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Anderson Field Airport
Brewster, 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 Anderson Field 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. The inventory portion of this chapter will summarize the airport location, history and existing facilities. By establishing a thorough and accurate inventory, an appropriate forecast, along with airfield and landside development, can be determined.

The information included in this chapter 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 presently summarize most 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

Anderson Field Airport is located in the City of Brewster, Washington in Okanogan County. Located in north central Washington, the county is bordered by British Columbia, Canada on the north, the Cascade Mountain Range on the west, and the Columbia River Basin and Lake Roosevelt on the south and east. Okanogan County is home to a wide variety of wildlife and spectacular scenery. The city is served by U.S. Highway 97. Public transportation to and from

the airport is provided by local taxi service. The Cascade Railroad runs adjacent to the airport on the north side. Brewster is located 70 miles from Wenatchee and 30 miles from Omak. The airport is situated east of downtown Brewster along U.S. Highway 97. It is bounded by the Okanogan and Columbia Rivers on the south, and the railroad on the north.

AREA TOPOGRAPHY

The airport sits just above the Columbia River at an elevation of 917 feet MSL. The site is relatively flat, with a ravine at least 100 feet deep running diagonally from the south side of the Airport toward the river.

CLIMATE

Winter temperatures in Brewster can range from 17 to 39 degrees Fahrenheit, and summer temperatures can range from 50 to 86 degrees Fahrenheit. Annual rainfall averages about 13 inches, with the majority of it occurring in late fall to early winter, peaking at about 1.8 inches in a single month. Annual snowfall averages about 24 inches, peaking at about 9 inches in a single month.

COMMUNITY AND AIRPORT HISTORY

The area, which is now the City of Brewster, originally served as a transfer point for river shipping between the Okanogan and Columbia Rivers in 1896. The city was officially founded in 1910. With the new railroads in 1914 the city grew quickly, spurring the mining and logging industry. The major industry today is fruit growing.

The airport was originally owned by the U.S. Army and ownership was transferred to the City of Brewster in 1968 through a Quit Claim Deed and Transfer Agreement. The area originally transferred was approximately 2.46 acres.

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 tie-downs). Annual operations are a reflection of the yearly number of aircraft that perform a takeoff or a landing at the Airport. There are currently seven based aircraft at Anderson Field, three single-engine aircraft, three multi-engine aircraft, and one helicopter. Based on the FAA's Airport Master Records (Form 5010) for Anderson Field, current annual aircraft operations at the Airport are estimated to be 18,900. Projected based aircraft and annual operations data will be presented in Chapter Two, *Forecasts.*

No significant Airport Service Area studies have been conducted, but based on discussions with the Airport tenants and users, it is estimated that the service area includes the City of Brewster and other small communities in the southeastern portion of Okanogan County.

CRITICAL AIRCRAFT

An airport is designed based on the characteristics of the most demanding aircraft, or critical aircraft, in terms of approach speed and wingspan, which currently use an airport or that are projected to use an airport at some point in the future. The critical aircraft, or family of aircraft, for an airport must have 500 or more annual itinerant operations at that airport. Itinerant operations are defined as an operation involving a trip extending more than 20 miles from and/or to an airport. The critical aircraft at Anderson Field is a Cessna 182. This aircraft has a wingspan of 35.8 feet and a maximum takeoff weight of 2,950 pounds.

EXISTING FACILITIES

The airport reference code is a criterion that defines the critical airport dimensions by the characteristics of the aircraft operating at the airport. This code is defined specifically by the approach category and the design group of the aircraft. The approach category of the aircraft 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.

Anderson Field 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 but not including 49 feet. The Cessna 182 fits this ARC. The existing facilities at Anderson Field are discussed in the following paragraphs and are identified on **Exhibit 1B**. Table 1A presents the existing Airport design standards and the 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	110*	120
-Runway 7 Length beyond runway end	200*	240
-Runway 25 Length beyond runway end	165*	240
Runway Object Free Area (OFA)		
-Width	250	250
-Runway 7 Length beyond runway end	200*	240
-Runway 25 length beyond runway end	165*	240
Runway Obstacle Free Zone (OFZ)		
-Width	200	200
-Length beyond runway ends	250	250
Runway Protection Zone	250 x 1,000 x 450	250 x 1,000 x 450

Sources: W&H Pacific Airport Field Visit, 2004, FAA Advisory Circular, AC-150/5300-13
Note: Dimensions marked with an asterisk are non-standard.

As can be noted above, there are a few areas (marked by an asterisk) where the existing standards do not meet A-I (small) ARC standards. These variances, as well as the recommended solutions to bring them to standard, will be discussed later in the report.

AIRFIELD FACILITIES

All existing pavement section and pavement condition information was 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 an airport field visit on September 2, 2004.

Runway

Anderson Field Airport has one paved runway, Runway 7-25 with a length of 4,000 feet and a width of 60 feet. The pavement section for Runway 7-25 is two inches of asphalt concrete and six inches of crushed aggregate base course. The pavement is rated for single wheel gear (SWG) 15,000 pound aircraft. This pavement strength is adequate in supporting operations by the critical aircraft (Cessna 182, 2,950 pounds). The runway was last crack sealed in 1997, and was rated to be in good condition in 2004 based on the PCI. However, during the site visit for the project's inventory review, it was noted that the runway is in fair condition with heavy longitudinal and transverse cracking.

