3.0 Aviation Activity Forecasts

3.1 Introduction

Projecting future aviation demand is an important element in the airport planning process. Activity forecasts will be used in subsequent tasks to help justify future airside and landside facility developments. To assist in this effort, based aircraft and general aviation operations will be projected in this chapter and the critical aircraft will be identified.

The projections of aviation demand developed for Ohio State University Airport (KOSU or the Airport) are documented in the following sections:

- Historic Activity
- Present & Future Airport Role
- Trends Impacting Future Airport Growth
    - Regional Demographics
    - National Aviation Trends
    - State Aviation Trends
    - Competing Airports
- Projections of Aviation Demand
- Critical Aircraft
- Comparison to TAF and Summary

Aviation forecasts are based on numerous factors, including socioeconomic data, local, regional, and national aviation trends, historic growth trends, and Federal Aviation Administration (FAA) aviation forecasts. Historical airport data were collected from several sources including the FAA's Air Traffic Activity System (ATADS), Traffic Flow Management System Counts (TFMSC), Terminal Area Forecast (TAF), and the Based Aircraft Inventory Program (NBAI). Other sources include Flight Wise historical IFR operations data, ANOMS radar operations data, and airport records.

It is important to point out that activity forecasts are generally based on available information and perceived assumptions captured and discussed at a particular point in time. Because of these factors, aviation activity forecasts need to be monitored to ensure validity as time and other influences dictate.

Projections of aviation activity for KOSU were prepared for the near-term (5 year), mid-term (10 year), and long-term (11-20 year) timeframes. These projections are unconstrained and assume KOSU will be able to develop the various facilities necessary to accommodate based aircraft and future operations.

3.2 Historic Activity

Historic based aircraft and operations data for the airport can provide the baseline from which future activity at KOSU can be projected. While historic trends are not always reflective of future periods, when combined with other trends, they can provide insight into future growth.

A based aircraft is generally defined as an aircraft that is permanently stored at an airport. According to the FAA's National Based Aircraft Inventory Program and airport counts, there are currently 187 aircraft based at KOSU including 139 single-engine aircraft, 21 multi-engine aircraft, 16 jets, five light sport/experimental aircraft, and seven helicopters. This differs from the FAA's most recent counts included in Terminal Area Forecasts (TAF) which was published in January 2018. The TAF reports 162 based aircraft. The reason for this discrepancy is the addition of new hangars constructed in Summer 2017. The airport currently has more than 50 aircraft on its hangar waiting list.

An aircraft operation represents either a landing or departure conducted by an aircraft. A takeoff and a landing, for example, would count as two operations. Historic aircraft operations data are reported by the Federal Aviation Administration (FAA) air traffic control tower for the Airport. In 2017, a total of 90,687 operations occurred at KOSU. This is based on operational counts from the tower, which is open from 7:00 am to 11:00 pm each day and estimates of night operations that occur between 11:00 pm and 7:00 am. Night operations estimates were derived from an industry data source, Flight Wise, that records aircraft that have filed Instrument Flight Rules (IFR) flight plans which records the arrival and departure time of aircraft. In 2017, KOSU ranked as the busiest towered general aviation airport in Ohio and ranked #186 out of 517 of all towered airports (commercial service and general aviation) in the country.

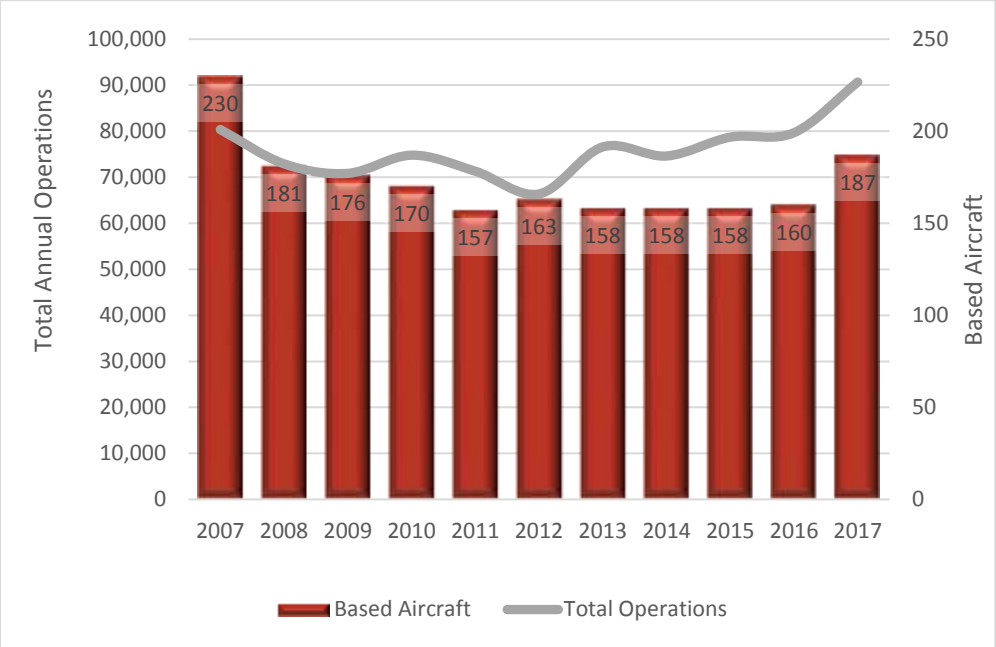
Historic based aircraft and general aviation operations for KOSU are presented **Exhibit 3.2-1**. Although based aircraft have shown an overall decline, the number has increased in the last year. As shown, total annual aircraft operations grew at an average annual growth rate of 1.2% over the last 10 years. Air taxi operations and local general aviation operations exhibited the largest growth. All segments of general aviation activity at KOSU have grown in 2017 over 2016 activity levels. Total operations increased 14% between 2016 and 2017 while based aircraft grew 17%. The 10-year trend is graphically depicted in **Exhibit 3.2-2.**

Exhibit 3.2-1: Historic Operations and Based Aircraft at KOSU

Year	ITINERANT				LOCAL			Est. Night Ops[1]	Total Ops	Based Aircraft
	Air Taxi	General Aviation	Military	Total	General Aviation	Military	Total			
2007	3,718	50,880	323	**54,921**	21,587	82	**21,669**	**3,774**	**80,364**	**230**
2008	3,049	44,042	128	**47,219**	21,295	80	**21,375**	**4,321**	**72,915**	**181**
2009	1,626	42,473	50	**44,149**	23,614	8	**23,622**	**3,074**	**70,845**	**176**
2010	2,484	39,817	141	**42,442**	27,888	18	**27,906**	**4,447**	**74,795**	**170**
2011	2,532	36,190	146	**38,868**	29,483	50	**29,533**	**2,914**	**71,315**	**157**
2012	2,593	39,624	156	**42,373**	21,222	64	**21,286**	**2,712**	**66,371**	**163**
2013	6,497	36,318	121	**42,936**	30,472	56	**30,528**	**3,129**	**76,593**	**158**
2014	10,781	31,455	178	**42,414**	29,109	46	**29,155**	**3,049**	**74,618**	**158**
2015	12,481	29,099	204	**41,784**	33,686	26	**33,712**	**3,216**	**78,712**	**158**
2016	14,081	29,405	131	**43,617**	32,683	116	**32,799**	**3,255**	**79,671**	**160**
2017	17,238	32,742	184	**50,164**	36,816	160	**36,976**	**3,547**	**90,687**	**187**
CAGR 2007-2017	**16.6%**	**-4.3%**	**-5.5%**	**-0.9%**	**5.5%**	**6.9%**	**5.5%**	**-0.6%**	**1.2%**	**-2.0%**

Sources: Airport records, FAA ATADS database, National Based Aircraft Inventory Database
Note: Actual data for determining night operations (11:00pm- 7:00am) was collected for 2007-2010 and the year ending October 2017. Night operations for 2011-2016 were derived from the 2017 night operations percentage of total operations.

Exhibit 3.2-2: KOSU Historic Operations and Based Aircraft 10-Year Trends



Sources: Airport records, FAA ATADS database, National Based Aircraft Inventory Database, Marr Arnold

3.3 Present & Future Airport Role

Ohio State University Airport is one of four public-use airports in Franklin County (including John Glenn Columbus International, Bolton Field, and Rickenbacker International) that serves the Columbus metro area. As a university-owned airport, KOSU's primary role is to support the aviation needs of The Ohio State University. However, KOSU plays a much larger role in supporting the economic vitality of the region and the welfare of the state. The Airport's present and future role will help support and justify the projections of future demand. The various roles of KOSU in supporting aviation are described below.

