



3 FORECAST OF AVIATION

3.1 INTRODUCTION

This section of the master plan presents forecasts of future aviation activity at the Yakima Air Terminal/McAllister Field (YKM). These forecasts are a key step in the airport planning process and provide the basis for:

- ◆ Determining the airport's role in the aviation system;
- ◆ Determining the improvements to the airfield, terminal facilities, apron areas, and airside/landside access circulation and parking facilities needed to accommodate growth in demand;
- ◆ Estimating the potential environmental effects, such as noise and air quality, of the airport's operation on the surrounding community; and,
- ◆ Evaluating the financial feasibility of alternative airport development proposals.



The nature and scope of aviation demand forecasts vary from airport to airport depending on the facility's role and level of activity. For YKM, the forecasts address the following elements:

Commercial Activity

- ◆ Enplaned passengers
- ◆ Commercial aircraft fleet
- ◆ Total annual commercial service operations

Commuter/ Air Taxi Activity

- ◆ Annual air cargo operations
- ◆ Annual air taxi operations

General Aviation Activity

- ◆ Total number of based aircraft
- ◆ Based aircraft fleet mix
- ◆ Annual general aviation operations
- ◆ Local and itinerant operations

Military Activity

Operational Characteristics

- ◆ Annual instrument operations
- ◆ Peak period forecasts for peak month, design day, and design hour

Critical Aircraft and Operations Activity

TAF Comparison

Key steps in the aviation demand forecast process defined in Advisory Circular 150/5070-6B "Airport Master Plans" include the following:

- Identify aviation activity parameters and measures to forecast,
- Collect and review previous airport forecasts,
- Gather additional data as needed to forecast aviation activity parameters,
- Apply forecast methods and evaluate results; and,
- Compare the results with the Federal Aviation Administration (FAA) Terminal Area Forecast (TAF).

3.2 SUMMARY OF FORECASTS FOR YKM

Development of forecasts of future activity forecasts for YKM followed the process described by FAA and included in Advisory Circular (AC) 150/5070-6B “Airport Master Plans.” Details of historical information, assumptions, and decisions regarding these forecasts are contained in the following section. The following is a summary of the forecasting results.

1. The growth in enplaned passengers will continue to be influenced by competing service at both the Tri-Cities and Seattle-Tacoma International Airports until additional destinations are added to the Yakima schedule. Efforts by the City of Yakima, Yakima County and other local supporters, such as the Chamber of Commerce and the Yakima Valley Development Agency have successfully attracted SeaPort Airlines, which will offer six daily flights to Portland International Airport (PDX) and Pangborn Memorial Airport in Wenatchee from March 2012 to December 2012.
2. Commercial service growth will continue with growth rates driven by passenger levels, decisions regarding new destinations, and airline profitability. Adding additional flights will depend on whether the airline is attaining satisfactory load factors on existing flights. In other words, the aircraft operating at YKM will need to depart with profitable load factors before adding flights. Since it is likely that service will continue to be offered on 75- to 100-passenger aircraft, such as the Bombardier Q-400 currently being used by Alaska Airlines or a similarly sized regional jet, this translates to an average of 80 percent loads or 60 to 80 passengers per departure.
3. Air cargo/air taxi operations consist primarily of air cargo flights by the three carriers offering service to YKM using small turboprop aircraft such as the Cessna Caravan, Embraer 120, or Cessna 340. The remaining are non-scheduled air taxi flights. The cargo service will continue to expand as the population in the Yakima Valley continues to grow. This service will continue to be dominated by small “feeder” aircraft operating from YKM to the carriers’ bases at Boeing Field, Spokane or Seattle-Tacoma International.
4. The general aviation community in YKM is healthy and active and these forecasts show a continued growth over the 20-year period. While this growth is not “spectacular,” it is assumed the business aviation sector will remain active and that business related operations will increase in the future. Sport aviation and private flights in small piston aircraft will also remain active at YKM.

5. Military operations at YKM consist primarily of training on the Instrument Landing System (ILS). Future use by the military is unpredictable, but this forecast assumes the military will continue to use the airport as it has in the past.
6. The number of aircraft based at YKM will continue to grow as the aircraft owners who increasingly use their aircraft for business purposes seek the services offered at YKM and take advantage of the good flying conditions in the valley.

Table 3-1 shows the anticipated growth in activity levels forecast for YKM. The remainder of this chapter provides details of the development of these forecasts.

Table 3-1: Forecast Summary

	Actual	Forecast			
	2010	2015	2020	2025	2030
Enplaned Passengers	58,994	65,134	75,508	96,370	122,995
Operations					
Commercial	2,190	2,285	2,483	2,983	3,596
Air Cargo/Air Taxi	5,777	6,222	6,701	7,219	7,778
General Aviation	38,481	40,130	42,132	44,287	46,651
Military	4,040	4,040	4,040	4,040	4,040
Total Operations	50,488	52,677	55,357	58,529	62,065
Based Aircraft	162	175	185	196	208

Source: Actual - Airport Records
Forecast - URS

3.3 FORECASTING PROCESS

The process used to develop aviation demand forecasts is the same, regardless of the type or size of the airport. Key steps in the process defined in Advisory Circular 150/5070-6B “Airport Master Plans” include the following:

- ♦ Identify aviation activity parameters and measures to forecast;
- ♦ Collect and review previous airport forecasts;
- ♦ Gather additional data as needed to forecast aviation activity parameters;
- ♦ Select forecast methods to include;

- ♦ Apply forecast methods and evaluate results; and,
- ♦ Compare the results with the Federal Aviation Administration (FAA) Terminal Area Forecast (TAF).

Subsequent sections of this chapter provide the background information on how the forecasts were developed. Forecasts have been prepared for periods ending 5-, 10-, and 20-years from the base year of the forecast (year 2010). Peak period forecasts were also prepared for the peak month, design day, and design hour of each period.

3.4 FORECAST OF COMMERCIAL ACTIVITY

3.4.1 Background and Trends

The FAA develops annual forecasts of commercial passenger activity. The most recent is the FAA Aerospace Forecasts, Fiscal Years 2009–2025. The FAA continues to forecast long-term aviation growth despite global economic conditions. Since 2000, American airlines have dealt with the impacts of 9/11, heightened concerns about pandemics, the bankruptcy of four network carriers (five with the recent filing by American Airlines), record high fuel prices, and the most serious economic downturn since the Great Depression. In spite of these challenges, the number of passengers traveling continues to grow, demonstrating the value of air transportation to the public. In last year's forecast, the FAA predicted the American commercial aviation industry would carry one billion passengers by 2023.

Air traffic will not rise to prior forecast levels even when the economy recovers because of the absence of significant price cuts in the near term. Following previous downturns (e.g. the recessions in 1991 and 2001) carriers stimulated passenger demand by reducing fares sharply. The industry's response to the current economic downturn is to better match capacity (the number of seats) with demand (passengers) by modestly cutting fares and dramatically reducing seat capacity. According to FAA publications, there is no current evidence of pent-up demand, therefore it is not anticipated that a return to previously forecasted passenger levels will occur, even after an economic recovery takes hold.

