Chapter 3 – Aviation Activity Forecasts

The overall goal of aviation activity forecasting is to provide reasonable projections of future activity that can be translated into specific airport facility needs anticipated during the next twenty years and beyond.

Overview and Purpose

This chapter provides updated aviation activity forecasts for Ashland Municipal Airport (S03) for the twenty-year master plan horizon (2017-2037). The most recent Federal Aviation Administration (FAA) approved aviation activity forecasts for Ashland Municipal Airport were developed in the 2004 Airport Layout Plan Report.

The forecasts presented in this chapter are consistent with current and historic role as a community/regional general aviation airport. Ashland Municipal Airport is capable of accommodating a full range of general aviation activity, including business class turboprops, small business jets and helicopters. This level of capability expands the airport's role beyond the local community and accommodates users throughout the region, which is acknowledged in the 2007 Oregon Aviation Plan (OAP).

Ashland Municipal Airport is designated a **Category III - Regional General Aviation** airport in OAP 2007. The definition for Category III airports is: "*These airports support most twin and single-engine aircraft and may accommodate occasional business jets. These airports support a regional transportation need.*"

The forecasts of activity are unconstrained and assume the City of Ashland will be able to make the facility improvements necessary to accommodate the anticipated demand unless specifically noted. The City of Ashland will consider if any unconstrained demand will not or cannot be reasonably met through the evaluation of airport development alternatives later in the master plan.

FAA FORECASTING PROCESS

The FAA provides aviation activity forecasting guidance for airport master planning projects. FAA Advisory Circular (AC) 150/5070-6B, Airport Master Plans, outlines seven standard steps involved in the forecast process:

1) **Identify Aviation Activity Measures**: The level and type of aviation activities likely to impact facility needs. For general aviation, this typically includes based aircraft and operations.
2) **Previous Airport Forecasts**: May include the FAA Terminal Area Forecast (TAF), state or regional system plans, and previous master plans.
3) **Gather Data**: Determine what data are required to prepare the forecasts, identify data sources, and collect historical and forecast data.
4) **Select Forecast Methods**: There are several appropriate methodologies and techniques available, including regression analysis, trend analysis, market share or ratio analysis, exponential smoothing, econometric modeling, comparison with other airports, survey techniques, cohort analysis, choice and distribution models, range projections, and professional judgment.
5) **Apply Forecast Methods and Evaluate Results**: Prepare the actual forecasts and evaluate for reasonableness.
6) **Summarize and Document Results**: Provide supporting text and tables as necessary.
7) **Compare Forecast Results with FAA's TAF**: Follow guidance in FAA Order 5090.3C, Field Formulation of the National Plan of Integrated Airport Systems. In part, the Order indicates that forecasts should not vary significantly (more than 10 percent) from the TAF. When there is a greater than 10 percent variance, supporting documentation should be supplied to the FAA. The aviation demand forecasts are then submitted to the FAA for their approval.

KEY ACTIVITY ELEMENTS

As noted above, general aviation airport activity forecasting focuses on two key activity segments: **based aircraft** and **aircraft operations** (takeoffs & landings). Detailed breakdowns of these activity segments include:

- Aircraft fleet mix;
- Peak activity;
- Distribution of local and itinerant operations; and
- Determination of the critical aircraft (also referred to as the design aircraft).

The critical aircraft represents the most demanding aircraft type or family of aircraft that uses an airport on a regular basis (a minimum of 500 annual takeoffs & landings). The critical aircraft is used to establish a variety of FAA design categories, which then establish design standards for airfield facilities. FAA airport design standard groupings reflect the physical requirements of specific aircraft types and sizes. Design

items, such as runway length evaluations, are determined by the requirements of current/future critical aircraft. The activity forecasts also support the evaluation of several demand-based facility requirements including runway and taxiway capacity, aircraft parking, and hangar capacity.

Airport Service Area

An airport service area refers to the geographic area surrounding an airport that has the greatest influence on its activity. The population and economic conditions, and the number and type of airports within a service area can directly influence individual airport activity. For general aviation airports, a 30- or 60-minute surface travel time is often used to approximate the boundaries of its service area.

A significant portion of general aviation airport activity is normally generated by aircraft that are owned and operated by individuals, businesses, or government agencies located within its service area. Other activity is generated by transient aircraft that chose to operate at the airport, instead of a nearby competing airport. Transient aircraft activity includes both enroute and origin-destination travel. In many cases, the airport itself is the destination, when the purpose of flight is to access FBO and related services, fuel, an airport restaurant, or specific flight training needs.

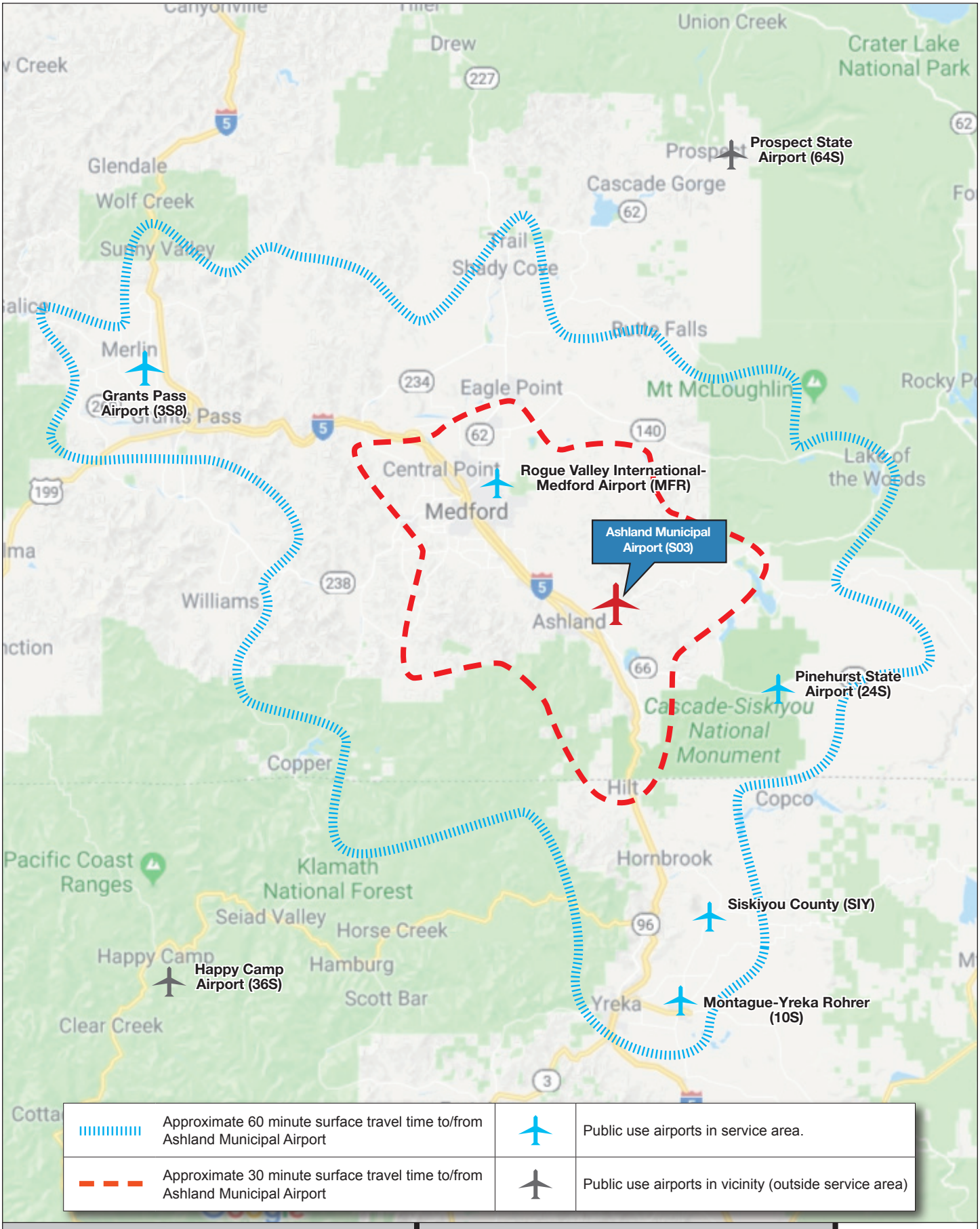
Convenience, choice, and cost are three primary considerations that every airport user weighs when making their consumer choice. Surface travel time to or from an airport is a primary measure of convenience, although facility capabilities, available services, and user costs may outweigh convenience for many users.

Table 3-1 lists the public use airports within a 35 nautical mile (air miles) radius of Ashland Municipal Airport, which incorporates the majority of the defined service area for the airport. **Figure 3-1** illustrates the approximate service area boundaries for Ashland Municipal Airport.

Service areas for commercial airports often extend well beyond a one-hour drive time due to the relatively small number of airports with scheduled airline service. Ashland Municipal Airport is located within the service areas (approximately a two-hour drive time) defined for two commercial airports: Rogue Valley International Medford Airport (approximately 30 minute drive time) and Crater Lake Klamath Regional Airport (approximately 1.5-hour drive time).

TABLE 3-1: PUBLIC USE AIRPORTS IN VICINITY OF ASHLAND MUNICIPAL AIRPORT
(WITHIN 35 NAUTICAL MILES)

Airport	Location	Runway Length(s) (Feet)	Surface	Lighted Runway	Fuel Available
Rogue Valley International-Medford Airport (MFR)	15NM NW	8,800	Asphalt	HIRL	100LL Jet-A
Pinehurst State (24S)	13NM SE	2,800	Asphalt	N/A	N/A
Siskiyou County Airport (SIY)	26 NM S	7,490	Asphalt	MIRL	100LL Jet-A
Montague-Yreka Rohrer Field (105)	28 NM S	3,360	Asphalt	MIRL	100LL
Butte Valley Airport (A32)	35 NM SE	4,000	Asphalt	N/A	N/A



AIRPORT SERVICE AREA
FIGURE 3-1

ASHLAND MUNICIPAL AIRPORT
AIRPORT MASTER PLAN

CENTURY WEST ENGINEERING

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Economic Conditions and Population

Historically, downturns in general aviation activity often occur during periods of weak economic conditions while growth typically coincides with favorable economic conditions. The recent economic recession and the slow recovery that followed, has constrained general aviation activity locally, statewide, and throughout the national airport system. However, the FAA's national long-term aviation forecasts[1] reflect overall strength in both the U.S. and regional economies. This forecast economic strength is expected to sustain modest growth in aviation activity over the long-term.

