TABLE OF CONTENTS

CHAPTER ONE
INTRODUCTION AND PLAN RECOMMENDATIONS

The Port of Hood River, in cooperation with the Oregon Department of Aviation (ODA), is updating the Airport Master Plan (ALP) Report for Ken Jernstedt Airfield (hereafter referred to as "the Airport"). The purpose of the study is to define the current, short-term and long-term needs of the airport. This Airport Master Plan Report replaces the Hood River Airport Master Plan 1990-2010 (W&H Pacific, 1993) and updates the Ken Jernstedt Airfield Airport Layout Plan Update 2004-2024 (Century West Engineering, 2005). The basis of these two reports are the Hood River Airport Master Plan Report (Century West Engineering, 1977), which the Port of Hood River developed after Hood River County transferred airport ownership to the Port in 1976. This Airport Master Plan Report replaces the Hood River Airport Master Plan completed in 1990 (Hood River Airport Master Plan 1990-2010, W&H Pacific, 1993). Prior master plan recommendations have been reviewed and revised as necessary, to reflect current conditions and any changes in activity, utilization, or facility development that may affect future demand for aviation facilities.

Funding for the ALP project was provided through a Federal Aviation Administration (FAA) Airport Improvement Program grant (90 %) and local match (10 %) from the Port of Hood River. Overall project coordination is being provided by the Oregon Department of Aviation through administration of a multiple airport layout plan grant.

The preparation of this document may have been supported, in part, through the Airport Improvement Program financial assistance from the Federal Aviation Administration as provided under Title 49, United States Code, section 47104. The contents do not necessarily reflect the official views or policy of the FAA. Acceptance of this report by the FAA does not in any way constitute a commitment on the part of the United States to participate in any development depicted therein nor does it indicate that the proposed development is environmentally acceptable with appropriate public laws.

OVERVIEW

The Hood River Airport was officially renamed Ken Jernstedt Airfield in 2001 to honor a lifetime of public service provided by the prominent local resident. Mr. Jernstedt was a member of the American Volunteer Group (AVG), also known as the Flying Tigers, which was formed to assist China in the months leading up to the United States' entry into World War II. He was a decorated fighter pilot (Oregon's first Ace) and a recipient of the Distinguished Flying Cross. Following his military service, Mr. Jernstedt twice served as Hood River mayor and spent twenty years in the Oregon State Legislature (House and Senate) before retiring in 1988. He was also a local business owner and has supported a variety of aviation related activities.

Ken Jernstedt's P-40 Warhawk on display at the Evergreen Air Museum

Ken Jernstedt Airfield has the only paved and lighted runway in Hood River County and is included in the "Core System of Airports" in the Oregon Aviation Plan (OAP).[1] Core system airports are defined as having "a significant role in the statewide aviation system." The airport is included in the "Community General Aviation Airport" category based on its current functional role. Community airports typically accommodate a wide range of general aviation users and local business activities. Local airport activity includes business and general aviation users, aerial applicators, government users, and visitors to Hood River and the surrounding area.

Community airports are significant components in the statewide transportation system and often generate both direct (employment, etc.) and indirect economic benefits for the local community or region. In recent years, the communities within the Columbia River Gorge have attracted new residents and businesses that value the region's natural setting and economic opportunities. According to local data, the population of the immediate four-county area (Hood River, Wasco, Skamania, and Klickitat) has grown to approximately 75,000. Commercial-related aviation businesses, such as aerial applicators, fixed base operators and aircraft maintenance shops create employment and provide vital services within a large geographic area.

For smaller communities without convenient access to commercial air travel, general aviation airports provide additional transportation options for business and personal travel. The availability of a safe, well-maintained general aviation airport is often a key factor in a business decision to locate in, or serve a small community. The nearest commercial air service is about one hour away at Portland International Airport.

The airport is included in the National Plan of Integrated Airport Systems (NPIAS), administered by the FAA. NPIAS airports are eligible for federal funding of improvements through FAA programs such as the current Airport Improvement Program (AIP). The FAA requires that all NPIAS airports periodically update their airport plans to maintain effective long-term planning. This project enables the airport to meet the FAA's requirement to maintain an up-to-date plan.

The primary objective of the Airport Master Plan Report is to identify current and future facility needs and the improvements necessary to maintain a safe and efficient airport that is economically, environmentally and socially sustainable. The Airport Master Plan Report will:

- *Examine previous recommendations and development alternatives as appropriate to meet the current and projected airport facility needs;*

[1] Oregon Aviation Plan (Dye Management/Century West), © Oregon Department of Transportation 2000.

- *Determine current and future activity and facility requirements;*
- *Update the airport layout plan, airspace plan, and land-use plan for the airport and its surrounding areas; and*
- *Schedule priorities of improvements and estimate development costs for the 20-year planning period.*

PUBLIC INVOLVEMENT

The public involvement element of the planning process provided opportunities for all interested individuals, organizations, or groups to participate in the project. A list of stakeholders was developed for the project, which included airport users, local citizens, businesses, and local, state and federal government agencies, and community leaders.

At the project kickoff, a Joint Planning Conference (JPC) was held for agencies and organizations with a specific interest or responsibility (land use, environmental, natural resources, transportation, etc.) associated with the airport or its vicinity. The purpose of the JPC was to identify any concerns or issues, which needed to be addressed as part of this airport layout plan update. The JPC provided valuable information that can be used in formulating the plan.

A planning advisory committee (PAC) was formed to assist the Consultant and Port in developing the updated plan. The PAC reviewed and commented on draft work products and provided local knowledge and expertise to the planning process. PAC meetings were held at key points during the study in conjunction with public informational meetings.

The Draft Report contained the entire work effort and reflected the input provided by all participants in the planning process. Following a period of review, additional public and agency comments were integrated into the Final Airport Layout Plan Report and drawing set.

AIRPORT MASTER PLAN REPORT CONCLUSIONS

1. Ken Jernstedt Airfield is owned and operated by the Port of Hood River, Oregon. The ownership of the airport was transferred from Hood River County to the Port in 1976. According to local records, the current airport site was acquired and developed by Hood River County in the mid-1940s, replacing another local airstrip that was developed in 1928 and closed in 1931.

2. The airport is categorized as a "Community General Aviation Airport" in the 2000 Oregon Aviation Plan and is included in Oregon's core system of airports, which denotes its significance in Oregon's aviation system.

3. The airport is included in the National Plan of Integrated Airport System (NPIAS), making it eligible for federal funding through the Federal Aviation Administration (FAA).

4. The "existing" critical aircraft type identified in the 1990 Airport Master Plan was a Cessna 421 light twin-engine aircraft included in Airport Reference Code (ARC B-I). The "future" critical aircraft was identified as a Beechcraft King Air 200, a twin-engine business turboprop (ARC B-II).

5. The airport has a single paved and lighted runway (3,040 feet by 75 feet) with a full-length parallel taxiway on its north side. The airfield facilities are generally designed to meet FAA Airport Design Group (ADG) I standards associated with small fixed wing aircraft. However, some facilities (runway width, pavement strength, taxiway widths) are designed to accommodate larger aircraft.

6. Runway 07/25 has a pavement strength rating of 23,000 pounds for aircraft with single wheel landing gear configurations.

7. Airfield lighting currently includes low intensity runway edge lights (LIRL), runway end identifier lights (REIL) on Runway 25, runway threshold lights and the airport beacon.

8. Landside facilities (aircraft parking aircraft parking apron, hangars, etc.) are located on both sides of the runway; however, the fixed base operator (FBO) and aircraft fuel are located on the south side of the airfield.

9. The 1990 Airport Master Plan indicated that the airport consisted of 120 acres of land held in fee and recommended 48.2 acres of future property acquisition for the airport to accommodate facility improvements and airspace protections.

10. The most recent estimate of air traffic activity generated through the ODA Acoustical Counting Program is for 1998 (13,555 annual operations). The airport had 80 based aircraft listed on the most recent FAA Form 5010 Airport Record Form.

11. The airport operates under day and night visual flight rules (VFR) and does not currently have instrument approach capabilities. According to a December 2008 Airport Layout

Plan Airspace Classification Review, "The feasibility of developing a nonprecision instrument approach to Runway 7/25 has not been established by FAA through detailed airspace and flight procedure analyses. In the event that a basic feasibility can be established, it appears that the approach minimums would be negatively affected by terrain clearance requirements for the inbound approach procedure, missed approach procedure, or both segments. These conditions suggest that developing instrument procedures, if feasible, may have marginal effectiveness. Local pilots familiar with the terrain surrounding the airport have expressed reservations about the viability of developing a useable instrument approach to either runway end."

12. Aviation fuel (AVGAS) and aircraft maintenance services are available at the airport.

13. The airport has an automated weather observation system (AWOS), which provides 24-hour on-site weather observation.

14. The airport is zoned Airport Development (AD) by Hood River County. The airport is surrounded by predominantly Exclusive Farm Use (EFU), with areas of Rural Residential zoning located to the north and west. Airport overlay zoning exists (County) based on the airspace surfaces previously defined for the airport. The airport is located entirely outside the City of Hood River urban growth boundary (UGB).

15. Ken Jernstedt Airfield does not currently have sufficient land area to accommodate forecast demand for hangar space.

AIRPORT MASTER PLAN REPORT RECOMMENDATIONS

The recommendations of previous planning efforts were examined and revalidated or modified as appropriate based on current considerations and design standards.

1. Current design standards for Runway 7/25 are based on airport reference code (ARC) B-I; the ultimate design standards are based on ARC B-II.

2. A regular schedule of pavement maintenance (vegetation control, crack filling, slurry seals, patching, etc.) should be conducted on airfield pavements to maximize the useful life and optimize life cycle maintenance expenditures.

3. Shifting the ends of Runway 7/25 approximately 550 feet east is recommended to improve obstruction clearance at both runway ends.

4. The section of Orchard Road that is located approximately 300 feet from the east end of Runway 7/25 will be closed to accommodate the runway shift and to eliminate the existing obstructions to the Runway 25 approach.

5. Based on the ultimate B-II ARC, the north parallel taxiway and portions of the south parallel taxiway will be closed (relocated) to meet the 240-foot runway separation standard. Some existing aircraft parking and fueling facilities will also require reconfiguration to meet B-II design standards.

6. Future development of aircraft hangars and aircraft parking areas will be located on the north side of the runway. Relocation of the fixed base operation and aircraft fueling facilities to the north apron is also recommended. Redevelopment of the south apron areas to accommodate additional hangars is recommended, where space permits.

7. Property acquisition is recommended on the north side of the airport to accommodate future hangar development.

8. Property acquisition is recommended along the southeast edge of the airport to allow the airport to maintain a clear runway primary surface (extending 250 feet from runway centerline), based on the ultimate B-II ARC development.

9. Trees located within the primary and transitional surfaces should be removed or topped to eliminate obstructions.

10. Buildings or other structures penetrating the primary or transitional surfaces should be removed or marked with obstruction lights.

11. Extensions of access roadways and utilities within the airport will be required to serve new aviation-related development areas.

12. Visual Approach Slope Indicators (VASI) or Precision Approach Path Indicators (PAPI) are recommended for Runways 7 and 25.

13. Lighted wind cones are recommended near the ends of Runway 7 and 25 to improve the representation of surface wind conditions.

14. Fencing should be added along the airport boundary to limit unauthorized human, animal and vehicle access to the airfield. In addition, fencing and electronic (keypad

combination) gates should be provided within the airport to further protect aircraft operations areas from unauthorized vehicle or pedestrian access.

15. Hood River County should update existing airport overlay zoning to reflect the updated boundaries of the FAR Part 77 airspace surfaces defined in this plan to comply with state law (ORS Ch. 836.600-630). In addition to ensuring quality and cohesive mapping of the areas affected by the required airport overlay zone, in County jurisdictions, the existing zoning and transportation plan languages should also be reviewed and amended to ensure compliance with ORS Chapter 836.600-630.

16. Hood River County should ensure that development of rural lands in the vicinity of the airport be compatible with airport activities. Maintaining the Agricultural or Manufacturing zoning in the areas surrounding the airport provides effective land use compatibility with airport operations. Development of residential areas, or increasing the densities of existing rural residential areas within the boundaries of the protected airspace surfaces of Ken Jernstedt Airfield should be discouraged to ensure the long-term viability of the airport.

17. The Port of Hood River should require that applicants for all leases or development proposals involving construction of structures demonstrate compatibility with the airport's protected airspace surfaces. The applicant should be required to provide documentation of "no objection" by FAA resulting from the review of FAA Form 7460-1 – Notice of Proposed Construction or Alteration (to be submitted by the Port), prior to approval of ground leases. Any proposal that receives an objection by FAA should not be approved without first addressing FAA concerns.

18. County planning officials should adopt a policy so that "documentation of no objections by FAA" is not required for non-critical airspace areas..

19. With Port of Hood River Airport Master Plan adoption completed, Hood River County should adopt the Airport Master Plan Report and drawings for incorporation into local comprehensive and transportation planning.

20. An updated Exhibit "A" property plan has been prepared for Ken Jernstedt Airfield, updating airport property boundaries and acreage. FAA has reviewed and approved the updated Exhibit "A".

21. The Port of Hood River should initiate the recommended improvements and major maintenance items in a timely manner, requesting funding assistance under FAA and other federal, state or county funding programs for all eligible capital improvements.

CHAPTER TWO
INVENTORY OF EXISTING CONDITIONS

INTRODUCTION

This chapter documents existing conditions and aviation activity at the airport. Existing forecasts of aviation activity will be evaluated, and updated as necessary, to identify in broad terms, anticipated trends that may affect development needs at Ken Jernstedt Airfield, through the twenty-year planning period and beyond. The existing airfield facilities were also examined during recent on-site inspections. Historical data from a variety of sources are used in this evaluation:

- **Hood River Airport Master Plan 2004-2024** (Century West Engineering, 2005)
- **Hood River Airport Master Plan 1990-2010** (W&H Pacific, Inc., 1994)
- **Hood River Airport Master Plan Report** (Century West Engineering, 1977)
- **Hood River Airport Planning Study – Demand Analysis of Runway Options and Review of RPZ Standards** (W&H Pacific, Inc., 2000)
- **Hood River Airport Pavement Evaluation Maintenance-Management Program** (Pavement Consultants, Inc., 2000)
- **Oregon Continuous Aviation System Plan – Volume I: Inventory and Forecasts; Volume III: Recommended Development Plan** (AirTech, 1997)
- **Oregon Aviation Plan** (Dye Management Group, 2000)
- **FAA Airport Master Record Form** (5010-1), **APO Terminal Area Forecasts**.
- **Seattle Sectional Aeronautical Chart; IFR Enroute Low Altitude (L-2) Chart** – US DOT Federal Aviation Administration National Charting Office.
- **Instrument Approach Procedure Charts -** Jeppesen Airway Manual
- Other local documents and regional socioeconomic data.

Airport History

In 1928, the Hood River County Court authorized construction of an airfield, located on a flat field west of the Hood River, in response to the need to provide landing capability for airplanes traveling through the Columbia Gorge. By 1931, increased air traffic led to noise, dust and complaints from the residential area surrounding the airfield, causing the County Court to limit the use of the airfield to refueling and emergencies only. This effectively closed the airstrip.

In 1945, the airport's current location was established when a new airstrip was created by two aircraft owners on 80 acres of leased pasture near Orchard Road. The Civil Air Patrol helped prepare the field in exchange for use of the airstrip. At this time, an agricultural spraying business was started.

In 1946, the County took over ownership and operation of the airfield, under public pressure to establish a municipal airport facility. Additional land was acquired to make it safer for use by larger aircraft. By 1952, the turf runway was 1,960 feet long. A small hangar and mechanic shop were built around this time. In 1959, the turf runway was paved. The County acquired more land for expansion in 1960. Airport ownership was transferred from the County to the Port of Hood River in January 1976. The Port also purchased an additional 35 acres of land adjacent to the airport for future expansion and began working toward bringing the airport into FAA compliance.

The 1970s and 1980s were a time of major growth for the airport as both business and government usage increased, creating further need for improvements. During this time, more property was added, several hangars were constructed, the runway was rehabilitated and extended to 3,040 feet, a lighting system was installed, two 12,000-gallon underground fuel tanks were installed, and the north tiedown apron was constructed.

During the mid to late 1990s, further improvements were made to the runway and taxiway, as recommended in a master plan published in 1994. Other improvements included the construction of the south 12-unit T-hangar, removal of the underground fuel storage tanks, and the construction of a north access road. A new 12,000-gallon above ground fuel storage tank was installed to replace the underground tanks.

In June 2001, the Port Commission changed the name of Hood River Airport to Ken Jernstedt Airfield, to honor Ken Jernstedt, a World War II Flying Tiger ace. Mr. Jernstedt was also a former state legislator, served as mayor of Hood River twice and owned a local business.

AIRPORT LOCALE

Ken Jernstedt Airfield is located approximately one and one-half miles southwest of the City of Hood River, in northeastern Hood River County, adjacent to Tucker Road (State Highway 281). Highway 281 is a secondary north-south highway route in Hood River County, which connects to State Highway 35 at Parkdale, approximately 15 miles south of Hood River. Highway 35 is the primary north-south route through the county, which provides a direct route south to Mount Hood National Forest where it joins U.S Highway 26, then continues south and connects to U.S. Highway 97. U.S. Interstate 84 is the primary east-west highway route and provides a direct route from Portland, which is 66 miles west of Hood River.

Established in 1895, Hood River is the largest community, the county seat and one of two incorporated cities within Hood River County (Cascade Locks is the other incorporated city in the county). Hood River County, located at the north-central Oregon, borders Wasco County to the east and south; Clackamas and Multnomah Counties to the west; and the Columbia River and Washington State border to the north. Hood River County is situated mainly within the Hood River Basin with a land area of 533 square miles (339,865 acres). The region is comprised mainly of farmland, rivers, lakes, creeks, and moderate to highly mountainous terrain

Recreational activities in the local area include windsurfing, skiing, fishing, hiking, biking, golf and visiting scenic areas including the Columbia River Gorge National Scenic Area, Mt. Hood Recreation Area, Crown Point State Park, Columbia River, Multnomah Falls, and other waterfalls. Hood River County also has two ports and two boat basins, with one serving local barge traffic, a steel boat manufacturing firm and Mid-Columbia yachting interests. The City of Hood River, situated along the Columbia River, attracts windsurfers from all over the world.

Airport Environment

The airport area is approximately 120 acres with an elevation of 631 feet above mean sea level (msl). Major landside developments and services (six hangars, FBO, aircraft parking, fueling, aircraft maintenance, etc.) are located on the south side of the runway; an aircraft parking apron and several hangars (two 12-unit T-hangars and two multi-space conventional hangars) are located on the north side of the runway. Two large conventional hangars are located off airport property to the north and are served by a taxiway that extends beyond the aircraft apron and northwest hangar area. The north and south landside developments are served by separate access roads that connect to Tucker Road/State Route 281.

CLIMATE

The geographical climate for Hood River County varies greatly, with elevations ranging from 100 feet along the Columbia River to 11,235 feet at Mt. Hood. The climate of southern Hood River County is characterized by heavy annual precipitation, with considerable snowfall most winters, and cool summer temperatures. The climate of northern Hood River County has less precipitation, less snowfall, and significantly warmer temperatures in the summer. Ken Jernstedt Airfield is located in northern Hood River County in the Hood River Valley. Detailed climatic data for Hood River was available for a 29-year period between 1971 and 2000.[2] The average maximum temperature is 82.3 degrees Fahrenheit (August) and the average minimum temperature is 27.9 degrees (January). Hood River averages 32 inches of precipitation and 33 inches of snowfall annually. The daily extreme temperatures recorded for Hood River are -10 degrees Fahrenheit (January) and 108 degrees (August). The prevailing winds for Hood River are primarily from the west, but in the winter large-scale easterly flows can occur.

GEOLOGY

Hood River County has an area of 533 square miles and is bordered by the Columbia River along the northern boundary and Mt. Hood to the south. Hood River County is located within the Columbia Lava rock formation. This formation is a vast sheet covering nearly 250,000 square

[2] Western Regional Climate Center.

miles and varying in thickness from 300 to 4,000 feet and was formed by a series of several eruptions between Mt. Hood and Mt. Adams.

Ken Jernstedt Airfield is situated in the Hood River Valley, which extends about 16 miles south from the Hood River city center. This area is very fertile and is used to grow a variety of agricultural crops. About 74 percent of Hood River County is under public ownership, with Mt. Hood National Forest comprising 84 percent of these public lands. The privately owned lands are concentrated in the Hood River Valley.

The terrain at the airport site is generally level with some gentle sloping. The dominant soil in the vicinity of the airport is classified as Rockford stony loam (typically located on uplands), moderately deep and well drained with 0 to 8 percent slope.[3] Rockford soils were formed in very stony, medium and fine textured glacial outwash from basalt and andesite. These soils have a depth to bedrock of 40 to 60 inches. At the east end of the airport, the soils become a mix of sandy loams and fine sandy loams (Van Horn and Wind River series), which were formed in alluvial deposits. These alluvial deposits are most likely associated with the proximity of the east end of the airport to Hood River, which is a major tributary of the Columbia River. The soils in all of these series are used for pasture, hay, fruit orchards, woodland, wildlife habitat, and water supply. The land surrounding the airport is used largely as fruit orchards.

SOCIOECONOMIC CONDITIONS

Population

According to data compiled by the U.S. Census Bureau and Portland State University Center for Population Research and Census, the population of Hood River County was 20,411 in 2000. The population of Hood River, one of only two incorporated cities in Hood River County, had a population of 5,831 in 2000.

Between 1990 and 2000, the population within the City of Hood River increased by 26 percent (2.3% average annual rate). Within Hood River County, the population increased by approximately 21 percent during the same period (1.9% average annual rate). This growth was up sharply from the previous ten-year period between 1980 and 1990, where population growth averaged less than one percent per year for both Hood River and Hood River County. A certified

[3] U.S. Department of Agriculture, Soil Conservation Service (1981).

estimate for 2001 by the Population Research Center shows the City of Hood River, with an annual increase of 3.2 percent above 2000 levels, outpacing Hood River County's growth, which was less than one percent.

Hood River County's population is projected to increase by approximately 50 percent (to 30,780) by the year 2040.[4] This represents an average annual increase of approximately 1.03 percent over the forty-year period. If current city/county distributions continue, the population for Hood River would be expected to increase to approximately 8,793 residents by 2040.

Economy

Hood River County's economy is comprised of agriculture, food processing, forest products, electronics and electronics manufacturing, recreation and tourism, and wholesale and retail trade. Tree fruits and nuts, specialty products, cattle, and miscellaneous animals are the principal agricultural products. Hood River County grows pears, apples, cherries, and peaches on more than 14,000 acres of commercial orchards and is the world's leading Anjou pear producer. There are approximately 380 commercial farms and 20,000 acres in farmland. Historically, agricultural sales have been a significant source of revenue for the county, but the industry experienced a significant gross sales decline in 2000 in the fruit tree and nuts sector, primarily pears.

The five largest employers in Hood River County, as of March 2002, were Providence Hood River Memorial Hospital, Sprint Communications, Luhr Jensen & Sons, Inc., Wal-Mart, and Hood River Inn.[5] According to the 2002 Regional Economic Profile for Central Oregon, the growth in the retail and trade sectors that occurred in 2000 helped to offset losses in the manufacturing (specifically forest products) industry, transportation and public utilities. Hood River County's economy relies heavily on the manufacturing, trade, wholesale and retail sectors.

The Port of Hood River is actively involved in supporting economic development within the local area through operation and management of several facilities including the airport, marine facilities and industrial lands.

The 2000 average annual unemployment rate in Hood River County was 7.8 percent. While still about 2.4 percentage points above the statewide level due to the high rate of seasonal

[4] State of Oregon, Office of Economic Analysis.
[5] Oregon Economic and Community Development Department (2002)

employment characteristic of the agriculture and timber products industries, the unemployment rate has been steadily improving since 1998.

Job growth for Hood River County increased by 2.4 percent in 2000, slightly ahead of the statewide growth average (1.8 percent) during the same period. While a continued decline in the forest products industry is projected through 2010, other types of manufacturing are expected to grow, as they have during the last ten years. The manufacturing sector, not including the forest products industry, experienced a gain of 270 jobs from 1990-2000, an increase of 38 percent. In 2000, the service industry (mainly lodging, amusement, and recreation) along with the trade industry became the county's largest non-farm industries. Sustained growth is anticipated to occur in the service and trade sectors.

AIRFIELD FACILITIES

Historically, Ken Jernstedt Airfield has served a variety of general aviation users, including business, commercial, and government aviation. The United States Forest Service (USFS) and the Bureau of Land Management (BLM) periodically utilize the airport to support their operations. **Table 2-1** summarizes airport data.

TABLE 2-1
AIRPORT DATA

Airport Name/Designation	Ken Jernstedt Airfield (4S2)
Airport Owner	Port of Hood River
Date Established	1946
Airport Category	National Plan of Integrated Airport Systems (NPIAS) General Aviation. FAA Airport Reference Code: B-I
Oregon Aviation System Designation	Community General Aviation Airport (Category 4)
Airport Acreage	Approximately 120 Acres
Airport Coordinates	N 45º40.36' W 121º 32.19'
Airport Elevation	631 feet Mean Sea Level (MSL)
Airport Traffic Pattern Configuration/Altitude	Left Traffic – 1,500 feet MSL (869 feet above ground level) Right Traffic for Gliders and Ultralights

Runways and Taxiways

Ken Jernstedt Airfield has one paved, lighted runway (7/25), oriented in an east-west direction. The runway has basic runway markings (runway numbers, centerline stripe, and taxiway lead-in striping), which are consistent for runways used in visual flight rules (VFR) conditions. The runway utilizes a standard left traffic pattern for powered aircraft and right traffic for gliders and ultralights.

Runway 7/25 is served by a full-length parallel taxiway on its north side with three exit taxiways (one at each end of the runway and a third exit located 875 feet from the Runway 7 threshold.). The runway has a partial-length (900-foot) parallel taxiway on its south side, with three exits. Another 560-foot section of south parallel taxiway extends from the east end of the terminal apron and is not directly connected to the runway. The dimensions and runway separations for each of the parallel taxiway sections are different and will be evaluated for compliance with FAA standards later in the study. There are no aircraft holding areas located adjacent to the parallel taxiways, although aircraft hold lines are located 125 feet from runway centerline on all exit taxiways that connect to the runway. None of the taxiways on the airport have edge lighting or reflectors. **Tables 2-2 and 2-3** summarize existing runway and taxiway facilities.

TABLE 2-2
RUNWAY 7/25 DATA

Dimensions	3,040 x 75 feet
Effective Gradient	.01259%
Surface	Asphalt
Weight Bearing Capacity	23,000 pounds – Single Wheel Landing Gear[1]
Marking	Basic (rwy numbers, centerline stripe; yellow lead-in lines at main exit taxiway)
Lighting	Low Intensity Runway Edge Lighting (LIRL); threshold lights; REIL (Rwy 25)
Wind Coverage	96.5 percent (All Weather) with a 15 mph crosswind. Data: 1994 ALP

1. Pavement Strength as published in U.S. Airport/Facility Directory

The north parallel taxiway (Taxiway "A") has taxiway connections at the east and west ends of the north apron. Taxiway A and the other access taxiways serve the north aircraft tiedown apron and the adjacent on- and off-airport hangars.