3.4.2 Local Input

On October 13, 2011, workshops were conducted in Yakima to identify local factors likely to influence aviation demand at YKM in both the short and long term. Participating in the workshops were the Master Plan Technical Advisory Committee (TAC) and the Citizen's and Agency Advisory Committee (CAC). The purpose of the meetings was to gather information

about current activity at YKM and explore explanations for the situation and identify possible ways to optimize future service at YKM. During these meetings and discussions that followed the opinion was expressed that travelers from Yakima generally chose between three airports when planning a trip—Yakima Air Terminal (YKM), Tri-Cities Airport (PSC) in Pasco or Seattle-Tacoma International Airport (SEA). Both committees cited the following opinions as being important considerations when preparing the forecast of aviation demand:

- ♦ Passengers flying to and from YKM are a mixture of business travelers and families taking casual trips.
- ♦ The distance from YKM to SEA is approximately 120 miles or 2.5 hours driving time. During winter months this trip, which must traverse the Cascade Mountain range, is particularly difficult and unpredictable.
- ♦ Most YKM passengers look for a direct flight not requiring a long layover at SEA. Layover times at SEA can be long because there are only three flights per day to or from Yakima. This fact limits use of the current service.
- ♦ Schedule, cost, and convenience are the three factors that influence the local traveler's choice of airports.
- ♦ The general perception is that it is cheaper to drive to Pasco than to Seattle results in more passengers “leaking” to Pasco than to Seattle.
- ♦ The reintroduction of eastbound flights, such as Delta service to Salt Lake City, would attract more passengers. In fact while this service was available in 2007 and 2008, passenger levels jumped by almost 15,700 enplanements per year.
- ♦ The shuttle bus service to and from SEA carries close to 400 people per month. Some of these shuttle passengers could become airline passengers if service improvements were made.
- ♦ Improving the ambiance of the passenger terminal could help attract more passengers. There is currently no restaurant or bar where passengers can wait for their flights. There is an overall need to bring more development and improve the overall attractiveness of the terminal to encourage additional passengers to use the airport.
- ♦ Improved marketing of the local airline service is important to attract new passengers. If the public is educated about how it can be cheaper to fly out of YKM than to drive to Seattle, they will be more likely to use the local service.

- ♦ The introduction of a second airline often drives fare prices down and increases passenger levels. This was demonstrated at YKM during 2007 and 2008 when Delta's eastbound service was being offered.
- ♦ Walla Walla's wine tourism has increased passenger activity at the Walla Walla Regional Airport. The Yakima region could implement similar wine tasting tours and elevate the region's presence in this market.
- ♦ Regional commercial and industrial growth will increase passenger and operations levels.
- ♦ The reliability of the air carrier service is very important to the city. Return flights from Seattle are unpredictable during the winter due to delays caused by weather. This lessens the overall reliability of the service and leads to less use by travelers. Driving over the mountain passes can be difficult during the winter, so passengers need better service.
- ♦ When SEA is fogged in, Portland usually is not. This is a good reason to diversify the number of destinations from YKM.
- ♦ The biggest factor in deciding whether to fly out of YKM is the cost of flying versus the cost of driving. It is often perceived as less expensive to drive to Seattle than to fly from Yakima. Generally if you are connecting with a flight and travelling beyond SEA the price difference is not as great.
- ♦ More and more passengers are driving to PSC to fly because the service is better, cheaper and more reliable.
- ♦ When ticket price is used as the primary online search factor tickets from YKM are listed last below the airports in Pasco and Wenatchee (and in one case Moses Lake).
- ♦ Make flights available to destinations other than Seattle (e.g., Portland, Spokane, or Boise). In the past airlines at YKM flew to Portland and Boise, but airlines need to be confident flights will be full and profitable before considering reintroducing them.

Airline service at YKM has been relatively consistent over the past decade. Service has been primarily back and forth to SEA offered by Horizon Airlines using 35- to 75-seat aircraft and some unscheduled charter service offering flights to destinations associated with the gaming industry (Las Vegas, Reno, Elko, etc.) using 120- to 130-seat aircraft. Total passenger levels have ranged from 89,463 in 1999 to a low of 53,155 in 2004. Table 3-2 shows the number of passengers enplaned at YKM from 1990 through 2009. These show that although passenger levels fluctuated year by year there was overall growth from 1990 through 2001. With the tragedy of 9/11 and the resulting changes in the air transportation business, passenger levels

dropped from 81,882 in 2001 to 59,463 in 2002 (a nearly 30-percent decline). In 2007, Delta Airlines added service from YKM to its hub in Salt Lake City under a community sponsored ticket guarantee program. With the initiation of this service, passenger volumes grew by 15 percent from 2006 to 2007 and close to 14 percent from 2007 to 2008. In 2008 the air service grant expired and Delta cancelled their flights at YKM. The result was a decrease of 15,700 enplaned passengers in 2009.

Table 3-2: Historical Enplaned Passenger Levels

Year	Enplanements			Percent Change
	Air Carrier	Air Taxi and Commuter	Total	
1990	39,022	30,406	69,428	
1991	21,140	74,638	95,778	37.95%
1992	24,710	62,710	87,420	-8.73%
1993	16,826	62,177	79,003	-9.63%
1994	3,740	71,323	75,063	-4.99%
1995	4,301	80,717	85,018	13.26%
1996	4,633	86,105	90,738	6.73%
1997	3,247	89,162	92,409	1.84%
1998	2,655	84,617	87,272	-5.56%
1999	1,154	88,003	89,157	2.16%
2000	1,104	85,266	86,370	-3.13%
2001	1,338	80,544	81,882	-5.20%
2002	1,514	57,949	59,463	-27.38%
2003	1,543	55,756	57,299	-3.64%
2004	914	52,241	53,155	-7.23%
2005	1,567	55,752	57,319	7.83%
2006	1,004	56,116	57,120	-0.35%
2007	1,281	64,750	66,031	15.60%
2008	1,678	73,034	74,712	13.15%
2009	2,224	56,770	58,994	-21.04%

Source: FAA Terminal Area Forecast

3.4.3 Forecast of Enplaned Passengers

A variety of forecasting methods for air carrier passengers and activity were tested for relevance at YKM. The three most common forecasting approaches examined (regression analysis; time-series; and market share), share the shortcoming that they assume relationships that existed in the past will continue unchanged into the future. Consequently, they do not allow for the effects of more aggressive marketing, increased service levels, or other changes independent of past indicators but key to YKM capturing a higher percentage of the passengers from their catchment area currently leaking to PSC or SEA.

Similarly, these methods do not permit the analysis of the impact of point-in-time activity changes such as the introduction of the new eastbound service by Delta in 2007. These factors are a vital component of understanding YKM's historical growth patterns. To counter this weakness, the second phase of forecasting involves a judgmental analysis. During this phase, decisions are made regarding the growth projections resulting from the analyses of each demand element. These decisions require that a number of intangible factors, such as policy and objective changes, be considered. The forecast team adds these elements to the process using experience at other airports, industry trends, knowledge of the aviation community, and information gathered from airport users and passengers.

3.4.3.1 Regression Analyses

Regression analysis bases projections of an aviation demand element (the dependent variable) on one or more outside indicators, such as population or other socioeconomic factors (the independent variables). Historical values for both the dependent and the independent variables are tested using correlation analyses to determine whether a relationship exists between the variables. If it is determined there is a relationship, it can be used to project future aviation activity levels assuming a continuation of the relationship into the future. This method requires the use of forecasts of the independent variables as prepared by others.

A regression model was prepared for this forecast comparing enplanements at YKM to Yakima County population as forecast by the Washington Office of Financial Management. This resulted in low growth rates over the 20-year forecast period with total enplaned passenger levels gradually growing by 15,718. Although this appears to be a low expectation, the model is included for consideration in the development of the forecast.

3.4.3.2 Time Series Analysis

A time series analysis is the simplest and most widely used of forecasting techniques. The time-series analysis is a basic regression analysis fitting growth curves to historical data and using past growth rates to forecast future activity levels. The time series analysis assumes that, although short-term perturbations may occur from time to time, a consistent overall trend can be identified over an extended period of time. The forecast from the time series analyses for this plan was not used since the correlation between year and passengers was not only weak, but also negative (-0.647). This projection was rejected because the conditions that influenced past activity (9/11; the high cost of fuel; general recessionary conditions; and, airline retrenchment) were unlikely to be repeated in the future in the same manner. Therefore, these numbers are not presented in this forecast.

3.4.3.3 Market Share Analyses

Market share analysis techniques involve a review of the historical activity levels at the airport compared to those for a larger market. The comparison is used to determine what share of the larger market area is concentrated at YKM. This share can then be compared to forecasts prepared for the larger market by the FAA to determine likely future activity levels at YKM. Market share models tested in this analysis included:

- ♦ A comparison of YKM enplanements as a percentage of total U.S. enplanement levels as forecast by FAA in the TAF;
- ♦ A comparison of YKM enplanements as a percentage of the enplanements for the FAA Northwest Mountain Region (Washington, Oregon, Idaho, Montana, Wyoming, Utah and Colorado) enplanements; and,
- ♦ A comparison of YKM enplanements as a percentage of the total enplanements for all commercial service airports in Washington State.

