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Grand Coulee Dam Airport
Electric City, Washington

AIRPORT LAYOUT PLAN REPORT

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Chapter One
INVENTORY

The initial step in the preparation of the Airport Layout Plan Report for Grand Coulee Dam Airport is the collection of information pertaining to the Airport and the area it serves. The information collected in this chapter will be used in subsequent analyses in this study. This chapter summarizes the Airport location, history and existing facilities. By establishing a thorough and accurate inventory, an appropriate forecast and recommendations for airfield and landside facilities can be developed.

The information was obtained from several sources, including on-site inspections, airport records, reviews of other planning studies, the Federal Aviation Administration (FAA), various government agencies, a number of on-line (Internet sites) which summarize statistical information and facts about the Airport, and interviews with airport staff, planning associations, and airport tenants. As with any airport planning study, an attempt has been made to utilize existing data, or information provided in existing planning documents, to the maximum extent possible.

AIRPORT LOCATION AND ACCESS

Grand Coulee Dam Airport is located in Electric City, Washington in Grant County. Grant County is home to the Grand Coulee Dam, several state parks and national recreation areas, lakes, and many other tourist activities. The City of Electric City is situated in northern Grant County and is served by State Highway 155. A pilot's courtesy car is available at the Airport. Grand Coulee Dam Airport is located two miles southwest of downtown Electric City.

AREA TOPOGRAPHY

The Airport has an elevation of 1,588 feet. The surrounding terrain is hilly to mountainous. The north, west, and south sides of the Airport are situated along the shoreline of Banks Lake.

CLIMATE

Electric City has a relatively dry, mild climate. The average high temperatures during the winter months (December through March) generally range from 26 to 40 degrees Fahrenheit with the coolest temperatures typically occurring in January. Average high temperatures during the summer months (June through September) generally range from 60 to 72 degrees Fahrenheit with the warmest days occurring in the month of July. Annual precipitation averages about 10.8 inches, while annual snowfall averages about 18.5 inches.

COUNTY AND AIRPORT HISTORY

The area now known as Grant County was first settled in the 1850's; its land was originally used for stock raising. By the 1880's agriculture production become the main industry as good soil and abundant water sources allowed for the development of fruit orchards and other produce. This agricultural industry attracted many people to the area and small towns began to form. Construction of the railroads allowed these new communities to flourish and in 1909 Grant County was established. The County is named after President Ulysses S. Grant. The Great Depression and the severe droughts reduced the County's population by more than a third. In 1933 Congress authorized construction of the Grand Coulee Dam and the Columbia Basin Project which once again allowed the agriculture industry to grow very rapidly and population levels tripled. By 1950, the Columbia Basin was the nation's largest reclamation project. Today, Grant County is a popular tourist area and fruit orchards are plentiful.

Grand Coulee Dam Airport was originally constructed by Grant County Port Authority District Number 7 in the late 1960's under an FAA grant. At that time, the Airport operated as a turf strip. In 1972, the Department of Interior Bureau of Land Reclamation constructed a paved airport with a runway length of 3,000 feet and a width of 55 feet. In 1980, a 1,199-foot runway extension was completed and the runway was widened to 75 feet.

AIRCRAFT ACTIVITY DATA

There are two types of aircraft activity data: based aircraft and annual operations. Based aircraft are the number of aircraft that are stored at an airport (either in hangars or in tiedowns). Annual operations are a reflection of the yearly number of aircraft that perform a takeoff or a landing at the Airport. There are currently nine based aircraft at Grand Coulee Dam Airport. Current annual aircraft operations at the Airport are estimated to be 11,000. Ameriflight (hauling freight for UPS) operates daily flights into the Airport using a Beech 99. The Bureau of Land Reclamation also regularly operates a Beech King Air (B200) at the Airport. Projected based aircraft and annual operations data will be presented in Chapter Two, *Forecasts.*

No significant airport service area studies have been completed; however conversations with the Airport and its users indicate that the primary service area of the airport is northern Grant County.

CRITICAL AIRCRAFT

An airport is designed based on the characteristics of the most demanding aircraft, by approach speed and wingspan, which currently use an airport or that is projected to use an airport at some point in the future. The critical aircraft for an airport must have 500 or more annual itinerant operations at that airport. An itinerant operation is defined as an operation involving a trip extending more than 20 miles from and/or to the Airport. The WSDOT System Plan database records indicate that the critical aircraft for Grand Coulee Dam Airport is a Beech 18. This aircraft has a wingspan of 49.7 feet and a maximum takeoff weight of 9,300 pounds.

EXISTING FACILITIES

The airport reference code (ARC) is a criterion that defines the critical airport dimensions based on an airport's critical aircraft. The ARC is defined specifically by the approach category and the design group of the critical aircraft. The approach category is determined by 1.3 times the stall speed of the aircraft in its landing configuration at its maximum landing weight. The approach category is represented by the letters A, B, C, D and E. The design group of the aircraft is based on the length of the wingspan and is defined by roman numerals I, II, III, IV, V and VI. **Exhibit 1A** summarizes representative aircraft by ARC.

Grand Coulee Dam Airport has an existing ARC of A-I (small). Approach category A includes those aircraft that have an approach speed of less than 91 knots. Design group I includes those aircraft that have a wingspan of up to 49 feet. Due to the Beech 18's wingspan of 49.7 feet, it is considered a design group II aircraft, and therefore does not fit into the A-I (small) ARC. Subsequent chapters will evaluate the Airport's existing critical aircraft and will make recommendations as to the future critical aircraft and ARC. The existing facilities at Grand Coulee Dam Airport are discussed in the following paragraphs and are identified on **Exhibit 1B**.

Table 1A presents the existing Airport dimensions and the recommended design standards that the Airport should have in order to meet the ARC of A-I (small).

Table 1A - Airport Design Standards

Design Feature	Existing (feet)	Standard A-I (small) (feet)
Runway Safety Area (RSA)		
-Width	120	120
-Runway 3 Length beyond runway end	330	240
-Runway 21 Length beyond runway end	255	240
Runway Object Free Area (OFA)		
-Width	240*	250
-Runway 3 Length beyond runway end	1,000	240
-Runway 21 Length beyond runway end	310	240
Runway Obstacle Free Zone (OFZ)		
-Width	240*	250
-Length beyond runway end	200	200
Runway Protection Zones	250x 1,000 x 450	250 x 1,000 x 450

Sources: Existing – W& H Pacific, Inc.
Standard – FAA AC 150/5300-13, Change 8
Note: Items marked with an asterisk do not meet FAA recommended standards

As can be noted in Table 1A, there are a few critical area dimensions which do not meet A-I (small) ARC standards. These variances will be discussed later in the report.

AIRFIELD FACILITIES

All existing pavement sections and pavement conditions were obtained from Pavement Consultants Inc.'s 1999 pavement survey (see **Exhibits 1C** and **1D**). The pavement condition index (PCI) survey is an inventory of the existing pavement sections and pavement conditions at all state-funded airports. The survey is compiled by a consultant hired by the State of Washington. The consultant uses a form of pavement testing to get a rating for each pavement surface. The rating, based on a numbered scale of 0-100, with 0 being the lowest and 100 being the highest, corresponds to a pavement condition ranging from poor to excellent. The State has hired another consultant to update this data in 2004/2005. Current pavement conditions discussed below are reported based on visual observations by W&H Pacific through a recent (August, 2004) airport field visit.

Runway

Grand Coulee Dam Airport has one paved, asphalt runway, Runway 3-21, at a length of 4,199 feet and a width of 75 feet.

There are two pavement sections for Runway 3-21. The north 1,200 feet of the runway, which was constructed in 1980, consists of five inches of crushed aggregate base course, topped with two inches of asphalt. The south 3,000 feet of the runway, constructed in 1972, consists of six inches of crushed aggregate base course, a layer of bituminous surface treatment (BST), and two inches of concrete. Both runway pavement sections were slurry sealed in 1996. The pavement is rated for single wheel gear 26,000-pound aircraft. This pavement strength rating is adequate in

supporting the operations of the critical aircraft. The runway pavement is in good condition; however there are several areas of severe longitudinal and lateral cracking. Additional crack sealing will prolong the life of the pavement.

Runway orientation is determined by the direction of the prevailing winds. The FAA recommends that a runway have 95% wind coverage based on specified crosswind components. Grand Coulee Dam Airport does not currently have a wind rose; therefore, current wind coverages can not be identified. As part of the facilities requirements chapter, an effort will be made to obtain wind data for the Airport.

