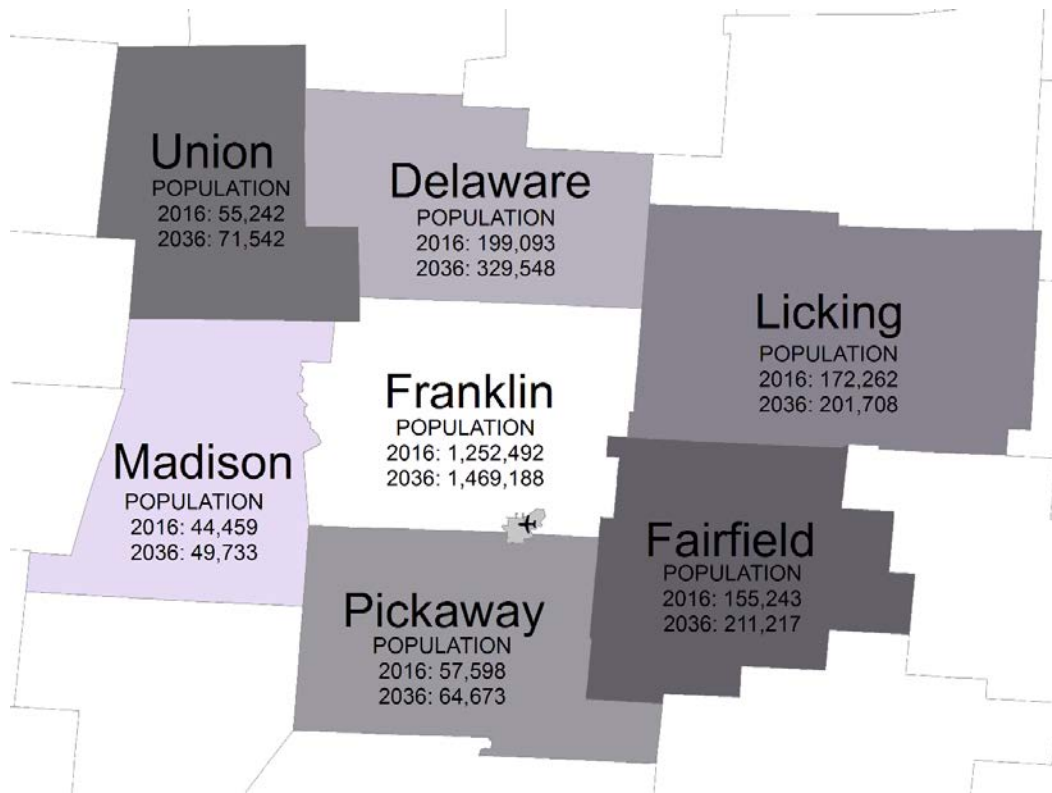


Sources: U.S. Energy Information Administration and Michael Baker International, Inc., 2017.

2.3.2 Economic Conditions

The economic conditions of an area can affect the demand for aviation-related travel and business services. Three key factors were selected to evaluate the economic profile of the area surrounding LCK: 1) Population, 2) Total Employment, and 3) Per Capita Personal Income (PCPI). The historical and forecast data shown in **Table 2-4 Historical and Forecast Economic Conditions (2000-2036)** was obtained from Woods & Poole Economics, Inc. and was extracted from a 2016 dataset for all counties and metro areas in Ohio. The dataset is useful because it provides a single-source of annually updated economic variables. A comparison of geographies was conducted for the U.S., State of Ohio, and the seven counties that comprise the MORPC planning area (refer to **Figure 2-5 Seven-County Region**).

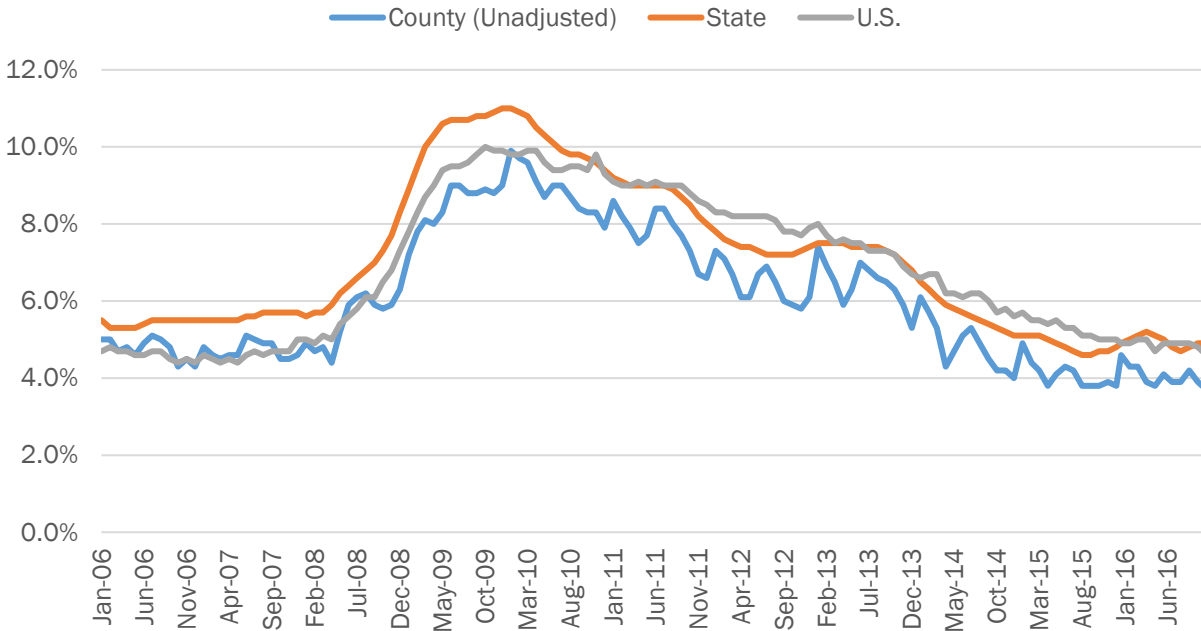
Figure 2-5 Seven-County Region



Sources: Woods & Poole Economics, Inc. and Michael Baker International, Inc., 2017.
Note: Woods & Poole does not guarantee the accuracy of the data.

According to the economic data from Woods & Poole, modest growth is forecast for population and employment in the State of Ohio. The state population is expected to grow at an Average Annual Growth Rate (AAGR) of 0.31% and employment is expected to grow at an AAGR of 0.88% over the 20-year planning period. LCK is physically located in both Franklin and Pickaway Counties, with the majority of the airport property located in Franklin County. Of the seven counties in the area, Franklin County has the largest population and employment base. Being the state capital of Ohio, Columbus and Franklin County have benefitted from historically lower unemployment rates than the state and U.S. (refer to **Figure 2-6 Historical Unemployment Rates (2006-2016)**). This can be attributed to the high number of state employee positions within Franklin County and the surrounding suburban areas, as well as the presence of The Ohio State University (OSU). The historical and forecast growth in Central Ohio suggests that a demand for aviation services will likely continue to grow as population, employment, and PCPI levels are projected to increase. This information was compared to MORPC’s 2040 Land Use Projections forecasts that have a base year of 2015. As an example, MORPC’s population forecast from 2015 to 2040 shows an AAGR of 0.64% for the seven counties and the Woods & Poole data shows an AAGR of 1.07% from 2016 to 2036 for the same region. Because MORPC was in the process of updating the Land Use Projections forecast at the time of this writing, the more current Woods & Poole data was incorporated into this Study.

Figure 2-6 Historical Unemployment Rates (2006-2016)



Sources: U.S. Bureau of Labor Statistics and Michael Baker International, Inc., 2017.

Table 2-4 Historical and Forecast Economic Conditions (2000-2036)

Year	U.S.	Ohio	Seven-County Region							
			Delaware	Fairfield	Franklin	Licking	Madison	Pickaway	Union	Combined/Average
Population										
2000	282,162,000	11,364,000	111,759	123,485	1,072,018	146,268	40,218	52,808	41,338	1,587,894
2010	309,347,000	11,540,000	175,108	146,391	1,166,107	166,707	43,412	55,725	52,391	1,805,841
2016	324,507,000	11,664,000	199,093	155,243	1,252,492	172,262	44,459	57,598	55,242	1,936,389
2021	339,812,000	11,866,000	226,681	168,300	1,308,410	179,873	45,896	59,516	59,154	2,047,830
2026	355,802,000	12,068,000	257,699	182,178	1,364,744	187,535	47,307	61,403	63,247	2,164,113
2031	372,071,000	12,255,000	292,162	196,661	1,419,617	194,989	48,629	63,178	67,439	2,282,675
2036	387,690,000	12,399,000	329,549	211,217	1,469,188	201,708	49,733	64,673	71,542	2,397,610
AAGR 2000-2010	0.92%	0.15%	4.59%	1.72%	0.84%	1.32%	0.77%	0.54%	2.40%	1.29%
AAGR 2010-2016	0.80%	0.18%	2.16%	0.98%	1.20%	0.55%	0.40%	0.55%	0.89%	1.17%
AAGR 2016-2036	0.89%	0.31%	2.55%	1.55%	0.80%	0.79%	0.56%	0.58%	1.30%	1.07%
Employment										
2000	165,371,000	6,780,000	54,728	51,567	851,573	72,635	18,283	22,134	29,018	1,099,938
2010	173,035,000	6,400,000	116,290	61,296	822,241	71,101	19,124	19,429	32,344	1,141,825
2016	191,871,000	6,922,000	138,963	67,749	934,293	75,933	21,955	19,779	38,450	1,297,122
2021	206,284,000	7,299,000	159,538	74,602	1,006,557	80,253	23,516	20,729	41,697	1,406,892
2026	220,486,000	7,646,000	182,123	81,702	1,077,833	84,104	24,989	21,526	44,898	1,517,175
2031	234,283,000	7,962,000	206,685	88,999	1,146,633	87,439	26,353	22,171	48,072	1,626,352
2036	247,548,000	8,243,000	233,198	96,454	1,211,655	90,261	27,605	22,678	51,212	1,733,063
AAGR 2000-2010	0.45%	-0.57%	7.83%	1.74%	-0.35%	-0.21%	0.45%	-1.30%	1.09%	0.37%
AAGR 2010-2016	1.74%	1.32%	3.01%	1.68%	2.15%	1.10%	2.33%	0.30%	2.92%	2.15%
AAGR 2016-2036	1.28%	0.88%	2.62%	1.78%	1.31%	0.87%	1.15%	0.69%	1.44%	1.46%
Per Capita Personal Income (PCPI)										
2000	\$30,602	\$28,631	\$42,698	\$28,527	\$38,768	\$27,445	\$24,233	\$22,113	\$26,641	\$30,061
2010	\$40,277	\$36,377	\$53,358	\$35,126	\$38,662	\$34,390	\$31,475	\$30,130	\$34,517	\$36,808
2016	\$48,134	\$44,310	\$68,481	\$41,745	\$42,775	\$41,454	\$38,208	\$36,326	\$44,646	\$44,805
2021	\$56,667	\$52,604	\$80,007	\$48,819	\$46,148	\$48,218	\$45,138	\$42,272	\$51,816	\$51,774
2026	\$69,840	\$65,344	\$97,888	\$59,746	\$49,656	\$58,581	\$55,687	\$51,326	\$62,961	\$62,264
2031	\$88,466	\$83,343	\$123,685	\$75,215	\$52,901	\$73,014	\$70,499	\$63,842	\$78,880	\$76,862
2036	\$112,547	\$106,686	\$157,682	\$95,182	\$55,946	\$91,239	\$89,557	\$79,522	\$99,633	\$95,537
AAGR 2000-2010	2.79%	2.42%	2.25%	2.10%	-0.03%	2.28%	2.65%	3.14%	2.62%	2.05%
AAGR 2010-2016	3.01%	3.34%	4.25%	2.92%	1.70%	3.16%	3.28%	3.17%	4.38%	3.33%
AAGR 2016-2036	4.34%	4.49%	4.26%	4.21%	1.35%	4.02%	4.35%	4.00%	4.10%	3.86%

Sources: Woods & Poole Economics, Inc. and Michael Baker International, Inc., 2017.
 Note: Woods & Poole does not guarantee the accuracy of the data.
 AAGR - Average Annual Growth Rate

2.3.3 FAA Next Generation Air Transportation System (NextGen)

NextGen includes a series of improvements to the national aviation system that are intended to make air travel more safe, convenient, and dependable. By investing in new technologies and replacing aging systems, NextGen initiatives are focused on improving schedule predictability, reducing environmental impacts, flying more direct routes, limiting ground holding, better circumventing poor weather, providing better approaches and access to airports, and improving safety for accident avoidance. The FAA's investment in NextGen initiatives should help to improve access and approach capability for airports around the U.S., as has been the case at LCK with the rollout of Localizer Performance with Vertical Guidance (LPV) approaches that provide horizontal and vertical course guidance to aircraft via Global Positioning System (GPS). Through the recommendations of this Study and the FAA's ongoing NextGen initiatives, it is anticipated that LCK will continue to become more accessible and that airlines will be able to continue to save time and money through more efficient route planning.

2.4 Airline Forecasts

The airline forecasts were divided into the following elements:

- Scheduled Airlines
- Allegiant Trends
- Scheduled Airlines Forecast
- Unscheduled Airlines Forecast
- Airline Fleet Mix Forecast
- Airline Belly Cargo and Remain-Overnight (RON) Considerations

2.4.2 Scheduled Airlines

As mentioned in this Study, the scheduled airline service at LCK is conducted exclusively by Allegiant. Allegiant began service at LCK in late 2012 and has experienced high levels of year-to-year growth ever since. In the first full year of service at LCK in 2013, Allegiant conducted a total of 214 operations flying to two airports in Florida: St. Pete-Clearwater International Airport (PIE) and Orlando Sanford International Airport (SFB). During 2013, Allegiant flew 29,864 passengers between LCK and those two airports using 166-passenger McDonnell Douglas MD-80 jets (MD-80s). In 2014, Allegiant passenger service at LCK grew by 189.07% over the previous year and service was added to Punta Gorda Airport (PGD) in Florida and Myrtle Beach International Airport (MYR) in South Carolina. As shown in **Table 2-5 Allegiant Activity at LCK (2013-2016)**, Allegiant continued to fly more passengers and add destinations in 2015 and 2016, with total passengers reaching 196,115 in 2016 on 1,338 operations using a mix of MD-80s and Airbus A320 jets (A320s) flying between LCK and eight destinations. **Figure 2-7 Total Allegiant Passengers at LCK (2001-2016)** illustrates the growth in total Allegiant passengers between 2013 and 2016—a historical trend line is shown to evaluate what the future passenger growth might look like at LCK if the growth were to continue in a similar manner. Using the trend line equation below, total 2036 Allegiant passengers would reach 1,345,682 at LCK, however that value was not deemed appropriate

for this forecasting effort because of recent and announced business plans by Allegiant that are described later in this section. With the addition of seasonal service to Destin-Fort Walton Beach Airport (VPS) in Florida and increased frequency on existing routes, the Allegiant service is expected to continue to experience passenger and operational growth in 2017. **Table 2-6 Allegiant Non-Stop Destinations from LCK (as of January 10, 2017)** summarizes the Allegiant schedule for LCK as of January 10, 2017 and **Figure 2-8 Allegiant Non-Stop Destinations from LCK (as of January 10, 2017)** illustrates the map of year-round and seasonal destinations from LCK.

Trend Line Equation: $y = 57113x - 25030$

Where y equals annual passengers...

And X is the evaluation year minus the base year (2013) plus 1.

2036 Example: $y = (57113 \times (2036-2013+1)) - 25030 = 1,345,682$ passengers

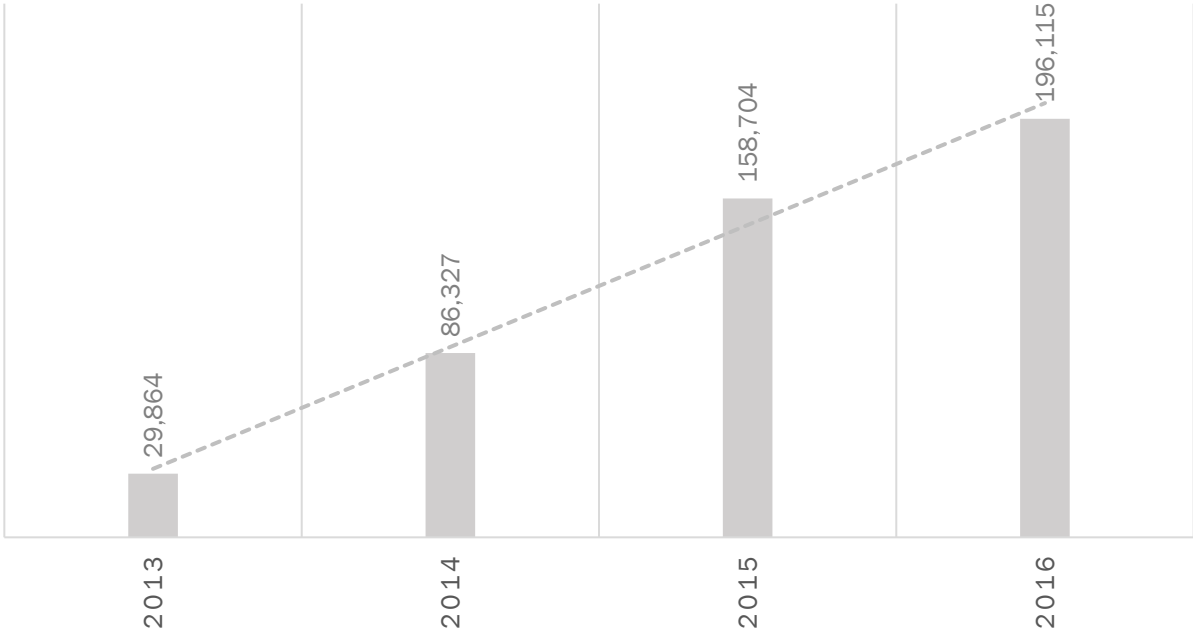
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Table 2-5 Allegiant Activity at LCK (2013-2016)

Year	Passengers				Operations			
	Enplanements	Deplanements	Total	Yearly Growth	Departures	Arrivals	Total	Yearly Growth
2013	15,063	14,801	29,864		107	107	214	
2014	43,425	42,902	86,327	189.07%	296	296	592	176.64%
2015	79,730	78,974	158,704	83.84%	569	569	1,138	92.23%
2016	99,311	96,804	196,115	23.57%	669	669	1,338	17.57%
AAGR 2013-2016	87.51%	87.01%	87.26%		84.22%	84.22%	84.22%	

Sources: Historical activity records from CRAA and Michael Baker International, Inc., 2017.
 AAGR – Average Annual Growth Rate

Figure 2-7 Total Allegiant Passengers at LCK (2001-2016)



Sources: Historical activity records from CRAA and Michael Baker International, Inc., 2017.