AREA ECONOMY

The economy for the City of Ashland has both local and regional components. The City actively pursues and promotes local economic development activities while supporting a broader regional initiatives. In 2007, the City of Ashland supported Jackson County's expansion of commercial and industrially zoned properties in the Jackson County Enterprise Zone. The Ashland City Council adopted the city's current Economic Development Strategy in 2011 and is now engaged in implementation. The purpose of the strategy addressed four elements including diversifying the economic base of the community; supporting growth in businesses that provide local and regional products; increasing family-wage jobs in the community; and leveraging Ashland's tourism and repeat visitor strengths. Several key economic sectors were identified:

- Southern Oregon University;
- Oregon Shakespeare Festival;
- Lodging, restaurants and specialty retail;
- Value added specialty manufacturing; and
- Specialty food and beverage innovation.

The economic strategy recommended focused efforts to build on current successes, while also addressing several economic challenges or weaknesses. Examples include seasonality of tourism, high housing costs, land supply required to support industrial employment, distance to major economic markets, and an older age demographic.

The City of Ashland conducted a buildable lands inventory in 2011 to quantify land development opportunities and constraints within the city limits and urban growth boundary (UGB). Ashland Municipal Airport is included in the inventory with 9 developable parcels listed; no net buildable acreage within the airport is listed, instead referring to the airport specific site planning ("Per Airport Master Plan"). Although the airport represents a small percentage of developable lands in the Ashland UGB, it provides an inventory of developable land that is capable of supporting targeted airport-compatible

[1] FAA Aerospace Forecast (Fiscal Years 2016-2036)

commercial or light industrial uses. These activities may generate aviation activity or complement the common range of aeronautical activities.

The economy of Jackson County has a diverse group of sectors including trade, transportation, and utilities; education and health services; government; leisure and hospitality; and manufacturing. The nearby Medford metropolitan area supports a wide range of consumer services and employment opportunities that results in a strong economic connection with Ashland.

EMPLOYMENT

Oregon Employment Department data indicates total employment for Jackson County in 2016 was 87,110 employees. In 2016 the average income among all industry segments in Jackson County was $40,323 compared to Oregon's statewide average of $49,467. The leading employment sectors and average annual wages for Jackson County are summarized in Table 3-2 and Table 3-3.

TABLE 3-2: LEADING EMPLOYMENT SECTORS IN JACKSON COUNTY (2016)

JACKSON COUNTY		
Sector	**Total Employment by Sector**	**% of Total Employment**
1. Trade, Transportation, and Utilities	20,900	24%
2. Education and Health Services	15,280	17.5%
3. Government	12,880	14.8%
4. Leisure and Hospitality	10,520	12.1%
5. Manufacturing	7,610	8.7%
All other industries	19,920	22.9%
Total Employment	87,110	100%
Source: State of Oregon Employment Department, Jackson County 2016		

TABLE 3-3: LEADING EMPLOYMENT SECTORS WAGES IN JACKSON COUNTY (2016)

Sector	Jackson County Annual Average Wage	Oregon Annual Average Wage
1. Trade, Transportation, and Utilities	$35,676	$41,405
2. Education and Health Services	$50,644	$49,269
3. Government	$47,992	$52,766
4. Leisure and Hospitality	$18,711	$20,165
5. Manufacturing	$46,390	$67,493
Source: State of Oregon Employment Department, Jackson County and State of Oregon 2016		

POPULATION

The population within an airport's service area, in broad terms, affects the type and scale of aviation facilities and services that can be supported. Changes in population often reflect broader economic conditions that may also affect airport activity. The airport service area for Ashland Municipal Airport extends beyond the City of Ashland and Jackson County along the Interstate 5 corridor and includes portions of Klamath County in Oregon and Siskiyou County in California. However, for the purpose of forecasting aviation activity, an evaluation of local city and Jackson County population trends will provide a reasonable indication of activity.

Historic Population

Certified estimates of population for Oregon counties and incorporated cities are developed annually by the Population Research Center at Portland State University (PRC-PSU). The annual PRC-PSU estimates, coupled with U.S. Census conducted every ten years, provide an indication of local area population trends over an extended period.[2] The 2017 PRC-PSU certified population estimate for the City of Ashland was 20,700 and the estimate for Jackson County was 216,900.

The City of Ashland's population has increased slightly since the 2000 Census. Annual population growth over the last 25 years has been modest, averaging just below 0.5 percent, compared to statewide average growth that is typically just above 1 percent per year. Jackson County grew at a rate nearly double that of the City of Ashland, averaging just above 1 percent since 2000. Recent historic population data and average growth rates for the City of Ashland, Jackson County, and Oregon are summarized in **Table 3-4.**

[2] Portland State University Population Research Center (July 1, 2017); Estimates 1990, 2000, 2010 U.S. Census

TABLE 3-4: HISTORIC POPULATION DATA

Year	Jackson County	City of Ashland (Incorporated Area)	City Share (%) of Jackson County	Oregon
1990[1]	146,389	16,252	11.1%	2,842,321
2000[1]	181,269	19,610	10.8%	3,421,399
2010[1]	203,206	20,078	9.9%	3,831,074
2017[2]	216,900	20,700	9.5%	4,141,100
Average Annual Rates (AAR) of Growth (%)				
Year	**Jackson County**	**City of Ashland (Incorporated Area)**		**Oregon**
1990-2000	2.16%	1.90%		1.87%
2000-2010	1.14%	0.24%		1.14%
2000-2017	1.06%	0.32%		1.13%
2010-2017	0.94%	0.44%		1.11%

Sources:
1. U.S. Census Data (April 1)
2. Portland State University, Certified Population Estimate (July 1, 2017)

POPULATION FORECASTS

Population Research Center – Portland State University

The Oregon legislature recently assigned development of coordinated population forecasts for Oregon counties and cities to the Population Research Center at Portland State University (PRC-PSU). Previously, long-term population forecasts were prepared by the Oregon Office of Economic Analysis (OEA) to support local and statewide planning. The current PRC forecast for Jackson County was published in June 2015.[3]

The current PRC forecast provides a fifty-year projection (2065), with one intermediate projection (2035). The 2035 projection approximates the end of the current airport master plan planning period (2017-2037) and provides relevant information about future population expectations for the City of Ashland Urban Growth Boundary (UGB) and Jackson County. The PRC forecast projects modest, sustained population growth for the Ashland UGB and more rapid growth for Jackson County through 2065. The PRC forecasts indicate that Ashland's share of Jackson County population will decrease slightly during this period, while still experiencing growth. The PRC population forecasts are summarized below and in **Table 3-5**.

[3] Coordinated Population Forecast 2015 through 2065 Jackson County Urban Growth Boundaries (UGB), and Area of outside UGBs. Population Research Center Portland State University, June 2015.

City of Ashland

Ashland's population is projected to increase from 20,905 in 2015 to 24,138 in 2065. The forecast reflects a 15 percent increase in population over the next fifty years, with an average annual growth rate of approximately 0.3 percent. Slightly higher annual growth (0.5% AAR) is anticipated through the first thirty years (between 2015 and 2035), followed by slower growth (0.1%) over the latter twenty years.

Jackson County

Jackson County's population is projected to increase from 211,275 in 2015 to 306,858 in 2065. The forecast reflects a 45 percent increase in population over the next fifty years, with an average annual growth rate of approximately 0.75 percent. As with the Ashland forecast, a slightly higher annual growth (1.0% AAR) is anticipated between 2015 and 2035, followed by slower growth (0.6% AAR) over the latter twenty years.

TABLE 3-5: POPULATION FORECASTS

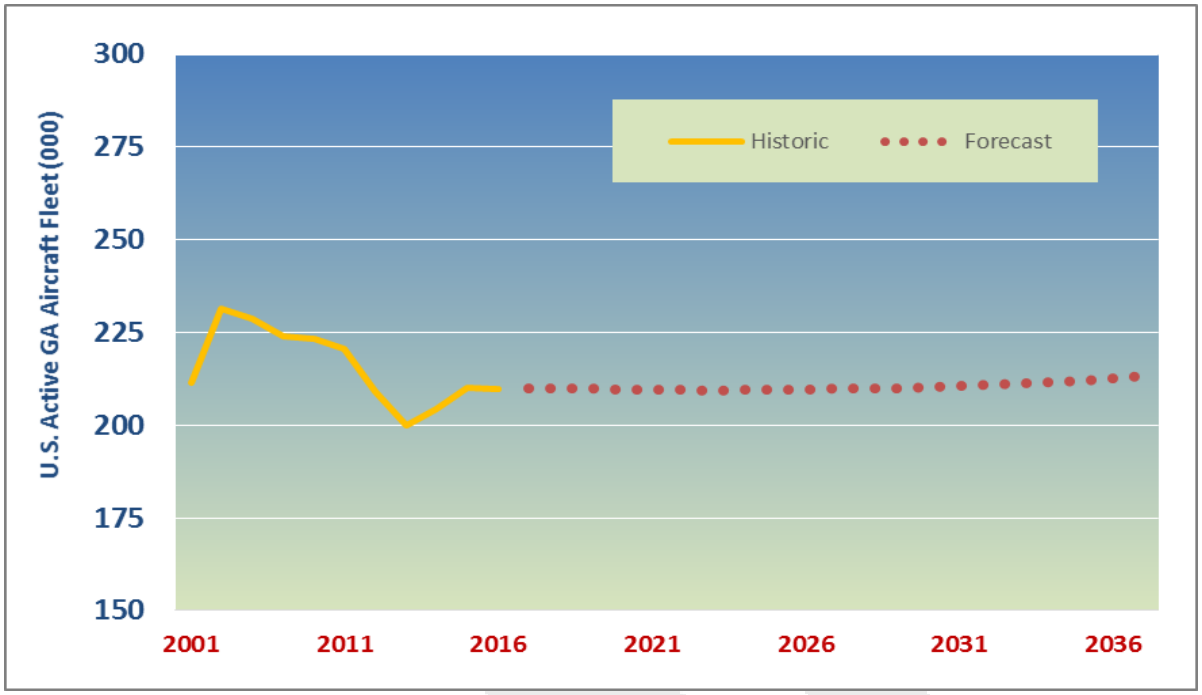
Year	Jackson County	City of Ashland (UGB)	City Share (%) of County
2015	211,275	20,905	9.9%
2035	255,840	23,183	9.1%
2065	306,858	24,138	7.9%
Annual Average Growth Rate (AAR %)			
2015-2065	0.75%	0.3%	--
2015-2035	1.0%	0.5%	--
2035-2065	0.6%	0.1%	--

National General Aviation Activity Trends

The early years of the 21st Century have presented numerous challenges for general aviation (GA). On a national level, most measures of GA activity declined sharply during "The Great Recession" and have only modestly improved in recent years.