The two variations of the market share analysis tested included determining YKM's average market share over the past ten years (average market share) and the most recent (2009) share (static market share) extended into the future.

These market share analyses are included in the forecast for further consideration. The underlying assumption is that the FAA's overall passenger market projections reflect realistic growth rates and that YKM can be expected to at least retain its demonstrated share of that market.

Table 3-3 shows the results of the market analyses conducted for YKM using the average market share results in a higher forecast than the static share recorded in 2009. This difference reflects the fact that a single year's data is never as good a predictor of the future as is data from multiple years. In this case information dating back to 1990 reflects passenger levels when there were more daily flights than at present and periods when there were flights to several destinations. However, the average also gives weight to the previous years when national and regional economic and market conditions were vastly different than they are today. Given this, projections based on a static share over the 20-year historical period represent a conservative estimate of the growth at YKM.

Table 3-3: Enplaned Passengers Forecasts Based on Market Share Analyses

	2009	2015	2020	2025	2030
Share of U.S. Market					
Static	58,994	74,514	85,147	97,421	111,614
Average	58,994	192,818	221,673	255,317	294,757
Share of Northwest Region					
Static	58,994	69,586	80,387	92,959	107,670
Average	58,994	61,137	87,790	145,858	170,479
Share of Washington State					
Static	58,994	74,598	85,147	97,362	111,456
Average	58,994	139,192	158,686	181,152	207,079

Source: URS

3.4.3.4 Potential Market Analysis

In February of 2010, an air service market analysis was conducted for YKM entitled “True Market Estimate.” This report identified the catchment area for YKM as consisting of portions of Yakima, Lewis, King, and Kittitas Counties with a combined population of approximately 270,700 people. The analysis showed this catchment area generated 223,792 Origin and Destination (O&D) 2007 through 2008. These passengers, of course, do not currently all use YKM at the present time.

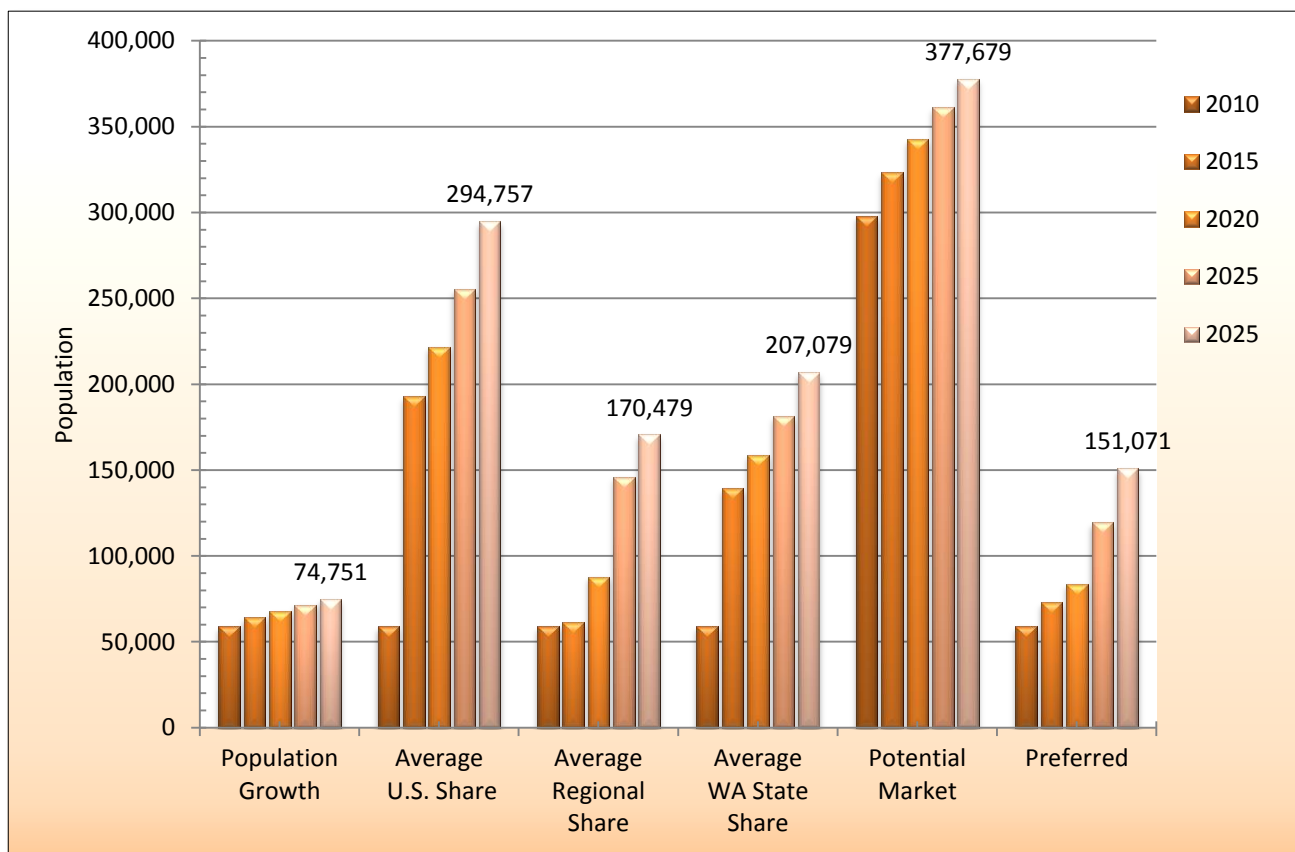
Using the estimate of the size of the potential market from the air service report as a base and forecasting increases in passengers at the same rate as the growth in population for the catchment area as forecast by the State of Washington results in the identification of a potential future market of 377,679 enplaned passengers by 2030.

3.4.4 Summary of Enplaned Passenger Projections

The projections prepared for this forecast all reflect growth over the next 20 years ranging from a conservative level of 15,757 additional passengers by 2030 if the only factor influencing growth is the rate of population growth to a high of 377,679 if the entire potential market is captured. The range of projections for passenger growth are shown in Table 3-4.

Table 3-4: Summary of Projections and Preferred Forecast of Enplaned Passengers

Year	Population Growth	U.S. Share		Regional Share		WA State Share		Potential Market
		Static	Average	Static	Average	Static	Average	
2010	58,994	58,994	58,994	58,994	58,994	58,994	58,994	298,066
2015	63,975	74,514	192,818	69,586	61,137	74,598	139,192	323,230
2020	67,806	85,147	221,673	80,387	87,790	85,166	158,686	342,587
2025	71,476	97,421	255,317	92,959	145,858	97,362	181,152	361,133
2030	74,751	111,614	294,757	107,670	170,479	111,456	207,079	377,679



The forecast approved for use in the master plan represents a vision for the airport that is expressed as follows;

1. For the short-term (0 to 5 years) there will be moderate growth. The assumption is that the airport's share of the national, regional and statewide markets will remain static. This implies that the people from the Yakima area who fly will continue to choose the airport they currently use with the majority opting to avail themselves of the service at Tri-Cities Airport (PSC) or Seattle-Tacoma International Airport (SEA) rather than that at YKM. Further implied is that the service levels at YKM will not change. Under these assumptions annual growth of passengers was forecast to be approximately 2.0% per year.
2. In the intermediate time range (6 to 10 years) growth at YKM is expected to continue at a moderate pace of about 3% per year. However, during this period it was assumed that the first step in service improvement would occur such as a new flight to a new location.
3. For the long term forecast (11 to 20 years) it was assumed that actions by airport management and the community economic development agencies would result in service improvements that would alter the current passenger distribution paradigm resulting in an increasing percentage of the local passenger market opting to use YKM instead of driving to PSC or SEA. During this time period passenger levels could grow at a rate of 5% per year. The primary assumption in this time frame is that new airline(s) would begin service to Yakima to locations that are not currently served.

In assessing this forecast it is important to identify the number of assumed circumstances that have been used in making forecasts and identify the ways that changes in these assumptions could result in markedly different activity levels. In this analysis the following need to be considered.