Table 2-6 Allegiant Non-Stop Destinations from LCK (as of January 10, 2017)

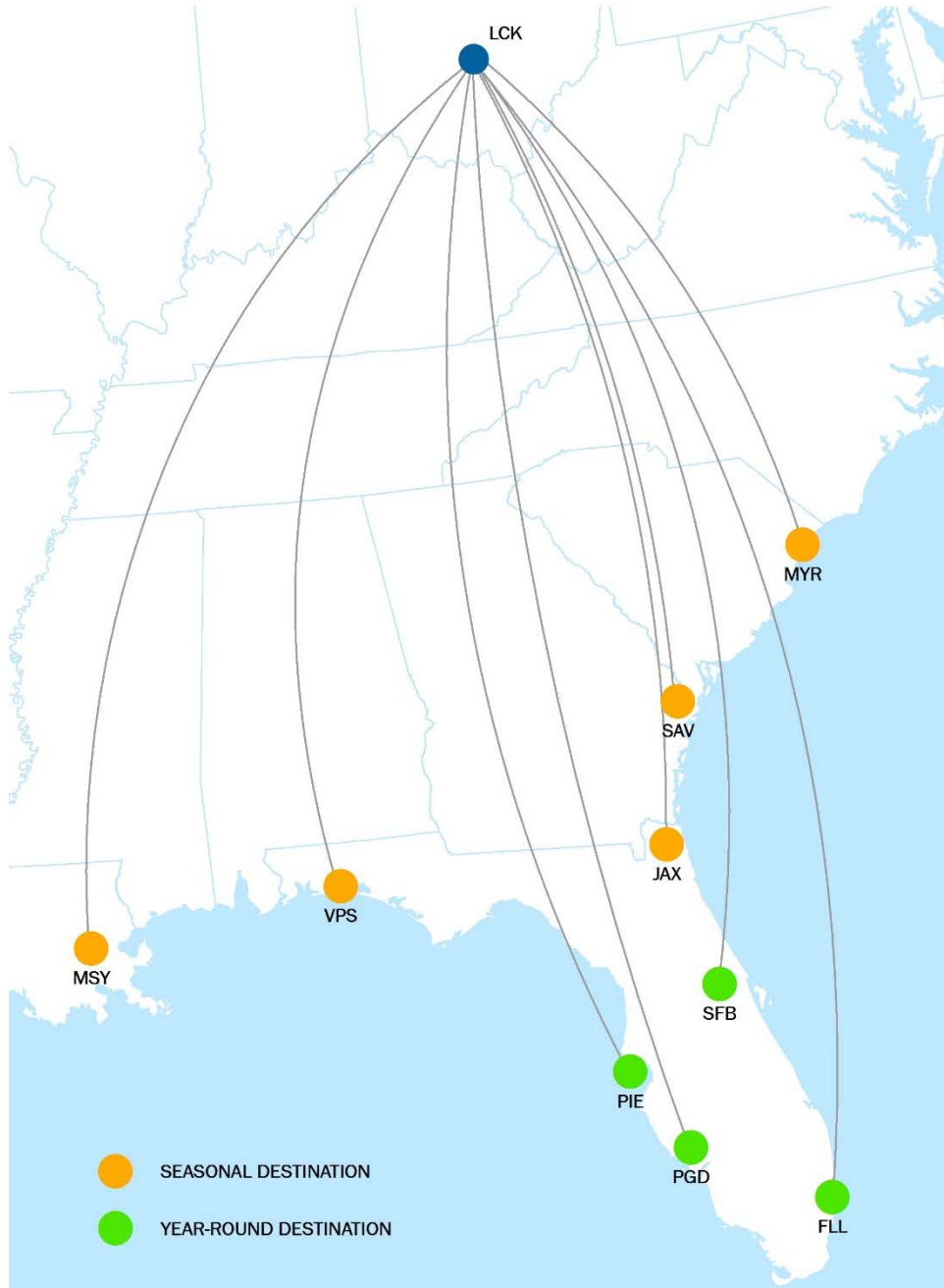
Airport	Airport Location	Service Duration	Service Frequency
Destin-Fort Walton Beach (VPS)	Destin, FL	Seasonal Begins 5/25/2017	2 x Week
Fort Lauderdale/Hollywood International (FLL)	Fort Lauderdale, FL	Year-Round	2-3 x Week
Jacksonville International (JAX)	Jacksonville, FL	Seasonal Returns 4/4/2017	2 x Week
Myrtle Beach International (MYR)	Myrtle Beach, SC	Seasonal Returns 4/13/2017	2-7 x Week
New Orleans International (MSY)	New Orleans, LA	Seasonal Returns 2/17/2017	2 x Week
Orlando Sanford International (SFB)	Orlando, FL	Year-Round	2-4 x Week
Punta Gorda Airport (PGD)	Punta Gorda, FL	Year-Round	2-5 x Week
Savannah/Hilton Head International (SAV)	Savannah, GA	Seasonal Returns 3/10/2017	2-3 x Week
St. Pete-Clearwater International (PIE)	St. Petersburg, FL	Year-Round	2-6 x Week

Sources: CRAA records.

2.4.3 Allegiant Trends

Based on preliminary information from the USDOT’s BTS, LCK was the busiest airport in the State of Ohio for Allegiant service in 2016 (not including CVG which is located in Kentucky). The airport’s location in Central Ohio, proximity to a large population center, and connections to leisure destinations in the Southeastern U.S. have allowed Allegiant to continuously expand its low-cost service at LCK while maintaining high load factor ratios, which are calculated by dividing occupied passenger seats by available passenger seats. Airlines strive to have high load factors in order to maximize the number of passengers on each flight, thereby maximizing the profitability of each flight. According to the FAA Aerospace Forecast Fiscal Years 2016-2036, domestic scheduled passenger load factor ratios are forecast to increase from 80.5% in 2016 to 81.0% by 2036. In every year since 2013 at LCK (refer to **Table 2-7 Allegiant Load Factors at LCK (2013-2016)**), Allegiant has exceeded the FAA’s 2036 forecast load factor ratio for domestic scheduled passengers (for both enplaned and deplaned passengers). This is a common trend for Allegiant in many markets where routes continue to experience high load factor ratios even as service is expanded. Consequently, the desire for low-cost leisure travel services is seen as the primary driving force for the Allegiant service growth at LCK.

Figure 2-8 Allegiant Non-Stop Destinations from LCK (as of January 10, 2017)



Sources: CRAA records and Michael Baker International, Inc., 2017.

Table 2-7 Allegiant Load Factors at LCK (2013-2016)

Year	Load Factors			Average Passengers	Aircraft		Destinations
	Enplaned	Deplaned	Average		Type	Seats	
2013	87.03%	84.70%	85.87%	139.55	MD80	166	PIE, SFB
2014	89.14%	86.43%	87.79%	145.82	MD80, A320	166 or 177	PIE, PGD, SFB, MYR
2015	83.51%	80.83%	82.17%	139.46	MD80, A320	166 or 177	FLL, SAV, PIE, PGD, SFB, MYR
2016	87.66%	84.59%	86.13%	146.57	MD80, A320	166 or 177	FLL, SAV, PIE, PGD, SFB, MYR, MSY, JAX

Sources: Bureau of Transportation Statistics (BTS) Air Carrier Statistics (Form 41 Traffic, T-100 Domestic Segment, U.S. Carriers) and Michael Baker International, Inc., 2017.

Note: Only a partial year of data was available for 2016.

According to Allegiant’s website, “From America’s favorite small cities to world-class destinations, Allegiant makes leisure travel affordable and convenient. With low-low fares, nonstop, all-jet service and premier travel partners, Allegiant provides a complete travel experience with great value and without the hassle.” Based in Las Vegas, Nevada, Allegiant has experienced rapid growth at LCK and in revenues, profits, and net income in recent years. However, the company has faced numerous maintenance issues associated with an aging fleet and is undergoing fleet replacements and maintenance. According to Allegiant’s 2016 Investor Day presentation (dated November 28, 2016), the company plans to phase out all MD80s by 2019, to purchase 12 new 186 seat A320s by 2020, and also focus on utilizing additional used Airbus jets (A319s and A320s). The new A320s will be the first new aircraft that Allegiant has received during the airline’s history as it transitions to an all Airbus fleet. Due to this investment, rising fuel prices, and a new contract deal with pilots, Allegiant anticipates slower growth. While Allegiant does not outline specific proprietary growth plans, the forecasts for this Study anticipate slower growth for Allegiant service in the long-term. Other airlines are also employing strategies to become more competitive with Allegiant (e.g., Basic Economy Fares on American Airlines that do not come with a seat assignment or allow for a full-sized carry-on and similar fare structures/policies on Delta Air Lines and United Airlines).

In Ohio, Allegiant pulled its service from Akron-Canton Regional Airport (CAK) and shifted operations to Cleveland-Hopkins International Airport (CLE). This was done in an effort to be closer to their customer base in Cleveland and to increase the airline’s presence in Northeast Ohio. At CLE, Allegiant will fly to two additional destinations beyond those scheduled at LCK in 2017: Austin-Bergstrom International Airport (AUS) in Texas and Phoenix-Mesa Gateway Airport (IWA) in Arizona, both of which are key destinations for Allegiant (*note that there are not currently any direct flights between CRAA’s airports and AUS*). CVG also has Allegiant service to AUS, IWA, and other destinations not currently served from LCK. Situations like this and airline mergers, acquisitions, and/or losses of an airline hub such as what occurred at CLE can create unknown, undesired, or unwelcome circumstances for an airport.

2.4.4 Scheduled Airlines Forecast

While the population around the Columbus area appears to sustain the increasing service to leisure markets served by Allegiant, the market may become oversaturated, particularly considering the proximity to and airline service at John Glenn Columbus International Airport (CMH). Furthermore, the ability to withstand continued airline service growth at LCK may decline due to a lack of appropriate facilities to accommodate demands (short-term and long-term) and it is not CAAA's intention to grow passenger service at LCK to any substantial degree given the focus is on passenger growth at CMH. While previous forecasting efforts were reviewed to develop the scheduled airline forecast for LCK, such as the 2006 Federal Aviation Regulation (FAR) Part 150 Noise Study and the 2012 environmental documentation for Air Cargo Terminal (ACT) 5, the rise in Allegiant's service at LCK since those studies were conducted suggests that recent trends are more appropriate to analyze for this Study.

Two scheduled airline forecast scenarios were identified for LCK due to the uncertainty associated with Allegiant's future growth expectations in Columbus and throughout the U.S. The first scenario assumes lower growth based on Allegiant's known plans at LCK and also accounts for the natural growth that is associated with growing population and employment in the region. The second scenario assumes higher growth based on operations Allegiant is currently conducting at comparable markets around Ohio.

Scenario 1 assumes that what is known for 2017 will occur. Allegiant intends to add bi-weekly roundtrip service to VPS beginning on May 25, 2017. Assuming that the VPS service will last four months per year, it would result in 16 additional operations per month or 64 additional operations per year. Allegiant also intends to add additional frequencies to some destinations served in 2016, which vary throughout the year based on demand and seasonal activities. Through a review of Allegiant's flight schedule through July 2017, it appears that the additional frequencies could result in five additional departures and arrivals per week on average in 2017, which would generate 520 more operations per year. Therefore, 584 additional scheduled Allegiant operations may occur in 2017 to accommodate the new VPS service and added frequencies. In 2016, Allegiant service at LCK averaged 146.57 (rounded) Persons Per Operation (PPO), which if applied to 2017 suggests that 85,599 more passengers could be accommodated. After 2017, Scenario 1 assumes that natural growth will occur in accordance with the forecast population AAGR of 1.07% for the seven-county MORPC region between 2016 and 2036. That value was applied to enplanements and deplanements (with the same 146.57 PPO) to determine the number of scheduled airline departures through 2036 (and arrivals were assumed to equal departures). The resulting forecast for Scenario 1 is presented in **Table 2-8 Scheduled Airline Forecast Scenario 1 (2016-2036)** and illustrates enplanements increasing from 99,311 in 2016 to 173,960, total passengers increasing from 196,115 to 344,851, and total operations increasing from 1,338 to 2,374.

Scenario 2 assumes all of the same factors as Scenario 1, but adds two additional bi-weekly round trip destinations to 2018, one to 2019, and one to 2020. This would provide a comparable number of destinations that are now provided by Allegiant at CLE as of 2017, potentially with the addition of year-round service to AUS and IWA (or other key Allegiant destinations), and also considers the potential for continued growth and new routes in the

short-term. In 2018, Scenario 2 adds a total of eight weekly operations or 416 annual operations and approximately 1,173 weekly passengers or 60,974 annual passengers (rounded). Half of those values were applied in both 2019 and 2020 to account for the addition of new destinations. Then starting in 2021, Scenario 2 applies the same natural growth assumptions as Scenario 1. The resulting forecast for Scenario 1 is presented in **Table 2-9 Scheduled Airline Forecast Scenario 2 (2016-2036)** and illustrates enplanements increasing from 99,311 in 2016 to 240,787, total passengers increasing from 196,115 to 478,602, and total operations increasing from 1,338 to 3,286.

Figure 2-9 Scheduled Passenger Scenarios (2013-2036) illustrates a comparison between the scheduled passenger forecasts and **Figure 2-10 Scheduled Operations Scenarios (2013-2036)** illustrates a comparison between the scheduled operations forecasts (including historical activity back to 2013). Both tables indicate what the average number of operations would be each day if spread evenly across a year. Because Allegiant does not conduct routine and daily service between many of its routes, those numbers do not represent true peaking that would occur under each scenario. Actual peak days may be higher due to seasonal activity, delays, and other factors, but it provides a preliminary expectation of what the average daily requirement would look like for the passenger terminal facility under each scenario. Because CRAA has indicated that passenger growth should be focused on CMH, the added facility demands under Scenario 2 may make such a growth forecast challenging without significant improvements to the passenger terminal area at LCK. Consequently, no further analysis of Scenario 2 was conducted as part of this forecasting effort; however, the ability to meet such a level of demand at LCK should be discussed with CRAA staff and considered as part of the facility requirements within this Study.

2.4.5 Unscheduled Airlines Forecast

Unscheduled airlines at LCK also provide charter service primarily for athletic charters by OSU and Ohio University (OU), whereas visiting teams generally use CMH. Occasional charters are also conducted for university marching bands, university boosters, visiting athletic teams, and the military. The historical and forecast unscheduled airline information is presented in **Table 2-10 Combined Scenario 1 and Unscheduled Airline Forecasts (2013-2036)** and combined with Scenario 1 of the scheduled airline forecast to show the overall airline passenger and airline forecasts during the planning period. The unscheduled airline forecasts were conducted by increasing all variables (enplanements, deplanements, departures, and arrivals) by the forecast population AAGR of 1.07% for the seven-county region between 2016 and 2036. Unscheduled activity at LCK can change from year-to-year depending upon the travel schedules of OSU and OU, and is therefore hard to predict until the teams establish their schedules and coordinate with CRAA staff to make proper arrangements. Because it only represents a small percentage of the total airline activity at LCK, the 1.07% AAGR should be sufficient to estimate long-term demands. Total scheduled and unscheduled airline passengers are forecast to increase from 203,269 in 2016 to 353,702 by 2036 and operations are forecast to increase from 1,438 to 2,497 during the same period.

Table 2-8 Scheduled Airline Forecast Scenario 1 (2016-2036)

Year	Passengers				Operations				
	Enplanements	Deplanements	Total	Yearly Growth	Departures	Arrivals	Total	Yearly Growth	Operations + 365
2016	99,311	96,804	196,115	23.57%	669	669	1,338	17.57%	3.67
2017	142,110	139,603	281,714	43.65%	961	961	1,922	43.65%	5.27
2018	143,631	141,097	284,728	1.07%	980	980	1,960	1.97%	5.37
2019	145,168	142,607	287,775	1.07%	990	990	1,981	1.07%	5.43
2020	146,721	144,133	290,854	1.07%	1,001	1,001	2,002	1.07%	5.48
2021	148,291	145,675	293,966	1.07%	1,012	1,012	2,023	1.07%	5.54
2022	149,878	147,234	297,111	1.07%	1,023	1,023	2,045	1.07%	5.60
2023	151,481	148,809	300,291	1.07%	1,033	1,033	2,067	1.07%	5.66
2024	153,102	150,401	303,504	1.07%	1,045	1,045	2,089	1.07%	5.72
2025	154,740	152,011	306,751	1.07%	1,056	1,056	2,111	1.07%	5.78
2026	156,396	153,637	310,033	1.07%	1,067	1,067	2,134	1.07%	5.85
2027	158,070	155,281	313,351	1.07%	1,078	1,078	2,157	1.07%	5.91
2028	159,761	156,943	316,704	1.07%	1,090	1,090	2,180	1.07%	5.97
2029	161,470	158,622	320,092	1.07%	1,102	1,102	2,203	1.07%	6.04
2030	163,198	160,319	323,517	1.07%	1,113	1,113	2,227	1.07%	6.10
2031	164,944	162,035	326,979	1.07%	1,125	1,125	2,251	1.07%	6.17
2032	166,709	163,768	330,478	1.07%	1,137	1,137	2,275	1.07%	6.23
2033	168,493	165,521	334,014	1.07%	1,150	1,150	2,299	1.07%	6.30
2034	170,296	167,292	337,588	1.07%	1,162	1,162	2,324	1.07%	6.37
2035	172,118	169,082	341,200	1.07%	1,174	1,174	2,349	1.07%	6.43
2036	173,960	170,891	344,851	1.07%	1,187	1,187	2,374	1.07%	6.50
AAGR 2016-2036	2.84%	2.88%	2.86%		2.91%	2.91%	2.91%		

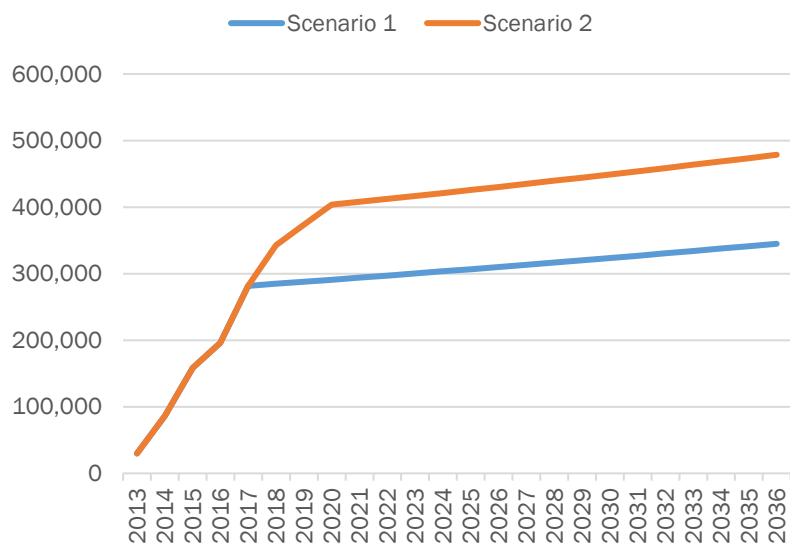
Source: Michael Baker International, Inc., 2017.
 Note: Some numbers may not add correctly due to rounding.
 AAGR – Average Annual Growth Rate