As depicted in **Figure 3-2**, the active U.S. GA fleet has fluctuated within a slight overall decline since 2001. This trend coincides with other GA industry trends including annual aviation fuel consumption, hours flown, IFR enroute air traffic, operations at towered airports, active pilots, etc.

FIGURE 3-2: US ACTIVE GENERAL AVIATION FLEET



The FAA performs an annual assessment of U.S. civil aviation through its FAA Aerospace Forecast.[4] The twenty-year forecasts are updated annually by evaluating recent events and established trends affecting a wide range of commercial and general aviation segments. Broad economic conditions and current forecasts are examined in order to provide reasonable expectations for aviation within the broader U.S. and global economy. The FAA forecasts examine in detail several key aviation industry indicators including fuel prices, production and supply; aircraft manufacturing trends; aircraft ownership trends; fleet and pilot attrition; flight training trends; advances in fuel, engine, avionics, and airspace technology (ADS-B NextGen, etc.); and on-demand air travel. This array of factors is reflected in the FAA's overall assessment of future U.S. aviation activity.

The FAA currently predicts that the active GA aircraft fleet will grow at an average annual rate of approximately 0.1 percent between 2016 and 2037. Although the FAA maintains a modestly favorable long-term outlook for general aviation, many of the activity segments associated with piston engine aircraft and AVGAS consumption are not projected to return to "pre-recession" levels within the 20-year forecast. It should be noted however, that the FAA forecasts do include some bright spots for specific activity segments that are relevant to Ashland Municipal Airport. Key takeaways from the FAA 2017-2037 Aerospace Forecast Highlights are summarized below:

[4] FAA Aerospace Forecast Fiscal Years 2017-2037.

Positive

- Turbine aircraft (turboprop, turbojet, helicopter) fleet and hours flown will grow;
- Sport and Experimental aircraft fleet and hours flown will grow;
- Piston Rotorcraft fleet and hours flown will grow;
- Jet fuel consumption will grow;
- Student, Sport, Airline Transport, Rotorcraft, and Instrument rated pilots will grow;
- GA enroute IFR air traffic will grow; and
- GA Operations at towered airports will grow.

Negative

- Fixed wing Piston aircraft fleet and hours flown will shrink;
- AVGAS consumption will shrink; and
- The number of Private and Commercial pilots will shrink.

Neutral

- Overall GA fleet will grow by less than 2% over the next 20 years.

The FAA's annual growth assumptions for individual general aviation activity segments are summarized in **Table 3-6.**

TABLE 3-6: FAA LONG RANGE FORECAST ASSUMPTIONS (U.S. GENERAL AVIATION)

Activity Component	Forecast Annual Average Growth Rate (2016-2037)
Aircraft in U.S. Fleet	
Single Engine Piston Aircraft in U.S. Fleet	-0.9%
Multi-Engine Piston Aircraft in U.S. Fleet	-0.5%
Turboprop Aircraft in U.S. Fleet	1.4%
Turbojet Aircraft in U.S. Fleet	2.3%
Experimental Aircraft in U.S. Fleet	1.0%
Sport Aircraft in U.S. Fleet	4.1%
Piston Helicopters in U.S. Fleet	1.3%
Turbine Helicopters in U.S. Fleet	1.8%
Active GA Fleet (# of Aircraft)	0.1%
Active Pilots in U.S.	
Private Pilots	-0.7%
Commercial Pilots	-0.6%
Airline Transport Pilots	0.5%
Instrument Rated Pilots	0.3%
Sport Pilots	4.1%
Student Pilots (Indicator of flight training activity)	0.4%
Active GA Pilots (All Ratings)	0.1%
Hours Flown in U.S.	
Piston AC	-0.8%
Turbine AC	2.5%
Experimental AC	2.0%
Sport AC	4.6%
Total GA Fleet Hours	0.9%
Fuel Consumption in U.S.	
AVGAS (Gallons consumed - GA only)	-0.4%
Jet Fuel (Gallons consumed – GA only)	1.9%
Source: FAA Long Range Aerospace Forecasts (FY 2016-2037)	

Overview of Recent Local Events

AVIATION FUELING ACTIVITY

Historic fuel sale volumes often provide an indication of airport activity trends over time. The Fixed Base Operator (FBO) at Ashland Municipal Airport provides self-service 100 low lead (100LL) aviation gasoline (AVGAS) and Jet-A. A review of historic FBO fueling records for 2013 to 2017 shows relatively stable consumption of 100LL with mostly minor annual fluctuations. Jet fuel volumes experienced significantly more fluctuation, although over the five-year period jet accounted for approximately 11 percent of total FBO aviation fuel sales volume. The data indicate that no clear upward or downward trend is identified for aviation gasoline or jet fuel sales at Ashland Municipal Airport in the most recent five years. The historic FBO fueling data for Ashland Municipal Airport are summarized in Table 3-7.

It is noted that one airport tenant (Brim Aviation) self-fuels their turbine aircraft from private mobile storage and dispensing facilities. Brim reports 29,547 gallons of on-airport jet fuel usage in 2016. Brim's jet fuel activity alone accounted for approximately 55 percent of total airport fueling activity (FBO and tenant) at Ashland Municipal Airport in 2016. Brim purchases 100LL from the FBO for their piston aircraft.

TABLE 3-7: S03 - AIRCRAFT FUELING ACTIVITY

Year	100LL (Gallons)	Net Change % Year to Year	Jet-A (Gallons)	Net Change % Year to Year	Combined (Gallons)	Net Change % Year to Year
2013	28,000	-	2,971	-	30,971	-
2014	27,013	-3.5%	5,678	+91.1%	32,691	+6.4%
2015	22,370	-17.2%	2,086	-63.3%	24,456	-25.2%
2016	22,372	+0.1%	1,631	-21.8%	24,003	-1.9%
2017	24,257	+8.4%	3,426	+100.6%	27,683	+15.3%
5-Year Average	24,802 *(2013-2017 Mean)*	*-3.07% (Average Annual Fluctuation)*	3,158 *(2013-2017 Mean)*	*+26.65% (Average Annual Fluctuation)*	27,961 *(2013-2017 Mean)*	*+1.35% (Average Annual Fluctuation)*

HANGAR CONSTRUCTION

A review of current aerial photography and the most recent Airport Layout Plan drawing (October 2005) indicates that one new 14-unit T-hangar (building 437) and one small conventional hangar (building 399) have been constructed at Ashland Municipal Airport since late 2004.

CHANGES IN BASED AIRCRAFT FLEET

The fall 2017 airport management count (74 based aircraft) at Ashland Municipal Airport is summarized in **Table 3-8**. The current mix of aircraft is predominantly single-engine piston, light sport/experimental aircraft and helicopters. The airport also has three multi-engine aircraft including two light piston twins and one business jet.

TABLE 3-8: 2017 BASED AIRCRAFT – S03

Aircraft Type	2017
Single Engine Piston	64
Multi-Engine Piston	2
Turboprop	0
Business Jet	1
Helicopter	5
LSA/Experimental	2
Total Based Aircraft	74
Source: Airport Management Count (12/2017); data being updated in FAA www.basedaircraft.com database.	

The current based aircraft count is 15 aircraft below the 2004 count of 89 cited in the 2005 Airport Layout Plan Report forecasts. At first glance, this would suggest a significant decline in airport activity has occurred during this 12-year period. However, several airport-specific factors suggest that the earlier count may have been overestimated. The source for the 2004-05 based aircraft estimate was the FAA Terminal Area Forecast (TAF) and FAA Airport Master Record (Form 5010). No independent verification was available at the time and the FAA data was accepted for use. TAF and 5010 data are not regularly verified by FAA and often contain significant deviations from locally-validated counts.

FAA efforts to improve the accuracy of based aircraft data have resulted in the development of an airport-specific based aircraft database (www.basedaircraft.com). The database recognizes duplicate entries (aircraft counted by more than one airport), inactive aircraft (without current registration), and requires annual updates of based aircraft records by airport sponsors, all of which contribute to improved accuracy of based aircraft counts over previous estimating methods.

A 2004 aerial photo (Figure 2-2) in the 2005 Airport Layout Plan Report depicts existing buildings and parked aircraft in the terminal area. Approximately 46 "hangar units" in 16 separate structures are identified in the figure. A total of 24 aircraft are identified parked on the aircraft apron. Although some variations in counts would be expected, the combination of hangar units and observed parked aircraft is more than 20 percent below the 2004 estimate of 89 based aircraft for the airport. Although not a definitive analysis, this suggests two important points: 1) The 2004 estimate of 89 based aircraft may not provide a

reliable baseline to measure recent trends in based aircraft; and 2) the based aircraft fleet at Ashland Municipal Airport may have actually experienced slight growth or remained stable in recent years, rather than experiencing the significant decline suggested by the two data points.

At a minimum, the uncertainty surrounding the based aircraft data limits the ability to draw firm conclusions about recent historic trends beyond what can be quantified through recent hangar construction.

INSTRUMENT FLIGHT ACTIVITY

The FAA tracks flight activity data using the Traffic Flow Management System Counts (TFMSC) for aircraft operating under instrument flight rules (IFR) in the national airspace system. The data captures all civil aircraft filing instrument flight plans with the originating and the destination airport. Aircraft may cancel IFR flight plans enroute, so not every flight plan actually results in an instrument operation. As noted in the Inventory chapter, Ashland Municipal Airport does not have a published instrument approach procedure, which limits its instrument activity.

Instrument flight plan data for Ashland Municipal Airport was obtained and analyzed for 2012-2016 to assist in evaluating overall air traffic. The 2012-2016 data are summarized in **Table 3-9** by Airport Reference Code (ARC). 2017 activity is summarized by ARC and aircraft type in **Table 3-10**. The mix of air traffic includes single-engine and multi-engine piston aircraft, business jets and turboprops. A portion of the turboprop activity was attributed to air cargo/express aircraft diverted from Medford.