TABLE 2-3
TAXIWAY DATA

Taxiway	Dimensions/Configuration
North Parallel Taxiway (Alpha)	
Dimensions	3,040 x 30 feet with (3) 90-degree exit taxiways
Surface	Asphalt (good condition)
Marking	Centerline stripe; hold lines 125 feet from Rwy centerline on all exit taxiways
Lighting/Reflectors	None
Runway-Parallel Taxiway Separation	200 feet
South Parallel Taxiway (Bravo)	
Dimensions	900 x 25 feet with (3) 90-degree exit taxiways
Surface	Asphalt (good condition, except far west end - very poor)
Marking	Centerline stripe; hold lines 125 feet from Rwy centerline on all exit taxiways; no markings visible on far west end)
Lighting/Reflectors	None
Runway-Parallel Taxiway Separation	150 feet
South Parallel Taxiway (East Extension)	
Dimensions	560 x 35 feet connected the northeast corner of the main apron and the south T-hangar taxilanes.
Surface	Asphalt (very good condition)
Marking	Centerline stripe
Lighting/Reflectors	None
Runway-Parallel Taxiway Separation	240 feet
North Hangar Taxiway (off airport)	
Dimensions	470 x 25 feet (width varies)
Surface/Condition	Asphalt (fair condition)
Marking/Lighting/Reflectors	None
Southwest AG Area Taxiway	
Dimensions	200 x 25 feet
Surface	Asphalt (fair condition)
Marking/Lighting/Reflectors	None

The south parallel taxiway (Taxiway "B") extends from the end of Runway 7 to the east end of the south apron, opposite the fixed base operator (FBO). Taxiway B has seven connections to adjacent hangar and apron taxiways/taxilanes serving south landside facilities. The separate section of south parallel taxiway that extends east of the FBO area is not directly connected to Taxiway B or the runway. This taxiway is currently limited to providing access to the hangars located east of the FBO. A short section of taxiway connects Taxiway "B" to the adjacent agricultural aircraft operations area.

During site visits, associated with this project, most of the runway and taxiways appeared to be in fair condition, except the extreme western section of the south parallel taxiway, which was observed to be in very poor condition. The runway numbers and other markings on the runways and taxiways were also observed to be in fair condition, but some required repainting. The aircraft parking aprons appeared to be generally in good or fair condition, with some areas in fair to poor condition.

The 1994 Airport Layout Plan included a wind rose created for the runway based on estimated data generated for the airport in the 1970s. The data estimated that Runway 7/25 has approximately 96.5 percent coverage at 15 miles per hour. This level of wind coverage meets FAA requirements for small runways. Local pilots indicate that the prevailing winds generally follow an easterly-westerly direction, with seasonal shifts.

Aircraft Apron

The airport has two aircraft tiedown aprons and several smaller aprons in a variety of uses (fueling, FBO operations, aerial applicator and frontage for aircraft hangars). **Table 2-4** summarizes existing apron facilities at the airport.

The south tiedown apron has 27 light aircraft tiedowns configured in four north-south rows. The tiedowns are served by three taxilanes that extend from Taxiway B to the back edge of the apron; the taxilanes do not extend around the south ends of the tiedown rows. The outer two rows of tiedowns are single tail-in positions (4/5 tiedowns each) and the inner two rows each have 9 tail-in positions. The markings (tiedown locations and taxilane centerline stripes) are in very good condition. It appears that some of the original tiedowns on the south apron have been removed or reconfigured. The outer tiedown position in the eastern-most parking row has been sealed over

and one of the tiedown anchors has been removed. A single tiedown located immediately east of the eastern row of tiedowns has also had its markings and tiedown anchors sealed over. The outer tiedown in the western-most row of tiedowns also appears to be unavailable. A small section of hard surfacing extends from the west edge of the apron (directly in line with the tiedown) to the adjacent apron that appears to be used by vehicles.

South Apron Tiedown

The north apron is configured with three rows of aircraft parking positions served by two interior taxilanes, oriented in an east-west direction. The inner and outer tiedown rows have single tail-in parking positions facing inward toward the apron. The center tiedown row has tail-to-tail parking facing both north and south. The apron was originally configured with 48 designated parking positions with the eastern end used for aircraft fueling. Although the fuel tank has been removed, additional tiedowns have not been installed in the former fueling area. It appears that this portion of the apron is available for aircraft parking, but is not currently equipped with tiedowns. The pavement is in fair condition with extensive cracking (mostly filled), minor fuel/oil damage, minor depressions (water ponding), large asphalt patches, and vegetation growth visible. The tiedowns rows have cables extending along the apron, with individual tiedown chains attached. The cables do not appear to extend to all parking positions. The markings (tiedown positions and taxilane stripes) on the apron are in fair to poor condition.

The terminal apron extends from the FBO to the south tiedown apron and includes fueling, a limited number of aircraft tiedowns and other parking. The portion of the apron located directly in front of the large maintenance hangar is used for aircraft parking but does not have a specific tiedown configuration. The fuel storage tank is located near the northern edge of apron, adjacent to Taxiway B. The fueling area is configured to accommodate aircraft on the north and south sides of the storage tank and on the east end. Two light aircraft tiedowns are located in front of the FBO building; a third tiedown (outer position) has been removed to accommodate aircraft access to the taxiway that serves the south T-hangar.

TABLE 2-4
AIRCRAFT APRON DATA

North Tiedown Apron	Approximately 700 x 220 ' (17,111 square yards) Light aircraft tiedowns (48 positions as originally configured) Asphalt Concrete
South Tiedown Apron	Approximately 365 x 210' (8,517 square yards) Light aircraft tiedowns (27 positions) Asphalt Concrete
FBO/Terminal Apron	Approximately 370 x 120'; fueling area 55' x 135' (5,760 square yards) Temporary aircraft parking, aircraft fueling Asphalt Concrete
Hangar Apron (SW Section of Airport) Glider Club	Approximately 200 x 80' (1,778 square yards) Hangar Frontage Asphalt Concrete w/ PCC sections
Hangar Apron (NW section of airport)	Approximately 135 x 60' (900 square yards) Hangar Frontage Asphalt Concrete
Hangar Apron (SE section of airport) ANPC	Approximately 90 x 40' (400 square yards) Hangar Frontage Asphalt Concrete w/ PCC Section 12 x12'
AG Aircraft Apron	Approximately 200 x 80' (1,778 square yards) Asphalt Concrete 2 Hard Surfaced Loading Pads (approximately 30 x 50') Portland Cement Concrete (PCC)

The airport has a designated agricultural operations apron located at the southwest corner of the airport. The apron is connected to Taxiway B by a single access taxiway. The apron is asphalt surfaced with two hard surfaced areas (Portland Cement Concrete) for aircraft parking and loading. The apron appears to be in fair condition.

Agricultural Aircraft Facilities

Ken Jernstedt Airfield has one designated agricultural (AG) aircraft loading area located at the southwest corner of the airport. As noted in the previous section, aircraft access to the facilities is provided by a single access taxiway that extends from the west end of Taxiway B and Runway 7. The AG area includes an asphalt apron with one concrete loading pad, a conventional hangar, equipment storage, an aboveground fuel tank, water storage tanks, and vehicle parking. Vehicle access to the AG area is provided by the main airport access road.

Airfield Pavement Condition

As part of the **Oregon Aviation System Plan**, the Oregon Department of Aviation manages a program of pavement evaluation and maintenance for Oregon's general aviation airports. This evaluation provides standardized pavement condition index (PCI) ratings, pavement features and current conditions. Through the use of MicroPAVER computer software, current pavement condition ratings are entered into the system with the specifics of each pavement section. The program is able to predict the future condition of the pavements if no action is taken (i.e. based on a normal rate of deterioration) while also identifying the recommended measures needed to extend the useful life of the pavement section.

Table 2-5 summarizes airfield pavement conditions for Ken Jernstedt Airfield based on the most recent inspection conducted in 2000. During the 2000 inspection, the ratings for the pavements ranged from "excellent" to "poor." Runway 7/25 was rated "very good." The north parallel taxiway was rated "excellent." Most of the south parallel taxiway was rated "very good," with the exception of the far western section, which was rated poor. The average PCI for all airfield pavements at the airport was 75 in 2000, which corresponds to a "very good" pavement condition rating.

During recent site visits, the airfield pavements were observed to be generally consistent with the most recent formal pavement evaluations. The runway and parallel taxiways have considerable cracking, although it appears that crackfilling has been performed on a regular basis. Most sections of the aircraft parking aprons are in fair to good condition. The north apron has considerable cracking visible with large areas recently patched. Areas of vegetation growth were observed around the tiedowns and along the southern edge of the apron where vegetation has encroached onto the apron from the adjacent grass areas.

TABLE 2-5
SUMMARY OF AIRFIELD PAVEMENT CONDITION
(AUGUST 2000)

Pavement	Section Design/Age	PCI Rating[1]	Condition
Runway 7/25	2" AC (1986); 6-13" (varies) Crushed Aggregate (1986)	73 (West Section) 83 (Center Section) 81/77 (East Sections)	Very Good Very Good Very Good
Taxiway A (North Parallel)	2" AC (1986); 6" Crushed Aggregate (1986)	91 (main taxiway) 77 (center exit - north)	Excellent Good
Taxiway B (South Parallel)	2" AC (1986); 6" Crushed Aggregate (1986)	84 (main taxiway) 70 (center exit – south)	Very Good Good
Taxiway B (west section)	AC (circa 1970); Unknown Base	27 (main taxiway) 50 (west exit - south)	Poor Fair
Taxiway B (east extension)	2" AC (1995); 7" Crushed Aggregate (1995)	79 (main taxiway)	Very Good
North Tiedown Apron	2" AC (1986); 6" Crushed Aggregate (1986)	59	Good
South Tiedown Apron	2" AC (1986); 6" Crushed Aggregate (1986)	84	Very Good
AG Apron	Data Not Available	Not Rated	Fair
South (west) Hangar Apron (glider area)	AC; Unknown Base (circa 1970)	57	Good
North Hangar Apron	Data Not Available	Not Rated	Excellent (new)
North Hangar Taxilanes	2" AC (circa 1980); 6" Crushed Aggregate (circa 1980)	65	Good
South T-hangar Taxilane	2" AC (1995); 7" Crushed Aggregate (1995)	90	Excellent
South (east) Hangar Apron (ANPC)	AC; Unknown Base (circa 1983). Concrete Sections: PCC; Unknown Subbase (circa 1983)	87 (asphalt section) 72 (PCC section)	Excellent Very Good
Terminal /FBO Apron	East Section: AC; Unknown Base (circa 1983). West Section: 2" AC (1986); 6" Crushed Aggregate (1986)	26 (east section) 21 (PCC section) 84 (west section)	Poor Very Poor Very Good

1. The Pavement Condition Index (PCI) scale ranges from 0 to 100, with seven general condition categories ranging from "failed" to "excellent." For additional details, see *Oregon Aviation System Plan Pavement Evaluation/Maintenance Management Program* for Hood River Airport.

North Apron Tiedown

The pavement in the north hangar area varies from new to very poor. The pavement located directly in front of the two new hangars is new and is in excellent condition; the taxilanes located adjacent to the T-hangars are generally in fair condition, except the northern taxilane, which was recently observed to be in very poor condition (it was rated "good" in 2000).

The pavement surrounding the south T-hangar, east of the terminal apron, is in good condition. The section of parallel taxiway that extends from the terminal apron to these hangars is also in good condition. The apron areas that front the large Quonset hangar and the adjacent conventional hangar are in good condition. The apron located directly in front of the FBO is in poor condition. The pavement surrounding the fuel area is in fair condition. The apron located between the FBO and the south tiedown apron is in fair to good condition. The AG apron and access taxiway are in fair condition.

South Apron Tiedown

LANDSIDE FACILITIES

Hangars and Airport Buildings

In 2004 the airport had twelve buildings, including seven conventional hangars, three T-hangars, one double-wide mobile office/classroom building, and the FBO office. The hangars are used primarily for aircraft storage, although the airport also supports two airport-based businesses (Flightline Services and Shearer Sprayers Inc.); a third business (Advanced Navigation & Positioning Corporation) leases a hangar on the airport.

Two additional large conventional hangars are located off airport property (north) and are accessed by a single access taxiway that extends beyond the north apron. A small hangar attached to a residence is located off-airport property, near the end of Runway 25 on the south side. Existing airport buildings are summarized in **Table 2-6.**

TABLE 2-6
AIRPORT BUILDINGS

Bldg. No. (See Figure 2-2)	Building	North / South Side of Rwy	Existing Use
1	Conventional Hangar (Shearer Sprayers)	South	AG Operations, Aircraft Storage
2	Conventional Hangar (Insitu)	South	Aircraft Storage
3	Medium Quonset Hangar	South	Aircraft Maintenance
4	Large Quonset Hangar	South	Aircraft Storage
5	Conventional Hangar (ANPC)	South	Commercial Operation
6	Modular Building	South	Classrooms, Office
7	Fixed Base Operator	South	Office, restrooms, pilot/passenger waiting area
8	South T-Hangar (12-unit)	South	Aircraft Storage
9	North T-Hangar #1 (12-unit)	North	Aircraft Storage
10	North T-Hangar #2 (12-unit)	North	Aircraft Storage
11	Large Conventional Hangar (3-bay)	North	Aircraft Storage
12	Medium Conventional Hangar	North	Aircraft Storage
13	Large Conventional Hangar (Off airport property)	North	Aircraft Storage, Museum
14	Large Conventional Hangar (Off airport property)	North	Aircraft Storage, Museum
15	Small Conventional Hangar Attached to Residence	South	Aircraft Storage

Airport Hangars (South)

Airport Hangars (North)

Airport Lighting

Ken Jernstedt Airfield accommodates day and night operations in visual flight rules (VFR) conditions. Runway 7/25 is equipped with low intensity runway edge lighting (LIRL) and threshold lights. The runway lights are in fair to poor condition and are set on a dusk-to-dawn automatic (photocell) switch. The taxiways on the airport do not have any lighting or edge reflectors; major exit taxiways are marked with blue light fixtures as part of the runway edge lighting.

Neither runway end is equipped with visual guidance indicators (VGI), although visual approach slope indicators (VASI) were recommended in the 1994 ALP. Runway 25 is equipped with runway end identifier lighting (REIL), which is pilot-activated on the radio frequency 122.8 MHz. The REIL consists of two high-intensity strobes located near each corner of the runway end that flash in short sequences to improve the identification of the runway for pilots landing in darkness or reduced visibility conditions. It appears that ground-level shielding was added to reduce glare for vehicles traveling on Orchard Road, which is approximately 260 feet from the REIL.

The airport rotating beacon is mounted on the roof of the large Quonset hangar, immediately east of the FBO on the south side of the runway. The beacon is also set on an automatic dusk-dawn switch. The airport has a large unlighted wind cone mounted on the roof of a hangar, west of the FBO; a second unlighted wind cone and segmented circle is located east of the terminal apron, along the south edge of the runway. **Table 2-7** summarizes existing airport lighting at Ken Jernstedt Airfield.

Overhead flood lighting is mounted on most hangars around the airport. Additional overhead lighting is located in the aircraft fuel area and along the main (south) access road.

TABLE 2-7
AIRPORT LIGHTING

Component	Type	Condition
Runway Lighting	Low Intensity Runway Edge Lighting (LIRL)	Fair/Poor
Approach/Other Runway Lights	Runway End Identifier Lights (REIL) Rwy 25	Good
Taxiway Lighting or Reflectors	None	N/A
Lighted Airfield Signage	None	N/A
Visual Guidance Indicators	None	Good
Airport Lighting	Airport Rotating Beacon	Good

AIRSPACE AND NAVIGATIONAL AIDS

Ken Jernstedt Airfield does not have any ground-based electronic navigational aids. The previous airport master plan recommended development of a global positioning system (GPS) nonprecision instrument approach at the airport. During the December 2008 Airport Layout Plan Airspace Classification Review, it was determined an instrument approach standard would have marginal effectiveness. After considering this and unintended land use consequences implicit with an instrument approach, the Port has abandoned all efforts to develop an instrument approach. The existing visual approach remains.

The airport has automated weather observation system (AWOS) on the north side of the runway. The AWOS provides important weather information to pilots operating in VFR conditions.

The area surrounding the airport consists of orchards and other forested lands in a variety of uses including residential, commercial, industrial and agricultural. Tucker Road crosses through the runway protection zone (RPZ) for Runway 7 and Orchard Road travels through the RPZ for Runway 25. It appears that vehicles traveling on the roads penetrate the standard 20:1 visual approach surfaces for both runways, although the 1994 Airport Layout Plan indicates that 20:1 obstacle clearance approaches (OCA) are clear. To accomplish this, the 20:1 OCA begins at the runway end, rather than the standard 200 feet beyond the runway. The OCA is an alternative approach clearance criteria used when standard approach clearances cannot be met. The previous runway approach clearance criteria will be reviewed in this plan update.

Tables 2-8 and 2-9 summarize notable obstructions, special airspace designations and IFR routes in the vicinity of Ken Jernstedt Airfield, as identified on the Seattle Sectional Aeronautical Chart.

Local airport operations and flight activity is not affected by the noted airspace or obstructions located in the vicinity of the airport.

TABLE 2-8
LOCAL AIRSPACE OBSTRUCTIONS/FEATURES
(10 nautical mile radius)

Type of Obstruction	Description	Distance From Airport
Overhead Power Line	Transmission Line	10 miles south of airport
Overhead Power Line	Transmission Line	0.5 -1.0 miles north/east of airport
Overhead Power Line	Transmission Line	5 miles north of airport
Federal Wilderness Area	Aircraft are required to maintain 2000 feet AGL over designated area.	7 miles west of airport; Columbia Wilderness Area

TABLE 2-9
AIRSPACE/ ROUTES

Airspace Item	Description	Location
Low Altitude Enroute Airway	Victor 520 – 7,000 feet mean sea level minimum enroute altitude (MEA)	3 nautical miles south. Connects Battleground and Klickitat VORTACs on a 054-234 degree course.
Low Altitude Enroute Airway	Victor 112-182 – 7,000 feet mean sea level minimum enroute altitude (MEA)	3 nautical miles north. Connects Battleground and Klickitat VORTACs on a 071-251 degree course.
Military Training Route	IR344 - extends from the surface upwards.	2 nautical miles east.
Class E Airspace	Associated with low altitude federal airways (700 feet above ground level)	11 miles east; in vicinity of Klickitat VOR.

The local airport traffic pattern altitude is 1,500 feet mean sea level (MSL), which is approximately 869 feet above ground level (AGL) with standard left traffic. Gliders and ultralights use a right traffic pattern. Ken Jernstedt Airfield is located near an area of Class E airspace with floor 700 feet above ground level, although there are no mandatory radio communication requirements during visual flight rules (VFR) conditions.

AIRPORT SUPPORT FACILITIES/SERVICES

Aircraft Fuel

Aviation gasoline (AVGAS) is available for sale at the airport. The airport has one 12,000-gallon double wall aboveground fuel storage tank for 100LL AVGAS. The fuel storage tank and dispensing area are located on the south side of the runway, opposite the FBO building. Jet fuel is not available for sale at the airport, but it may be added in 2009.

Aviation Fuel Storage (12,000-gallon 100LL AVGAS)

Shearer Sprayers (Aero Spray) maintains a 3,000-gallon double wall aboveground fuel tank for storage of jet fuel for their turbine-powered Air Tractor 402B, which is currently the only turbine powered aircraft based at the airport.

Surface Access and Vehicle Parking

Vehicle access to the south apron and hangar areas is provided by the airport access road that extends from Tucker Road. A north side airport access road also extends from Tucker Road to serve the north hangars and apron. Vehicle parking on the airport includes paved areas located adjacent to the FBO and other buildings along the main access road. Additional paved vehicle

parking is located adjacent to each of the conventional hangars located on the south side of the runway. A small parking area is located outside the vehicle gate adjacent to the north apron.

Fencing

The airport has wire fencing along portions of its boundary, although the majority of the airport is not fenced. The airport has two electric-powered keypad controlled vehicle gates located adjacent to landside areas. One gate is located at the end of the north airport access road, which provides access to the north apron and north-side hangars. The second gate is located at the end of the main airport access, just east of the FBO building, and provides access to the south T-hangar and the ANPC hangar.

Access Road & Electronic Gate at North Apron

It has been reported that pedestrians are frequently observed walking on the airport and reports of runway incursions are numerous. The area surrounding the airport provides a pleasant environment for walking; however, a significant safety hazard for both pedestrians and aircraft operators is currently created by the non-aviation activity on the airfield. Chain-link fencing along the airport property line is normally recommended to limit unauthorized access to an airfield.

South Tiedown Apron & Access Road

Another common airfield incursion occurs when vehicles are driven around the west end of the runway to access aircraft parking and hangars on the north side of the runway. The common path extends within 30 feet of the end of Runway 7 within the runway safety area and runs from the west end of the south and north parallel taxiways. This issue will be examined further in the facility requirements evaluation.

Utilities

Ken Jernstedt Airfield is located approximately one and one-half miles outside the city limits and has water, electric and telephone service. The airport is not served by sanitary sewer at this time, but the airport's owner, Port of Hood River, played an early financial role in establishing the Windmaster Sewer District that will serve the airport and properties to the west and north; a limited number of septic tanks are located on the airport for buildings with restrooms. Electrical service at the airport is provided by Pacific Power. The Ice Fountain Water District provides

water service to the airport. Sprint provides telephone and data service, which includes fiber capability. Natural gas (provided by NW Natural Gas) is not available at the airport, but access is located nearby.

There are two fire stations (West Side Fire Department) located within one mile of the airport. Fire hydrants are located along the southern edge of the airport and in the north hangar area.

LAND USE PLANNING AND ZONING

Ken Jernstedt Airfield is located in Hood River County, Oregon, approximately one and one-half miles south of the City of Hood River urban growth boundary. Zoning on the airport property is Hood River County Airport Development (AD). Aviation related uses are permitted outright in this zone, and light industrial uses allowed in the county's M-2, Industrial Zone are also allowed in the AD Zone, subject to Conditional Use Permit. Surrounding uses are almost exclusively rural residential and orchards. County zoning affecting lands, which neighbor and abut the Ken Jernstedt Airfield are predominantly Exclusive Farm Use (EFU), with some Rural Residential, two-acre minimum lot size zoning also occurring in the vicinity of the airport. **Table 2-10** summarizes the existing land uses and zoning in the vicinity of the airport.

A small restaurant is located on the west side of Tucker Road (Oregon State Highway 281), opposite the end of Runway 7, within the runway protection zone (RPZ). It has been previously recommended that the property located within the RPZ be acquired and the restaurant be relocated outside of the RPZ. Limited areas of residential development exist around the perimeter of the airport, particularly along the southeast corner and on the north side of the runway, near the midpoint. The local high school is located approximately ½ to ¾ miles northwest of the end of Runway 7; flight paths should avoid direct overflights of the school, whenever possible. No other significant concerns have been identified relative to compatibility of existing land uses neighboring the airport.

The County's Airport Hazard Zones (AH) extend off either runway end and are depicted graphically on the County Assessor's maps which were provided to the consultant by the County planner as the zone map for the County; however, this does not incorporate all of the necessary airspace protection zones and requirements currently mandated by state law. Please see Chapter Six Environmental Review, Compatible Land Use section for a more detailed discussion of airport land use compatibility planning.

It is recommended that the County conduct an analysis of its compliance with ORS 836 and make any necessary text and mapping amendments in order to demonstrate full compliance, and comprehensive protection of the subject airfield.

TABLE 2-10
AIRPORT VICINITY LAND USE AND ZONING

Land Use	Zoning
Airport Site:	Hood River Airport Development (AD)
North: Rural Residential, Vacant, Orchard Land Oregon State Highway 281	Hood River Rural Residential, Two Acre Minimum (RR-1*) Limited County Commercial and Industrial Zoning Hood River County Exclusive Farm Use (EFU)
South: Airport Road, Rural Residential and Resource Related Dwellings Orchards	EFU, RR-1
East: Orchard Road Orchard Land Resource Related Dwellings	EFU
West: Twin Peaks Restaurant Rural Residential, Agriculture, Orchards	EFU, RR-2 ½ , RR-1

* *It is noted that the Zone Title does not coincide with the minimum lot size due to changes in standards since the time of the Zone designation's conception and titling.*

AIRPORT SERVICE AREA

The airport service area refers to the area surrounding an airport that is directly affected by the activities at that airport. Normally a 30 or 60-minute surface travel time is used to approximate the boundaries of a service area. For Hood River, the service area extends primarily east-west along the Interstate 84 corridor, but also extends along Highway 14 on the Washington side of the Columbia River and south on Highways 281 and 35 toward Mount Hood. Although there are several public use airports located within a 40 nautical mile radius of Hood River, only a few are located within a 30-minute driving time. The nearest airports with comparable or better facilities and services are Columbia Gorge Regional (The Dalles), which is located within a 30-minute

drive time of Hood River, and Troutdale, which has a 45-minute/1 hour drive time from Hood River. There are several small communities located within the Hood River airport service area that have significant travel distances to the next nearest public use airport.

Ken Jernstedt Airfield serves a wide variety of general aviation users within the community and throughout the local region. The close proximity of Hood River and The Dalles creates natural competition between the airports due to overlapping service areas. However, it appears that both airports play an important role in their respective communities serving general aviation users, providing access to air transportation and supporting local economies. When multiple airports are located within an airport's local service area, competition to attract aircraft and tenants can fluctuate based on facility and market related elements. The availability and price of hangar space, fuel and aircraft services tend to be key market factors affecting activity within an airport's service area. Airfield facility capabilities such as runway length are primary factors in determining the typical user base for an airport. **Table 2-11** lists the public airports in the vicinity of Ken Jernstedt Airfield.

TABLE 2-11
PUBLIC USE AIRPORTS IN VICINITY
(WITHIN 40 NAUTICAL MILES)

Airport	Location	Runway Dimension (feet)	Surface	Lighted Runway ?	Fuel Available ?
Cascade Locks State	14 NM west	1,800 x 30	Asphalt	No	No
Columbia Gorge Regional – The Dalles	15 NM east-southeast	5,097 x 150 (primary rwy)	Asphalt	Yes	Yes
Goldendale Municipal	31 NM northeast	3,490 x 40	Asphalt	Yes	No
Wasco State	37 NM southeast	3,450 x 60	Asphalt	Yes	No
Hillcrest	36 NM northeast	2,730 x 100	Turf	No	No
Grove Field (Camas)	37 NM west	2,710 x 40	Asphalt	Yes	Yes
Sandy River	34 NM southwest	2,115 x 100	Turf	No	No
Country Squire	37 NM southwest	3,095 x 32	Asphalt	No	No
Portland-Troutdale	37 NM west-southwest	5,399 x 150	Asphalt	Yes	Yes

CHAPTER THREE
AVIATION ACTIVITY AND FORECASTS

INTRODUCTION

The purpose of this section is to update the forecasts of aviation activity for the 20-year planning period addressed in the Airport Layout Plan Update (2004-2024). The updated activity forecasts will provide the basis for estimating future facility needs at Ken Jernstedt Airfield. The scope of work for this project suggests use of the most recent Oregon Aviation System Plan (OASP)[6] forecasts (1994-2018), with revision as required, to reflect current conditions. However, airport master plan forecasts (1990-2010) are also available for Ken Jernstedt Airfield.[7] The available forecasts provide a range of projections for based aircraft and aircraft operations that can be compared with recent historic data to determine the current relevance of each projection. Once relevance is determined, a judgment can then be made regarding the need to update the projections for the current twenty-year planning period.

Recent Historic Activity

Recent historic activity data available for Ken Jernstedt Airfield includes estimates of existing conditions (base-year activity) contained in the 1990 Airport Master Plan and the 1997 Oregon Aviation System Plan; several years of activity counts generated through the RENS Aircraft Monitoring Program, conducted by the Oregon Department of Aviation (ODA); and FAA Terminal Area Forecast (TAF) historical data.

In the absence of air traffic control tower records, the RENS data generally provides the most reliable estimates of activity for uncontrolled airports. At Ken Jernstedt Airfield, activity counts have been conducted for six separate years since 1981, which provides an indication of activity over an extended period. Current estimates of based aircraft were provided by airport

[6] Oregon Continuous Aviation System Plan, Volume I Inventory and Forecasts (1997, AirTech).
[7] Hood River Airport Master Plan 1990-2010 (W&H Pacific)

management for this evaluation. There has not been measurable growth or construction at the airport since 2005 adoption of the Ken Jernstedt Airfield Airport Layout Plan Update 2004-2024.