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. Anderson Field does not currently have a wind rose; therefore, current wind coverages can not be identified. As part of *Chapter Three: Facility Requirements*, an effort will be made to obtain wind data for Anderson Field.

Taxiways and Taxilanes

Runway 7-25 has a midfield connector taxiway with a length of 270 feet. The midfield connector taxiway, Taxiway A, was crack sealed in 1997. This taxiway has a pavement section of two inches of asphalt concrete and six inches of crushed aggregate base course. This taxiway is in fair condition with extensive longitudinal and transverse cracking. Taxiway B, another taxiway used as a connector to the agricultural spray operator's facility. This taxiway is constructed of a gravel material which is in fair to poor condition.

Aprons and Aircraft Parking

There is one aircraft apron, connected to the runway by the midfield taxiway. Its area is approximately 360 feet by 150 feet and it contains eleven aircraft tie-down positions. The apron pavement was crack sealed in 1997 and was projected to be in fair condition in 2004.

LANDSIDE FACILITIES

Hangars and Airport Buildings

There are five (5) hangar buildings located adjacent to the central apron that are privately owned. Each is operated under a ground lease from the City of Brewster. The hangar building conditions vary from poor to good.

In addition to hangar buildings, the airport has a storage shed, an agriculture spray operation, including storage tanks, and two privately owned mobile homes on land leases.

Fixed Based Operators (FBOs)

A fixed based operator (FBO) 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 is one FBO at Anderson Field Airport, Golden Wings. Golden Wings provides aircraft maintenance services. Golden Wings leases land for its hangar and operational needs from the City of Brewster. Golden Wings provides on-site 100 LL fuel for emergency use only.

Internal Circulation, Access and Vehicle Parking

Vehicular traffic utilizes the airport road to access facilities located on airport property. Access to the airport is gained from an access roadway that stems directly from US Route 97. There is currently no designated automobile parking lot on the airfield.

AIRFIELD SUPPORT FACILITIES

Aircraft Rescue and Firefighting

There is no aircraft rescue and fire fighting (ARFF) service available at the Airport, however in the event of an emergency, the City of Brewster Fire Department would respond.

Fueling Facilities

100 LL fuel is available on an emergency basis through the local FBO.

Airport Maintenance

Airport maintenance is provided by the City of Brewster. Limited airport maintenance facilities are located on site.

Utilities

Water and sewer services at the Airport are provided by the City of Brewster. Power and phone services are also available, through the local franchise utility companies.

Other Facilities

There is an existing plastic lined sewage lagoon, approximately 10,000 SF in size, located on airport property near the airport access road. The lagoon is a holding cell for waste from a septic tank or a portable toilet pumping business.

The agricultural operator has several very large steel storage tanks on site. Two appear to be 10,000 to 15,000 gallon tanks mounted vertically and there are two tank trailers which appear to be fuel tanks of up to 9,000 or 10,000 gallons.

Common Traffic Advisory Frequency (CTAF)

The Federal Communications Commission issued Anderson Field Airport a CTAF frequency of 122.8 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 is no air traffic control tower or any instrument approach aids at Anderson Field.

Visual Approach Aids

There are no visual approach aids at the Airport. All approaches to the Airport are made solely on a visual basis.

Airport Lighting and Signing

Runway 7-25 is equipped with low intensity runway lights (LIRL) with traffic signal bulbs on a 110 volt circuit. The midfield connector taxiway is also equipped with a low intensity lighting system. Signage at the Airport consists of a runway directional sign and a distance remaining sign.

Other NAVAIDS

Anderson Field is equipped with a rotating beacon to assist pilots in locating the Airport at night or in periods of low visibility. The Airport also has a segmented circle and a 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 are used by the State and local governments 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.

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.

Okanogan County does not participate in Washington's Growth Management Act. However, the County is required to plan for Critical Areas and Natural Resources Lands. The City of Brewster also has a comprehensive plan that includes a critical areas overlay zone. The City's Comprehensive Plan is also being revised and is expected to be completed during the summer of 2006.

The following subsections describe the existing land uses and zoning that are currently in place.

Existing Land Use

The land uses immediately adjacent to airport property are primarily agricultural. The areas lying directly north and west are apple orchards. Highway 97 borders the Airport property on the south side. On the east side of the Airport property, the terrain drops approximately 100 feet down to a secondary road and the Okanogan River.

Existing Zoning

Chapter 17 of the City of Brewster Municipal Code and Chapter 17 of Okanogan County Code describe their respective zoning designations. Descriptions of the specific zones from both the City and the County that are relevant to the Airport are included in Appendix B. Each is summarized below.

Okanogan County Zoning

The City of Brewster and Anderson Field are located within Okanogan County's minimum requirement district. The purpose of this district is to maintain broad controls in preserving rural character and protecting natural resources. Permitted uses in this district include auto sales, banks, dairy farms, single and multi family residences, day care facilities, wholesale and retails stores, maintenance shops, restaurants, gravel pits less than three acres in size, hospitals, light manufacturing, parks and golf courses, hotels/motels, and others. This district allows a minimum density of one acre per single family unit and a minimum of 9,600 square feet per multi-family unit or mobile home park unit. The maximum height of buildings and structures within this zone ranges from 35 feet to 200 feet, depending on its use. For example grain elevators and water tanks can be no higher than 100 feet, while the maximum height for most agricultural uses is limited to 65 feet.