TABLE 3-9: INSTRUMENT ACTIVITY (2012-2016)

ARC	2012	2013	2014	2015	2016
A-I	231	351	406	304	213
A-II	30	19	8	12	8
B-I	29	98	96	68	76
B-II	14	26	75	98	76
C-I	0	0	0	0	0
C-II	0	0	0	0	0
D-I	0	0	0	0	0
D-II	0	0	0	0	0
HELI	0	0	0	0	0
UNKNOWN	0	0	0	0	0
	304	**494**	**585**	**482**	**373**

Source: FAA TFMSC Data (normalized)

TABLE 3-10: INSTRUMENT ACTIVITY DETAIL – S03 (2017)

Aircraft Type	ARC	2017
Single Engine Piston	A-I	280
Multi-Engine Piston	B-I	32
Single Engine Turboprop	A-II	22
Multi-Engine Turboprop	B-I /B-II	34
Business Jet	B-I / B-II	40
Helicopter	--	4
Total Aircraft Operations Related to Instrument Flight Plans		**412**

Existing Aviation Activity Forecasts

Updating aviation activity forecasts for the master plan requires an updated assessment of current conditions and a review of existing aviation activity forecasts. Several existing forecasts relevant to Ashland Municipal Airport are available for review, including the 2005 Airport Layout Plan Report, the 2007 Oregon Aviation Plan (OAP), and the 2018 FAA Terminal Area Forecast (TAF). **Table 3-11** summarizes the based aircraft and operations forecasts currently available for Ashland Municipal Airport.

Estimating annual aircraft operations is particularly challenging at non-towered airports. With few exceptions, aircraft operations data are estimates, and the associated forecasts are heavily dependent on the accuracy of the estimates. It is common practice for state aviation system plans, and some airport master plans to rely on the FAA TAF as the single definitive operations estimate for non-towered airports. However, a study of TAF operations data for individual airports often reveals significant data events that do not appear to relate to the airport itself, and cannot be independently verified. The resulting uncertainty should be considered when gauging the reliability of any related forecasts.

It is important to note that aviation activity forecasts prepared prior to "The Great Recession," that began in Q4 of 2007, became largely obsolete due to the effects of the severe economic downturn. General aviation airports routinely saw sustained, double-digit declines in annual activity during the recession that was characterized by closed businesses, reduced fuel sales, loss of based aircraft, increased hangar vacancy rates, lower aircraft utilization, and a dearth of new hangar construction. In general, the recovery of airport activity segments has been slower than their preceding declines. None of these conditions were anticipated in forecasts prepared prior to the recession, and as a result, pre-recession forecasts tend to significantly overestimate activity compared to actual events.

It is also important to note that all of the forecasts generated for Ashland Municipal Airport in the 2004-2005 time period (TAF, OAP and ALP Report) shared a common TAF based aircraft estimate that appears to have inadvertently overstated existing activity and skewed aircraft operations forecasts upward. The TAF based aircraft forecast was adjusted downward (-22 aircraft) in 2008, and again periodically between 2008 and 2016 (-15 aircraft), but the current TAF still does not closely match current airport management counts. There is no evidence that the recent TAF adjustments reflected specific conditions on the airport. It is recommended that the FAA reconcile the TAF with the updated data provided in the www.basedaircraft.com database.

TABLE 3-11: EXISTING BASED AIRCRAFT & GA OPERATIONS FORECASTS

Forecast	2017	2022	2027	2032	2037	AAR
2018 FAA Terminal Area Forecast (TAF) Operations	26,357	27,887	29,431	31,050	32,757	1.10%[1]
2018 FAA Terminal Area Forecast (TAF) Based Aircraft	59	65	70	75	80	1.54%[1]
Operations Per Based Aircraft (OPBA)	447	429	420	414	410	-
2007 Oregon Aviation Plan Annual Operations	24,584[4]	25,943[4]	27,376[5]	-	-	1.24%[2]
2007 Oregon Aviation Plan Based Aircraft	105[4]	111[4]	118[5]	-	-	1.27%[2]
Operations Per Based Aircraft (OPBA)	234	234	232	-	-	-
2005 Airport Layout Plan Report Annual Operations	26,730[4]	28,607[4]	30,563[5]	-	-	1.72%[3]
2005 Airport Layout Plan Report Based Aircraft	114[4]	123[4]	131[5]	-	-	1.71%[3]
Operations Per Based Aircraft (OPBA)	235	233	233	-	-	-

1. AAR: annual average rate of growth (2016-2037)
2. AAR: annual average rate of growth (2005-2025)
3. AAR: annual average rate of growth (2004-2024)
4. Interpolation of original forecast to fit current forecast year
5. Extrapolation of original forecast to fit current forecast year

ASHLAND MUNICIPAL AIRPORT – AIRPORT LAYOUT PLAN REPORT (2005)

Assessment: The forecasts of based aircraft are skewed upward by the high base year estimate and pre-recession assumptions about future growth. As a result, the based aircraft forecast is approximately 58 percent above the most recent airport management count. The aircraft operations utilized a relatively modest operations ratio, which provided reasonable projections of activity.

The Airport Layout Plan Report provides airport activity forecasts for a 2004-2024 planning period. The forecasts include based aircraft, based aircraft fleet mix, annual aircraft operations, activity peaking, and local/itinerant traffic distributions. The analysis of critical aircraft was developed in the facility requirements element of the master plan, using overall numbers contained in the forecast.

Based Aircraft

The based aircraft forecast projected an increase from 89 to 125 at Ashland Municipal Airport between 2004 and 2024, which translates into an annual average growth rate of **1.71 percent** over the twenty-year period. The forecasts for 2014 and 2019 (109 and 117) are well above the fall 2017 based aircraft count of 74, indicating that the forecast does not accurately reflect current conditions or near term future expectations.

Annual Aircraft Operations

The annual aircraft operations forecast for Ashland Municipal Airport began with a base year (2004) estimate of 20,878 annual operations and projected an increase to 29,375 in 2024, which translates into an annual average growth rate of **1.72 percent** over the twenty-year period. The annual aircraft operations forecast reflected a fixed operations to based aircraft (OPBA) ratio of 235.

FAA TERMINAL AREA FORECAST (2018-2038)

Assessment: The FAA TAF based aircraft projections for Ashland Municipal Airport are affected by a baseline that is significantly lower than current based aircraft count. This is partially mitigated over time by a strong annual growth rate (1.1%) that eventually provides based aircraft levels that exceed the current count. The validity of TAF operations data and the subsequent forecast for Ashland Municipal Airport cannot be definitively determined. However, in its current form the TAF provides a reasonable estimate of long term activity.

The FAA Terminal Area Forecast (TAF) for Ashland Municipal Airport was reviewed as one of the estimates of activity currently available for the airport. The current TAF base year is 2016, with projections extending through 2037 referenced in this analysis. This period coincides the planning horizon defined for the current airport master plan.

The current FAA Airport Master Record Form (5010-1) for Ashland Municipal Airport (effective 12 months 3/17/2015) lists 28 based aircraft and 26,050 annual aircraft operations. The 5010 based aircraft numbers do not correlate to the TAF, although the 5010 aircraft operations listing duplicates the 2015 TAF.

Based Aircraft

The TAF for Ashland Municipal Airport projects an increase from 58 (2016) to 80 based aircraft in 2037 (the end of current master planning period). This forecast translates into an annual average growth rate of **1.54 percent** over the 21-year period (2016-2037). It is noted that the 2017 TAF based aircraft total of 59 is 15 aircraft below the 2017 airport management count of 74.

Annual Aircraft Operations

The TAF for Ashland Municipal Airport projects an increase in annual aircraft operations from a base estimate of 26,050 in 2016 to 32,757 in 2037. This forecast translates into an annual average growth rate of **1.1 percent** over the period.

A review of the TAF operations forecast and the underlying historic data for Ashland Municipal Airport identifies the following:

- The 2017 TAF based aircraft forecast (59) is approximately 20 percent lower than the 2017 airport management based aircraft count (74);
- The 2016 TAF annual aircraft operations total (26,050) was maintained (unchanged) for seven consecutive years (2010-2016). The forecast for 2017 reflects the first positive growth applied to the airport since 2010; and
- Recent reductions to the TAF based aircraft numbers are noted, although there were no corresponding adjustments to the TAF aircraft operations numbers for those years.

It should be noted that despite questions about the accuracy of the TAF aircraft operations data for Ashland Municipal Airport, the annual average growth rate (1.1%) reflected in the long-term forecast for Ashland Municipal Airport is generally consistent with the FAA's overall expectations for system wide general aviation growth.

For reference, the TAF 2017 forecast (26,357 annual operations) corresponds to an operation to based aircraft ratio (OPBA) of 447, when paired with the 2017 TAF based aircraft forecast of 59. This ratio is considerably higher than previous estimates at Ashland Municipal Airport developed from acoustical aircraft operations counts.

OREGON AVIATION PLAN (2007)

Assessment: The OAP forecasts provide estimates of activity for Ashland Municipal Airport that are comparable to the range of activity defined in the FAA TAF. It is noted that the OAP forecasts relied on 2005 FAA TAF data which has since been modified. However, despite its data limitations, the OAP forecast provides a reasonable estimate of future activity to evaluate among other forecasts.

The OAP provides aviation activity forecasts for a 2005-2025 planning period. Forecasts were developed for general aviation activity (based aircraft and annual aircraft operations) individual airports and statewide.

Based Aircraft

The OAP based aircraft forecast projected an increase from 89 to 115 at Ashland Municipal Airport between 2005 and 2025, which translates into an annual average growth rate of **1.29 percent** over the twenty-year period.

Annual Aircraft Operations

The OAP forecast of annual aircraft operations at Ashland Municipal Airport projected an increase from 20,954 to 26,793 between 2005 and 2025, which reflects an average annual rate of **1.24 percent** over the twenty-year period.

Updated Aviation Activity Forecasts

BASED AIRCRAFT

Four new based aircraft forecasts were developed for Ashland Municipal Airport, for comparison with the existing forecasts described earlier. Three of the forecasts are based on Ashland Municipal Airport's market share within the FAA's seven state Northwest-Mountain Region,[5] utilizing the FAA's current long-term based aircraft forecast for the region.[6] The fourth forecast applies the Oregon Aviation Plan (OAP) 2005-2025 forecast growth rate assigned to Ashland Municipal Airport to the updated (2017) based aircraft count for Ashland Municipal Airport.

A review of historic local and regional population and based aircraft activity at Ashland Municipal Airport did not identify any statistical correlations that supported using population as the basis for estimating future based aircraft activity at Ashland Municipal Airport. As a result, no population-based projections of airport demand were developed. Despite the absence of a statistical correlation and a measurable cause and effect, it is important to emphasize that population growth is generally recognized as one of many factors needed to contribute to growth in airport activity.

FAA NORTHWEST-MOUNTAIN REGION (ANM) MARKET SHARE

A regional market share analysis was conducted that evaluated Ashland Municipal Airport's based aircraft fleet as part of the FAA's Northwest-Mountain Region (ANM). In 2017, the FAA estimated total based aircraft in the region at 22,720. The 2017 Ashland Municipal Airport based aircraft total of 74 aircraft

[5] ANM – FAA Northwest Mountain Region (WA, OR, ID, MT, WY, UT, CO)

[6] Terminal Area Forecast Summary Fiscal Years 2016-2045

reported to FAA through the www.basedaircraft.com database accounted for approximately 0.325 percent[7] of the regional market in 2017.