3.3.1 University Activities, including Flight Training

KOSU is considered a "Core Facility" of the university and offers 350,000 square feet of office space, classroom, simulation lab, and hangar space. Over 350 undergraduate and graduate students and 65 faculty members/instructors are dependent upon airport access each semester to conduct their coursework and/or research initiatives. KOSU supports the university in many capacities. These include:

- **Flight Education Program and Flight Training:** KOSU operates the university's Fight Education Program and has 20 university-owned aircraft and multiple simulation platforms.
- **Research and Teaching:** KOSU supports interdisciplinary teaching and research for various departments in the university including Aviation, Aeronautical Engineering, Civil Engineering, Architecture, City and Regional Planning, Geography, Material Science, Finance, Industrial Design, and Chemistry. The airport is home to the Aeronautics Research Center (ARC) and is also an Unmanned Aircraft System (UAS) certified operations site.
- **On-the-Job Training:** Provides on-the-job training for roughly 30 students each semester, many of which go on to work for airports, airlines, aviation consultants, and other flight providers such as NetJets.

- **Sports Teams and Athletes:** Although nearly all university sports teams typically fly commercially out of John Glenn Columbus International, KOSU provides an additional access point for many visiting sports teams and athletes as well others associated with sporting events, such as announcers, news crews, and officials. Sports teams from Notre Dame, Penn State, Ohio University, Purdue, and Wisconsin have all utilized the Airport in recent years. Many alumni fly into KOSU to attend university football games and other sporting events.
- **Visiting Speakers, Faculty, and Trustees:** Visiting professors, speakers, vendors, and others frequently travel to the campus to conduct business and often arrive via air at KOSU. These groups typically value the convenience of the Airport to campus compared to John Glenn Columbus International.
- **Parents and Alumni:** Parents and alumni frequently fly into KOSU to attend events or visit their children.

3.3.2 NIFA SAFECON

The National Intercollegiate Flying Association (NIFA) regularly hosts the National Safety and Flight Evaluation Conferences (SAFECON) at KOSU. At SAFECON, flight teams compete in a number of ground and flight events honing the skills and knowledge of the next generation of aviation professionals. Approximately 30 schools from around the country compete. The six-day event occurs in May each year and includes more than 500 people between competitors, coaches, volunteers, and judges. According to KOSU air traffic control tower counts, 8,000 local operations were associated with SAFECON activities in May 2017. This increased activity makes May the busiest month at KOSU.

3.3.3 Business Activity

KOSU's proximity to several upscale communities in the Columbus metro area as makes it an ideal base and landing point for corporate users. KOSU is home to the corporate aircraft for several nearby businesses which are some of the largest employers in the region.

- **Cardinal Health**, which provides integrated health services and medical products, employees about 4,000 people at its headquarters in Dublin, just five miles from KOSU. It has 50,000 employees in 60 countries worldwide. Cardinal Health ranked #15 on the 2017 Fortune 500 list. For the last two decades, Cardinal Health's corporate flight department has been based at KOSU. The company has a corporate aircraft fleet consisting of two Dassault Falcon 2000s and a Learjet 75. In 2017, these aircraft accounted for an estimated 1,000 operations at the Airport. While Cardinal Health flies to many airports across the country, top destinations include Nashville, Washington D.C., Philadelphia, Chicago, and Teterboro. Cardinal Health executives noted the one of the reasons for the addition of the Dassault Falcon jets to their fleet was the aircraft's ability to fly internationally from KOSU to London. Although the aircraft has the capability to fly between Columbus and London, the runway length at KOSU makes this currently prohibitive and the aircraft must make a stop at an east coast airport before continuing to London. In addition to the flights operated by Cardinal Health's aircraft, there are additional flights that occur each year conducted by other vendors and other businesses that fly into KOSU to do conduct business with Cardinal Health.

- **Worthington Industries**, a metals manufacturer, is also headquartered just five miles from KOSU in Worthington. Worthington Industries employees 10,500 and operates 82 facilities in 11 countries. An estimated 1,500 are employed locally. Worthington Industries' corporate aircraft fleet currently includes a Challenger 300, Gulfstream IV, and a Beech King Air 350, which are all based at KOSU. It is estimated that these aircraft account for more than 400 annual operations. Worthington Industries uses their corporate fleet to conduct business at its numerous facilities in North America.

- **Advanced Drainage Systems (ADS)** is based in Hilliard Ohio, five miles west of the Airport. ADS manufactures drainage pipes and ancillary products for water management. Although there are only 110 employees at the Hilliard headquarters, ADS employs 3,700 employees worldwide at 61 manufacturing plants and 34 distribution centers. ADS owns and operates two Cessna Citation V jets based at KOSU that are frequently flown to project sites and manufacturing plants across the U.S. An estimated 750 operations occurred at KOSU by ADS aircraft.
- **DLZ**, an engineering, architectural, and construction services firm located in Columbus five miles from KOSU, bases its Cessna Citation Jet at the Airport. DLZ has 600 employees in 22 U.S. offices. DLZ regularly visits its project sites and offices which account for approximately 500 operations a year from KOSU.

NetJets, Inc. was the first private business jet charter and aircraft management company in the world and was also the first fractional aircraft ownership company. NetJets frequently uses the airport to pick up and drop off charter passengers and its use of KOSU has been growing steadily over the last decade. Based on available IFR data, there were an estimated 700 NetJet charter operations in 2017. In 2017, NetJets utilized many types of aircraft including the Embraer Phenom 300; Dassault Falcon; Cessna Citation Sovereign, Citation V, and Citation X; and the Bombardier Challenger 350. Wheels Up offers passengers a private plane subscription service. Wheels Up flies daily into KOSU with King Air fleet. In 2017, Wheels Up accounted for about 600 operations.

KOSU airport management indicated many additional business users, sports figures, politicians, and celebrities that utilize the airport as well and include the following:

- Columbus Zoo
- Limited Brands
- CVS Pharmacy
- Jimmy Johns
- Culvers
- Wendy's
- Firehouse Subs
- Papa Johns
- Cracker Barrel
- Midwest Automotive Group
- Ashland Chemicals
- Dow Chemical
- Quest Communications
- Steelcase
- Duke Realty
- General Electric
- IBM
- Dad's Dog Food
- Quickrete
- Emerson Electric
- VonMaur
- Meijer
- Owens Corning
- Scotts
- Honda
- Russell Stover
- Costco
- Macys
- Tyson Food
- Goodyear Blimp

3.3.4 Medical-Related Activity

KOSU supports several types of medical-related operations. MedFlight has two helicopters based at KOSU that are utilized for critical care patient transfers and organ transfers. KOSU is also an ideal fueling stop for other critical care helicopter companies that are doing patient transfers at local hospitals. ATC tower management estimates 10 to 20 helicopter operations per day on average.

LabCorp, one of the top medical testing companies in the U.S., operates a fleet of 13 Pilatus PC-12 aircraft to pick up and deliver samples and tests throughout the Midwest and east coast. LabCorp performs 6-10 operations each day at KOSU with the majority occurring when the air traffic control tower is closed. Radar data shows that approximately 3,000 operations occur by LabCorp and its contractors (operating Aero Commander and Socata TBM aircraft) each

year at KOSU. Most of the flights fly between KOSU and Burlington, NC, Chicago, Louisville, St. Louis, and Charleston, West Virginia.

3.3.5 State and Federal Government

With convenient access to the state capital, KOSU serves as the base for several state and federal government entities. The Ohio Department of Transportation (ODOT), has a fleet of 25 aircraft that supports:

- Transportation of state officials
- Aerial photography and mapping
- Traffic enforcement and accident assistance by the State Highway Patrol
- Environmental patrol by the Department of Natural Resources.

The U.S. Drug Enforcement Agency (DEA) maintains two Cessna 206 aircraft based at KOSU to assist with the detection, location, identification, and assessing of illicit narcotics-related trafficking activities throughout the state.

3.3.6 Recreation

In addition to the above-mentioned aviation activities, KOSU also provides access to visitors attending various recreational events and activities in the area. Many visitors fly in to attend sporting events such as the Memorial Golf Tournament, concerts, sightseeing, and other events.

KOSU also supports the recreational pilot. There are four flying clubs located at KOSU that provide flight training and aircraft rental. Activity associated with these clubs has grown in recent years. With the addition of 56 T-hangars in July 2017, single-engine aircraft activity has increased. ATC tower management estimates an additional 30 operations per day associated with single-engine aircraft in based in new hangars. Several of the new tenants are also doing flight training utilized Cirrus SR 20/22 aircraft. 2018 should also see a notable increase in single-engine recreational activity based on the influx of new aircraft last summer.

3.3.7 Future Role

The future role of KOSU is not expected to change. University activity, NIFA SAFECON, business flying, medical flights, flights to support the government activities, and recreational activity will continue to be important at KOSU over the planning horizon. It is not anticipated that the activity by the various aircraft associated with these activities will approach the threshold to consider changes to the identified critical aircraft at the Airport, discussed later in this chapter. Future airport improvements and development should be based on the accommodating the demand associated with these future airport activity levels. Recommended facilities and strategies to address future activity are considered in later chapters of this report.