Okanogan County also has an Airport Safety Overlay District which contains those areas defined by Part 77 imaginary surfaces, and Runway Protection Zones. The purpose of this overlay district is to protect lives and property on lands which lie within the transition and approach zone surrounding an airport or landing field. Also, the district is intended to prevent the establishment of airspace obstructions through height restrictions. The district prohibits uses such as schools, churches, and auditoriums (i.e., assemblies of people), uses which create electrical interference with navigational signals or radio communications, and uses which foster an increased bird

population. There is also language in the ordinance prohibiting emission of smoke, ash, dust, vapor and other forms of air pollution, and materials that may produce glare. The heights of building or structures within this overlay zone are limited by obstruction surfaces described in Part 77 Regulations. Exhibit 1E shows the County's zoning map and the Airport Overlay District for the Brewster area.

City of Brewster Zoning

The existing zoning map for the City of Brewster does not include the Airport; the existing zoning ordinance is old and the Airport property was annexed in after the zoning ordinance was adopted. Discussions with City officials indicate that although the Airport is not shown on the existing zoning map, it is considered part of the Public Use District and is protected as such. Permitted uses within the Public Use District include schools, airports, cemeteries, community centers, meeting halls, golf courses, hospitals and clinics, parks, public buildings and advertising devices. The maximum height of buildings within this district is 35 feet. There are no density requirements specified for this district.

Many of the permitted uses in the Public Utilities District are incompatible with airports. Large concentrations of people such as those that occur in schools, hospitals, and community centers compromise safety (of both people and aircraft) when they are located anywhere within the Airport property boundary or if they fall under the runway's approach surface. In addition, the noise generated by aircraft may not provide an appropriate environment for these types of facilities.

Because the Airport is not currently shown on the City's existing zoning map, the specific zoning districts that surround the Airport are unknown. The updated zoning map and comprehensive plan will incorporate the Airport.

Comprehensive Plan Goals and Policies

Okanogan County Comprehensive Plan

Since Okanogan County is not required to plan under GMA, a comprehensive plan is not required. The County is required, however, to plan for Critical Areas and Natural Resoruces Lands. The County will have its first update of the Critical Areas and Natural Resources Lands completed by December 1, 2007. Okanogan County does have a comprehensive plan, however it is in the process of being revised; a draft document is in place, dated June, 2005. The Transportation Element of the plan is not addressed in this draft document.

City of Brewster Comprehensive Plan

The City of Brewster has an existing comprehensive plan in place; however the City Planner has indicated that the document is old, and does not address Anderson Field. The City is currently in the process of re-writing the existing comprehensive plan. At this time, the transportation element of the plan has not been addressed. It is expected that a revised comprehensive plan will be complete in Summer, 2006. The plan will include a transportation element which addresses

the Airport as well as a zoning map which incorporates the Airport and the surrounding properties. Chapter Three will provide a list of recommendations to be incorporated into the new comprehensive plan.

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 Anderson 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 Anderson Field, the following activity categories are projected:

- Based Aircraft, including fleet mix.
- Aircraft Operations, including air taxi, 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 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 provided an advance copy of the draft TAF for Anderson Field, dated August 2004. The TAF, presented in Table 2A, indicates no change in the number or composition of historical aircraft operations from 1994 through 2003 and projects 0% growth through 2020. Table 2B shows TAF data for based aircraft, which indicate that the number of based aircraft has been higher in the past. The TAF projects 0% growth in based aircraft through 2020.

Table 2A, FAA TAF Aircraft Operations, Historical and Forecast

Aircraft Operations	Actual/Forecast 1994-2020
Itinerant:	
Air Taxi	100
GA	12,000
Military	0
Local:	
GA	6,800
Military	0
Total:	18,900
Instrument Operations:	0

Table 2B, FAA TAF Based Aircraft, Historical and Forecast

Year	Single-Engine	Multi-engine	Other Light Misc. Craft	Total Based Aircraft
Actual				
1980	16	3	0	19
1985	10	1	0	17
1990	11	0	0	11
1995	12	0	0	12
2000	12	0	0	12
2003	8	0	1	9
Forecast				
2005	8	0	1	9
2010	8	0	1	9
2015	8	0	1	9
2020	8	0	1	9

WSDOT Aviation Division's *Aviation System Plan – Forecast and Economic Significance Study* contains the forecasts for Anderson Field that appear in Table 2C. 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; and 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, a utilization rate (operations per based aircraft) was calculated. 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 2C, Washington Aviation System Plan Forecasts

	2000	2005	2010	2015	2020	Annual Growth 2000-2020
Aircraft Operations						
Itinerant:						
Air Taxi	100	100	100	100	100	0.0%
GA	12,000	12,100	12,100	12,200	12,300	0.1%
Military	0	0	0	0	0	
Local:						
GA	6,800	6,800	6,800	6,800	6,800	0.0%
Military	0	0	0	0	0	
Total Operations	**18,900**	**19,000**	**19,000**	**19,100**	**19,200**	**0.1%**
Instrument Approaches	0	256	256	258	260	0.1%*
Total Based Aircraft	**9**	**9**	**9**	**9**	**9**	**0.0%**
Single Engine Piston	8	8	8	8	8	0.0%
Multi-Engine Piston	1	1	1	1	1	0.0%

** Annual growth rate is for 2005-2020, since there were no instrument approaches in 2000.*

NATIONAL FAA FORECASTS

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 (see Table 2D). 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 2D, 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 (see Table 2E).

Table 2E, 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 2F).