Projections were developed that maintain, increase, and decrease Ashland Municipal Airport's current market share based on the FAA's regional Terminal Area Forecast. The market share based aircraft forecasts are summarized in **Table 3-12** and depicted on **Figure 3-3**, following this section.

The FAA projects the based aircraft fleet in the Northwest-Mountain Region to grow at an average annual rate of 0.93 percent between 2015 and 2045. This rate exceeds the growth rate projected for five of the nine FAA regions and it is well above the annual projected growth for the nation (0.63 percent). The overall takeaway is that although the forecast rate of growth is modest, our region is expected to be among the strongest in the nation for general aviation based aircraft fleet growth over the next thirty years.

The **Decreasing ANM Market Share** forecast gradually reduces Ashland Municipal Airport's share of the ANM region by approximately 10 percent over the twenty year planning period. In this projection, the current market share percentage declines from 0.325 to 0.294 over the next twenty years. Despite the slight decline in market share, the projection results in an increase from 74 to 80 based aircraft (+6) by 2037, which represents **0.39 percent** average annual growth.

This projection assumes that Ashland Municipal Airport's based aircraft fleet will grow at a slightly slower pace than the overall region. However, the region's overall growth in its based aircraft fleet offsets the slight decline in market share. Ashland Municipal Airport, like other airports is expected to lose existing aircraft through fleet attrition, retiring pilots, etc. The forecast represents the overall net change in activity.

The **Maintain ANM Market Share** forecast maintains Ashland Municipal Airport's share of the ANM region at current levels (0.325 percent). The projection results in an increase from 74 to 89 based aircraft (+15) by 2037, which represents an average annual growth rate of **0.93 percent**. This projection assumes that Ashland Municipal Airport's growth in based aircraft will mirror the regional average over the next twenty years. This projection also represents a net increase in based aircraft above current levels, which includes loss of existing aircraft through attrition.

The **Increasing ANM Market Share** forecast gradually increases Ashland Municipal Airport's share of the ANM region by approximately 10 percent over the twenty year planning period. In this projection, the current market share percentage increases from 0.325 to 0.358 over the next twenty years. The projection results in an increase from 74 to 98 based aircraft (+24) by 2037, which represents an average annual growth rate of **1.41 percent**. This projection assumes that Ashland Municipal Airport's growth in based aircraft will slightly outpace regional growth over the next twenty years. This projection also represents a net increase in based aircraft above current levels, including fleet attrition.

[7] Ashland Municipal Airport 2017 Share of ANM Market

TABLE 3-12: MARKET SHARE BASED AIRCRAFT FORECAST

Year	Based Aircraft	NW Mtn. Region (ANM) Based Aircraft[1]	% of ANM Based Aircraft
Forecast – Decreasing Share (0.39% AAR) [2]			
2017	74	22,720	0.326%
2022	76	23,896	0.318%
2027	78	25,046	0.310%
2032	79	26,174	0.302%
2037	80	27,359	0.294%
Forecast – Maintain Share (0.93% AAR) [2]			
2017	74	22,720	0.326%
2022	78	23,896	0.326%
2027	82	25,046	0.326%
2032	85	26,174	0.326%
2037	89	27,359	0.326%
Forecast – Increasing Share (1.41% AAR) [2]			
2017	74	22,720	0.326%
2022	80	23,896	0.334%
2027	86	25,046	0.342%
2032	92	26,174	0.350%
2037	98	27,359	0.358%

1. FAA Terminal Area Forecasts FY 2016-2045
2. AAR: annual average rate of growth (2017-2037)

OAP GROWTH RATE APPLIED TO UPDATED BAC

This forecast was developed by applying the 2007 OAP forecast growth rate for Ashland Municipal Airport to the Airport's current based aircraft count. The 2007 OAP forecast projected based aircraft at Ashland Municipal Airport to grow at an annual rate of 1.29 percent between 2005 and 2025. Despite the intervening recession, which likely slowed both local and statewide based aircraft growth, the underlying growth rate of the OAP forecast remains consistent with the FAA's current long term expectations for general aviation.

The projection results in an increase from 74 to 96 based aircraft (+22) by 2037, which represents an average annual growth rate of **1.31 percent**. The OAP growth rate forecast is summarized in **Table 3-12** and depicted on **Figure 3-3**, following this section.

Summary (Recommended Based Aircraft Forecast)

The **Maintain ANM Market Share** forecast is recommended as the preferred based aircraft forecast for use in the airport master plan. This projection assumes that Ashland Municipal Airport will be able sustain growth in its based aircraft fleet that is in line with the FAA's anticipated growth in the Northwest-Mountain region. The selected forecast results in a net increase of 15 based aircraft over the twenty-year

planning period (2017-2037), which reflects an average annual growth of **0.93 percent.** The recommended based aircraft forecast is summarized in **Table 3-13** and depicted on **Figure 3-3.**

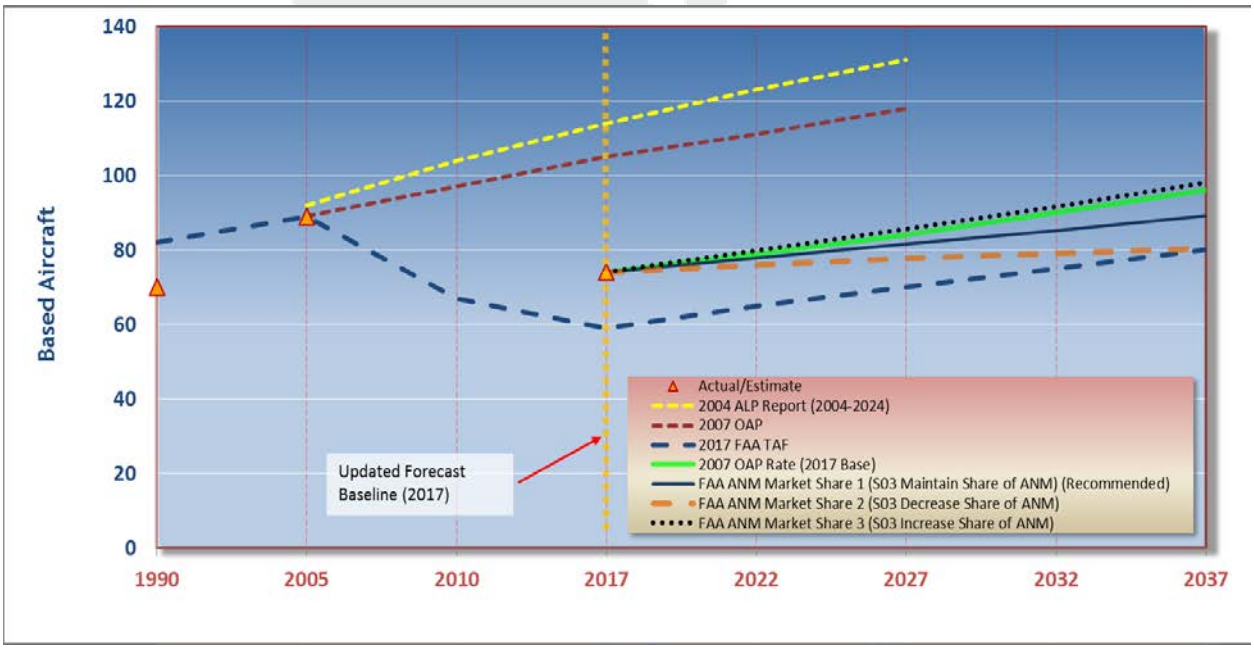
TABLE 3-13: BASED AIRCRAFT FORECAST SUMMARY

Projection	2017	2022	2027	2032	2037	AAR
2005 ALP Forecast	114	123	131	-	-	1.71%[1]
2007 OAP Forecast (Unadjusted)	105	111	118	-	-	1.29%[2]
2017 FAA Terminal Area Forecast (TAF)	59	65	70	75	80	1.54%[3]0
ANM Market Share 1	74	76	78	79	80	.39%[4]**0.**
ANM Market Share 2 (Recommended)	**74**	**78**	**82**	**85**	**89**	**93%[4]**
ANM Market Share 3	74	80	86	92	98	1.41%[4]
2007 OAP Growth Rate : 2017 BAC	74	79	84	90	96	1.31%[4]
Selected Forecast	74	78	82	85	89	0.93%[4]

1. AAR: annual average rate of growth (2004-2024)
2. AAR: annual average rate of growth (2005-2025)
3. AAR: annual average rate of growth (2016-2037)
4. AAR: annual average rate of growth (2017-2037)

The primary purpose of the based aircraft forecast is to define future related facility needs, particularly aircraft storage (aircraft parking and hangar space). The use of development reserves is recommended for planning activity-dependent facility needs as a way to compensate for the uncertainty associated with long term forecasts. A development reserve equal to 100 percent of projected net increase in based aircraft will be adequate to absorb any significant, unanticipated increases in landside facilities demand well into the planning period.

FIGURE 3-3: BASED AIRCRAFT FORECASTS



Based Aircraft Fleet Mix

The airport's current mix of based aircraft consists of single-engine and multi-engine piston aircraft, multi-engine turbine aircraft, and helicopters. **Table 3-14** summarizes the forecast based aircraft fleet mix for the planning period. **Figures 3-4** and **3-5** depict the current (2017) and long-term (2037) distribution of based aircraft by type. The based aircraft fleet mix during the planning period is expected to become slightly more diverse to include light sport aircraft, additional turbine aircraft, and helicopters.