3.4 Trends Impacting Future Airport Growth

There are several factors that may influence aviation activity which are independent of airport activity. It is worthwhile to review outside influences to determine how they may impact future growth. These factors include:

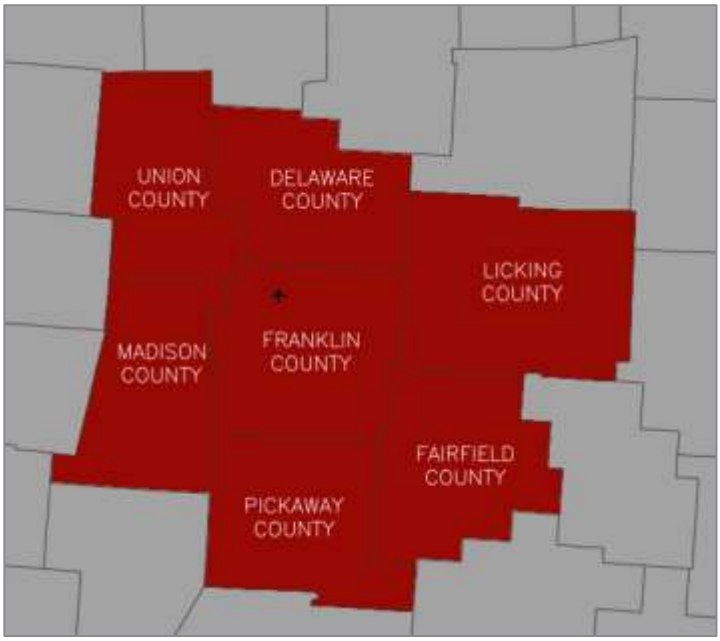
- Regional Demographics
- National Aviation Trends
- State Aviation Trends
- Competing Regional Airports

The purpose of this section is to provide an overview of what might affect demand and the associated needs of KOSU. The downturn in the economy between 2007 and 2010 has led businesses to be conservative when expanding and moving into the area, and regional population is projected to grow at slightly lower rates than experienced over the last 20 years. The economic downturn had a large impact on general aviation activity at many airports throughout the U.S. as airports continue to transition to serving more of a business base of activity. However, KOSU's large base of business users and training activity make it poised for future growth in activity as new opportunities arise.

3.4.1 Regional Demographics

Demographic and socioeconomic characteristics are often collected and examined to derive an understanding of the dynamics of historic and projected growth within the geographic area served by KOSU. The airport's primary service area was defined previously in the KOSU Airport Development Program and includes Franklin County, where the airport is located, as well as the six surrounding counties: Delaware, Licking, Fairfield, Pickaway, Madison and Union. The KOSU service area is depicted in **Exhibit 3.4.1-1.** The seven-county airport service area is slightly smaller than the 10-county Columbus Metropolitan Statistical Area (MSA).

Exhibit 3.4.1-1: Ohio State University Airport Service Area



Source: Woolpert, 2018

Exhibit 3.4.1-2 shows historic population, employment, and per capita income information for the KOSU service area, the State of Ohio, and the U.S. This information is typically used as one tool to assist in forecasting aviation demand. As shown, both population and employment in the service area has grown steadily since 1990, exceeding the growth experienced by the state and nation overall. Per capita income in Franklin County grew strongly at an average annual rate of 4.2% since 2000, higher than the growth experienced by the state and U.S. The income level in the KOSU service area in 2016 (most recent year available) was 16% less than the state average.

According to the U.S. Census Bureau, of the 28 Ohio counties that gained people in 2017, six KOSU service area counties — Franklin, Delaware, Pickaway, Union, Fairfield and Licking — accounted for 22,274 of the total gain or about 64%. The service area counties with the highest historic and projected growth are those closest to the airport-

Delaware, Franklin, and Union. These three counties were the fastest growing counties in Ohio in 2017 according to U.S. Census Bureau data.

Exhibit 3.4.1-2: Historic Growth in Population, Employment, and Per Capita Income

	KOSU Service Area	Ohio	United States
Population			
1990	1,347,439	10,847,115	248,709,873
2000	1,581,640	11,353,140	281,421,906
2010	1,801,709	11,536,504	308,758,105
2016	1,941,943	11,614,373	323,127,513
AAGR 1990-2016	1.4%	0.3%	1.0%
AAGR 2000-2016	1.3%	0.1%	0.9%
Employment			
1990	720,300	5,114,000	118,793,000
2000	835,400	5,557,000	136,891,000
2010	871,600	5,247,000	139,064,000
2016	964,500	5,431,000	151,436,000
AAGR 1990-2016	1.1%	0.2%	0.9%
AAGR 2000-2016	0.9%	-0.1%	0.6%
Per Capita Income			
1990	$20,292*	$19,591	$18,669
2000	$32,032*	$30,602	$28,509
2010	$38,653*	$40,277	$36,355
2016**	$46,949*	$49,571	$44,876
AAGR 1990-2016	3.3%	3.6%	3.4%
AAGR 2000-2016	2.4%	3.1%	2.9%

Sources: U.S. Census Bureau, Bureau of Economic Analysis, Ohio Department of Job and Family Services
Note: AAGR = Average Annual Growth Rate;
* Franklin County only
**2015 most recent data available for Franklin County per capita income. Growth rates shown through 2015 for Franklin County per capita income only.

Future projections of the service area population, employment, and earnings are presented in **Exhibit 3.4.1-3.** Data was compiled from a variety of sources. As shown, according the Mid-Ohio Regional Planning Commission, population growth is projected to grow at approximately 0.9% per year on average between 2015 and 2040. This exceeds state and national projections of growth. Employment growth is anticipated to be approximately 1.1% per year through 2037 according to Woods & Poole Economics data. Per capita income for the service area is projected to grow at approximately 1.4% per year on average through 2037.

Exhibit 3.4.1-3: Projections of Population, Employment and Per Capita Income

Indicator	Area	Source	Time Frame	AAGR
Population				
	KOSU Service Area	Mid-Ohio Regional Planning Commission	2015-2040	0.86%
	Ohio	Ohio Development Service Agency	2010-2040	0.04%
	U.S.	U.S. Census Bureau	2015-2040	0.67%
Employment				
	KOSU Service Area	Woods & Poole Economics, Inc.	2015-2037	1.06%
	Columbus MSA	Ohio Dept. of Job and Family Services	2014-2024	0.60%
	Ohio	Ohio Dept. of Job and Family Services	2014-2024	0.52%
	U.S.	U.S. Bureau of Labor Statistics	2016-2026	0.71%
Per Capita Income				
	KOSU Service Area	Woods & Poole Economics, Inc.	2015-2037	1.44%

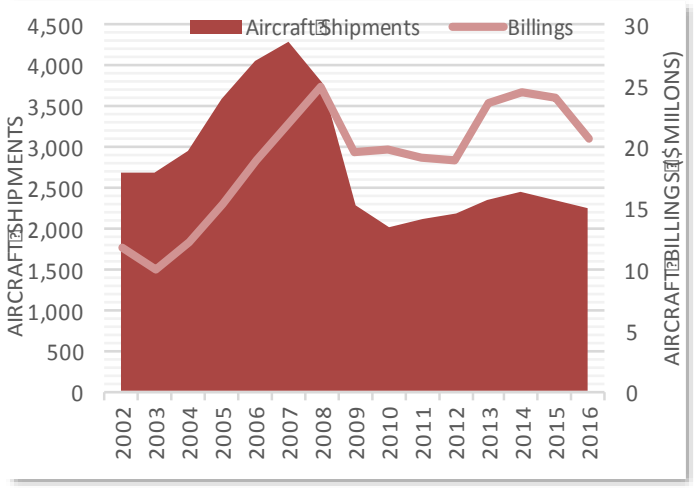
AAGR = Average Annual Growth Rate.

3.4.2 National General Aviation Trends

At the national level, fluctuating trends regarding general aviation usage and economic upturns/downturns have impacted general aviation demand. Slow economic recovery and economic uncertainties impacted general aviation demand over last decade and future U.S. projections of aircraft and operational activity are conservative. Some of the national trends that may impact aviation demand at KOSU are shown and discussed in this section.

