# Chapter Two
# FORECAST



## *INTRODUCTION*

Aviation demand forecasts help to determine the size and timing of needed airport improvements. This chapter indicates the types and levels of aviation activity expected at Grove Field during the forecast period of 2005 through 2025. The methodology followed is from "Forecasting Aviation Activity by Airport," GRA, Incorporated, July 2001.

## *AVIATION ACTIVITY PARAMETERS AND MEASURES TO FORECASTS*

For Grove Field Airport, the following activity categories are projected:

- Based Aircraft, including fleet mix.
- Annual Aircraft Operations, including general aviation (GA), local vs. itinerant, and annual instrument approaches.
- Airport Reference Code, which defines the appropriate FAA criteria for airport design and is determined by the most demanding aircraft that regularly uses the airport.

## *PREVIOUS AIRPORT FORECASTS*

The following previous airport forecasts for Grove Field were reviewed:

- FAA Terminal Area Forecast (TAF). The FAA provided an advance copy of the draft 2004 TAF
- Washington State Department of Transportation (WSDOT) Aviation Division, *Aviation System Plan – Forecast and Economic Significance Study,* 2000 (see Table 2B)

Historical and forecasted data from both of these sources is presented in the subsequent text below.

The FAA annually prepares aviation demand forecasts (for a 20-year period) called the Terminal Area Forecasts (TAF) for all airports included in the National Plan of Integrated Airport Systems (NPIAS). The FAA TAF provides forecast data for based aircraft, annual operations, and annual growth rates for each. Table 2A presents the FAA TAF data for Grove Field. As shown in the table, the average annual growth rate for all components of aviation activity at the Airport is 0%.

**TABLE 2A: FAA TAF, Historical and Forecast, Based Aircraft and Annual Operations**

| Year | Based Aircraft [1/] | Total Annual Operations | GA Itinerant Operations | GA Local Operations |
|---|---|---|---|---|
| **Historical:** | | | | |
| 2001 | 61 | 12,600 | 7,000 | 5,000 |
| 2002 | 61 | 12,600 | 7,000 | 5,000 |
| 2003 | 61 | 12,600 | 7,000 | 5,000 |
| **Forecast:** | | | | |
| 2004-2020 | 61 | 12,600 | 7,000 | 5,000 |
| **Avg. Annual Growth Rate** | 0.0% | 0.0% | 0.0% | 0.0% |

*Source: FAA draft TAF, 2004*
*Notes: [1/] The TAF forecast indicates all based aircraft are singe-engine*

WSDOT Aviation Division's *Aviation System Plan – Forecast and Economic Significance Study* contains forecasts for all airports in the state. Registered aircraft in the state were forecast by using the average of five forecasting models:

1) Time-Series Analysis (continuation of historical trends).
2) Regression analysis that examined per capita personal income (PCPI) in Washington compared to that in the United States.
3) Regression analysis using state population and PCPI as independent variables.
4) The FAA's nationwide growth rates for registered aircraft.
5) A multiple regression analysis that used pilot population as one of the variables.

The registered aircraft forecasts were distributed among the counties according to the actual distribution in 1998, with adjustments in the future to consider different population and PCPI growth forecast by the State. Based aircraft for individual airports were forecast by holding

constant the market share of the aircraft based in the county to the number of aircraft registered in that county. To forecast aircraft operations, the WSDOT methodology was to calculate a utilization rate (operations per based aircraft) for the base year. Except where specific conditions were noted, the utilization rate at each airport was increased uniformly by 0.3% for 2005, 0.33% for 2010, .36% for 2015, and 0.39% for 2020. Table 2B presents the WSDOT System Plan forecasts for based aircraft and annual operations at Grove Field.