TABLE 3-14: FORECAST BASED AIRCRAFT FLEET MIX

Aircraft Type	2017	2022	2027	2032	2037
Single Engine Piston	64	65	66	67	65
Multi-Engine Piston	2	3	3	3	2
Turboprop	0	1	1	2	5
Business Jet	1	1	1	1	2
Helicopter	5	5	6	6	7
LSA/Experimental	2	3	5	6	8
Total Based Aircraft	74	78	82	85	89

FIGURE 3-4: BASED AIRCRAFT FLEET MIX (2017)

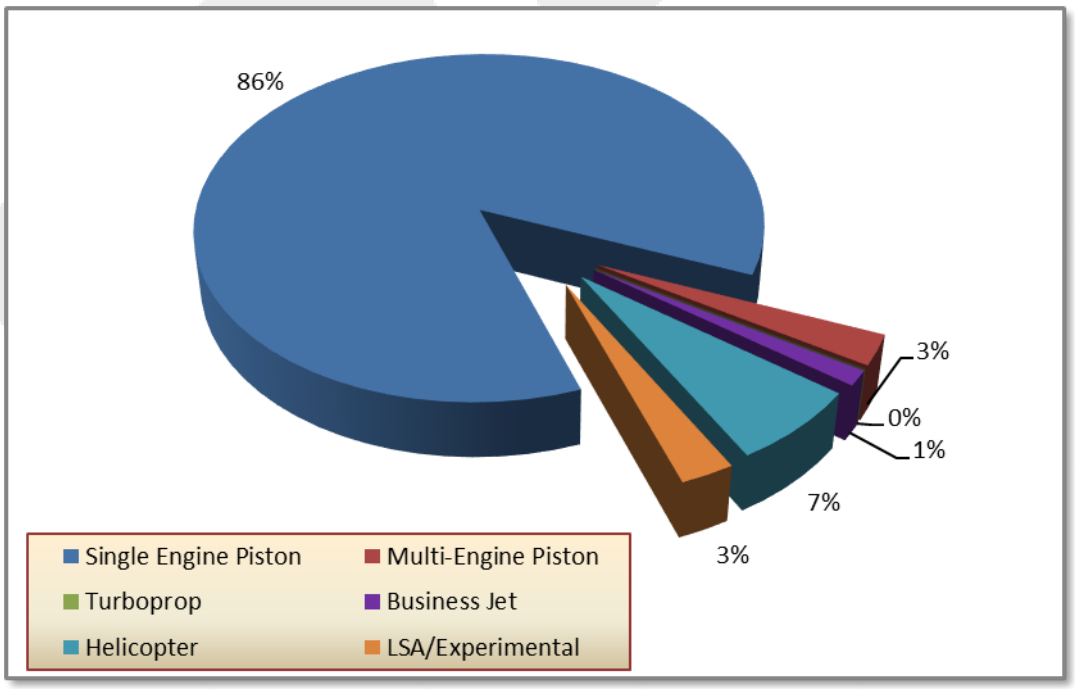
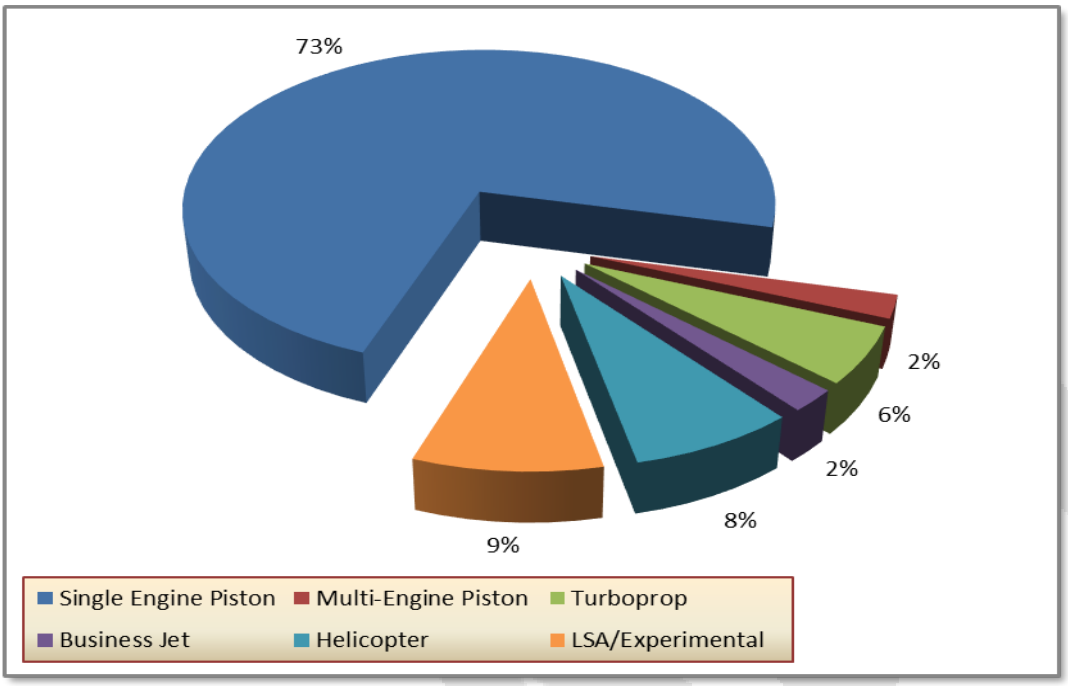


FIGURE 3-5: FORECAST BASED AIRCRAFT FLEET MIX (2037)



Aircraft Operations

As a non-towered airport, overall operational data (total number of takeoffs and landings) for Ashland Municipal Airport is limited to estimates. Due to limited data, defining current operations levels, and therefore future activity, presents a significant challenge.

As noted earlier, several operations estimates and forecasts exist for Ashland Municipal Airport. However, most of these appear to be dependent on a single source (FAA TAF). The 2016 FAA TAF for Ashland Municipal Airport lists 26,050 operations and 58 based aircraft, which results in an operations per based aircraft (OPBA) ratio of 449. The current Airport Master Record Form (5010-1) utilizes exactly the same operations estimate, but lists only 28 based aircraft. As noted earlier, the December 2017 airport management count is 74 based aircraft.

Several methods were used to develop forecasts of current and future aircraft operations at KLS. The new forecasts are compared to the existing operations forecasts described earlier in the chapter.

Three new forecasts were prepared for the master plan. The new forecasts are compared to the existing FAA TAF, OAP, and the 2004 Airport Layout Plan forecasts presented earlier. One forecast was developed by using a mathematical regression model developed for FAA that incorporates several airport-specific and regional inputs to generate a baseline operations estimate. Future year forecasts were then developed using

fixed growth in population and other inputs defined in the model. Two additional forecasts were developed using operations per based aircraft (OPBA) formulas recognized by FAA for estimating activity at general aviation airports.

The forecasts are summarized in **Table 3-15** and depicted on **Figure 3-6**.

2018 FORECAST – FAA NPIAS FORMULA

FAA Order 5090.3C. Field Formulation of the National Plan of Integrated Airport Systems, suggests a forecast methodology for non-towered airports that relies on a general formula for estimating operations by utilizing an activity ratio that is applied to current and forecast based aircraft. The Order 5090.3C identifies a typical range of 250 to 450 operations per based aircraft (OPBA) for different types of general aviation airports. The FAA recognizes that these ratios approximate activity, and that individual airports may vary.

The projection **(NPIAS 1)** uses a fixed OPBA of 350, which is applied to the recommended based aircraft forecast at Ashland Municipal Airport. The OPBA is within the FAA's range for general aviation airports with moderate levels of itinerant traffic. This assumption is consistent with Ashland Municipal Airport's ability to attract business aviation and general aviation activity within the region and the Airport's functional role (Category III - Regional General Aviation) defined in the current Oregon Aviation Plan (OAP).

The formula establishes base year (2017) activity at 25,900 annual operations (74 BAC x 350 OPBA) and projects general aviation operations to increase from 25,900 to 31,188 by 2037, which reflects an average annual growth rate of **0.93 percent.**

2018 FORECAST – HISTORIC AIRPORT ACTIVITY RATIO (MODIFIED)

This projection utilizes an OPBA that was defined through the series of seven acoustical activity counts conducted at the airport by the Oregon Department of Aviation (ODA) between 1981 and 2003.

The OPBAs for the acoustical count years were calculated with FAA TAF based aircraft data. The average (mean) OPBA for the seven years of activity counts at Ashland Municipal Airport was 218 (range: 187-291). The assumed overestimates of TAF based aircraft described earlier would have artificially skewed any dependent OPBA ratios downward.

The accuracy of the TAF historic based aircraft data for Ashland Municipal Airport during this period cannot be fully assessed. However, the FAA's incremental reduction of the TAF based aircraft for Ashland Municipal Airport between 2006 and 2015 (from 92 to 55) is consistent in theme, although the changes did not correspond to any known updated activity assessments and now appear to underestimate based aircraft on a scale similar to the earlier overestimates.

The most recent acoustical activity count conducted at Ashland Municipal Airport was in 2003 (20,878 annual operations). With 89 based aircraft listed for 2003 (TAF), the corresponding OPBA is 234. However, as noted earlier in the chapter, Ashland's actual based aircraft totals at that time may have been closer to 70, which would have yielded an OPBA of 298 from 20,878 operations.

Based on the factors noted above, the projection was developed using a fixed OPBA of 300, which is applied to the recommended based aircraft forecast at Ashland Municipal Airport. This captures locally-based and transient activity, including approximately 2,000 annual operations estimated by a single on-airport tenant (Brim Aviation). The projection correlates reasonably well to the historic activity counts conducted at the airport, with an adjustment to account for based aircraft levels. The OPBA is within the FAA's range for general aviation airports with moderate levels of itinerant traffic.

The formula establishes base year (2017) activity at 22,200 annual operations (74 BAC x 300 OPBA) and projects general aviation operations to increase from 22,200 to 26,732 by 2037, which reflects an average annual growth rate of **0.93 percent**. The growth rate is the same as the other OBPA forecast since both utilized fixed OPBA ratios that are applied to the recommended based aircraft forecast.

2018 FORECAST – FAA REGRESSION MODEL FOR ESTIMATING AIRCRAFT OPERATIONS AT NON-TOWERED AIRPORTS

This forecast uses a statistical regression model approved by the FAA to estimate operations at non-towered airports. The report, entitled Model for Estimating General Aviation Operations at Non-Towered Airports Using Towered and Non-Towered Airport Data (GRA, Inc., 2001) presents the methodology and formula for the model. Several independent variables are used in the model, including airport characteristics, demographics, and geographic features. The model was created by using a combined data set for small towered and non-towered general aviation airports with the addition of a dummy variable to distinguish the two airport types. The following variables are included in the model:

- Based Aircraft (at the subject airport);
- Percent of aircraft based at the airport among general aviation airports within 100 miles;
- Number of FAR Part 141 flight training schools at the airport;
- Population within 100 miles; and
- Ratio of population within 25 miles and 100 miles.

The model is designed to consider a variety of elements that directly and indirectly affect airport activity. This forecast uses the current year analysis of the model to estimate annual aircraft operations. The accompanying forecast of operations is developed from the based aircraft forecast and reflects several key assumptions: 1 percent annual population growth; no changes in the number of FAR Part 141 flight schools at the airport; and no change in the number of airports located in the 100 mile radius surrounding the airport. The worksheets for the regression analysis are provided in **Appendix C**, at the end of the master plan report.