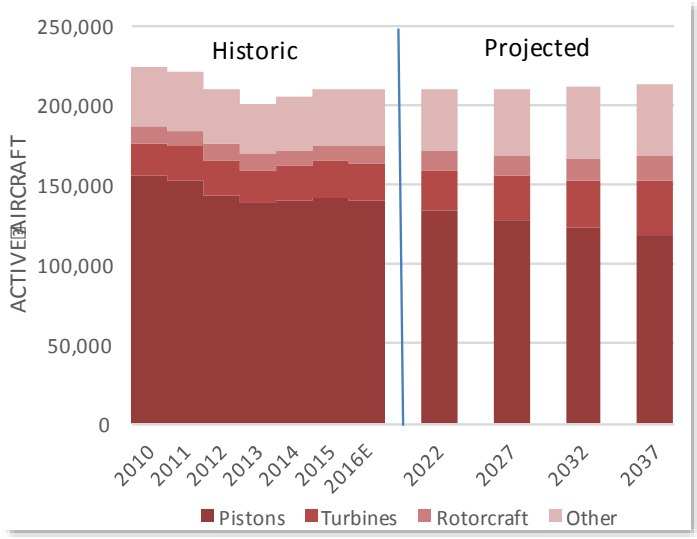
Exhibit 3.4.2-1 presents recent and projected trends in general aviation aircraft orders, active aircraft fleet, and operations.

Exhibit 3.4.2-1: National General Aviation Trends



Slow Recovery of General Aviation Aircraft Shipments and Billings*

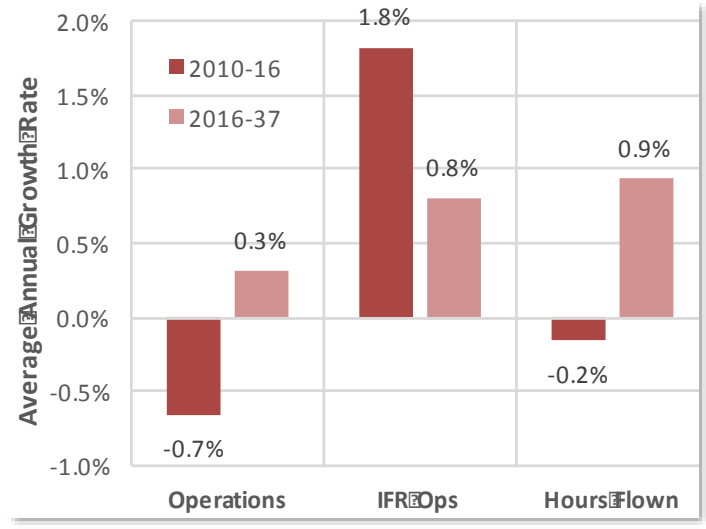
- Number of units produced fell beginning in 2007 due to economic downturn and escalating fuel prices.
- 2010-2014, production and billings started to show modest improvement, but has again slowed in the last 2 years.
- Cost trend line is driven by higher percentage of turboprop and jet aircraft purchased to support business travel since 2007.



Stable National Growth in Active Fleet over the Next 20 Years**

- 2010-2016: -1.0% average annual (AAGR) decline in total aircraft, driven by 1.7% decline in single engine and multi-engine pistons.
- Projected growth in jets and turboprops offsets low-end declines.
- 2016-2037 AAGRs:

Total aircraft: 0.1%	Jet: 2.3%
Single engine: -0.9%	Rotorcraft: 1.6%
Multi-engine: -0.5%	Experimental: 1.0%
Turboprop: 1.4%	Sport: 4.1%



Slightly Higher Growth Projected for General Aviation Activity**

- General aviation operations to grow 0.3% per year, despite recent declines.
- General aviation instrument flight rules (IFR) operations to increase 0.8% per year.
- Hours flown by general aviation aircraft projected to increase 0.9% per year.
- Growth in turbine, rotorcraft, and experimental operations and hours expected to offset a decline in fixed wing piston hours and activity.

Sources: * 2016 General Aviation Statistical Databook and Industry Outlook; ** FAA Aerospace Forecasts, Fiscal Year 2017-2037

There are opportunities for general aviation growth at KOSU, but there are also threats. The national trends have impacted the airport in the past and have the potential to impact future growth. National trends have been taken into consideration during the development of demand projections presented later in this chapter. Some of the recent trends that have the potential to impact aviation demand across the county are presented in **Exhibit 3.4.2-2**.

Exhibit 3.4.2-2: National Trends Influencing Aviation Growth

Opportunities	Threats
Increased Delivery of Several Aircraft Types 2017-2037 (FAA): Industry trends show that the delivery of some types of GA aircraft is projected to increase. - Turbo Jet: 2.3% AAGR - Rotorcraft: 1.6% CAGR - Turboprop: 1.4% CAGR	**Decline in Single-Engine Piston Fleet (FAA):** The single engine piston fleet makes up the largest percentage of GA fleet. FAA projects contraction of this portion of the fleet at a rate of -0.9% over the next 20 years. - 2005: 148,101 - 2016: 126,820 - 2037 Projected: 105,350 CAGR: 2005-2016: -1.4%; 2016-2037: -0.9%
Projected Growth in Sport and Experimental Aircraft (FAA): Because of lower entry and operating costs, industry growth is also projected for light sport and experimental aircraft. - Sport: 4.1% CAGR - Experimental Aircraft: 1.0% CAGR	**Decline in Active Private Pilots (FAA)** The number of active private pilots in the U.S. is decreasing due to new medical requirements for certification and the cost to fly. - 2000: 605,700 - 2016: 584,400 CAGR 2005-2016: -0.3%, 2016-2037: 0.1%
Increase in Business Flying: Business use of general aviation aircraft as a tool to increase efficiency and productivity also continues to grow. - Efficiency tool - More consistent activity - Purchase more fuel - Higher revenue generators for airports	**Decline in Annual GA Operations at Towered Airports (FAA):** GA operations at all towered airports in the U.S. decreased -2.6% per year between 2005 and 2016. - 2005: 34.1 million - 2016: 25.5 million - 2037 Projected: 27.3 million CAGR 2005-2016: -2.6%; 2016-2037: 0.3%
Increased Reliance on General Aviation Travel: As airlines conservatively grow scheduled service, there is an opportunity for flights on general aviation aircraft to backfill this void.	**Phase Out of 100 LL Fuel to Non-Leaded Fuel:** Plans to replace 100LL fuel with a non-leaded aviation fuel will result in further reduction in the piston GA fleet.
Some Recovery in General Aviation Shipments and Billings (GAMA): Aircraft shipments and billings have seen small increases over the last six years. - Shipments: 2010: 2,024 2016: 2,262 - Billings: 2010: $19.7M 2016: $20.7M	**Increase in Cost of New GA Aircraft (aircraft manufacturers):** The cost to purchase a new single-engine piston plane has increased significantly. - Piper Seneca: $650,000 (2006) $1 million (2014) - Cessna 172 Skyhawk: $300,000 (2005) $400,000 (2017)

3.4.3 Ohio Based Aircraft Trends

Over the last several years Ohio's public use airports have been experiencing continued growth in their based aircraft and aviation activity in terms of operations. According to the FAA's TAF (published January 2018), total based aircraft at Ohio's public use airports were approximately 5,337 in 2006. Over a ten-year period, total based aircraft in the State dropped to 4,376 in 2016, a decline of 22%. While this may seem significant, much of this decline can be

attributed to the FAA's rule on "Re-Registration and Renewal of Aircraft Registration" which corrected many registrations of unairworthy aircraft that had accumulated over the years. The FAA projects that "active general aviation aircraft" in Ohio will increase at a compound average annual growth rate of 0.56% from 2016 to 2037.

3.4.4 Competing General Aviation Airports and Local Factors Impacting Projections

Various factors specific to KOSU are also important in determining future growth in airport operations. One influential factor is the proximity of competing airports. There are a number of airports in central Ohio that are within the seven county KOSU service area. As noted in **Exhibit 3.4.4-1**, the neighboring airports vary size and activity.

Bolton Field and Delaware Municipal are both within 12 nautical miles of KOSU and have longer runways that allow them to accommodate larger business jets. The principal factor affecting competitive advantage is KOSU's existing runway length. The current length limits the type of jet aircraft operations (or their payload) that can use the airport.

KOSU has the highest operational level of all the general aviation airports located within the service area. This is due largely to the university's extensive flight training program, the large corporate user presence, the instrument landing system, and the availability of an air traffic control tower. When total based aircraft among all of airports in the area are considered, there are presently 675 based general aviation aircraft in the area. KOSU accommodates 28% of the regional based aircraft and 29% of the operations.

Exhibit 3.4.4-1: Area General Aviation Airport Summary

Airport	Primary Runway Length and Width	Based Aircraft	Annual Operations	Distance from KOSU
Ohio State University	5,004' x 100'	187	90,687	
Bolton Field	5,500' x 100'	81	22,700	11 nm S
Delaware Municipal	5,800' x 100'	102	39,300	12 nm N
Union County	4,218' x 75'	56	31,900	15 nm NW
Madison County	4,001' x 75'	49	41,400	20 nm SW
Fairfield County	5,004' x 75'	104	43,100	27 nm SE
Newark-Heath	4,649' x 75'	64	12,500	28 nm W
Pickaway County	4,346' x 75'	32	35,000	34 nm S
	TOTAL	**675**	**316,587**	

Sources: KOSU airport records, Airport IQ FAA 5010, AirNav.com.