Table 2-9 Scheduled Airline Forecast Scenario 2 (2016-2036)

Year	Passengers				Operations				
	Enplanements	Deplanements	Total	Yearly Growth	Departures	Arrivals	Total	Yearly Growth	Operations + 365
2016	99,311	96,804	196,115	23.57%	669	669	1,338	17.57%	3.67
2017	142,110	139,603	281,714	43.65%	961	961	1,922	43.65%	5.27
2018	172,598	170,091	342,688	21.64%	1,169	1,169	2,338	21.64%	6.41
2019	187,841	185,334	373,175	8.90%	1,273	1,273	2,546	8.90%	6.98
2020	203,085	200,578	403,663	8.17%	1,377	1,377	2,754	8.17%	7.55
2021	205,258	202,724	407,982	1.07%	1,400	1,400	2,801	1.70%	7.67
2022	207,454	204,893	412,347	1.07%	1,415	1,415	2,831	1.07%	7.76
2023	209,674	207,086	416,759	1.07%	1,431	1,431	2,861	1.07%	7.84
2024	211,917	209,301	421,219	1.07%	1,446	1,446	2,892	1.07%	7.92
2025	214,185	211,541	425,726	1.07%	1,461	1,461	2,923	1.07%	8.01
2026	216,477	213,804	430,281	1.07%	1,477	1,477	2,954	1.07%	8.09
2027	218,793	216,092	434,885	1.07%	1,493	1,493	2,985	1.07%	8.18
2028	221,134	218,404	439,538	1.07%	1,509	1,509	3,017	1.07%	8.27
2029	223,500	220,741	444,241	1.07%	1,525	1,525	3,050	1.07%	8.36
2030	225,892	223,103	448,995	1.07%	1,541	1,541	3,082	1.07%	8.44
2031	228,309	225,490	453,799	1.07%	1,558	1,558	3,115	1.07%	8.54
2032	230,752	227,903	458,655	1.07%	1,574	1,574	3,149	1.07%	8.63
2033	233,221	230,342	463,562	1.07%	1,591	1,591	3,182	1.07%	8.72
2034	235,716	232,806	468,522	1.07%	1,608	1,608	3,216	1.07%	8.81
2035	238,238	235,297	473,536	1.07%	1,625	1,625	3,251	1.07%	8.91
2036	240,787	237,815	478,602	1.07%	1,643	1,643	3,286	1.07%	9.00
AAGR 2016-2036	4.53%	4.60%	4.59%		4.59%	4.59%	4.59%		

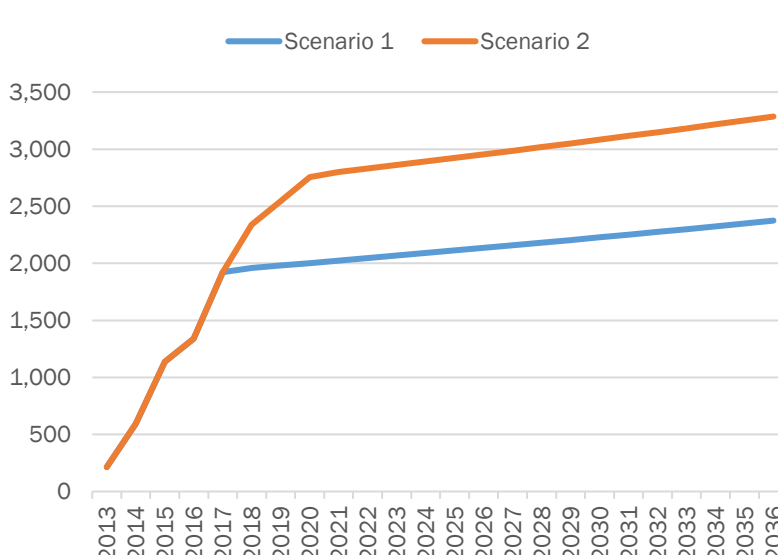
Source: Michael Baker International, Inc., 2017.
 Note: Some numbers may not add correctly due to rounding.
 AAGR – Average Annual Growth Rate

Figure 2-9 Scheduled Passenger Scenarios (2013-2036)



Source: Michael Baker International, Inc., 2017.

Figure 2-10 Scheduled Operations Scenarios (2013-2036)



Sources: Michael Baker International, Inc., 2017.

Table 2-10 Combined Scenario 1 and Unscheduled Airline Forecasts (2013-2036)

Year	Unscheduled Airlines						Combined Scenario 1 and Unscheduled Airlines					
	Passengers			Operations			Passengers			Operations		
	Enplanements	Deplanements	Total	Departures	Arrivals	Total	Enplanements	Deplanements	Total	Departures	Arrivals	Total
2013	1,745	1,660	3,405	102	102	204	16,808	16,461	33,269	209	209	418
2014	3,068	2,177	5,245	64	64	128	46,493	45,079	91,572	360	360	720
2015	3,355	4,192	7,547	51	51	102	83,085	83,166	166,251	620	620	1,240
2016	3,978	3,176	7,154	50	50	100	103,289	99,980	203,269	719	719	1,438
2017	4,021	3,210	7,231	51	51	101	146,131	142,813	288,944	1,012	1,012	2,023
2018	4,064	3,244	7,308	51	51	102	147,695	144,341	292,036	1,031	1,031	2,062
2019	4,107	3,279	7,386	52	52	103	149,275	145,886	295,161	1,042	1,042	2,084
2020	4,151	3,314	7,465	52	52	104	150,872	147,447	298,319	1,053	1,053	2,106
2021	4,195	3,350	7,545	53	53	105	152,486	149,025	301,511	1,064	1,064	2,129
2022	4,240	3,385	7,626	53	53	107	154,118	150,619	304,737	1,076	1,076	2,152
2023	4,286	3,422	7,707	54	54	108	155,767	152,231	307,998	1,087	1,087	2,175
2024	4,332	3,458	7,790	54	54	109	157,434	153,860	311,293	1,099	1,099	2,198
2025	4,378	3,495	7,873	55	55	110	159,118	155,506	314,624	1,111	1,111	2,221
2026	4,425	3,533	7,957	56	56	111	160,821	157,170	317,991	1,123	1,123	2,245
2027	4,472	3,570	8,043	56	56	112	162,542	158,852	321,393	1,135	1,135	2,269
2028	4,520	3,609	8,129	57	57	114	164,281	160,551	324,832	1,147	1,147	2,294
2029	4,568	3,647	8,216	57	57	115	166,039	162,269	328,308	1,159	1,159	2,318
2030	4,617	3,686	8,303	58	58	116	167,815	164,005	331,821	1,171	1,171	2,343
2031	4,667	3,726	8,392	59	59	117	169,611	165,760	335,371	1,184	1,184	2,368
2032	4,717	3,766	8,482	59	59	119	171,426	167,534	338,960	1,197	1,197	2,393
2033	4,767	3,806	8,573	60	60	120	173,260	169,327	342,587	1,209	1,209	2,419
2034	4,818	3,847	8,665	61	61	121	175,114	171,138	346,252	1,222	1,222	2,445
2035	4,870	3,888	8,757	61	61	122	176,988	172,970	349,957	1,235	1,235	2,471
2036	4,922	3,929	8,851	62	62	124	178,881	174,820	353,702	1,249	1,249	2,497
AAGR 2016-2036	1.07%	1.07%	1.07%	1.07%	1.07%	1.07%	2.78%	2.83%	2.81%	2.80%	2.80%	2.80%

Source: Michael Baker International, Inc., 2017.
 Note: Some numbers may not add correctly due to rounding.
 AAGR - Average Annual Growth Rate

2.4.6 Airline Fleet Mix Forecast

All airline activity at LCK is conducted using jets whether it is scheduled or unscheduled. As mentioned earlier, Allegiant is in the process of replacing its older aircraft (MD80s) with new A320s and other used Airbus jets (A320s and A319s). By 2019, Allegiant plans to be flying an entirely Airbus fleet, with the exception of some spare MD80s for peak times, whereas in 2016 they flew approximately 36% of their operations at LCK using MD80s. Unscheduled airline operations tend to be conducted in a variety of different aircraft each year, but predominantly in aircraft comparable to those that Allegiant flies (e.g., Boeing 737 aircraft). For some larger football games during the year (e.g., Bowl games), OSU may charter Boeing 747s to transport the team, marching band, and others; however, for the sake of this forecast analysis, it was determined that Allegiant’s trend of increasing use of narrow-body Airbus jets and phasing out older jets was most representative of the passenger airline activity that currently operates and is forecast to operate at LCK during the planning period. The resulting forecast is presented in **Table 2-11 Airline Fleet Mix Forecast (2013-2036)**. The numbers were estimated by reviewing Allegiant’s proposed fleet replacement plans.

Table 2-11 Airline Fleet Mix Forecast (2013-2036)

Year	MD80 (or Equivalent)	Airbus (or Equivalent)	Total
2016	524	914	1,438
2017	445	1,578	2,023
2018	158	1,904	2,062
2019	0	2,084	2,084
2020	0	2,106	2,106
2021	0	2,129	2,129
2022	0	2,152	2,152
2023	0	2,175	2,175
2024	0	2,198	2,198
2025	0	2,221	2,221
2026	0	2,245	2,245
2027	0	2,269	2,269
2028	0	2,294	2,294
2029	0	2,318	2,318
2030	0	2,343	2,343
2031	0	2,368	2,368
2032	0	2,393	2,393
2033	0	2,419	2,419
2034	0	2,445	2,445
2035	0	2,471	2,471
2036	0	2,497	2,497
AAGR 2016-2036	N/A	5.15%	2.80%

Source: Michael Baker International, Inc., 2017.
 AAGR - Average Annual Growth Rate

2.4.7 Airline Belly Cargo and Remain Overnight (RON) Considerations

Some passenger airlines carry cargo in the belly or baggage compartment of the aircraft. This is often arranged with contract mail and courier services and the United States Postal Service (USPS). However, Allegiant does not carry cargo or mail in the belly of its aircraft. Allegiant's corporate policy is that all baggage must accompany a passenger on the flight. This is common for low-cost carriers who have quick turnaround times and limited staff at each location to make such a practice profitable. Therefore, no forecasts of airline belly cargo were conducted for this Study.

According to Change 2 of FAA AC 150/6070-6B, "The availability and need for Remain-Overnight (RON) aircraft parking should be evaluated. RON aircraft parking may be provided at gates or in proximity to the passenger terminal building or in remote locations (remote hardstands)." Based on discussions with the Fixed Base Operator (FBO) at LCK, Allegiant rarely has a need for RON aircraft parking unless there is an issue with an aircraft where a flight has to be canceled and maintenance needs to occur. Therefore, no forecast of RON aircraft parking was conducted for this Study.

2.5 Cargo Activity

The following summary identifies the existing state of the cargo activity at LCK and identifies the activity levels that have occurred since 2013. **Table 2-12 Cargo Activity, Scheduled, and Unscheduled Operations** below summarizes each year of activity and the contribution of each of the carriers/groups. As will be noted later in this section, 2016 was the year in which scheduled operations added loaded exports out of LCK. The table demonstrates the contribution to the overall volumes; stated here in pounds by the carriers. There has been an evolution in carrier activity at LCK and a noticeable shift in contribution by the four current air carriers who manage operations and the arrival/departure of international air cargo.

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Table 2-12 Cargo Activity, Scheduled, and Unscheduled Operations

Carrier		2013	2014	2015	2016
AirNet		619,780	553,351		
Amerijet			312,560		
Atlas Air		51,205	1,161,331		
Cargolux		5,456,089	14,150,181	21,915,516	27,380,616
Cathay Pacific			9,985,973	19,081,839	23,053,238
Emirates				6,263,209	21,911,017
Ethiopian					2,792,514
FedEx		106,737,571	111,502,955	96,195,242	86,909,693
Kalitta Air		13,338,637	4,099,276		
UPS		26,760,239	28,495,325	31,056,527	30,827,855
Charter					9,294,586
Charter (Domestic)				1,833,474	
Charter (International)				22,250,218	
Other		706,640	1,161,666		
Total Carrier Volume	Pounds	5,456,089	24,136,154	47,260,564	75,137,385
Total, All Activities	Pounds	153,670,161	171,422,618	198,596,025	202,159,519

Source: IMS Worldwide, 2017

The above charts can be summarized in the following data points:

- Growth from 2013-2014: 342.4 % pure international freighter traffic, not including charters, FedEx, or UPS, representing growth from 5,456,089 to 24,136,154 pounds. All-inclusive, total growth was 11.6% from 153,670,161 pounds to 171,422,618 pounds.
- Growth from 2014-2015: 95.8 % pure international freighter traffic, not including charters, FedEx, or UPS, representing growth from 24,136,154 pounds to 47,260,564 pounds. All-inclusive, total growth was 15.9 % from 171,422,618 pounds to 198,596,025 pounds.
- Growth from 2015-2016: 59 % pure international freighter traffic, not including charters, FedEx, or UPS, representing growth from 47,260,564 pounds to 75,137,385 pounds. All-inclusive total growth is only 1.8 %, due to lower FedEx numbers.

The average annual growth in pure international freighter traffic for the four carriers who manage scheduled operations at LCK was 167.5% between 2013 and 2016. The total average combined annual cargo growth of all carrier and charter operations was 9.8%.

This finding is a critical component of the air cargo forecast for LCK. The total growth in the past years, in terms of total operations (all carriers and charters), is almost twice the global cargo growth forecast (Boeing @ 4.2%, see details in Section 2.5.3 below). This growth is not only spectacular for a small activity airport, but historic, as Columbus and Rickenbacker have now evolved into a viable alternative for global operations for the largest and most significant air carriers. The efforts undertaken to date provide a foundation for continued growth in the international freight sector, with more and more forwarders, logistics providers, air carriers

and cargo owners leveraging their utilization of the Rickenbacker option to produce a more competitive global supply chain.

The LCK airport has a long history of charter activity driven by the changing demands of the retail and other manufacturers in the region. While most of the charter activity is inbound, import driven, there are also domestic charters that support movement of goods between key manufacturing origins and consumer destinations in the US and North America. Given the volumes of charter activity over the past years, and the expectation that charter volumes will be sustained, this provides a strong context to support shifts from unscheduled freighter charter operations to scheduled freighter activity. Converting unscheduled operations to scheduled operations is a top priority for the CRAA, cargo owners and the global freight forwarders who operate in the region.

2.5.1 Variables Affecting the Forecast

The carriers, the cargo owners and their logistics service providers all have recognized and embraced the value proposition provided by using the Rickenbacker gateway as an option for cargo. However, observing the growth of the scheduled carriers creates numerous immediate challenges and opportunities that must be addressed if new business growth is to be captured and sustained at LCK. These challenges are outlined below in summary and presented in detail within later sections of this document.

- In the past three years, many freight forwarders who operate in or near Columbus have only moved a percentage of their cargo in favor of a Rickenbacker solution for freight they manage for cargo owners.
- Many cargo owners have moved some, but not all cargo to this gateway option.
- Freight stakeholders, the airlines, and Forward Air Freight (FAF) have not completed an operations, pricing or logistics solution that would “terminate” the FAF way-bill from one of the many remote cities that send cargo into the FAF sort operation in Columbus. This sort facility processes over 16 million pounds of cargo each week. Diverting freight from this current routing to the LCK aircraft, instead of having FAF trucking this freight to other gateway markets is being considered. Terminating 5% of the cargo that moves via truck to these other cities each night would result in a growth of 9.9 million additional pounds to the current 75,137,385 pounds contributed by the four carriers. This would represent a potential impact of 13.2% growth to the annual volume total.
- FAF performs a weekend sort for Pilot Air Freight at another location in Columbus. Pilot’s new management seeks a more aggressive presence in the global cargo markets. If it is possible to capture 5% of the Pilot cargo processed in Columbus, this would add 1.95 million pounds to the 75,137,385 pounds currently contributed by the four carriers. This represents a potential impact of 2.6 % growth to the annual volume total.
- One prospective e-commerce vendor who has a strong presence in JFK and LAX has indicated the need for a mid-country processing and sortation center. Initial forecasts for e-commerce volumes are much higher, but if 50,000 packages per day were to be processed by this vendor (10% of what they indicate is possible when permits, facilities

and procedures are in place) this would add 44 million new pounds of cargo to the current air carriers' contribution of 75,137,385 pounds annually. This single vendor would increase the total cargo volumes by up to 58.6% over existing 2016 volumes.

The effect of these initiatives would almost double the total volume of international freighter cargo at Rickenbacker within the next two years or sooner. It means that the cargo contributions by the current four (or new carriers or increased frequencies) has the potential to add 55,850,000 pounds to the forecast. This is cargo that would be enplaned or deplaned using incumbent or new air carriers operating at LCK and does not include any "organic" growth contributions from the Global Freight Forwarders (GFF), who will continue to route and re-route cargo to the LCK gateway.

This statement is made without consideration of any of the freight forwarders who are currently considering and evaluating relocation of their entire global hub operations to Columbus from ORD or JFK. This does not consider the volumes of growth that could be captured by this group or other freight stakeholders, if they are successful in their e-commerce strategies. Finally, it does not consider the impact on downstream transportation or logistics infrastructure that would be necessary to accommodate this growth. In future sections of this forecast, this impact will be discussed.

The above historical cargo activity and annual summaries point to significant growth at LCK. This growth is driven by a wide-array of factors, each is catalogued and the potential impact on future growth is provided within future sections of this report/forecast.

2.5.2 Factors and Opportunities Affecting Cargo Activity Levels

In 2012, the leading economic development and business recruitment entity in Columbus, the Columbus 2020 organization, conducted a study to determine if Columbus was retaining its leadership "edge" as a desired location for global logistics activities. During this study, a market review and analysis was conducted which demonstrated that Columbus was an excellent location for supporting retailers, manufacturers and their freight forwarding, third-party logistics service providers. With significant transportation assets and the ability to reach large populations of consumers due to its strong logistics infrastructure, this makes Columbus a location that will continue to attract warehouse, distribution and emerging fulfillment activities for the new e-commerce industry.