Taxiways and Taxilanes

Runway 3-21 has three taxiways. Taxiway A, the midfield connector was constructed in 1972. It is 227 feet long and 40 feet wide and is in fair condition. The pavement section for Taxiway A consists of six inches of crushed aggregate base course, a single layer of Bituminous Surface Treatment (BST) and two inches of asphalt. Taxiway B, the east turnaround and Taxiway C, the west turnaround were constructed in 1980 and are both 360 feet long by 30 feet wide and are in good condition. The pavement sections for Taxiways B and C consist of five inches of crushed aggregate base course and two inches of asphalt. All three taxiways were slurry sealed in 1996.

Aprons and Aircraft Parking

Grand Coulee Dam Airport has one asphalt aircraft apron area, approximately 288 feet by 210 feet, located on the east side of the runway. The apron pavement is in fair condition with heavy thermal cracks. There are 17 tie-downs with concrete anchors located on the apron. There is a $2 per day (night) or $20 per month tie down fee.

LANDSIDE FACILITIES

Hangars and Airport Buildings

There are a total of six hangar buildings on Airport property, all located adjacent to the apron area. All hangars are privately owned under a ground lease at a rate of $0.11 per square foot per year. There is also an electrical building, a pilot's waiting room, and a separate restroom building located at the Airport.

Fixed Based Operators (FBOs)

A fixed based operator is an individual or a business that offers aviation-related services to Airport users, such as flight instruction, aircraft rental, aircraft maintenance, full-service aircraft fueling, etc. There are currently no fixed based operators at Grand Coulee Dam Airport

Internal Circulation, Access and Vehicle Parking

The Airport is fenced from the east shore to the west shore of Bank's Lake (see Exhibit 1B). Vehicular access to the Airport from State Highway 155 is via Ludolph Road. Access to the field is controlled by a steel gate secured by a combination lock. Vehicular parking is available in a small gravel lot located outside of the gate.

AIRFIELD SUPPORT FACILITIES

Aircraft Rescue and Firefighting

There are no Aircraft Rescue and Firefighting (ARFF) facilities available at the Airport, however, in the event of an emergency, these services are provided by local Police & Fire Departments.

Fueling Facilities

There are currently no fueling facilities available at the Airport.

Airport Maintenance

Airport maintenance is provided by the Grant County Port District.

Utilities

Utilities are limited at the Airport. Water is pumped from Bank's Lake. Telephone and power service are provided by the local utility companies. Sewer is limited to a septic system for the restroom building.

Common Traffic Advisory Frequency (CTAF)

The Federal Communications Commission (FCC) issued Grand Coulee Dam Airport a Common Traffic Advisory Frequency (CTAF) of 122.9 MHz. This frequency is used by pilots to communicate their intentions, via radio, to other pilots who may be in the vicinity of the Airport.

AIRPORT NAVIGATIONAL AIDS

Airport Navigational Aids, or NAVAIDS, provide electronic navigational assistance to aircraft for approaches to an airport. NAVAIDS are either visual approach aids or instrument approach aids; the former providing a visual navigational tool, and the latter being an instrument-based navigational tool. The types of approaches available at an airport are based on the NAVAIDS which are provided.

Instrument Approach Aids

There are no instrument approach aids at Grand Coulee Dam Airport.

Visual Approach Aids

All approaches to the Airport are made on a visual basis. Grand Coulee Dam Airport is equipped with a rotating beacon to assist pilots in locating the Airport. The Airport also has a 2-box Precision Approach Path Indicator (PAPI) on the left side of Runway 21. PAPIs contain multiple light units that are angled to provide the pilot with information as to whether he is approaching too low or too high.

Airport Lighting and Signing

Runway 3-21 is equipped with medium intensity runway lights (MIRL). The MIRL are pilot activated by using the CTAF frequency of 122.9 MHz. There is no lighting on the airport taxiways; however all three taxiways are equipped with reflectors. Taxiways A and B also have hold signs.

Other NAVAIDS

Grand Coulee Dam Airport has a segmented circle and lighted wind sock.

LAND USE PLANNING AND ZONING

There are several land use requirements, on the Federal, State, County and City levels, that need to be considered when reviewing existing land uses and planning for future development at and around an airport.

Federal regulations are generally concerned with airspace protection (14 CFR Part 77) and noise levels, particularly for areas that fall within the 65 decibel (dBA) noise contour line. 14 CFR Part 77, *Objects Affecting Navigable Airspace*, establishes obstruction standards used for identifying potential adverse effects to air navigation and establishes notice standards for proposed construction. Imaginary surfaces were created and are used as the basis for protecting the airspace around an airport. There are five imaginary surfaces, each with specific controlling measures: a primary surface, an approach surface, a transitional surface, a horizontal surface and a conical surface. It is ideal to keep these surfaces clear of any and all obstructions. The controlling obstruction to the approach surface of Runway 21 is a group of trees. The controlling obstruction to the approach surface of Runway 3 is a hill. It is located on the extended runway centerline, 9,000 feet from the runway end. Additional obstructions to the Part 77 surfaces will be will be further discussed in subsequent chapters.

Under FAA guidelines, before FAA grants can be received, the airport sponsor must provide assurances that appropriate actions have been (or will be) taken to the extent reasonable, to restrict the use of land adjacent to or in the immediate vicinity of the airport, to activities and purposes compatible with normal airport operations.

Washington State regulations are based on the Growth Management Act (GMA), Chapter 36.70A of the Revised Code of Washington (RCW), which requires most counties and cities to establish goals, evaluate community assets, and write comprehensive plans to discourage the siting of incompatible uses near airports that are operated for the benefit of the general public. The requirements to plan under GMA are based on the city or county's population or rate of population growth. Areas that do not meet specified growth rates may choose whether or not to plan under GMA requirements.

The GMA establishes four basic principles related to public use airports:

- Local comprehensive plans and development regulations must discourage development of incompatible land uses adjacent to public-use airports
- Formal consultation with airport owners, ports, pilots and WSDOT Aviation prior to adoption of protective ordinances
- WSDOT Aviation to provide technical assistance program to develop such protection
- Airport to be identified as an Essential Public Facility (EPF) in the Comprehensive Plan.

Grant County participates in Washington's Growth Management Act and therefore has adopted a comprehensive plan. Grand Coulee Dam Airport is owned and operated by Grant County Port District Number 7 and is therefore controlled by the County's zoning ordinance. The following subsections describe the existing land uses and zoning that are currently in place. Recommendations for improvements to land use and zoning is addressed in Chapter 3.

Existing Land Use

The land uses immediately adjacent to airport property are open space. The west side of the Airport is bordered by Banks Lake, as is the south side of the Airport. The north and east sides of Airport are open space. The only buildings/facilities in the area are those on the airport property.

Existing Zoning

Title 23 of Grant County Code describes zoning designations. Descriptions of the specific zones that are relevant to the Airport are included in Appendix B. A zoning map is also included in **Exhibit 1E**.

Grand Coulee Dam Airport is located in the County's Public Open Space District. The primary use of these lands is resource conservation and low-intensity public recreation. Permitted uses in this zone include public historic sites, passive recreation, state and federal parks, wildlife management areas, open space parks, and trails or educational enterprises designed to offer special access to natural resource-based and recreational opportunities. Conditional uses include cultural and interpretive centers, primitive campgrounds, and temporary outdoor events. This district does not designate any density, intensity or height restrictions.

Some of the permitted uses in the Public Open Space District are incompatible with airports, particularly wildlife management areas. Any type of wildlife in the vicinity of the Airport can compromise safety of both people and aircraft.

Other zones within a one mile radius of the Airport include the Open Space Conservation District. This District is comprised of privately-owned lands whose purpose is to reflect the area's remoteness and unique resources. This district is intended to: (1) provide opportunities for resource-oriented activities (farming and mineral extraction); (2) be sensitive to the site's physical characteristics and protect critical areas; (3) provide opportunities to create open space corridors; and (4) not create demands for urban level services. Permitted uses within this District include passive recreation, trails or educational enterprises designed to offer special access to natural resource-based and recreational opportunities, and single family residential development. This district does not designate any density, intensity or height restrictions.

The Grant County zoning ordinance includes an Airport Safety Overlay District to further protect the airspace surrounding the airports within the County, including Grand Coulee Dam Airport. This zoning district is in place to assist in protecting the Airport from airspace obstructions, hazards and other incompatible land uses and to protect public health and safety within this district. The District is based on Part 77 regulations. Specific requirements for new buildings and structures which lie within this district are also addressed (see Appendix B for additional detail)

Comprehensive Plan Goals and Policies

Grant County maintains a Comprehensive Plan which provides a broad vision for the county. This vision is implemented through an array of goals and policies. The comprehensive plan does not designate Grand Coulee Dam Airport as an essential public facility. The Transportation chapter provides the following description of the Airport:

> "The Grand Coulee Dam Airport serves the entire area, and is located just south of Electric City. Operated by the Port District #7, it is leased to the Grand Coulee Dam Flyers club. In 1990, the airport was base to 9 aircraft. The 4,200-foot long runway includes medium intensity runway lighting. Grand Coulee Dam Airport is a "non-instrument airport", but is equipped with VASI/PAPI."