3.5 KOSU Forecasts

The general aviation facilities at an airport should accurately reflect the level and type of aviation activity. To assist in the Master Plan for KOSU, forecasts of general aviation activity have been developed for the near term (5 year), mid-term (10 year), and the long term (20 year) planning period. The general aviation activity categories forecasted include based aircraft, based aircraft fleet mix, total operations, local/itinerant split, operational fleet mix, and peak hour operations. Data collected at the airport, FAA records of aircraft operations, historical aviation trends, and information collected through discussions with the airport, airport users, and local businesses have contributed to the forecast of future general aviation activity for KOSU.

3.5.1 Based Aircraft Forecast

Forecasting based aircraft requires the assumption that airport facilities will keep pace with and meet the demand for aviation use and those facilities will not limit the number of based aircraft to be accommodated in the future (i.e. unconstrained). Based on an airport inventory in 2017, a total of 187 aircraft are based at KOSU. For this study, several based aircraft projection methodologies were tested, including the use of socioeconomic indicators, trends, and market share. Regression analysis and state and national market share projections proved not to be viable options for projecting based aircraft at KOSU because they either did not produce statistically significant results or resulted in declining based aircraft even though aircraft levels are increasing at KOSU. The methodologies that did produce viable projections included the following:

- Methodology 1 – Service Area Population Growth – The Mid-Ohio Regional Planning Commission projects the population in the seven-county service area to grow at an average annual rate (AAGR) of 0.86% between 2015 and 2040. This rate of growth is applied to KOSU's 2017 based aircraft to develop projections.
- Methodology 2 – Service Area Per Capita Income (PCI) Growth – A based aircraft projection was developed for KOSU that reflects that anticipated PCI growth for the service area. Using this methodology and continuing the growth rate of 1.4% through the forecast period allows for the projection of based aircraft. According to Woods & Poole Economics, the service area's PCI is anticipated to increase from $43,100 in 2015 to $59,000 in 2037.
- Methodology 3 – Linear Trendline – A short term linear trendline projection was developed to reflect the recent influx of hangars and additional based aircraft in the last several years. This projection allows aircraft to reach 266 based aircraft at the end of the representing an AAGR of 1.8%.
- Methodology 4 – FAA National Growth by Segment – The last scenario projected based aircraft by equipment type using growth rates developed as port of the FAA's Aerospace Forecasts Fiscal Years 2016-2037. While single engine aircraft grow slowly in this projection scenario, the growth rates for turboprops, jets, light sport and experimental aircraft grew at the rates presented in Exhibit 3.7 above. This projection reflects the conservative growth projected for general aviation active aircraft nationwide by the FAA.

The average annual growth rate for the four methodologies described above range from 0.6% to 1.8%. The projections are presented in **Exhibit 3.5.1-1** and graphically depicted in **Exhibit 3.5.1-2**.

The exhibits also compare these methodologies to the *Ohio Airports Focus Study* published by the Ohio Department of Transportation in 2014 and the FAA's Terminal Area Forecast (TAF) projections published in January 2018. The *Ohio Airports Focus Study* projected based aircraft to grow at 0.75% average annual growth, which was based on Franklin County population projections and the FAA's projected active aircraft. The FAA TAF projects based aircraft to grow at 1.7% per year on average from 2016 (the most recent year available) to 2037. Exhibit 3.5.1-2 presents two TAF projections: one based on the actual number of based aircraft reported in the TAF and growing at 1.66% (which is significantly lower that what currently exists at the airport) and the other based on revising the TAF to show 2017 actual based aircraft reported in the FAA National Based Aircraft Inventory and airport management and growing at the same 1.66% in the TAF (i.e., if the TAF were updated to show the current based aircraft as the starting point for the growth).

While all four methods provide an acceptable range of values, the Linear Trendline (Methodology 3) was chosen as the preferred projection of based aircraft KOSU and results in an AAGR of 1.8%. This rate of growth is based on the recent growth in based aircraft and the strong demand for hangars at the airport. The airport has had a large demand for hangars over the last 20 years. In June 2017, the airport opened 54 new T-hangars, which were immediately

filled. As of January 2018, there were still 35 aircraft on the T-hangar wait list and 18 aircraft on the wait list for box hangars. In addition, 12 companies (that wished to remain anonymous) have contacted the Airport to request corporate hangars. To meet the request of new and existing tenants that own larger aircraft, KOSU has plans in the near-term to fund and build a large corporate hangar as well as several 5,000-10,000 square foot box hangars.

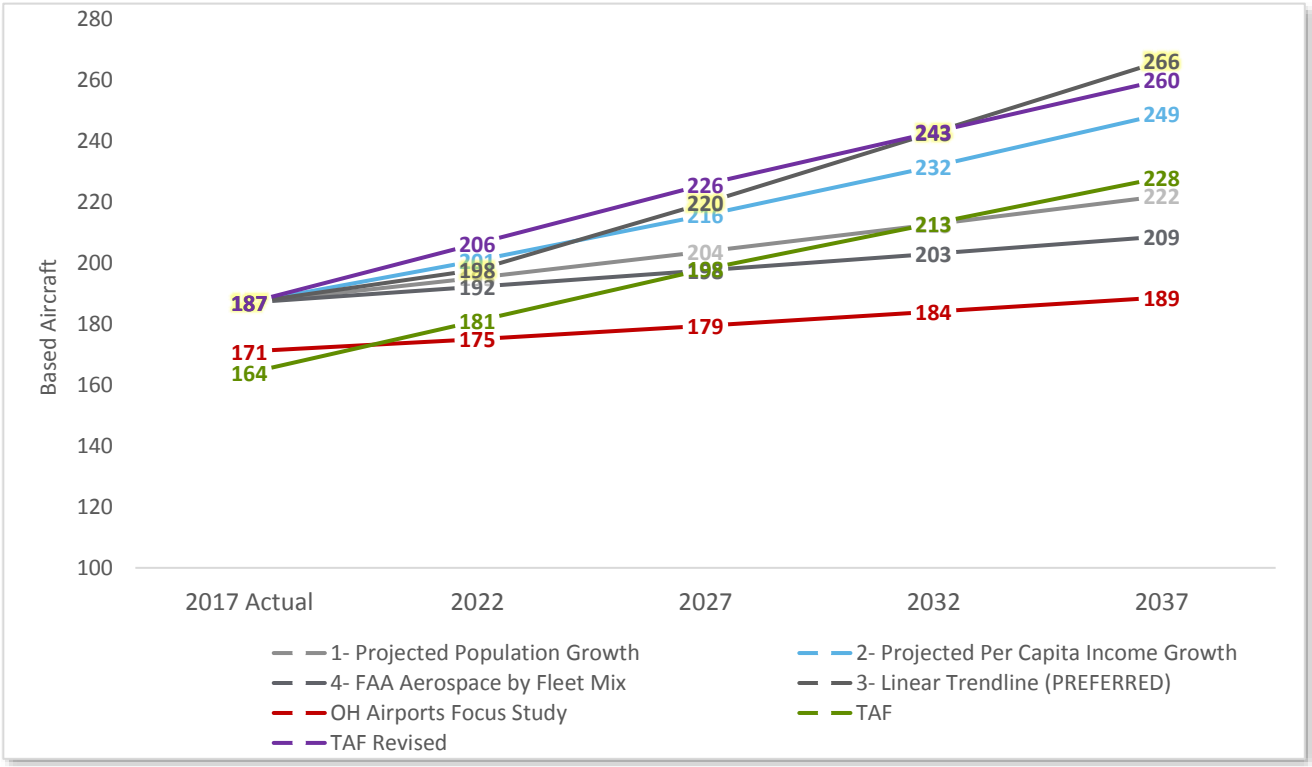
The TAF projects growth that is comparable to the preferred methodology. Based on the recent economic climate in the service area, especially the adjacent counties of Delaware and Union, the preferred methodology is considered reasonable without being overly aggressive and on par with the airport growth anticipated by the FAA.

Exhibit 3.5.1-1: Based Aircraft Forecasts

	Year	Method 1- Population Growth	Method 2- PCI Growth	Method 3- Linear Trendline	Method 4- National Growth by Segment	TAF	Adjusted TAF[1]
Historic	2017	187	187	187	187	164	187
Projected	2022	195	201	198	192	181	206
	2027	204	216	220	198	198	226
	2037	222	249	266	209	228	260
AAGR 2017-2037		0.86%	1.44%	1.78%	0.55%	1.66%	1.66%
2037 Variation from TAF		-17.1%	-4.5%	2.3%	-24.6%		

Source: Marr Arnold Planning.
Projected based aircraft have been rounded.
[1] 2017 TAF numbers have been updated to reflect actual counts at KOSU.
AAGR = Average Annual Growth Rate

Exhibit 3.5.1-2: KOSU Based Aircraft Projection Methodologies



Source: Marr Arnold Planning, 2018.