In 2013-2014, the CRAA aligned with an array of economic development stakeholders, and private business partners to determine the feasibility of expanding international cargo operations at LCK to include new scheduled operations in support of the growth in both imports and exports. This move was supported by a local retailer and key strategic staff from the air carriers operating at LCK. The CRAA conducted an initiative to determine, given the volumes identified in the study, an effort to attract other global cargo carriers to expand the frequency and depth of operations at LCK. A local firm, Regionomics, and IMS Worldwide, Inc., a national logistics consulting firm, were hired to conduct an economic impact study to determine the overall direct, indirect and induced impact which would result from new and expanded air cargo operations at LCK. As a result of this effort, the CRAA launched an

expanded, successful marketing effort and constructed the new private-publicly funded air cargo terminal, which has positioned LCK (as demonstrated above) as a new alternative global gateway. As such, LCK has seen significant growth in operations, both scheduled, unscheduled or ad-hoc charters, increases in LCK cargo routings, as well as an expansion in the array of global freight forwarders that occupy space in/near LCK.

Columbus Value Proposition

The LCK value proposition has been simply to provide the freight stakeholders, shippers and third-party service providers with an alternative to other traditional gateways such as ORD, JFK, ATL and EWR, while at the same time providing the freight stakeholders with a congestion-free and more efficient supply chain model. The result has been extraordinary growth that has significantly exceeded the projections for global air cargo growth. Using the LCK alternative to the traditional gateway provides the freight forwarder, their client, and the cargo owner with loading from warehouse to airplane on the ramp in minutes and hours, not days. The same compression of time occurs during the un-load, sort and dispatch cycle. None of the other traditional gateways can provide this level of “speed to market.”

For the years 2013-2016, the total growth of cargo at LCK has been 9.8% growth year-over-year. This is a significant contrast to the overall projections and historic performance of global cargo. What is remarkable about the growth of cargo imports and exports at LCK is that in 2015, during the prolonged labor issues impacting ocean freight on the west coast at the Ports of Los Angeles and Long Beach, cargo owners and their logistics providers re-routed cargo impacted by ocean supply chains to both scheduled and ad-hoc charter operations. Despite having over 90 charters in 2015, during the peak of the supply chain disruption, in 2016 the overall cargo volumes will still surpass the historic high volumes achieved in 2015. This is an important consideration as the baseline for the Cargo Forecast must be grounded on data that supports continued growth and expansion of air operations at LCK. Given the impact of the charters and the ability of the carriers and cargo owners to route cargo to LCK over other gateways, it demonstrates the strength of the LCK value proposition and logistics advantages of using this gateway.

The Columbus freight community relies on a wide diversity of conveyances to move cargo between global origins and destinations, to and from Columbus and the region. Columbus is connected to the world by air cargo operations and package/express couriers, and is connected to North America by rail and truck. Columbus is served by two of the Class 1 Railways in North America that operate intermodal operations in Columbus. Norfolk Southern (NS) operates their intermodal facility at Rickenbacker; CSX Transportation (CSX) operates their facility in West Columbus. These two rail carriers connect Columbus with ocean carriers that deliver inbound cargo from global suppliers that primarily utilize containerized cargo to move high volumes of goods from origins to destinations in Columbus. By connecting to the western rail carriers (Burlington Northern Santa Fe (BNSF) and Union Pacific (UP) Railways), CSX and NS provide access to the global freight that is discharged from ocean container ships at both western and eastern US ports. This ocean shipment method of conveyance is preferred, as it provides a cost-effective method to move high volumes of goods in a secure supply chain to a warehouse, distribution or fulfillment center in Columbus.

FedEx and UPS operate both ground and air cargo operations at Rickenbacker and in Columbus. These, as will be demonstrated in the e-commerce and intermodal portion of this section, provide a broad reach and a wide-array of delivery choices for cargo owners or their third-party logistics service providers to “match up” the demand for delivery to or from Columbus.

Given the strength of the LCK operations and the supporting cast of logistics services, (ocean, rail, truck, courier, cargo aircraft), LCK is well positioned to sustain its growth and exceed the forecasts for global air cargo. Columbus is one of the key inland ports used by the rail carriers, ocean carriers, freight forwarders and cargo owners, where industrial buildings are arrayed in a cluster that allows the freight community to aggregate high volumes of cargo to specific destinations. Inland ports are places where organized economic activity occurs and where these activities produce efficiencies of scale for the collective users.

Inland Ports also exist in Dallas-Fort Worth, Kansas City and Chicago. These inland ports are supported by the rail carriers who discharge intermodal ocean volumes at these locations from west coast ports. Atlanta, Columbus, Lehigh Valley and Chicago are inland ports supported by the eastern rail carriers who operate in support of the key ocean ports on the eastern coast. Columbus, Atlanta and Chicago are unique as these inland ports are supported by rail carriers who discharge containerized freight from both western and eastern ports. As an inland port, Columbus is viewed by the freight community as a critical location for distribution and now for fulfillment platforms in support of store and e-commerce requirements in a local, regional, national and international platform for high-volume trade.

CRAA Staff Contribution

In 2015, the CRAA hired a dedicated outside sales person focused on business development to increase cargo activity within the catchment area. This new position held the following specific objectives:

- Identify global freight forwarders (GFF) who do not operate or occupy space at/near LCK.
- Determine a strategy to add their volumes, customers and influence to the Columbus, OH area and occupy space at/near LCK.
- Identify a “pathway” to re-direct freight from traditional freight gateways to LCK as it provides a more predictable global solution and in many cases, a shorter cycle between origin/destination than the traditional gateways.

To assist in the strategic marketing process, a catchment zone was defined as a region that would benefit by using freight routed through LCK. This catchment zone has been the focus of the sales and business development efforts by the CRAA. Cities such as Detroit, Cleveland, Pittsburgh, Louisville, Cincinnati and Indianapolis were identified as markets where the line haul and “speed to market” advantages provided at LCK would benefit shippers and freight logistics providers.

As these initiatives continue and new GFF/third-party logistics providers (3PL) embrace the value proposition of LCK as a strong global gateway, this will continue to drive new import and export volumes at LCK. Some of the GFF/3PL firms have indicated that because of the favorable advantages that are gained by using the LCK gateway, they will re-route significant volumes of cargo from existing gateways to LCK. Currently, many of the GFF/3PL firms only route a minor portion of their import/export traffic through the LCK gateway and have significant volumes routing through the traditional gateways of JFK and ORD.

2.5.3 Cargo Industry Growth Projections

The forecasts below demonstrate the views of some of the world's top industry leaders and summarizes their projections for air cargo growth:

- The International Air Transport Association projects 4.1% CAG (2015-2020)
- International market forecast specialist Sandler Research projects 5.97% growth each year (2014-2019)
- The Boeing Company projects 4.2% CAG (2015-2035)
- Leading international market research firm Technavio projects 4.57% (2016-2020)

Boeing states in its Current Market Outlook 2015-2035, "Replacement of aging airplanes, plus the industry's growth requirements, will create a demand for 2,370 freighter deliveries over the next 20 years. Of these, 1,440 will be passenger airplane conversions. The remaining 930 airplanes, valued at \$270 billion, will be new. The overall freighter fleet will increase by more than half—from 1,770 airplanes in 2015 to 3,010 by 2035. According to Andrew Herdman, General Director of the Association of Asia Pacific Airlines, "air cargo is an essential part of the global supply chain accounting for the transportation of over \$6 trillion worth of goods a year and 40% of this volume moves on Asian Airlines." According to the Journal of Commerce (January 2017), the share of cargo carried by freighters remains high in markets worldwide, specifically in the two largest trade routes: Asia-North America and Asia-Europe, where more than 70% of total air cargo traffic is carried by freighters.

LCK has exceeded the growth projections for global air cargo and this report provides the context for multiple impacts that will drive a higher rate of growth over current levels at least for the next 4-5 years and into future years. There are several initiatives in place that will contribute to even higher growth and increasing volumes of cargo, operations and frequencies. These initiatives and their impact are presented in separate sections within the report below.

2.5.4 Logistics Providers

LCK is well positioned for continuing and expanding its influence on global logistics and trade. This statement is supported by the following initiatives and efforts in place that will drive increases in cargo volumes to this new global gateway.

There are many companies involved in managing global trade for cargo owners. These companies are called freight forwarders, or third-party logistics service providers, that provide

a wide-array of services to cargo owners in support of their global manufacturing, distribution and e-commerce fulfillment programs. These global freight forwarders, or third-party logistics providers, occupy space in the Columbus region and utilize the intermodal rail, truck, courier and air networks to support their client's movement of goods. These providers utilize their ability to reach a large portion of the population of the US from their warehouses, distribution or fulfillment centers located in Columbus. As new demands emerge for global e-commerce or cross-border trade, Columbus and LCK are well positioned due to the high density of retailers that produce, distribute and support their retail stores from locations at/near Columbus. These cargo owners rely on one, or in some cases, multiple freight logistics partners to move, manage, store, control and ship or receive goods on their behalf, not only in Columbus but in other domestic and international markets. The relationships between cargo owners and their selected GFF or 3PL is significant and often includes aspects of technology platforms used to support order management, inventory control and supply chain visibility which are shared between the cargo owner and the freight logistics partner.

Of the top 25 GFF firms shown in **Table 2-13 Top 25 Global Freight Forwarders**, 17 (as of 2016) have operations, occupy facilities and manage ground, ocean and air cargo for multiple clients, or cargo owners from their facilities located in Ohio or in the Columbus area.

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Table 2-13 Top 25 Global Freight Forwarders

A & A Rank	Provider
1	DHL Supply Chain & Global Forwarding
2	Kuehne + Nagel
3	DB Schenker Logistics
4	Panalpina
5	Sinotrans
6	Nippon Express
7	Expeditors International of Washington
8	SDV (Bolloré Group)
9	CEVA Logistics
10	DSV A/S – Cleveland
11	Hellmann Worldwide Logistics
12	UPS Supply Chain Solutions
13	Kintetsu World Express – Cleveland
14	UTi Worldwide – Cleveland
15	Damco
16	Pantos Logistics
17	Yusen Logistics – Cincinnati
18	C.H. Robinson
19	Kerry Logistics
20	Agility
21	Geodis
22	Toll Holdings
23	Logwin
24	NNR Global Logistics
25	Dimerco Express

Note: Columbus-Based FF (in RED) – Ohio Markets (GOLD)
 Source: Armstrong & Associates, Inc., 2015

In addition, many “niche” freight forwarders, who do not have the global “spend” of the top forwarders, are also located in Columbus and these providers still retain a high level of volume in relationships to the top retailers. While these forwarders are not identified as the top tier in terms of revenue dollars, they uniquely contribute to a significant component of retailers’ global operations, while occupying industrial space at/near Columbus.

There are a number of the top tier of freight forwarders who do not have a significant presence at/near Columbus. Some of these firms were identified and contacts established during project interviews. This information was provided to CRAA and local economic development stakeholders in order to determine a process to communicate the advantages of the Columbus market.

In later portions of this section, there is a description of the CSX and NS operations and their historical statistics for intermodal activities in Columbus. Intermodal business connects the ocean ports to inland ports. Intermodal shipments arrive at ocean ports and are transferred

to rail carriers for delivery to an intermodal facility for final drayage (truck delivery) to a warehouse, manufacturing, distribution or fulfillment center.

The growth of the intermodal sector at an inland port drives the growth of new industrial buildings occupied by 3PLs or GFF firms. As more companies recognize the value of a facility in/near Columbus, they will bring their 3PL or GFF to that market in order to assure a seamless transition or expansion of their logistics network.

In many cases, cargo owners utilize one or several 3PLs, and these expansions are a partnership between the cargo owner and their GFF. This new business, driven by strong growth in intermodal activity results in some demand for air cargo as part of the business-driven by plant, logistics, labor or other disruptions. As more GFF move into facilities in Columbus, they will contribute to the expedited cargo moves required when disruptions occur or when market demand exceeds what can be moved on an all-water/intermodal supply chain. This relationship becomes more critical as the couriers, both FedEx and UPS, and now Amazon, utilize more intermodal moves to supplement their ground distribution networks.

2.5.5 Movement of Goods

The GFF/3PL community of logistics service providers have for many decades supported their traditional air freight gateways, such as ORD, JFK, ATL, DFW, LAX and MIA. These gateway hubs provide the GFF with locations where they can aggregate export volumes from their national network of operations and access global lift. LCK now offers an alternative to this traditional freight routing regime. However, many of the GFF firms have strict policies related to supporting specific gateway locations in terms of volumes, and in many cases, the GFF pay a fee to support the gateway facility and staff.

Numerous cities in the near-Columbus area have been identified as markets where the air cargo solution offered at LCK provides a lower cost (by virtue of a shorter line haul to LCK rather than other gateways) and compressed supply chain from origin to destination by as much as one to two days. Both of these reasons and significant congestion at the traditional gateways are resulting in some forwarders and cargo owners re-assessing the traditional gateway model and embracing the LCK model.

In 2013-2014, when the demand study was completed, it was recommended that a new cargo facility be immediately constructed to support the expected volumes. Air Cargo Terminal 5 is the result, and consideration should already be underway to determine the funding strategy for the expansion of Air Cargo Terminal 5.

During the course of this forecast, many GFFs indicated the desire, and, in fact, the need to be in a facility on the cargo ramp in order to have more control over the airside process. Today, many of the forwarders rely on a ground-handler, Container Freight Station (CFS) operator to unload, sort and deliver cargo. This adds another layer of time and cost to their supply chain.

2.5.6 Foreign Trade Zone Overview

Columbus is served by Foreign Trade Zone (FTZ) No. 138, managed by the Grantee, Columbus Regional Airport Authority. FTZ No. 138 currently serves 1 industrial park, along with 11 usage-driven and 1 subzone, which operate for a specific user. This Zone project is an Alternate Site Framework (ASF) Zone project and serves the counties of Champaign, Clark, Coshocton, Crawford, Delaware, Fairfield, Franklin, Hocking, Knox, Licking, Logan, Madison, Marion, Morrow, Muskingum, Perry, Pickaway, Pike, Ross, Union, Vinton and Wyandot, along with portions of Guernsey, Athens and Highland counties in Ohio. The ASF structure offers an expedited approval process for single user sites. The federal approval process takes from 30-60 days once the application has completed the local and grantee process.

By definition, an FTZ is a government-designated site where foreign and domestic materials remain in a kind of international commerce limbo. While the goods remain in the Zone, the materials may be stored, manipulated, mixed with domestic and/or foreign materials, used in assembly or manufacturing processes, or exhibited for sale without triggering the payment of US Customs and Border Protection (CBP) duties and excise taxes.

Imports may flow directly into the Zone and be held there indefinitely duty free. Duty is assessed only when those goods are shipped out of the Zone and into the US marketplace. However, the most important new benefits are those that result in supply-chain efficiencies and velocity improvement, while cutting costs from the Supply Chain. These new benefits are known as Weekly Entry and Direct Delivery.

- **Weekly Entry** was added to the FTZ benefits stream in the year 2000 by the Trade and Development Act. This benefit allows the importer to file a consolidated entry to CBP instead of the regular “entry per Bill of Lading” that normally occurs in shipping. By reducing the number of CBP entries, huge economies of scale can lower an importer’s internal paperwork processing costs and reduce the fees paid to CBP for each entry. This fee reduction can be \$200,000, \$300,000, or up to \$1 million of savings annually for a large Distribution Center (DC) operator. The cost savings are so significant that the FTZ program is now being used by 45 of the top 100 importers in the U.S.
- **Direct Delivery** is a CBP procedure, only allowed in an FTZ. This benefit gives the users/tenant the ability to “Sign for” CBP upon receipt of goods that normally have to go to another location for signature, BEFORE the goods can be delivered to the DC. With Direct Delivery, the importers can cut 1 – 2 days of inbound time on their receipt of goods. This is being proven daily by Huffy Bikes, Black and Decker, Skechers, and other importers who have announced publicly that they are receiving improved supply-chain velocity within their FTZ.

FTZs can offer a number of benefits to importers, including:

- **Eliminating delays in customs clearance.** This is particularly important at this time of unprecedented longer supply chains, port security and continued port congestion.

- **Eliminating duty drawback.** Goods that are imported and stored in an FTZ may be re-exported without ever incurring duties. This eliminates the need to file for duty drawback refunds, a lengthy procedure that ties up funds.
- **Avoiding duty on waste or scrap.** If for some reason goods in the Zone must be destroyed or returned, no duties will be charged.
- **Providing relief from inverted tariffs.** There are instances where companies are actually penalized for manufacturing at home (here in the USA). When the duty on raw materials is higher than that on the finished product, an importer of finished goods has an advantage over the U.S. producer. If the manufacturing takes place in an FTZ, however, the owner pays duty on his end products as they are shipped, thus leveling the playing field. Examples are appliances, solar equipment, pharmaceuticals, chemicals, autos, machinery, pumps and many other industry groups that use the FTZ program to lower parts-tariffs by making the finished product in the Zone.
- **Big savings in processing fees.** The 2000 Trade and Development Act contained a provision that provided for “weekly entry” procedures in all FTZs. This may not seem like a big deal, but companies located outside the Zones pay a 0.3464% (value of merchandise) fee for every shipment processed by CBP. The minimum fee is \$25, and maximum (which applies to any shipment valued at \$140,000 or above) is \$485, regardless of the amount of duty paid.

2.5.7 Rail Services Overview

NS operates an intermodal facility at Rickenbacker. CSX Transportation operates an intermodal facility in West Columbus. These two rail carriers provide a rail link between east coast ports, the ocean carriers who call at these ports and Columbus. By interchanges with the western rail carriers (UP and BNSF) the two serving rail carriers provide inbound and outbound containerized service to cargo owners, freight forwarders and logistics service providers in Columbus. Both CSX and NS contribute to the demand for facilities in the Columbus region.

Norfolk Southern has seen solid growth in intermodal activities at their Rickenbacker Terminal with growth rates of 24.5% in 2013, 11.1% in 2014, 10.8% in 2015 and 12.4% in 2016. CSX activity in Columbus has been flat for the past three years; however, this is due to a shift in intermodal activity to their expanded facility in Marion, OH which has seen solid expansion and growth since the transition began in 2014. CSX operates a joint-venture with Union Pacific (UP) Railroad called UMAX which is their domestic intermodal service.

The GFF firms who support the retailers with logistics services utilize the intermodal solution as the first option for their supply chains. In addition, the availability of two rail carriers with access to both east and west coast ports provides the forwarder with a competitive option for service, routing and costs. As more freight is delivered by the rail carriers to the Columbus intermodal ramps, more retailers and cargo owners will recognize the value of a distribution or fulfillment center in Columbus.

Columbus has seen significant growth in industrial distribution centers in the past years. This is driven in part by the growth of the intermodal facilities and the demands of the retailers that operate their distribution or fulfillment centers in Columbus. Occupancy rates remain low, occupation of new/spec buildings is almost immediate, and build-to-suit facilities are occurring routinely. Currently, Columbus has 245 million in total industrial rentable square feet in inventory. Of this, 143 million square feet is defined as bulk/modern warehouse or distribution center/facilities over 100,000 square feet. In the third quarter of 2016, 2.6 million in this category was completed and 1.2 million square feet was under construction. There was a 6.6% vacancy rate in this category, while overall in the industrial market, Columbus was at 5.6% vacancy (CBRE Columbus Industrial Report, Q3, 2016). There is a direct link between the growth of industrial products and the support of a growing intermodal platform in a market. According to a recent Jones Lang LaSalle Industrial report, in the past five years, over 146 million square feet of industrial space has been constructed within five miles of key intermodal centers in the United States.