The plan does not include specific policies relating to airports or air transportation within the County, however, the following goals within the transportation element aid in discouraging incompatible land uses:

- The transportation system should complement the land use and rural areas element of the Grant County Comprehensive Plan
- The transportation system should be coordinated with neighboring cities and other transportation providers.

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 Grand Coulee Dam Airport during the forecast period of 2005 through 2025. The methodology followed is from "Forecasting Aviation Activity by Airport," GRA, Incorporated, July 2001.

STEP 1: AVIATION ACTIVITY PARAMETERS AND MEASURES TO FORECASTS

For Grand Coulee Dam Airport, the following activity categories are projected:

- Based Aircraft, including fleet mix.
- Annual Aircraft Operations, including air taxi, general aviation (GA), military, 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.

STEP 2: COLLECT AND REVIEW PREVIOUS AIRPORT FORECASTS

The following previous airport forecasts for Grand Coulee Dam Airport 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)

STEP 3: GATHER DATA AND STEP 4: SELECT FORECAST METHODS

This section describes the historical aviation data, aviation forecasts, and socioeconomic information that was collected and evaluated for the Grand Coulee Dam Airport forecasts. Also described is how the information was used in the three forecast methods applied to the based aircraft and aircraft operations forecasts for Grand Coulee Dam.

For based aircraft, the three methods were:

- TAF growth rates, interpolated to 2025
- WSDOT growth rates, interpolated to 2025
- Grant County Intermediate population growth rates

For aircraft operations, the three methods were:

- TAF growth rates, interpolated to 2025
- WSDOT aircraft utilization (operations per based aircraft) method, with slight growth in aircraft utilization over the forecast period.
- Grant County Intermediate population growth rates

CURRENT AVIATION DATA

Current aviation data for based aircraft and aircraft operations was obtained from the following sources:

- FAA TAF
- FAA Airport Master Record, Form 5010
- WSDOT *Aviation System Plan - Forecast and Economic Significance Study*.

The based aircraft numbers from these sources were compared with numbers of based aircraft obtained in discussion with the airport manager during 2004. A summary of current data is shown in Table 2A. The date of the study data is shown in each column heading.

TABLE 2A: Current Aviation Demand

	FAA TAF (2003)	FAA Master Record (2002)	WSDOT Aviation Study (1998)	Airport Manager Discussion (2004)
Based Aircraft				
Single Engine	8	7	6	7
Other Light Aircraft	2	3	0	2
TOTAL	10	10	6	9
Annual Operations				
Itinerant:				
Air Taxi	750	0	0	Not Available
GA	7,000	7,000	7,000	Not Available
Military	0	0	0	Not Available
Local				
GA	4,000	4,000	4,000	Not Available
Military	0	0	0	Not Available
TOTAL	11,750	11,000	11,000	11,000
Calculated Utilization Rate(ops/based aircraft)	1,175	1,100	1,833	-
Instrument Operations	0	Not Available	0	Not Available

Because the conversation with the Airport manger took place during 2004, the number of based aircraft provided by the airport manager is the most recent. Consequently, the base year number of based aircraft used for the Grand Coulee Dam forecasts was 9 aircraft, including 7 single engine aircraft and 2 ultralight aircraft.

The base year operations used was 11,750, as shown in the FAA TAF.

FORECAST 1: FAA TERMINAL AREA FORECAST GROWTH RATE

The FAA annually prepares aviation demand forecasts 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. The TAF annual growth rate for all components of aviation activity at Grand Coulee Dam is 0%.

This growth rate was applied to the selected base year based aircraft and operations data to create Forecast #1.

FORECAST 2: WSDOT AVIATION FORECAST GROWTH RATE/METHODOLOGY

WSDOT Aviation Division's *Aviation System Plan – Forecast and Economic Significance Study* contains the forecasts for Grand Coulee Dam Airport. 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.

The average annual growth rate projected for based aircraft at Grand Coulee Dam was 0.0% between 2000 and 2020. This growth rate was applied to the selected base year based aircraft to create Forecast #2. The growth rate was extrapolated to year 2025 for this forecast.

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.

The WSDOT study did not forecast into year 2025. To apply the WSDOT methodology to the forecast for Grand Coulee Dam through 2025, the utilization rate was increased by 0.42%, matching the +0.03% change in utilization rate increase for each previous five-year period. The utilization rates were applied to the selected based aircraft forecast to create Forecast #2 of aircraft operations.

FORECAST 3: SOCIOECONOMIC DATA – POPULATION FORECAST GROWTH RATE

An analysis of local socioeconomic data was incorporated into this airport planning forecast. Population growth within an airport's service area can be a significant factor in the growth of aviation activity at the airport.

Projections of the total resident population of Grant County were obtained from the State of Washington Office of Financial Management. The population projections included low, intermediate, and high projections for years 2005 – 2025, using base year data from 2000. Based on the intermediate population projections, average annual growth rates were calculated for each five year period, as shown in Table 2B:

TABLE 2B: Grant County Population

Year		Population	
1980		48,522	
1985		50,805	
1990		54,798	
1995		66,515	
2000		74,698	
		Forecasts	
	Low	**Intermediate**	**High**
2005	77,762	82,397	87,238
2010	80,602	88,331	96,502
2015	81,785	92,806	104,523
2020	81,358	95,715	111,029
2025	80,561	98,395	117,459
		Average Annual Growth Rates	
1980-1985		0.92%	
1985-1990		1.52%	
1990-1995		3.95%	
1995-2000		2.35%	
2000-2005	0.81%	1.98%	3.15%
2005-2010	0.72%	1.40%	2.04%
2010-2015	0.29%	0.99%	1.61%
2015-2020	-0.10%	0.62%	1.22%
2020-2025	-0.20%	0.55%	1.13%

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

The intermediate growth rates were applied to the selected base year based aircraft and aircraft operations to create Forecast #3.

OTHER FAA FORECASTS

Two other FAA forecasts were reviewed for an understanding of GA activity trends nationwide. None of the growth rates in these forecasts were used in the Grand Coulee Dam forecasts, but the information helped in forecast selection.

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, as shown in Table 2C. 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: 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 (shown in Table 2D), 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: FAA Forecasts for GA and Air Taxi Active Fleet (Average 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. Starting in 2003, owners of ultralight aircraft can begin registering 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 (see Table 2E).

TABLE 2E: FAA Forecasts for GA and Air Taxi Hours Flown
(Average 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

STEP 5: EVALUATE RESULTS

The results of the three based aircraft forecast methods are shown below in Table 2F.

TABLE 2F: Comparison of Based Aircraft Forecasts

Year	Forecast #1: FAA TAF Growth Rate*	Forecast #2: WSDOT Growth Rate**	Forecast #3: Population Growth Rate***
Base Year			
2004	9	9	9
Forecast			
2005	9	9	9
2010	9	9	10
2015	9	9	10
2020	9	9	11
2025	9	9	11

**0.0% annual growth from Terminal Area Forecasts, August 2004*
***0.0% annual growth from Washington Aviation System Plan – Forecast and Economic Significance Study*
****Annual growth rates from intermediate population projections of State of Washington Office of Financial Management, Table 2B*

Because 2 of the 9 based aircraft are ultralights (sport aircraft), which are nationally projected to grow at 3% annually, it seems reasonable to assume that there will be some growth in the number of based aircraft at the airport. For this reason, Forecast #3 is the selected based aircraft forecast. It is assumed that all of the growth (an increase of 2 aircraft over 20 years) will be in sport aircraft.

Using the selected based aircraft forecast, the aircraft operations forecast was calculated using the WSDOT study methodology to create Operations Forecast #2. The results of the WSDOT forecast are compared with the operations forecast using FAA TAF and population growth rates in Table 2G.

TABLE 2G: Comparison of Aircraft Operations Forecasts

Year	Forecast #1: FAA TAF Growth Rate*	Forecast #2: WSDOT Method**	Forecast #3: Population Growth Rate***
Base Year			
2004	11,750	11,750	11,750
Forecast			
2005	11,750	11,785	11,983
2010	11,750	13,138	12,846
2015	11,750	13,185	13,497
2020	11,750	14,560	13,920
2025	11,750	14,621	14,309

**0.0% annual growth from Terminal Area Forecasts, August 2004*
*** WSDOT growth = growing aircraft utilization method from Washington Aviation System Plan – Forecast and Economic Significance Study*
****Annual growth rates from intermediate population projections of State of Washington Office of Financial Management, Table 2B*

Because a slight increase in utilization is consistent with national FAA forecasts for hours flown in GA piston aircraft, the WSDOT forecast was selected as the 2005-2025 aircraft operations forecast. The selected forecast uses the State Aviation System Plan's aircraft utilization method. Annual operations per based aircraft are projected to grow from 11,750 now to 14,621 in 2025.