Table 2F, 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

POPULATION FORECASTS

Population growth within an airport's service area is usually a significant factor in the growth of aviation activity at the airport. Table 2G shows historical and projected population for Okanogan County.

Table 2G, Okanogan County Population

Year		Population	
Historical			
1980		30,663	
1985		32,687	
1990		33,350	
1995		38,943	
2000		39,564	
Forecast	**Low**	**Medium**	**High**
2005	39,219	41,458	43,904
2010	40,712	44,061	47,850
2015	41,776	46,315	51,549
2020	42,170	47,920	54,629
2025	42,394	49,410	57,661
		Average Annual Growth Rates	
1980-1985		1.3%	
1985-1990		0.4%	
1990-1995		3.1%	
1995-2000		0.3%	
2000-2005	-0.2%	0.9%	2.1%
2005-2010	0.8%	1.2%	1.7%
2010-2015	0.5%	1.0%	1.5%
2015-2020	0.2%	0.7%	1.2%
2020-2025	0.1%	0.6%	1.1%

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

ANDERSON FIELD FORECASTS

For the Anderson Field forecasts, growth rates from three different sources were examined—the FAA's Terminal Area Forecasts, the Washington Aviation System Plan, and State of Washington Office of Financial Management Population Forecasts.

Based Aircraft Forecasts

The inventory effort for this report found that the actual number and fleet mix of based aircraft differs from the TAF, Airport Master Record, and Washington Aviation System Plan records. A representative of Golden Wings, the FBO at the airport, stated that the current number of airworthy aircraft based at Anderson Field is seven, including three single engine piston airplanes, three multi-engine piston airplanes, and one helicopter. The number of based aircraft has been declining in recent years. Table 2H presents the based aircraft forecasts that resulted from the three different sources cited in the previous paragraph. Table 2H does not contain the actual forecast numbers that are in the TAF.

Table 2H, Comparison of Based Aircraft Forecasts

Year	FAA*	State**	Population***
2005	7	7	7
2010	7	7	8
2015	7	7	8
2020	7	7	8
2025	7	7	9

*Notes:*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 2G*

Because two of the three forecast models used 0% growth for based aircraft at Anderson Field, the selected forecast also uses 0% growth. Throughout the 20-year planning period, the fleet mix of based aircraft is not projected to change.

Aircraft Operations Forecasts

Since the number of based aircraft is actually lower than that reported in the TAF, it is reasonable to assume that the actual number of aircraft operations is too. Assuming the same aircraft utilization as reported in the TAF since 1994 (2,100 operations per based aircraft), the estimated actual number of aircraft operations is 14,700. If the number of annual operations were not lowered from 18,900, the operations per based aircraft would be 2,700. The adjusted number, 2,100, is still an unusually high number of operations per based aircraft and probably due to the large number of agricultural spray operations conducted from the airport.

Table 2I shows the operations forecasts for Anderson Field, using the same three sources as the based aircraft forecasts. The selected forecast uses the TAF's 0% growth rate because there are

no local factors indicating there will be growth. Table 2I does not contain the actual forecast numbers that are in the TAF.

Table 2I, Comparison of Aircraft Operations Forecasts

Year	FAA*	State**	Population***
2005	14,700	14,744	14,966
2010	14,700	14,793	15,145
2015	14,700	14,846	15,327
2020	14,700	14,904	15,511
2025	14,700	14,967	15,697

*Notes:*0.0% annual growth from Terminal Area Forecasts, August 2004*
***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 2G*

SELECTED FORECASTS

Table 2J presents the selected forecasts for based aircraft and aircraft operations. Based aircraft and aircraft operations are projected to grow at 0% annually.

Table 2J, Anderson Field Aviation Demand Forecasts

	Based Aircraft				Aircraft Operations				
Year	Single Engine	Multi-Engine	Heli-copter	Total	Air Taxi	Itinerant GA	Local GA	Total Ops	Inst. Approaches
Current	3	3	1	7	147	9,261	5,292	14,700	0
2005	3	3	1	7	147	9,261	5,292	14,700	0
2010	3	3	1	7	147	9,261	5,292	14,700	199
2015	3	3	1	7	147	9,261	5,292	14,700	199
2020	3	3	1	7	147	9,261	5,292	14,700	199
2025	3	3	1	7	147	9,261	5,292	14,700	199

There has been no indication that military aircraft will start to use the airport or that the composition of the aircraft operations--general aviation vs. air taxi, local vs. itinerant aircraft—will change in the future. Consequently, the operations in Table 2J are 63% itinerant GA, 36% local GA, and 1% air taxi throughout the forecast period. Of the local GA operations, 100% will be by A-I (small) aircraft or helicopters through the forecast period. Three percent of itinerant GA operations are projected to be ARC B-II (small) throughout the forecast period.

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 Anderson 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. Instrument weather is estimated to occur 9% of the time east of the Cascade Mountains where Anderson Field is

located. All air taxi approaches and 46.1% of GA aircraft approaches are assumed instrument approaches.

AIRPORT REFERENCE CODE AND CRITICAL AIRCRAFT

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 and future critical aircraft is the Cessna 182 (maximum takeoff weight 2,950 pounds, wingspan 35.83 feet).