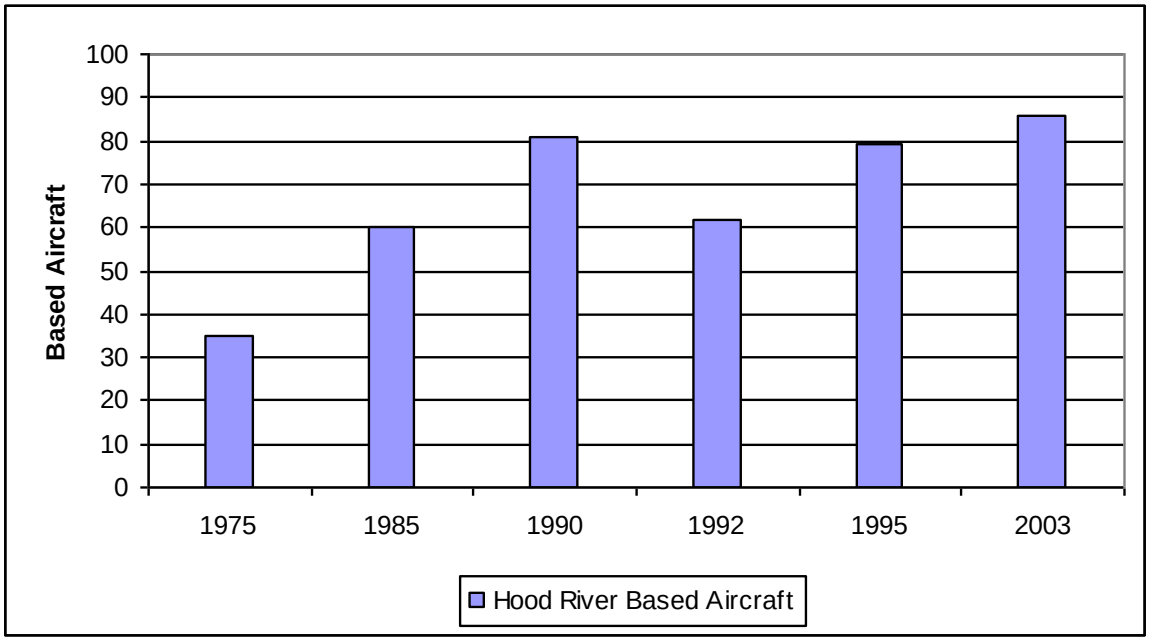
Based Aircraft

The 1990 Airport Master Plan estimated that Ken Jernstedt Airfield had 81 based aircraft in 1990. According to airport management estimates, there were 86 based aircraft at Ken Jernstedt Airfield in March 2003. Since 1990, the net increase in based aircraft at the airport has been slight (6.2%), with an average annual growth of 0.46 percent (1990 to 2003). The 1997 OASP estimated 79 based aircraft at the airport in 1994. It appears that the number of based aircraft at the airport declined slightly in the early 1990s, followed by subsequent increases that may have coincided with new hangar construction or other events on the airfield. Based aircraft totals at small airports are subject to rapid changes that often correspond to specific events on the airport or within the airport's local service area. The most common factors are often the availability and price of hangar space, fuel and aircraft services. Some fluctuation can be expected as market conditions change, although the airport's fundamental strengths (facilities, services and local economy) will be the primary factors affecting demand over the long-term.

According to available data, it appears that Ken Jernstedt Airfield experienced two significant periods of growth in based aircraft over the last twenty five years. A significant increase occurred between 1975 and 1986, where based aircraft increased from 35 to 58 (+23 aircraft; 65.7% increase). Another increase is noted between 1986 and 1990, where based aircraft increased from 58 to 81 (+23 aircraft; 39.7% increase). Increases of this magnitude are not uncommon at small airports, but are difficult to predict. For this reason, it is important that the airport plan include a facility development program that can quickly respond to changes market demand.

Recent historic based aircraft totals at Ken Jernstedt Airfield are depicted in **Figure 3-1**. In early 2003, the airport had one locally based turbine agricultural aircraft, one piston-engine helicopter and three gliders. All other based aircraft were single-engine piston. The breakdown of current based aircraft at Ken Jernstedt Airfield is summarized in **Table 3-1**.

FIGURE 3-1: HISTORICAL BASED AIRCRAFT (KEN JERNSTEDT AIRFIELD)



Source: FAA TAF (1985), Airport Master Plan (1975, 1990); Airport Management Estimates (2003)

TABLE 3-1
2003 BASED AIRCRAFT
(KEN JERNSTEDT AIRFIELD)

Aircraft Type	2003 (Estimate)
Single Engine Piston	81
Multi-Engine Piston	0
Turboprop	1
Business Jet	0
Helicopters	1
Gliders	3
Total	**86**

Source: Airport Management Estimate (3/03)

Aircraft Operations

The historic data contained in the FAA Terminal Area Forecast (TAF) indicates that annual operations at Ken Jernstedt Airfield have ranged from about 15,000 to 26,000 since 1976. The 1990 Airport Master Plan estimated existing aircraft operations at 15,300 (1990) based a review of the RENS counts conducted in 1987-88. The 1997 Oregon Aviation System Plan estimated aircraft operations at 13,700 in 1994.

RENS estimates of aircraft operations at Ken Jernstedt Airfield have been developed by ODA for six separate years since 1981, including a consecutive three-year period from 1996 to 1998 (see **Table 3-2)**. **Figure 3-2** depicts the historic FAA TAF data and the RENS counts at Ken Jernstedt Airfield. In general, it appears that the TAF estimates have been consistently higher than RENS estimates for the airport, although an adjustment in the 1997 TAF estimates correlates very closely to the most recent (1998) RENS count. Although prone to some fluctuation, it appears that the RENS data provides the best indication of broad activity trends at Ken Jernstedt Airfield. A breakdown of the most recent (1998) activity count by aircraft type is provided in **Table 3-3**.

Over the seventeen-year period between the 1981 and 1998 RENS counts, aircraft operations at Ken Jernstedt Airfield increased by 21.3 percent, this equals 1.14 percent per year despite several upward and downward shifts. For the purposes of updating forecasts of aircraft activity, the 1998 RENS count data provides a reasonable "base year" which can be adjusted to reflect subsequent events.

TABLE 3-2
SUMMARY OF ACTIVITY COUNTS
(KEN JERNSTEDT AIRFIELD)

	1981	1987	1992	1996	1997	1998
Annual Operations	11,174	11,922	5,918	14,127	8,234	13,555
Net Increase/Decrease Over Prior Count	--	+6.7%	-50.4%	+138.7%	-41.7%	+64.6%

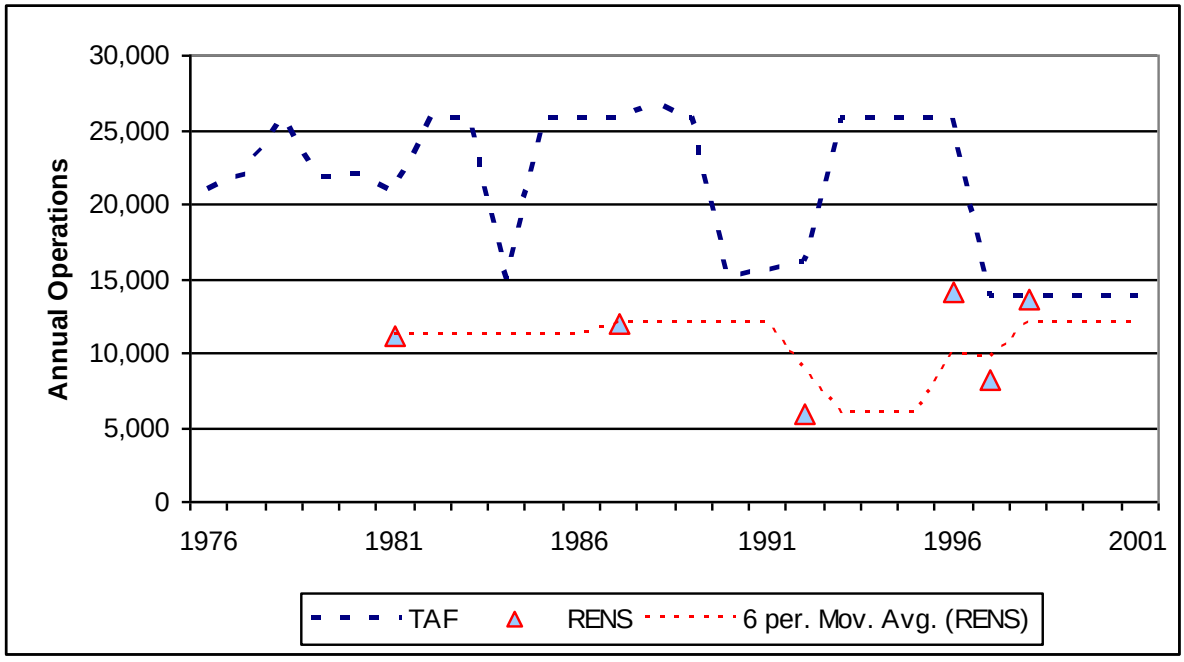
Source: Oregon Department of Aviation, RENS acoustical counts.

TABLE 3-3
1998 AIR TRAFFIC BREAKDOWN BY TYPE
(KEN JERNSTEDT AIRFIELD)

Operations by Type	Annual Estimate	Percent by Type
Single-Engine	11,802	87%
Multi-Engine	877	6.5%
Jet Engine	-	0%
Rotary Engine	517	3.8%
Other	360	2.7%
Total Aircraft Operations	**13,555**	**100%**

Source: Oregon Department of Aviation Aircraft Monitoring Program (data: 10/97-10/98)

FIGURE 3-2: FAA TAF DATA & RENS COUNTS (KEN JERNSTEDT AIRFIELD)



The decline documented in the early 1990s at Ken Jernstedt Airfield coincided with weak economic conditions and a seriously lagging general aviation industry. The rebound in activity was consistent with broad industry trends and a strengthening national economy during the balance of the 1990s. However, after seven consecutive years of growth within the U.S. general aviation industry, activity began to decline in early 2001 as the economy slowed. This negative trend was further hardened by the events of September 11th, which included temporary flight restrictions and other permanent measures that limited general aviation activities. Most general aviation airports experienced declines in air traffic in 2001 and relatively flat activity in 2002.

Recent hangar construction activity and the growing based aircraft fleet at Ken Jernstedt Airfield suggests that demand for facilities has remained relatively firm despite recent economic and industry downturns experienced in 2001 and 2002. As a result, aircraft operations for 2002 are estimated to be slightly higher than the most recent activity count (1998).

Recent historical data for Ken Jernstedt Airfield is summarized in **Table 3-4.** Ken Jernstedt Airfield has averaged approximately 165 operations per based aircraft since 1981.

TABLE 3-4
SUMMARY OF HISTORICAL AVIATION ACTIVITY
(KEN JERNSTEDT AIRFIELD)

Year	Aircraft Operations	Based Aircraft	Operations Per Based Aircraft	Data Source
1981	11,174	58	193	1,2
1987	11,922	63	189	1,2
1990	15,300	81	189	3
1992	5,918	62	96	1,2
1994	13,700	79	173	2,4
1996	14,127	80	179	1,2
1997	8,234	80	103	1,2
1998	13,555	79	172	1,2
2002	14,190	86	165	5,6

Data Sources/Notes:
1. ODA RENS Aircraft Activity Counter Program
2. FAA TAF Data (BASED AIRCRAFT)
3. 1990 Airport Master Plan - Base Year Estimates (1990)
4. Oregon Continuous Aviation System Plan. Volume 1: Inventory and Forecasts (1997) (Based Aircraft Estimate for 1994)
5. Airport Management Estimate (Based AC)
6. David Miller/Century West Estimate (Aircraft Operations)

Population

Table 3-5 summarizes recent historic population for the City of Hood River and Hood River County. The local area experienced strong growth in population between 1990 and 2000, which reflects an active economic climate. **Figure 3-3** depicts the historic relationship between local population trends and aircraft operations at Ken Jernstedt Airfield. The data indicate that while both population and aircraft operations have increased over an extended period, airport operations periodically fluctuate without corresponding shifts in population. These events suggest that while there may be a general correlation between population and activity at Ken Jernstedt Airfield, other airport- or industry-specific factors are likely to have a more direct effect on airport activity.

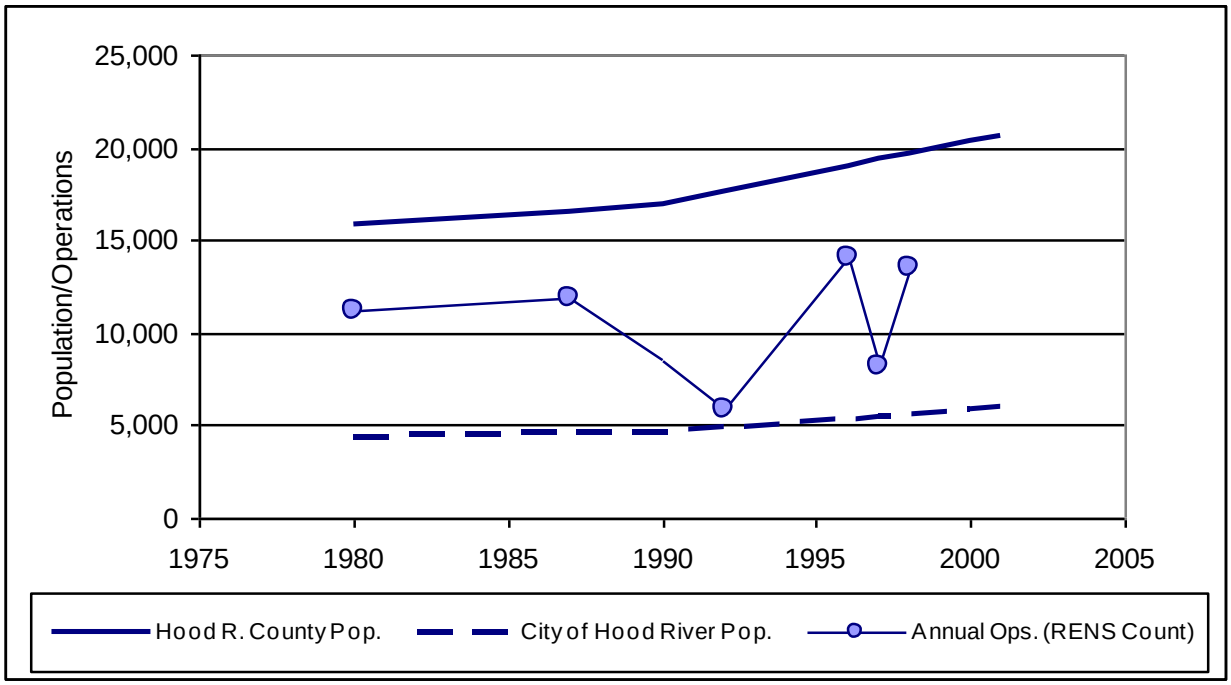
However, with local area population growth forecast to average about 1.03 percent annually through 2040, it appears that the existing local demographic base supporting Ken Jernstedt Airfield will continue to grow through the current planning period. To the extent that historic population growth has generally accompanied increased airport activity, this trend may be expected to continue during the current twenty-year planning period.

TABLE 3-5
HISTORICAL AREA POPULATION

	1980	1990	2000	2001
Hood River County	15,835	16,903	20,411	20,600
City of Hood River	4,329	4,632	5,831	6,020
Percentage of County Population	*27.3%*	*27.4%*	*28.6%*	*29.2%*

Source: 1980, 1990, 2000 U.S. Census; Center for Population Research and Census, Portland State University 2001 estimate.

FIGURE 3-3: POPULATION AND AIRPORT OPERATIONS (KEN JERNSTEDT AIRFIELD)



ASSESSMENT OF EXISTING FORECASTS

A review of existing aviation forecasts for Ken Jernstedt Airfield was conducted to identify information that may be useful in projecting future activity. The previous forecasts of based aircraft and aircraft operations are depicted in **Figure 3-4** and **Figure 3-5** and summarized in **Table 3-6**.

1990 Airport Master Plan Forecasts

The 1990 Airport Master Plan provides forecasts through the year 2010. Based aircraft were forecast to increase from 81 to 121 between 1990 and 2010, which represented an average annual increase of **2.03 percent**. The actual growth in based aircraft between 1990 and 2003 was approximately one-quarter of the forecast; the 2003 estimate of 86 based aircraft is 15 aircraft less than forecast of 101 based aircraft for 2000.

Due in part to the forecast increase in based aircraft, the master plan recommended property acquisition (18.1 acres) on the south side of the airport to accommodate projected facility needs, including 67 additional hangar spaces by 2010. Although several new hangars have been

constructed in recent years (approximately 20 spaces), the planned property acquisition to locate additional hangars has not occurred. Recent land limitations, including development of the Western Antique Aeroplane and Automobile Museum north of the airport, have affected hangar development and growth in based aircraft at the airport.

The master plan's operations forecasts have also overestimated activity by a considerable margin through the midpoint of 1990-2010 planning period. Aircraft operations at Ken Jernstedt Airfield were forecast to increase from 15,300 to 27,700 between 1990 and 2010, which represented an average annual increase of **3.01 percent**. None of the aircraft activity counts conducted at Ken Jernstedt Airfield since 1981 have exceeded the master plan's base year estimate. The most recent activity count (1998) was approximately 11 percent below 1990 base year operations estimate and 34 percent below the operations forecast for 2000.

The operations forecasts were based on two moderately aggressive assumptions: 1) strong growth in based aircraft; and 2) rising levels of aircraft utilization through the planning period. A review of historic activity reveals that neither of these assumptions proved to be accurate. As noted earlier, the airport has averaged approximately 165 operations per based aircraft since the early 1980s, well below the range of 189 to 229 used for the 1990-2010 forecasts. In addition, the number of based aircraft has increased well below the forecast rate. The combination of these two factors directly affects operations levels.

The 1990 Airport Master Plan forecasts are not consistent with recent historical activity at the airport. As a result, the forecasts do not provide the best indication of future activity in relation to current activity levels. However, the master plan forecasts provide an upper range projection that will be helpful in defining facility development reserves.

Oregon Aviation System Plan (OASP)

The most recent Oregon Aviation System Plan (OASP) forecasts for Ken Jernstedt Airfield were developed in 1997 (1994 base data) with projections made to 2014. The 2000 Oregon Aviation Plan[8] (OAP) extrapolated these forecasts to 2018, but did not include any changes in forecast assumptions.

From a 1994 base year estimate of 79 based aircraft, the OASP projected the number of based aircraft at Ken Jernstedt Airfield to increase to 99 by 2014; this projection was subsequently extended to 104 based aircraft for 2018. The OASP forecasts (1994-2018) represent an increase

[8] Oregon Aviation Plan, © 2000 Dye Management Group/Century West.

in based aircraft of 31.7 percent, which translates into an average annual growth rate of **1.15 percent**. Aircraft operations at Ken Jernstedt Airfield were projected to increase at a rate comparable to based aircraft. Operations were forecast to increase from 13,700 to 18,025 between 1994 and 2018, which translates into an average annual growth rate of **1.12 percent**.

Current activity levels at Ken Jernstedt Airfield fall directly between the OASP forecasts for 1999 and 2004, which indicates a reasonable degree of accuracy midway through the forecast period. The OASP forecasts are line with the slower growth that has occurred at the airport in recent years. Based on their reflection of current activity, the OASP forecasts provide a reasonable baseline projection of modest growth. However, since the airport has the potential of addressing existing development constraints through a combination of onsite development and property acquisition, a slightly more aggressive projection may be warranted for use as a "preferred forecast."

FAA Terminal Area Forecasts (TAF)

The Federal Aviation Administration (FAA) maintains forecasts for Ken Jernstedt Airfield in the Terminal Area Forecast (TAF). However, the current TAF for Ken Jernstedt Airfield provides static projections (no change) for both based aircraft and operations through 2020. The current TAF projections were adjusted in 1997 and are relatively close to current activity. The static projections do not reflect the community's long-term growth trend and the historic growth in general aviation activity that has occurred at the airport over the last 25 years. As a result, the current TAF projections are unsuitable for use in updating the forecasts.

TABLE 3-6
EXISTING AVIATION FORECASTS
(KEN JERNSTEDT AIRFIELD)

Source	2000	2002	2005	2007	2010	2014	2018
Based Aircraft							
1990 Airport Master Plan (2.03% AAR: 1990-2010)	101	--	111	--	121	--	--
1997 / 2000 OASP (1.15% AAR: 1994-2018)	82*	--	87*	--	--	99	104
FAA TAF (0% AAR: 2000-2020)	80	80	80	80	80	80	80
Aircraft Operations							
1990 Airport Master Plan (3.01% AAR: 1990-2010)	20,600	--	23,900	--	27,700	--	--
1997 / 2000 OASP (1.12% AAR: 1994-2018)	14,220*	--	15,090*	--	--	17,130*	18,025*
FAA TAF (0% AAR: 2000-2020)	13,700	13,700	13,700	13,700	13,700	13,700	13,700

* OASP Forecast Years: 1999, 2004, 2014, 2018; interpolated for intermediate years.

FIGURE 3-4: EXISTING BASED AIRCRAFT FORECASTS (KEN JERNSTEDT AIRFIELD)

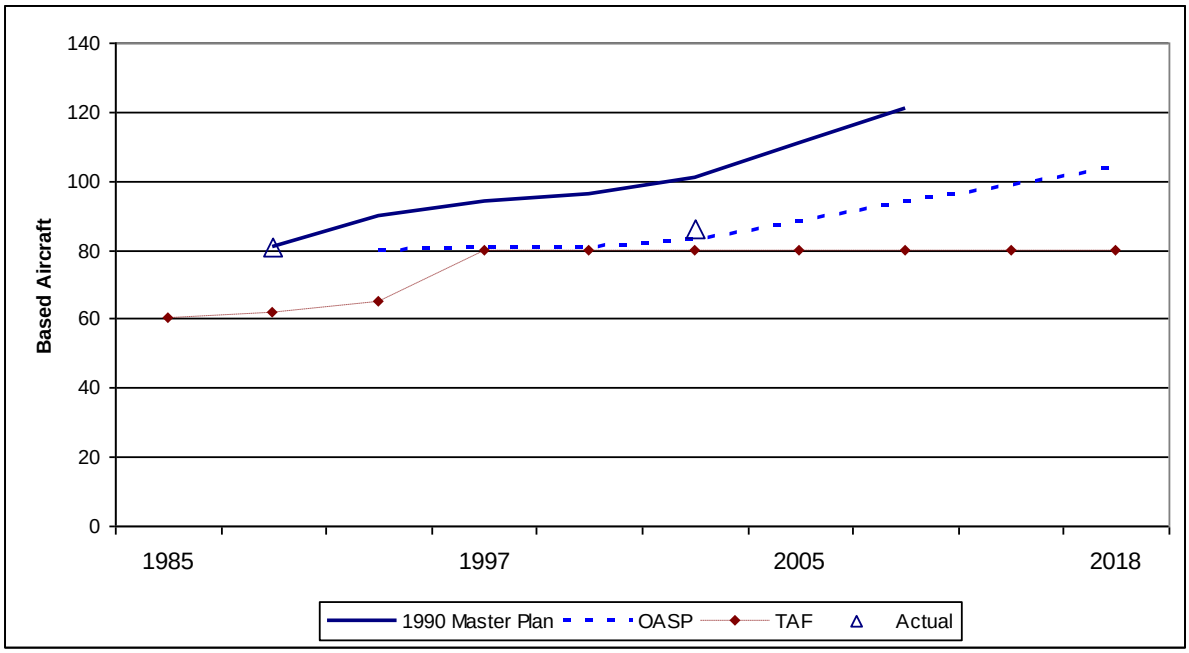
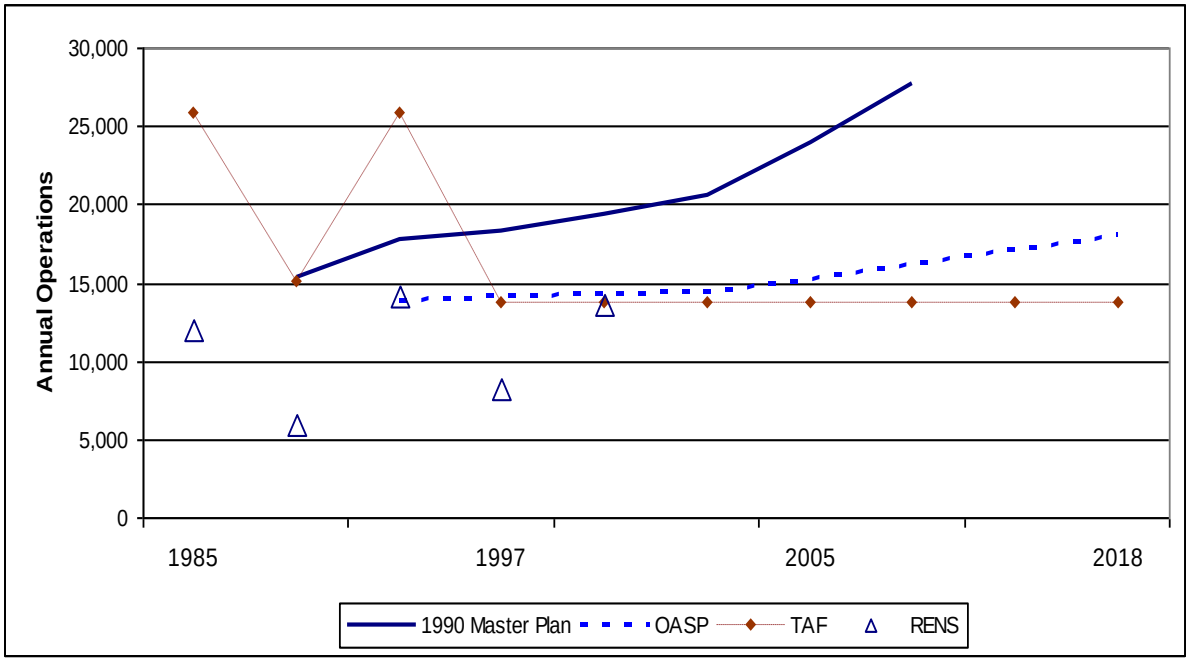


FIGURE 3-5: EXISTING AIRCRAFT OPERATIONS FORECASTS (KEN JERNSTEDT AIRFIELD)



Updated Forecasts

Based on a review of existing forecasts, it was determined that the 1990 Airport Master Plan and 1997/2000 OASP forecasts continue to provide projections of activity that are useful in evaluating long-term aviation activity. This updated report relies on projections contained in the Airport Layout Plan Update 2004-2024, and the December 2008 Airport Layout Plan Airspace Classification Review. These forecasts provide the basis for developing updated high and baseline forecasts. To correspond to the current 20-year planning period, the existing forecasts were extended to 2022 by extrapolating (without revision) the growth rates for the last 5- or 10-year intervals of the original forecasts. When required, the intermediate forecasts were interpolated (without revision) to correspond with the 5-, 10- 15- and 20-year forecast periods used for the current planning period. For purposes of comparison, the FAA TAF is presented as it is currently published without revision. The TAF projects no increase in based aircraft or aircraft operations through 2020.

Updated forecasts of aviation activity are summarized below and are presented in **Table 3-7** and depicted in **Figures 3-6 and 3-7**.

1990 Airport Master Plan (High)

The 1990 Airport Master Plan based aircraft and operations forecasts were extrapolated to 2022 to provide a high range projection. The forecast represents an average annual growth rate of 2.94 percent for based aircraft and 5.53 percent for aircraft operations (above current levels). Although the master plan forecasts have not provided a close match with actual activity in recent years, the more aggressive projection provides an indication of potential development reserve needs or the possibility of a sharp upturn in activity.