STEP 6: SUMMARIZE RESULTS

Table 2H presents the selected forecasts for based aircraft and aircraft operations. 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 by 2005. For this Airport Layout Plan Report, it is assumed that Grand Coulee Dam Airport will have an instrument approach in place by 2010. The forecast of instrument approaches in Table 2H follows the methodology in the Washington Aviation System Plan. Instrument weather is estimated to occur 9% of the time east of the Cascade Mountains where Grand Coulee Dam Airport is located and 46.1% of GA aircraft approaches are assumed instrument approaches

TABLE 2H: Grand Coulee Dam Airport Aviation Demand Forecasts

Year	Based Aircraft			Aircraft Operations				
	Single Engine	Ultra Light	Total	Local GA	Itinerant GA	Itinerant Air Taxi	Total Operations	Inst. Approaches
Base Year								
2004	7	2	9	4,000	7,000	750	11,750	
Forecast								
2005	7	2	9	4,012	7,021	752	11,785	
2010	7	3	10	4,472	7,827	839	13,138	200
2015	7	3	10	4,489	7,855	842	13,185	201
2020	7	4	11	4,957	8,674	929	14,560	222
2025	7	4	11	4,978	8,710	933	14,621	223

STEP 7: COMPARE RESULTS WITH TAF

Table 2I compares the selected forecasts for Grand Coulee Dam Airport with the TAF numbers.

TABLE 2I: Comparison of Selected Forecasts with Terminal Area Forecasts

Year	Based Aircraft Forecast			Operations Forecast		
	FAA TAF	Selected	Difference	FAA TAF	Selected	Difference
Base Year						
2004	10	9	- 10%	11,750	11,750	0.0%
Forecast						
2005	10	9	- 10%	11,750	11,785	+ 0.3%
2010	10	10	0%	11,750	13,138	+ 11.8%
2015	10	10	0%	11,750	13,185	+ 12.2%
2020	10	11	+ 10%	11,750	14,560	+ 23.9%
2025	10	11	+ 10%	11,750	14,621	+ 24.4%

The selected based aircraft forecast is within 10% of the FAA TAF forecast.

The selected operation forecast is 24.4% higher than the TAF by year 2020. This is due to the increasing number of based aircraft, as well as the increasing utilization of operations per based aircraft.

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 Grand Coulee Dam Airport is A-I (small). Since there are regular itinerant operations by both the Beech 99 and the Beech King Air, it is recommended that the future critical aircraft be a family of critical aircraft. The future family of critical aircraft would include the existing critical aircraft - Beech 18 (A-II (small)), which has a Maximum Takeoff Weight of 9,300 lbs and a wingspan of 49.7 feet, the Beech 99 (B-I (small)) which has a Maximum Takeoff Weight of 11,300 pounds and a wingspan of 45.9 feet, and the Beech King Air B100 (B-II (small)) which has a Maximum Takeoff Weight of 12,500 pounds and a wingspan of 54.5 feet.

The appropriate ARC for this 20-year forecast planning period is B-II (small), based on the fastest and largest family of aircraft that operate at Grand Coulee Dam Airport a minimum of 500 annual itinerant operations.

Table 2J shows the forecast aircraft operations based on ARC and local vs. itinerant.

Table 2J: Operations Mix

Airport Reference Code	**A-I**	**A-II**	**B-I**
Takeoff Weight (pounds)	**Small (max. 12,500)**	**Small (max. 12,500)**	**Max. 26,000**
Base Year (2004)			
Local	3,489	170	340
Itinerant	6,761	330	660
2005			
Local	3,502	170	340
Itinerant	6,783	330	660
2010			
Local	3,962	170	340
Itinerant	7,586	420	660
2015			
Local	3,979	170	340
Itinerant	7,600	437	660
2020			
Local	4,447	170	340
Itinerant	8,443	500	660
2025			
Local	4,468	170	340
Itinerant	8,463	520	660

The percentage of operations by aircraft with an ARC of A-I is forecasted to increase, as the sport craft (ultralight) based aircraft and operations increase

Recommended Operations & Instrument Approach Forecasts versus TAF

The recommended forecasts presented in this chapter are for planning purposes. The operations forecast with 1.04% growth rate has been selected as the recommended forecast for use in

facilities programming associated with this airport layout plan study. However, the FAA does not accept the premise of an increased utilization rate since the rate exceeds FAA's recommended estimates of operations per based aircraft, and since actual traffic counts or other documentation from airport users is not available at this time. Based on this, it is important to note that the FAA will utilize a flat line operational count for their TAF projections.

The same premise applies to projected annual instrument approaches. The projections presented in Table 2H are for planning purposes. Until a published instrument approach is available at Grand Coulee Dam Airport, the FAA TAF will utilize a flat line trend of 150 annual instrument approaches starting in 2010 through 2025.

Chapter Three
AIRPORT FACILITY REQUIREMENTS/ALTERNATIVES

In this chapter, existing components of the airport are evaluated so that the capacities of the overall system are identified. Once identified, the existing capacity is compared to the forecast activity levels prepared in Chapter Two to determine where deficiencies currently exist or may be expected to materialize in the future. Once deficiencies in a component are identified, a more specific determination of the approximate sizing and timing of the new facilities can be made.

The objective of this effort is to identify, in general terms, the adequacy of the existing airport facilities and outline what new facilities may be needed and when they may be needed to accommodate forecast demands. Having established these facility requirements, alternatives for providing these facilities will be evaluated to determine the most cost-effective and efficient means for implementation.

Airport facilities include both airfield and landside components. Airfield facilities include those facilities that are related to the arrival, departure, and ground movement of aircraft. These components include:

- Runways
- Taxiways
- Navigational Approach Aids
- Lighting, Markings, and Signage

Landside facilities are needed for the interface between air and ground transportation modes. This includes components for general aviation needs such as:

- Aircraft Hangars
- Aircraft Parking Aprons
- Auto Parking and Access
- Airport Support Facilities

PLANNING HORIZONS

The cost-effective, efficient, and orderly development of an airport should rely more upon actual demand at an airport than a time-based forecast figure. In order to develop an airport layout plan that is demand-based rather than time-based, a series of planning horizon milestones have been established for Grand Coulee Dam Airport that take into consideration the reasonable range of aviation demand projections.

It is important to consider that the actual activity at the airport may be higher or lower than projected activity levels. By planning according to activity milestones, the resultant plan can accommodate unexpected shifts, or changes in the area's aviation demand. It is important that the plan accommodate these changes so that the Airport can respond to unexpected changes in a timely fashion. These milestones provide flexibility, while potentially extending this plan's useful life if aviation trends slow over the period.

The most important reason for utilizing milestones is that they allow the airport to develop facilities according to need generated by actual demand levels. The demand-based schedule provides flexibility in development, as development schedules can be slowed or expedited according to actual demand at any given time over the planning period. The resultant plan provides airport officials with a financially responsible and need-based program. **Table 3A** presents the planning horizon milestones for each activity demand category.

TABLE 3A: Aviation Demand Planning Horizons

Demand Category	Current	Short Term (2010)	Intermediate Term (2015)	Long Term (2025)
Operations				
Local	4,000	4,472	4,489	4,978
Itinerant[1\]	7,500	8,666	8,697	9,643
Total	11,750	13,138	13,186	14,621
Based Aircraft	9	10	10	11

Note: [1\] Itinerant operations include itinerant general aviation operations and air taxi operations

AIRFIELD REQUIREMENTS

Airfield requirements include the need for those facilities related to the arrival and departure of aircraft. The adequacy of existing airfield facilities at Grand Coulee Dam Airport has been analyzed from a number of perspectives, including airfield capacity, runway length, runway pavement strength, airfield lighting, navigational aids, and pavement markings.

AIRFIELD DESIGN STANDARDS

In order to determine facility requirements, the Airport Reference Code (ARC) must be referred to in order for the appropriate airport design criteria to be applied. As discussed in Chapter Two, the existing ARC for Grand Coulee Dam is A-I (small) and the critical aircraft is a Beech 18. The forecasts anticipate the Airport maintaining a similar operational fleet mix; however the future critical aircraft is based on a family of critical aircraft which will change the ARC to B-II (small). This change in ARC will create a new set of design standards. Facility requirements will be developed using design group II standards.