The current and forecast ARC for Anderson Field is A-I (small), which covers the current and future critical aircraft. The most demanding aircraft that ever uses the airport is the twin-engine turboprop Beech King Air B100, which has a maximum takeoff weight of 11,800 pounds, an aircraft approach speed between 91 and 120 knots (Aircraft Approach Category B), and wingspan less than 49 feet (Airplane Design Group I). This aircraft is not based at the airport but is used for medical evacuation and to support firefighting activity, both irregular activities that would not likely account for more than 100 annual operations, or an average of one flight per week. Transient ARC B-II (wingspan up to 79 feet) aircraft, such as larger King Air models, occasionally use the airport for maintenance at the FBO, but the annual number of operations by such aircraft is far less than 500.

In summary, the appropriate ARC for this 20-year forecast planning period is A-I (small), based on the fastest and largest aircraft, the Cessna 182, that operates at Anderson Field a minimum of 500 annual itinerant operations.

AIRPORT PLANNING FORECAST RESULTS COMPARED WITH TAF

Table 2K compares the selected forecasts for Anderson Field with the TAF numbers. The selected forecasts are 22% lower than the TAF numbers, because the actual number of based aircraft was found to be lower and the estimated current aircraft operations were lowered proportionately to the based aircraft.

Table 2K, Comparison of Selected Forecasts with Terminal Area Forecasts

	Based Aircraft Forecast			Operations Forecast		
Year	**TAF**	**Selected**	**Difference**	**TAF**	**Selected**	**Difference**
2005	9	7	-22%	18,900	14,700	-22%
2010	9	7	-22%	18,900	14,700	-22%
2015	9	7	-22%	18,900	14,700	-22%
2020	9	7	-22%	18,900	14,700	-22%

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 created.

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 Anderson Field 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	5,292	5,292	5,292	5,292
Itinerant	9,261	9,261	9,261	9,261
Total	14,700	14,700	14,700	14,700
Based Aircraft	7	7	7	7

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 Anderson Field 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 the previous two chapters, the existing ARC for Anderson Field is A-I (small) and the critical aircraft is a Cessna 182. The forecasts anticipate the Airport maintaining the current operational fleet mix, which will continue to place the Airport in the A-I (small) category. Facility requirements will be developed based on these assumptions.

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 8 for ARC A-I (small). Appendix C includes the Airport Standards print out from the FAA's Computer Design Program. Deficiencies in standards will be discussed throughout the chapter.

TABLE 3B: Airfield Design Standards

Category	Actual	Recommended A-I (small)
Runway Width	60’	60’
Runway Centerline to Parallel Taxiway Centerline Separation	N/A	150’
RSA		
-Width	110’	120’
-Length beyond runway end (7/25)	200’/165’	240’
OFA		
-Width	250’	250’
-Length beyond runway end (7/25)	200’/165’	240’
OFZ		
-Width	250’	250’
-Length beyond runway end (7/25)	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’	0’
-Width at start of trapezoid	250’	250’
-Width at end of trapezoid	700’	700’
-Length of trapezoidal section	2,250’	2,250’
-Length of rectangular section	2,750’	2,750’
-Slope of Surface	20:1	20:1
Taxiway Width	N/A	25’
Taxiway Safety Area Width	N/A	49’
Taxiway Object Free Area Width	N/A	89’
Type of Instrument Approach	None	TBD
Instrument Approach Visibility Minimums	None	TBD

Source: FAA Advisory Circular 150/5300-13, Change 8

As shown in the table, the RSA width falls 10 feet short of the required 120- foot width needed to meet A-I (small) standards. The existing RSA width is non-standard due to brush and uneven ground on the north side of the runway. It is recommended that the brush be removed and that the area be graded. The RSA and OFA lengths beyond the Runway 25 end both fall 75 feet short of the 240-foot A-I (small) standard, due to a three-foot rise located 165 feet from the runway end and 60 feet to the south of the extended centerline. There is also a ravine drop-off located 195 feet from the runway end. In order to meet A-I (small) RSA and OFA standards on the Runway 25 end, it is recommended that the rise be graded and that the runway be shifted 75 feet to the west to avoid portions of the RSA being located over the ravine. A 75-foot runway shift will provide the full 240-foot RSA length beyond the runway end. The Runway 7 RSA and OFA are 40 feet short of the recommended 240-foot standards due to a gravel road located 200 feet beyond the Runway 7 end. It is recommended that this road be closed as it is not needed for access to areas north of the Airport. Closure of the road will prevent vehicular traffic from

interfering with aircraft operations.

RUNWAY

The adequacy of the existing runway system at Anderson Field was analyzed based on airfield capacity, runway orientation, runway length, runway width, and pavement strength. From this information, requirements for runway improvements were determined for the airport.

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 Anderson Field, Advisory Circular 150/5060-5, Airport Capacity and Delay was referenced. A typical airport with a single runway configuration similar to Anderson Field has an annual capacity of 230,000 operations. Since the forecasts for Anderson Field 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 recommend 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.

Current wind data from the National Climatic Data Center (NCDC) is unavailable for Anderson Field. A review of nearby airports indicates that Omak Municipal Airport is the airport nearest to Anderson Field with historical wind data. Due to the distance between Omak and Brewster and the surrounding terrain, it is possible that the data from Omak may provide inaccurate information for Anderson Field; therefore, a wind rose was not created. However, prior facilities layouts for Anderson Field assume that the wind coverage at the Airport meets the FAA’s 95% recommendation.

Runway Length

The determination of runway length requirements 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 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 airport elevation is 917 feet above mean sea level (MSL) and the mean maximum temperature of the hottest month is 87 degrees Fahrenheit (F). Runway elevation varies by approximately five feet along Runway 7-25.