3.5.2 Based Aircraft Forecast Fleet Mix

The distribution of aircraft by number and type of engines is necessary in estimating the requirements for hangar and apron space. Consideration was given to the existing conditions and national trends, both historic and predicted, in the development of this forecast. The recommended forecast recognized that, nationally, the turboprop, business jet, light sport and experimental fleets are growing at a faster rate than the single-engine piston aircraft fleets.

The number of based aircraft is projected to increase by 79 aircraft from a total of 187 for 2017 to a total of 266 by 2037. Fourteen (14) additional jet aircraft are projected to be based at KOSU by 2037. (See **Exhibit 3.5.2-1**). Jets are estimated to account for 11% of the based aircraft at KOSU in 2037, up from 9% in 2017. Single engine and multi-engine aircraft are also expected to grow, albeit at a lower rate than jets, helicopters, and lights sport/experimental aircraft. Flight training and single-engine aircraft usage will continue to be a strong and part of the aircraft mix. The exact number and type of aircraft actually based at KOSU in any of the planning periods may vary from what is shown. However, the total and mix of aircraft shown are a reasonable representation and may be adopted for planning purposes.

Exhibit 3.5.2-1: KOSU Based Aircraft by Fleet Mix

	Year	Single Engine	Multi-Engine	Jet	Helicopter	Light Sport	Experi-mental	Total
Historic	2017	138	21	16	7	2	3	187
Projected	2022	143	22	18	8	3	4	198
	2027	155	23	21	11	5	5	220
	2037	174	27	30	17	11	7	266
Percent of Total								
Historic	2017	74%	11%	9%	4%	1%	2%	100%
Projected	2022	72%	11%	9%	4%	2%	2%	100%
	2027	71%	10%	10%	5%	2%	2%	100%
	2037	65%	10%	11%	6%	4%	3%	100%

Source: Marr Arnold Planning.

3.5.3 Operational Demand

The projections of operational demand at an airport are critical to determining the need for airside improvements. Total annual operations consist of several types of activities including air carrier, regional/commuter, air taxi, military, and general aviation. Four methodologies were tested to project general aviation operations to ensure a reasonable forecast. Projections of general aviation operations were calculated for the next 20 years using these four methodologies:

- Methodology 1 – Operations Per Based Aircraft – This method examines operations per based aircraft (OPBA) ratio for the airport and projects operations based on this ratio. KOSU's 2017 operations per based aircraft ratio (485) was applied to the recommended forecast of based aircraft (linear trendline) noted in Exhibit 3.9. This yields an average annual growth rate of 1.8%.
- Methodology 2 – Service Area Employment Growth – Woods and Poole Economics projected that seven-county KOSU service area employment will grow at an average annual rate of 1.1% between 2015 and 2037. Employment tends to be the socioeconomic indicator most closely correlated with aviation growth. This

annual rate of growth has been applied to 2017 operations to project total general aviation operations at KOSU.

- Methodology 3 – Historic Growth – Between 2007 and 2017, total general aviation operations at KOSU grew at an average annual rate of 1.2%. This rate of growth is applied to 2017 operations to yield 115,500 operations by 2037.
- Methodology 4 – National Growth in Operations at Towered Airports – This method takes the projected growth in the national general; aviation operations from the FAA Aerospace Fiscal Years 2016-2037 and applies that growth to KOSU's 2017 operations to determine a projection of total airport operations.

Exhibit 3.5.3-1 presents the forecast of general aviation operations for the 20-year planning period. Of the four forecasts developed, the employment growth methodology (Methodology 2) is believed to be a reasonable forecast of general aviation operations for planning purposes at KOSU. Operations are projected to grow at an average annual rate of 1.1% and reach 112,000 annually by 2037.

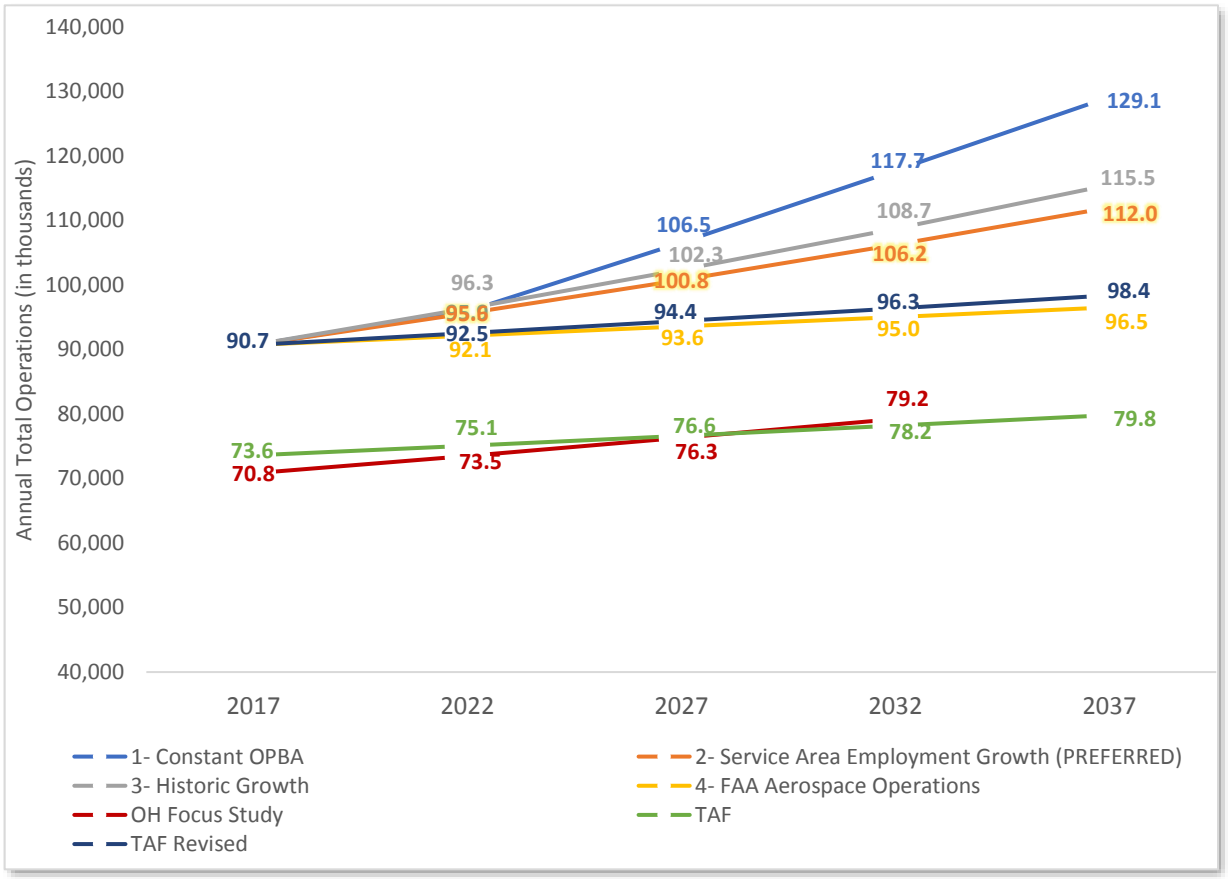
Exhibit 3.5.3-1: KOSU General Aviation Operations Forecasts

	Year	Method 1- OPBA	Method 2- Employment Growth	Method 3- Historic Growth	Method 4- FAA Growth Rate	TAF	Adjusted TAF[1]
Historic	2017	90,687	90,687	90,687	90,687	73,578	90,687
Projected	2022	95,900	95,600	96,300	92,100	75,100	92,500
	2027	106,500	100,800	102,300	93,600	76,600	94,400
	2037	129,100	112,000	115,500	96,500	79,800	98,400
AAGR 2017-2037		1.78%	1.06%	1.22%	0.31%	0.41%	0.41%
2037 Variation from TAF		23.8%	12.1%	14.8%	-1.9%		

Source: Marr Arnold Planning and FAA TAF, 2018.
[1] 2017 TAF numbers have been updated to reflect master plan estimates (tower counts plus estimated night operations). The growth rate has remained the same.
AAGR=Average Annual Growth Rate

Exhibit 3.5.3-1 and **Exhibit 3.5.3-2** compare the operations forecast to FAA's TAF projections. The FAA projects operations at KOSU to grow at a 0.4% AAGR over the forecast period.

Exhibit 3.5.3-2: Comparison of General Aviation Operations Projections



Source: Marr Arnold Planning and FAA TAF, 2018

3.5.4 Local and Itinerant Operations

Aircraft operations are divided into two types: local and itinerant. Local operations are classified as arrivals and departures of aircraft that operate in the local traffic pattern or within sight of the airport. Local operators are known to be departing for or arriving from flights in local practice areas within a 30-mile radius of the airport, or they have simulated approaches or low passes at the airport. Itinerant operations are defined as all other operations other than local. At KOSU, itinerant operations are categorized as air taxi, military, or general aviation. Air taxi operations, often referred to as air charter operations, are those operations conducted by turbine aircraft with greater than six seats operating under FAR Part 135 or Part 91/91K flight rules.