1997/2000 Oregon Aviation System Plan (Baseline)

The 1997/2000 OASP based aircraft and operations forecasts were extrapolated to 2022 to provide a baseline projection. The forecast represents an average annual growth rate of 1.26 percent for based aircraft and 1.27 percent for aircraft operations (above current levels). As noted earlier, the OASP forecasts have provided an excellent match with current/recent activity.

2003 ALP Updated Forecast (Preferred)

A new projection of based aircraft was developed that fell between the master plan and OASP forecasts. This forecast provides a mid-range projection that slightly exceeds recent historic growth while reflecting the airport's expansion and development potential.

An updated forecast of aircraft operations was developed based on recent-historic aircraft utilization levels and the updated based aircraft forecast. For this projection, aircraft utilization is projected to increase from 165 (current average) to 180 operations per based aircraft by the end of the twenty-year planning period. This range represents a balance between long-term historic and recent utilization levels and also reflects the airport's ability to continue developing a strong user base through the planning period. The forecast has an average annual growth rate of **1.99 percent** for based aircraft and **2.46 percent** for aircraft operations.

TABLE 3-7
UPDATED AVIATION FORECASTS
(KEN JERNSTEDT AIRFIELD)

	Base Year 2003	2007	2012	2017	2022
Based Aircraft					
Actual	86				
Forecast					
2003 ALP Forecasts (Preferred)		**93**	**103**	**114**	**125**
1990 Master Plan (Derived)[1]		115	125	137	149
OASP (Derived) [2]		90	97	103	109
FAA TAF (Unadjusted) [3]		80	80	80	80
Aircraft Operations					
Actual (estimated) [4]	14,190				
Forecast					
2003 ALP Forecasts (Preferred)		**15,345**	**17,510**	**19,950**	**22,500**
1990 Master Plan (Derived) [1]		25,350	29,380	34,060	39,470
OASP (Derived) [2]		15,680	16,700	17,800	18,970
FAA TAF (Unadjusted) [3]		13,700	13,700	13,700	13,700

1. Forecasts derived from 1990 Airport Master Plan through interpolation for intermediate years and extrapolation for outer years with no change in original forecast growth rates.
2. Forecasts derived from 1997/2000 Oregon Aviation System Plan (OASP) through interpolation for intermediate years and extrapolation for outer years with no change in original forecast growth rates.
3. Unadjusted except for extrapolation to 2022 using TAF (2015-2020) growth rate.
4. Estimate by David Miller/Century West Engineering

Fleet Mix and Design Aircraft

The 1990 Airport Master Plan identified the existing design aircraft as a light multi-engine piston aircraft, such as the Cessna 421, which is included in Approach Category B and Airplane Design Group I (B-I). An upgrade to Airplane Design Group II (ADG II) was expected in the 1995-2000 time period as the airport was expected to accommodate increasing levels of business aircraft, including multi-engine turboprops and small business jets.

Historically, the majority of based aircraft at Ken Jernstedt Airfield have been single-engine piston (fixed wing). While single-engine piston aircraft are expected to continue representing the majority based aircraft at the airport, an increase in the high performance aircraft activity could be reasonably anticipated based on the current trends in aircraft manufacturing. The production of turbine-powered aircraft for general aviation, business aviation and agricultural aviation is among the industry's strongest segments; many of these aircraft types can operate at small general aviation airports with relatively short runway lengths. The forecast fleet mix for Ken Jernstedt Airfield is summarized in **Table 3-8**.

The 1998 RENS count estimated multi-engine operations at 877. Based on an airport survey conducted in 1999, it appears that light piston and turboprop twin-engine aircraft (B-I) accounted for the majority of the 877 operations. No business jet operations were recorded. No specific counts of turbine operations were provided for single- or multi-engine aircraft, although one single-engine turbine aircraft is based at the airport. The turbine aircraft (Air Tractor 402B spray plane) is included in Approach Category A and Airplane Design Group II (A-II). The local operator estimates the aircraft averages about 300 operations per year. The airport also accommodates several locally based ADG II sailplanes (wingspans 49+ feet). Rotary aircraft accounted for about 3.8 percent of total airfield operations in the 1998 activity count.

Based on this information, the combined total of A/B-II operations at Ken Jernstedt Airfield is currently estimated to be slightly less than 500, most of which are generated by the aerial applicator and sailplanes. By FAA definition, the "design aircraft" must have a minimum of 500 itinerant annual operations. For Ken Jernstedt Airfield, runway length requirements would be based on the more demanding business aircraft included in B-II, rather than the agricultural or un-powered aircraft, which require very little runway length to operate. As a result, a future upgrade to airplane design group II (ADG II) standards may be based on total activity within the group, while justification for a runway extension would be based on the number of aircraft that are constrained or unable to operate on the existing runway.

An updated survey of activity was conducted in 1999 as part of a study to evaluate runway extension options for the airport.[9] The survey estimated current demand of 80 annual operations "by aircraft that are constrained/prevented by inadequate runway length." The study concluded that the current activity levels did not meet FAA criteria for runway extension. Although current activity counts are not available, it appears that the air traffic volume and composition at Ken Jernstedt Airfield has not changed significantly since the recent survey was conducted.

Based on these factors, it appears that Airport Reference Code (ARC) B-I design standards continue to be appropriate for Runway 7/25, although a future upgrade to ARC B-II standards may be justified early in the twenty- year planning period.

Forecast Summary

The updated forecast of aviation activity at Ken Jernstedt Airfield is summarized in **Table 3-8. Figures 3-8** and **3-9** depict the updated based aircraft and operations forecasts. The preferred forecast of based aircraft represents an average annual growth rate of **1.99 percent** for based aircraft through the planning period. Aircraft operations are forecast to increase at an average annual rate of **2.46 percent** during the planning period, which reflects a gradual increase in average aircraft utilization at the airport. The breakdown between local and itinerant operations is projected to be 30/70 percent.

[9] Hood River Airport Planning Study – Demand Analysis of Runway Options and Review of RPZ Standards (January 2000, W&H Pacific)

TABLE 3-8
PREFERRED FORECAST SUMMARY

	Existing **2003**	**2007**	**2012**	**2017**	**2022**
Based Aircraft					
Single Engine	81	87	95	103	111
Multi Engine Piston	0	1	1	2	2
Turboprop (SE & ME)	1	1	1	2	3
Business Jet	0	0	0	1	1
Rotor	1	1	2	2	3
Glider	**3**	**3**	**4**	**4**	**5**
Total	**86**	**93**	**103**	**114**	**125**
Average Operations per Based Aircraft	*165*	*165*	*170*	*175*	*180*
Aircraft Operations					
Local (30%)	4,290	4,605	5,250	5,985	6,750
Itinerant (70%)	9,900	10,740	12,260	13,965	15,750
Total	14,190	15,345	17,510	19,950	22,500
Design Aircraft Operations (A/B-II Single; Twin; Jet; Glider)	400	460	525	600	675

FIGURE 3-6: UPDATED BASED AIRCRAFT FORECASTS (KEN JERNSTEDT AIRFIELD)

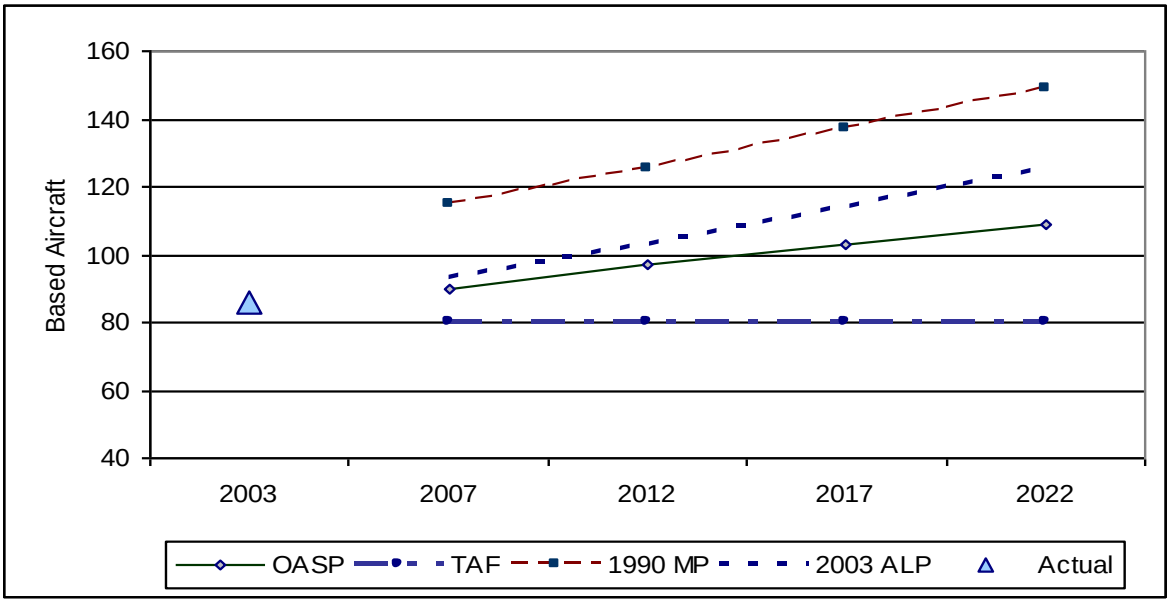
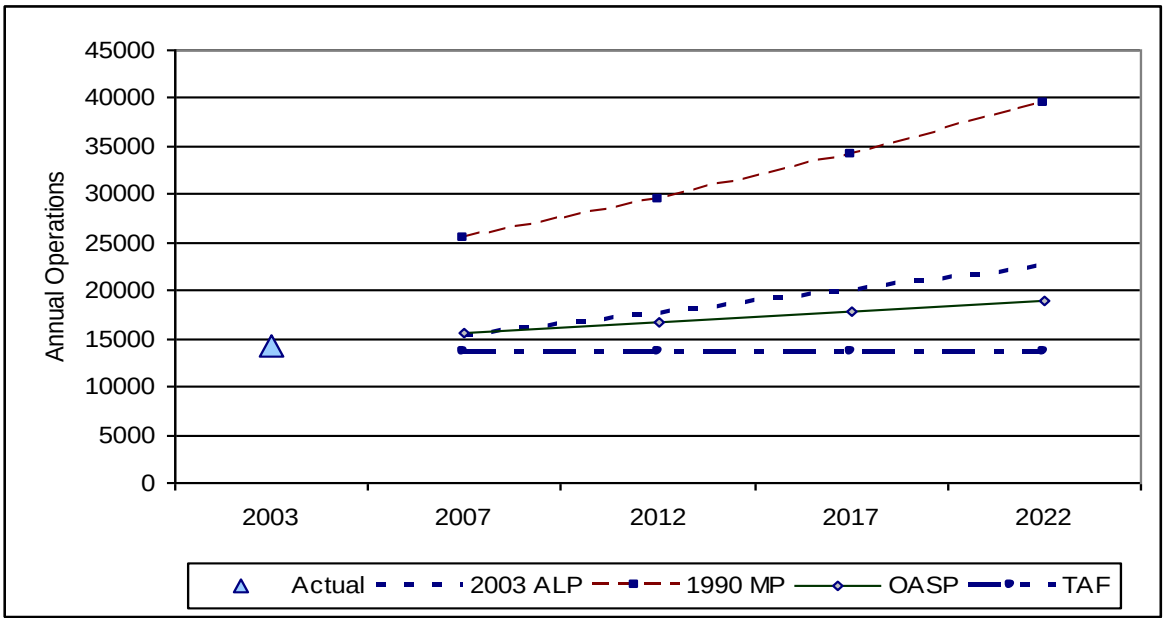


FIGURE 3-7: UPDATED OPERATIONS FORECAST (KEN JERNSTEDT AIRFIELD)


45000
40000
35000
30000
25000
20000
15000
10000
5000
0
Annual Operations
2003
2007
2012
2017
2022
Actual
2003 ALP
1990 MP
OASP
TAF

CHAPTER FOUR
AIRPORT FACILITY REQUIREMENTS

INTRODUCTION

This chapter uses the results of the inventory and forecast conducted in **Chapters Two** and **Three**, as well as established planning criteria, to determine the airside and landside facility requirements through the current 20-year planning period. Airside facilities include runways, taxiways, navigational aids and lighting systems. Landside facilities include hangars, fixed base operator (FBO) facilities, aircraft parking apron, agricultural aircraft facilities, aircraft fueling, automobile parking, utilities and surface access.

The facility requirements evaluation is used to identify the adequacy or inadequacy of existing airport facilities and identify what new facilities may be needed during the planning period based on forecast demand. Options for providing these facilities will be evaluated in **Chapter Five** to determine the most cost effective and efficient means for implementation.

1990 Airport Master Plan Overview

The 1990 Airport Master Plan recommended a variety of facility improvements at Ken Jernstedt Airfield which are summarized in **Table 4-1**. The final Airport Layout Plan (ALP) completed as part of the 1990 Master Plan was approved in 1994. Previously recommended facility improvements that have not been implemented will be revalidated, modified or eliminated based on the updated facility needs assessment and FAA guidelines.

TABLE 4-1: SUMMARY OF 1990 AIRPORT MASTER PLAN RECOMMENDED PROJECTS AND CURRENT STATUS

Completed Yes/No	Projects
No	Land Purchase (Rwy 7 RPZ)
Unknown	Land Improvements ($16,000 listed for 1992 – unspecified improvements)
Unknown	Runway/Taxiway Improvements ($6,000 listed for 1992 – unspecified improvements)
Unknown	Building Renovation
No	Equipment (GPS)
No	Remove South Fuel Island
No	Relocate FBO
Partial *	Relocate Restaurant and Beauty Shop (* Beauty Shop relocated)
Yes	Reconstruct Access Road (north access road)
No	Reconstruct Parking (paved)
No	Public Restrooms (at north apron)
No	North Hangar Taxiway
No	Reconstruct Taxiway B
Yes *	T-Hangar Taxilanes (*Two south T-hangar taxilanes constructed)
No	Land Acquisition
No	Relocate Orchard Road
No	Runway & Taxiway Extension
No	PAPI Rwy 25
No	Segmented Circle & Wind T
Yes *	Remove Taxilane (*Eastern section of Txy. B removed when south T-hangar constructed)
Yes *	Fencing and Gates (*Fencing, gates located near south T-hangar and north apron)
No	T-Hangar Taxilanes
No	2- 12-unit T-Hangars
No	Land Acquisition/Relocation
No	Rotorcraft Pads
No	T-Hangar Taxilanes
No	1 12-unit T-Hangar
Yes	ASOS (AWOS Constructed in 2003)
No	Fencing and Gates
No	Reconstruct Auto Parking

In addition to the master plan-recommended projects completed, other completed projects include:

- Construction (private) of two conventional hangars at NW corner of airport (one 3-bay hangar and one medium conventional hangar) and one conventional hangar adjacent to south T-hangar.
- Removal of North Fuel Tank and site remediation; apron repair.

PROPERTY ACQUISITION

The 1994 Airport Layout Plan depicted recommended property acquisition totaling approximately 48.2 acres. The property acquisition included five separate parcels: the Runway 7 RPZ; an area located along the south side of the airport access road; an area located east of the north apron; an area located along the north (east) end of the runway; a narrow strip located along the south (east) side of the runway; and the future Runway 25 RPZ. None of the recommended property acquisition had been conducted by 2004, when this study was completed. The plan also recommended that the two businesses located in the Runway 7 RPZ be relocated (one has now been removed from the RPZ).

The south 12-unit T-hangar and access taxilanes were constructed in 1995 and configured to remain within existing airport property (parallel to the runway). However, this configuration deviated from the ALP defined plan to construct six 12-unit T-hangars perpendicular to the runway, which required property acquisition to accommodate the hangars.

Airspace

The airspace surfaces defined for Runway 7/25 in the 1990 Airport Master Plan are based on standards for utility runways (designed for aircraft weighing less than 12,500 pounds) with nonprecision instrument approaches. The previous airspace planning recommendation was based on future development of a nonprecision instrument approach to Runway 25. As stated in the December 2008 Airport Layout Plan Airspace Classification Review, feasibility of developing a nonprecision instrument approach to either end of Runway 7/25 has not been established by FAA through detailed airspace and flight procedure analysis. The December 2008 report also notes the development of instrument procedures may have marginal effectiveness. Due to terrain

surrounding the airport, local pilots familiar with the airport have expressed reservations about the viability of developing a useable instrument approach at either runway end, the December 2008 report states. The airport's owner, Port of Hood River, has formally approached FAA regarding removing instrument approach language from the present Airport Master Plan, and the December 2008 Airport Layout Plan Airspace Classification Review has affirmed that request.

The 1994 ALP identified the future critical aircraft as a Beechcraft King Air 200, twin-engine turboprop, which has a corresponding airport reference code (ARC) of B-II. The FAA currently indicates that runways designed to accommodate B-II aircraft should use "other-than-utility" airspace planning criteria under FAR Part 77. Since the activity forecasts presented in Chapter Three include a level of ADG II activity required to meet the FAA's design aircraft criteria, ADG II standards are appropriate for defining future or ultimate facility requirements at Ken Jernstedt Airfield. As a result, the airspace surfaces depicted in the previous ALP drawings will need to be revised to reflect the "other-than-utility" standards.

One prominent area of terrain penetration was previously depicted southwest of the runway, at the outer edge of the horizontal surface and within the conical surface near the end of the Runway 7 approach surface. Data for the penetrating terrain was not listed on the obstruction table for the airspace plan.

It appears that the area of terrain penetration previously identified will also exist in the expanded "other-than-utility" airspace surfaces. The utility approach surfaces (5,000 feet long; 20:1 slope) for both runways appeared to be free of terrain penetrations, although several obstructions (trees, vehicles traveling on roadways, etc.) were listed within the approaches on the 1994 Airspace Plan.

Instrument Approach Capabilities

The airport currently has no instrument approach capabilities. None are anticipated in this update. The 1990 Airport Master Plan identified "GPS" as a future approach aid for Runway 25. The airport was identified as a candidate for global positioning system (GPS) approach in the 2000 Oregon Aviation Plan[10], and subsequently was identified as a "priority candidate" in the 2002 Oregon GPS Survey Study.[11] The GPS study noted that additional planning and airspace analyses would be required to address potential development issues. The recent addition of an

[10] Oregon Aviation Plan © Oregon Department of Transportation (March 2001)
[11] Oregon GPS Survey Study (Century West Engineering, 2002)

automated weather observation system (AWOS) provides useful weather data for local and itinerant operations by VFR pilots, both at the airport and enroute, through the Columbia River Gorge.

Airport Design Standards

The selection of the appropriate design standards for airfield facilities is based primarily upon the characteristics of the aircraft that are expected to use the airport. The most critical characteristics are the approach speed and wingspan of the design aircraft. The design aircraft is defined as the most demanding aircraft type operating at the airport with a minimum of 500 annual itinerant operations (takeoffs and landings). Planning for future aircraft use is important because design standards are used to determine separation distances between facilities that could be very costly to relocate at a later date.

Federal Aviation Administration (FAA) **Advisory Circular (AC) 150/5300-13, Airport Design**, serves as the primary reference in planning airfield facilities. **FAR Part 77, Objects Affecting Navigable Airspace**, defines imaginary surfaces, which are established to protect the airspace immediately surrounding a runway. The airspace and areas surrounding a runway should be free of obstructions (i.e., structures, parked aircraft, trees, etc.) to the greatest extent possible.

FAA **Advisory Circular 150/5300-13** groups aircraft into five categories based upon their approach speed. Categories A and B include small propeller aircraft, many small or medium business jet aircraft, and some larger aircraft with approach speeds of less than 121 knots. Categories C, D, and E consist of the remaining business jets as well as larger jet and propeller aircraft generally associated with commercial and military use; these aircraft have approach speeds of 121 knots or more. The advisory circular also establishes six aircraft design groups, based on the physical size (wingspan) of the aircraft. The categories range from Airplane Design Group (ADG) I, for aircraft with wingspans of less than 49 feet, to ADG VI for the largest commercial and military aircraft. ADG I is further divided into two subcategories: runways serving "small airplanes exclusively" and runways serving aircraft weighing more than 12,500 pounds. The Federal Aviation Administration classifies aircraft with a maximum gross takeoff weight of less than 12,500 pounds as "small aircraft". A summary of typical aircraft and their respective design categories is presented in **Table 4-2.**

The 1994 Airport Layout Plan (approved in 1994) listed an airport reference code of B-I, based on a typical twin-engine piston aircraft; the future airport reference code was listed as B-II, based

on a typical twin-engine turboprop aircraft. Most aircraft currently operating at Ken Jernstedt Airfield are in Airplane Design Group I and II and Approach Categories A or B. The airport has historically accommodated general aviation and business aviation fixed-wing aircraft and rotor aircraft. The airport currently accommodates one locally based turbine-powered agricultural aircraft and several sailplanes that are included in ADG II.

TABLE 4-2: TYPICAL AIRCRAFT & DESIGN CATEGORIES

Aircraft	Design Group	Approach Category	Maximum Gross Takeoff Weight (lbs)
Grumman American Tiger	A	I	2,400
Cessna 182	A	I	3,110
Lancair Columbia 300	A	I	3,400
Cirrus Design SR22	A	I	3,400
Cessna 206	A	I	3,600
Beechcraft Bonanza A36	A	I	3,650
Piper Seneca V (PA-34)	A	I	4,750
Socata/Aerospatiale TBM 700	A	I	6,579
Ayres 400 Turbo Thrush	A	I	9,300
Beechcraft Baron 58	B	I	5,500
Cessna 340	B	I	5,990
Piper Aerostar 602P	B	I	6,000
Cessna Citation CJ1	B	I	10,600
Beech King Air B100	B	I	11,800
Cessna Citation I	B	I	11,850
Piper Malibu (PA-46)	A	II	4,340
Cessna Caravan 1	A	II	8,000
Pilatus PC-12	A	II	9,920
Air Tractor 502B	A	II	9,700
Beech King Air B200	B	II	12,500
Cessna Citation CJ2	B	II	12,300
Cessna Citation II	B	II	13,300
Beech King Air 350	B	II	15,000
Cessna Citation Bravo	B	II	15,000
Cessna Citation Excel	B	II	20,000
Dassault Falcon 20	B	II	28,660
Bombardier Learjet 31A	C	I	17,000
Hawker (HS125-700A)	C	I	25,000
Gulfstream 100	C	II	24,650
Beechcraft Hawker 800XP	C	II	28,000
Cessna Citation Sovereign	C	II	30,250
Gulfstream 200	C	II	34,450
Cessna Citation X	C	II	36,100
Bombardier Challenger 300	C	II	37,500
Gulfstream IV	D	II	71,780

Source: AC 150/5300-13, change 7; aircraft manufacturer data.

Based on the existing airfield configuration, past master plan recommendations and current airport activity, the use of design standards based on **Aircraft Approach Category B and Airplane Design Group I is currently recommended for Runway 7/25 (*Airport Reference Code - ARC B-I*).** Based on these factors combined with forecast activity, **Aircraft Approach Category B and Airplane Design Group II is recommended as the future design standard for Runway 7/25 (*Airport Reference Code - ARC B-II*).** Airfield design standards for ADG I and ADG II are summarized in **Table 4-3**. ADG I (small aircraft exclusively) standards are also included for comparison.

Based on FAA planning guidelines, the use of "other-than-utility" airspace surfaces, as defined in FAR Part 77, is appropriate for Runway 7/25.

A summary of Ken Jernstedt Airfield's current conformance with recommended design standards is presented in **Table 4-4**. As indicated in the table, Runway 7/25 meets most ADG I (small) design standards, but does not meet all recommended ADG I standards for Approach Category A and B aircraft. With the exception of runway width and potential safety area dimensions (west end only), the existing runway-taxiway system does not currently meet most ADG II standards. The most significant items include existing separations for parallel taxiways, aircraft parking, and aircraft fueling areas that are too close to the runway to meet ADG II standards.

TABLE 4-3: AIRPORT DESIGN STANDARDS SUMMARY (DIMENSIONS IN FEET)

Standard	Runway 7/25 (Existing Conditions)	ADG I[1] (small aircraft exclusively)	ADG I[2] A&B Aircraft	ADG II[3] A&B Aircraft
Runway Length	3,040	3,150/3,760[4]	3,150/3,760[4]	5,060/6,540[5]
Runway Width	75	60	60	75
Runway Shoulder Width	10	10	10	10
Runway Safety Area Width	120	120	120	150
Runway Safety Area Length (Beyond Rwy End)	240	240	240	300
Obstacle-Free Zone	250	250	250	400
Object Free Area Width	250	250	400	500
Object Free Area Length (Beyond Rwy End)	240	240	240	300
Primary Surface Width	250	250	500	500
Primary Surface Length (Beyond Rwy End)	200	200	200	200
Runway Protection Zone Length	1,000	1,000	1,000	1,000
Runway Protection Zone Inner Width	250	250	500	500
Runway Protection Zone Outer Width	450	450	700	700
Runway Centerline to:				
Parallel Taxiway Centerline	Varies 125-240'	150	225	240
Aircraft Parking Area	225	125	200	250
Building Restriction Line	230/270 (S/N)	251[6]	376[6]	376[6]
Taxiway Width	Varies (25-30')	25	25	35
Taxiway Shoulder Width	10	10	10	10
Taxiway Safety Area Width	49	49	49	79
Taxiway Object Free Area Width	89	89	89	131
Taxiway Centerline to Fixed/Movable Object	44.5	44.5	44.5	65.5

1. Utility (visual) runways (Per FAR Part 77); all other dimensions reflect visual runways and runways with not lower than 3/4-statute mile approach visibility minimums (per AC 150/5300-13, Change 7). RPZ dimensions bases on visual and not lower than 1-mile approach visibility minimums.
2. Utility (nonprecision instrument) runways (Per FAR Part 77); all other dimensions reflect visual runways and runways with not lower than 3/4-statute mile approach visibility minimums (per AC 150/5300-13, Change 7). RPZ dimensions bases on visual and not lower than 1-mile approach visibility minimums.
3. Other than Utility (nonprecision instrument) runways (Per FAR Part 77); all other dimensions reflect visual runways and runways with not lower than 3/4-statute mile approach visibility minimums (per AC 150/5300-13, Change 7). RPZ dimensions bases on visual and not lower than 1-mile approach visibility minimums.
4. Runway length required to accommodate 95 and 100 percent of General Aviation Fleet 12,500 pounds or less. 85 degrees F, 10-foot change in runway centerline elevation.
5. Runway length required to accommodate 75 percent large airplane fleet (60,000 pounds or less) at 60 and 90 percent useful load. 85 degrees F, 10-foot change in runway centerline elevation.
6. Distance to protect standard parallel taxiway object free area and accommodate an 18-foot structure (at the BRL) without penetrating the 7:1 Transitional Surface.