The FAA has established several airport design standards to protect aircraft operational areas and keep them free from obstructions that could affect the safe operation of aircraft. These include the runway safety area (RSA), object free area (OFA), obstacle free zone (OFZ), and runway protection zone (RPZ).

The RSA is "a defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or an excursion from the runway."

An OFA is an area on the ground centered on the runway or taxiway centerline provided to enhance the safety of aircraft operations. No above-ground objects are allowed except for objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes.

An OFZ is a volume of airspace that is required to be clear of objects, except for frangible items required for navigation of aircraft. It is centered along the runway and extended runway centerline.

The RPZ is defined as an area off the runway end to enhance the protection of people and property on the ground. The RPZ is trapezoidal in shape and centered about the extended runway centerline. The dimensions of an RPZ are a function of the runway ARC and approach visibility minimums.

In addition to these design standards which were also discussed in Chapter one, the FAA provides recommended dimensions for runway width, taxiway width, taxiway safety areas and others. Table 3B presents the recommended design standards set forth in AC 150/5300-13, Change 9 for ARC B-II (small). Appendix C includes the Airport standards print out from FAA's Computer Design Program. Deficiencies in standards will be discussed throughout the chapter.

TABLE 3B: Airfield Design Standards

Category	Actual	Recommended for B-II (small)
Runway Width	75’	75’
Runway Centerline to Parallel Taxiway Centerline Separation	N/A	240’
RSA		
-Width	120’	150’
-Length beyond runway end (3/21)	330’/255’*	300’
OFA		
-Width	240’	500’
-Length beyond runway end (3/21)	1,000’/310’	300’
OFZ		
-Width	240’*	250’
-Length beyond runway end (3/21)	200’/200’	200’
RPZ		
(Inner Width x Outer Width x Length)	250 x 450 x 1,000	250 x 450 x 1,000
Threshold Siting Surface		
-Distance out from threshold to start of surface	0’	
-Width at start of trapezoid	250’	Varies
-Width at end of trapezoid	700’	Depending on
-Length of trapezoidal section	2,250’	Type of Approach
-Length of rectangular section	2,750’	Implemented
-Slope of Surface	20:1	
Taxiway Width	N/A	35’
Taxiway Safety Area Width	N/A	79’
Taxiway Object Free Area Width	N/A	131’
Type of Instrument Approach	None	TBD
Instrument Approach Visibility Minimums	Visual	TBD

Source: FAA Advisory Circular 150/5300-13, Change 9
Notes: Asterisk indicates non-standard condition
Instrument Approach Procedures will be discussed later in the chapter

As shown in Table 3B, the RSA width falls 30 feet short of the recommended 150-foot width and the OFA width is 260 feet less than the 500-foot recommended width. In order for the existing RSA to meet B-II (small) standards, a significant amount of fill and slope stabilization will be needed particularly on the west side of the runway. The RSA length beyond the Runway 21 end is 45 feet short of the 300-foot standard. It is recommended that the existing RSA length be increased by 45 feet and that the area be graded. There are currently 25-30% slopes from the edge of the existing Safety Area down to Bank’s Lake. Cut, fill, and grading work will also be needed on the east side of the runway. The OFA width is non-standard due to a tree/brush line along the west edge of the runway. It is recommended that these trees and brush be removed.

RUNWAY

The adequacy of the existing runway system at Grand Coulee Dam Airport was analyzed and is presented in the following subsections. Based on this information, requirements for runway improvements were determined.

Airfield Capacity

A demand/capacity analysis measures the capacity of the airfield configuration. Planning standards indicate that when demand reaches 60% of capacity, new facilities should be planned. When demand reaches 80% of capacity, new facilities should be in place. To determine the airfield capacity at Grand Coulee Dam Airport, the Advisory Circular 150/5060-5, Airport Capacity and Delay was referenced. A typical airport with a single runway configuration and a parallel taxiway has an annual capacity of 230,000 operations. Because Grand Coulee Dam Airport does not have a parallel taxiway and back taxiing is required, it is estimated that the runway has an annual capacity of about 100,000 operations. Since the forecasts for the Airport remain well below this threshold, the capacity of the existing runway will not be reached; therefore the airfield will be able to meet operational demands.

Runway Orientation

For the operational safety and efficiency of an airport, it is desirable for the primary runway of an airport's runway system to be oriented as close as possible to the direction of the prevailing wind. This reduces the impact of wind components perpendicular to the direction of travel of an aircraft that is landing or taking off (defined as a crosswind).

FAA design standards specify that additional runway configurations are needed when the primary runway configuration provides less than 95 percent wind coverage at specific crosswind components. The 95 percent wind coverage is computed on the basis of crosswinds not exceeding 10.5 knots for small aircraft weighing less than 12,500 pounds and from 13 to 16 knots for aircraft weighing over 12,500 pounds.

There is no wind data available for Grand Coulee Dam Airport; therefore, a wind rose can not be created. The orientation of the runway is adequate based on local knowledge of prevailing winds at the Airport.

Runway Length

The determination of runway length should consider both takeoff and landing requirements. Takeoff requirements are a factor of airport elevation, mean maximum temperature of the hottest month, critical aircraft type (or family of aircraft types) expected to use the airport, and stage length of the longest nonstop trip destinations. Aircraft performance declines as airport elevation, temperature and stage length increase. Landing requirements are a factor of airport elevation, aircraft landing weight and the runway condition (i.e. dry conditions or wet conditions).

The local elevation at Grand Coulee Dam Airport is 1,588 feet and the mean maximum temperature of the hottest month is 86.6 degrees Fahrenheit (F). There is no difference in runway end elevations at the Airport.

Using the site-specific data described above, runway length requirements for the various classifications of aircraft that may operate at the airport were examined using the FAA Airport Design computer program, Version 4.2D. The program groups general aviation aircraft into several categories, reflecting the percentage of the fleet within each category and useful load (passengers and fuel) of the aircraft. **Table 3C** summarizes FAA's generalized recommended runway lengths for Grand Coulee Dam Airport.

TABLE 3C, Runway Length Requirements

AIRPORT AND RUNWAY DATA	
Airport elevation	1,588 feet
Mean daily maximum temperature of the hottest month	86.6 F
Maximum difference in runway centerline elevation	0 feet
Wet and slippery runways	
RUNWAY LENGTHS RECOMMENDED FOR AIRPORT DESIGN	
Small airplanes with less than 10 passenger seats	
75 percent of these small airplanes	3,000 feet
95 percent of these small airplanes	3,580 feet
100 percent of these small airplanes	4,210 feet
Small airplanes with 10 or more passenger seats	4,520 feet

Source: FAA's Airport Design Computer Program, Version 4.2D utilizing Chapter Two of AC 150/5325-4A, Runway Length Requirements for Airport Design

As shown in the table, the current runway length of 4,199 feet can accommodate at least 95% of small airplanes with less than 10 passenger seats. It is important to note that small aircraft with more than 10 passenger seats may also use the Airport, however, the aircraft's fuel or passenger load may need to be reduced. The current runway length of 4,199 feet will be adequate for Grand Coulee Dam Airport throughout the planning period.

RUNWAY WIDTH

The width of the existing runway was also examined to determine the need for facility improvements. Runway 3-21 currently has a width of 75 feet, which is adequate for ADG II.

RUNWAY PAVEMENT STRENGTH

The most important feature of airfield pavement is its ability to withstand repeated use by aircraft of a certain weight. At Grand Coulee Dam Airport, this includes a wide range of general aviation aircraft including small single and multi-engine aircraft, as well as occasional visits by some larger corporate aircraft such as a Lear jet and a Gulfstream. Runway 3-21 has an existing strength-rating of 12,500 pounds single wheel (SW) gear load. This pavement strength is

adequate in supporting operations by the current and projected fleet mix (primarily aircraft in ADG I) through the planning period.

TAXIWAYS

Taxiways are constructed primarily to facilitate aircraft movements to and from the runway system. Some taxiways are necessary simply to provide access between the aprons and the runways, whereas other taxiways become necessary as activity increases at an airport to provide safe and efficient use of the airfield.

Taxiway width is determined by the ADG of the most demanding aircraft to use the taxiway. According to FAA design standards, the minimum taxiway width for ADG II is 35 feet. Grand Coulee Dam Airport has one midfield connector taxiway (Taxiway A) at a width of 40 feet, exceeding the standard, and two turnaround taxiways (Taxiways B & C), which are both 30 feet wide. It is recommended that Taxiways B and C be widened to 35 feet to meet ADG II standards or that these two taxiways be replaced.

