Columbia Gorge Regional Airport

Airport Master Plan

Airport Master Plan

for

COLUMBIA GORGE REGIONAL AIRPORT

Prepared for

THE CITY OF THE DALLES, OR
and
KLICKITAT COUNTY, WA

by
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and
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Approved by The City of The Dalles on July 26, 2010
Approved by Klickitat County on July 27, 2010

August 2010
Final Printing

"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 in accordance with appropriate public laws."

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INTRODUCTION

INTRODUCTION

In the fall of 2008, the City of The Dalles and Klickitat County provided direction to the airport's consulting engineer, Precision Approach Engineering, to begin the process of preparing a grant application and scope of services for an *Airport Master Plan Update* for Columbia Gorge Regional /The Dalles Municipal Airport (DLS). Following development of a scope of services, budget, and schedule, the City of The Dalles and Klickitat County subsequently received a grant from the Federal Aviation Administration (FAA) in February 2009 to conduct the study.

The study was designed to provide guidance for future development and provide updated justification for projects for which the airport may receive funding participation through federal and state airport improvement programs. Working with Precision Approach Engineering was Coffman Associates, an airport consulting firm which specializes in master planning and environmental studies.

The *Airport Master Plan Update* was prepared in accordance with FAA requirements, including Advisory Circular 150/5300-13, *Airport Design* (as amended), and Advisory Circular 150/5070-6B, *Airport Master Plans* (2005). The scope of services, budget, and schedule were approved by the City of The Dalles and the Klickitat County Board of Commissioners, following review by the FAA. A notice-to-proceed was issued to the consultants on August 21, 2009. The following paragraphs outline the study background, objectives, study elements and process, coordination and recommendations.

BACKGROUND

The City of The Dalles, Oregon and Klickitat County, Washington are co-owners/sponsors of the Columbia Gorge Regional Airport, also known as The Dalles Municipal Airport. The airport is managed by Aeronautical Management, Inc. (AMI) under contract with the City of The Dalles and Klickitat County. Located in Dallesport, Washington, the airport lies adjacent to the Columbia River (on the north bank) and at the east end of the Columbia Gorge Scenic Area. The airport provides support to approximately 60 commercial and private aircraft. Services and facilities available include: hangar storage, tiedowns, fixed base operator services, flight instruction, aircraft rental, aircraft maintenance, and fueling.

Nearly 200 acres of the 1,000-acre site have been reserved for general aviation development. An airport industrial park lies adjacent to the airport, providing convenient multi-modal access to air, rail, highway, and river transportation. Interstate 84 follows the Columbia River to Portland and east to Boise (and points beyond), while U.S. Highway 197/97 provides access to points north and south. The Burlington Northern Santa Fe (BNSF) railroad runs adjacent to the airport, while the Union Pacific railroad runs on the south side of the river. East of the airport lies the Klickitat Port area, providing access to the Columbia River.

The current runway system consists of Runway 12-30, a 5,097-foot by 100-foot asphalt runway with medium intensity edge lighting and Runway 7-25, a 4,647-foot by 100-foot asphalt runway with medium intensity edge lighting. Over the past few years, several improvements have been made at the facility, including:

- New drainage facilities along runways and taxiways.
- An automated surface observation system (ASOS) - for weather observations.
- New hangars and lead-in ramp.
- New runway lighting and lighted signs.
- New runway resurfacing and marking.

MASTER PLAN OBJECTIVES

The overall objective of the *Airport Master Plan Update* was to provide the co-sponsors with guidance for future development of the airport, meeting the needs of existing and future users, while also being compatible with the environment. The most recent planning effort related to the airport was the 2004 *Airport Layout Plan and Report*. *The Airport Master Plan Update* provides justification for new priorities. The plan was closely coordinated with other existing or ongoing planning studies in the area, and with aviation plans developed by the FAA and the two states. Specific objectives of the study included:

- Research factors likely to affect air transportation demand in the Columbia Gorge area over the next 20 years and develop new operational and basing forecasts.

- Determine projected needs of airport users, taking into consideration recent FAA design standards, global positioning (GPS) aircraft approach capability, and transitions in the type of aircraft flown by corporate and general aviation users.

- Recommend improvements which enhance Columbia Gorge Regional Airport's ability to satisfy future aviation needs: runway extensions and/or realignment, increases in weight bearing capacity, and upgraded approaches (two-dimensional lateral navigation, vertical navigation, or localizer performance with vertical guidance).

- Determine the circumstances, ability, and operational costs of 14 Code of Federal Aviation Regulation Part 139 compliance requirements; operation as a commercial service airport.

- Establish a schedule of development priorities, a financial program for implementation of development, and analyze potential funding sources consistent with FAA planning.

- Provide specific recommendations for aviation and non-aviation related land uses on airport property and review existing or proposed land use, economic development, and zoning documents to ensure future compatibility with off-airport development.

- Develop active and productive public involvement throughout the planning process.