- ♦ New service to new locations could be offered at any time. This would impact the forecast in two ways. First, an immediate growth in passenger levels would be experienced. Second the successful introduction of such service would lead to the “reclaiming” of portions of the potential market that currently goes elsewhere.
- ♦ YKM could continue in its current state with single airline service to a single market. Under this scenario growth would likely be steady but unspectacular. This growth would be driven almost solely by the growth in local population levels. Without service increases there would be no market capture from PSC or SEA.
- ♦ Due to a change in operating or service philosophy, Alaska Airlines could reduce service to YKM, or cease service altogether. Decreasing service will result in a loss of market

share over the long run with minimal annual growth rates. If service is discontinued the results would be catastrophic.

To assure that the forecasts presented herein are useful for long range planning, the preferred forecast is presented with two contrasting scenarios designed to represent the range of future possibilities for YKM. These are described as follows.

- ♦ **Low Growth:** This forecast assumes that the City's efforts to attract new service are not successful and the population of the region does not increase at the rates projected by the State. The forecast is based on passengers growing at ½ the annual percentage projected by the State for population growth.
- ♦ **Status Quo:** This forecast is based solely on the rate of population growth in Yakima County as forecast by Washington State. The forecast assumes that there will be no successful new service initiatives that attract a larger share of the potential passenger market. The majority of passengers will continue to use PSC and SEA.
- ♦ **Preferred Forecast:** The assumed conditions here are that the City and community's efforts to attract new service are successful over time. The forecast assumes that these service improvements will occur sometime in the intermediate- to long-term period. However they could occur at any time.

The three forecast scenarios are shown in the following Table 3-5. The numbers shown represent the range of possibilities for future passenger levels for future planning purposes. For determining facility requirements the high growth forecast will be used. Financial planning will examine the range of forecasts.

Table 3-5: Range of Enplaned Passenger Forecast

	High Growth		Status Quo		Low Growth		Preferred Forecast	
Year	Annual Passengers	Growth Rate	Annual Passengers	Growth Rate	Annual Passengers	Growth Rate	Annual Passengers	Growth Rate
2010	58,994		58,994		58,994		58,994	
2011	61,775	4.71%	59,990	1.69%	59,492	0.84%	60,174	2.00%
2012	64,556	4.50%	60,986	1.66%	59,986	0.83%	61,377	2.00%
2013	67,337	4.31%	61,983	1.63%	60,476	0.82%	62,605	2.00%
2014	70,118	4.13%	62,979	1.61%	60,962	0.80%	63,857	2.00%
2015	72,899	3.97%	63,975	1.58%	61,444	0.79%	65,134	2.00%
2016	75,033	2.93%	64,741	1.20%	61,812	0.60%	67,088	3.00%
2017	77,166	2.84%	65,507	1.18%	62,178	0.59%	69,101	3.00%
2018	79,300	2.76%	66,274	1.17%	62,541	0.58%	71,174	3.00%
2019	81,433	2.69%	67,040	1.16%	62,903	0.58%	73,309	3.00%
2020	83,567	2.62%	67,806	1.14%	63,262	0.57%	75,508	3.00%
2021	90,738	8.58%	68,540	1.08%	63,605	0.54%	79,284	5.00%
2022	97,908	7.90%	69,274	1.07%	63,945	0.54%	83,248	5.00%
2023	105,079	7.32%	70,008	1.06%	64,284	0.53%	87,410	5.00%
2024	112,249	6.82%	70,742	1.05%	64,621	0.52%	91,781	5.00%
2025	119,420	6.39%	71,476	1.04%	64,956	0.52%	96,370	5.00%
2026	125,750	5.30%	72,131	0.92%	65,254	0.46%	101,188	5.00%
2027	132,080	5.03%	72,786	0.91%	65,550	0.45%	106,248	5.00%
2028	138,411	4.79%	73,441	0.90%	65,845	0.45%	111,560	5.00%
2029	144,741	4.57%	74,096	0.89%	66,139	0.45%	117,138	5.00%
2030	151,071	4.37%	74,751	0.88%	66,431	0.44%	122,995	5.00%

3.4.5 Forecasts by Others

Since the development of the previous master plan two independent forecasts of enplaned passengers have been prepared for YKM. The first of these is the TAF previously cited, and the second is the Washington State Department of Transportation, Aviation Division Long-range Air Transportation System Plan (LATS). Both these forecasts employed top-down modeling with a forecast prepared for a larger entity (U.S. or State) with the totals disaggregated to individual airports. The weakness in this methodology is it gives no consideration to the specific circumstances driving activity at individual airports and encourages the adoption of a stagnant forecast.

As can be seen in Table 3-6 the TAF forecasts do not reflect the fact the airport will maintain a constant share of an expanding market. The TAF assumes YKM will lose ground in the marketplace, dropping below a static share of any of the markets studied in the TAF.

Table 3-6: Preferred Forecast Compared with TAF and LATS

Year	FAA TAF	WSDOT LATS	Preferred Forecast
2010	58,994	58,994	58,994
2015	61,598	90,100	65,134
2020	66,166	95,300	75,508
2025	71,090	100,900	96,370
2030	76,367	106,800	122,995

The state forecast produced under the LATS program shows a slightly more optimistic forecast, but the overall levels are still less than those that would result from the airport merely holding on to its existing share of the larger market areas.

3.4.6 Total Passenger Forecast

The preceding section dealt with forecasts of enplaned passengers only. Naturally there will be a complementary number of deplaning passengers at the YKM. Historical records show deplaning passenger levels are roughly equal to those enplaning. This accounts for the fact that most flights are roundtrips. Therefore, this forecast assumes deplaning passenger levels will remain equal to those for enplanements, and the total passengers using YKM will be twice the enplaned passenger projections. Table 3-7 shows this forecast level for all passengers.

Table 3-7: Forecasts for Total Passengers

Year	Enplaned Passengers	Total Passengers
2010	58,994	117,988
2015	65,134	130,268
2020	75,508	157,016
2025	96,370	192,740
2030	122,995	245,990

3.4.7 Forecast of Air Carrier Operations

Air carrier operations are recorded to include all take-offs and landings of commercial aircraft having a capacity of more than 60 passenger seats. At YKM this includes all of the scheduled commercial activity. An aircraft operation is defined as a take-off or a landing; thus, each flight consists of two operations.

A direct relationship exists between the number of passenger enplanements and the number of air carrier operations. The average number of passengers on a departing airplane helps determine the frequency of flights and/or the size of the aircraft being used on a particular route. This relationship is measured using a passenger boarding load factor, expressed as a percentage of seats filled per departing aircraft. When an air carrier consistently has a boarding load factor above 80 percent, it generally chooses to increase the number of flights offered or to use an aircraft with greater seating capacity in serving the route.

Given the existing fleet mix and what is known about the plans of the airlines, and the current industry trends in service, it is assumed operations at YKM will continue to be serviced by regional aircraft such as the Q-400 currently in Horizon service. Regardless of which airline serves the YKM market, this size of airplane has been proven to be reliable and profitable for the carriers in markets where enplaned passenger numbers are under 200,000 and the markets being served are within 1,000 miles. Neither condition is likely to change at YKM in the future.

The forecast of air carrier operations shown below has been determined from the ratio of passenger enplanements per operation using the following process:

- ♦ Determine the ratio of enplaned passengers to airline departures;
- ♦ Project changes in the enplaned passenger to departure ratio;

- ♦ Apply projected ratios to the enplaned passenger forecast to determine the number of departures; and,
- ♦ Double the number of departures to calculate the total operations.

Using these average seats per departure numbers, the historical and assumed passenger load factors, and the forecast of annual enplaned passengers, the forecast of annual air carrier operations shown in Table 3-8 was developed.