A secondary influence will begin to impact large inland ports such as Columbus. Amazon applied for and was granted a non-vessel operating common carrier license (NVOCC) by the Federal Maritime Commission, which gives them the authority to book, route and move containers for themselves. They will be acting as their own GFF or 3PL. In 2016, Amazon acquired the rights to purchase up to a total of 30% of Atlas Air (Investor's Business Daily 5/5/2016) and 19.9% of ATSG (Cargo Facts 3/9/2016) to support their air cargo operations in the US and around the world. This new capacity provides a platform for Amazon's global growth in both air and containerized supply-chain activities.

Amazon operates two large fulfillment centers in/near Columbus, three data centers in the region and uses the Wilmington, OH air hub for part of their domestic and global air cargo operations. According to Jon Budish, investment strategist at Fairleigh Dickinson University's Silberman College of Business, Amazon.com accounted for more than 6% of the UPS business in 2015 (US News & World Report, March 28, 2016). Key economic/business development stakeholders in Columbus have been working on creating a strategy and solution to attract more Amazon services and new Amazon Air operations to LCK. However, the recent announcement of a decision by Amazon to locate their operations and hub activity in Cincinnati will diminish the future impact on Columbus and LCK. However, there are numerous other global and national e-commerce providers who have significant "scale" and cross-border volumes that if captured at LCK would replace the expected impact of Amazon.

Both UPS and FedEx use rail intermodal solutions to move cargo between origins and destinations. Rail provides a point-to-point solution, allowing the package carrier to load volumes on domestic containers for transport by rail. In addition, JB Hunt, a North American logistics and trucking firm, ships large numbers of their own domestic containers on NS out of Columbus. JB Hunt contributes as much as 25% of the total volumes processed at the NS intermodal terminal at Rickenbacker. JB Hunt operates the largest fleet of 53-0 domestic intermodal containers and one of the largest drayage fleets across the nation's rail providers. JB Hunt utilizes a strategic partnership with NS in the eastern network and BNSF on their western network. JB Hunt uses the intermodal rail services of the rail carriers for their line-haul, origin to destination, movement and performs the drayage from the rail ramp to

customers. Intermodal revenues make up 59% of the company's revenue and load growth increased 12% in 2016 over 2015, with the eastern network outperforming the national growth rate.

The balance of the cargo is made up of international containers arriving from eastern or western coastal ports. The NS and CSX intermodal terminals are a significant and important component of the market's value in terms of logistics infrastructure. FedEx Freight, the second largest less-than-truckload carrier in the nation, said it plans to utilize rail intermodal, with the move expected to shift as much as 10% of FedEx Freight miles from truck to rail. UPS will use rail if a shipment is traveling 400 miles or more (Parcel Industry magazine, 9/2014).

The intermodal operations in Columbus will continue to attract new GFF who will occupy space and bring new tenants and customers to Columbus. Or, the freight owner who has a specific relationship with a GFF will, rather than seek out a new forwarder for a Columbus operation, require/request that their partner occupy space and provide service for this new operation in Columbus. Over time, this relationship will be supported by intermodal and occasional air services. As the relationship and value proposition of a location in Columbus is leveraged, progressively more air, ground, ocean and courier services will be required to support the new GFF operations at or near Columbus.

2.5.8 Key Target Industry Sectors

As the global automotive industry continues to grow and expand into Mexico, adding routes to/from major markets in Mexico City, Monterrey or Guadalajara, Mexico would provide access to the suppliers in Mexico and provide a foundation for supplier expansion in the Columbus region. Ohio is home to many original equipment manufacturers and their suppliers, including Honda/Acura, Ford, Jeep/FCA and GM/Chevrolet. The International Business Convention for the Automotive Industry forecast in 2016, indicated that Mexico's production will reach 4 million units by 2018 and 5 million units by 2020. In 2016, the entire automotive industry in North America was estimated to produce 17.85 units (Automotive News, 12/26/2016). In Mexico, there are 18 production centers located in 11 of their states, and 48 car and light truck models are produced in Mexico. Ohio exported \$1.33 billion in automotive parts (HS 87) to Mexico in 2015, and imported \$1.93 billion in parts from Mexico (Ohio Development). This industry is seeing a shift from traditional truck to intermodal, and Columbus is well positioned to gain new volumes of imports and exports as trade between Mexico and Ohio continues to grow.

Mexico also has a robust "fresh/cold chain" export initiative that could result in new imports into Columbus and drive demand for new cargo services and new freight forwarders who excel in this market niche. This industry would require new facilities designed to support this new line of business at LCK. Overall, the global cold chain is expected to grow at a compounded annual growth rate of 13.9% from 2015 to 2020 (Zion Research, 2015). According to Zion, the global cold chain market was valued at \$110.20 billion in 2014 and is expected to reach \$271.9 billion in 2020. A cold chain is a temperature controlled supply chain that involves the storage and transportation of temperature-sensitive perishable goods. A cold chain is a series of storage and distribution activities at a desired temperature. Cold chain helps to

preserve and extend the shelf life of various products including seafood, agricultural produce, frozen food, pharmaceuticals, flowers and related floral products, etc. Food and pharmaceuticals are major end user industries of cold chain services.

The cold chain/storage industry in the US consists of 4.06 billion cubic feet of space within 1,497 facilities. Today, 46% of the North America's inventory is controlled by five companies: Americold Logistics, Lineage Logistics, US Cold Storage, Preferred Freezer and VersaCold Logistics. Total demand for refrigerated space is broken out as 33% for food manufacturing, 33% for food wholesalers and 22% for retailers. However, the major food retailers such as Wal-Mart, Target and Costco are studying and implementing strategies to bypass wholesalers and purchase, store and distribute goods from their own facilities. The remaining 12% of the US cold storage is utilized for pharmaceutical, floral or fur products. (Jones, Lang, LaSalle/JLL, 2015)

According to the International Association of Refrigerated Warehouses (IAWR), Mexico's growth in refrigerated capacity increased 9.29% during 2008-2014. According to MCI (Maersk Container Industry) the global fleet of refrigerated containers will be 3 million units by 2018. As the ocean carriers prepare for increased cold chain activity, a similar increase in cold chain tonnage will occur in air cargo. JLL indicates that about half of the world's top selling drugs, in terms of value, will be temperature sensitive biologics.

The pharmaceutical industry is becoming a global industry. In this sector, there are several GFFs emerging as forwarders of choice for the pharmaceutical producers seeking a partner who demonstrates control and integrity of their product from origin to delivered destination. As drug consumption becomes more globalized and as supply chains become more demanding in terms of control over custody, control of temperature or other environmental requirements, LCK provides the global pharmaceutical provider and their 3PL with a solution that differentiates themselves from other traditional gateways. Compression of the supply chain is a clear value proposition for Columbus and LCK. Glyn Hughes, Global Head of Cargo for IATA, indicated in the Journal of Commerce (January 2017) "The growth in the transport of time and temperature-sensitive goods such as pharmaceuticals likewise provides grounds for optimism. In 2014, this market was estimated to be worth \$8.36 billion, and it is projected to rise to \$10.28 billion by 2018."

LCK is already well positioned by virtue of significant local efforts to provide live animal shipments. Here, a significant value proposition that distinguishes the LCK option is the ability to move from truck to pen to plane in a very short cycle, which limits the stress on the animals being shipped or received. This industry segment is also dominated by a few GFF/3PL providers who have established their credentials as curators and managers of live animal shipments. As a new product for LCK operations and for regional service providers who specialize in live animal shipments, the initial impact to the overall cargo forecast is not significant. However, in future years, because of the higher revenue yield of this cargo type, it will positively impact operations, if volumes are re-directed from competing gateways.

2.5.9 Freight Stakeholders

Forward Air Freight (FAF), a national expedited trucking firm, operates their national hub at Columbus. While the hub is located at Rickenbacker, FAF refers to this facility as their CMH Hub. FAF also operates another facility in closer proximity to the cargo ramp at Rickenbacker, known as a Container Freight Station (CFS). This is the facility through which FAF directs arrival and departures to/from the ramp and provides the ground handlers who load or unload the aircraft. This facility is referred to by FAF as their LCK facility.

The FAF network is national and FAF operates their network almost exclusively for the national and global 3PL and GFF community. FAF provides airport-airport or hub-hub and facility to ramp line-hauls for their freight customers. Some freight in the system is routed to an airline cargo ramp for a “drop” for the airline to build into a destination consolidation. Other freight is “dropped” at the destination GFF/3PL facility and the forwarder manages the final mile (for domestic freight) or builds their own consolidation for an airline (freight or passenger/belly move).

45 of the cities on the FAF network are defined as “overnight” from the origin city to their CMH Hub at Rickenbacker. Both FAF and many of the 3PL/GFF operators at Rickenbacker are working on a solution (both pricing and operations) that would allow freight to be terminated and loaded at Rickenbacker rather than trucked by FAF to a more distant gateway, which adds transit time to the cycle between global origins/destinations for the cargo. Succeeding in creating this “termination strategy” for cargo in the FAF network would result in new volumes for exports that could be loaded at LCK.

Today, FAF dispatches line-haul trucks with freight dispatched to either airlines or GFF, in what are the traditional air “gateway operations” of ORD, JFK, ATL and EWR. These gateway operations provide the GFF with options to access both passenger/belly cargo flights and scheduled cargo operations who operate from these gateway cities. FAF sorts over 16 million pounds of freight each week at their CMH facility and dispatches trucks to the four gateways as export cargo loaded in their line-haul trucks. Over twenty trucks per night depart Columbus for these four international gateways.

Each truck moves an average of 30,000 pounds of cargo. This is the context for capturing some volumes of this cargo to be terminated and exported directly on existing or new cargo flights from LCK. **A capture rate of 5% of the total FAF cargo moved to other gateways would produce 9.9 million pounds or better than a 13% increase in total yearly cargo activity at LCK over current volumes with no other contributors.**

In addition to the nightly sort that FAF conducts at their CMH Hub, FAF also performs a weekend sort for the entire Pilot Air Freight (Pilot) network. Freight arrives from market stations/franchises in trucks to the Pilot sortation center. FAF staff provide the forklifts, material handling equipment and man power, and freight is sorted to the destination trucks for delivery to the Pilot stations on Sunday or Monday, depending on the distance from Columbus. FAF reports that the Pilot sort averages 750,000 pounds per weekend. Pilot has indicated they are evaluating re-configuring their gateway network program in order to utilize

the more-efficient and less-congested gateway at LCK. While not all the freight in the weekend sort conducted by FAF is international or gateway destination cargo, Pilot's new ownership seeks to expand their network overseas and control a higher percentage of international cargo. The immediate contribution to the LCK export volumes would be small, however, in future years such an initiative would provide a strong base for international cargo that today is not routed over LCK. **If 5% of the total Pilot operations was captured as exports in future years, this addition alone would produce 1,950,000 pounds, or a 2.6% increase in annual cargo weight over current LCK volumes.**

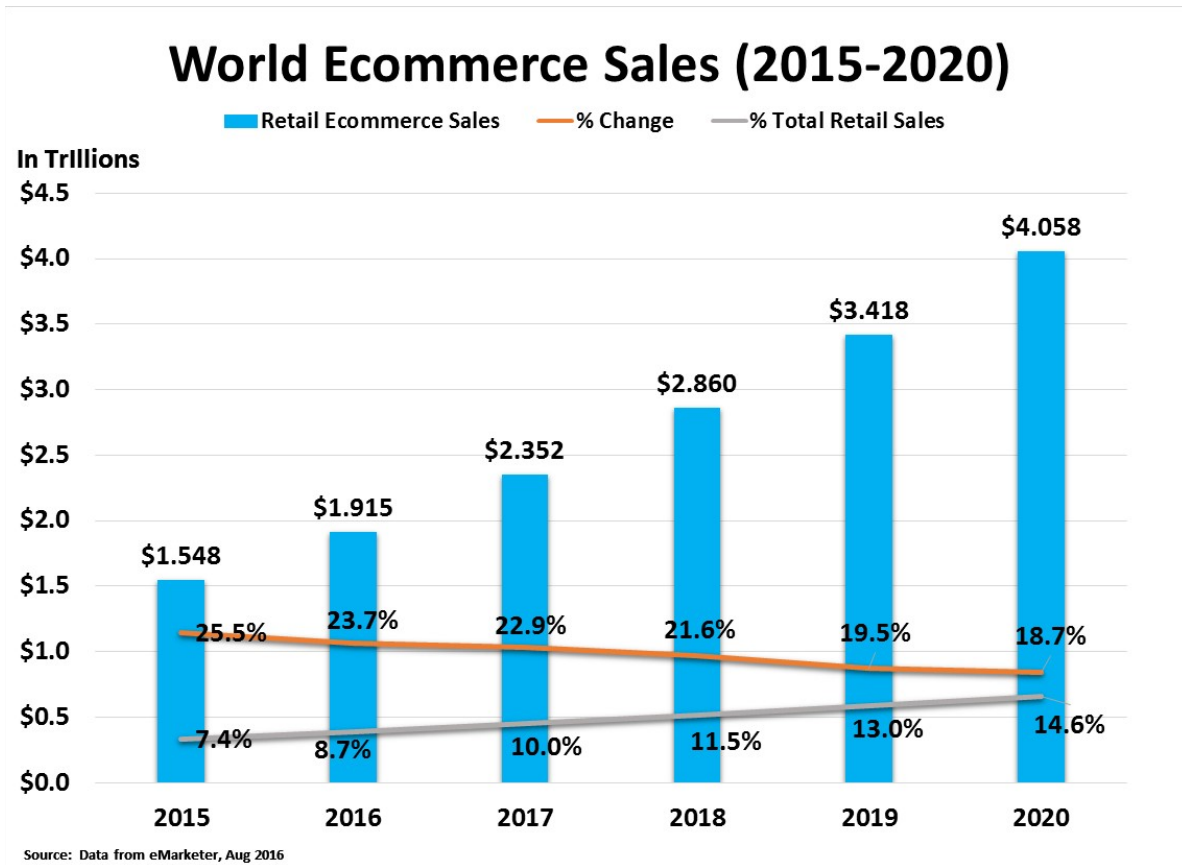
2.5.10 International Cross-Border E-commerce Projections

In the past few years, numerous retailers have witnessed significant growth in their e-commerce programs. Initially, most of the growth occurred in the domestic market and retailers have re-configured supply chains and operations to meet the demand for compression between the "click" to buy the product and the "knock" to have the product delivered to the buyer at the buyer's designated delivery location. As the cycle between buy and deliver is compressed, more on-hand inventory is required in more locations, and the seller's data and logistics platforms must be closely synchronized in order to have the delivery match up with the "promise" when the product is ordered.

In 2015, US Customs and Border Protection initiated a policy change for goods bought overseas and shipped or brought to the US, known as the Trade Facilitation and Trade Enforcement Act of 2015 and announced in March 2016. This Act increased the shipment value of merchandise that can be imported duty and tax free by one person, on a single day from \$200 to \$800. The raising of the de minimis exemption is due to an amendment of the Tariff Act of 1930. This, along with the expansion of e-commerce in high-growth areas of China and Europe, coupled with the international expansion of companies, which includes Amazon, JDH China (which sells on Alibaba), Wal-Mart/JD.com and others) has led to an explosion in cross-border, international e-commerce and demand for high-velocity movement of packages between buyers and sellers. According to eMarketer, a leading e-commerce news resource, global e-commerce growth will continue to occur at a rate of 15-16% year-over-year through 2020 (as shown in **Figure 2-11 World Ecommerce Sales (2015-2020)**). Significant volumes of growth will occur between the US, China and Europe, with growth in these lanes exceeding the global projections.

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Figure 2-11 World Ecommerce Sales (2015-2020)



Source: Data from eMarketer, Aug 2016

Today, there are numerous e-commerce “aggregators” who operate in the Columbus Region. These companies accept e-commerce orders as packages “picked” from the inventory of multiple retailers and aggregate packages to build a consolidated volume of packages to be shipped to a global destination city or region. Upon arrival in a foreign market, the packages will be “de-aggregated” and moved for delivery by a “last mile” delivery agent in that country. This activity of aggregation and dis-aggregation is occurring in both directions and requires new facilities, linked technologies and significant cargo lift. Many GFF/3PL providers are aligning with their client’s e-commerce programs to be selected to provide some/all of the new supply chain solutions for the retailer’s e-commerce program. These initiatives will increase the influence of the GFF/3PL over a higher amount of their client’s cargo and result in them offering expanded services for delivery and management of the last-mile solutions, either at home in the US or overseas.

One of the numerous global e-commerce fulfillment firms that is a prospect for a facility at Rickenbacker is seeking approval for an express consignment carrier facility (ECCF). The ECCF is a bonded warehouse approved by US CBP at key entry points into the US to process high volume parcel import flow. E-commerce shippers to the US can access these facilities for

cost-effective clearance and expedited domestic delivery by postal services (USPS) or regional last-mile carriers. The ECCF is a facility approved for operations by the CBP Port Director for the examination and release of express consignment shipments. The creation and approval of an ECCF at Rickenbacker for LCK arrivals would drive high volumes of new imported e-commerce packages to the airlines that operate at LCK. One global e-commerce provider alone estimates that such a facility would need to process up to 50,000 packages per day. Assuming an average weight of only four pounds per box (verified by FedEx Trade Network), this would increase the inbound volume by 200,000 pounds per day, or 44 million pounds annually, raising the current volume by 58.6% cargo growth over current cargo loads, starting in mid-2017. Each 50,000 package increase in import e-commerce volumes will drive demand for one new freighter operation and immediately impacts the need for new high volume sortation facilities.

This is inclusive of only one prospect and represents only 10% of the potential volume that could be processed at LCK in the future by this one prospect. This prospect visited LCK and identified this location as a “mid-country” option for e-commerce volumes already arriving under their control to JFK and LAX. Such a surge in growth would require a new purpose-built, high volume sortation facility for the imports and to support sortation of export e-commerce traffic. In addition, such a surge in volume would require a focus by local economic development stakeholders and the CRAA on building a “balance” for the air carriers so that the outbound would match up with the new volumes of inbound cargo.