**TABLE 2B: WSDOT AVIATION SYSTEM PLAN FORECASTS**

| Year | Based Aircraft | Total Annual Operations | GA Itinerant Operations | GA Local Operations |
|---|---|---|---|---|
| **Historical:** | | | | |
| 2000 | 66 | 5,000 | 3,750 | 1,250 |
| **Forecast:** | | | | |
| 2005 | 78 | 5,900 | 4,400 | 1,500 |
| 2010 | 89 | 6,800 | 5,100 | 1,700 |
| 2015 | 98 | 7,500 | 5,600 | 1,900 |
| 2020 | 106 | 8,100 | 6,000 | 2,100 |
| **Avg. Annual Growth Rate (2000-2020)** | 2.39% | 2.44% | 2.37% | 2.62% |

*Source: WSDOT Aviation System Plan, 2001*

## *BACKGROUND DATA*

This section presents historical and forecasted national aviation trends as well as socioeconomic trends for the area surrounding Grove Field. It is important to relate how these trends are most likely to influence demand at the Airport over the planning period.

NATIONAL AVIATION TRENDS

The FAA has developed two different forecasts (*FAA Long-Range Forecasts and FAA Aerospace Forecasts)* which identify nationwide general aviation activity trends. These trends have been reviewed and are discussed within the text for purposes of providing background information and assisting in selecting among the three forecast models that were analyzed. The specific growth rates from these national forecasts will not be used to forecast aviation demand components related to Grove Field.

FAA-APO-03-3, *FAA Long-Range Forecasts, Fiscal Years 2015, 2020, 2025, and 2030*, June 2003, contains forecasts of long-term growth in GA aircraft, GA hours flown, and pilots. GA activity is very sensitive to changes in fuel price and economic growth. Forecast assumptions include sustained economic growth, relative stability in fuel prices, and continued growth in fractional ownership programs and corporate flying. Also important to GA growth is continued investment in production by GA aircraft manufacturers. Pilot growth is aided by recent industry program initiatives designed to promote GA. According to FAA-APO-03-3, the number of active

GA aircraft is expected to increase at an average annual growth rate of 0.5%, with slower growth for the piston engine portion of the fleet than the turbine portion, reflecting more business and corporate use of GA aircraft in an expanding U.S. economy. Flight hours are projected to increase at a faster rate than the fleet, 1.5% annually through 2014, and 1.2% annually from 2015 through 2030. The number of pilots is forecast to grow at an average annual rate of 1.2% over the 28-year period. Table 2C presents average annual growth rates through 2025 for the various aircraft categories as well growth rates for pilot hours flown.

**TABLE 2C: FAA Long-Range GA Forecasts (Average Annual Growth Rates)**

| | 2002-2005 | 2005-2010 | 2010-2015 | 2015-2025 |
|---|---|---|---|---|
| Piston | 0.2% | 0.3% | 0.2% | 0.2% |
| Turbine | 2.2% | 3.2% | 2.6% | 2.3% |
| Helicopters | 0.5% | 0.9% | 0.5% | 0.5% |
| Experimental | 3.0% | 1.9% | 1.5% | 1.0% |
| Hours Flown | 1.3% | 1.6% | 1.5% | 1.3% |

*Source: FAA-APO-03-3*

FAA-APO-04-1, *FAA Aerospace Forecasts Fiscal Years 2004-2015*, March 2004, contains the FAA's latest national forecasts for GA. The document begins with an assessment of recent trends. GA aircraft manufacturing has been declining: an estimated 15.9% decline in 2003 shipments compared to 2002. The active GA fleet declined 0.1% and hours flown increased 0.1% from the previous year. The business/corporate segment continues to offer the greatest potential for GA growth; fractional ownership activity has been increasing, with flight hours up 3.8% in 2003. Student pilots also increased in 2003, up 1.5% from 2002. Table 2D presents the FAA's average annual growth rates for the active GA and Air Taxi Fleets.

**TABLE 2D: FAA Forecasts for GA and Air Taxi Active Fleet (Avg. Annual Growth Rates)**

| | 2002-2005 | 2005-2010 | 2010-2015 |
|---|---|---|---|
| Single Engine Piston | 0.0% | 0.4% | 0.3% |
| Multi-Engine Piston | -0.5% | -0.5% | -0.5% |
| Turboprop | 0.8% | 1.6% | 1.4% |
| Turbojet | 2.6% | 5.9% | 5.3% |
| Rotorcraft (Piston) | 1.2% | 1.2% | 0.8% |
| Rotorcraft (Turbine) | -0.1% | 0.6% | 0.4% |
| Experimental | 0.2% | 0.6% | 0.3% |
| Sport Aircraft | | 3.1% | 3.0% |