Table 3-8: Forecasts of Annual Air Carrier Operations

Year	Enplaned Passengers	Average Seats/Departure	Average Load Factor	Annual Departures	Annual Operations
2010	58,994	76	71%	1,095	2,190
2015	65,134	76	75%	1,143	2,285
2020	75,508	76	80%	1,242	2,484
2025	96,370	76	85%	1,492	2,984
2030	122,995	76	90%	1,798	3,596

3.4.8 Forecast of Commuter/Air Taxi Operations

The definition of the commuter/air taxi operational category is somewhat confusing at airports such as YKM. Operations recorded in this category include takeoffs and landings by scheduled commercial carriers using aircraft with fewer than 60 seats. This category includes air cargo operations and operations by air taxis on a non-scheduled or for-hire basis. There were 5,777 operations registered in this category during 2009 at YKM which include operations performed by the air cargo carriers and a limited number of air taxi operations performed by either based or transient aircraft. Historical records show the number of operations in this category has been declining steadily over the past 20 years from a high of 20,014 in 1992 to a low of 5,777 in 2009. Most of this decline can be attributed to the change in the type of aircraft operated by the airlines at YKM. In the past they used 30-passenger turboprops which were recorded in this category but in recent years they changed to 76-passenger models.

Preparing a forecast for this category begins with defining the air cargo activity. There are currently three air cargo carriers flying in and out of Yakima:

- ♦ **Empire Airlines** operates a feeder route for FedEx using the Cessna Caravan 208 aircraft. They have three daily flights from Spokane with departures to other cities in

Washington State each morning. Afternoon flights consist of two arrivals from Spokane, which then return to Spokane.

- ♦ **Ameriflight** operates as a feeder service to UPS using the Embraer 120 aircraft. They operate one flight per day arriving from Boeing Field each morning with a departure in the afternoon.
- ♦ **Aeroflight** operates at YKM using the PA32 or Cessna 340 aircraft. They have a daily flight from Boeing Field with a continuation to Pasco each morning. This route is flown in reverse (Pasco to Yakima to Boeing) each afternoon.

These carriers account for 14 air cargo operations each day. Subtracting for the lack of Sunday service, air cargo accounts for 4,382 annual operations. Air cargo growth is generally dependent on factors related to local growth and is less apt to be influenced by the introduction of new services. In this case the air cargo activity was forecast to grow at the same rate as the growth in overall population in the Yakima region. This is equal to roughly 0.014 percent per year, which produces a moderate increase in annual operations to 5,741 by 2030 as shown in Table 3-9.

The remaining 1,395 annual operations fall into the traditional “air taxi” category of non-scheduled flights, generally flown in small aircraft at YKM. The forecast for this category was based on the assumption that growth in air taxi operations at YKM would be roughly equivalent to the growth in

air taxi operations statewide. This forecast made projections based on YKM maintaining its share of the total commuter/air taxi category as forecast for the State of Washington in the TAF.

Table 3-9: Forecast of Commuter/Air Taxi Operations

Year	Air Cargo	Air Taxi	Total Commuter/ Air Taxi Operations
2010	4,382	1,395	5,777
2015	4,688	1,533	6,222
2020	5,016	1,686	6,701
2025	5,366	1,853	7,219
2030	5,741	2,037	7,778

3.4.9 General Aviation Operations

3.4.9.1 General Aviation Service Area

It is assumed airports within a 50-mile radius of Yakima compete directly with YKM for general aviation activity. As seen in Table 3-10, there are twelve such airports. Few of these, however,

have the capability to compete for the corporate aviation sector customers since six are privately owned and operated and only Ellensburg's Bowers Field is capable of fully accommodating corporate aircraft. The following table summarizes the facilities available at each of the airports located within 50 miles of YKM.

Table 3-10: Regional General Aviation Airports

Airport	Location	Longest Runway	Approach
Vagabond Army Heliport	8 miles NE	NA	NA
Desert Aire	32 miles E	3,665'	Visual
Christenson Brothers (pvt)	37 miles NE	2,506'	Visual
Mattawa (pvt)	42 miles NE	2,600'	Visual
McMahan (pvt)	18 miles SE	2,000' turf	Visual
Sunnyside	32 miles SE	3,423'	Visual
Prosser	44 miles SE	3,453'	Visual
Harrah (pvt)	12 miles SW	2,650' dirt	Visual
West Valley (pvt)	11 miles W	2,400'	Visual
Tieton State	27 miles W	2,509' turf	Visual
Vantage (pvt)	34 miles NW	2,400' gravel	Visual
Bowers Field	34 miles N	5,590'	Non-Precision

3.4.10 General Aviation Trends

There has been an overall decline in general aviation activity over the past decade that reflects the industry's reaction to higher fuel prices and operating costs. These factors, as well as others such as the continued availability of all types of AvGas will continue to exert a negative influence. However, the Aircraft Owners and Pilots Association (AOPA) statistics offer a glimpse into the potential direction the general aviation industry may be moving. For the purposes of this master plan, the scenario assumed for general aviation is as follows:

- ♦ Business aviation will continue to grow and remain an important component of general aviation. The efficiencies provided by air transport and the benefits of business aircraft ownership will help offset higher operating costs. The eventual introduction of new technology such as Very Light Jets (VLJs) will further support continued growth of business aviation.
- ♦ The number of older technology two- to four-seat aircraft comprising the bulk of the general aviation fleet will decline somewhat over time. Some of these aircraft will be

replaced by newer technology aircraft and new light sport aircraft. The older aircraft remaining will likely fly fewer hours. However, considering the total cost of ownership and operation, fuel cost alone may not be the determinant whether or not the aircraft remain part of the active general aviation fleet.

- ♦ Over time, there will be a divergence in the general aviation industry with business/corporate flying representing one end of the spectrum, and the sport pilot flying a Light Sport Aircraft under a sport pilot certificate representing a large portion of the private recreational flying at the other end. Over time there will be fewer and fewer of those aircraft having historically represented the main-stay of the general aviation fleet.

The AOPA report further suggests that business/corporate aviation will continue to be the segment that makes the greatest demand on the airport facilities.

3.4.11 Local Factors

Given these trends in the national general aviation market, the question is—will based aircraft or general aviation operations at YKM be affected? During forecast workshops conducted as part of this master plan, several opinions were expressed regarding general aviation at YKM by aircraft owners, agencies and businesses on or near the airport:

- ♦ Yakima is likely to exceed FAA's growth curve for general aviation because there has been no drop-off in the number of aircraft based at the airport.
- ♦ Westside (Puget Sound Region) growth and congestion could cause spillover to the eastside (i.e., YKM) as people look for less crowded airspace, cheaper hangars and better flying weather.
- ♦ Small corporate flights will increase at YKM. The Cessna 182 is the size of aircraft companies in Yakima use for business purposes.
- ♦ Improved marketing of the airport will help with growth. YKM is in a good location with good weather and a high number of days of sunshine. It has unrestricted space (both airside and landside) and the wide runways are preferable to the shorter, narrower runways at other facilities in the region.
- ♦ There is only one full-service fuel vendor in operation at the airport and training aircraft based in YKM currently fly to Sunnyside for cheaper fuel. A facility that could provide automotive gasoline (MoGas) could attract aircraft to YKM. Pullman is the closest airport with MoGas available.

- ◆ Sport aviation is expected to continue to grow in Yakima since Cub Crafters builds approximately 50 sport aircraft per year at YKM and provides training, repairs and support services to the owners of these aircraft.
- ◆ At the moment, hangar space is about even (supply/demand) but the cost to build hangars is going up. There is no waiting list for hangars at YKM but there is a demand for hangars caused by owners with aircraft that are stored on tie-down aprons wanting to move into an enclosed hangar.

3.4.12 General Aviation Forecast

With this data as background, forecasts can be produced for general aviation growth at Yakima. In this respect two factors will be examined. The first will be the number and type of aircraft calling YKM home over the next twenty years. The second will be forecasts of operations by general aviation aircraft.

3.4.12.1 Forecast of Based Aircraft

Historical records of the number of aircraft based at YKM since 2000 were examined as part of this master plan. The following graph shows the growth experienced over time. Over the last 10 years there has been a steady trend upward at YKM.