TABLE 4-4: RUNWAY 7/25 CONFORMANCE WITH FAA DESIGN STANDARDS

Item	*Airplane Design Group I (Small Aircraft Exclusively)*	*Airplane Design Group I A & B Aircraft*	*Airplane Design Group II A & B Aircraft*
Runway Safety Area	Yes	Yes	Yes
Runway Object Free Area	Yes	No[0]	No[1]
Runway Obstacle Free Zone	Yes	No[2]	No[2]
Taxiway Safety Area	Yes	Yes[3]	No[4]
Taxiway Object Free Area	Yes	Yes[3]	No[4]
Building Restriction Line - North[5]	Yes	No	No
Building Restriction Line - South[5]	No	No	No
Aircraft Parking Line –North	Yes	No[6]	No[6]
Aircraft Parking Line – South	Yes	No[6]	No[5]
Runway Protection Zones	No[7]	No[7]	No[7]
Runway-Parallel Taxiway Separation -North	Yes	No	No
Runway-Parallel Taxiway Separation - South	Yes	No	No
Runway Width[8]	Yes	Yes	Yes
Runway Length	No[9]	No[10]	Yes[11]
Taxiway Width – North Parallel	Yes	Yes	No[12]
Taxiway Width – South Parallel	Yes	Yes	No[12]

0. Aircraft fuel area (south apron) located within ADG I OFA.
1. Aircraft parking positions (south apron) located within ADG II OFA.
2. North and South Parallel Taxiways within OFZ for runways serving large airplanes.
3. Taxiway OFA/SA clearances meet standards--runway-taxiway separations do not meet standards.
4. Taxiways require relocation to meet ADG II standard runway separation; relocation of some aircraft tiedowns also required.
5. BRL depicted on 1994 ALP is 230 feet (south side) and 270 feet (north side) from runway centerline.
6. Aircraft parking areas penetrate nonprecision instrument airspace (primary or transitional surfaces) and may conflict with FAA-recommended parallel taxiway separations.
7. Tucker Road and Orchard Road cross the Runway 7 and 25 protection zones; structures within RPZ.
8. Standard runway widths: 60' (ADG I).and 75' (ADG II).
9. Per FAA Runway Length Model: Existing runway length less than FAA-recommended length required to accommodate 95% of small aircraft fleet.
10. Per FAA Runway Length Model: Existing runway length less than FAA-recommended length required to accommodate 95/100% of small aircraft fleet.
11. Per FAA Runway Length Model: Existing runway length less than FAA-recommended length required to accommodate 75% of large aircraft weighing less than 60,000# at 60% useful load.
12. ADGII taxiway width standard is 35 feet.

Airport Design Standards Note:

The airport planning criteria recommended for Runway 7/25 at Ken Jernstedt Airfield are based on the following assumptions:

Visual runways and runways with not lower than ¾ statute mile visibility minimums. Runway protection zones (RPZ) are based on a visibility standard of "visual and not lower than 1-mile" for runways expected to serve Aircraft Approach Categories A and B. All references to the "standards" are based on these approach visibility assumptions, unless otherwise noted. (Per FAA Advisory Circular 150/5300-13, change 7). Airport Design Standards are based on Airport Reference Code (ARC) B-I (existing) and B-II (future

Runway Safety Area (RSA)

The FAA defines runway safety area (RSA) as "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 excursion from the runway." Runway safety areas are most commonly used by aircraft that inadvertently leave (or miss) the runway environment during landing or takeoff.

By FAA design standard, the RSA *"shall be:*

(1) cleared and graded and have no potentially hazardous ruts, humps, depressions, or other surface variations;

(2) drained by grading or storm sewers to prevent water accumulation;

(3) capable, under dry conditions, of supporting snow removal equipment, aircraft rescue and firefighting equipment, and the occasional passage of aircraft without causing structural damage to the aircraft; and

(4) free of objects, except for objects that need to be located in the runway safety area because of their function. Objects higher than 3 inches above grade should be constructed on low impact resistant supports (frangible mounted structures) of the lowest practical height with the frangible point no higher than 3 inches. Other objects such as manholes, should be constructed at grade. In no case should their height exceed 3 inches."

The recommended transverse grade for the lateral RSA ranges between 1½ and 5 percent from runway shoulder edges. The recommended longitudinal grade for the first 200 feet of extended RSA beyond the runway end is 0 to 3 percent. The remainder of the RSA must remain below the runway approach surface slope. The maximum negative grade is 5 percent. Limits on longitudinal grade changes are plus or minus 2 percent per 100 feet within the RSA. The airport sponsor should regularly clear the RSA of brush or other debris and periodically grade and compact the RSA to maintain FAA standards.

The RSA along the sides and beyond the ends of Runway 7/25 appears to be cleared, graded and free of physical obstructions within the ADG I dimensions. Some areas of wetlands may exist within the RSA beyond the end of Runway 7, although a formal evaluation may be required to define the boundaries. The runway edge lights and threshold lights located within the RSA are mounted on frangible supports (breakable coupling and disconnect plug). Any future lighting located within the RSA will also need to meet the FAA frangibility standard.

A future upgrade to ADG II standards will require expansion of the RSA to meet the appropriate dimensional standards (see Table 4-3).

Runway Object Free Area (OFA)

Runway object free areas (OFA) are two-dimensional surfaces intended to be clear of ground objects that protrude above the runway safety area edge elevation. Obstructions within the OFA may interfere with aircraft flight in the immediate vicinity of the runway. The FAA defines the OFA clearing standard:

"The OFA clearing standard requires clearing the OFA of above ground objects protruding above the runway safety area edge elevation. Except where precluded by other clearing standards, it is acceptable to place objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes and to taxi and hold aircraft in the OFA. Objects non-essential for air navigation or aircraft ground maneuvering purposes are not to be placed in the OFA. This includes parked airplanes and agricultural operations."

The north side of the aircraft fueling area is located approximately 190 feet from runway centerline and 25 feet from the south parallel taxiway centerline, within the ADG I OFA. The location of the fuel storage facilities will need to be evaluated in conjunction with the parallel taxiway to meet the full ADG I dimensional standards currently recommended for the airport. A future upgrade to ADG II standards will require expansion of the OFA to meet the appropriate

dimensional standards (see Table 4-3). The airport sponsor should periodically inspect the OFA and remove any objects that protrude into the OFA.

Obstacle Free Zone (OFZ)

The OFZ is a plane of clear airspace extending upward to a height of 150 feet above runway elevation, which coincides with the FAR Part 77 horizontal surface elevation. The FAA defines the following clearing standard for the OFZ:

"The OFZ clearing standard precludes taxiing and parked airplanes and object penetrations, except for frangible visual NAVAIDs that need to located in the OFZ because of their function."

The OFZ may include the Runway OFZ, the Inner-approach OFZ (for runways with approach lighting systems), and the Inner-transitional OFZ (for runways with lower than ¾-statute mile approach visibility minimums. For Ken Jernstedt Airfield, only the Runway OFZ is required based on runway configuration. The FAA defines the Runway OFZ as:

"The runway OFZ is a defined volume of airspace centered above the runway centerline. The runway OFZ is the airspace above a surface whose elevation at any point is the same as the elevation of the nearest point on the runway centerline. The runway OFZ extends 200 feet beyond each end of the runway."

The standard OFZ for runways serving small aircraft is 250 feet wide. This dimension corresponds with the visual approaches for the existing runway.

The OFZ for Runway 7/25 appears to be free of physical obstructions and meets the small aircraft dimensional standards. The future upgrade to ADG II and the corresponding change to "other-than-utility" runway designation would require a 400-foot wide OFZ based on the runway's ability to accommodate aircraft weighing 12,500 pounds and above.

The exit taxiways connecting to the runway have aircraft hold lines located 125 feet from runway centerline, which coincide with the outer edge of the existing OFZ boundary. The holding areas have adequate area to allow aircraft to remain clear of the OFZ. A future OFZ width of 400 feet will require the relocation of aircraft hold lines to 200 feet from runway centerline, in addition to relocation of aircraft fueling areas outside the OFZ.

Taxiway Safety Area

The taxiways at Ken Jernstedt Airfield include a full-length north parallel taxiway, a partial-length south parallel taxiway, and several access taxiways. The taxiways vary in width (25, 30 and 35 feet) and appear to meet the dimensional standard for ADG I taxiway safety area. The taxiway safety areas should be regularly cleared of brush or other debris and periodically graded and compacted to maintain FAA standards. A future upgrade to ADG II standards will require expansion of the taxiway safety area to meet the dimensional standards (see Table 4-3).

Taxiway Object Free Area

Most taxiways on the airport meet the dimensional standard for ADG I taxiway object free area. Two exceptions include the south parallel taxiway and the north access taxiway that extends beyond airport property. The north side of the aircraft fueling area is located within 25 feet of the south parallel taxiway, although the fuel tanks and other above ground equipment are located outside the ADG I taxiway OFA. Aircraft parked on the north side of the fuel tanks could limit wingtip clearances for aircraft taxiing on the south parallel taxiway. The north taxiway that extends beyond airport property does not appear to have adequate clearance from the adjacent T-hangars to meet the OFA standard.

Conformance with FAA-recommended taxiway object free area standards will be reviewed in conjunction with an evaluation of runway-parallel taxiway separations. The ADG I and ADG II taxiway OFA widths are 89 and 131 feet respectively. All future buildings and parked aircraft located along existing/planned taxiways should have a minimum setback (building restriction line and/or aircraft parking line) of at least 65.5 feet, which corresponds to the outer edge of the ADG II taxiway OFA, which preserves a long-term upgrade to ADG II design standards.

Building Restriction Line (BRL)

The 1994 Airport Layout Plan (ALP) depicts 230-foot (south side) and 270-foot (north side) building restriction lines (BRL) for Runway 7/25. The south BRL (230 feet) will accommodate a 15-foot high building without penetrating the utility/visual runway transitional surface and is clear of the ADG I (small) taxiway object free area. The north BRL will accommodate a 20-foot

high structure without penetrating the existing utility/visual runway transitional surface and also is compatible with either an ADG I (small) or ADG I taxiway separation.

The nearest airport building to Runway 7/25 is located approximately 320 feet from runway centerline (large conventional hangar near NW corner of airport), although its location does not affect the ability to meet recommended parallel taxiway separations. The minimum setback required to accommodate a 15-foot high structure (typical low profile – T-hangar) for a runway with a utility/visual approach would be 230 feet from runway centerline. Structures with higher roof elevations will require additional setback distances to remain clear of the runway transitional surface. A 230-foot BRL is also compatible with both ADG I or ADG II parallel taxiways and their clear areas.

Runway Protection Zones (RPZ)

The FAA provides the following definition for runway protection zones (RPZ):

"The RPZ's function is to enhance the protection of people and property on the ground. This is achieved through airport owner control over RPZs. Such control includes clearing RPZ areas (and maintaining them clear) of incompatible objects and activities. Control is preferably exercised through the acquisition of property interest in the RPZ. The RPZ is trapezoidal in shape and centered about the extended runway centerline. The RPZ begins 200 feet beyond the end of the area useable for takeoff or landing."

The RPZ dimensions recommended for Runways 7 and 25 are based on Aircraft Approach Categories A & B with approach visibility minimums "visual and not lower than 1-mile."

RPZs with buildings, roadways, or other items do not fully comply with FAA standards. The 1994 ALP depicted existing RPZs based on runways designed to serve small aircraft exclusively, and future RPZ dimensions based on aircraft approach categories A and B. Both RPZs types are consistent with approach visibility minimums "visual and not lower than 1-mile."

A review of recent aerial photography for Ken Jernstedt Airfield identified public roadways within both visual RPZs for Runway 7/25. In addition, the "small aircraft" RPZ for Runway 7 has a business (drive-in restaurant) and a portion of a residence located within its boundaries. Several additional structures are located within the boundaries future RPZs depicted on the 1994 ALP. An evaluation of runway configuration options and RPZ clearance will be completed as part of this planning update.

It is recognized that realigning major surface roads routes located within the RPZs may not be highly feasible. However, where possible, the County should discourage development within the RPZs (particularly structures) that is inconsistent with FAA standards.

Aircraft Parking Line (APL)

The existing aircraft parking areas at the airport are located adjacent to the parallel taxiways, approximately 225 to 275 feet from the runway centerline. The 1994 Airport Layout Plan does not depict aircraft parking lines (APL), although the parking areas do not conflict with the adjacent parallel taxiways and the parked aircraft do not penetrate the existing utility visual airspace surfaces.

However, to meet either the standard ADG I or ADG II runway-parallel taxiway separation distances, the north and south parallel taxiways will need to be relocated. The 1994 ALP (airspace plan) reflects the then-planned instrument approach for Runway 7/25 and increases the primary surface from 250 feet to 500 feet wide. As a result, the outer row of tiedowns on the south apron would be located within a 500-foot wide primary surface and most aircraft parked on the front half of the south tiedown apron would penetrate the runway transitional surface. Tail heights of 10 feet or less are typical of most light aircraft, although business aircraft often have tail heights ranging from 10 to 25 feet. An APL located 320 feet from runway centerline will accommodate an aircraft with a 10-foot tail height; this distance will also accommodate standard ADG I and ADG II parallel taxiway separations.

Several existing aircraft parking positions located nearest the runway will not comply with the recommended APL separation. These tiedowns would need to be eliminated or relocated outside the APL.

Runway – Parallel Taxiway Separation

Runway 7/25 is served by dual parallel taxiways. The north parallel taxiway is a full-length taxiway with a 200-foot runway-taxiway centerline separation. The south parallel taxiway is a partial-length taxiway with a 150-foot runway separation. The eastern 650-foot section of the south parallel taxiway was removed when the south T-hangar and hangar taxilanes were constructed in 1995. The south hangar and taxilane configurations were altered significantly from the layout depicted on the 1994 ALP. As a result, the taxilane located on the north side of

the T-hangar is located 240 feet from runway centerline and meets ADG II standards (runway separation and taxiway width).

The existing separation of both parallel taxiways meets the ADG I (small aircraft exclusively) design standard, but does not meet either the full ADG I standard (225 feet) or the ADG II standard (240 feet). Future relocation of the parallel taxiways should at a minimum, reflect the ADG I standard for runway separation, but increasing the separations to the ADG II standard would be required as part of a future upgrade from ADG I to ADG II standards.

FAR PART 77 SURFACES

Airspace planning for U.S. airports is defined by Federal Air Regulations (FAR) Part 77 – Objects Affecting Navigable Airspace. FAR Part 77 defines imaginary surfaces (airspace) to be protected surrounding airports.

The 1994 Airport Airspace Plan[12] depicted airspace surfaces that were consistent with nonprecision instrument approach capabilities and utility runways based on an ultimate runway length of 4,000 feet. One area of terrain penetration was identified within the airspace surfaces, southwest of the runway.

[12] Hood River Airport Master Plan 1990-2010. Airport Airspace Plan (Sheet No. 4), W&H Pacific (approved 1994)

Table 4-5 summarizes FAR Part 77 standards with the corresponding runway type and approach capability.

TABLE 4-5: FAR PART 77 AIRSPACE SURFACES
KEN JERNSTEDT AIRFIELD

Item	Utility (Visual)[1]	Utility (Nonprecision)[1]	Other-than-utility (Visual)[1]	Other-than-utility (Nonprecision)[1]
Width of Primary Surface	250 feet	500 feet	500 feet	500 feet
Radius of Horizontal Surface	5,000 feet	5,000 feet	5,000 feet	10,000 feet
Approach Surface Width at End	1,250 feet	2,000 feet	1,500 feet	3,500 feet
Approach Surface Length	5,000 feet	5,000 feet	5,000 feet	10,000 feet
Approach Slope	20:1	20:1	20:1	34:1

1. Utility runways are designed for aircraft weighing 12,500 pounds or less; other-than-utility runways are designed for aircraft weighing more than 12,500 pounds.

Approach Surfaces

Runway approach surfaces extend outward and upward from each end of the primary surface, along the extended runway centerline. As noted earlier, the dimensions and slope of approach surfaces are determined by the type of aircraft intended to use the runway and most demanding approach planned for the runway.

The 1994 Airspace Plan depicted future utility runway approach surfaces with slopes of 20:1. The approach surface for Runway 25 reflects a planned nonprecision instrument approach; Runway 7 has a visual approach surface dimensions. The FAA recommends that ADG II runways (as recommended on the 1994 ALP) be planned using "other-than-utility" airspace surfaces, which indicates that the 1994-defined surfaces are not consistent with FAA current guidance in airspace planning. As noted earlier, however, this recommendation has been removed following instrument approach analysis that occurred with the December 2008 Airport Layout Plan Airspace Classification Review.

Several obstructions were identified within the 20:1 approach surfaces for Runway 7/25. Tucker Road passes under the Runway 7 approach surface, approximately 640 feet from the runway end. According to the 1994 Airspace Plan, vehicles traveling on the roadway penetrate the 20:1 approach surface by approximately 5 feet. Orchard Road crosses the Runway 25

approach surface, approximately 300 feet from the runway end. Vehicles traveling on the roadway penetrate the 20:1 approach surface by 8 feet.

The 1994 Runway Protection Zone Plans and Profiles depicted Obstruction Clearance Approach (OCA)[13] surfaces to improve obstruction clearance for both runway ends. The use of alternative OCA surface criteria for Runway 7/25 allowed the 20:1 approach surface to begin at each runway threshold, rather than 200 feet beyond the runway, which is standard under FAR Part 77. The use of OCA technically eliminated the obstructions created by the roads at both runway ends, although this criterion is not appropriate for runways expected to support instrument night circling operations, if that is required.

The 1994 Plan also depicted Orchard Road being relocated to accommodate the future runway extension and improve obstruction clearance for the approach. A beauty shop and restaurant penetrating the Runway 7 approach surface were recommended for relocation. The beauty shop building has since been removed.

Based on the elimination of all plans for nonprecision instrument approach capabilities for Runway 7/25 and the forecast B-II design aircraft, "other-than-utility" nonprecision approach surfaces with a slope of 20:1 are removed. An updated evaluation of obstructions within the 20:1 5,000-foot visual approach surfaces reflects current airspace planning criteria.

Primary Surface

The primary surface is a rectangular plane of airspace, which rests on the runway (at centerline elevation) and extends 200 feet beyond the runway end. The primary surface should be free of any penetrations, except items with locations fixed by function (i.e., VASI, runway or taxiway edge lights, etc.). The primary surface end connects to the inner portion of the runway approach surface.

The primary surface for Runway 7/25 has historically been maintained to meet utility/visual runway standards (250 feet wide). The 1994 Airspace Plan recommended a 500-foot wide primary surface for Runway 7/25 based on future instrument approach capabilities. Due to the "marginal effectiveness" of an instrument approach, as cited in the December 2008 Airport Layout Plan Airspace Classification Review, the Port has abandoned plans for an instrument approach and now relies on utility/visual standards. A 500-foot wide primary surface continues to

[13] FAA Advisory Circular 150/5300-13, Appendix 2.

be appropriate for Runway 7/25 based on the utility/visual approach capabilities for the runway. This dimension is compatible with the existing utility runway designation.

It appears that a 500-foot wide primary surface for Runway 7/25 can be provided to meet FAA standards through minor grading and relocation of the aircraft tiedown positions and the aircraft fuel facilities on the south apron located within 250 feet of runway centerline. During a recent visual inspection of the airport several large trees were observed to be located within primary surface near the southeast corner of the airport. The airport property line in this area is located approximately 160 to 170 feet from the runway centerline. This does not allow the airport to control and protect the recommended 500-foot wide primary surface, which would be required for a nonprecision instrument approach. The recommended acquisition of a 100-foot strip of property along the southeast airport property line was depicted on the 1994 ALP with a modification to standards to allow an existing residence to remain.

Transitional Surface

The transitional surface is located at the outer edge of the primary surface, represented by a plane of airspace that rises perpendicularly at a slope of 7 to 1, until reaching an elevation 150 feet above runway elevation. This surface should be free of obstructions (i.e., parked aircraft, structures, trees, etc.).

Horizontal Surface

The horizontal surface is a flat plane of airspace located 150 feet above runway elevation. Based on the utility/visual runway designation associated with the future B-II design aircraft, the outer boundary of the Runway 7/25 horizontal surface is defined by two 5,000-foot radii, which extend from the runway ends (the intersection point of the extended runway centerline, the outer edge of primary surface, and the inner edge of the approach surface). The outer points of the radii for each runway are connected to form an oval, which is defined as the horizontal surface.

The 1994 Airspace Plan depicted a horizontal surface with 5,000-foot radii, based on a utility runway designation. One area of terrain penetration was identified within the horizontal surface, southwest of the runway.

Conical Surface

The conical surface is an outer band of airspace, which abuts the horizontal surface. The conical surface begins at the elevation of the horizontal surface and extends outward 4,000 feet at a slope of 20:1. The top elevation of the conical surface is 200 feet above the horizontal surface and 350 feet above airport elevation.

AIRSIDE REQUIREMENTS

Airside facilities are those directly related to the arrival and departure and movement of aircraft:

- Runways
- Taxiways
- Airfield Lighting

Runways

The adequacy of the existing runway system at Ken Jernstedt Airfield was analyzed from a number of perspectives including runway orientation, airfield capacity, runway length, and pavement strength.

Runway Orientation

The orientation of runways for takeoff and landing operations is primarily a function of wind velocity and direction, combined with the ability of aircraft to operate under adverse wind conditions. When landing and taking off, aircraft are able to maneuver on a runway as long as the wind component perpendicular to the aircraft's direction of travel (defined as crosswind) is not excessive. For runway planning and design, a crosswind component is considered excessive at 12 miles per hour for smaller aircraft (gross takeoff weight 12,500 pounds or less) and 15 miles per hour for larger aircraft. FAA planning standards indicate that an airport should be planned with the capability to operate under allowable wind conditions at least 95 percent of the time.

A wind rose was created for the runway as part of the 1977 Airport Master Plan using local estimates. Based on that evaluation, wind coverage for Runway 7/25 was estimated at

approximately 96.5 percent at 15 miles per hour (13 knots). Prevailing winds are from the west and local pilots indicate that Runway 25 is most often used. Based on available data, it appears that Runway 7/25 meets the FAA-recommended wind coverage (95 percent) at both 12 and 15 miles per hour.

Runway Length

Runway length requirements are based primarily upon airport elevation, mean maximum daily temperature of the hottest month, runway gradient, and the critical aircraft type expected to use the runway. A summary of FAA-recommended runway lengths for a variety of aircraft types and load configurations are described in **Table 4-6**.

Runway 7/25 accommodates predominantly small aircraft (less than 12,500 pounds) operations. Since the airport accommodates limited activity from aircraft weighing more than 12,500 pounds, the current evaluation of runway length requirements should be based on the FAA's model for "small airplanes."

The 1994 Airport Layout Plan identified the future critical aircraft for Runway 7/25 as twin-engine turboprop, which corresponds to airport reference code (ARC) B-II. As noted in the updated forecast evaluation, the airport is expected to accommodate increasing levels of B-II aircraft activity during the current planning period.

Based on local conditions and the methodology outlined in **AC 150/5325-4A**, Runway 7/25 can currently accommodate approximately 91 percent of the small airplane fleet under the conditions common during a typical summer day in Hood River.

A runway length of 3,150 feet is required to accommodate 95 percent of small airplanes (12,500 pounds or less maximum gross takeoff weight) with 10 or less passenger seats; a length of 3,760 feet would be required to accommodate 100 percent of small airplanes, which would include business class twin-engine piston, turboprop and light jets weighing less than 12,500 pounds. The runway length requirements for several typical small/medium business jets are also summarized in **Table 4-6** for general comparison.

As noted in **Table 4-6**, a runway length of approximately 5,060 feet would be required to accommodate approximately 75 percent of the large aircraft fleet (weighing more 12,500 pounds) with a 60 percent useful load. However, it does not appear that sufficient demand would be

generated by the portion of ADG II aircraft requiring significantly longer runways than most small business class turboprops or business jets.

With this updated plan, the runway will remain at its present length, 3,040 feet. There are absolutely no plans to expand the runway beyond this present length.

The existing width of Runway 7/25 is 75 feet, which exceeds the ADG I standard (60 feet) and meets the ADG II standard (75 feet). The existing runway width will accommodate both existing and forecast air traffic through the twenty-year planning period.

TABLE 4-6: FAA-RECOMMENDED RUNWAY LENGTHS (FROM FAA COMPUTER MODEL)

Runway Length Parameters for Ken Jernstedt Airfield

- *Airport Elevation: 631 feet MSL*
- *Mean Max Temperature in Hottest Month: 81 F*
- *Maximum Difference in Runway Centerline Elevation: 38 feet*
- *Existing Runway Length: 3,040 feet*

Small Airplanes with less than 10 seats	
75 percent of these airplanes	*2,620 feet*
95 percent of these airplanes	*3,150 feet*
100 percent of these airplanes	*3,760 feet*
Small airplanes with 10 or more seats	*4,230 feet*
Large Airplanes of 60,000 pounds or less	
75 percent of these airplanes at 60 percent useful load	*5,060 feet*
75 percent of these airplanes at 90 percent useful load	*6,540 feet*
100 percent of these airplanes at 60 percent useful load	*5,640 feet*
100 percent of these airplanes at 90 percent useful load	*8,190 feet*
Airplanes of more than 60,000 pounds	*5,230 feet*
Selected Aircraft Types:	
Cessna Citation CJI (6-7 passengers / 1 crew 10,600# MGW)	*4,670 feet***
Cessna Citation Bravo (7-11 passengers / 2 crew 14,800# MGW)	*4,300 feet***
Cessna Citation Excel (7-8 passengers / 2 crew 20,000# MGW)	*4,200 feet***

*** Takeoff distances based on maximum gross weight and conditions listed above; passenger and/or fuel loads may be reduced based on aircraft operating weight limits.*

1. FAR Part 25 Balanced Field Length at maximum certificated takeoff weight (accelerated/stop distance). Cessna Citation runway length requirements based on 15 degrees flaps, 81 degrees F, MGTW, distance to 35 feet above the runway; data provided by manufacturer (Cessna Citation Flight Planning Guides).

Airfield Pavement

According to the data contained in the 2000 pavement condition report, Ken Jernstedt Airfield pavements ranged from "failed" to "excellent."[14] **Table 4-7** summarizes the five-year maintenance program recommended for Ken Jernstedt Airfield and additional pavement maintenance items anticipated during the current 20-year planning period. The rate of deterioration of airfield pavements increases significantly as they age. A regular maintenance program of vegetation control, crackfilling, and sealcoating is recommended to extend the useful life of all airfield pavements. It should also be noted that some of the pavement plan's recommended 5-year projects (such as the overlay/reconstruct of the south parallel taxiway) may not be required or appropriate if other projects are planned in the near term to correct existing facility deficiencies.

TABLE 4-7: SUMMARY OF RECOMMENDED AIRFIELD PAVEMENT MAINTENANCE

Pavement Section	5-Year Recommended Maintenance	Other Recommended Maintenance During 20-Year Planning Period[1]
Runway 7/25	Slurry Seal (2002)	Overlay (2008) Slurry Seal (2013) Slurry Seal (2018)
North Parallel Taxiway	Slurry Seal (2002)	Relocate (new taxiway) (2007+) Slurry Seal (2012) Slurry Seal (2017)
South Parallel Taxiway	Overlay West Taxiway Exit (2003) Reconstruct West 200-foot Section (2003) Slurry Seal All Other sections (2003)	Relocate (new taxiway) (2007+) Slurry Seal (2013) Slurry Seal (2018)
South Tiedown Apron (to FBO)	Slurry Seal (2003) Reconstruct Section Adjacent to FBO (2003)	Overlay (2010) Slurry Seal (2015) Slurry Seal (2020)
South T-Hangar Apron/Taxilanes	Slurry Seal (2002)	Overlay (2010) Slurry Seal (2015) Slurry Seal (2020)
SW Hangar Apron	Reconstruct (2003)	Slurry Seal (2008) Slurry Seal (2014) Slurry Seal (2019)
North Apron and NW Hangar Taxilanes	Slurry Seal (2001)	Overlay (2011) Slurry Seal (2016) Slurry Seal (2021)

1. The dates identified for long-term pavement maintenance are approximate and assume that all deferred 5-year maintenance recommended in Years 1, 2 or 3 (2001-2003), will be completed by 2004 with all subsequent schedules based on 5 year intervals for slurry seals and rehabilitation timing based on 2000 PCI ratings. These projections should be periodically adjusted based on updated inspections.

[14] Pavement Consultants Inc. (8/21/2000).

Runway 7/25

The 2000 PCI report rates the runway "very good." The report indicates that without the recommended maintenance, the runway rating will decline to "good" by 2010. The PCI report recommended a slurry seal for the entire runway in Year 2 (2002).