*Source: FAA-APO-04-1*

The FAA's forecasts for 2004–2015 assume there will not be any successful terrorist incidents against either U.S. or world aviation. Business use of GA is projected to expand more rapidly than that for personal and sport use. The business/corporate side of GA should continue to benefit from safety concerns for corporate staff, increased processing times for airline travel, and the bonus depreciation provision of the Presidents economic stimulus package that should help stimulate jet sales. The new Eclipse jet aircraft is assumed to add 4,600 aircraft to the fleet by 2015. The Eclipse, priced under $1 million, is believed to have the potential to redefine the

business jet segment and support a true on-demand air taxi business. In addition, starting in 2003, owners of ultralight aircraft could register these aircraft as "light sport" aircraft, and the GA fleet forecast includes 20,915 aircraft in this new category by 2015. The active GA fleet is projected to increase at 1.3% annually over the forecast period, while the GA hours flown are projected to increase at 1.6% per year over the last 11 years of the forecast period. Table 2E presents the FAA forecasted average annual growth rates for GA and Air Taxi Hours Flown.

**TABLE 2E: FAA Forecasts for GA and Air Taxi Hours Flown (Avg. annual growth rates)**

| | 2002-2005 | 2005-2010 | 2010-2015 |
|---|---|---|---|
| Single Engine Piston | -0.3% | 0.9% | 0.7% |
| Multi-Engine Piston | -0.6% | -0.4% | -0.4% |
| Turboprop | -0.2% | 0.5% | 0.5% |
| Turbojet | 2.5% | 8.0% | 6.3% |
| Rotorcraft (Piston) | 1.2% | 2.0% | 0.9% |
| Rotorcraft (Turbine) | -0.3% | 1.4% | 0.7% |
| Experimental | 0.1% | 0.9% | 0.6% |
| Sport Aircraft | | 3.2% | 3.2% |

*Source: FAA-APO-04-1*

SOCIOECONOMIC TRENDS

In creating realistic forecasts for an airport, it is important to evaluate the socioeconomic trends of the surrounding area. Historical and projected population trends are often evaluated to determine the type of growth that is occurring in an area. This growth (or lack of growth) can influence demand levels at an Airport. Since the majority of aircraft owners that base aircraft at Grove Field are from Clark County, the County's population data have been analyzed. Table 2F presents historical and projected total resident population of Clark County. The population projections include low, intermediate, and high projections for years 2005 – 2025, using base year data from 2000.

**TABLE 2F: Clark County Population**

| Year | | Population | |
|---|---|---|---|
| **Historical:** | | | |
| 1980 | | 192,227 | |
| 1985 | | 206,744 | |
| 1990 | | 238,053 | |
| 1995 | | 290,111 | |
| 2000 | | 345,238 | |
| **Forecasts:** | | | |
| | **Low** | **Intermediate** | **High** |
| 2005 | 370,136 | 391,264 | 413,273 |
| 2010 | 400,908 | 432,479 | 465,996 |
| 2015 | 430,096 | 473,674 | 520,449 |
| 2020 | 453,280 | 509,876 | 571,061 |
| 2025 | 473,984 | 544,809 | 621,763 |
| **Average Annual Growth Rates:** | | | |
| 2000-2005 | 1.40% | 2.53% | 3.66% |
| 2005-2010 | 4.61% | 2.02% | 2.43% |
| 2010-2015 | 1.42% | 1.84% | 2.23% |
| 2015-2020 | 1.06% | 1.48% | 1.87% |
| 2020-2025 | 0.90% | 1.33% | 1.72% |

*Source: State of Washington Office of Financial Management, Projections released January, 2002*

As shown in the above table, population in Clark County is expected to grow rather aggressively over the next 20 years. According to Census 2000, Clark County is the second fastest growing county in the State of Washington. This is a strong indicator that growth will continue at the Airport as well.