To forecast the growth in based aircraft at YKM, various forecast modeling techniques were used. Standard regression analyses were discounted as a viable approach as any model that relies on historical relationships with any independent variable such as population have proven to have low correlation values and therefore are poor forecasting tools. There are, however, several forecasting methods that can be used to generate reliable estimates of future growth in based aircraft. These are:

- ◆ **FAA Terminal Area Forecast (TAF):** FAA based aircraft forecasts for 2010 through 2030 contained in the Terminal Area Forecasts for YKM were evaluated. Under the FAA TAF model, based aircraft are expected to continue to increase through 2030 when 204 aircraft are expected to be based at the airport.
- ◆ **Population Based Growth:** Testing the historical relationship between area population and the number of based aircraft resulted in a finding that the relationship between the two, although not very strong historically, did show evidence that area population is a force behind based aircraft. Therefore, we have produced a forecast of based aircraft using the growth rate the state has produced for population applied to current based aircraft counts. This projection represents local growth conditions.

- ♦ **Market Share Analyses:** As with previous forecasts, projections have been made to represent the number of aircraft at YKM that result from the airport maintaining its current share of the growth in the State of Washington and the NW Mountain region as forecast by FAA in the TAF.
- ♦ **WSDOT LATS Market Share:** Forecasts for the airport prepared under the WSDOT LATS provide another recent comprehensive analysis of regional aviation demand in the YKM service area. WSDOT LATS based aircraft and operations forecasts for the region provided the foundation for market share allocations of activity to YKM. To account for the fact the LATS forecasts were produced using 2006 data as a base, it was decided that while the actual forecast may be dated, applying the growth rate from LATS to the actual 2009 based aircraft number would produce a reliable projection of future growth.

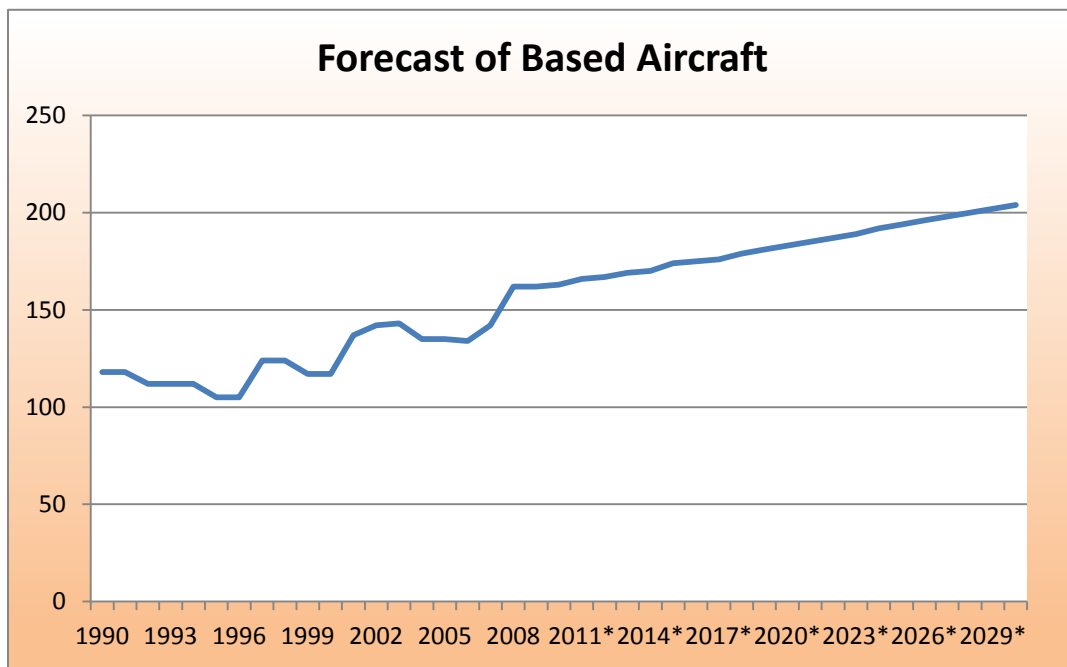


Table 3-11 shows the results of these projections for based aircraft at YKM. In reviewing these and considering the factors discussed in the preceding, it was determined the preferred forecast for based aircraft at YKM should combine the growth rates used in developing the LATS with the growth expected based solely on area population growth. The LATS growth rates included factors reflecting the expectations within the state's aviation system, combined with the DOT's expectations as to how the growth would be distributed within regions of the state and finally to the individual airports while the population based forecast relies solely on the State Office of

Financial Management’s (OFM) projections for growth in Yakima County. This combination results in a forecast of continued growth at YKM at a rate sustainable and consistent with the national trends discussed in preceding sections as well as reflecting the local factors discussed by the stakeholders.

Table 3-11: Forecasts for Based Aircraft

Year	TAF	Population Growth	Share of WA	Share of Region	LATS Projection	Average/ Preferred
2010	162	162	162	162	162	162
2015	174	176	172	173	179	175
2020	183	188	182	182	189	185
2025	194	201	192	192	199	196
2030	204	215	202	201	218	208

3.4.12.2 Based Aircraft Fleet Mix

The current based aircraft fleet at Yakima consists primarily of small piston-engine aircraft. Eighty-six percent of the based aircraft are single engine and 11 percent multi engine. The remaining 3 percent are jet or rotorcraft. It is expected that this fleet will evolve based on changes in the aircraft manufacturing, delivery, and use trends being experienced nationally. Naturally the fleet will continue to be dominated by small private aircraft used as personal or business aircraft. However, the increasing reliance on jet aircraft by the corporate sector in general will be felt in Yakima as the population and economy continues to evolve. The forecast of based aircraft fleet is based on the following:

- ♦ **Single-Engine/Piston (SEP):** This category includes both traditional single-engine piston aircraft as well as the newer light sport aircraft (LSA).
- ♦ **Multi-Engine (ME):** The multi-engine category is composed of both twin-engine piston and turboprop aircraft. However, the FAA Aerospace Forecasts 2008 to 2025 project multi-engine fixed wing piston powered aircraft to decline at an annual rate of 0.9 percent.
- ♦ **Turbojet:** This category includes both traditional business/corporate jet aircraft, as well as the very light jets (VLJ).
- ♦ **Rotor:** The rotor category includes both piston and turbine-powered rotorcraft.

The FAA Aerospace Forecasts note that light sport aircraft such as those being manufactured by Cub Crafters at YKM and VLJs are expected to make significant in-roads into the low and high ends of the general aviation fleet through 2025. The reasons for this expectation are that these newer more affordable aircraft will continue to attract the general aviation market in a manner that the older aircraft fleet will not. Although these aircraft do not have their own specific categories in the fleet mix forecasts, it is assumed they will represent an increasing percentage of the aircraft in the SEP and turbojet categories.

The based aircraft fleet mix forecast for YKM uses current data and forecasts changes to the mix based on the overall evolution of general aviation in the United States and the expectations and observations of the airport stakeholders. The fleet mix percentages for YKM were applied to the based aircraft forecast for the airport. The recommended YKM fleet mix forecast for the benchmark years is presented in Table 3-12 below.

Table 3-12: Recommended YKM Fleet Mix Forecast

Year	Single Engine Piston		Multi Engine Piston		Turbine		Rotor		Total	
	%	No.	%	No.	%	No.	%	No.	%	No.
2010	85.2%	138	11.1%	18	2.5%	4	1.2%	2	100.0%	162
2015	85.0%	149	11.0%	19	2.6%	5	1.4%	2	100.0%	175
2020	84.2%	156	11.1%	21	3.0%	6	1.7%	3	100.0%	185
2025	83.7%	164	10.9%	21	3.3%	6	2.1%	4	100.0%	196
2030	82.9%	173	10.5%	22	4.1%	9	2.5%	5	100.0%	208

3.4.12.3 General Aviation Operations

As with activity indicators at many airports the historical records for general aviation operations exhibit a long term reduction in the total number of operations. From 1997 to the present the number of annual operations have fluctuated but remained relatively stable around the 45,000 to 50,000 range. Therefore our forecast will need to rely on techniques considering this historical record but do not under estimate the growth rate based on the early years of this same record.

Market Share Analyses: For general aviation operations, the share of the market in the State of Washington, the Northwest Mountain Region and the United States likely to occur at YKM was reviewed. These shares were calculated using the percentage of the larger market that was experienced at YKM in 2009.