Based on the age and condition of the pavement, additional slurry seals and eventually, a full asphalt overlay will be needed during the twenty-year planning period. The existing 23,000 pound (single wheel) pavement strength is adequate to accommodate regular operations with most aircraft, although as part of a future upgrade to ADG II standards, a 30,000 pound single wheel rating would be appropriate.

North Parallel Taxiway

In the 2000 report, the north parallel taxiway was rated "excellent." The report indicates that without the recommended maintenance, the taxiway rating will decline to "good" by 2010. The PCI report recommended a slurry seal for the taxiway in Year 2 (2002).

As earlier noted that the north parallel taxiway does not meet ADG I or II runway separation standards. Once the taxiway is relocated, additional slurry seals will be needed periodically to maximize useful life of the pavement. The taxiway markings will also require periodic repainting during the current planning period, usually in conjunction with periodic seal coats.

South Parallel Taxiway

In the 2000 report, the south parallel taxiway was rated "very good" to "poor." The report indicates that without the recommended maintenance, the western section of the taxiway will deteriorate to "very poor" condition by 2010 and the other sections of the taxiway are projected to decline to "good" condition. The PCI report recommended a combination of reconstruction, overlay and slurry seal for the taxiway in Year 3 (2003).

As noted earlier, the south parallel taxiway does not meet ADG I or II runway separation standards. Once the taxiway is relocated, additional slurry seals will be needed periodically to maximize useful life of the pavement. The taxiway markings will also require periodic repainting during the current planning period.

Aircraft Aprons

In the 2000 PCI report, the north apron and hangar area pavements were rated "good." The report indicates that without the recommended maintenance, the tiedown apron will decline to "fair" condition by 2010. The PCI report recommended a slurry seal for the north apron and hangar taxilanes in Year 1 (2001). Based on the age and condition of the pavement, additional slurry seals and eventually, a full asphalt overlay will be needed during the twenty-year planning period.

The south apron and hangar area pavements were rated from "poor" to "excellent." The pavement located directly in front of the FBO was rated "poor" and is projected to "fail" by 2005 without recommended maintenance. Other sections of the south aprons are projected to decline from "very good" or "excellent" condition to "fair" to "good" condition by 2010, without recommended maintenance. The PCI report recommended a combination of reconstruction, overlay and slurry seal for all of the south apron sections in Year 3 (2003). Additional slurry seals and eventually, full asphalt overlays will be needed during the twenty year planning period for the south apron sections.

Airfield Capacity

The capacity of a single runway with a parallel taxiway typically ranges between 60 to 90 operations per hour during visual flight rules (VFR) conditions.

The existing runway/taxiway configuration provides reasonably efficient ground movement for aircraft, although the partial-length south parallel taxiway requires aircraft to cross the active runway when taxiing from the south apron to the end of Runway 25 for takeoff. Adding exit taxiways east of midfield on the north and south sides of the runway would reduce the roll-out and taxiing distances (and runway occupancy time) for aircraft landing on Runway 25. However, based on activity forecasts, the runway is expected to operate below capacity during the twenty-year planning period, in its existing configuration.

Taxiways

Runway 7/25 is served by parallel taxiways on both sides. As noted earlier, the existing runway-taxiway separations do not meet ADG I or ADG II standards. The ADG I standard separation is

225 feet from runway centerline. At a minimum, the parallel taxiways should be relocated with ADG I separations when the next major project (overlay or reconstruction) is required. At that time, the Port may wish to consider increasing the taxiway separation to 240 feet in order to meet the future ADG II standard. This would eliminate the need to relocate the taxiway twice and would also protect the long-term facility needs by establishing adequate clearances for parked aircraft and other facilities. If an ADG I separation is used, the taxiways would be constructed at a width of 25 feet. If an ADG II separation is used, the taxiways may be constructed at either the ADG I width (25 feet) or at the ADG II width (35 feet), depending on the conditions at the time.

Providing exit taxiways on both sides of the runway (east of midfield) is recommended to reduce runway occupancy times during roll-out by allowing aircraft to reach one of the parallel taxiways more quickly.

Based on current runway utilization, an aircraft holding area should be added at the Runway 25 end on the north parallel taxiway. The hold area would allow pre-departure aircraft checks and run-ups to be conducted without blocking taxiway access to the runway for other aircraft.

Airfield Instrumentation, Lighting and Marking

Runway 7/25 has low-intensity runway edge lighting (LIRL). The LIRL system appears to be in fair to poor condition and will require replacement early in the current planning period. Medium-intensity runway edge lighting (MIRL) is the standard for general aviation runways.

Runways 7 and 25 are not equipped with visual guidance indicators (VGI). The 1994 ALP recommended installation of visual approach slope indicators (VASI) for both runway ends. The Precision Approach Path Indicator (PAPI) is currently the primary visual guidance system used at general aviation airports and is recommended for both runway ends.

Runway 25 is equipped with runway end identifier lights (REILS). REILs consist of two sequenced strobes that provide rapid and positive identification at the approach end of the runway. REILs improve utilization of the runway during nighttime and poor visibility. The existing taxiway system does not have lighting or edge reflectors. Based on the relatively low level of nighttime operations, edge reflectors would be adequate for current operations.

Overhead lighting is available in most aircraft hangar and apron areas. Additional flood lighting is recommended for all expanded operations areas for improved utilization and security.

Runway 7/25 has basic runway markings (runway numbers, centerline stripe). .

On-Field Weather Data

The automated weather observation system (AWOS) meets all on-site weather reporting requirements for visual use.

LANDSIDE FACILITIES

The purpose of this section is to determine the space requirements during the planning period for landside facilities. The following types of facilities are associated with landside aviation operations areas:

- *Hangars*
- *Aircraft Parking and Tiedown Apron*
- *Fixed Base Operator (FBO) Facilities*

Hangars

In 2004, Ken Jernstedt Airfield had three 12-unit T-hangars and several conventional hangars located on the north and south sides of the runway. It is estimated that the existing on-airport hangar capacity accommodates approximately 50 aircraft, which represents about 60 percent of the current estimate of 86 based aircraft. Three additional hangars are currently located off airport property.

For planning purposes, it is estimated that the percentage of the airport's locally based aircraft stored in hangars will increase from approximately 60 percent to 80 percent during the current planning period. It is anticipated that the higher level of hangar utilization will be reflected in both newly arriving aircraft and aircraft currently located at the airport (parked on tiedown aprons). The higher rates of hangar utilization assumed in this facility requirements evaluation is based on the level of interest expressed by local pilots in having new hangar space constructed at the airport. It is also assumed that all existing hangar space is committed and future demand will need to be met through new construction.

A planning standard of 1,500 square feet per based aircraft stored in hangars is used to project gross space requirements. As indicated in the aviation activity forecasts, the number of based aircraft at Ken Jernstedt Airfield is projected to increase by 39 aircraft during the twenty-year planning period, although demand for hangars will also be partially driven by existing aircraft. Based on projected hangar utilization levels, long-term demand for new hangar space hangars is estimated to be 50 spaces, or approximately 75,000 square feet. The projected hangar needs are presented in **Table 4-9**, on page 4-33.

Individual aircraft owners needs vary and demand can be influenced by a wide range of factors beyond the control of an airport. For this reason, it is recommended that an additional hangar development reserve be identified to accommodate any unanticipated demand. Reserves should be established to accommodate a combination of conventional hangars and T-hangars.

It is recognized that the airport does not currently have adequate space to accommodate projected hangar requirements within existing property. Property acquisition will be needed in order for the airport to accommodate forecast demand.

Aircraft Parking and Tiedown Apron

Aircraft parking apron should be provided for locally based aircraft that are not stored in hangars and for transient aircraft visiting the airport. Currently, locally based aircraft parking is divided between the south and north aprons. Most itinerant parking is accommodated on the south apron, adjacent to the FBO and aircraft fuel. The existing aircraft aprons have approximately 63 light aircraft tiedowns. As noted in the inventory chapter, the north apron originally had an additional 14 tiedowns that were eliminated when an old underground fuel tank was removed. Some or all of these tiedowns could be replaced if needed.

The relocation of the north and south parallel taxiways to meet recommended runway separation standards will reduce available aircraft parking by eliminating tiedowns that are located within future taxiway object free areas. The number of parking positions eliminated will depend on whether the taxiways are located to meet ADG I or ADG II runway separation standards. **Table 4-8** summarizes the potential impacts associated with the parallel taxiway reconfiguration options. For the purposes of evaluating aircraft parking requirements, it is assumed that the ADG I taxiway impacts will occur early in the planning period, and the ADG II taxiway impacts would occur late in the twenty year planning period (based on forecast activity).

TABLE 4-8: CHANGES IN AIRCRAFT PARKING AVAILABILITY WITH RELOCATED PARALLEL TAXIWAYS

Apron	North and South ADG I Parallel Taxiways (@ 225 feet)	North and South ADG II Parallel Taxiways (@ 240 feet)
South Tiedown Apron	- 7 tiedowns	-13 tiedowns
FBO Apron	-1 tiedown	-2 tiedowns
North Tiedown Apron	No loss of tiedowns	-11 tiedowns
Total	-8 tiedowns (13% of available tiedowns)	-26 tiedowns (41% of available tiedowns)

During recent airport visits, 25 to 40 aircraft have typically been observed parked on the aprons. The estimated 40 percent of locally based aircraft currently parked on an apron would account for approximately 34 aircraft, with the remaining aircraft believed to be transient. As noted earlier, it is anticipated that the percentage of based aircraft stored in hangars at the airport will increase during the planning period and the percentage of aircraft parked on aprons will decrease. Based on the assumption that locally based aircraft apron parking demand will gradually decline from 40 percent to 20 percent during the planning period, the long-term forecast of 125 based aircraft will require 25 local tiedown positions. However, since the projections of demand are dependent on the availability of new hangar space, which cannot be assured, it would be appropriate to maintain enough parking to account for changes in activity patterns. The combined demand for locally based and itinerant parking can be monitored to determine when demand for additional parking capacity becomes sufficient to warrant apron expansion. It is recommended that apron development reserves be planned to replace existing parking capacity (as needed) that will be eliminated when parallel taxiway relocations are completed. Locally based aircraft tiedowns are planned at 300 square yards per position.

FAA **Advisory Circular 150/5300-13** suggests a methodology by which itinerant parking requirements can be determined from knowledge of busy-day operations. At Ken Jernstedt Airfield, the demand for itinerant parking spaces was estimated based on 30 percent of busy day itinerant operations (30% of busy day itinerant operations divided by two, to identify peak parking demand). By the end of the twenty-year planning period, itinerant parking requirements are estimated to be 16 light aircraft tiedowns. The FAA planning criterion of 360 square yards per itinerant aircraft was applied to the number itinerant spaces to determine future itinerant ramp requirements.

In addition to light aircraft parking positions, the airport accommodates itinerant business aircraft. Initially, one parking (drive through) space capable of accommodating a typical business aircraft would be adequate to accommodate periodic demand. Additional positions may be recommended in during the planning period if demand is sufficient. The aircraft parking area requirements are summarized in **Table 4-9.**

As with aircraft hangars, reserve areas should be identified to accommodate unanticipated demands for aircraft parking, which may exceed current projections. A development reserve area equal to 50 percent of the 20-year parking demand will provide a conservative planning guideline to accommodate unanticipated demand, changes in existing apron configurations, and demand beyond the current planning period. The location and configuration of the development reserves will be addressed in the alternatives analysis.

Agricultural Aircraft Facilities

The existing agricultural aircraft facilities at the airport can accommodate one or two aircraft. The area is located near the end of Runway 7 and is used for aircraft loading and storage of equipment, water and mixing tanks, and chemical/pesticides drums. The size and location of the facilities appears to be adequate for current and projected needs.

Helicopter Parking Facilities

Demand for itinerant helicopter parking does not appear to be significant. However, it would be desirable to have a designated helicopter parking area located near the FBO, but with adequate separation from fixed wing aircraft tiedowns. Initially, one designated helicopter parking position would be adequate to accommodate periodic demand.

TABLE 4-9: APRON AND HANGAR FACILITY REQUIREMENTS SUMMARY

Item	Base Year (2003)	2007	2012	2017	2022
Based Aircraft (Forecast)	**86**	**93**	**103**	**114**	**125**
Aircraft Parking Apron *(Existing Facilities)*					
Light Aircraft Tiedowns	63				
AG Aircraft Parking Spaces	1				
Business Aircraft Spaces	0[1]				
Total Apron Area	36,244 sy				
Projected Needs *(Demand)* [2]					
Itinerant Aircraft Parking (@ 360 SY each)		11 spaces / 3,960 sy	12 spaces / 4,320 sy	14 spaces / 5,040 sy	16 spaces / 5,760 sy
Locally-Based Tiedowns (@ 300 SY each)		33 spaces / 9,900 sy	31 spaces / 9,300 sy	29 spaces / 8,700 sy	25 spaces / 7,500 sy
Business Aircraft Parking Demand (@ 625 SY each)		1 space / 625 sy	2 spaces / 1,250 sy	2 spaces / 1,250 sy	3 spaces / 1,875 sy
AG Aircraft Parking Spaces (@ 700 SY each)		1 space / 700 sy	1 space / 700 sy	1 space / 700 sy	2 spaces / 1,400 sy
Itinerant Helicopter Parking (@ 1,200 SY each)		1 space / 1,200 sy	1 space / 1,200 sy	1 space / 1,200 sy	2 spaces / 2,400 sy
Total Apron Needs		**47 spaces 16,385 SY**	**47 spaces 16,770 SY**	**47 spaces 16,890 SY**	**48 spaces 18,935 SY**
Aircraft Hangars *(Existing Facilities)*					
Existing Hangar Spaces (on airport)	50 spaces (estimated)				
Projected Needs *(Demand)* [3]					
(New) Hangar Space Demand (@ 1,500 SF per space) *(Cumulative 20-year projected demand: 50 spaces / 75,000 SF)*		**+11 spaces / 16,500 sf**	**+11 spaces / 16,500 sf**	**+14 spaces / 21,000 sf**	**+14 spaces / 21,000 sf**

1. No designated parking for business aircraft, although areas of unused apron are generally available.
2. Aircraft parking demand levels identified for each forecast year represent forecast gross demand, which may be accommodated through a combination of existing and future parking areas.
3. Hangar demand levels identified for each forecast year represent the net increase above current hangar capacity.

FBO Facilities

The current FBO building is used for a variety of purposes. The 1990 Master Plan recommended relocating the FBO and fuel facilities to the north apron. This recommendation will be reevaluated in the updated alternatives analysis. Depending on the preferred alternative, options may include replacement of the building in its current location, full/partial renovation or relocation to a new site.

The FBO building should have adequate space for office, classroom, restrooms, and pilot & passenger waiting areas. FBO facility requirements are driven primarily by market conditions and the particular needs of the FBO and its customers. Because future FBO facility needs are difficult to quantify, the best planning approach is to identify development reserves that could accommodate new or expanded FBO facilities. General areas for expanded operations, maintenance hangar, vehicle parking, and apron should also be reserved. A 1,500 to 3,000 square foot building should be adequate to meet the airport's basic FBO needs, although the economics involved for the FBO and the Port will largely determine the type of facilities that are developed.

The airport should be capable of accommodating an additional FBO, should that interest develop. Although it appears unlikely that Ken Jernstedt Airfield will be able to support more than one FBO during the current planning period, the airport needs to provide equal access to prospective tenants, without discrimination.

Surface Access Requirements

Surface access to the airport appears to be adequate for the planning period. However, it has been noted that vehicles are driven around the west end of the runway when crossing between the south and north sides of the airfield. An internal airport access road located outside the runway safety area, should be considered to address this need.

Vehicle parking adjacent to the aircraft parking areas appears to be adequate based on current needs, although terminal area vehicle parking reserves should be provided to allow for an expansion or reconfiguration of the FBO facilities or a general increase in vehicle parking demand. Additional parking areas should be provided as part of future hangar projects. The requirements for providing designated vehicle parking areas adjacent to hangars vary greatly at small airports. A planning standard of 0.5 to 1.0 vehicle parking spaces per based aircraft will

accommodate the most common parking demand levels. For larger hangars, a formula based on the square footage of the building is often used to determine vehicle parking requirements. This is a common approach for establishing off-street parking in most communities.

SUPPORT FACILITIES

Aviation Fuel Storage

Aviation gasoline (AVGAS) is available at Ken Jernstedt Airfield. As noted previously in the inventory chapter, the airport currently has one 12,000-gallon double wall aboveground tank. The frequency of restocking AVGAS would be expected to increase as aircraft activity increases, although a need for additional storage capacity is not anticipated. However, adequate space should be reserved to accommodate larger capacity fuel tanks or another fuel grade in the event that future demand warrants expansion.

Airport Utilities

The existing utilities on the airport appear to be adequate for current and projected needs within existing developed areas of the airport. Future expansion of hangars facilities on the airport will normally require extensions of electrical service; demand for water, sewer and telephone service may also occur in the new development areas.

Overhead electrical and telephone lines should be buried whenever possible; new electrical connections to hangars or other airfield developments should also be placed underground. New airfield electrical requirements include providing power to the PAPIs and REILs on the runway.

Security

The airport has very limited wire fencing on portions of its boundary and chain link fencing at the entrance to the north apron and south T-hangar. There are no major security concerns at the airport, although providing chain-link fencing and gates along exposed areas of airfield activity is recommended to reduce unauthorized human access. As noted in the inventory chapter, the airport experiences a significant amount of non-airport pedestrian traffic, which often involves

crossing the runway-taxiway system. Upgrading fencing around the airport property line will be helpful in reducing these incursions.

Additional flood lighting should be provided around the aircraft parking apron, fueling area, and hangar areas to maintain adequate security.

FACILITY REQUIREMENTS SUMMARY

The projected twenty-year facility needs for Ken Jernstedt Airfield are summarized in **Table 4-10**. As noted in the table, the primary facility requirements include parallel taxiway improvements and the addition of new hangar space on the airport. Maintaining and replacing existing pavements represents a significant facility need. Property acquisition is also an important factor in the airport's ability to accommodate forecast facility demand.

The forecasts of aviation activity contained in Chapter Three anticipate moderate growth in activity that will result in specific airside facility demands beyond existing capabilities. The existing airfield facilities have the ability to accommodate a significant increase in activity, with targeted facility improvements. For the most part, the need for new or expanded facilities, such as aircraft hangars, will be market driven, although there will be significant costs associated with site preparation, utility extensions, and taxiway construction.

TABLE 4-10: FACILITY REQUIREMENTS SUMMARY

Item	Short Term	Long Term
Runway 7/25	Pavement Maintenance[1]	Runway Overlay Pavement Maintenance Upgrade Markings to Nonprecision Inst. 960-foot Runway Extension Reserve (east)
Parallel Taxiways	Pavement Maintenance Relocate North Parallel Taxiway w/ AC Holding Area (east end) Relocate South Parallel Taxiway	Mid-Field Exit Taxiways Pavement Maintenance Taxiways to New Hangar Areas
Aircraft Aprons	Pavement Maintenance Reconfigure Aircraft Tiedowns Based on Parallel Taxiway Relocations	Pavement Maintenance Overlay South and North Aprons Apron Development Reserves
Agricultural Aircraft Facilities	None	Development Reserve
Hangars	Development Areas for T-hangar and Conventional Hangar	Development Areas and Additional Hangar Development Reserves
Navigational Aids and Lighting	MIRL PAPI (Rwy 7 & 25) Taxiway Edge Reflectors Flood Lighting (a/c parking & hangar areas)	REIL (Rwy 7) Additional Flood Lighting As Required
Fuel Storage	None	Fuel Storage Reserve
FBO Facilities	FBO Building/Apron Expansion Reserve	Reserve for 2nd FBO
Utilities	Extend Electrical to New Facilities	Same
Roadways	Extend Roads to New Facilities Internal Airport Access Road (around western end of Runway)	Same
Security	Airport Fencing; Flood Lighting	Same
Property Acquisition	Hangar Development Areas	Protection for future airport airspace surfaces and airfield setbacks.

1. Vegetation control, crackfill, sealcoat

CHAPTER FIVE
AIRPORT DEVELOPMENT ALTERNATIVES & AIRPORT LAYOUT PLANS

INTRODUCTION

The evaluation of development options at Ken Jernstedt Airfield began with preparation of three preliminary runway options and two options for landside facility improvements. The runway options addressed obstruction clearance issues at both ends and the need to upgrade the runway to meet FAA airport design standards to correct several existing non-standard configurations.

These preliminary concepts were presented to port staff and board, the planning advisory committee, FAA, ODA and the public for review and comment. The advisory committee and Port staff also reviewed the concepts in greater detail at subsequent meetings and forwarded recommendations to the Consultant. Overall, the input provided by Port staff/board and planning advisory committee provided clear direction, which allowed refinement of the concepts and integration into the Airport Layout Plan as the preferred alternative.

As noted in the forecasts, demand for landside facilities (hangars, aircraft parking, associated facilities, etc.) within the current 20-year planning period is expected to be moderate. However, it has been previously noted that the airport's existing land base is not adequate to accommodate future landside facility expansion needs. Both options for future landside facility improvements (hangars, aircraft parking, etc.) were dependent on north-side property acquisition. These parcels, identified in the Ken Jernstedt Airfield Airport Layout Plan Update 2004-2024, However, since that plan's adoption by FAA and the Port, those properties are no longer available for airport expansion; an aviation museum, the Western Antique Aeroplane and Automobile Museum, now occupies the majority of this property. Based on the uncertainty associated with predicting future activity trends, it is also recommended that facility development areas and reserves be identified to provide long-term development potential.

The 2004-2024 Update offered a variety of options before identifying the Airport Layout Plan that was adopted by the FAA and the Port. In late 2008, this Airport Layout Plan was amended by FAA to remove all references to an instrument approach in favor of the existing visual approach. All options except the adopted Airport Layout Plan are removed from this document.

The Runway 7 threshold is shifted 550 feet to improve obstruction clearance and eliminate Highway 281/Tucker Road from the runway protection zone (RPZ). The end of Runway 25 end is also shifted 550 feet to compensate for the west end shift and maintain the existing runway length. Orchard Road is vacated (similar to 1994 ALP) to the east, with the section passing near the east end of the runway being closed.

SUMMARY OF PREFERRED AIRPORT DEVELOPMENT ALTERNATIVES

Based on their review, the planning advisory committee and Port supported a preferred alternative that contained the following elements:

- Close Orchard Road near the end of Runway 25 to accommodate runway shift;
- Shift Runway 7/25 550 feet east to improve obstruction clearance at both ends; maintain existing runway length (3,040 feet); and use chevron stripping on abandoned 550 feet west of Runway 7 to provide additional safety area in the event a pilot requires additional landing area. The Port has the option of removing existing sections of closed runway and parallel taxiway pavement, should it be required by Hood River County;
- Maintain long-term plan to upgrade to B-II design standards;
- Relocate north parallel taxiway to 240 feet from runway centerline (B-II standard);
- Reconfigure/expand north apron tiedown;
- Develop area on north side of north apron for conventional hangars and FBO (reserve);
- Extend taxiway access to serve facilities on north side of north apron;
- Relocate FBO and aircraft fuel to north apron;

- Redevelopment of the south apron to accommodate small/medium conventional hangars once the south parallel taxiway is relocated and the FBO/fuel is relocated to the north side of the runway;

- Property acquisition is recommended, with willing sellers, to accommodate aviation-related development on the north side of the airport;

- Additional property acquisition is recommended as feasible (with willing sellers) along the southeast corner of the airport, to increase runway clear areas and development setbacks necessary to meet B-II design standards and airspace associated with planned airfield configuration.

Based on all comments provided, the input was incorporated into the Airport Layout Plan drawing. The draft set of Airport Layout Plan drawings is presented at the end of this chapter.

AIRPORT LAYOUT PLAN DRAWINGS

The options that were considered for the long-term development of Ken Jernstedt Airfield were described in the Alternatives section of this chapter. This evaluation resulted in the selection of a preferred alternative. The components of the preferred alternative have been incorporated into the Airport Layout Plan drawings, which are summarized in this section. The set of airport plans, which is referred to in aggregate as the "Airport Layout Plan" (ALP) has been prepared in accordance with FAA guidelines. The drawings illustrate existing conditions, recommended changes in airfield facilities, existing and recommended property ownership, land use, and obstruction removal. The ALP set is presented at the end of this chapter:

- *Drawing 1 - Airport Layout Plan*

- *Drawing 2 – FAR Part 77 Airspace Plan*

- *Drawing 3 – Runway 7/25 Approach Surface Plan & Profile*

- *Drawing 4 – Airport Land Use Plan with 2022 Noise Contours*

Airport Layout Plan

The Airport Layout Plan (ALP) presents the existing and ultimate airport layout and depicts the improvements that are recommended to enable the airport to meet forecast aviation demand. Airport vicinity and location maps, and data blocks for the overall airport and the runway are presented on the ALP. A declared distances table, legend of symbols and line types, and building/facility table (with corresponding numbers depicted on the Airport Layout Plan drawing) are also provided.

The improvements depicted on the ALP reflect all major airfield developments recommended in the twenty-year planning period. Decisions made by the airport sponsor regarding the actual scheduling of projects will be based on specific demand and the availability of funding. Long-term development reserves are also identified on the ALP to accommodate potential demand that could exceed current expectations or may occur beyond the current twenty-year planning period.

The major improvements depicted on the ALP are summarized below:

- Runway 7/25 is shifted 550 feet east; existing length is maintained;
- Orchard Road is closed near the Runway 25 end;
- Property acquisition is identified for aviation-related development on the north side of the airport, and the southeast corner of the airport to provide adequate runway clear areas; The Port has indicated that property acquisition will be limited to willing sellers only;
- The north parallel taxiway is relocated to provide B-II runway separation (240 feet);
- North side landside improvements within existing airport property and on property to be acquired include: apron expansion, hangar sites, FBO site, and relocated aircraft fuel facilities;
- Improvements to the south parallel taxiway will be made based on B-II runway separation with additional connections to the runway provided; and
- A new internal airport access road is provided beyond the west end of the runway (outside RSA and OFA) to connect north and south side development and eliminate vehicle crossings near end of Runway 7.

Projects such as maintenance or reconstruction of airfield pavements, which are not depicted on the ALP, are described in the Capital Improvements Program, in **Chapter Six**.

Airspace Plan

The FAR Part 77 Airspace Plan for Ken Jernstedt Airfield was developed based on Federal Aviation Regulations (FAR) **Part 77, Objects Affecting Navigable Airspace**. The Airspace Plan provides the plan view of the airspace surfaces, profile views of the runway approach surfaces, and a detailed plan view of the runway approach surfaces. This information is intended to define and protect the airspace surfaces from encroachment due to incompatible land uses, which could adversely affect safe airport operations. By comparing the elevations of the airspace surfaces with the surrounding terrain, an evaluation of potential obstructions to navigable airspace was conducted. Additional plan and profile detail for the runway is provided on a separate drawing (see Sheet 3).

The airspace surfaces depicted for Ken Jernstedt Airfield reflect the ALP-recommended (ultimate) runway length of 3,040 feet for Runway 7/25. Based on the planned use of B-II design standards, Runway 7/25 will be designed for use by aircraft weighing more than 12,500 pounds, which places it in the "other than utility" category under FAR Part 77. The December 2008 Airport Layout Plan Airspace Classification Review noted the "marginal effectiveness" of a nonprecision instrument approach, and FAA and the Port have concluded that visual approach surfaces may only be feasible on one or both runway ends. A 5,000-foot horizontal surface radius is used for each runway end to protect visual approach capabilities, which is consistent with the current horizontal surface radius.