The current ratio of local to itinerant general aviation is 41% local and 59% itinerant. This ratio is expected to remain constant throughout the study period as shown in **Exhibit 3.5.4-1**. This growth correlates with the growth in both business travel (itinerant) and flight training (local).

Exhibit 3.5.4-1: General Aviation Operations Forecast by Type

	Year	ITINERANT			LOCAL	Total Operations
		Air Taxi	General Aviation + Military	Total Itinerant	General Aviation + Military	
Historic	2017	17,238	36,473	53,711	36,976	90,687
Projected	2022	18,500	38,300	56,800	39,500	96,300
	2027	19,600	40,700	60,300	42,000	102,300
	2037	21,500	44,600	66,100	45,900	112,000

Source: Marr Arnold Planning, 2018

3.5.5 Operational Fleet Mix

According to 2017 ANOMS radar data for KOSU and discussions with tower management, approximately 80% of existing annual operations are conducted by single-engine aircraft. The remaining 20% are made by a mix of multi-engine, turboprop, jet, helicopter, and light sport/experimental aircraft (**Exhibit 3.5.5-1**). The operational fleet mix will shift slightly at KOSU throughout the forecast period based on FAA forecasted growth in turbine, light sport, and rotorcraft utilization. It is anticipated that single engine usage will grow as well, at a slightly lower rate. This coincides with our projection of based aircraft by aircraft type presented in Exhibit 3.5.2-1. By 2037, it is anticipated that operations by single engine aircraft will account for 73% of the total annual operations at KOSU. Jet aircraft will account for 10% by the end of the forecast period, multiengine/turboprop operations will account for 6%, helicopter operations will account for 9% and light sport/experimental will account for 2% of the total operations in 2037.

Exhibit 3.5.5-1: Operational Fleet Mix

	Year	Single-Engine	Multi Engine/ Turboprop	Jet	Helicopter	Light Sport/ Experimental	Military	Total Annual Operations
Historic	2017	72,351	5,225	4,800	7,255	750	306	90,687
Projected	2022	75,800	5,500	5,800	7,900	1000	300	96,300
	2027	78,000	5,900	8,200	8,700	1200	300	102,300
	2037	82,100	6,500	11,200	9,900	2000	300	112,000

Source: Marr Arnold Planning, FAA TFMSC data, ANOMS radar data

3.5.6 Peak Hour Operations

Another primary consideration for facility planning at airports relates to peak hour, also referred to as design level activity. This operational characteristic is important to understand because some facilities should be sized to accommodate the peaks in activity, for example, the aircraft apron or terminal areas.

Forecasts were developed for peak month, day, and hour operations. The number of general aviation operations occurring during the peak month and hour were estimated based on tower counts and discussion with air traffic control tower management. May is the peak month due the Airport hosting the National Intercollegiate Flying Association (NIFA) SAFECON events and competition each year. The event includes flying competitions by competitors from 30 universities. While the event takes place over six days during the second week of May each year, the week before the event is even busier with team practices. In 2017, ATC records showed 11,144 total operations occurred during the first two weeks of May 2017. The majority of the operations are touch-and-goes and occur within the 10-hour window of 8am-6pm.

In 2017, 1,787 peak day operations occurred during the peak hour. **Exhibit 3.5.6-1** presents peak factors for the 20-year planning period. It is anticipated that SAFECON will continue to be held at the Airport over the 20-year forecast period and it is estimated that the operational activity associated with SAFECON will remain unchanged through the forecast period. The growth in peak periods will be to accommodate the increase in activity that is not associated with SAFECON.

Exhibit 3.5.6-1: Peak Period Forecasts

	Year	Annual Operations	Peak Month	Peak Day	Peak Hour
Historic	2017	90,687	15,649	1,787	180
Projected	2022	95,600	16,100	1,839	185
	2027	100,800	16,600	1,884	190
	2037	112,000	17,600	1,992	201

Source: Marr Arnold Planning, 2018

3.6 Critical Aircraft

Knowledge of the types of aircraft currently using, and those that are expected to use KOSU provides insight concerning the Runway Design Code (RDC). FAA Advisory Circular 150/5300-13A, Change 1, Airport Design, provides guidance for this determination. The RDC is based on the "Design Aircraft" that is determined the most critical aircraft, or group of aircraft, using or projected to use a runway on a regular basis. A number of FAA guidance documents define regular basis as 500 or more annual operations (landing and takeoffs are considered as separate operations). It is important to note that the 500 annual operations substantial use threshold is not a cap or limit on aircraft operations, but rather a planning metric for consideration of the potential need to upgrade airport facilities. The design aircraft can be only one aircraft or a composite of more than one aircraft representing the highest Aircraft Approach Category (AAC) and Airplane Design Group (ADG).

The selected AAC and ADG are combined to form the Runway Design Code (RDC) of a particular runway. The RDC provides the information needed to determine the dimensional criteria standards that apply to that runway. The first component, depicted by a letter, is the AAC and relates to the aircraft approach speed. The second component, depicted by a roman numeral, is the ADG and relates to the aircraft wingspan, and tail height. The AAC and ADG are presented in **Exhibits 3.6-1** and **3.6-2**. RDC data by runway end will be summarized in the next chapter.

Exhibit 3.6-1: Aircraft Approach Category (AAC)

AAC	Approach Speed
A	Approach speed less than 91 knots
B	Approach speed 91 knots or more but less than 121 knots
C	Approach speed 121 knots or more but less than 141 knots
D	Approach speed 141 knots or more but less than 166 knots
E	Approach speed 166 knots or more

Source: FAA AC 150/5300-13A, Airport Design, Change 1, February 2014

Exhibit 3.6-2: Airplane Design Group (ADG)

ADG	Tail Height	Wing Span
I	Less than 20 Feet	Less than 49 Feet
II	Greater than 20, but less than 30 Feet	Greater than 49, but less than 79 Feet
III	Greater than 30, but less than 45 Feet	Greater than 79, but less than 118 Feet
IV	Greater than 45, but less than 60 Feet	Greater than 118, but less than 171 Feet
V	Greater than 60, but less than 66 Feet	Greater than 171, but less than 214 Feet
VI	Greater than 66, but less than 80 Feet	Greater than 214, but less than 262 Feet

Source: FAA AC 150/5300-13A, Airport Design, Change 1, February 2014

FAA Instrument Flight Rules (IFR) flight data for KOSU from November 2016- October 2017 was obtained to determine critical aircraft. IFR flight data is recorded when pilots file a flight plan with the FAA. It does not take into account fair weather flights, touch-and-go operations, or flights with flight plans cancelled before landing at the airport. The ARC for the critical design aircraft, the aircraft or family of aircraft performing more than 500 annual operations, will determine what design standards the airport will adhere to.

Exhibit 3.6-3 summarizes the operations by aircraft ARC. **Exhibit 3.6-4** presents the confirmed operations from the IFR data by ARC and aircraft type. Data collected from IFR flights show there were 177 unique aircraft that operated at KOSU. There were a total of 14,260 IFR operations reported at KOSU between November, 2016 and October, 2017. There were over 1,000 operations by C-II aircraft. The C-II aircraft that account for the most operations are the Challenger 300/350 and the LearJet 75, each with about 300 total annual operations

Exhibit 3.6-3: Summary of Aircraft Operations at KOSU by ARC

ARC Family	IFR Operations
A-I	4,713
A-II	2,078
B-I	1,670
B-II	3,747
C-I/D-I	804
C-II/D-II	1,274
C-III/D-III	60
C-IV/D-IV	2
HELI	90
Other/Unknown	72
Total IFR Aircraft Operations	**14,620**

Source: FAA TFMSC database, FAA AC 150/5300-13A Appendix 1, and Marr Arnold Planning, 2018