## *GROVE FIELD FORECASTS*

For Grove Field forecasts, growth rates and methodologies from three different sources were reviewed - the FAA's Terminal Area Forecast, the Washington Aviation System Plan and the State of Washington Office of Financial Management Population Forecasts

BASED AIRCRAFT FORECASTS

The inventory effort for this report found that the actual number of existing based aircraft, 73, differs from the TAF and the WSDOT System Plan forecasts, which both reported 61 based aircraft in 2003 and 2000, respectively. The differences in these numbers imply that the fleet based at Grove Field has been growing in recent years. This growth is evident by examining the demand for hangars at Grove Field. Airport Management indicates that there is a hangar waiting list of 20 people. In preparing based aircraft forecasts, it is important to consider the existing number of aircraft stored at the Airport *as well as* the existing demand (hangar waiting list). For planning purposes, since not all aircraft owners on a waiting list typically sign a lease if a hangar is available, it is common to assign a 50% probability of "takers" to the waiting list (i.e. ten aircraft owners would accept a hangar). Based on the current number of aircraft housed at the

Airport, and the hangar waiting list of 20, the 2004 demand for aircraft based at Grove Field is 83.

Table 2G compares the based aircraft forecasts that resulted by applying the *average annual growth rates* from each of the three sources previously discussed (FAA TAF, WSDOT Aviation System Plan, and County population forecasts) to the existing based aircraft demand. The average annual growth rates presented in Table 2G were derived by interpolating and extrapolating the data presented in Tables 2A, 2B, and 2C so that all methodologies reflect the same base year and projected milestones.

**TABLE 2G: COMPARISON OF BASED AIRCRAFT FORECAST MODELS**

| Year | Based Aircraft Demand | FAA TAF Based Aircraft Growth Rate | WSDOT Based Aircraft Growth Rate | High County Population Growth Rate |
|---|---|---|---|---|
| **Current:** | | | | |
| 2004 | 83 | | | |
| **Forecast:** | | | | |
| 2005 | | 83 | 85 | 85 |
| 2010 | | 83 | 94 | 94 |
| 2015 | | 83 | 104 | 105 |
| 2020 | | 83 | 116 | 116 |
| 2025 | | 83 | 128 | 129 |
| **Avg. Annual Growth Rate (2004-2025)** | | 0.0% | 2.10% | 2.14% |

*Source: Current Data- Airport Management, Forecast Data- W&H Pacific, Inc.*
*Notes: 0.0% average annual growth from Terminal Area Forecasts, August 2004, Table 2A*
*2.10% average annual growth calculated by interpolation and extrapolation from Washington Aviation System Plan – Forecast and Economic Significance Study, Table 2B*
*2.14% Average Annual growth calculated from high population projections of State of Washington Office of Financial Management, Table 2F*

The FAA's projection for no growth is unreasonably low, considering that Clark County is one of the fastest growing areas in Washington State. In addition, the Airport has recently added six additional tie-down spaces and two new T-hangars. Both the WSDOT and Clark County models are projecting growth rates of approximately 2.1%, significantly higher than the national FAA forecasts for general aviation, however, more reflective of the growth at the Airport and the area around the Airport.

The WSDOT Aviation System Plan model is the recommended forecasting model for projecting based aircraft at Grove Field. This model is indicative of local factors and most accurately represents the growth expected to occur at Grove Field.

Throughout the 20 year planning period, the fleet mix of based aircraft is expected to change slightly. Discussions with the airport management have indicated that the Airport will maintain its role serving small general aviation aircraft, primarily single and multi engine piston aircraft. Table 2H presents the based aircraft fleet mix projected through 2025.

**TABLE 2H: BASED AIRCRAFT FLEET MIX**

| Year | Single Engine | % | Multi Engine | % | Total |
|---|---|---|---|---|---|
| **Current:** | | | | | |
| 2004 | 82 | 99 % | 1 | 1% | 83 |
| | | | | | |
| **Projected:** | | | | | |
| 2005 | 84 | 99% | 1 | 1% | 85 |
| 2010 | 93 | 99% | 1 | 1% | 94 |
| 2015 | 102 | 98% | 2 | 2% | 104 |
| 2020 | 114 | 98% | 2 | 2% | 116 |
| 2025 | 126 | 98% | 2 | 2% | 128 |
| | | | | | |
| **Avg. Annual Growth Rate (2004-2025)** | 2.08% | | 3.36% | | 2.10% |

*Source: W&H Pacific, Inc.*

AIRCRAFT OPERATIONS FORECASTS

Aircraft operations numbers for Grove Field vary widely depending on which source is being consulted. The FAA's draft TAF forecast reported 12,600 annual operations for 2003, while the WSDOT System Plan Forecasts reported 5,000 annual operations for the year 2000. Discussions with airport management indicate that a realistic annual operations number is between 7,000 and 7,500. To be conservative and for planning purposes, 7,500 annual operations are used for the current year.