WSDOT LATS: As discussed before, the WSDOT LATS study represents the most recent, comprehensive forecast of aviation activity in the state of Washington. In the study, aviation activity was forecast through 2030 for each region and airport in the State. Under LATS, aircraft operations at YKM are anticipated to grow at an annual rate of 1.2% through 2015 and then slow to annual growth of 1 percent per year through 2030.

Operations per Based Aircraft: The final forecasting technique used relied on applying a factor for the number of operations per based aircraft to the based aircraft forecast presented in the previous section. This technique is being used as a baseline for comparing the others. Forecasts generated by using operations per based aircraft alone are generally unreliable because the historical patterns are not reliable and the relationship has not proven to be strong. The alternative operations forecasts for YKM are presented in Table 3-13. The exhibit also shows the preferred forecast for general aviation operations. This preferred forecast used an average of all of the projections.

Table 3-13: General Aviation Operations Forecast

Year	TAF	Market Shares			LATS	OPBA	Preferred
		State	Region	Nation			
2010	38,481	38,481	38,481	38,481	38,481	38,481	38,481
2015	39,780	39,832	39,996	38,245	41,336	41,593	40,130
2020	41,218	42,214	42,318	39,633	43,445	43,966	42,132
2025	42,716	44,837	44,844	41,127	45,661	46,539	44,287
2030	44,279	47,727	47,623	42,749	47,990	49,538	46,651

Records of general aviation activity at YKM show that, on average, about 55 percent of all operations were transient and 45 percent local. Future levels of local and itinerant activity were forecast using this distribution, as shown in Table 3-14.

Table 3-14: Forecast of General Aviation Local and Itinerant Operations

Year	Total	Transient	Local
2010	38,481	21,165	17,316
2015	40,130	22,072	18,059
2020	42,132	23,173	18,960
2025	44,287	24,358	19,929
2030	46,651	25,658	20,993

3.4.13 Military Operations

Between 1990 and 2009, total military operations at YKM averaged 4,040 per year with higher levels occurring in the 1990s. In forecasting future military operations levels, it has been assumed that they would remain a low percentage of total airport activity and would continue to average 4,040 per year.

3.5 PEAKING

The facility requirements determination presented in the subsequent section depends, in part, on forecasts of peak future aircraft and passenger activity levels. Peak levels of activity closely correlate with the need for facilities, such as runways, taxiways, aircraft apron and passenger terminal facilities. Three primary descriptors are used as indicators of peak aviation activity:

- ♦ **Peak Month:** Defined as that month in the calendar year when the highest overall activity levels occur. The term "design month" is interchangeable with peak month.
- ♦ **Average Day:** Defined as the average day within the peak month. This indicator is developed by dividing the peak month activity by 31.
- ♦ **Design Hour:** Defined as the peak hour within the average day, typically ranging between 10 and 20 percent of the average day activity. According to FAA Advisory Circular 150/5360-13, design hour operations may reach levels as high as 12 to 20 percent of the average day operations and drop as low as 6.25 percent.

It is important to note that neither the average day nor the design hour is the absolute peak occurring within a given year. By definition, average day activity will be exceeded at least fifteen days during the peak month. Likewise, design hour activity will be exceeded numerous times due to the calculation methodology used.

Peaking forecasts are prepared to determine the maximum number of passengers needing to use the terminal facilities and the hourly operations demand the runway system. In this regard, we have estimated peak period operations based on the following observations and assumptions:

Enplaned Passengers:

- ◆ **A peak month:** value of 10 percent of total annual enplaned passengers is used to reflect the elevated activity experienced during the peak travel months—typically July and August (normal month equals 8 percent of the year).
- ◆ **Average day:** The average day calculation divides the peak month by 31 days to yield an average daily operations figure.
- ◆ **Peak hour:** The peak hour calculation is used to determine the maximum number of passengers during the busiest one hour period of the average day. With three daily departures this number will be relatively high as a percentage. The peak hour enplaned passenger forecast is estimated to be 35 percent of average day.

Commercial Operations

- ◆ **Peak month:** Since this category included scheduled service, the peak month will not fluctuate from the average. For commercial service the peak month will be equal to eight percent of the annual.
- ◆ **Average day:** The average day calculation divides the peak month by 31 days to yield an average daily operations figure.
- ◆ **Peak hour:** With three scheduled departures per day, there are two peak hour operations (one take off and one landing). This number will increase as flights are added

Air Cargo/Air Taxi

- ◆ **Peak month:** Like commercial operations, this category is primarily scheduled activity therefore the peak month has been estimated to remain at eight percent of the year.
- ◆ **Average day:** The average day calculation divides the peak month levels by 31 days to yield an average daily operations figure.
- ◆ **Peak hour:** With this category dominated by air cargo, the peak hour will be related to the cargo carrier's daily schedules, which consist of morning arrivals and evening departures. A figure representing half of the operations in the morning is used in the peak calculation.

General Aviation

- ♦ **Peak month:** General aviation activity is assumed to peak during the summertime when the days are longer and the weather suited for training activity. A peaking factor of eleven percent of the total annual operations is used in this analysis.
- ♦ **Average day:** The average day calculation divides the peak month levels by 31 days to yield an average daily operations figure.
- ♦ **Peak hour:** Peak hour operations are assumed to occur during the early summer evening periods when general aviation pilots are conducting training activity. During this time levels as high as 25 percent of the average day are expected to occur.

Total Activity

- ♦ **Peak month:** Since the peak periods for each category are not likely to occur simultaneously, the peaks for total will not consist of the total for the other categories. Total activity levels are assumed to peak during the summertime with a peaking factor of eleven percent of the total annual operations is used in this analysis.
- ♦ **Average day:** The average day calculation divides the peak month levels by 31 days to yield an average daily operations figure.
- ♦ **Peak hour:** Like general aviation, total peak hour operations are assumed to occur during the early summer evening periods when general aviation pilots are conducting training activity. During this time levels as high as 25 percent of the average day are expected to occur.

The forecast peak period operations for YKM are shown in Table 3-15.

Table 3-15: Forecast of Peak Period Activity

Year/Category	Annual Activity	Peak Month	Average Day/ Peak Month	Peak Hour
Enplaned Passengers				
2010	58,994	5,899	190	67
2015	65,134	6,513	210	74
2020	75,508	7,551	244	85
2025	96,370	9,637	311	109
2030	122,995	12,300	397	139
Commercial Operations				
2010	2,190	175	6	2
2015	2,285	183	6	2
2020	2,483	199	6	2
2025	2,983	239	8	3
2030	3,596	288	23	5
Air Cargo/Air Taxi Operations				
2010	5,777	462	15	7
2015	6,222	498	16	8
2020	6,701	536	17	9
2025	7,219	578	19	9
2030	7,778	622	20	10
General Aviation Operations				
2010	38,481	4,233	137	34
2015	40,130	4,414	142	36
2020	42,132	4,635	150	37
2025	44,287	4,872	157	39
2030	46,651	5,132	166	41
Military Operations				
2010	4,040	444	14	4
2015	4,040	444	14	4
2020	4,040	444	14	4
2025	4,040	444	14	4
2030	4,040	444	14	4
Total Operations				
2010	50,488	5,554	179	45
2015	52,677	5,794	187	47
2020	55,357	6,089	196	49
2025	58,529	6,438	208	52
2030	62,065	6,827	220	55

3.5.1 Total Annual Operations

Table 3-16 combines the forecasts of all activity categories determined in the preceding results in a forecast of total annual operations through the year 2030.

Table 3-16: Forecast of Total Annual Operations

	2010	2015	2020	2025	2030
Commercial	2,190	2,285	2,483	2,983	3,596
Air Cargo/Air Taxi	5,777	6,222	6,701	7,219	7,778
General Aviation	38,481	40,130	42,132	44,287	46,651
Military	4,040	4,040	4,040	4,040	4,040
Total Operations	50,488	52,677	55,357	58,529	62,065

3.6 INSTRUMENT OPERATIONS

An instrument operation at an airport is defined as any arrival or departure from an airport by aircraft operating in accordance with an Instrument Flight Rule (IFR) flight plan or with the provision of IFR separation from other aircraft by a terminal control facility; or, any contact with the ATCT by aircraft operating under an IFR flight plan. Instrument operations can be conducted at any time, regardless of meteorological conditions. Actual instrument approaches, however, are defined as instrument operations conducted during instrument meteorological conditions. Instrument meteorological conditions exist when the cloud ceiling is less than 1,000 feet above ground level (AGL) and/or visibility is less than three miles. Instrument approach statistics are normally compiled by an Airport Traffic Control Tower (ATCT).