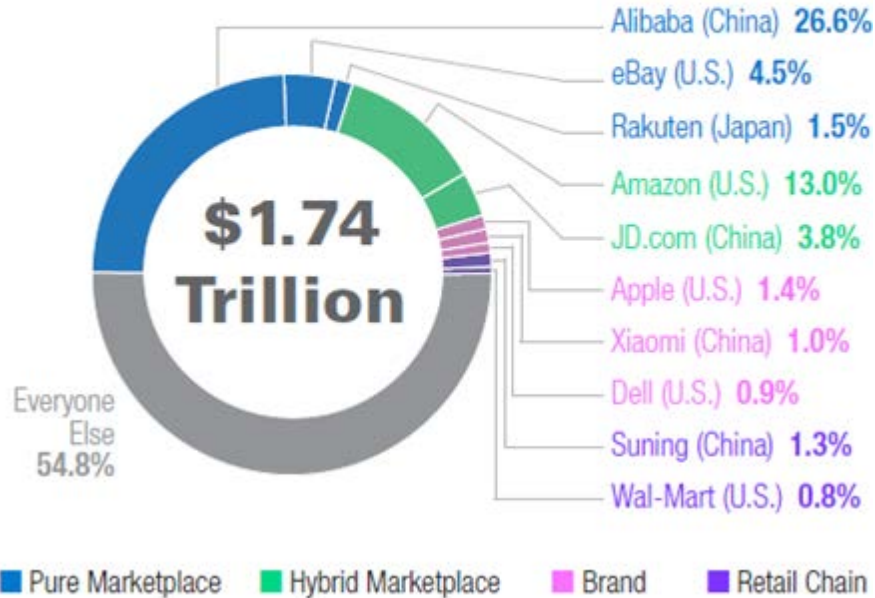
This level of growth would have a ripple impact on demand for new logistics facilities, cargo cross-dock facilities and would require both FedEx and UPS to expand their ground and air facilities and operational capabilities. In most cases, UPS and FedEx accomplish the “last mile” delivery in their ground networks.

Delivering a fully deployed e-commerce solution is a complex operation. Many retailers operate and host their own website to support sales of their products. In addition, retailers also operate “marketplace” sites where a shopper can buy directly from a retailer and also shop for products hosted on the retailer’s website but produced by others. These marketplaces provide another “channel” that allows the retailer who supports a traditional storefront relationship to the buyer, an alternative to keep them on the host retailer’s site.

Other non-traditional e-commerce sellers do not operate a traditional network of stores, rather they are a “pure e-commerce retailer” choosing to deploy a strategy driven entirely by on-line purchasing and fulfillment. **Figure 2-12 The World’s Top 10 Largest Retailers** below shows how the global e-commerce sellers are arrayed as a traditional retailer chain, a site that only sells its own brand, or as one that uses the marketplace platform. What is important to note is only one of the e-commerce sellers has identified an interest in Columbus as a central hub for their e-commerce volumes. The names on the chart below represents companies who will require multiple global hub operations in order to meet the demands of order management, high volume sortation and last mile delivery or first mile pick up. There is potential for other global sellers to follow suit as they seek access to the buyers in the US. This demand could double the size of the air carrier contribution to LCK if one or more of these operators selected LCK as their hub for distribution.

In addition, cross-border trade as exports (sellers who seek to fulfill sales around the globe to individual buyers) is growing at a robust pace. According to Jim Tompkins of Tompkins International, by 2020 the US will sell \$486 billion of goods to the world in cross-border e-commerce. In that same timeframe, the US will buy \$140 billion of goods from overseas in cross-border e-commerce. This is the context for future impacts and demand for facilities, infrastructure and capacity at LCK, should this new gateway center be chosen as one of the major e-commerce hubs in the US.

Figure 2-12 The World's Top 10 Largest Retailers
The World's Top 10 Largest Retailers Hold Nearly Half the Global Market
 Global E-Retail Market Share, Company Type



Source: Data firm Internet Retailer and Modified by IMSW

If LCK attracts higher e-commerce volumes, downstream, the parcel carriers (FedEx, UPS, USPS and SmartPost) systems would require more productive, larger and more efficient sortation systems at LCK or in Columbus. Thus, future facilities to support this high-volume product flow will need to be planned as volumes increase and other e-commerce service providers establish or expand services at or near LCK. According to the local FedEx freight manager who operates their air cargo operation at LCK, 11 of FedEx's top 20 retail clients operate a distribution facility or fulfillment operations in or near Columbus. This density of the apparel industry, accompanying growth of e-commerce and the ease of conducting cross-border commerce will continue to drive volumes at LCK.

SF Express represents the conveyance of choice for the e-commerce industry in China. In 2015, SF Express was identified as the fastest growing 3PL company in the world. This ranking was driven by the significant volumes of e-commerce shipments that were made

across Asia and specifically, China. SF Express with \$6.6 billion in revenues derived from e-commerce in China was first on this list, and GeoPost, with revenue of \$5.93 billion was third.

2.5.11 Domestic E-commerce Growth Projections

The growth of domestic e-commerce is different than the pace of international growth. Forrester Research (April 2016) forecasts a compounded annual growth rate for just the domestic market to be 8.6%. However, as indicated in the chart below, eMarketer forecasts growth in 2016 (13.0%) 2017 (12.2%) and 2018 (11.6%) with significant shifts away from traditional retail to e-commerce in the US. According to CBRE, January, 2016, “e-commerce remains the industrial market’s primary growth engine. Citing (other) forecasts from research firm Forrester, US online sales will increase by 9.3% annually over the next five years to \$523 billion per year. At that pace, e-commerce will generate roughly 40 million square feet of demand for US industrial space each year throughout 2020, based on the industry rule of thumb that each \$1 billion of new online sales creates demand for another 1 million square feet of warehouse and distribution space.” These growth projections will impact FedEx and UPS at LCK or in Columbus, however the incremental impact is mitigated as both carriers operate line-haul trucks during the daylight and evening hours to/from their hubs and only operate the aircraft in the late evening to capture all the “last-minute” orders that must make their sorts. Much of the increases in domestic e-commerce will be moved using their ground and intermodal networks.

China’s Alibaba, an e-commerce marketplace, is beginning to develop a strategy to enter the US market and will require infrastructure, facilities and personnel to support their trading platform. Alibaba’s 2016 “singles day” sales (similar to a Black Friday or Cyber Monday sale in the US) event netted sales of \$17.79 billion in revenue in one day. This was up from 19.6 % over the same day sales in 2015, which were \$14.3 billion. Key stakeholders in Columbus’ economic development and recruitment organizations are working on strategies to attract Alibaba, JDH and GeoPost (who delivered over one billion packages, parcels and e-commerce volumes to 230 countries in 2015) and others to LCK. Competition in Ohio will be tough, as both Cincinnati and Wilmington are pursuing a parallel recruitment strategy for Alibaba.

In December, 2016, there was an introductory press release and related articles on a new e-commerce company entering the marketplace named Monarch Fx. Led by the Tompkins International organization, this new model will allow disparate retailers to join the alliance and supplement their own e-commerce platform with the alliance platform. By joining the alliance, companies can utilize the leverage, scale and volumes of multiple retailers to “share” facilities, logistics systems, technology, order and inventory systems, and ultimately deliver a channel of seamless services to customers. This program and effort is still in the early development stages. However, it is tailor made for LCK. LCK could act as the alliance’s primary Midwest location for the fulfillment of goods to the world, and for receiving and shipping goods from global sellers to buyers across the nation or region. Being one of the locations chosen for the Monarch Fx e-commerce alliance will be important for LCK, CRAA and economic development stakeholders, as it represents a domestic solution for retailers who seek to offer a competitive alternative to Amazon’s scale and network advantages.

The challenge is to correctly quantify the opportunities that could be captured at LCK and to determine when these activities would start and at what level these activities could be expected to occur in the near and longer terms. Therefore, three scenarios are presented as forecasts. The key for the CRAA, LCK and its freight community is to align the necessary efforts to recruit the “right” business to LCK, which aligns well with the air cargo operators and drives new volumes of balanced imports and exports.

2.5.12 Conclusions, Forecast Summaries and Assumptions

Tables 2-14 through 2-19 LCK Cargo Forecasts (Aggressive, Moderate, and Low) below represent three Cargo Forecast Growth Scenarios: Aggressive, Moderate and Low growth. Each chart includes the basis for the growth projections and the expected schedule for certain critical activities to occur. Freight owners, GFF/3PL firms, along with private and public economic and business development stakeholders, must perform the necessary investments in the LCK Gateway in order for the most aggressive growth forecast/scenario to become a reality.

There are in fact three separate growth forecasts, an aggressive, medium and low. However, within each forecast, there are separate scenarios which plot the differences in growth between the existing international air carriers and other segments that contribute to cargo volumes at LCK. The reason for these two forecasts is because the growth expectation for the international air carrier segment is vastly higher than for the other segments that operate at LCK. These separate forecasts are included in the charts below. The air carriers who contribute to the international freight arrivals and departures are separated from the UPS/FedEx and charter aircraft volumes. Each category of operation is treated with a different multiplier in the forecast. FedEx, UPS and the charter category are treated as flat growth with under 5% growth expected across the forecast timeframe. This is based on both FedEx and UPS efforts to utilize truck conveyances to move cargo from Columbus to their respective hubs in Indianapolis, Memphis and Louisville. As their e-commerce volumes continue to be moved in their ground networks, there will be limited impact to their air networks even with a significant expansion in arriving e-commerce contributed by the global air carriers.

The carriers who operate at LCK will be the key drivers for facility expansion and increased operations. Each chart contains separate columns showing the forecast schedule for expected demand for facilities and the increases in arrivals/departures indicated by the increases in cargo volumes. Also, for this carrier sector, there are variable load scenarios presented as it is expected that as LCK continues to mature as an inland port and cargo gateway, greater density will be seen in the load factors for the carriers. Thus, the “as is” load factor is presented to show the number of aircraft per day that support the volumes. As the load factor increases, the number of aircraft are adjusted to reflect the heavier loads at arrival and departure. As noted earlier in this section, it will be critical for CRAA and economic/business development stakeholders to focus on maintaining a balance between imports and exports at LCK to continue to provide the carriers with denser lift from LCK to destinations around the world.

During the course of interviews with freight stakeholders and cargo owners, one route or air transportation hub was identified as a “gap” in services provided by the incumbent air carriers operating to/from LCK. This gap was identified as transport to East Midlands of England (EMA) which is located between Derby, Nottingham and Leicester. EMA is a major cargo hub, ranked as the second busiest UK airport for freight traffic after London Heathrow airport. A route including this airport was identified as an important consideration for future operations.

Supporting each of the forecast charts is a supplemental chart that demonstrates the requirements and schedule for new facilities and an analysis of the flights required based on load factors of 80 tons per cycle, per day and the target of 120 tons per cycle, per day.

Recommended Cargo Forecast

The factors presented in this Cargo Forecast contain variables that if accomplished, will dictate the growth of cargo at LCK. As noted in the report, there is considerable alignment within Columbus and CRAA to achieve and sustain the growth that will fulfill the vision of a viable global cargo gateway. Economic development stakeholders, air carriers and CRAA staff are all focused on sustaining the current growth and leveraging the value proposition that Columbus and Rickenbacker provide to the freight community with a competitive supply chain option. This alignment will be required to accomplish the Aggressive Forecast. A continued focus on the growth of tonnage per flight and increased export tonnage to match import volumes is critical, and this forecast provides the guidance to accomplish this growth in future years. In addition, there is an expectation that the global fleet will continue to be supported by cargo freighters of 100-120 ton capacity, and these will be the aircraft utilized to support the LCK global gateway. This document also predicts that Columbus, CRAA and LCK will become a major part of the global cross-border e-commerce industry, in which case such a global provider would produce results that would easily achieve the Aggressive Forecast projections. Thus, the Aggressive Cargo Forecast is highly achievable based on accomplishing the variables in this report. It is recommended that the Aggressive Cargo Forecast be adapted as the model for future projections for facilities, flights, cargo volumes and infrastructure at LCK. This Aggressive Cargo Forecast can be achieved because the freight community and the freight owners know that utilization of the LCK option for their global cargo movements is more competitive than services offered at other gateways.

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Table 2-14 LCK Aggressive Cargo Forecast

Scenarios	Year	Carrier Total (Pounds)	UPS/FedEx/Charters (Pounds)	Annual Total (Pounds)
Base Year	2016	75,137,385	127,022,134	202,159,519
Short-term Growth: Carrier 30% UPS/FedEx 5%	2017	97,678,601	133,373,241	231,051,841
	2018	126,982,181	140,041,903	267,024,083
	2019	165,076,835	147,043,998	312,120,833
	2020	214,599,885	154,396,198	368,996,083
	2021	278,979,851	162,116,008	441,095,859
Mid-term Growth: Carrier 20% UPS/FedEx 3%	2022	334,775,821	166,979,488	501,755,309
	2023	401,730,985	171,988,873	573,719,858
	2024	482,077,182	177,148,539	659,225,721
	2025	578,492,619	182,462,995	760,955,614
	2026	694,191,143	187,936,885	882,128,027
Long-term Growth: Carrier 10% UPS/FedEx 3%	2027	763,610,257	193,574,991	957,185,248
	2028	839,971,282	199,382,241	1,039,353,523
	2029	923,968,411	205,363,708	1,129,332,119
	2030	1,016,365,252	211,524,619	1,227,889,871
	2031	1,118,001,777	217,870,358	1,335,872,135
	2032	1,229,801,955	224,406,469	1,454,208,423
	2033	1,352,782,150	231,138,663	1,583,920,813
	2034	1,488,060,365	238,072,823	1,726,133,188
	2035	1,636,866,402	245,215,007	1,882,081,409
	2036	1,800,553,042	252,571,458	2,053,124,500

Forecast Assumptions:

- Based on 5% capture of Pilot weekly sort conducted by FAF in Columbus by 2017-2018.
- Based on increase of 50,000 packages delivered inbound per day to the new ECCF facility.
- Based on 5% capture of the CMH terminated FAF cargo to be loaded at LCK.
- Based on continued CRAA business development efforts in the catchment area.
- Based on one GFF/3PL re-routing their ORD/JFK cargo to LCK per year with 50% capture of imports/exports.
- Assumes construction, expansion of ACT 5 in 2017-2018.
- Assumes construction of new ECCF high volume package sortation facility in 2018-2020.
- Assumes that for new incremental growth of ECCF e-commerce cargo, one new operation will occur.
- Assumes considerable effort by CRAA, public-private economic and business development stakeholders to shift exports to provide carriers with balance for the increases in import e-commerce to the ECCF facility.
- Assumes success in gaining one export, e-commerce aggregator to operate at LCK and route all exports thru LCK.
- For Reference: ORD processed 1.73M metric tons in 2016 (3.8 billion pounds).

Source: IMS Worldwide, 2017

Table 2-15 LCK Aggressive Cargo Operations Forecast

Scenarios	A	B	C	D	E	F	G
	Year	Carrier Total (Pounds)	Annual Flights (80T/ Aircraft)	Daily Flights (80T/ Aircraft)	Annual Flights (120T/ Aircraft)	Daily Flights (120T/ Aircraft)	Operations per day
Base Year	2016	75,137,385	470	2	313	1	2
Short-term Growth: Carrier 30%	2017	97,678,601	610	3	407	2	4
	2018	126,982,181	794	4	529	2	4
	2019	165,076,835	1,032	5	688	3	6
	2020	214,599,885	1,341	6	894	4	8
	2021	278,979,851	1,744	8	1,162	5	10
Mid-term Growth: Carrier 20%	2022	334,775,821	2,092	10	1,395	6	12
	2023	401,730,985	2,511	11	1,674	8	16
	2024	482,077,182	3,013	14	2,009	9	18
	2025	578,492,619	3,616	16	2,410	11	22
	2026	694,191,143	4,339	20	2,892	13	26
Long-term Growth: Carrier 10%	2027	763,610,257	4,773	22	3,182	14	28
	2028	839,971,282	5,250	24	3,500	16	32
	2029	923,968,411	5,775	26	3,850	17	34
	2030	1,016,365,252	6,352	29	4,235	19	38
	2031	1,118,001,777	6,988	32	4,658	21	42
	2032	1,229,801,955	7,686	35	5,124	23	46
	2033	1,352,782,150	8,455	38	5,637	26	52
	2034	1,488,060,365	9,300	42	6,200	28	56
	2035	1,636,866,402	10,230	47	6,820	31	62
	2036	1,800,553,042	11,253	51	7,502	34	68

Assumptions:

- The carrier (Column B) is a transfer of the total annual pounds from the above Aggressive Forecast
- The Actual Tonnage/Cycle are based on the actual load factor from 2016 of 80 tons per cycle inclusive of all imports/deplaned and exports/enplaned (Column D - Number of flights/day required to support 80 tons per cycle).
- (Columns D and F) assumes 220 days of flight activity per year.
- The Flights (Column E) represent a load factor of 120 tons per cycle inclusive of all imports/deplaned and exports/enplaned (Column F - Number of flights/day required to support 120 tons per cycle).
- (Column G) Two operations per flight represent inbound and outbound activity.

Source: IMS Worldwide, 2017.