Table 2I presents annual aircraft operations forecasts that resulted by applying the *average annual growth rates* from each of the three sources previously discussed to the actual number of existing annual operations (7,500) at Grove Field. Similar to based aircraft forecasts, the average annual growth rates presented in Table 2I were derived by interpolating and extrapolating the data presented in Tables 2A, 2B, and 2C so that all methodologies reflect the same base year and projected milestones.

**TABLE 2I: COMPARISON OF ANNUAL AIRCRAFT OPERATIONS**

| Year | Approximate Total Annual Operations | FAA TAF Annual Operations Growth Rate | WSDOT Annual Operations Growth Rate | Clark County High Population Growth Rate |
|---|---|---|---|---|
| **Current:** | | | | |
| 2004 | 7,500 [1/] | | | |
| **Forecast:** | | | | |
| 2005 | | 7,500 | 7,614 | 7,774 |
| 2010 | | 7,500 | 8,210 | 8,766 |
| 2015 | | 7,500 | 8,854 | 9,790 |
| 2020 | | 7,500 | 9,547 | 10,742 |
| 2025 | | 7,500 | 10,295 | 11,696 |
| **Avg. Annual Growth Rate** (2004-2025) | | 0.0% | 1.52% | 2.14% |

*Source: Current Data- Airport Management, Forecast Data- W&H Pacific, Inc.*
*Notes: [1/] Estimated number from Airport Management*
*0.0% average annual growth from Terminal Area Forecasts, August 2004, Table 2A*
*1.52% average annual growth calculated by interpolation and extrapolation from Washington Aviation System Plan – Forecast and Economic Significance Study, Table 2B*
*2.14% average annual growth rates from high population projections of State of Washington Office of Financial Management, Table 2B*

As with based aircraft projections, the FAA's 0% growth rate is unreasonable due to the aggressive growth that appears to be occurring in the area surrounding the Airport. The WSDOT annual operations forecast is projecting a 1.52% average annual growth, which is somewhat low considering that based aircraft are expected to grow at 2.10%. The County population model provides the same growth rate for operations as for based aircraft, 2.14%.

The recommended methodology for forecasting annual operations at Grove Field is the methodology using the Clark County High Population growth rate. This growth rate, 2.14%, is slightly higher than the based aircraft growth rate (2.10%) which is consistent with the FAA's national forecasts projecting an increase of hours flown in GA aircraft.

Table 2J shows the operational fleet mix projections. It is estimated that 50% of local and itinerant operations are in aircraft which fall into ARC A-I (small), the remaining 50% of local and itinerant operations are by B-I (small). It is assumed that this split will remain at approximately 50/50 throughout the planning period.

**TABLE 2J: Operational Mix Forecast**

| Airport Reference Code | A-I (small) | B-I (small) |
|---|---|---|
| **Takeoff Weight (pounds)** | **Max. of 12,500** | **Max. of 12,500** |
| Base Year (2004) | | |
| Local | 937 | 938 |
| Itinerant | 2813 | 2812 |
| 2005 | | |
| Local | 972 | 972 |
| Itinerant | 2916 | 2915 |
| 2010 | | |
| Local | 1096 | 1096 |
| Itinerant | 3288 | 3287 |
| 2015 | | |
| Local | 1224 | 1224 |
| Itinerant | 3672 | 3671 |
| 2020 | | |
| Local | 1343 | 1343 |
| Itinerant | 4028 | 4029 |
| 2025 | | |
| Local | 1462 | 1462 |
| Itinerant | 4386 | 4386 |

## *SELECTED FORECASTS*

Table 2K presents a summary of the selected forecasts for based aircraft, aircraft operations, and instrument approaches. Local and itinerant operations numbers were derived by using the existing ratio of 25% versus 75%, respectively. This ratio corresponds with the ratio presented in the WSDOT Aviation System Plan.