The regression model developed for Ashland Municipal Airport produced 21,000 aircraft operations for 2017. The associated forecast increases annual aircraft operations to 24,400 by 2037, which reflects an average annual growth rate of 0.75 percent between 2017 and 2037.

Summary (Aircraft Operations Forecast)

The FAA TAF, three new forecasts, and an additional median projection for Ashland Municipal Airport are summarized in **Table 3-15** and depicted in **Figure 3-6**.

Based on the wide range of activity that can be estimated at Ashland Municipal Airport through a variety of accepted methods, it is recommended that a median forecast of aircraft operations be defined from the range of current and updated forecasts developed for this chapter.

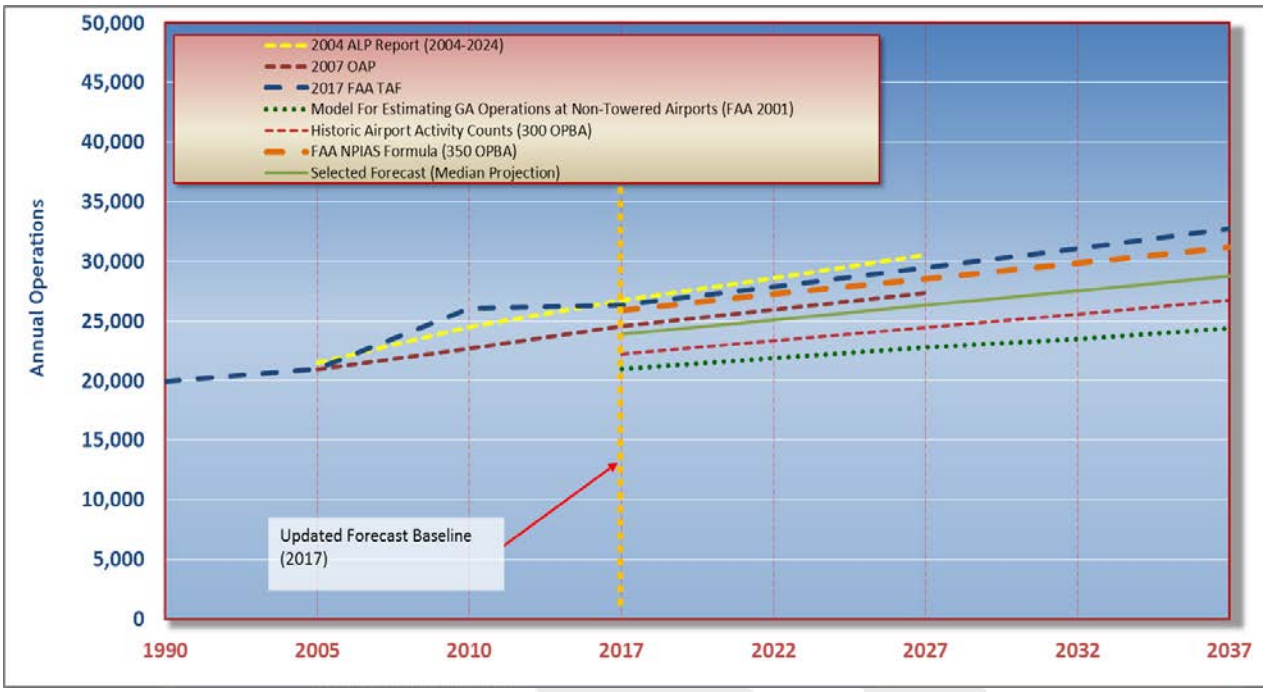
The recommended forecast of operations is the average (median) of the four new projections. For 2017, it is estimated that the airport generated approximately 23,864 operations. The selected forecast projects an increase from 23,864 to 28,769 operations by 2037, which reflects an average annual growth rate of **0.93 percent**.

TABLE 3-15: UPDATED GA AIRCRAFT OPERATIONS FORECASTS

Projection	2017	2022	2027	2032	2037
2018 FAA Terminal Area Forecast (1.10% AAR 2016-2037)	26,357	27,887	29,431	31,050	32,757
NPIAS Formula (OPBA 350) (0.93% AAR 2017-2037)	25,900	27,240	28,551	29,837	31,188
Acoustical Counts Modified (OPBA 300) (0.93% AAR 2017-2037)	22,200	23,349	24,472	25,575	26,732
FAA Non-Towered Equation[2] (0.75% AAR 2017-2037)	21,000	21,900	22,800	23,500	24,400
Selected Forecast – Median Projection (0.94% AAR 2017-2037)	**23,864**	**25,094**	**26,314**	**27,490**	**28,769**

[1] FAA Field Formulation for NPIAS,
[2] Model for Estimating General Aviation Operations at Non-Towered Airports (FAA 2001)
AAR: Average Annual Rate (Growth)

FIGURE 3-6: GENERAL AVIATION OPERATIONS FORECAST



Local and Itinerant Operations

General aviation (GA) operations consist of aircraft takeoffs and landings conducted by GA aircraft. All aircraft operations are classified as local or itinerant. **Local operations** are conducted in the vicinity of an airport and include flights that begin and end at the airport. These include aerial applicators, flight training, touch and go operations, and other flights that do not involve a landing at another airport. **Itinerant operations** include flights between airports, including cross-country flights. Itinerant operations reflect specific travel between multiple points, often associated with business and personal travel.

The aircraft operations data presented in the current FAA TAF for Ashland Municipal Airport reflects a 17/83[8] percent split between local and itinerant aircraft operations. This operational distribution was similar to the 15/85 percent split reflected in the 2005 Airport Layout Plan forecasts. It is recommended that the TAF's 17/83 percent - local/itinerant air traffic distribution be applied to forecast aircraft operations during the current planning period. The local and itinerant distribution for each forecast year is summarized in the forecast summary (**Table 3-21**), located at the end of the chapter.

[8] Airport Master Record - Itinerant operations include General Aviation and Air Taxi for 12 months ending 03/17/2015.

Aircraft Operations Fleet Mix

Single engine piston aircraft (including light sport and experimental) currently account for nearly 90 percent of airport operations, followed by helicopters, multi-engine piston, single-engine and multi-engine turboprops, and business jets. It is expected that the mix of air traffic at Ashland Municipal Airport will shift slightly during the twenty-year planning period to include more turbine aircraft (turboprops, jets, and helicopters) based on current trends in aircraft manufacturing and the composition of airport users. The growing popularity of single-engine turboprops for personal and business use is also expected to affect the operational fleet mix at Ashland Municipal Airport. Piston helicopter activity is also expected to increase for both transportation and flight training purposes. The aircraft operations fleet mix forecast is summarized in Table 3-16.

TABLE 3-16: GA AIRCRAFT OPERATIONS FLEET MIX

Aircraft Type	2017	%	2022	%	2027	%	2032	%	2037	%
Single Engine Piston*	21,084	88	21,994	88	22,924	87	23,820	87	24,569	85
Multi Engine Piston	500	2	550	2	520	<2	520	<2	550	<2
Turboprop	200	<1	250	1	350	<2	400	<2	450	<2
Jet	80	<1	100	<1	120	<1	150	<1	200	<1
Helicopter	2,000	8	2,200	8	2,400	9	2,600	9	3,000	10
Total Operations	**23,864**	**100**	**25,094**	**100**	**26,314**	**100**	**27,490**	**100**	**28,769**	**100**

*Includes Sport and LSA
Note: Percentages may not sum due to independent rounding

Critical Aircraft (FAA Planning Guidance)

As noted earlier, the selection of design standards for airfield facilities is based upon the characteristics of the aircraft that are expected to use the airport. This aircraft or aircraft type is designated as the "critical aircraft." The FAA provides the following definitions:

"The critical aircraft is the most demanding aircraft type, or grouping of aircraft with similar characteristics, that make regular use of the airport. Regular use is 500 annual operations, including both itinerant and local operations, but excluding touch-and-go operations. An operation is either a takeoff or landing." [9]

The FAA group aircraft into five categories (A-E) based upon their approach speeds. Aircraft Approach Categories A and B include small propeller aircraft, many small or medium business jet aircraft, and some larger aircraft with approach speeds of less than 121 knots (nautical miles per hour). Categories C, D, and

[9] FAA Advisory Circular (AC) 150/5000-17 Critical Aircraft and Regular Use Determination

E consist of the remaining business jets as well as larger jet and propeller aircraft generally associated with commercial and military use with approach speeds of 121 knots or more. The FAA also establishes six airplane design groups (I-VI), based on the wingspan and tail height of the aircraft. The categories range from Airplane Design Group (ADG) I, for aircraft with wingspans of less than 49 feet, to ADG VI for the largest commercial and military aircraft.

The combination of airplane design group and aircraft approach speed for the critical aircraft creates the Airport Reference Code (ARC), which is used to define applicable airfield design standards. It is noted that each runway is assigned an ARC through the facility requirements runway use analysis, and the *Airport* ARC is based on the most demanding runway-derived ARC at the airport.

A list of typical general aviation and business aviation aircraft and their respective design categories is presented in **Table 3-17. Figure 3-7** illustrates representative aircraft in various design groups. Aircraft with a maximum gross takeoff weight greater than 12,500 pounds are classified as "large aircraft" by the FAA; aircraft 12,500 pounds and less are classified as "small aircraft."

TABLE 3-17: GA AIRCRAFT & DESIGN CATEGORIES

Aircraft	Aircraft Approach Category	Airplane Design Group	Maximum Gross Takeoff Weight (lbs)
Cessna 182 (Skylane)	A	I	3,100
Cirrus Design SR22	A	I	3,400
Beechcraft Bonanza A36	A	I	3,650
Socata/Daher TBM 700-930	A	I	6,579-7,394
Beechcraft Baron 58	B	I	5,500
Cessna 340	B	I	5,990
Cessna Citation Mustang	B	I	8,645
Embraer Phenom 100	B	I	10,472
Cessna Citation CJ1+	B	I	10,700
Beech King Air A100	B	I	11,800
Beechcraft 400A/Premier I	B	I	16,100
Piper Malibu (PA-46)	A	II	4,340
Cessna Caravan 675	A	II	8,000
Pilatus PC-12	A	II	10,450
Cessna Citation CJ2+	B	II	12,500
Cessna Citation II	B	II	13,300
Cessna Citation CJ3	B	II	13,870
Beech King Air 350	B	II	15,000
Cessna Citation CJ4	B	II	16,950
Embraer Phenom 300	B	II	17,968
Cessna Citation XLS+	B	II	20,200
Dassault Falcon 20/200	B	II	28,660
Bombardier Learjet 55	C	I	21,500
Beechcraft Hawker 800XP	C	II	28,000
Gulfstream 150	C	II	26,100
Cessna Citation X	C	II	36,100
Bombardier Challenger 300	C	II	37,500
Gulfstream III	C	II	69,700
Learjet 35A/36A	D	I	18,300
Gulfstream G450	D	II	73,900
Bombardier Global Express 5000	C	III	92,750

Source: AC 150/5300-13, as amended; aircraft manufacturer data.