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 Anderson Field. (See Appendix C for print out of recommended runway lengths).

As shown in the table, the current runway length of 4,000 feet can accommodate 100% 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. Based on the types of aircraft forecasted to use airport, as presented in the previous chapter, the current runway length of 4,000 feet will be adequate for Anderson Field throughout the planning period.

TABLE 3C, Runway Length Requirements

AIRPORT AND RUNWAY DATA	
Airport elevation	917 feet
Mean daily maximum temperature of the hottest month	87 F
Maximum difference in runway centerline elevation	5 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	2,790 feet
95 percent of these small airplanes	3,320 feet
100 percent of these small airplanes	3,940 feet
Small airplanes with 10 or more passenger seats	4,390 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, no changes included.

Runway Width

The width of the existing runway was also examined to determine the need for facility improvements. Runway 7-25 currently has a width of 60 feet, which is adequate for ADG I category A and B visual runways, with not lower than three-fourths mile approach visibility minimums.

Runway Pavement Strength

The most important feature of airfield pavement is its ability to withstand repeated use by aircraft of significant weight. At Anderson Field, this includes a wide range of general aviation aircraft including small single and multi-engine aircraft. Runway 7-25 has an existing strength-rating of 15,000 pounds single wheel gear loading (SWG). This pavement strength is adequate in supporting operations by the current and projected fleet mix 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 critical aircraft to use the taxiway. As previously mentioned, the most demanding aircraft to use the airfield fall within ADG I. According to FAA design standards, the minimum taxiway width for ADG I is 25 feet. Anderson Field has one midfield connector taxiway (Taxiway A) at a width of 40 feet, exceeding the standard, and a gravel connector taxiway (Taxiway B) which is 20 feet wide. It is recommended Taxiway B, if paved, be widened to 25 feet to meet ADG I standards.

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 present safety concerns and 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 annual operations alone does not necessarily justify a parallel taxiway. The FAA recommends a runway centerline to taxiway centerline separation distance of 150 feet for ADG I.

Navigational and Approach Aids

As discussed in Chapter One, Anderson Field does not currently have any navigational or approach aids. However, pilots flying into or out of Anderson Field can utilize NAVAIDS at nearby airports. A Non-Directional Beacon (NDB) is available at Omak Municipal Airport, which is located approximately 22 miles north-northeast of Anderson Field.

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. 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. 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 Anderson Field will have a GPS approach procedure in place by 2010. The FAA requires that airports having a non-precision GPS approach must have a minimum runway length of 3,200 feet. These requirements will be further discussed during a review of the alternatives.

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

Anderson Field 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 on the south side of the airfield at about mid-field, is sufficient and should be maintained in the future.

Runway and Taxiway Lighting

Airport lighting systems provide critical guidance to pilots during nighttime and low visibility operations. Runway 7-25 is currently equipped with low intensity runway lighting (LIRL). This system is outdated and is difficult to maintain. It is recommended that the Airport upgrade their runway lighting system to medium intensity runway lighting (MIRL).

Effective ground movement of aircraft at night is enhanced by the availability of taxiway lighting. Currently, there are low intensity taxiway lights (LITL) on the midfield connector taxiway (Taxiway A). Taxiway B does not have a lighting system or reflectors. Future improvements to taxiways at the Airport should consider an upgrade to medium intensity edge lighting. Taxiway lighting is not required, and a system of edge reflectors may be adequate to serve the needs of the Airport.

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. Presently, the Airport does not have any visual approach lighting. It is recommended that a Precision Approach Path Indicator (PAPI) be installed on both runway ends. PAPIs contain multiple light units that are angled to provide the pilot with information as to whether he/she is approaching too high or too low.

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. If a night time instrument approach procedure is implemented, it is recommended that REILs be installed on both runway ends.

Pilot-Controlled Lighting

Anderson Field 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 is used to identify 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. Anderson Field has some signage including a runway directional sign located on Taxiway A and a distance remaining sign on the runway. It is recommended that lighted hold signs be installed when upgrading the runway lighting system.

Pavement Markings

Runway markings are designed according to the type of approach available on the runway. FAA Advisory Circular 150/5340-1J, *Marking of Paved Areas on Airports*, provides the guidance necessary to design airport markings. Runway 7-25 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, unless the GPS approach procedure implemented is circle to land. In the latter case, the existing visual markings would be adequate.

Taxiway and apron areas also require marking. Yellow centerline stripes are currently painted on Taxiway A; however the paint is in poor condition and the markings are not very visible. The paved aircraft parking apron also has centerline markings to indicate the alignment of taxilanes within these areas. Besides routine maintenance of the taxiway striping, these markings will be sufficient through the planning period.

Weather Reporting

Anderson Field 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. The existing wind cone is lit by an external source and therefore, is not always visible during night time operations. It is

recommended that the Airport install a light source inside of the wind cone for increased night time visibility.

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 Anderson Field a weather reporting system, such as an AWOS or a Super Unicom, will be needed. Based on the land limitations at the Airport, an AWOS would be difficult to site and would be a costly option. A Super Unicom, on the other hand, is a low cost alternative to an AWOS that does not require special siting criteria. If an instrument approach is implemented, it is recommended that a Super Unicom be installed near the Airport's windsock.

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. In the case of Anderson Field, the forecasts are not indicating growth in based aircraft. It is important to note, though, that over the last few years the Airport has received several inquiries regarding ground leases to construct hangar space. It is worth noting that hangar development should be based upon actual demand trends and financial investment conditions, not solely on forecasts. With this in mind, potential hangar layouts are shown in the "Development Alternatives" section of this chapter.