Table 2-16 LCK Moderate Cargo Forecast

Scenarios	Year	Carrier Total (Pounds)	UPS/FedEx/ Charters (Pounds)	Annual Total (Pounds)
Base Year	2016	75,137,385	127,022,134	202,159,519
Short-term Growth: Carrier 25% UPS/FedEx 5%	2017	93,921,731	133,373,241	227,294,972
	2018	117,402,164	140,041,903	257,444,067
	2019	146,752,705	147,043,998	293,796,703
	2020	183,440,881	154,396,198	337,837,079
	2021	229,301,102	162,116,008	391,417,109
Mid-term Growth: Carrier 15% UPS/FedEx 3%	2022	263,696,267	166,979,488	430,675,755
	2023	303,250,707	171,988,873	475,239,579
	2024	348,738,313	177,148,539	525,886,852
	2025	401,049,060	182,462,995	583,512,055
	2026	461,206,419	187,936,885	649,143,304
Long-term Growth: Carrier 10% UPS/FedEx 3%	2027	507,327,061	193,574,991	700,902,052
	2028	558,059,767	199,382,241	757,442,008
	2029	613,865,744	205,363,708	819,229,452
	2030	675,252,318	211,524,619	886,776,937
	2031	742,777,550	217,870,358	960,647,908
Long-term Growth: Carrier 5% UPS/FedEx 3%	2032	779,916,427	224,406,469	1,004,322,896
	2033	818,912,249	231,138,663	1,050,050,912
	2034	859,857,861	238,072,823	1,097,930,684
	2035	902,850,754	245,215,007	1,148,065,762
	2036	947,993,292	252,571,458	1,200,564,750

Forecast Assumptions:

- Based on only gaining a single, 50,000 package-per-day ECCF e-commerce importer, requires new facility construction.
- Does not assume any contribution by FAF/CMH terminations, Internal FAF or Pilot routings in favor of LCK.
- Based on continued CRAA business development efforts in the catchment area.
- Based on one GFF/3PL re-routing their ORD/JFK cargo to LCK per year with 50% capture of imports/exports.
- Requires one, new export focused e-commerce provider to upload cargo at LCK starting in 2018

Source: IMS Worldwide, 2017

Table 2-17 LCK Moderate Cargo Operations Forecast

Scenarios	A	B	C	D	E	F	G
	Year	Carrier Total (Pounds)	Annual Flights (80T/ Aircraft)	Daily Flights (80T/ Aircraft)	Annual Flights (120T/ Aircraft)	Daily Flights (120T/ Aircraft)	Operations per day
Base Year	2016	75,137,385	470	2	313	1	2
Short-term Growth: Carrier 25%	2017	93,921,731	587	3	391	2	4
	2018	117,402,164	734	3	489	2	4
	2019	146,752,705	917	4	611	3	6
	2020	183,440,881	1,147	5	764	3	6
	2021	229,301,102	1,433	7	955	4	8
Mid-term Growth: Carrier 15%	2022	263,696,267	1,648	7	1,099	5	10
	2023	303,250,707	1,895	9	1,264	6	12
	2024	348,738,313	2,180	10	1,453	7	14
	2025	401,049,060	2,507	11	1,671	8	16
	2026	461,206,419	2,883	13	1,922	9	18
Long-term Growth: Carrier 10%	2027	507,327,061	3,171	14	2,114	10	20
	2028	558,059,767	3,488	16	2,325	11	22
	2029	613,865,744	3,837	17	2,558	12	24
	2030	675,252,318	4,220	19	2,814	13	26
	2031	742,777,550	4,642	21	3,095	14	28
Long-term Growth: Carrier 5%	2032	779,916,427	4,874	22	3,250	15	30
	2033	818,912,249	5,118	23	3,412	16	32
	2034	859,857,861	5,374	24	3,583	16	32
	2035	902,850,754	5,643	26	3,762	17	34
	2036	947,993,292	5,925	27	3,950	18	36

Assumptions:

- The carrier (Column B) is a transfer of the total annual pounds from the above Aggressive Forecast
- The Actual Tonnage/Cycle are based on the actual load factor from 2016 of 80 tons per cycle inclusive of all imports/deplaned and exports/enplaned (Column D - Number of flights/day required to support 80 tons per cycle).
- (Columns D and F) assumes 220 days of flight activity per year.
- The Flights (Column E) represent a load factor of 120 tons per cycle inclusive of all imports/deplaned and exports/enplaned (Column F - Number of flights/day required to support 120 tons per cycle).
- (Column G) Two operations per flight represent inbound and outbound activity.

Source: IMS Worldwide, 2017.

Table 2-18 LCK Low Cargo Forecast

Scenarios	Year	Carrier Total (Pounds)	UPS/FedEx/ Charters (Pounds)	Annual Total (Pounds)
Base Year	2016	75,137,385	127,022,134	202,159,519
Short-term Growth: Carrier 25% UPS/FedEx 5%	2017	93,921,731	133,373,241	227,294,972
	2018	117,402,164	140,041,903	257,444,067
	2019	146,752,705	147,043,998	293,796,703
	2020	183,440,881	154,396,198	337,837,079
	2021	229,301,102	162,116,008	391,417,109
Mid-term Growth: Carrier 5% UPS/FedEx 2%	2022	240,766,157	165,358,328	406,124,485
	2023	252,804,465	168,665,494	421,469,959
	2024	265,444,688	172,038,804	437,483,492
	2025	278,716,922	175,479,580	454,196,503
	2026	292,652,768	178,989,172	471,641,940
Long-term Growth: Carrier 5% UPS/FedEx 2%	2027	307,285,407	182,568,955	489,854,362
	2028	322,649,677	186,220,334	508,870,012
	2029	338,782,161	189,944,741	528,726,902
	2030	355,721,269	193,743,636	549,464,905
	2031	373,507,332	197,618,509	571,125,841
	2032	392,182,699	201,570,879	593,753,578
	2033	411,791,834	205,602,296	617,394,130
	2034	432,381,426	209,714,342	642,095,768
	2035	454,000,497	213,908,629	667,909,126
	2036	476,700,522	218,186,802	694,887,324

Forecast Assumptions:

- Assumes continued focus by CRAA to re-route cargo from the catchment zone to LCK.
- Based on one GFF/3PL re-routing their ORD/JFK cargo to LCK per year with 50% capture of imports/exports.
- Does not include ECCF, new e-commerce activity outside what is captured by the GFF/3PL community and routed as consolidations/de-consolidations with their other imports or exports which will be seen as steady increases but will not be visible as actual e-commerce trade activity.

Source: IMS Worldwide, 2017

Table 2-19 LCK Low Cargo Operations Forecast

Scenarios	A	B	C	D	E	F	G
	Year	Carrier Total (Pounds)	Annual Flights (80T/ Aircraft)	Daily Flights (80T/ Aircraft)	Annual Flights (120T/ Aircraft)	Daily Flights (120T/ Aircraft)	Operations per day
Base Year	2016	75,137,385	470	2	313	1	2
Short-term Growth: Carrier 25%	2017	93,921,731	587	3	391	2	4
	2018	117,402,164	734	3	489	2	4
	2019	146,752,705	917	4	611	3	6
	2020	183,440,881	1147	5	764	3	6
	2021	229,301,102	1433	7	955	4	8
Mid-term Growth: Carrier 5%	2022	240,766,157	1505	7	1003	5	10
	2023	252,804,465	1580	7	1053	5	10
	2024	265,444,688	1659	8	1106	5	10
	2025	278,716,922	1742	8	1161	5	10
	2026	292,652,768	1829	8	1219	6	12
Long-term Growth: Carrier 5%	2027	307,285,407	1921	9	1280	6	12
	2028	322,649,677	2017	9	1344	6	12
	2029	338,782,161	2117	10	1412	6	12
	2030	355,721,269	2223	10	1482	7	14
	2031	373,507,332	2334	11	1556	7	14
	2032	392,182,699	2451	11	1634	7	14
	2033	411,791,834	2574	12	1716	8	16
	2034	432,381,426	2702	12	1802	8	18
	2035	454,000,497	2838	13	1892	9	18
	2036	476,700,522	2979	14	1986	9	18

Assumptions:

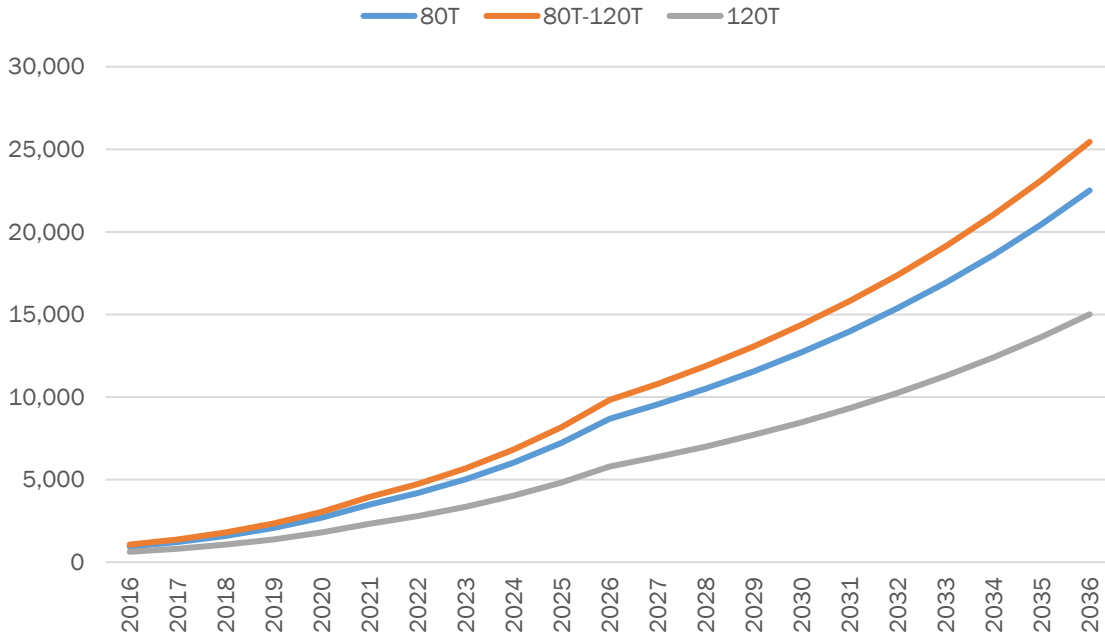
- The carrier (Column B) is a transfer of the total annual tons from the above Aggressive Forecast
- The Actual Tonnage/Cycle are based on the actual load factor from 2016 of 80 tons per cycle inclusive of all imports/deplaned and exports/enplaned (Column D - Number of flights/day required to support 80 tons per cycle).
- (Columns D and F) assumes 220 days of flight activity per year.
- The Flights (Column E) represent a load factor of 120 tons per cycle inclusive of all imports/deplaned and exports/enplaned (Column F - Number of flights/day required to support 120 tons per cycle).
- (Column G) Two operations per flight represent inbound and outbound activity.

Source: IMS Worldwide, 2017.

2.5.13 Forecast of Dedicated Air Cargo Fleet Mix

The air cargo recommendations include an aggressive forecast that would require the construction of additional processing facilities and apron to handle the added volume that is projected through 2036. The aggressive forecast considers the use of two different heavy aircraft and the required number of operations it would take to haul the projected annual tonnage. The 80-ton payload aircraft would be comparable to a Boeing 777 Freighter (777F) and the 120-ton payload aircraft would be comparable to a Boeing 747-8F. **Figure 2-13 International Cargo Operations Forecasts (2016-2036)** and **Table 2-20 Forecast of Dedicated Air Cargo Fleet Mix (2016-2036)** illustrate the actual scenario that is occurring at LCK where both types of aircraft are used to haul international cargo, as opposed to the previous analysis that illustrates how many operations would be needed if payload could be maximized. Because the actual scenario matches current practices and operations levels at LCK, it was carried forward as a potential scenario that is likely to occur in the near-future. However, it is preferential to maximize the payload of each aircraft in order to minimize costs and cycles, as is suggested by the 120-ton payload analysis.

Figure 2-13 International Cargo Operations Forecasts (2016-2036)



Source: Michael Baker International, Inc., 2017.

Table 2-20 Forecast of Dedicated Air Cargo Fleet Mix (2016-2036)

Year	FedEx / UPS		Unfavorable Range		Current Range		Favorable Range		FedEx/UPS + Current Range	
			80 Ton Payload		80-120 Ton Payload		120 Ton Payload			
	Landings	Total	Landings	Total	Landings	Total	Landings	Total	Landings	Total
2016	3,198	6,396	470	939	531	1,062	313	626	3,729	7,458
2017	3,358	6,716	610	1,221	690	1,381	407	814	4,048	8,096
2018	3,526	7,052	794	1,587	897	1,795	529	1,058	4,423	8,846
2019	3,702	7,404	1,032	2,063	1,167	2,333	688	1,376	4,869	9,737
2020	3,887	7,774	1,341	2,682	1,517	3,033	894	1,788	5,404	10,808
2021	4,082	8,163	1,744	3,487	1,972	3,943	1,162	2,325	6,053	12,106
2022	4,204	8,408	2,092	4,185	2,366	4,732	1,395	2,790	6,570	13,140
2023	4,330	8,660	2,511	5,022	2,839	5,678	1,674	3,348	7,169	14,338
2024	4,460	8,920	3,013	6,026	3,407	6,814	2,009	4,017	7,867	15,734
2025	4,594	9,188	3,616	7,231	4,088	8,176	2,410	4,821	8,682	17,364
2026	4,732	9,463	4,339	8,677	4,906	9,812	2,892	5,785	9,638	19,275
2027	4,874	9,747	4,773	9,545	5,396	10,793	3,182	6,363	10,270	20,540
2028	5,020	10,040	5,250	10,500	5,936	11,872	3,500	7,000	10,956	21,912
2029	5,170	10,341	5,775	11,550	6,530	13,059	3,850	7,700	11,700	23,400
2030	5,325	10,651	6,352	12,705	7,183	14,365	4,235	8,470	12,508	25,016
2031	5,485	10,971	6,988	13,975	7,901	15,802	4,658	9,317	13,386	26,772
2032	5,650	11,300	7,686	15,373	8,691	17,382	5,124	10,248	14,341	28,682
2033	5,819	11,639	8,455	16,910	9,560	19,120	5,637	11,273	15,379	30,759
2034	5,994	11,988	9,300	18,601	10,516	21,032	6,200	12,401	16,510	33,020
2035	6,174	12,347	10,230	20,461	11,568	23,136	6,820	13,641	17,742	35,483
2036	6,359	12,718	11,253	22,507	12,725	25,449	7,502	15,005	19,084	38,167
AAGR 2016-2036	3.50%	3.50%	17.21%	17.21%	17.21%	17.21%	17.21%	17.21%	8.51%	8.51%

Sources: IMS Worldwide Inc., and Michael Baker International, Inc., 2017.

Note: Some numbers may not add correctly due to rounding.

AAGR – Average Annual Growth Rate

2.6 Military Forecasts

Rickenbacker International Airport is home to the 121st Air Refueling Wing (ARW) of the Ohio Air National Guard (ANG). The 121st ARW currently has 12 primary KC-135 Stratotanker aerial refueling jets (KC-135s) and has the capacity to add 12 more if required for a future mission. There are currently 300 full-time ANG personnel based at LCK and approximately 1,800 Drill Status Guardsmen (DSG). The airport also has facilities for the Ohio Army National Guard (ARNG) and military reservist activities. The ARNG primarily flies UH-60 Blackhawk helicopters. The largest military aircraft that occasionally flies into LCK is the Boeing C-17 Globemaster II jet and the airport also serves as a site for military fighter jets such as the Lockheed Martin F-22 stealth jet when they need to temporarily relocate because of poor weather at their home base.

According to the FAA TAF Summary for Fiscal Years 2015-2040, “because military operations forecasts have national security implications, the Department of Defense (DOD) provides only limited information on future aviation activity. Hence, the TAF projects military activity at its present level except when FAA has specific knowledge of a change. For instance, DOD may announce a base closing or may shift an Air Force wing from one base to another.” Therefore, the number of local and military operations were held at 2016 levels through 2036: 1,470 itinerant operations and 5,138 local operations.

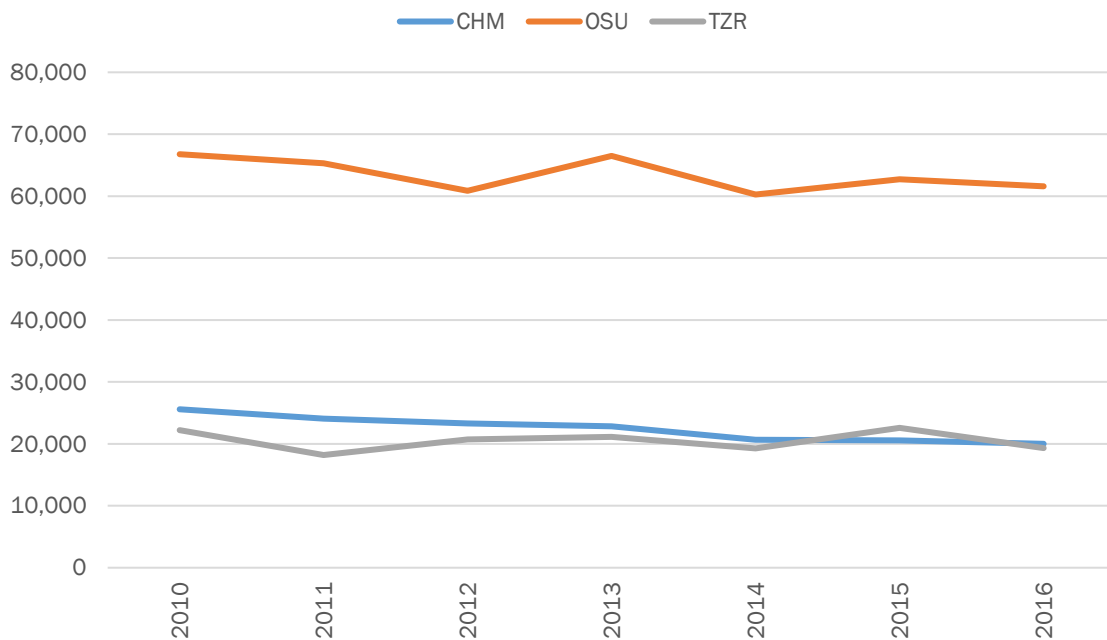
2.7 General Aviation and Based Aircraft Forecasts

Many elements compose the broad definition of general aviation activity. In simplest terms, general aviation includes all segments of the aviation industry except those conducted by scheduled air carriers and the U.S. military. General aviation activities may include pilot training, sightseeing, aerial photography, law enforcement, and medical flights, as well as business, corporate, and personal travel. General aviation operations are divided into the categories of local or itinerant. Local operations are arrivals or departures performed by aircraft that remain within the airport traffic pattern, or those that occur within sight of the airport. Local operations are most often associated with training activity and flight instruction (e.g., touch-and-goes). Itinerant operations are arrivals or departures that do not remain within the airport traffic pattern and/or originate from another airport. The FAA defines an operation as either a single aircraft landing or takeoff. Under this definition, touch-and-goes are considered two operations (one takeoff plus one landing) and are deemed local operations. Itinerant operations are typically comprised of private, business/corporate, and air taxi flight activity, but may also include law enforcement and medical flights.

Activity records were analyzed for the three other airports in Franklin County with ATCTs to determine if any relevant trends could be identified for regional general aviation activity. The airports include CMH, Bolton Field Airport (TZR), and Ohio State University Airport (OSU). As shown in **Figure 2-14 General Aviation Activity Trends in Franklin County (2010-2016)**, all three airports have experienced an overall decline in general aviation activity since 2010, which is not uncommon for many airports due to the impacts associated with the most recent economic recession; however, there are known opportunities for growth in general aviation activity in Central Ohio and at LCK. For example, OSU (the university and airport) has a busy

flight school that conducts operations at many airports in the region, as well as an aviation education program that was started in 1917. According to OSU, they received a \$10 million donation in 2015 that was intended to grow the university’s aviation program and was named a ‘Top Hawk’ flight school by Cessna in 2016 and was expected to receive delivery of several new Cessna aircraft over the next several years. At LCK, the new FBO facility may also encourage general aviation growth because of the availability of enhanced amenities, additional aircraft storage capacity, and separation from the commercial airline apron. While the growth potential for LCK and the region is hard to predict for general aviation activity, it should be accounted for so that the need for facilities and services can be planned for as part of this Study.

Figure 2-14 General Aviation Activity Trends in Franklin County (2010-2016)



Sources: FAA Air Traffic Activity Data System (ATADS) database and Michael Baker International, Inc., 2017.