Due to the limited taxiway system at the Airport, aircraft are required to back taxi on the runway in order to take-off. This could affect operational effectiveness at the Airport; therefore it is recommended that a parallel taxiway be constructed. It is important to note that the FAA does not require construction of a parallel taxiway until the Airport has 20,000 annual operations. In addition, the number of operations does not necessarily justify a parallel taxiway. The FAA recommends a runway centerline to taxiway centerline separation distance of 240 feet for ADG II. Aircraft hold bays can be constructed in conjunction with a parallel taxiway to replace Taxiways B and C.

NAVIGATIONAL AND APPROACH AIDS

As discussed in Chapter One, Grand Coulee Dam Airport does not currently have any instrument approach aids. However, pilots flying into or out of Grand Coulee Dam Airport can utilize NAVAIDS at nearby airports. A Non-Directional Beacon (NDB) is available at Omak Municipal Airport, which is located approximately 36 miles northwest of Grand Coulee Dam Airport and a VORTAC is available at Ephrata Municipal Airport, located approximately 36 miles south-southwest of the Airport.

The advent of GPS technology can ultimately provide the airport with the capability of establishing new instrument approaches at minimal cost since there is not a requirement for the installation and maintenance of costly ground-based transmission equipment at the airport. The FAA is proceeding with a program to transition from existing ground-based navigational aids to a satellite-based navigation system utilizing GPS technology.

The FAA commissioned the Wide Area Augmentation System (WAAS) in July 2003. The WAAS refines the GPS guidance for enroute navigation and approaches. General aviation, corporate, air taxi, and regional airline operators are expected to benefit from this augmentation to GPS signals. The FAA is certifying new approaches at the current rate of about 300 per year, nationally.

GPS approaches fit into three categories, each based upon the desired visibility minimum of the approach. The three categories of GPS approaches are: precision, non-precision with vertical guidance, and non-precision. Chapter Two: Forecasts, notes that the Washington Aviation System Plan forecasts assumed that all public-use airports in the State would have a minimum of one non-precision GPS approach and that Grand Coulee Dam Airport will have a GPS approach procedure in place by 2010. To be eligible for a GPS approach, the airport landing surface must meet specific standards as outlined in *FAA AC 150/5300-13*, Airport Design, Change 8. The FAA requires that airports having a non-precision GPS approach must have a minimum runway length of 3,200 feet and depending on the visibility minimums, may be required to have an approach lighting system.

The FAA Flight Procedures Office has evaluated the potential for an approach procedure at Grand Coulee Dam Airport and has determined that a straight-in approach to both runways would be feasible. Implementing a straight-in approach would require the Airport to have a 500' primary surface width, an increase from the existing 250' width. This increase in width can be achieved with minimal impacts to the existing facilities and therefore it is recommended that the Airport implement a straight-in non-precision GPS approach to both Runways 3 and 21 with visibility minimums equal to or greater than one statute mile.

AIRFIELD LIGHTING, SIGNAGE AND MARKING

Airports commonly include a variety of lighting and pavement markings to assist pilots utilizing the airport. These lighting systems and marking aids are used to assist pilots in locating the airport during the day, at night, during poor weather conditions, and assisting in the ground movement of aircraft.

Identification Lighting

Grand Coulee Dam Airport is equipped with a rotating beacon to assist pilots in locating the airport at night or in low visibility conditions. The existing rotating beacon, located east of the runway, on the south side of the apron is sufficient and should be maintained in the future, however it may need to be relocated with the construction of a parallel taxiway. This will be further examined in the alternatives development section.

Runway and Taxiway Lighting

Airport lighting systems provide critical guidance to pilots during nighttime and low visibility operations. Runway 3-21 is currently equipped with a Medium Intensity Runway Lighting (MIRL) system. This existing system is adequate and should be maintained through the planning period.

Effective ground movement of aircraft at night is enhanced by the availability of taxiway lighting. Currently, there are not taxiway lights on any of the three taxiways at the Airport. Taxiway lighting is not required, and a system of edge reflectors may be adequate to serve the needs of the Airport. Construction of a parallel taxiway should also include the installation of medium intensity taxiway edge lighting or reflectors.

Visual Approach Lighting

In most instances, the landing phase of any flight must be conducted in visual conditions. To provide pilots with visual guidance information during landings to the runway, visual glideslope indicators are commonly provided at airports. The Airport currently has a Precision Approach Path Indicator (PAPI) on the Runway 21 end. It is recommended that a PAPI be installed on the Runway 3 end as well.

Runway identification lighting provides the pilot with a rapid and positive identification of the runway end. The most basic system involves runway end identifier lights (REILs). There are no REILs available at the Airport at this time. It is recommended that REILs be installed if a night time instrument approach procedure is implemented.

Pilot-Controlled Lighting

Grand Coulee Dam Airport is equipped with pilot-controlled lighting (PCL). PCL allows pilots to activate the lighting systems at the Airport using the radio transmitter in the aircraft. This system should be maintained through the planning period.

Airfield Signage

Airfield signage identifies runways, taxiways, and apron areas. These aid pilots in determining their position on the airport and provide directions to their desired location on the airport. Grand Coulee Dam Airport has a non-standard hold sign on Taxiway A. Taxiways B and C both have standard hold signs. Consideration should be given to installing lighted hold signs in conjunction with any improvements to the MIRL system.

Pavement Markings

Runway markings are designed according to the type of approach available on the runway. FAA Advisory Circular 150/5340-H, *Markings of Paved Areas on Airports,* provides the guidance necessary to design airport markings. Runway 3-21 is currently marked for visual approaches to the Airport. If the Airport implements a non-precision GPS approach, the runway markings will need to be upgraded to non-precision markings.

Taxiway and apron areas also require marking. Yellow centerline stripes are currently painted on Taxiway A. The paved aircraft parking apron also has centerline markings to indicate the alignment of taxilanes within these areas. Other than routine maintenance of the taxiway/taxilane striping, these markings will be sufficient through the planning period.

WEATHER REPORTING

Grand Coulee Dam Airport is equipped with a lighted wind cone and a segmented circle, which provides pilots with information about wind conditions and local traffic patterns. These facilities are required when an airport is not served by a 24-hour ATCT and should be maintained through the planning period.

The FAA states that establishment of an instrument approach procedure requires the ability to obtain the local altimeter setting. If a GPS approach is to be developed for Grand Coulee Dam Airport, a weather reporting system, such as an AWOS, will be needed.

LANDSIDE REQUIREMENTS

Landside facilities include hangars, aircraft apron, aircraft tie-downs, and automobile parking. These facilities provide the essential interface between the air and ground transportation modes. The capacities of the various components of each area were examined in relation to projected demand to identify future landside facility needs.

HANGARS

Utilization of hangar space varies as a function of local climate, security, and owner preferences. The trend in general aviation aircraft, whether single or multi-engine, is toward higher performance aircraft. Therefore, many aircraft owners prefer enclosed hangar space to outside tie-downs.

The demand for aircraft storage hangars is dependent upon the number and type of aircraft expected to be based at the airport in the future. For planning purposes, it is necessary to estimate hangar requirements based upon forecast operational activity. However, hangar development should be based upon actual demand trends and financial investment conditions, not solely on forecasts. In the case of Grand Coulee Dam Airport, the forecasts indicate an increase of two based aircraft through out the planning period. At this time, all based aircraft at the Airport are stored in hangars. It is assumed that the two forecasted based aircraft will also be stored in hangars.

The existing hangars at Grand Coulee Dam Airport are all private/conventional hangars. For planning purposes, a combination of T-hangar and conventional hangar layouts has been developed and are shown in the *Development Alternatives* section of this chapter.

AIRCRAFT PARKING APRON

The existing parking apron is approximately 6,700 square yards. The FAA recommends that tie-down space be provided for all based aircraft not stored in hangars. There are a total of 17 tie-down positions at the Airport. At this time there are not designated areas for based and transient aircraft. The following subsections will discuss the requirements for both types of tie-downs.

Based Aircraft Tie-Downs

All based aircraft at the Airport are currently stored in hangar spaces. As previously mentioned, it is anticipated that the two additional forecasted based aircraft will also be stored in hangars. It is recommended that the Airport maintain the existing apron space and reallocate a portion of the tie-downs to accommodate transient aircraft needs.