AIRCRAFT PARKING APRON

The FAA recommends that tie-down space be provided for all based aircraft not stored in hangars. Currently, there are 11 tie-down positions available 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 and therefore do not utilize the existing tie-downs. It is recommended, though, that the Airport maintain the existing apron

space and reallocate several of the existing tie-downs for transient aircraft needs.

Transient Aircraft Tie-Downs

In regard to transient aircraft tie-downs, the FAA has developed an approach 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 8):

- 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. Written as: (((9,261*50%)/12)/30)*50%

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 11 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 period. While new construction is not required to accommodate additional transient tie-downs, reallocation of the existing space will likely require a new apron configuration. These options will be explored in the Development Alternatives section of this chapter.

VEHICLE PARKING

The Airport does not have a designated automobile parking lot. It is typical at general aviation airports, such as Anderson Field, for pilots to park their vehicles in their hangars while utilizing their aircraft. For apron tie-down users, a designated automobile lot will reduce the need for vehicles to drive on aircraft movement areas; it will also provide a location for airport patrons and transient traffic to park their vehicles. It is recommended that a parking lot be constructed to accommodate approximately eight vehicles. This lot would provide vehicle parking for transient and helicopter traffic as well as airport patrons. If the airport decides to establish an FBO or flight training school, parking would be available. Planning standards use a ratio of about 44 square yards per vehicle. Using this ratio, an area of approximately 355 square yards is needed to accommodate eight vehicles.

HELICOPTER FACILITIES

The existing helicopter facilities at the Airport include an un-surfaced area adjacent to the aircraft apron. This area is inadequate as large clouds of dust and dirt are generated during helicopter take-off and landing phases. It is recommended that a paved helicopter parking facility be constructed to accommodate between three and seven helicopters.

SUPPORT FACILITIES

Various facilities that do not logically fall within classifications of airfield, terminal area, 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 fire fighting, fuel storage, and airport maintenance facilities.

PILOT LOUNGE

There is currently no pilot lounge area or waiting room at the Airport. It is recommended that a small building be constructed or an existing area be designated for the purposes of pilot flight planning and a resting area. This building should also have a public telephone and public restrooms.

AIRCRAFT RESCUE AND FIREFIGHTING

Aircraft rescue and firefighting (ARFF) is not a required service at Anderson Field. Emergency response services are available through the City of Brewster fire and police department. This will be adequate through the planning period.

AIRPORT MAINTENANCE/STORAGE FACILITIES

The City of Brewster maintains the Airport. Limited maintenance facilities are located on-site at Anderson Field. Large maintenance equipment is stored at the City of Brewster Public Works Department. This setup will be adequate through the planning period.

AVIATION FUEL STORAGE

There is 100LL fuel at the Airport, however, it is on private property and is available for emergency use only. At this time it is not necessary for the Airport to construct a fueling facility for public-use. However, if demand dictates the need for fueling facilities at the Airport, consideration should be given to installing a fuel facility.

SECURITY/FENCING

There is currently no perimeter fencing around Anderson Field leaving the Airport's facilities accessible to anyone at any time. The Airport has expressed concerns about security, particularly on the north side of the field where the fruit orchards are located. Fencing the entire perimeter of the Airport would be ideal; however, if this is not financially possible, it is recommended that, at a minimum, the north side of the field be secured by fencing to restrict unauthorized access. It is important to note that though fencing is being recommended, the FAA does not require it at airports such as Anderson Field (i.e., without commercial service). The FAA will however support a phased approach for installing fencing.

UTILITIES

The existing utilities at the Airport include, water, sewer, power and phone services. The Airport has expressed concern regarding the existing water supply and its ability to provide fire protection. The current well is small and provides inadequate fire flow needs. In 1992, the City submitted an application to obtain a water right, but the application has not been acted on. If the City is able to obtain a water right, it is recommended that a larger capacity well be constructed to meet the Airport's fire flow needs.

OTHER FACILITIES

The existing sewage lagoon located on airport property is a holding cell for waste from a septic tank or a portable toilet pumping business. The lagoon has not had any adverse impacts on the Airport and does not appear to be a wildlife attractant. It is recommended that if the lagoon begins to attract birds or other wildlife or begins to impact the safety of the Airport, it should be relocated off site.

LAND USE PLANNING AND ZONING

There are several items the City of Brewster should complete with regard to the land use and zoning around the Airport. These recommendations are provided below. The Capital Improvement Plan (CIP) will provide a cost estimate to implement these recommendations.

City of Brewster Zoning Code Recommendations:

- Rezone the Airport property as "Airport" to ensure that only compatible uses are occurring within the Airport property boundary. Alternatively, the property could be zoned as "Industrial", which would help limit incompatible uses.

City of Brewster & Okanogan County Comprehensive Plan Recommendations:

- The final Airport Layout Plan should be adopted by reference into the Comprehensive Plan for Okanagan County and the City of Brewster.
- Identify Anderson Field as an Essential Public Facility
- Add a summary of planned improvements identified in the Airport Layout Plan to the transportation inventory.
- Insert a description of Anderson Field and its facilities (i.e., runway dimensions, runway orientation, number of hangars, aviation activity levels).

Other Recommendations:

- Discourage incompatible land use adjacent to Anderson Field
- 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 Anderson Field 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 operations, 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 Anderson Field through the long term planning horizon. The next step is to develop alternatives that best meet these projected facility needs and any deviations to airport standards.