The airport does not have an instrument approach now. The Washington Aviation System Plan forecasts assumed that all public-use airports in the state would have a minimum of one GPS approach. For this Airport Layout Plan Report, it is assumed that Grove Field will have an instrument approach in place by 2010. The forecast of instrument approaches in Table 2J follows the methodology in the Washington Aviation System Plan, which makes two assumptions: 1). 46.1% of general aviation aircraft approaches are assumed to be instrument approaches and 2). Instrument weather in the area west of the Cascade Mountains is estimated to occur 13% of the time.

**TABLE 2K: Grove Field Aviation Demand Forecast Summary**

| Year | Total Based Aircraft | Total Operations | Local GA Operations | Itinerant GA Operations | Instrument Approaches |
|---|---|---|---|---|---|
| **Current:** | | | | | |
| 2004 | 83 | 7,500 | 1,875 | 5,625 | 0 |
| **Forecast:** | | | | | |
| 2005 | 85 | 7,774 | 1,944 | 5,831 | 0 |
| 2010 | 94 | 8,766 | 2,192 | 6,575 | 197 |
| 2015 | 104 | 9,790 | 2,448 | 7,343 | 220 |
| 2020 | 116 | 10,742 | 2,686 | 8,057 | 241 |
| 2025 | 128 | 11,696 | 2,924 | 8,772 | 262 |
| **Avg. Annual Growth Rate (2004-2025)** | 2.10% | 2.14% | 2.14% | 2.14% | 1.91%[1/] |

*Source: Current – Airport Management, Forecast – W&H Pacific, Inc.*
*Note: [1/] Average Annual Growth Rate is for years 2010-2025*

## *AIRPORT REFERENCE CODE*

As discussed in Chapter One, the Airport Reference Code (ARC) is an important parameter for airport design. The appropriate ARC for an airport is determined by its design, or critical, aircraft, which is the most demanding aircraft that regularly, uses the airport. Regular use is defined as at least 500 annual itinerant operations--equivalent to an average of one departure per weekday.

The current ARC for Grove Field is A-I (small), which covers the current critical aircraft, based on the minimum activity threshold of 500 annual operations. The critical aircraft operating at Grove Field is the Cessna 172 (A-I (small)), which has a Maximum Takeoff Weight of 2,450 pounds. Since it is estimated that 50% of all local and itinerant operations will be conducted by B-I (small) aircraft (as shown in Table 2J), the appropriate future ARC is B-I (small).

## *AIRPORT PLANNING FORECAST RESULTS COMPARED WITH TAF*

Table 2L compares the selected forecasts for Grove Field with the FAA TAF forecasts.

**TABLE 2L: Comparison of Selected Forecasts with Terminal Area Forecasts**

| | Based Aircraft Forecast | | | Operations Forecast | | |
|---|---|---|---|---|---|---|
| Year | FAA TAF | Selected | Difference | FAA TAF | Selected | Difference |
| Base Year | | | | | | |
| 2004 | 61 | 83 | +36.1% | 12,600 | 7,500 | -40.5% |
| Forecast | | | | | | |
| 2005 | 61 | 85 | +39.3% | 12,600 | 7,774 | -38.3% |
| 2010 | 61 | 93 | +54.1% | 12,600 | 8,766 | -30.4% |
| 2015 | 61 | 104 | +70.5% | 12,600 | 9,790 | -22.3% |
| 2020 | 61 | 116 | + 90.2% | 12,600 | 10,742 | -14.7% |

*Sources: FAA draft 2004 TAF, W&H Pacific*
*Note: TAF data is projected through 2020*

As shown in the above table, the selected based aircraft forecast are 90.2% higher than that of the FAA TAF forecast. The difference is due largely to the TAF's 2003 based aircraft data being less than the actual number of based aircraft in 2004. In addition, the TAF is projecting no future growth, while the selected forecast is projecting rather aggressive growth due to increase in local populations and economic development.