Transient Aircraft Tie-Downs

In regard to transient aircraft tie-downs, the FAA has developed a formula for determining the number of tie-downs needed for itinerant aircraft operating at an airport. The following steps were taken from FAA Advisory Circular (AC 150/5300-13, Appendix 5, Change 9):

- Number of annual itinerant operations (from Chapter Two), multiplied by 50 percent (50 percent of annual itinerant operations are departures, divided by 12 (12 months per year), divided by 30 (30 days per month), and then reduced by 50 percent to account for aircraft that do not remain at the Airport.

$$8{,}710 \times 0.50 \div 12 \div 30 \times 0.50 = 6.04$$

Using this methodology, the Airport will need to have transient tie-down space for six aircraft by 2025. The FAA allocates 360 square yards of space per transient aircraft tie-down. Based on this allocation, 2,160 square yards is needed by 2025 to accommodate transient aircraft tie-down spaces.

Tie-Down Summary

There are currently 17 tie-downs at the Airport. Using the conclusions above, no tie-downs are needed for based aircraft; however, it is recommended that six be designated for transient use over the long-term planning period. While new construction may not be required to accommodate transient tie-downs, reallocation of the existing space will likely require a new apron configuration. The options for reconfiguring the apron will be explored in the Development Alternatives section of this chapter.

VEHICLE PARKING

The existing automobile parking lot at the Airport can accommodate 8-10 vehicles. It is typical at general aviation airports, such as Grand Coulee Dam Airport, for pilots to park their vehicles in their hangars while utilizing their aircraft, thereby eliminating the need for an increase of auto parking spaces. It is recommended that the existing parking lot be maintained throughout the planning period to accommodate airport patrons and transient traffic.

SEAPLANE FACILITIES

Bank's Lake is occasionally used to land seaplanes. Because of the lake's location in relation to the Airport, seaplanes typically dock on the west side of the runway. This area has not been officially designated as a landing/docking area and is creating the potential for runway incursions. The Airport would like to determine a way to minimize or eliminate crossings of the runway by developing a better location for docking. It is recommended that a seaplane parking area be located on the north side of the runway to eliminate crossings all together. One possible solution is shown in the development alternatives at the end of this chapter.

SUPPORT FACILITIES

Various facilities that do not logically fall within classifications of airfield, landside, or general aviation areas have also been identified. These other areas provide certain functions related to the overall operation of the airport, and include: pilot lounge area, aircraft rescue and firefighting, fuel storage, and airport maintenance facilities.

PILOT LOUNGE

The Airport currently has a small (8'x 8') pilot lounge/waiting room and restrooms which are located in a separate building. A telephone is available adjacent to hangar building number 6. It is recommended that the existing pilot's lounge be expanded to an area of approximately 15'x 20'. This size will allow room for flight planning/resting and a public restroom. It is also recommended that a telephone be located within this building in order to make/cancel flight plans, obtain weather briefings, etc.

AIRCRAFT RESCUE AND FIRE FIGHTING

Aircraft rescue and fire fighting (ARFF) is not a required service at Grand Coulee Dam Airport. Emergency response services are available through the local police and fire departments. This will be adequate through the planning period.

AIRPORT MAINTENANCE/STORAGE FACILITIES

The Grant County Port District is in charge of maintaining the Airport. At this time it is not necessary to have on-site maintenance facilities; therefore, it is recommended that the Port continue to maintain the Airport.

AVIATION FUEL STORAGE

There are currently no fueling facilities available at the Airport. If demand dictates, a minimum of 6,000 gallon 100LL above ground fuel storage tank could be installed. Potential locations for a future fueling facility include: on existing tie-down ramp after transient ramp is constructed or east of existing apron and proposed four-unit T-hangar. All options should be explored prior to installation.

SECURITY/FENCING

Grand Coulee Dam Airport has wire fencing along the north and east sides of the Airport. The south and west sides of the Airport are bounded by Banks Lake. The existing fencing will be adequate through the planning period.

UTILITIES

The existing utilities at the Airport include, water, sewer, power and phone services. The construction of a pilot's lounge with restrooms may create a need to install a new septic system.

LAND USE AND ZONING RECOMMENDATIONS

There are several items that should be complete with regard to land use and the County's Comprehensive Plan goals, policies, and development regulations to protect and enhance the airport facility. Recommendations are provided below. The recommended actions are included in the Capital Improvement Plan (CIP) in Chapter 5.

- The final Airport Layout Plan should be adopted by reference into the County's Comprehensive Plan
- Amend the Comprehensive Plan to strengthen existing goals and polices as part of the 2006 GMA update – specific goals for the County's Airports should be included.
- Identify Grand Coulee Dam Airport as an Essential Public Facility
- Add a summary of planned improvements identified in the Airport Layout Plan to the transportation inventory.
- Rezone the Airport to an "Airport Zone" designation to help eliminate incompatible uses in the vicinity of the Airport.
- Define specific density, intensity, and height limitations to each zoning designation
- Adopt a title notice or similar requirement to inform purchasers of property within one mile of the Airport that their property is located adjacent to or in close proximity to Grand Coulee Dam Airport and that their property may be impacted by a variety of aviation activities. Note that such activities may include but are not limited to noise, vibration, chemical odors, hours of operation, low overhead flights, and other associated activities.

SUMMARY

The intent of this chapter has been to outline the facilities required to meet potential aviation demands projected for Grand Coulee Dam Airport through the long term planning horizon. The next step is to develop alternatives that best meet these projected needs.

Based on the facility requirements previously identified, two development alternatives were created and are presented in **Exhibit 3A** (Alternative 1) and **Exhibit 3B** (Alternative 2). In addition to these two alternatives, which are described below, there is a no-build option in which the Airport would not make any significant changes to the existing facilities at the Airport. Though this option is desirable in the sense that cost is not a factor, a no-build alternative is likely to lead to reduced quality of services provided by the Airport (i.e., additional hangar buildings, tie-downs, and other airport patron services would not be constructed and existing facilities would not be improved). A no-build alternative may also affect the Airport's ability to obtain funding to maintain the viability of the facility. Implementing a no-build alternative would leave the Airport with several non-standard configurations. Funding for significant improvements may not be available until these non-standards issues are corrected. It is important to mention that the final decision with regard to pursuing a particular development plan rests with the Airport sponsor.

AIRSIDE DEVELOPMENT

No Build Alternative

- Non-standard RSA & OFA
- No parallel taxiway
- No additional navaids (visual or instrument)

- No additional landside development
- No future GPS approach

Proposed airside development for Alternative 1 includes the following improvements:

- Fill and slope stabilization work required on sides of runway to meet RSA standards
- Remove trees and brush along sides of runway to achieve OFA standard
- Construct partial parallel taxiway to Runway 3 end
- Remove turn around on Runway 3 end and construct a hold bay in its place
- Install AWOS
- Remark runway to reflect non-precision instrument approach

Proposed airside development for Alternative 2 includes the following improvements:

- Fill and slope stabilization work required on sides of runway to meet RSA standards
- Remove trees and brush along sides of runway to achieve OFA standard
- Construct full-length parallel taxiway
- Install AWOS
- Remark runway to reflect non-precision instrument approach

LANDSIDE DEVELOPMENT

Proposed landside development for Alternative 1 includes the following improvements:

- Construct apron pavement (300'x200') south of existing apron for six transient/large aircraft tie-downs.
- Construct a larger pilot's lounge (with restrooms) south of the auto parking lot, adjacent to the existing apron.
- Construct additional T-hangars and conventional hangars on south end of field.
- Extend access road to the hangar area; install security gate that will allow access by aircraft owners only.
- Remove existing restrooms, pilot lounge, and agricultural wash pad
- Relocate beacon so it is outside of TOFA
- Designate a sea plane parking area on north-east end of Airport property to eliminate runway crossings by pedestrians and vehicles

Proposed landside development for Alternative 2 includes the following improvements:

- Construct apron pavement (300'x200') south of existing apron for six transient/large aircraft tie-downs.
- Construct a larger pilot's lounge (with restrooms) south of the auto parking lot, adjacent to the existing apron.
- Construct additional T-hangars and conventional hangars on north end of field.
- Construct an additional access road to hangar area
- Remove existing restrooms, pilot lounge, and agricultural wash pad

- Relocate beacon so it is outside of TOFA
- Maintain existing sea plane docking area, develop the area, and designate it as the official seaplane docking area.

The Airport Advisory Committee has selected a derivative of both alternatives to be implemented to improve facilities at Grand Coulee Dam Airport. The variations include: construction of a partial parallel taxiway to Runway 21, construction of a transient tie-down apron north of the existing apron, and construction of the seaplane dock on the north side of the airfield. This option reduces the need for aircraft to back taxi the entire runway length by providing a partial parallel taxiway (A full length parallel taxiway was eliminated based on costs of removing existing terrain obstructions, which would be necessary to construct a full length taxiway), provides tie-down space for large and small aircraft, provides a seaplane base location which eliminates vehicular and pedestrian crossing of the runway, shows potential build-out options for hangars, and provides a straight-in non-precision GPS approach to both runway ends. This alternative also meets all FAA design standards for runway/parallel taxiway separation, runway safety and object free areas, and maintains a clear approach. The preferred alternative is depicted in **Exhibit 3C** and will be used as the basis for completing the ALP set.