A-I

12,500 lbs. or less (small)

Beech Baron 55
Beech Bonanza
Cessna 182
Piper Archer
Piper Seneca

B-I

12,500 lbs. or less (small)

Beech Baron 58
Beech King Air 100
Cessna 402
Cessna 421
Piper Navajo
Piper Cheyenne
Cessna Citation I

A-II, B-II

12,500 lbs. or less (small)

Super King Air 200
Pilatus PC-12
DHC Twin Otter
Cessna Caravan
King Air C90

B-II

Greater than 12,500 lbs.

Super King Air 300, 350
Beech 1900
Cessna Citation Excel
Falcon 20, 50
Falcon 200, 900
Citation II, Bravo XLS+
Citation CJ3

A-III, B-III

Greater than 12,500 lbs.

DHC Dash 7, Dash 8
Q-200, Q-300
DC-3
Convair 580
Fairchild F-27
ATR 72
ATP

C-I, D-I

Lear 25, 35, 55, 60
Israeli Westwind
HS 125-700

C-II, D-II

Gulfstream II, III, IV
Canadair 600
Canadair Regional Jet
Lockheed JetStar
Citation X
Citation Sovereign
Hawker 800 XP

C-III, D-III

Boeing Business Jet
Gulfstream 650
B 737-300 Series
MD-80, DC-9
Q-400
A319, A320
Gulfstream V
Global Express

C-IV, D-IV

B-757
B-767
DC - 8-70
DC - 10
MD - 11
L 1011

D-V

B - 747 Series
B - 777

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Current and Future Critical Aircraft

The identification of the existing and future critical aircraft for the airport is required to define the appropriate design standards for various airport facilities. **Table 3-18** summarizes the selected operations forecast at Ashland Municipal Airport by aircraft type; aircraft approach speed (AAC), and airplane design group (ADG).

TABLE 3-18: GA FORECAST ACTIVITY FLEET MIX (BY AAC + ADG)

Aircraft Type (Representative)	AAC + ADG	Historic	Forecast			
		2017	2022	2027	2032	2037
Cessna 172	A-I	21,084	21,994	22,924	23,820	24,569
TBM 900	A-I	60	80	120	150	180
Beechcraft Baron 58	B-I	500	550	520	520	550
Piper Cheyenne II (PA-31T)	B-I	60	60	80	90	100
Cessna Citation CJ1	B-I	20	40	50	70	100
Pilatus PC-12/Cessna Caravan	A-II	80	110	150	160	170
Cessna 550 - Citation Bravo	B-II	60	60	70	80	90
Bombardier Learjet 60	C-I	0	0	0	0	0
Gulfstream G150	C-II	0	0	0	0	10
Total Operations (Fixed Wing)		**21,864**	**22,894**	**23,914**	**24,890**	**25,769**
Helicopter		2,000	2,200	2,400	2,600	3,000
TOTAL – GA OPERATIONS		**23,864**	**25,094**	**26,314**	**27,490**	**28,769**
Subtotals by AAC (FW + Heli)	A	21,224	22,184	23,194	24,130	24,919
	B	640	710	720	760	840
	C	0	0	0	0	10
	D	0	0	0	0	0
Subtotals by ADG (FW only)	I	21,724	22,724	23,694	24,650	25,499
	II	140	170	220	240	270

Critical Aircraft Conclusions

Based on the updated aviation activity forecast, the current and future critical aircraft for Ashland Municipal Airport is a multi-engine piston aircraft included in Airplane Design Group I (ADG I). Ashland Municipal Airport currently has two multi-engine piston aircraft (Cessna 340 and Aero Commander 550) based at the airport, in addition to one medium business jet (Cessna Citation II/Bravo). Ashland Municipal Airport also accommodates a wide range of ADG I and II transient multi-engine piston and turbine aircraft.

The airport accommodate occasional small package express/air cargo flights (from Medford) when localized fog conditions require a weather diversion. This activity varies greatly, but appear to be less than 100 operations per year.

A review of 2017 instrument flight plan data identified 40 business jet and 56 turboprop operations at Ashland Municipal Airport. However, as noted earlier instrument flight plan activity for the airport is limited by the absence of a published instrument approach. As a result, historic instrument flight plan data may not fully reflect potential demand for turbine aircraft activity.

Table 3-19 summarizes the current and future critical aircraft and airport reference code (ARC) for Ashland Municipal Airport. An analysis of aircraft use and applicable design standards will be performed in the facility requirements analysis to address specific facility needs.

TABLE 3-19: SUMMARY OF CRITICAL AIRCRAFT & ARC

Current and Future "Airport" ARC: B-I
Based on the recommended master plan forecasts, the current and future critical aircraft for Ashland Municipal Airport is a multi-engine piston aircraft included in **Airport Reference Code (ARC) B-I**: **Existing/Future Critical Aircraft:** **Beechcraft Baron G58** (representative AC type, multi-engine piston) • Aircraft Approach Category B • Airplane Design Group I • Maximum Takeoff Weight: 5,524 Pounds (small aircraft)

Operational Peaks

Activity peaking is evaluated to identify potential capacity related issues that may need to be addressed through facility improvements or operational changes.

The **Peak Month** represents the month of the year with the greatest number of aircraft operations (takeoffs and landings). The peak month for most general aviation airports occurs during the summer when weather conditions and daylight are optimal. The peak month at Ashland Municipal Airport is estimated to account for approximately 11 percent of annual aircraft operations. This level of peaking is consistent with other airports with similar levels of flight training and transient activity.

Peak Day operations are defined by the average day in the peak month (**Design Day**) and the busy day in the typical week during peak month (busy day). The **Design Day** is calculated by dividing peak month operations by 30. For planning purposes, the **Busy Day** is often estimated to be 25 percent higher than the average day in the peak month (Design Day x 1.25), unless the airport routinely experiences significant seasonal or daily surges in traffic.

The peak activity period in the Design Day is the **Design Hour**. For planning purposes, the **Design Hour** operations are estimated to account for 20 percent of Design Day operations (Design Day x 0.20).

The operational peaks for each forecast year are summarized in **Table 3-20**. This level of peaking is consistent with the mix of airport traffic and is expected to remain relatively unchanged during the planning period. These measures of activity are considered when calculating runway/taxiway capacity and transient aircraft parking requirements. No significant runway or taxiway capacity issues have been identified based on current or forecast activity levels.

TABLE 3-20 PEAK GENERAL AVIATION OPERATIONS FORECAST

Activity	2017	2022	2027	2032	2037
Annual Operations (GA)	23,864	25,094	26,314	27,490	28,769
Peak Month Operations (11%)	2,625	2,760	2,895	3,024	3,165
Design Day Operations (average day in peak month)	88	92	97	101	106
Busy Day Operations (assumed 125% of design day)	109	115	121	126	133
Design Hour Operations (assumed 20% of design day)	18	18	19	20	21

Military Activity

The FAA Terminal Area Forecast (TAF) lists no military flight activity at Ashland Municipal Airport. However, occasional military use with helicopters or small fixed-wing aircraft in support of emergency response, search and rescue, and training activities would be consistent with activity (Oregon Army National Guard, etc.) experienced at other Oregon general aviation airports. Military flight activity at the airport is limited by available airfield capabilities and is assumed at 100 annual operations during the planning period.

Air Taxi Activity

Air taxi activity includes for-hire charter flights and some scheduled commercial air carriers operating under FAR Part 135. Ashland Municipal Airport accommodates a limited number air cargo/express flight diversions from Medford due to localized weather conditions. These aircraft are operated by a FedEx or UPS contract carrier under FAR Part 135. Additional charter flight activity at Ashland Municipal Airport would also be conducted under Part 135.

The FAA Terminal Area Forecast (TAF) estimates current air taxi activity at Ashland Municipal Airport at 1,500 annual operations. A static 1,500 air taxi operations projection is maintained through the end of the TAF forecast period (2045). For master planning purposes, this level of activity will be assumed in the recommended aircraft operations forecast.

Forecast Summary

The summary of based aircraft and annual aircraft operations forecasts is provided in **Table 3-21**. The forecast for based aircraft and aircraft operations projects modest sustained growth in activity at Ashland Municipal Airport through the twenty-year planning period that is consistent with the FAA's long-term expectations for general aviation.

Annual aircraft operations and based aircraft are forecast to increase at an average annual rate of **0.93 percent** between 2017 and 2037.

As with any long-term facility demand forecast, it is recommended that long-term development reserves be protected to accommodate demand that may exceed current projections. For planning purposes, a reserve capable of accommodating a doubling of the twenty-year preferred forecast demand should be adequate to accommodate unforeseen facility needs during the current planning period. However, should demand significantly deviate from the airport's recent historical trend, updated forecasts should be prepared to ensure that adequate facility planning is maintained.

TABLE 3-21: FORECAST SUMMARY

Activity	2017	2022	2027	2032	2037
Itinerant Operations					
General Aviation	18,307	19,328	20,341	21,317	22,378
Air Taxi/Commercial	1,500	1,500	1,500	1,500	1,500
Military	100	100	100	100	100
Total Itinerant Operations	**19,907**	**20,928**	**21,941**	**22,917**	**23,978**
Local Operations	4,057	4,266	4,473	4,673	4,891
Total Local & Itinerant Operations	**23,964**	**25,194**	**26,414**	**27,590**	**28,869**
Based Aircraft	74	78	82	85	89
Operations Per Based Aircraft (GA)	322	322	321	323	323

Fifty-Year Forecast

Fifty-year demand forecasts were prepared by extrapolating the average annual growth rates (AAGR) for the recommended 20-year based aircraft and aircraft operations forecasts. The purpose of the 50-year projection is to provide an estimate of demand that can be used to approximate long-term aviation use land requirements for the airport. **Table 3-22** summarizes the 50-year forecast including the intermediate 30- and 40-year based aircraft and aircraft operations

TABLE 3-22: 50-YEAR FORECAST

Activity	2017	2037	2047	2057	2067
Annual Operations	23,964	28,869	31,686	34,778	38,172
Based Aircraft	74	89	98	107	118