Approach Surface Plan & Profile

The Approach Surface Plan and Profile drawing provides additional detail for the runway approaches and the runway protection zones. The profile view depicts existing (20:1) approach surfaces. The planned easterly shift of the runway will eliminate Tucker Road from being located within the Runway 7 RPZ. The shift will also reduce obstructions to the Runway 7 approach surface. It appears that a clear 20:1 approach surface could be maintained on the shifted Runway

7, although several trees located beyond the runway (west of Tucker Road) need to be lowered or removed.

The shifted runway will require closing Orchard Road beyond the runway end. Vehicles traveling on the road create an obstruction to the Runway 25 20:1 approach surface. Trees located along the southern airport property line near Orchard Road also penetrate the approach, transitional and primary surfaces and are recommended for topping or removal.

Airport Land Use Plan with 2022 Noise Contours

The Airport Land Use Plan for Ken Jernstedt Airfield depicts existing zoning in the immediate vicinity of the airport. The area surrounding the airport is predominately zoned agricultural, although areas of rural residential zoning are located immediately southeast the airport and in all directions, within one to two miles.

Noise exposure contours based on the 2022 forecasts of aircraft activity are depicted on the Land Use Plan. The noise contours were created using the FAA's Integrated Noise Model (INM). Data from activity forecasts and aircraft fleet mix are combined with common flight tracks and runway use to create a general indication of airport-generated noise exposure. The noise contours are plotted in 5 DNL increments starting at 55 DNL. The size and shape of the contours is consistent with the airport's runway utilization and aircraft traffic.

Runway 25 is the primary landing and departure runway, which results in slightly larger contours extending outward. The contours beyond the end of Runway 7 extend over a longer distance, reflecting the flatter climb profiles of aircraft takeoff. As depicted on the Airport Layout Plan, the future runway configuration is shifted 550 feet east of its current location to improve roadway and obstruction clearance. The 2022 noise contours were developed based on this planned runway configuration.

The 2022 55 DNL noise contour extends approximately 3,600 feet beyond the future end of Runway 7 and approximately 3,200 feet beyond the future end of Runway 25. The areas located beyond the runway ends are predominantly agricultural and sparsely populated lands. The areas east of the runway are extensively developed in fruit orchards; the area west of the runway contains some orchards, but also includes open fields and low-density residential development.

Portions of the 2022 60 DNL contour extend beyond airport property beyond both runway ends. At the Runway 7 end, the 60 DNL contour, extends approximately 600 feet west of Highway 281

(Tucker Road). The Twin Peaks restaurant is located within the 60 DNL contour. At the Runway 25 end, the 60 DNL contour extends approximately 1,500 feet east of Orchard Road, largely over airport-owned lands (approximately 150 feet of 2022 60 DNL contour extends beyond the east airport boundary). Portions of the 60 DNL contour also extend along the sides of the runway and relatively narrow airport property area, particularly at the east end of the runway. The 60 DNL contour extends outward nearly 600 feet from the sides of the runway, near the east end, over adjacent residential and agricultural areas. The nearest residential area, which is located immediately south of the end of Runway 25, is located entirely within the 60 (and higher) DNL contour.

The 2022 65 DNL noise contours are contained almost entirely within airport property, with the exception of areas located near the end of Runway 25 (north and south sides). As noted above, a residential development (nine lots) is located adjacent to the southeast corner of the airport. Some of these lots have direct airfield access and at least one hangar is located off airport. The 2022 65 DNL extends over an unpopulated orchard area near the north end of Runway 25. The planned easterly shift of the runway results in the 65 DNL contour remaining entirely within airport property beyond the end of Runway 7 (approximately 800 feet east of Highway 281/Tucker Road).

The 2022 70 DNL noise contours are generally contained within airport property boundaries, although a very small portion extends beyond the airport near the end of Runway 25. Although the residential area located along the southeast corner of the airport is partially located within the 2022 70 DNL contour, most of the residences are located on the southern half of the lots, in the area of 65 or 60 DNL contour. Residential development within the 65 DNL and higher noise contour is not recommended and should be discouraged. The Airport Layout Plan identifies property acquisition in this area to provide standard runway clearances. The Port of Hood River has indicated an interest in acquiring these properties in cases where willing sellers exist. In addition to improving runway clearances, acquiring the property would help to ensure land use compatibility by preventing construction of additional residential development in areas of greater noise exposure.

With the exception of the residential area located along the southeast corner of the airport, the sparsely developed land uses in the vicinity of the airport suggest that noise compatibility will not be a significant issue during the planning period. However, since perceived noise impacts are not limited to areas with significant levels of noise, care should be taken by local land use authorities to avoid creating potential long-term land use incompatibilities in the vicinity of the airport by permitting development of incompatible land uses such as residential subdivisions

within areas of moderate or higher noise exposure. Under federal guidelines, all land uses, including residential, are considered compatible with noise exposure levels of 65DNL and lower. However, airport management should actively encourage local and transient pilots to avoid direct overflights of known noise-sensitive areas whenever possible. A detailed description of airport noise and land use compatibility is presented in **Chapter Seven**.

Drawing 1 - Airport Layout Plan

Drawing 2 - Airport Airspace Plan

Drawing 3 – Runway 7/25 Approach and Profile

Drawing 4 - Airport Land Use Plan

CHAPTER SIX
FINANCIAL MANAGEMENT AND DEVELOPMENT PROGRAM

The analyses conducted in the previous chapters have evaluated airport development needs based on forecast activity and the associated facility requirements. One of the most important elements of the master planning process is the application of basic economic, financial and management rationale so that the feasibility of implementation can be assured. The amount of local and outside funding (state, federal, etc.) that will be available during the current twenty-year planning cannot be guaranteed. In cases when the overall capital needs of an airport exceed available funding, projects will be deferred until funding can be obtained. In this situation, it is particularly important to establish and maintain priorities so that completion of the most essential improvements is assured.

Historically, the primary source of funding for major capital projects at the airport has been federal aviation trust fund monies with local matching funds provided by the Port. Hangar construction, which has not been eligible for FAA funding in the past, has been funded locally by the Port (T-hangars) and private tenants (conventional hangars). Utility improvements at the airport are also not typically eligible for FAA funding and have been locally funded.

The maintenance of airfield pavements ranges from very minor items such as crack filling to fog seals or patching. Minor pavement maintenance items such as crackfilling are not included in the capital improvement program, but will need to be undertaken by the Port on an annual or semi-annual basis. The Pavement Maintenance Management Program (PMMP) managed by the Oregon Department of Aviation (ODA) provides funding assistance for airfield pavement maintenance on established multi-year cycles. This program is intended to preserve and maintain existing airfield pavements in order to maximize their useful lives and the economic value of the pavement. As noted earlier, several short-term pavement maintenance projects are identified for Ken Jernstedt Airfield in the current PMMP, which will require local matching funds.

AIRPORT DEVELOPMENT SCHEDULE AND COST ESTIMATES

The analyses presented in Chapters Four and Five described the airport's overall development needs for the next twenty years. Estimates of project costs were developed for each project based on 2004 dollars. For planning purposes, 30 percent contingency overhead for engineering, administration, and unforeseen circumstances has been included in the estimated component and total costs. In future years, as the plan is carried out, these cost estimates can continue to assist management by adjusting the 2004-based figures for subsequent inflation. This may be accomplished by converting the interim change in the United States Consumer Price Index (USCPI) into a multiplier ratio through the following formula:

$$\frac{X}{I} = Y$$

Where:

X = USCPI in any given future year

Y = Change Ratio

I = Current Index (USCPI)

USCPI
189.1
(1982-1984 = 100)
May 2004

Multiplying the change ratio (Y) times any 2004-based cost figures presented in this study will yield the adjusted dollar amounts appropriate in any future year evaluation.

The following sections outline the recommended development program and funding assumptions. The scheduling has been prepared according to the facility requirements determined earlier. The projected staging of development projects is based upon anticipated needs and investment priorities. Actual activity levels may vary from projected levels; therefore, the staging of development in this section should be viewed as a general guide. When activity does vary from projected levels, implementation of development projects should occur when demand warrants, rather than according to the estimated staging presented in this chapter. In addition to major development projects, the airport will require regular facility maintenance and airfield pavement rehabilitation projects. As

noted in the facility requirements evaluation, airfield pavements require a regular schedule of maintenance and rehabilitation based on normal wear and useful life. Most asphalt pavement will require an overlay or similar rehabilitation on 15 to 20 year intervals. Heavily used pavements often require more frequent rehabilitation.

A summary of development costs during the twenty-year capital improvement plan is presented in **Table 6-1**. The twenty-year CIP is divided between short-term and long-term projects. The table provides a listing of the major capital projects included in the twenty-year CIP, including each project's eligibility for FAA funding. The FAA will not participate in vehicle parking, utilities, building renovations or projects associated with non-aviation developments. Some changes in funding levels and project eligibility were included in the current Airport Improvement Program (AIP) legislation. FAA funding levels have been increased from 90 percent to 95 percent. The general aviation entitlement funding level is established up to $150,000 per year, with a maximum rollover of four years. Projects such as hangar construction or fuel systems, which have not traditionally been eligible for funding, are now eligible, although the FAA indicates that this category of project would be funded only if there were no other project needs at a particular airport. Based on the overall facility needs and anticipated levels of federal funding, it has been assumed that hangar construction will not rely on FAA funds.

The short-term phase of the capital improvement program includes the highest priority projects recommended during the first five years. Long-term projects are expected to occur beyond the next five years, although changes in demand or other conditions could accelerate or slow demand for some improvements. As with most airports, pavement related improvements represent the largest portion of CIP needs at Ken Jernstedt Airfield during the current planning period. In addition, the planned upgrade to B-II design standards will require replacement (relocation) of the parallel taxiways that are located too close to the runway, which will in turn, require reconfiguration of aircraft parking and fueling facilities. Shifting the runway to improve obstruction clearance will also involve considerable cost.

The airport's extremely limited developable land area will necessitate property acquisition if future facility demands are to be met within airport boundaries. Based on the current airport boundaries and physical site characteristics, north-side property acquisition is required to accommodate all future T-hangar development. The Port has indicated that property acquisition will be limited to willing sellers only. The acquisition of property along the southeast edge of the airport, identified as a narrow strip (within the boundary of the primary surface), represents a potentially significant cost; however, depending on the requirements of the property owners, it may be necessary to acquire entire parcels and residences in order to acquire the smaller areas.

Short Term Projects

Short-term projects at Ken Jernstedt Airfield initially include property acquisition (approximately 10 acres - northeast of Runway 25) to accommodate the planned eastward runway shift. All existing airfield pavements will require a slurry seal within the five-year period. Pavement resurfacing and north apron expansion are scheduled in 2009. Projects to extend fencing around the south, west and north sections of the airport boundary are identified.

Construction of an internal airport access road around the west end of the runway is also identified as a short-term project. The roadway will be used to provide vehicle access between north- and south-side aviation areas. The unpaved access road will be located outside the runway safety area.

Long Term Projects

The majority of long-term projects at Ken Jernstedt involve several primary categories:

1. Pavement preservation, resurfacing and reconstruction. This includes periodic fog seals or slurry seals for all airfield pavements on a five-year cycle. Asphalt overlays will be required for most existing pavements within the twenty-year planning period;

2. New airfield pavement construction associated with airside and landside facilities;

3. Reconfiguration of existing facilities (i.e. parallel taxiways, etc.) to meet ADG II design standards or other FAA planning recommendations;

4. Property acquisition to support on-airport facility development and preserve FAA-required airfield and airspace clearances;

5. Building construction (hangars, FBO, etc.); and

6. Miscellaneous projects (fencing, access roads, airfield lighting, etc.).

<u>Individual long-term projects (beginning in six years) include:</u>

- Relocate north parallel taxiway (B-II standard 240 feet);

- Shift Runway 7/25 550 feet east to improve obstruction clearance at both ends; maintain existing runway length (3,040 feet) and remove existing sections of closed runway and parallel taxiway pavement;
- Overlay Runway 7/25 (in conjunction with shift);

- Hangar area taxilanes;
- South parallel taxiway improvements (B-II);
- Airport perimeter fencing w/ vehicle electronic gates;
- Expand north apron (tiedowns);
- Overlay aircraft parking aprons;
- Relocate FBO (new bldg) and aircraft fuel to north apron;
- Construct new taxiway to north hangar area and reserve;
- Periodic slurry seals all airfield pavements; and

TABLE 6-1:
20-YEAR CAPITAL IMPROVEMENT PROGRAM
2004 TO 2024

Project	Qty.	Unit	Unit $	Total Cost*	FAA Eligible	Local
Short Term Projects (Years 1-2)						
2009						
Slurry Seal North Parallel Taxiway & Exits	10,800	SY	$3.60	$38,880	$36,936	$1,944
Slurry Seal South Parallel Taxiway & Exits (3)	3,900	SY	$3.60	$14,040	$13,338	$702
Slurry Seal South T-Hangar Taxilanes	7,000	SY	$3.60	$25,200	$23,940	$1,260
Slurry Seal South Tiedown Apron	4,800	SY	$3.60	$17,280	$16,416	$864
Slurry Seal South Apron (west sections & Ag Apron)	3,725	SY	$3.60	$13,410	$12,740	$671
Slurry Seal North Apron	17,110	SY	$3.60	$61,596	$58,516	$3,080
Slurry Seal NW T-Hangar Taxilanes & Hangar Apron	9,520	SY	$3.60	$34,272	$32,558	$1,714
2010						
Airport Fencing- North Section (w/ 2 vehicle gates)	7,150	LF	$18.00	$143,700	$136,515	$7,185
Project	**Qty.**	**Unit**	**Unit $**	**Total Cost***	**FAA Eligible**	**Local**
Long Term Projects (Years 3 - 20)						
Relocate North Parallel Taxiway - Phase I (2,500 x25') w/ B-II Separation	6,940	SY	$30.00	$208,200	$187,380	$20,820
Runway 7/25 Shift (550' East) w/ North P.Txy. & AC Hold Area	7,000	SY	$30.00	$210,000	$189,000	$21,000
Overlay Runway 7/25 (reconfig.'d 2,500' west section)	20,830	SY	$12.00	$249,960	$224,964	$24,996
Demo West End Rwy/Txy Pavement	8,900	SY	$2.00	$17,800	$16,020	$1,780
REIL (Replacement Rwy 7)	1	ea	$25,000	$25,000	$22,500	$2,500
Northwest Taxiway (overlay & new construction)	1,250	SY	$18.00	$22,500	$20,250	$2,250
T-Hangar (8/10-unit)	1	ea	$240,000	$240,000	$0	$240,000
North Hangar Taxiway/Taxilane - Phase I	1,530	SY	$30.00	$45,900	$41,310	$4,590
Slurry Seal Runway 7/25; Basic Rwy Marking (2010)	25,330	SY	$3.60	$101,188	$91,069	$10,119
Slurry Seal North Parallel Taxiway & Exits (2013)	10,800	SY	$3.60	$38,880	$34,992	$3,888
Slurry Seal South Parallel Taxiway & Exits (2013)	4,000	SY	$3.60	$14,400	$12,960	$1,440
Slurry Seal South T-Hangar Taxilanes (2013)	7,000	SY	$3.60	$25,200	$22,680	$2,520
Slurry Seal South Tiedown Apron (2013)	4,800	SY	$3.60	$17,280	$15,552	$1,728
Slurry Seal South Apron (west sections & Ag Apron) (2013)	3,725	SY	$3.60	$13,410	$12,069	$1,341
Slurry Seal North Apron (2013)	16,300	SY	$3.60	$58,680	$52,812	$5,868

Slurry Seal NW T-Hangar Taxilane & Hangar Apron (2013)	11,820	SY	$3.60	$42,552	$38,297	$4,255
North Apron Expansion (GA Tiedowns)	4,440	SY	$30.00	$133,200	$119,880	$13,320
New GA Terminal/FBO Building (north apron)	1,200	SF	$100.00	$120,000	$0	$120,000
Relocate Fuel Storage	1	LS	$25,000	$25,000	$22,500	$2,500
Construct/Reconstruct South Parallel Taxiway (west section)	1,530	SY	$26.00	$39,780	$35,802	$3,978
South Parallel Taxiway Connectors (2)	1,200	SY	$30.00	$36,000	$32,400	$3,600
N Hangar Area - Property Acquisition (AD Zoning)	6.22	acres	$50,000	$311,000	$279,900	$31,100
NE Airport Property Acquisition (EFU Zoning)	7.58	acres	$10,000	$75,800	$68,220	$7,580
North Hangar Taxiway/Taxilane - Phase II	3,470	SY	$30.00	$104,100	$93,690	$10,410
Slurry Seal N. Hangar Taxiway/Taxilane - Phase I	1,530	SY	$3.60	$5,508	$4,957	$551
Slurry Seal Runway 7/25; NPI Rwy Marking (2016)	25,330	SY	$3.60	$111,188	$100,069	$11,119
Slurry Seal North Parallel Taxiway & Exits (2019)	10,800	SY	$3.60	$38,880	$34,992	$3,888
Slurry Seal South Parallel Taxiway & Exits (2019)	3,900	SY	$3.60	$14,040	$12,636	$1,404
Slurry Seal South T-Hangar Taxilanes (2019)	7,000	SY	$3.60	$25,200	$22,680	$2,520
Overlay North Aircraft Apron ; Tiedown marking	16,300	SY	$12.00	$205,600	$185,040	$20,560
Overlay South Aircraft Apron; Tiedown marking	4,800	SY	$12.00	$63,600	$57,240	$6,360
Slurry Seal NW T-Hangar Taxilanes & Hangar Apron (2019)	11,820	SY	$3.60	$42,552	$38,297	$4,255
North Hangar Taxiway/Taxilane - Phase III	1,600	SY	$30.00	$48,000	$43,200	$4,800
SE Airport Property Acquisition (Residential Zoning) **	2.68	acres	$250,000	$670,000	$603,000	$67,000
Slurry Seal North T-Hangar Taxilanes	10,650	SY	$3.60	$38,340	$34,506	$3,834
Slurry Seal South T-Hangar Taxilanes	5,300	SY	$3.60	$19,080	$17,172	$1,908
Slurry Seal N. Hangar Taxiway/Taxilane - Phase II	3,470	SY	$3.60	$12,492	$11,243	$1,249
Southwest Taxiway (new construction & overlay)	2,500	SY	$18.00	$45,000	$40,500	$4,500
Overlay South Parallel Taxiway (east section)	2,800	SY	$12.00	$33,600	$30,240	$3,360
Overlay S. T-Hangar Taxilanes	5,300	SY	$12.00	$63,600	$57,240	$6,360
Slurry Seal Runway 7/25; NPI Rwy Marking (2022)	25,330	SY	$3.60	$111,188	$100,069	$11,119

** Project costs include 30% engineering and contingency.*
*** Land purchase may require purchase of residential structures on some lots; seller may require purchase of entire parcel.*

FINANCING OF DEVELOPMENT PROGRAM

Federal Grants

A primary source of potential funding identified in this plan is the Federal Airport Improvement Program (AIP). As proposed, approximately 84 percent of the airport's 20-year CIP will be eligible for federal funding. Funds from this program are derived from the Aviation Trust Fund, which is the depository for all federal aviation taxes collected on such items as airline tickets, aviation fuel, lubricants, tires, aircraft registrations, and other aviation-related fees. These funds are distributed under appropriations set by Congress to all airports in the United States that have certified eligibility. The funds are distributed through grants administered by the Federal Aviation Administration (FAA).

Under current guidelines, the airport sponsor receives 95 percent FAA participation on eligible projects. According to FAA guidelines, Ken Jernstedt Airfield is eligible under AIP to receive discretionary grants and general aviation entitlement grants. Under the current authorization, the airport may receive up to $150,000 per year in the GA entitlement grants. The future availability of the GA non-primary entitlement funding is dependent on congressional reauthorization and may change during the planning period. However, based on current legislation, these grants have become a very significant source of FAA funding for general aviation airports. Airports may currently combine up to four years of GA entitlement funding for projects. Discretionary grants are also available to fund larger projects that require additional funding.

The constraints of AIP funding availability will dictate in large part, the actual schedule for completing airport improvement projects through the planning period. As a result, some projects included in the twenty-year CIP may be deferred beyond the twenty-year time frame.

Based on the limitations of the current AIP legislation, the level of FAA funding for eligible projects is estimated at the historic 90% level through the end of the 20-year planning period.

State Funding

The Oregon Department of Aviation (ODA) manages a pavement maintenance funding program to enable regularly-scheduled investment in airfield pavements. The program funds pavement

maintenance and associated improvements (crack filling, repair, sealcoats, etc.), which have not traditionally been eligible for FAA funding. The PMMP may also be expanded to include pavement overlays. ODA also provides limited funding assistance through its Financial Assistance to Municipalities (FAM) grant program. FAM grants are available for amounts up to $25,000 per year, with varying levels of local match required.

Financing the Local Share of Capital Improvements

As currently defined, the locally funded portion of the CIP is approximately 19 percent. For local airport sponsors, one of the most challenging aspects of financial planning is generating enough revenue to match available state or federal grants for large projects. As noted earlier, FAA AIP grants usually represent the single largest source of funding for major capital projects. However, the local match level for AIP grants was reduced to 5 percent in the current legislation.

As currently defined, the local share for projects included in the twenty-year planning period is estimated to be just over $1.0 million, which includes the local match for AIP-funded projects. Nearly 60 percent of the projected local share of the 20-year CIP consists of hangar construction and a new FBO building. Private funding of T-hangar construction may also be considered if adequate airport funding is not available.

CHAPTER SEVEN
ENVIRONMENTAL CHECKLIST

INTRODUCTION

The purpose of the Environmental Checklist is to identify any physical, social and environmental conditions of record, which may affect the ability to undertake future improvements at Ken Jernstedt Airfield. In comparison to an Environmental Assessment (EA) or Environmental Impact Statement (EIS), the project scope for this review is limited and focuses on gathering and summarizing information of record from the applicable local, state and federal sources pertaining to the existing conditions of the subject site and its environs. The scope of the review research does not involve extensive professional interpretation of the information, in-depth analyses, or the more comprehensive follow-up correspondence and inquiries with affected agencies and persons that is normally associated with an EA or EIS.

All research activities, including correspondence, data collection and documentation, proceeded under the provisions of FAA Order 5050.4A, The Airport Environmental Handbook, which is intended to implement the requirements of Sections 1505.1 and 1507.3 of the National Environmental Policy Act (NEPA). This report briefly addresses each potential impact category identified by Order 5050.4A as to be investigated under the EIS or EA processes, and is comprised of a narrative and table summarizing the consultant's findings under each investigation heading or potential impact category. In instances where a particular potential environmental impact type does not appear to exist or apply to the subject project, the table is noted accordingly.

Included below is a brief summary of the impact categories in which potentially significant impacts were identified, or appear to be possible, and where notable ecological or social conditions appear pertinent to the future development of this facility.

The airport is located in northern Hood River County, approximately one and one half miles south of the City of Hood River's Urban Growth Boundary (UGB). The site is subject to Hood

River County planning and zoning regulations, and is zoned Hood River County Airport Development (AD). This zoning designation permits aviation and related activities outright. It is recommended that any additional lands which are not currently zoned AD, but which are anticipated to be developed or utilized in the future for aviation should also be zoned AD. This does not apply to Port-owned properties east of Orchard Road which are currently zoned EFU.

Land uses surrounding the Ken Jernstedt Airfield are predominantly single family residential and orchard lands. Hood River County Rural Residential zoning in the vicinity carries a 2-acre minimum parcel size requirements and the neighboring orchards are zoned Exclusive Farm Use (EFU). A restaurant is located in the runway protection zone (RPZ) of Runway 7 and is strongly recommended for relocation. This represents the single most significant concern relative to the compatibility of neighboring land uses with the airport. The RPZ of any runway should be free of any obstructions and/or inhabitable structures. Please see the Social Impacts section of this chapter, following this discussion of issues pertaining to compatible land uses. Land uses and zoning immediately abutting the airport are described in **Table 7-1**.

TABLE 7-1
SUMMARY OF LAND USE AND ZONING
IN VICINITY OF AIRPORT

Land Use	Zoning
Airport Site:	Hood River Airport Development (AD)
North: Rural Residential, Vacant, Off-Airport Aviation Development (hangars) Orchard Land Oregon State Highway 281	Hood River Rural Residential, Two Acre Minimum (RR-1*) Limited County Commercial, Industrial and AD Zoning Hood River County Exclusive Farm Use (EFU)
South: Airport Road, Rural Residential and Resource Related Dwellings Orchards	EFU, RR-1
East: Orchard Road Orchard Land Resource Related Dwellings	EFU
West: Twin Peaks Restaurant Rural Residential, Agriculture, Orchards	EFU, RR-2 ½ , RR-1

* We note that the Zone Title does not coincide with the minimum lot size due to changes in standards since the time of the Zone designation's conception and titling.

The Hood River Transfer Station is a solid waste disposal / transfer site, located approximately 2/3 of a mile north of the runway, which reportedly attracts some birds. There are also reports of birds sometimes being attracted to the southeasterly corner of the airport property, where irrigation often results in a wet surface area. No reports of bird strike incidents in the vicinity of the airport have been received by the consultant as of this writing.

Oregon Revised Statutes (ORS) Chapter 836.600 through 836.630 addresses the appropriate zoning and protection of Oregon's airports and their surroundings. Under the statute, height restrictive zoning and, to some extent, use-restrictive zoning, are indicated as necessary components affecting land uses in the immediate vicinity of a public airport. An Airport Overlay Zone, which protects necessary airspace and limits incompatible uses in proximity to an airfield, is the primary means of ensuring the compatibility of surrounding land uses with operations of a general aviation airport.

Hood River County planners provided mapping of Airport Hazard and Overlay Zones affecting this site; however, the jurisdiction has not formally adopted the drawings, and the County's Airport Hazard Zone as indicated on the County Assessor's maps provided by the planner does not constitute compliance with FAA regulations and / or ORS Ch. 836.600 *et. seq*. In addition to ensuring quality and cohesive mapping of all of the areas affected by the required Airport Overlay and related safety Zones, in the County jurisdiction, the existing County zoning and transportation plan languages must also be reviewed and amended to ensure full compliance with ORS Chapter 836.600-630.

Among the provisions of this statute are the following (Please note: This is not intended to be a comprehensive summation of this legislation. Additional requirements may apply to this site under the cited or related statutes):

OAR 660-13-160(1) Requires jurisdictions to update Plan, land use regulations at Periodic Review to conform with provisions of this statute, or at next update of Transportation System Plan, per OAR 660-12-0015(4) and OAR 660-12-0045(2)(c)&(d). If more than one local government is affected by the Airport Safety Overlay (see below), a Coordinated Work Program for all jurisdictions is required, concurrent with timing of Periodic Review (or TSP update) for the jurisdiction having the most land area devoted to the airport use(s). The County Comprehensive Plans and Transportation Plans, Zoning Ordinances, and mapping should be amended no later than the affected jurisdiction's next Periodic Review work cycles, to ensure compliance with these provisions. An Inter-Governmental Agreement is one potential mechanism for complying with the requirement for a "coordinated work program" between concerned jurisdictions under this section.

(8) Adopt map delineating Safety Zones, compatibility zones, and existing noise impact boundaries identified by OAR 340-35. See also OAR 660-13-0070(1) and Exhibits 1 & 2 to Division 13. In addition to the fact that it has not been adopted by the local jurisdictions, the mapping provided the consultant does not fully demonstrate conformance with these requirements, as discussed above. For example, it does not appear that "compatibility zones" required under the cited statute exist currently in either affected jurisdiction.

This Airport Master Plan Update Report will provide the information and graphics necessary to incorporate into the County zoning data and mapping files in order to establish compliance with the requirement for mapping "noise impact boundaries." Additional analyses, safety zone designations and mapping may likely be necessary to establish full conformity with this section.