Within the FAA’s 2016 TAF for LCK, the FAA projects itinerant general aviation operations to grow at an AAGR of 1.01% between 2016 and 2036 and local general aviation operations to grow at a rate of 1.00%. It is noted that the FAA Aerospace Forecast for Fiscal Years 2016-2036 projects Itinerant General Aviation Operations at Airports with FAA and Contract Traffic Control Service to grow at an AAGR of 0.3% between 2015 and 2036 and Local General Aviation Operations to grow at an AAGR of 0.4% during the same time. As shown in **Table 2-21 Itinerant and Local General Aviation Operations Forecast (2016-2036)**, the stronger growth rates from the FAA’s 2016 TAF were applied to forecast general aviation activity throughout the forecast period at LCK. Note that all itinerant activity not counted as airline, air cargo, or military was classified as itinerant general aviation activity. This was done to

classify the activity in a way that separated it from the discussions about those different user groups at LCK that have very specific functions and utilize very specific facilities at the airport.

Table 2-21 Itinerant and Local General Aviation Operations Forecast (2016-2036)

Year	Itinerant		Local		Total GA
	Operations	% Total GA	Operations	% Total GA	
2016	7,979	73.86%	2,824	26.14%	10,803
2017	8,059	73.86%	2,852	26.14%	10,911
2018	8,141	73.86%	2,881	26.14%	11,021
2019	8,223	73.86%	2,910	26.14%	11,132
2020	8,306	73.87%	2,939	26.13%	11,244
2021	8,390	73.87%	2,968	26.13%	11,358
2022	8,474	73.87%	2,998	26.13%	11,472
2023	8,560	73.87%	3,028	26.13%	11,588
2024	8,647	73.87%	3,058	26.13%	11,704
2025	8,734	73.88%	3,089	26.12%	11,822
2026	8,822	73.88%	3,119	26.12%	11,941
2027	8,911	73.88%	3,151	26.12%	12,062
2028	9,001	73.88%	3,182	26.12%	12,183
2029	9,092	73.88%	3,214	26.12%	12,306
2030	9,184	73.88%	3,246	26.12%	12,430
2031	9,277	73.89%	3,279	26.11%	12,555
2032	9,370	73.89%	3,311	26.11%	12,682
2033	9,465	73.89%	3,344	26.11%	12,809
2034	9,561	73.89%	3,378	26.11%	12,938
2035	9,657	73.89%	3,412	26.11%	13,069
2036	9,755	73.90%	3,446	26.10%	13,200
AAGR 2016-2036	1.01%	0.00%	1.00%	-0.01%	1.01%

Source: Michael Baker International, Inc., 2017.
 Note: Some numbers may not add correctly due to rounding.
 AAGR – Average Annual Growth Rate

As shown in **Table 2-22 General Aviation Fleet Mix Forecast (2016-2036)**, the number of general aviation turboprops and jets that operated at LCK in 2016 was extracted from the FAA’s Traffic Flow Management System Counts (TFMSC) database. Through discussions with ATCT personnel, the remaining operations were estimated to be conducted by single-engine pistons 60% of the time and by multi-engine pistons 40% of the time. The growth in the general aviation fleet mix was estimated using growth rate projections for turboprops and jets from the FAA Aerospace Forecast Fiscal Years 2016-2036 for General Aviation and Air Taxi Hours Flown.

Table 2-22 General Aviation Fleet Mix Forecast (2016-2036)

Year	Single-Engine	Multi-Engine	Turboprop	Jet	Total GA
2016	5,214	3,476	1,600	513	10,803
2017	5,254	3,503	1,626	529	10,911
2018	5,295	3,530	1,652	545	11,021
2019	5,335	3,557	1,678	562	11,132
2020	5,376	3,584	1,705	580	11,244
2021	5,417	3,611	1,732	598	11,358
2022	5,458	3,638	1,760	616	11,472
2023	5,499	3,666	1,788	635	11,588
2024	5,540	3,693	1,817	655	11,704
2025	5,581	3,721	1,846	675	11,822
2026	5,622	3,748	1,875	696	11,941
2027	5,663	3,776	1,905	718	12,062
2028	5,705	3,803	1,936	740	12,183
2029	5,746	3,831	1,967	763	12,306
2030	5,787	3,858	1,998	787	12,430
2031	5,828	3,886	2,030	811	12,555
2032	5,870	3,913	2,063	836	12,682
2033	5,911	3,941	2,096	862	12,809
2034	5,952	3,968	2,129	889	12,938
2035	5,994	3,996	2,163	916	13,069
2036	6,035	4,023	2,198	945	13,200
AAGR 2016-2036	0.73%	0.73%	1.60%	3.10%	1.01%

Source: Michael Baker International, Inc., 2017.
 Note: Some numbers may not add correctly due to rounding.
 AAGR – Average Annual Growth Rate

There are currently three based civilian airplanes at LCK that include a Shorts 330 turboprop and two private Cessna single-engine pistons. When the FBO moves to the larger facility to the north of the passenger terminal building, general aviation aircraft owners may have a growing interest to base their plane in the large bulk hangar at LCK. For planning purposes, it was assumed that LCK would be able to attract 10% of the existing based aircraft fleets from the three other public use airports in Franklin County by 2036 (CMH, TZR, and OSU), resulting in the addition of 21 single-engine pistons, four multi-engine pistons, and six jets. Overall, the forecast increases the number of based aircraft by 30 at LCK from three in 2016 to 33 by 2036 (refer to **Table 2-23 General Aviation Fleet Mix Forecast (2016-2036)**).

Table 2-23 General Aviation Fleet Mix Forecast (2016-2036)

Year	Single-Engine	Multi-Engine	Turboprop	Jet	Total GA
2016	2	0	1	0	3
2017	3	1	1	1	6
2018	4	1	1	1	7
2019	5	1	1	2	9
2020	6	1	1	2	10
2021	7	2	1	2	12
2022	8	2	1	2	13
2023	9	2	1	3	15
2024	10	2	1	3	16
2025	11	2	1	3	17
2026	12	2	1	3	19
2027	13	3	1	4	20
2028	14	3	1	4	22
2029	15	3	1	4	23
2030	16	3	1	4	24
2031	17	3	1	5	26
2032	18	3	1	5	27
2033	19	4	1	5	29
2034	20	4	1	5	30
2035	21	4	1	6	32
2036	22	4	1	6	33
AAGR 2016-2036	12.74%	N/A	0.00%	N/A	12.74%

Source: Michael Baker International, Inc., 2017.
 Note: Some numbers may not add correctly due to rounding.
 AAGR – Average Annual Growth Rate

2.8 Instrument Operations Forecast

According to the FAA report, Forecasting Aviation Activity by Airport, instrument operations consist of “arrivals, departures, and overflights conducted by an FAA approach control facility for aircraft with an Instrument Flight Rule (IFR) flight plan or special Visual Flight Rule (VFR) procedures.” At LCK, IFR activity is tracked by the ATCT and consisted of 13,360 operations or 50.79% of total activity. During the forecast period, it is anticipated that the percentage of IFR activity will increase in accordance with the growth in airline and cargo operations. General aviation IFR activity was estimated to grow at an AAGR of 0.70% between 2016 and 2036, which is the FAA’s projected AAGR for general aviation IFR traffic from the FAA Aerospace Forecast Fiscal Years 2016-2036. The resulting forecast is presented in **Table 2-24 Instrument Operations Forecast (2016-2036)** and illustrates IFR activity increasing from 50.79% of total activity in 2016 to 75.73% by 2036.

Table 2-24 Instrument Operations Forecast (2016-2036)

Year	Total Operations	Instrument (IFR)		Visual (VFR)	
		Operations	% Total	Operations	% Total
2016	26,307	13,360	50.79%	12,947	49.21%
2017	27,639	14,615	52.88%	13,024	47.12%
2018	28,538	15,435	54.09%	13,103	45.91%
2019	29,562	16,380	55.41%	13,182	44.59%
2020	30,766	17,504	56.89%	13,262	43.11%
2021	32,201	18,858	58.56%	13,343	41.44%
2022	33,372	19,946	59.77%	13,425	40.23%
2023	34,709	21,200	61.08%	13,508	38.92%
2024	36,244	22,652	62.50%	13,592	37.50%
2025	38,016	24,339	64.02%	13,677	35.98%
2026	40,070	26,307	65.65%	13,763	34.35%
2027	41,479	27,629	66.61%	13,850	33.39%
2028	42,997	29,059	67.58%	13,938	32.42%
2029	44,632	30,606	68.57%	14,026	31.43%
2030	46,397	32,281	69.58%	14,116	30.42%
2031	48,304	34,097	70.59%	14,207	29.41%
2032	50,365	36,066	71.61%	14,299	28.39%
2033	52,595	38,204	72.64%	14,391	27.36%
2034	55,011	40,526	73.67%	14,485	26.33%
2035	57,631	43,051	74.70%	14,580	25.30%
2036	60,473	45,797	75.73%	14,676	24.27%
AAGR 2016-2036	4.25%	6.35%	2.02%	0.63%	-3.47%

Source: Michael Baker International, Inc., 2017.

Note: Some numbers may not add correctly due to rounding.

AAGR – Average Annual Growth Rate

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2.9 Peaking Forecasts

This section identifies the peaking forecasts for operational activity to determine whether there will be any needed airfield capacity-enhancing improvements during the planning period at LCK. Peaking forecasts were also identified for commercial airline passengers and operations to evaluate whether the commercial terminal building and associated infrastructure will require improvements. The operational peaking forecasts were conducted using the procedures outlined below and are summarized in **Table 2-25 Peaking Forecast 1 (2016-2036)**.

- **Average Peak Month (APM)** – Through a review of historical ATCT records, it was found that the APM represented 9.73% of annual activity in 2016 (the peak month in 2016 occurred in June).
- **Average Day Peak Month (ADPM)** – An average month contains 30.42 days ($365 \div 12$). The ADPM was calculated by dividing the APM by 30.42. Because facilities are typically designed for average peaking scenarios as opposed to occasional maximum peaks, this ADPM calculation was employed.
- **Average day Peak Hour (ADPH)** – The ADPH can include a combination of touch-and-go training operations and itinerant activity and was estimated at 17.50% of the ADPM. The IFR and VFR peak hours were calculated based on the percentages shown in Table 2-24.

The commercial passenger and operations peaking forecasts were conducted using the procedures outlined below and are summarized in **Table 2-26 Peaking Forecast 2 (2016-2036)**.

- **APM Passengers and Operations** – Through a review of historical CRAA records, it was found that the APM for passengers equaled 13.18% of annual activity in 2016 (the peak month in 2016 occurred in July), which was also similar to the percentage of airline operations in July 2016 to total airline operations.
- **ADPM Passengers and Operations** – An average month contains 30.42 days ($365 \div 12$). The ADPM was calculated by dividing the APM by 30.42. Because facilities are typically designed for average peaking scenarios as opposed to occasional maximum peaks, this ADPM calculation was employed.
- **Average Peak Hour (APH)** – Airline passenger and operations peaks at LCK can be challenging due to the limitations of the terminal facility, staffing demands, and desired turnaround times by Allegiant. Full-time and contract CRAA staff must handle the operations of the terminal building at LCK (ticketing, baggage, fueling, etc.) as well as the other operations of the airport (cargo, general aviation, and other). To best accommodate Allegiant's operations, the historical practice was to have a day shift and a night shift whereby approximately half of the airline operations are accommodated during each shift. The shifts can run for several hours to handle the pre- and post-flight activities, but actual flight activities can be confined to a single hour. Therefore, as shown in **Table 2-26 Peaking Forecast 2 (2016-2036)**, the two-shift approach assumes that the peak hour for airline passengers and operations

accounts for 50% of the ADPM. Because that practice had to be modified to at least a three-shift approach to meet peak hour passenger and operations demands during the planning period, the three-shift approach assigns 33.33% of the ADPM.

Table 2-25 Peaking Forecast 1 (2016-2036)

Year	APM	ADPM	ADPH	IT Peak Hour	Local Peak Hour
2016	2,560	84	15	7	7
2017	2,689	88	15	8	7
2018	2,777	91	16	9	7
2019	2,876	95	17	9	7
2020	2,994	98	17	10	7
2021	3,133	103	18	11	7
2022	3,247	107	19	11	8
2023	3,377	111	19	12	8
2024	3,527	116	20	13	8
2025	3,699	122	21	14	8
2026	3,899	128	22	15	8
2027	4,036	133	23	15	8
2028	4,184	138	24	16	8
2029	4,343	143	25	17	8
2030	4,514	148	26	18	8
2031	4,700	155	27	19	8
2032	4,900	161	28	20	8
2033	5,118	168	29	21	8
2034	5,353	176	31	23	8
2035	5,607	184	32	24	8
2036	5,884	193	34	26	8
AAGR 2016-2036	4.25%	4.25%	4.25%	6.35%	0.63%

Source: Michael Baker International, Inc., 2017.
 Note: Some numbers may not add correctly due to rounding.
 AAGR – Average Annual Growth Rate

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Table 2-26 Peaking Forecast 2 (2016-2036)

Year	APM		ADPM		APH (2-Shift)		APH (3-Shift)	
	Passengers	Operations	Passengers	Operations	Passengers	Operations	Passengers	Operations
2016	26,791	190	881	6	440	3	294	2
2017	38,083	267	1,252	9	626	4	417	3
2018	38,490	272	1,265	9	633	4	422	3
2019	38,902	275	1,279	9	639	5	426	3
2020	39,318	278	1,293	9	646	5	431	3
2021	39,739	281	1,306	9	653	5	435	3
2022	40,164	284	1,320	9	660	5	440	3
2023	40,594	287	1,334	9	667	5	445	3
2024	41,028	290	1,349	10	674	5	450	3
2025	41,467	293	1,363	10	682	5	454	3
2026	41,911	296	1,378	10	689	5	459	3
2027	42,360	299	1,392	10	696	5	464	3
2028	42,813	302	1,407	10	704	5	469	3
2029	43,271	306	1,422	10	711	5	474	3
2030	43,734	309	1,438	10	719	5	479	3
2031	44,202	312	1,453	10	727	5	484	3
2032	44,675	315	1,469	10	734	5	490	3
2033	45,153	319	1,484	10	742	5	495	3
2034	45,636	322	1,500	11	750	5	500	4
2035	46,124	326	1,516	11	758	5	505	4
2036	46,618	329	1,532	11	766	5	511	4
AAGR 2016-2036	2.81%	2.80%	2.81%	2.80%	2.81%	2.80%	2.81%	2.80%

Source: Michael Baker International, Inc., 2017.
 Note: Some numbers may not add correctly due to rounding.
 AAGR - Average Annual Growth Rate

2.10 Forecast Summary

According to the FAA's June 2008 Review and Approval of Aviation Forecasts guidance, total enplanements and operations forecasts are considered consistent with the TAF if they differ by less than 10% in the five, 10, and 15-year forecast period. As shown in **Table 2-27 Forecast Summary (2016-2036)**, the forecasts developed for this Study exceed the adjusted TAF thresholds for enplanements, operations, and based aircraft. However, the TAF does not account for the strong short-term passenger and operations growth that is expected and planned for by Allegiant. The forecasts also do not account for the extremely strong long-term growth that is projected for air cargo operations and processing activities at LCK during the planning period. As an example, passenger enplanements are projected to increase by 42,842 in 2017 over 2016 with Allegiant's new route and increased frequency on existing routes, which is not accounted for in the TAF. These forecasts are for planning purposes only and are not considered the justification for facility development nor funding. They will allow CRAA to evaluate and depict development options at LCK in order to help the airport meet the existing and long-term demands of all user groups (airline, cargo, general aviation, and military).

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Table 2-27 Forecast Summary (2016-2036)

Year	Passenger Enplanements			Aircraft Operations							Based Aircraft		
	Total	TAF (Corrected)	% Difference	Airline	Cargo	General Aviation	Military	Total	TAF (Corrected)	% Difference	Total	TAF (Corrected)	% Difference
2016	103,289	103,289	0.00%	1,438	7,458	10,803	6,608	26,307	26,307	0.00%	3	3	0.00%
2017	146,131	104,320	40.08%	2,023	8,096	10,911	6,608	27,639	26,556	4.08%	6	3	100.00%
2018	147,695	105,362	40.18%	2,062	8,846	11,021	6,608	28,538	26,807	6.45%	7	3	147.37%
2019	149,275	106,413	40.28%	2,084	9,737	11,132	6,608	29,562	27,061	9.24%	9	3	194.74%
2020	150,872	107,476	40.38%	2,106	10,808	11,244	6,608	30,766	27,318	12.62%	10	3	242.11%
2021	152,486	108,549	40.48%	2,129	12,106	11,358	6,608	32,201	27,576	16.77%	12	3	289.47%
2022	154,118	109,632	40.58%	2,152	13,140	11,472	6,608	33,372	27,838	19.88%	13	3	336.84%
2023	155,767	110,727	40.68%	2,175	14,338	11,588	6,608	34,709	28,101	23.51%	15	3	384.21%
2024	157,434	111,832	40.78%	2,198	15,734	11,704	6,608	36,244	28,368	27.77%	16	3	431.58%
2025	159,118	112,948	40.88%	2,221	17,364	11,822	6,608	38,016	28,636	32.75%	17	3	478.95%
2026	160,821	114,076	40.98%	2,245	19,275	11,941	6,608	40,070	28,908	38.61%	19	3	526.32%
2027	162,542	115,215	41.08%	2,269	20,540	12,062	6,608	41,479	29,181	42.14%	20	3	573.68%
2028	164,281	116,365	41.18%	2,294	21,912	12,183	6,608	42,997	29,458	45.96%	22	3	621.05%
2029	166,039	117,527	41.28%	2,318	23,400	12,306	6,608	44,632	29,737	50.09%	23	3	668.42%
2030	167,815	118,700	41.38%	2,343	25,016	12,430	6,608	46,397	30,019	54.56%	24	3	715.79%
2031	169,611	119,885	41.48%	2,368	26,772	12,555	6,608	48,304	30,303	59.40%	26	3	763.16%
2032	171,426	121,081	41.58%	2,393	28,682	12,682	6,608	50,365	30,590	64.64%	27	3	810.53%
2033	173,260	122,290	41.68%	2,419	30,759	12,809	6,608	52,595	30,880	70.32%	29	3	857.89%
2034	175,114	123,511	41.78%	2,445	33,020	12,938	6,608	55,011	31,172	76.47%	30	3	905.26%
2035	176,988	124,744	41.88%	2,471	35,483	13,069	6,608	57,631	31,468	83.14%	32	3	952.63%
2036	178,881	125,989	41.98%	2,497	38,167	13,200	6,608	60,473	31,766	90.37%	33	3	1000.00%
AAGR 2016-2036	2.78%	1.00%		2.80%	8.51%	1.01%	0.00%	4.25%			12.74%	0.00%	

Source: Michael Baker International, Inc., 2017.
 Note: Some numbers may not add correctly due to rounding.
 AAGR - Average Annual Growth Rate