MASTER PLAN ELEMENTS AND PROCESS

To achieve the objectives described above, the *Airport Master Plan Update* was prepared in a systematic fashion pursuant to the scope of services that has been coordinated with the co-sponsors and the FAA. The study included nine elements:

1.0 **Study Initiation** - Development of the scope of services, budget, and schedule. A kickoff meeting with an advisory committee was held at the study's initiation to obtain a more comprehensive understanding of local issues.

2.0 **Inventory** - Inventory of facility and operational data, wind data, distribution of user surveys, environmental inventory, population and economic data, airport financial data, and new aerial photography and mapping. All of the inventory data was organized in a working paper which was distributed to the advisory committee for review and comment.

3.0 **Forecasts** - Forecasts for based aircraft, operations, and peaking characteristics of the airport over a 20-year period. The forecasts were organized in a working paper which was distributed to the advisory committee for review and comments and forwarded to the FAA for review and approval.

4.0 **Facility Requirements** - After establishing critical aircraft and physical planning criteria, facility needs assessments were developed for airside and landside facilities. An evaluation of the circumstances, ability, and operational costs for operating the facility as a commercial service airport were evaluated, although the co-sponsors do not wish to pursue certification at this time. The facility requirements were organized in a working paper, distributed to the committee, and a meeting will be held with the advisory committee to review previous working paper submittals.

5.0 **Airport Development Alternatives** - Potential airside and landside alternatives were developed for meeting long-term needs. Each of the alternatives were subjected to engineering and environmental analysis and summarized in a working paper. Following distribution of the working paper to committee members, a review meeting was held to discuss the alternatives and preliminary master plan concept.

6.0 **Airport Plans/Land Use Compatibility** - Airport layout plans were developed to depict existing and proposed facilities. The drawings set will meet the requirements of the FAA Northwest Mountain Region. In addition, noise exposure contours were developed for existing and future conditions to determine the extent of critical noise exposure in the airport vicinity. The analysis was summarized in an appendix for distribution to the committee.

7.0 **Environmental Overview** - Environmental concerns and potential mitigation requirements were identified consistent with the *National Environmental Policy Act* (NEPA). The working paper appears as an appendix to the master plan report.

8.0 **Financial Management and Development Program** - Development schedules and cost estimates were prepared for the development program, and a financial analysis were included to identify potential federal and state aid for specific projects. Following development of the financial management working paper, a final meeting was held with the advisory committee, and an open public workshop was held for the general public.

9.0 **Final Reports** - Final report documentation will include technical reports (printed and digital formats), an executive summary of the study, and full size/full color copies of report exhibits and drawings produced for the study. The FAA will review and approve the final airport layout plan drawings.

STUDY COORDINATION

The study process included local participation through the formation of a Planning Advisory Committee (PAC). The PAC consisted of federal, state, and local agencies, airport tenants, and general public representatives. The co-sponsors decided the final makeup of the committee, with the assistance of the consultant. The study schedule called for four points in the study where the PAC convened to discuss draft working paper submittals. A kickoff meeting was held during the initial inventory process (September 24, 2009), with other meetings following facility requirements (December 2, 2009), development alternatives (February 17, 2010), and the financial management program (May 19, 2010). Following the final meeting with the PAC, an "open house" workshop for the general public was held to present the preliminary findings and to solicit public comment. The Draft Final report will be available on-line at www.columbiagorge.airportstudy.com for the duration of the study.

RECOMMENDATIONS

The recommended master plan concept addresses both airside and landside needs for a 20-year planning horizon. The top priority on the airside is to meet runway safety design standards – initially for Runway 12-30, then for Runway 7-25. To meet the needs of 75 percent of the business jet fleet at 60 percent useful load, the ultimate length of Runway 12-30 is planned for 5,500 feet, with improved pavement strength and pilot line-of-sight along the runway. Several taxiway improvements have been recommended. To improve the safety area on the west end of Runway 7-25, a relocation of Dallesport Road has been recommended.

A variety of hangar types have been recommended to meet future needs: T-hangars, box hangars, and conventional hangars. A new terminal building has been recommended to replace the existing facility and a new aboveground fueling facility to replace the underground tanks.

Development grants are projected to cover 83 percent of the projects included in the capital development program. The federal grant program is supported directly by aviation users through the collection of fuel taxes and other user fees.

Columbia Gorge Regional Airport

Chapter One

INVENTORY

INVENTORY

Columbia Gorge Regional Airport

The initial step in the preparation of the airport master plan update for Columbia Gorge Regional Airport is the collection of information that will provide a basis for the analysis to be completed in subsequent chapters. For the master plan, information is gathered regarding both the airport and the region it serves. This chapter will begin with an overview of the airport location, competing airports, and typical weather conditions. This will be followed by a discussion of demographic and socioeconomic factors relevant to the region. A comprehensive overview of the national aviation system for general aviation airports and the role of Columbia Gorge Regional Airport in the national system are also presented. Finally, an inventory of the existing facilities at the airport will be discussed.