At YKM a three-year record of flight tracking data was obtained from FlightAware, an aviation software and data services company based in Houston, Texas. FlightAware provides flight tracking of private and commercial flights at airports throughout the United States. The FlightAware data used in this analysis reflects flight plans that were filed to/from YKM from September 2008 through September 2010. This data, compared with total operations for the same time period, shows 28 percent of all flights at YKM are classified as instrument operations. This percentage is expected to hold constant over the forecast period, as shown in Table 3-17, due to the relative stability in the mixture of commercial operations, that are almost all included as instrument operations and general aviation, where the same relative percentages of instrument operations are envisioned.

Table 3-17: Forecast of Instrument Operations

Year	Total Operations	Instrument Operations
2010	50,488	14,137
2015	52,677	14,750
2020	55,357	15,500
2025	58,529	16,388
2030	62,065	17,378

3.7 OPERATIONS BY AIRCRAFT TYPE

Forecasting future activity by aircraft type is a very key step in the development of an airport's master plan. This forecast allows for the identification of the Critical Aircraft that will be used to determine many of the future airport requirements, particularly on the airfield. The critical aircraft is defined as that type (or combination of types) that regularly use, or are expected to use the airport. Regular use is defined as 500 or more annual operations.

The forecast of future operations by aircraft type at YKM was prepared using historical information, data collected during interviews with airport users, and analysis of trends in both national and regional aviation as presented in preceding sections of this report. The forecast anticipates the continued use of aircraft such as the Q-400 in the commercial service market with small turbo-prop aircraft such as the Embraer 120 or Cessna Caravan providing air cargo service. A special effort was made to analyze the types of aircraft using YKM today in order to best forecast the aircraft likely to use the airport in the future. For this study, the three-year record of flight tracking data obtained from FlightAware, was used.

This flight tracking data does not include flights occurring during visual conditions or for any flight for which a flight plan was not filed and is not a complete record of all flights at YKM during this three-year period. The data does reflect the best available information on actual flight activity by transient aircraft at YKM.

The flight plan data recorded 40,698 aircraft arrivals and/or departures over the three year period. This averages approximately 13,500 per year, or 28 percent of the airport's total annual operations. FlightAware data is reputed to accurately record nearly 95 percent of flights where flight plans were filed. The other five percent are aircraft operations where the owners have requested that the flight information not be reported for privacy reasons.

As seen from this data, about three percent of all activity at YKM was performed by business jet aircraft. These range from small business jets such as the Cessna Citation to the Boeing 747-8. Table 3-18 shows the breakdown of flight operations by aircraft type for both the current year as well as the projected changes in operational fleet through 2030.

In forecasting future activity by aircraft type, the following assumptions were used.

1. Use of YKM by business and corporate aircraft will continue into the future with slow but steady increases in the overall percentage of the fleet. These business jet operations today are primarily small to medium jets such as the Cessna Citation or Learjet 30.

In the future it is expected that more of the jet activity will be by larger aircraft such as Grumman Gulfstream III and IV as well as the Global Express.

2. The airport is regularly used by Boeing aircraft ranging from the 737 series to the 747-8. These operations are typically training flights where the aircraft does not touch the runway surface. However, YKM is a designated alternate airport for flights bound for Seattle and occasionally receives these stopovers during bad weather conditions.

This level of activity is expected to continue into the future. As Boeing's production levels continue to increase demand for these types of flights will also increase. Given current production schedules it is anticipated that this activity will be primarily the 737 series and the 747-8. Weather diversions will continue to be a small but important component.

3. Regularly scheduled commercial airline service is currently limited to operations by the Bombardier Q-400 turboprop aircraft with a seating capacity of 75. In March of 2012, additional service will be added by SeaPort Airlines using smaller 9-seat turboprop aircraft.

For the future it is assumed that this mix will continue with the possible addition of regional jet aircraft with a seating capacity of 75 to 100 should a fuel efficient model be introduced to the commercial fleet.

4. Air cargo flights to and from Yakima are expected to continue to consist of small, low-capacity aircraft such as the Cessna Caravan or the Embraer 120 feeding the cargo hubs in Seattle and Spokane.
5. Other general aviation flights being conducted by small turboprop or piston aircraft currently comprise approximately 80% of all recorded operations at YKM. In the future it is expected that these types of aircraft will continue to be the prominent users of the airport.

Table 3-18: Forecast of Operations by Aircraft Type

Aircraft/Category	Typical Aircraft	2010		2015		2020		2025		2030	
		%	Total	%	Total	%	Total	%	Total	%	Total
Jets											
B-I	Learjet 30	0.0%	23	0.0%	24	0.0%	25	0.0%	26	0.0%	28
B-II	Cessna Citation	2.0%	1,034	2.3%	1,185	2.3%	1,278	2.8%	1,639	3.5%	2,172
C-I	Learjet 25	0.1%	36	0.1%	39	0.1%	50	0.1%	59	0.2%	99
C-II	CRJ-700	0.2%	106	0.3%	147	0.3%	155	0.3%	164	0.3%	174
BIII	Citation X	0.0%	-	0.5%	263	0.5%	277	1.0%	585	1.0%	621
CII	Gulfstream GIII	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-
DII	Gulfstream GIV	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-
DIII	Global Express	0.0%	-	0.3%	132	0.3%	166	0.4%	234	0.5%	310
DIII	Gulfstream V	0.0%	-	0.3%	132	0.3%	155	0.4%	234	0.5%	310
C-III	Boeing 737 - all series	0.4%	187	0.4%	195	0.4%	205	0.4%	217	0.4%	230
C-IV	Airbus A330	0.0%	1	0.0%	1	0.0%	1	0.0%	1	0.0%	1
D-II	Learjet 35	0.0%	2	0.2%	79	0.2%	127	0.4%	205	0.5%	298
D-IV	Boeing 777	0.0%	1	0.0%	1	0.0%	1	0.0%	1	0.0%	1
D-VI	Boeing 747-8	0.0%	2	0.0%	2	0.0%	2	0.0%	2	0.0%	2
Total		2.8%	1,392	4.2%	2,199	4.4%	2,441	5.8%	3,366	6.8%	4,246
Turboprops											
C-III	Bombardier Q-400	4.3%	2,190	4.2%	2,191	4.0%	2,202	5.0%	2,920	8.0%	4,965
B-I	Beech King Air, Beech 1900	11.4%	5,777	11.8%	6,230	12.2%	6,734	12.4%	7,228	5.0%	3,103
Twin-Engine Piston											
	Beech Baron, Cessna 404	17.2%	8,664	18.0%	9,479	18.1%	10,016	18.0%	10,534	18.0%	11,172
Single-Engine Piston											
	Piper Cub, Beech 180	62.6%	31,599	59.8%	31,490	59.1%	32,704	56.5%	33,066	59.6%	36,991
Rotor											
	Robinson, Bell	1.7%	866	2.0%	1,053	2.2%	1,217	2.4%	1,405	2.6%	1,614
Total		100.0	50,488	100.0	52,659	100.0	55,336	100.0	58,524	100.0	62,065

Based on historical activity records, the critical aircraft for YKM is the Bombardier Q-400 operated by Alaska Airlines. This aircraft recorded more than 2,190 operations in 2010. The Q-400 is classified as a C-III with a maximum takeoff weight of 64,000 pounds. Projecting the future leads to the conclusion that the Q-400 is likely to remain the critical aircraft at least through the next ten years since Alaska is expected to continue to serve Yakima with these airplanes. Beyond 2020 Alaska service will still be offered using the Q-400 but fleet changes may occur as business and corporate aviation become a larger factor at YKM. This could lead to increased use by large corporate jets such as the Grumman G-V and the Global Express which are classified as D-III by FAA and weigh 90,000 pounds. However, it is likely that the Q-400 will continue to be the critical aircraft through the end of this 30 year planning period.