Exhibit 3.6-4: Summary of Aircraft Operations by Aircraft Reference Code

A-I		A-II	
C172 - Cessna Skyhawk 172	1,028	PC12 - Pilatus PC-12	2,078
SR22 - Cirrus SR 22	760		
SR20 - Cirrus SR-20	372		
C182 - Cessna Skylane 182	254		
EA50 - Eclipse 500	200		
P28A - Piper Cherokee	190		
PA32 - Piper Cherokee Six	174		
BE36 - Beech Bonanza 36	170		
TBM7 - Socata TBM-7	166		
BE33 - Beech Bonanza 33	162		
Other	2,265		
A-I Total	**4,713**	**A-II Total**	**2,078**
B-I		**B-II**	
C525 - Cessna CitationJet/CJ1	534	AC50 - Aero Commander 500	1072
BE40 - Raytheon/ Beechjet 400/T-1	176	C56X - Cessna Excel/XLS	748
C421 - Cessna Golden Eagle 421	128	F2TH - Dassault Falcon 2000	358
C206 - Cessna 206 Stationair	106	E55P - Embraer Phenom 300	240
BE9L - Beech King Air 90	86	BE20 - Beech 200 Super King	222
PAY1 - Piper Cheyenne 1	80	C680 - Cessna Citation Sovereign	198
AEST - Piper Aero Star	68	C550 - Cessna Citation II/Bravo	180
BE58 - Beech 58	66	C68A - Cessna Citation Latitude	172
C25A - Cessna Citation CJ2	54	C560 - Cessna Citation V	168
C414 - Cessna Chancellor 414	40	C25B - Cessna Citation CJ3	134
C500 - Cessna 500/Citation I	40	BE30 - Raytheon 300 Super King Air	46
C425 - Cessna 425 Corsair	36	C25C - Cessna Citation CJ4	32
BE10 - Beech King Air 100 A/B	34	F900 - Dassault Falcon 900	24
C340 - Cessna 340	32	FA50 - Dassault Falcon/Mystère 50	22
Other	190	Other	153
B-I Total	**1,670**	**B-II Total**	**3,747**
C-I/D-I		**C-II/D-II**	
B350 - Beech Super King Air 350	760	LJ75 - Learjet 75	292
LJ40 - Learjet 40; Gates Learjet	30	CL30 - Bombardier Challenger 300	228
LJ35 - Bombardier Learjet 35/36	20	H25B - BAe HS 125/700-800/Hawker 800	184
B190 - Beech 1900/C-12J	12	LJ45 - Bombardier Learjet 45	152
Other	2	CL60 - Bombardier Challenger 600	104
		CL35 - Bombardier Challenger 300	96
		GLF4 - Gulfstream IV/G400	88
		C750 - Cessna Citation X	74
		LJ60 - Bombardier Learjet 60	42
		GALX - IAI 1126 Galaxy	36
		C650 - Cessna III/VI/VII	28
		Other	38
C-I/D-I Total	**804**	**C-II/D-II Total**	**1,274**
Other Large Jets		**Helicopters**	
GLF5 - Gulfstream V/G500 (D-III)	30	EC45 - Eurocopter EC-145	58
GLEX - Bombardier BD-700 Global (C-III)	18	H47 - Boeing CH-47 Chinook	10
C-III Other	4	AS65 - Aérospatiale AS-366	8
C-IV Other	2	Other	14
D-III Other	8		
Other Total	**62**	**Helicopter Total**	**90**

Source: FAA TFMSC database, FAA AC 150/5300-13A Appendix 1, and Marr Arnold Planning, 2018

The specific design aircraft for the primary runway (existing runway 9R-27L) for the future falls within an AAC of C/D, and ADG of II aircraft design code. There is no one aircraft within this group that meets 500 operations, but cumulatively, they reach over 1,270 operations. The largest aircraft within this group is the Gulfstream 450, which is based at the airport. The runway design code of the primary runway on the previous ALP was a C/D-III, so this represents a slightly reduced design standard for the future than was previously shown for the airport. For the parallel runway (existing Runway 9L-27R), the specific design aircraft for the future is the same as the existing and falls within an AAC of A, and ADG of II. The specific design aircraft for this runway would be the Pilatus PC-12 with almost 2,100 operations. For the crosswind runway (Runway 5-23), the specific design aircraft for the future is the same as the existing and falls within an AAC of B and ADG of I (small). The specific design aircraft for this runway would be the Cessna Citation CJ1 with just over 500 operations.

3.7 Summary of Aviation Forecasts

Exhibit 3.7-1 presents a summary of the forecasts for KOSU over the 20-year planning period. These forecasts indicate all aspects of aviation demand at the airport will continue to grow during the planning period. KOSU will continue to support the university's vision of the being one of the premier aviation programs in the country while embracing the business community's growing aviation needs. Ongoing development of facilities will enable the airport to continue to accommodate the growth in aviation demand and contribute to the economic vitality of the region. Additionally, the C-II family of aircraft has been determined to be the ultimate critical design aircraft family using the airport will further drive the facility requirements needed over the 20-year planning period.

A continual, never-ending process defines effective airport planning. These forecasts were based on the most recent data available at a particular point in time and adequately describe future conditions concerning KOSU. As discussed in the introduction of this chapter, aviation activity and forecasts need to be monitored to ensure validity as time and other influences dictate. Facility requirements and plans will be presented in future chapters of this Master Plan.

Exhibit 3.7.2 compares the recommended forecasts to the FAA's Terminal Area Forecast (TAF). The 2017 TAF based aircraft and total operations numbers shown in the table differ from the data published in the FAA TAF, dated January 2018. The most recent actual data shown in the TAF is for fiscal year (FY) 2016. KOSU has 29 additional based aircraft than shown in the TAF due to the completion of new t-hangars in the summer of 2017. The actual operations for 2017 are also higher than those reported by the FAA TAF, due in part to the activity associated with the additional based aircraft. The 2017 operations numbers for KOSU are based on actual tower counts and estimated night operations. The TAF projections shown in Exhibit 3.7.2, apply the 20-year growth rates published in the TAF to the actual KOSU based aircraft and operations for 2017.

The recommended master plan forecasts for based aircraft and operations are just slightly more aggressive than the FAA's TAF projections for the airport. The master plan's based aircraft projections are 2.3% higher than the TAF over the 20-year planning horizon. Operations are also within 10% of the TAF projections within the 5-, 10-, and 15-year planning periods.

Exhibit 3.7-1: Summary of KOSU Aviation Forecasts over the 20-Year Planning Period

Base Year: 2017												
								Average Annual Compound Growth Rates				
	Base Yr. Level	Base Yr.+1yr.	Base Yr.+5yrs.	Base Yr.+10yrs.	Base Yr.+15yrs.	Base Yr.+20yrs.		Base Yr. to +1	Base Yr. to +5	Base Yr. to +10	Base Yr. to +15	Base Yr. to +20
Operations												
Itinerant	53,711	54,300	56,800	60,300	63,200	66,100		1.10%	1.12%	1.16%	1.09%	1.04%
Local	36,976	37,400	39,500	42,000	43,950	45,900		1.15%	1.33%	1.28%	1.16%	1.09%
TOTAL OPERATIONS	90,687	91,700	96,300	102,300	107,150	112,000		1.12%	1.21%	1.21%	1.12%	1.06%
Peak Hour Operations	180	181	185	190	195	201		0.56%	0.55%	0.54%	0.54%	0.55%
Based Aircraft												
Single Engine (Nonjet)	138	139	143	155	165	174		0.72%	0.71%	1.17%	1.18%	1.17%
Multi Engine (Nonjet)	21	21	22	23	25	27		0.00%	0.93%	0.91%	1.17%	1.26%
Jet Engine	16	16	18	21	26	30		0.00%	2.38%	2.76%	3.16%	3.19%
Helicopter	7	7	8	11	14	17		0.00%	2.71%	4.62%	4.73%	4.54%
Other	5	5	7	10	14	18		0.00%	6.96%	7.18%	7.11%	6.61%
TOTAL	187	188	198	220	243	266		0.53%	1.15%	1.64%	1.76%	1.78%
	Operational Factors											
	Base Yr. Level	**Base Yr.+1yr.**	**Base Yr.+5yrs.**	**Base Yr.+10yrs.**	**Base Yr.+15yrs.**	**Base Yr.+20yrs.**						
GA operations per based aircraft	485	488	486	465	441	421						

Source: Marr Arnold Planning

Exhibit 3.7.2: Recommended Forecasts Compared to TAF Forecasts

Forecast Element	Year	Recommended Forecast	Adjusted TAF Forecast[1]	% Difference
Based Aircraft				
Base Year	2017	187	187	
Base Year + 5 Years	2022	198	206	-4.0%
Base Year + 10 Years	2027	220	226	-2.7%
Base Year + 15 Years	2032	243	243	0.0%
Base Year + 20 Years	2037	266	260	2.3%
AAGR 2017-2037		1.78%	1.66%	
Total Operations				
Base Year	2017	89,930	89,930	0.0%
Base Year + 5 Years	2022	94,800	91,700	3.3%
Base Year + 10 Years	2027	99,900	93,600	6.3%
Base Year + 15 Years	2032	105,300	95,500	9.3%
Base Year + 20 Years	2037	111,000	97,600	12.1%
AAGR 2017-2037		1.1%	0.4%	

Source: Marr Arnold Planning and FAA Terminal Area Forecasts.
Note: [1]Since the most recent TAF data available is for FY2016, 2017 based aircraft and operations have been adjusted to reflect actual counts for KOSU and published TAF growth rates have been applied through the forecast period.