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.

In regard to implementing an instrument approach procedure at Anderson Field, the FAA Flight Procedures Office has determined that a straight-in approach to Runway 25 would be feasible. However, implementing a straight-in approach would require the Airport to have a 500' primary surface width, which would have a significant adverse impact on the buildings/facilities located at the Airport. Based on this, it is recommended that the Airport implement a circling GPS approach to Runway 25 with visibility minimums equal to or greater than one statute mile. This

type of approach would allow the Airport to maintain the existing primary surface width of 250'. The existing runway visual runway markings would be adequate as well.

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

Alternative 1 proposes the following airside development:

- Shift runway 75 feet to the west. Shifting the runway to the west will allow a standard RSA dimension on the Runway 25 end, while maintaining a 4,000-foot runway.
- Construct a full-length parallel taxiway at 25 feet wide
- Remove existing turn arounds and construct hold bays on each taxiway end
- Upgrade runway lighting to MIRL system
- Install a light source for wind cone
- Install lighted hold signs
- Install PAPIs on both runway ends
- Install security fencing around the airport perimeter line. Automated gates would be installed at each entrance to the airport.
- Install Super Unicom
- Acquire land north of Highway 97 within Runway 7 RPZ
- Construct helipads that will accommodate 30'-40' rotor diameters

Alternative 2 proposes the following airside development:

- Shift Runway 25 threshold by 75 feet to the west and shift the Runway 7 threshold 15 feet to the west. This will allow a standard RSA dimension on the Runway 25 end and will shorten the runway length to 3,940 feet. This length will accommodate 100% of small aircraft.
- Construct a partial parallel taxiway at a length of 2,000 feet and a width of 25 feet from the midfield connector to the Runway 25 threshold
- Remove existing turn around and construct hold bay on Runway 25 end
- Upgrade runway lighting to MIRL system
- Install a light source for wind cone
- Install lighted hold signs
- Install PAPIs on both runway ends
- Install Super Unicom
- Use a ditch/berm system on north side property line to restrict airport access from the orchard area.
- Acquire land north of Highway 97 within Runway 7 RPZ

- Construct helipads that will accommodate 50'+ rotor diameters

LANDSIDE DEVELOPMENT

Both landside alternatives contain the same options:

- Expand the apron 100 feet to the west to allow enough space to accommodate both small and larger transient aircraft .
- Construct a 20x20-foot pilot's lounge with restrooms
- Construct an automobile parking lot for eight vehicles
- Remove hangar buildings 2 and 3, construct new hangars

The Airport Advisory Committee has selected a slight variation of Alternative 1 to be implemented to improve facilities at Anderson Field. The variations include shifting the runway 80'to the west (versus 75') to ensure adequate safety area length beyond the Runway 25 end, constructing helipads large enough to accommodate 50'+ rotor dimensions (similar to helipads depicted in Alternative 2), reconfiguring the existing runway end turnarounds versus constructing holding bays, and extending the apron northwards versus westward. This option maintains the current runway length of 4,000', eliminates the need to back taxi by providing a full-length parallel taxiway, provides tie-down space for large and small aircraft, provides designated helipads to eliminate dust clouds, shows potential build-out options for hangars should demand warrant them, and provides a circling GPS approach to Runway 25. 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 existing and 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 Anderson Field. 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 an 80' runway shift, a complete runway reconstruct, newly designed aircraft turnarounds, a new midfield connector taxiway, a new apron and tie-down layout, standard RSA width, and standard RSA and OFA lengths beyond the runway ends. 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 Anderson Field. 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 Anderson Field. 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, 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 Anderson Field 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 Anderson Field 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 7-25 is 250 feet.

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 Anderson Field reflect visual 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 1,250 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 plan 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 Chapter 17 (zoning) of the Okanogan 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.

Airport Property Map Exhibit "A" Drawing

An Exhibit "A" drawing has been prepared depicting existing property ownership and future land acquisition and avigation easement areas.

Chapter Five
CAPITAL IMPROVEMENT PLAN

Through the evaluation of the facility requirements and the development of the airport layout plan, the improvements needed at Anderson Field 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:

1. Land Acquisition of Runway 7 RSA/OFA
2. Land Acquistion of Runway 7 RPZ
3. Tree Removal on Runway 7 end for RPZ and Part 77
4. Installation of MIRL & lighted hold signs
5. Installation of light source for wind cone
6. Installation of Super Unicom
7. First phase of Fencing installation - north and west sides

8. Construction of Helipads

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.

1. Pavement Maintenance
2. Construct Auto Parking lot
3. Construct east half of parallel taxiway
4. Remove two existing box hangars
5. Construct three 50 x 50 box hangars
6. Construct hangar taxilanes
7. Second phase of Fencing installation – south and east sides
8. Install Tipdown Beacon Pole

Phase III

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

1. Construct Pilot's Lounge
2. Construct west half of parallel taxiway
3. Installation of four box PAPIs at both runway ends
4. ALP Update
5. Pavement Overlay

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, the City of Brewster/Airport, 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.

<u>FAA</u>

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 5 percent of the project cost is funded by the airport sponsor. It is important to note that even though a project may be eligible for federal funding, this does not ensure that funds will be available or granted to the project by the FAA. In addition, some projects listed in the CIP will require completion of the FAA environmental checklist and documentation prior to being eligible to receive FAA funding.

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%.