Chapter Four
AIRPORT PLANS

The airport plans are one of the last steps in the development of an airport layout plan report. They are a pictorial representation and summarization of the efforts made in the airport layout planning process. The previous chapters on Inventory, Forecasting, and Facility Requirements/Alternatives and the reviews provided by the Airport Advisory Committee supply the basis for the future airport layouts that are shown in the airport layout drawings. As was previously discussed, the development at an airport should rely more on actual demand rather than a time-based forecast. The development shown in the airport plans reflects planned development, but the course and timing of this development must be carried forward as airport activity demands rather than in the exact form it has been presented.

It is important to note that following the creation and approval of the preferred alternative (presented in Chapter Three), an FAA funded airport improvement project has taken place at Grand Coulee Dam Airport. Because of this, the attached ALP drawing set does not entirely correlate with development as depicted in the preferred alternative, but rather reflects the "new" actual conditions at the Airport. The project, which began in August of 2005, involved a complete runway and apron reconstruction, and a new tie-down layout. The configuration labeled as existing in the attached drawings incorporates these improvements.

AIRPORT LAYOUT PLAN DRAWING SET

Cover Sheet

The cover sheet shows both the location and the vicinity map for Grand Coulee Dam Airport. A sheet index to the airport layout plan drawing set is also provided on this sheet.

Airport Layout Plan Drawing

The airport layout plan depicts the current airport layout and the proposed improvements to the airport for the 20-year planning period. Descriptions of the improvements and costs over the next 20-years are included in *Chapter 5, Capital Improvements Projects (CIP).* As previously mentioned, the needs defined in the Facility Requirements/Alternatives (Chapter 3) and the reviews provided by the Advisory Committee were the basis for determining the proposed improvements at the Airport. The future airport development is shown on the airport layout plan as required by the FAA. The plan can be modified to accommodate development as dictated by demand.

Runway visibility minimums, runway protection zones, object free areas, safety areas and other standard airport dimensions are shown in the plan and in the runway data tables. Other tables include an airport data table, buildings/facilities table, modifications to standards, and a non-standard conditions and disposition table.

Airport Airspace Plan Drawing

This drawing shows the Part 77 Imaginary Surfaces for the future layout of Grand Coulee Dam Airport with a USGS map as the background. Airport imaginary surfaces consist of five different types of surfaces. The surface shapes and dimensions as they apply to the Airport are as follows:

Primary Surface: A rectangular surface with a width (centered on the runway centerline) that varies for each runway and a length that extends 200 feet beyond each end of the runway. The elevation of the primary surface corresponds to the elevation of the nearest point of the runway centerline. The width of the primary surface of Runway 3-21 is 500 feet (based on a future non-precision instrument approach).

Approach Surface: A surface centered on the extended runway centerline, starting at each end of the primary surface (200 feet beyond each end of the runway), at a width equal to that of the primary surface and an elevation equal to that of the end of the runway. The approach surfaces at Grand Coulee Dam Airport reflect non-precision instrument approaches to both runway ends. The surface extends at a horizontal distance of 5,000 feet at a slope of 20:1 to a width of 2,000 feet.

Transitional Surface: A sloping 7:1 surface that extends outward and upward at right angles to the runway centerline from the sides of the primary surface and the approach surfaces.

Horizontal Surface: An elliptical surface at an elevation 150 feet above the established airport elevation created by swinging arcs of a 5,000-foot radius from the center of each end of the primary surface.

Conical Surface: A surface extending outward and upward from the horizontal surface at a slope of 20:1 for a horizontal distance of 4,000 feet.

It is ideal to keep these surfaces clear of obstructions whenever possible. The Part 77 surfaces are the basis for protection of the airspace around the airport. Obstructions to these surfaces are identified in the Obstruction Data Tables (on sheets 3 and 4), along with the distribution to address the described obstructions. Obstructions to the Part 77 surfaces were determined based on a review of the USGS map and a preliminary survey of obstructions performed by W&H Pacific and RLW Consulting in 2004. Past obstruction removal and the FAA 5010 form were also used to identify the existing obstructions. Obstruction removal has been incorporated into the capital improvement program.

Runway Approach Plan & Profile Drawing

This drawing provides a plan and profile view of any obstructions within the primary and approach surfaces of the runway. Obstruction Data Tables with proposed dispositions are included for both existing and future scenarios.

Land Use Plan Drawing

A land use plan has been developed for the airport and the surrounding area. This plan includes the zoning on and around the airport per the Grant County Code.

In general, land use concerns associated with the areas around airports fall into one of the following categories:

- Lighting
- Glare, Smoke and Dust
- Bird Attractions/Landfills
- Airspace Obstructions and Height Restrictions
- Electrical Interference
- Concentrations of People
- Noise Impacts

Any of these activities can create safety concerns for airport users and people on the ground or can be impacted adversely by airport operations. It is important that these issues be addressed in the land use zoning and development around an airport.

Chapter Five
CAPITAL IMPROVEMENT PROJECTS

Through the evaluation of the facility requirements and the development of the airport layout plan, the improvements needed at Grand Coulee Dam Airport over the next 20-year period have been determined. The capital improvement plan provides the basis for planning the funding of these improvements. The planned phases of development are in the 5-, 10- and 20-year time frames.

CAPITAL IMPROVEMENT PROJECTS

The Capital Improvement Plan (CIP) develops both the timeline for the airport improvements and estimated costs for those improvements. The plan is divided into three phases: Phase I, 2006-2010, Phase II, 2011-2015, and Phase III, 2016-2025.

Phase I

Phase I is the first five years of the planning period, 2006 to 2010. The projects included in this stage are focused on improving existing facilities and removing obstructions:

- Runway Safety Area Improvements
- Obstructions Removal (tree removal, relocate light pole, grade bank)
- Install AWOS
- Runway Pavement Marking for non-precision instrument approach
- Installation of Runway 3 PAPI

Phase II

Phase II is the second five years of the planning period, 2011- 2015. The projects planned during this stage focus on maintaining existing facilities and increasing the amount of hangars and storage area on the airport.

- Pavement Maintenance
- Construct partial parallel taxiway to Runway 21
- Install edge reflectors on all taxiways
- Perimeter Fence
- Hangar Site Development, Access Road Relocation, Auto Parking Construction
- Construct 4-unit T-Hangar and 50'x50' conventional hangar

Phase III

Phase III is the last ten years of the planning period, 2016 – 2025. These projects include:

- Construct North Side Access Road, Auto Parking Lot & Transient Tie-Down Ramp
- Remove existing pilot's lounge/waiting room and restroom building & Construct new Pilot's Lounge
- Hangar Site Development
- Construct 2 6-unit T-Hangars and 4-50'x50' conventional hangar
- Construct Access road to seaplane facilities & seaplane docks
- Pavement Maintenance
- ALP Update

PROJECT COSTS

A list of improvements and costs over the next 20-years are included in **Table 5A** at the end of this chapter. All costs are estimated in 2005 dollars. Total project costs include construction, temporary flagging and signing, construction staking, testing, engineering, administration, and contingency, as applicable. Utilities including phone and power are included in all new hangar projects, along with septic costs. No water service cost was added for the hangar developments. **Table 5B** presents the CIP in the FAA's formatted spreadsheet.

FUNDING SOURCES

Funding for a CIP can come from several different sources, including the FAA, the State of Washington, Grant County Port District Number 7, and private sources. Each project listed in the CIP has been assigned a total cost, which is then assigned a percentage based on its funding source(s) eligibility.

FAA

Federal grants are available through the current Airport Improvement Program (AIP) legislation called Vision 100 – Century of Aviation Reauthorization Act. This program was funded at $3.4 billion in fiscal year 2004 and is allowed to increase $100 million each year through 2007. Under most circumstances, projects that qualify for AIP funding are eligible for up to 95 percent of total project costs through 2007. It is anticipated that a similar reauthorization will continue in fiscal year 2008 and beyond. Typically, the remaining five percent of the project cost is funded by the airport sponsor. It is important to note that while a project may be eligible for federal funding, there is no guarantee that funds will be available or granted to the project by the FAA.

State

The Washington State Department of Transportation also provides grants. For projects eligible for AIP funding, the State typically matches the local share on a 50/50 basis, therefore, the funding percentages could be FAA -95%, State – 2.5%, Local – 2.5%. For projects funded by the State only, the minimum sponsor share is 5%.