OAR 660-13-0070(2): Review future development in Airport Safety Overlay for compliance with maximum height limitations. The consultant which created Ken Jernstedt Airfield Airport Layout Plan Update 2004-2024, Century West Engineering, recommended that the County adopt height limitations, and other Airport Safety Overlay zoning implementation language, consistent with this and other applicable state laws and federal regulations. In addition to Airport Hazard Overlay requirements described above, OAR 660-13-0040(1)-(3) also requires that jurisdictions adopt a map of existing and planned airport improvements.

Century West Engineering recommended that a general review be performed of all County Ordinance and Comprehensive Plan language, and mapping pertaining to the subject airport and its immediate environs, to compare those with the requirements of ORS Chapter 836.600-630 for airport compatibility. Any amendments to the County's codes, Plans and or maps necessary in order to demonstrate compliance should be affected, and it is further recommended that this Airport Master Plan be adopted as part of the Transportation Elements of the Hood River County Comprehensive Plan. Century West Engineering recommended that the TSP formally reflect the recommendations of the Airport Master Plan Report, particularly as related to changes in surface access in the vicinity of the airport (Orchard Road).

Ken Jernstedt Airfield contributes to the economic vitality of Hood River County and the nearby City of Hood River. In addition to at least one business which relies heavily on the airport, other users include glider pilots and occasional en-route aircraft seeking a safe haven from adverse weather conditions associated with the Columbia River Gorge. Improvements to the safety, longevity and accessibility of the airport's amenities may be expected to accrue positive social and socioeconomic impacts in the region. Site security and signage, and improvement of pilots' visibility through the enforcement of a prohibition on on-site burning are among aspects of the preferred alternative which may be considered as socially beneficial.

When a business would be relocated by a proposed airport improvement project, FAA Order 5050.4A states that the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 require the owner be offered assistance in finding a location and reestablishing the business.

If the business relocation would result in a severe economic hardship on the community, additional analysis is required in an environmental impact statement. It is not clear whether or not a recommendation for relocation of an existing business from an existing RPZ, where existing regulation and no development, per se, would relocate the business, prompt this requirement. It is recommended that the sponsor discuss this matter with a Federal Aviation

Administration (FAA) official. No existing residences would be displaced under the preferred alternative. As described above, any improvement project at this facility would be expected to have positive social and socioeconomic impacts. Implementation of the preferred alternative will result in the creation of jobs, and improvements to the safety and longevity of the airport facilities.

NOISE EVALUATION

Noise is defined as unwanted sound. However, sound is measurable, whereas noise is subjective. The relationship between measurable sound and human irritation is the key to understanding aircraft noise impact. A rating scale has been devised to relate sound to the sensitivity of the human ear. The A-weighted decibel scale (dBA) is measured on a "log" scale, by which is meant that for each increase in sound energy level by a factor of 10, there is a designated increase of 1 dBA. This system of measurement is used because the human ear functions over such an enormous range of sound energy impacts. At a psychological level, there is a rule of thumb that the human ear often "hears" an increase of 10 decibels as equivalent to a "doubling" of sound.

The challenge to evaluating noise impact lies in determining what amount and what kind of sound constitutes noise. The vast majority of people exposed to aircraft noise are not in danger of direct physical harm. However, much research on the effects of noise has led to several generally accepted conclusions:

- The effects of sound are cumulative; therefore, the duration of exposure must be included in any evaluation of noise.
- Noise can interfere with outdoor activities and other communication.
- Noise can disturb sleep, TV/radio listening, and relaxation.
- When community noise levels have reached sufficient intensity, community wide objection to the noise will likely occur.

Research has also found that individual responses to noise are difficult to predict.[15] Some people are annoyed by perceptible noise events, while others show little concern over the most disruptive events. However, it is possible to predict the responses of large groups of people (i.e.,

[15] Beranek, Leo, *Noise and Vibration Control*, McGraw-Hill, 1971, pages ix-x.

communities). Consequently, community response, rather than individual response, has emerged as the prime index of aircraft noise measurement.

On the basis of the findings described above, a methodology has been devised to relate measurable sound from a variety of sources to community response. It has been termed "Day-Night Average Sound Level" (DNL) and has been adopted by the U. S. Environmental Protection Agency (EPA), the Department of Housing and Urban Development (HUD), and the Federal Aviation Administration (FAA) for use in evaluating noise impacts. In a general sense, it is the yearly average of aircraft-created noise for a specific location (i.e., runway), but includes a calculation penalty for each night flight to account for increased sensitivity to noise during normal "hours of rest".

The basic unit in the computation of DNL is the sound exposure level (SEL). An SEL is computed by mathematically summing the dBA level for each second during which a noise event occurs. For example, the noise level of an aircraft might be recorded as it approaches, passes overhead, and then departs. The recorded noise level of each second of the noise event is then added logarithmically to compute the SEL. To provide a penalty for nighttime flights (considered to be between 10 PM and 7 AM), 10 dBA is added to each nighttime dBA measurement, second by second. Due to the mathematics of logarithms, this calculation penalty is equivalent to 10-day flights for each night flight.[16]

A DNL level is approximately equal to the average dBA level during a 24-hour period with a "weighing" added for nighttime noise events. The main advantage of DNL is that it provides a common measure for a variety of different noise environments. The same DNL level can describe an area with very few high noise events as well as an area with many low level events.

[16] Where Leq ("Equivalent Sound Level") is the same measure as DNL without the night penalty incorporated, this can be shown through the mathematical relationship of:

$$Leq_d = 10 \log \left(\frac{N_d \times 10^{(SEL/10)}}{86{,}400} \right) \qquad Leq_n = 10 \log \left(\frac{N_n \times 10^{((SEL+10)/10)}}{86{,}400} \right)$$

If SEL equals the same measured sound exposure level for each computation, and if N_d = 10 daytime flights, and N_n = 1 night-time flight, then use of a calculator shows that for any SEL value inserted, $Leq_d = Leq_n$.

Noise Modeling and Contour Criteria

DNL levels are typically depicted as contours. Contours are an interpolation of noise levels drawn to connect all points of a constant level, which are derived from information processed by the FAA-approved computer noise model. They appear similar to topographical contours and are superimposed on a map of the airport and its surrounding area. It is this map of noise levels drawn about an airport, which is used to predict community response to the noise from aircraft using that airport. DNL mapping is best used for comparative purposes, rather than for providing absolute values. That is, valid comparisons can be made between scenarios as long as consistent assumptions and basic data are used for all calculations. It should be noted that a line drawn on a map by a computer does not imply that a particular noise condition exists on one side of the line and not on the other. These calculations can only be used for comparing average noise impacts, not precisely defining them relative to a specific location at a specific time.

The noise contours depicted on the Airport Land Use Plan drawing in Chapter Five are plotted in 5 DNL increments starting at 55 DNL based on the 2022 forecast activity levels. The size and shape of the contours is consistent with the airport's runway utilization and overall volume of aircraft traffic. Runway 25 is the primary landing and departure runway, which results in slightly larger contours extending outward. The contours beyond the end of Runway 7 extend over a longer distance, reflecting the flatter climb profiles of aircraft takeoff. As depicted on the Airport Master Plan, the future runway configuration is shifted 550 feet east of its current location to improve roadway and obstruction clearance. The 2022 noise contours were developed based on this planned runway configuration.

The 2022 55 DNL noise contour extends approximately 3,600 feet beyond the future end of Runway 7 and approximately 3,200 feet beyond the future end of Runway 25. The areas located beyond the runway ends are predominantly agricultural and sparsely populated lands. The areas east of the runway are extensively developed in fruit orchards; the area west of the runway contains some orchards, but also includes open fields and low-density residential development.

Portions of the 2022 60 DNL contour extend beyond airport property beyond both runway ends. At the Runway 7 end, the 60 DNL contour, extends approximately 600 feet west of Highway 281 (Tucker Road). The Twin Peaks restaurant is located within the 60 DNL contour. At the Runway 25 end, the 60 DNL contour extends approximately 1,500 feet east of Orchard Road, largely over airport-owned lands (approximately 150 feet of 2022 60 DNL contour extends beyond the east airport boundary). Portions of the 60 DNL contour also extend along the sides of the runway and relatively narrow airport property area, particularly at the east end of the runway.

The 60 DNL contour extends outward nearly 600 feet from the sides of the runway, near the east end, over adjacent residential and agricultural areas. The nearest residential area, which is located immediately south of the end of Runway 25, is located entirely within the 60 (and higher) DNL contour.

The 2022 65 DNL noise contours are contained almost entirely within airport property, with the exception of areas located near the end of Runway 25 (north and south sides). As noted above, a residential development (nine lots) is located adjacent to the southeast corner of the airport. Some of these lots have direct airfield access and at least one hangar is located off airport. The 2022 65 DNL extends over an unpopulated orchard area near the north end of Runway 25. The planned easterly shift of the runway results in the 65 DNL contour remaining entirely within airport property beyond the end of Runway 7 (approximately 800 feet east of Highway 281/Tucker Road).

The 2022 70 DNL noise contours are generally contained within airport property boundaries, although a very small portion extends beyond the airport near the end of Runway 25. Although the residential area located along the southeast corner of the airport is partially located within the 2022 70 DNL contour, most of the residences are located on the southern half of the lots, in the area of 65 or 60 DNL contour. Residential development within the 65 DNL and higher noise contour is not recommended and should be discouraged. The Airport Master Plan identifies property acquisition in this area to provide standard runway clearances. The Port of Hood River has indicated an interest in acquiring these properties in cases where willing sellers exist. In addition to improving runway clearances, acquiring the property would help to ensure land use compatibility by preventing construction of additional residential development in areas of greater noise exposure.

With the exception of the residential area located along the southeast corner of the airport, the sparsely developed land uses in the vicinity of the airport suggest that noise compatibility will not be a significant issue during the planning period. However, since perceived noise impacts are not limited to areas with significant levels of noise, care should be taken by local land use authorities to avoid creating potential long-term land use incompatibilities in the vicinity of the airport by permitting development of incompatible land uses such as residential subdivisions within areas of moderate or higher noise exposure. Under federal guidelines, all land uses, including residential, are considered compatible with noise exposure levels of 65DNL and lower. However, airport management should actively encourage local and transient pilots to avoid direct overflights of residential or other known noise-sensitive areas whenever possible.

Noise and Land-Use Compatibility Criteria

Federal regulatory agencies of government have adopted standards and suggested guidelines relating DNL to compatible land uses. Most of the noise and land-use compatibility guidelines strongly support the concept that significant annoyance from aircraft noise levels does not occur outside a 65 DNL noise contour. Federal agencies supporting this concept include the Environmental Protection Agency, Department of Housing and Urban Development, and the Federal Aviation Administration.

Part 150, Airport Noise Compatibility Planning, of the Federal Aviation Regulations, provides guidance for land-use compatibility around airports. **Table 7-2** presents these guidelines. Compatibility or non-compatibility of land use is determined by comparing the noise contours with existing and potential land uses. Based on federal standards, all types of land uses are compatible in areas below 65 DNL. Generally, residential and some public uses are not compatible within the 65-70 DNL, and above. As noted in **Table 7-2**, some degree of noise level reduction (NLR) from outdoor to indoor environments may be required for specific land uses located within higher-level noise contours. Land uses such as commercial, manufacturing, some recreational uses, and agriculture are compatible within 65-70 DNL contours.

TABLE 7-2
LAND-USE COMPATIBILITY WITH DNL

Land Use	Yearly Day-Night Average Sound Level (DNL) In Decibels					
	Below 65	65-70	70-75	75-80	80-85	Over 85
Residential						
Residential, other than mobile homes & transient lodgings	Y	N(1)	N(1)	N	N	N
Mobile Home Parks	Y	N	N	N	N	N
Transient Lodgings	Y	N(1)	N(1)	N(1)	N	N
Public Use						
Schools	Y	N(1)	N(1)	N	N	N
Hospitals and Nursing Homes	Y	25	30	N	N	N
Churches, Auditoriums, and Concert Halls	Y	25	30	N	N	N
Governmental Services	Y	Y	25	30	N	N
Transportation	Y	Y	Y(2)	Y(3)	Y(4)	Y(4)
Parking	Y	Y	Y(2)	Y(3)	Y(4)	N
Commercial Use						
Offices, Business and Professional	Y	Y	25	30	N	N
Wholesale and Retail—Building Materials, Hardware and Farm Equipment	Y	Y	Y(2)	Y(3)	Y(4)	N
Retail Trade--General	Y	Y	25	30	N	N
Utilities	Y	Y	Y(2)	Y(3)	Y(4)	N
Communication	Y	Y	25	30	N	N
Manufacturing and Production						
Manufacturing General	Y	Y	Y(2)	Y(3)	Y(4)	N
Photographic and Optical	Y	Y	25	30	N	N
Agriculture (except livestock) and Forestry	Y	Y(6)	Y(7)	Y(8)	Y(8)	Y(8)
Livestock Farming and Breeding	Y	Y(6)	Y(7)	N	N	N
Mining and Fishing, Resource Production and Extraction	Y	Y	Y	Y	Y	Y
Recreational						
Outdoor Sports Arenas, Spectator Sports	Y	Y(5)	Y(5)	N	N	N
Outdoor Music Shells, Amphitheaters	Y	N	N	N	N	N
Nature Exhibits and Zoos	Y	Y	N	N	N	N
Amusements, Parks, Resorts and Camps	Y	Y	Y	N	N	N
Golf Courses, Riding Stables and Water Recreation	Y	Y	25	30	N	N

Y (Yes)	Land-use and related structures compatible without restrictions.
N (No)	Land-use and related structures are not compatible and should be prohibited.
NLR	Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into design and construction of the structure.

25, 30 or 35 Land uses and structures generally compatible; measures to achieve NLR or 25, 30, or 35 dB must be incorporated into design and construction of the structure.

NOTES:

1. Where the community determines that residential uses must be allowed, measures to achieve outdoor to indoor Noise Levels Reduction (NLR) of at least 25dB and 30dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide a NLR of 20 dB; thus, the reduction requirements are often stated as 5, 10, or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year-round. However, the use of NLR criteria will not eliminate outdoor noise problems.
2. Measures to achieve NLR of 25 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.
3. Measures to achieve NLR of 30 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.
4. Measures to achieve NLR of 35 dB must be incorporated into the design and construction of portions of these buildings where the public is received office areas, noise sensitive areas, or where the normal noise level is low.
5. Land-use compatible, provided special sound reinforcement systems are installed.
6. Residential buildings require an NLR of 25.
7. Residential buildings require an NLR of 30.
8. Residential buildings not permitted.

SOURCE: Federal Aviation Regulations, Part 150, Airport Noise Compatibility Planning, dated January 18, 1985.

OTHER ENVIRONMENTAL CONSIDERATIONS

A representative of the Oregon Department of Environmental Quality stated that the local area is "in attainment for" (meaning 'in compliance with') applicable air quality standards for all pollutants. No significant increase over existing levels of air and/or surface traffic is anticipated under the Preferred Alternative. In the event that significant increases in volume, of either automobile trips or aircraft trips, are anticipated in conjunction with future improvements, DEQ requests close coordination to ensure that the Columbia River Gorge is not unduly polluted with air emissions.

Water quality impacts are always a concern with any construction project, and especially when considering uses and sites where potentially hazardous materials, such as aviation fuel, fire retardants, de-icing agents, and/or agricultural chemicals are involved. The Oregon Department of Environmental Quality (DEQ) routinely recommends for airport projects that, at a minimum, investigations be performed which document past agricultural spraying practices, aviation fuel storage facilities, and other potential sources for adverse water quality impacts associated with past, present and potential future activities at the site. Agricultural and/or forestry-related

chemical operators and airport sponsors must ensure that wash down, collection, treatment and storage areas and devices comply with Oregon Administrative Rule 340-109 and all applicable environmental standards. In this case, there is the potential that past pesticide application activities may have resulted in a contamination event which warrants remediation, according to Mr. Brett McKnight of DEQ. Mr. Dick Nichols of the DEQ stated in telephone communication with the consultant that if any wastewater is currently being distributed to a septic drain field, Oregon Administrative Rule (OAR) 340-044 may apply and may require an Underground Injection Control (UIC) permit from DEQ. In addition to the requirement for securing wastewater permits for washing, maintenance, or deicing areas, the sponsor must secure a National Discharge Elimination System (NPDES) Permit for any project affecting one acre or more of land and discharging storm water runoff to surface waters.

The Port has completed removal and site remediation on two underground fuel storage tanks on the airport (north apron and AG hangar).

DEQ, as well as the Hood River County Soil and Water Conservation District (SWCD), are particularly interested in protecting the Cedar Creek watershed, which drains the subject site and empties into the nearby Hood River, from adverse impacts relative to water quality. Storm water removal systems should be designed so that water infiltrates into the ground as opposed to running off to surface waters.

Mr. Larry Toll, the Oregon State Water Resources Department's Water Master for this region, cautioned that the airport has water rights which may be lost, but could conceivably be continued to be charged for by the irrigation district, if impervious cover is placed atop the subject acreage. For example, Mr. Toll stated that grass areas between the runways are currently subject to water rights which could be effectively lost if that area is developed. Any new wells on the site must have corresponding water rights. Mr. Toll was not aware whether the Ice Fountain Water District serves the site or has capacity to meet long term plans of the airport and related uses. If any water intensive use desired to locate on the site, the careful retention at this juncture of the Port's existing water rights could prove to have been a significant and wise consideration.

During construction, adherence to the applicable local, state, and federal regulations and standards; observance of DEQ's "Best Management Practices for Storm Water Discharges Associated with Construction Activities" (2000); and compliance with the guidelines of FAA Advisory Circular 150/5370-10, are all advised to further protect against adverse water quality impacts.

As of April 15, 2001, the Oregon State Historic Preservation Office, SHPO, requires considerable documentation be provided by any party inquiring about the existence of significant cultural resources in a given location. The new procedure requires such information as architectural classification, window and roof types of all structures within the study area; if they may be considered as a resource; dates of any alterations; and "Significance Statements" for all types of resources. SHPO has provided specific forms, "Section 106 (of the National Historic Preservation Act) Documentation Forms" and "Section 106 Level of Effect Forms", for use in making such a request. This level of investigation surpasses the scope of this ALP Update Report.

During preliminary stages of this study process, the consultant forwarded letters to representatives of the Yakama Nation; Confederated Tribes of Warm Springs; Confederated Tribes of Umatilla; and the Nez Perce Tribe. No response was received as of this writing.

If any historic or cultural resources are discovered during construction, the Port will be responsible for immediately notifying SHPO, the Tribes, and the other appropriate authorities. Work would be required to be halted until the physical extent and relative cultural significance of the resource(s) could be identified, and a protection plan developed and implemented, if warranted.

Based on written comments provided by a representative of the Oregon Department of Fish and Wildlife (ODFW), Mid-Columbia District Office recommends protection of surface waters from adverse impacts of development, including but not limited to silting and sedimentation and obtaining a comprehensive inventory of the storage of hazardous waste materials on-site. A number of fish species associated with the nearby Hood River are afforded federal protection under the Endangered Species Act (ESA), and ODFW is concerned that water quality impacts might prove detrimental to those, as well as other less protected fish species. Please see the sections of this report regarding water quality and construction impacts for detailed recommendations for protecting against potential adverse water quality impacts. The consultant recommends that the Port develop and distribute the inventory of hazardous materials storage to ODFW Mid-Columbia District Office and Mr. McKnight of the Oregon DEQ.

A search of the database of the Oregon Natural Heritage Information Center, which was recently transferred to Oregon State University from the Nature Conservancy, revealed one noteworthy species of reptile; one bird; eight species of fish; one amphibian and six species of flora which are species of interest to the State of Oregon and which may occur in the project vicinity. Among those are the Oregon Slender Salamander, Batrachoseps wrighti, a species of concern to the US

Fish and Wildlife Service and "sensitive-undetermined" by the State of Oregon; the Harlequin Duck, or Histrionicus histrionicus, which is provided the same Federal and State protection status as the salamander, above; three species of salmon (Coho, two Chinook) which are listed as Threatened by the USFWS; the Coastal Cutthroat Trout, Oncorhynchus clarki pop 2, an Oregon State sensitive-critical species; summer and winter runs of Steelhead Trout, Oncorhynchus mykiss pop 27, which are Federally Threatened and State sensitive-critical; and the Western Pond Turtle, Clemmy's marmorata marmorata, Federally a species of concern and listed with the State of Oregon as sensitive-critical. Fauna of note included the Oregon Daisy; Hood River Milk Vetch; Violet Suksdorfia; and Howell's Bentgrass. The Natural Heritage Program recommends an inventory be conducted at the site, during the appropriate season, to assure there are no important biotic resources present in the project area.

In addition to some of the species discussed above, the US Department of Interior's Fish and Wildlife Service (USFWS) lists one bird and three fish species as "Threatened" Species which may be affected by an airport improvement project at this location. The Bald Eagle, or Haliaeetus leucocephalus, and the Lower Columbia Steelhead Trout, Oncorhynchus mykiss; Lower Columbia Chinook Salmon, Oncorhynchus tshawytscha; and Columbia River Bull Trout, Salvelinus confluentus, are reported within proximity to the project site. One bird, amphibian, and fish species are each also indicated as Candidate Species for some type of Federal Protection listing, but are "not yet the subject of a proposed rule". These include the Yellow-billed cuckoo, Coccyzus amreicanus; the Oregon Spotted Frog, Rana pretiosa; and Lower Columbia Coho Salmon, or Oncorhynchus kisutch.

Among Species of Concern which the USFWS indicates may occur within the project's vicinity are seven varieties of bat, including the Pale western big-eared bat, Corynorhinus (=Plecotus) townsendii townsendii; the Silver-haired bat, or Lasionycteris noctavigans; and the Long-legged myotis, Myotis volans. In addition, a duck; woodpecker; the Purple Martin (Progne subis); two other birds; a turtle and lamprey; two aquatic invertebrates; and four species of fauna are also Species of Concern. These are described as "Taxa whose conservation status is of concern to the Service, but for which further information is still needed." The USFWS correspondence states a Biological Assessment is required for "construction projects (or other undertakings having similar physical impacts) which are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (NEPA) (42 U.S.C. 4332 (2) (c)). For projects other than major construction activities," the USFWS' correspondence continues, "the Service suggests that a biological evaluation similar to the Biological Assessment be prepared to determine whether they may affect listed and proposed species."

According to a review of the US Fish and Wildlife Service's National Wetlands Inventory (NWI), Cedar Creek where it intersects airport property is a Palustrine Emergent, persistent wetland resource which is seasonally flooded. As a safe harbor approach, it is recommended that development generally maintain a minimum of thirty feet setback from this wetland, if feasible. Development activities which would impact a wetland resource must be preceded by any necessary permit(s) from the Oregon Division of State Lands (DSL) and/or US Army Corps of Engineers (ACOE). A wetlands determination can identify whether other jurisdictional wetlands occur on the airport property.

Hood River County planners report no floodplain would be affected by the planned airport improvements. Information provided by the USDA's Natural Resources Conservation Service web site describes the soils on the site as stony, wet, and in some cases subject to erosion.

Soils with Agricultural Capability Classifications ranging from VIIs, indicating severe limitations due to stone content, to IIw, indicating a high productivity potential which is somewhat limited by wetness, were observed on the subject site. Because no federal lands are proposed to be committed or otherwise involved in the Preferred Alternative, the Farmland Protection Policy Act (FPPA) does not apply to this proposal, and no further analysis under this impact category is necessary to demonstrate compliance with NEPA. No conversion of farm land is contemplated under the preferred alternative, although the question of lengthening the runway to the east at some point, thus requiring the closure of Orchard Road and conversion of some acreage of existing orchard land, will likely arise again in future discussions pertaining to airport development.

Silt fences, runoff diversion tactics, and storm water detention are commonly implemented in similar construction projects, and should be utilized for any project on the airport in order to minimize adverse impacts of development related activities. FAA Advisory Circular 150/5370-10 provides additional measures which are advised to be implemented to minimize adverse impacts of airport construction activities. In addition, DEQ's 2000 publication "Best Management Practices for Storm Water Discharges Associated with Construction Activities" should be followed during all phases of the project. Please see the above related discussion regarding water quality impacts.

A summary of the environmental checklist items and preliminary findings is presented in **Table 7-3**.

TABLE 7-3
KEN JERNSTEDT AIRFIELD
ENVIRONMENTAL CHECKLIST

Potential Impact Category	Existing Conditions / Comments	Further Action Needed?
Noise	Residential areas located southeast of airport partially located within 70 and 65 DNL contour (2022). Property acquisition recommended to provide clear primary surface and other runway clearances will also reduce exposure to higher noise levels off airport property.	POSSIBLE
Compatible Land Use	Relocate restaurant in Runway 7 RPZ. Local governments must adopt and Map Airport Overlay Zoning, planned improvements, and ensure consistency of zoning provisions with State law. Future uses in the vicinity must have the burden of demonstrating compatibility with aviation and compliance with ORS Ch. 836.600-630.	YES
Social / Socio-Economic	Expected to be positive, as is typical with airport projects. Observe requirements of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 in relocating existing business from RPZ Zone.	YES
Water Quality	Any wastewater distributed to a septic drain field may require application for an Underground Injection Control (UIC) permit from DEQ. DEQ requires surface storm water runoff be contained, treated, prior to discharge to any natural drainage system, water body. NPDES Permit; maintaining maximum physical separation between construction and sensitive waterways, adherence to FAA Advisory Circular 150/5370-10 required. Document to DEQ any chemicals stored on site. For fuel or agricultural chemical storage, see Water Quality section of this Environmental Checklist, observe compliance with DEQ requirements. Cedar Creek water quality is of concern.	YES
Special Land Uses, DOT Act Section 4(f)	No parks, recreation areas, or refuge areas per this section affected.	NO

TABLE 7-3
KEN JERNSTEDT AIRFIELD
ENVIRONMENTAL CHECKLIST

Potential Impact Category	Existing Conditions / Comments	Further Action Needed?
Historic, Architectural, Archaeological, and Cultural Resources	Records no longer provided by SHPO. Significant cultural resources possible on-site. Please see above discussion. Halt construction if resources discovered, notify identified tribes, SHPO of all development plans.	POSSIBLE
Biotic Communities	ODFW concerned primarily with water quality impacts as they relate to the tributary to Hood River, Cedar Creek, which originates on site. See Construction Impacts, Water Quality sections of Environmental Checklist narrative.	YES
Endangered and Threatened Species	Several Threatened, Endangered, and Species of Concern were identified as occurring in vicinity. A Biological Evaluation or Assessment is recommended by USFWS prior to major construction or similar undertakings. Please see narrative.	YES
Wetlands	According to National Wetlands Inventory Maps produced by the USFWS, Cedar Creek is a jurisdictional wetland. Other resources on-site possible. Wetlands Determination / Delineation is recommended.	YES
Floodplain	No flood plain affected by the project.	NO
Shoreline Management	Not Applicable to this facility.	NO
Coastal Barriers	Not Applicable.	NO
Wild and Scenic Rivers	Not Applicable.	NO
Farmland	Public airport improvement projects on private lands are exempt from Farmland Protection Policy Act (FPPA).	NO
Energy Supply and Natural Resources	No adverse impacts anticipated.	NO

TABLE 7-3
KEN JERNSTEDT AIRFIELD
ENVIRONMENTAL CHECKLIST

Potential Impact Category	Existing Conditions / Comments	Further Action Needed?
Light Emissions and Glare	No hazards reported by local planners or operators, upon inquiry. No analysis of existing light emissions which might pose potential hazards to aviation performed.	POSSIBLE
Solid Waste Impacts	Cedar Creek and other surface and ground water systems must be considered and protected from contamination during the handling of waste materials. Development under the Preferred Alternative would not considerably increase production of waste at the facility, except during construction phase.	NO
Construction Impacts	Temporary impacts will accrue during construction phase. Of particular concern is any runoff which might make its way to Hood River via the Cedar Creek tributary. Adherence to the provisions of FAA Advisory Circular 150/5370-10 should preclude foreseeable adverse impacts.	YES