The information outlined in this chapter was obtained through on-site inspections of the airport, including interviews with the airport sponsors, management, tenants, and representatives of various government agencies. Information was also obtained from existing studies, including the *2004 Airport Layout Plan Report*. A general list of document sources is provided at the end of this chapter.

AIRPORT HISTORY AND ADMINISTRATION

The Columbia Gorge region has a long aviation history. The original airport, known as Case Field, was constructed in the 1920s. The airport originally had a 1,000-foot long grass strip with 200-foot diameter turnarounds at each end. The City of The Dalles acquired

the airport in 1942 from approximately 30 individual owners at a total cost of $39,000.

During World War II, the U.S. Army Corps of Engineers began construction of The Dalles Military Base, which would ultimately include three paved runways. A terminal building was completed in 1943 at a cost of $7,000.

As depicted on **Exhibit 1A**, Columbia Gorge Regional Airport is located on approximately 950 acres of property on the north side of the Columbia River. The airport is located in Klickitat County, Washington, to the immediate east of the unincorporated town of Dallesport. The City of The Dalles is located on the south side of the Columbia River in the State of Oregon. The closest major metropolitan area is the City of Portland, Oregon, located approximately 80 miles to the west. The airport is located at the eastern end of the Columbia River Gorge National Scenic Area, a protected scenic area managed by the U.S. Forest Service.

In 2000, the City of The Dalles, Oregon and Klickitat County, Washington signed a co-ownership agreement, which resulted in sharing operating costs and planning for the future of the airport. The airport is managed jointly by a regional airport board consisting of seven members, with three members being appointed by Klickitat County, three by the City of The Dalles, and the seventh member being appointed by the board itself. The airport board has contracted with Aeronautical Management, Inc. (AMI) to provide for daily airport management. AMI employs a full-time airport manager and a line technician/security officer.

AREA TRANSPORTATION MODES

Airports are a significant part of the national transportation infrastructure. Other modes of transportation can work in synergy with airports to promote access and economic development. The following discussion presents information related to the various transportation modes in the Columbia Gorge Region.

HIGHWAYS

Interstate 84 passes through The City of The Dalles providing access to points east and west. U.S. Highway 197 extends from the City of The Dalles north across the Columbia River. Dallesport Road extends from U.S. Highway 197, providing direct access to the airport. Vehicular transportation is the dominant mode in the region.

RAIL

The Burlington Northern Santa Fe Railroad runs along the north side of the Columbia River just to the south of the airport. The Union Pacific Railroad runs along the south side of the Columbia River, through the City of The Dalles. Both of these rail lines are maintained in Federal Railroad Association (FRA) Class 5 condition that permits operation of freight trains at up to 80 mph and passenger trains at up to 90 mph.

08MP04-1A-10/27/09

Exhibit 1A
LOCATION MAP

Although there is no Amtrak station in The Dalles, Amtrak does provide a throughway bus service from The Transportation Center in The Dalles. The service provides bus transport to Amtrak stations in Wishram, Washington, approximately 15 miles east of The Dalles, and Bingen, Washington, approximately 16 miles to the west. Both stations are on the Amtrak Empire Builder route, which provides connections to: Portland, Oregon; Vancouver, Washington; Spokane, Washington; West Glacier, Montana; Fargo, North Dakota; St. Paul/Minneapolis, Minnesota; Milwaukee, Wisconsin; and Chicago, Illinois.

MARINE FACILITIES

The Port of Klickitat is located in Bingen, Washington, approximately 15 miles to the west of the airport. The Port manages two distinct industrial lease properties; Bingen Point Business Park and Dallesport Industrial Park. Bingen Point Business Park is a 104 acre area comprised of a 22 acre boat basin, 52 developable acres, and 30 acres of lake and wetlands. The Bingen Point property includes over 65,000 square feet of building space. The Dallesport Industrial Park encompasses 660 acres. It is located two miles north of the City of The Dalles. Rail service from Burlington Northern/Santa Fe is available immediately at the Dallesport Industrial Park and is ½-mile from Bingen Point. The following is a list of businesses leasing from the Port of Klickitat:

- Columbia Phyto Technology
- James Dean Construction
- Underground Specialties, LLC
- Columbia Hills RV Park
- Dallesport Foundry
- Dallesport Log Yard
- Dallesport Specialty Lumber
- Eternal Rest Pet Service
- Innovative Composite Engineering
- The Insitu Group (Boeing)
- Pellissier Trucking
- Underwood Fruit

The Port of The Dalles is located on the Columbia River, although it is primarily a marketing entity for industrial land in the region. In general, the Port owns industrial and commercial sites, some with riverfront barge access. Currently, no known marine freight is loaded from sites within the Port of The Dalles, but the potential for such facilities exists. The Port also owns and operates a 120-slip marina facility with moorage for all types of boats with drafts up to 14 feet. A public boat launch ramp is also available at the marina.

Adjacent to the Port of The Dalles is a private facility that currently provides storage and transport of wheat via the Columbia River. Approximately 800,000 bushels of wheat can be stored on site and a barge can transport up to 120,000 bushels. Opportunities to more fully utilize marine transport resources available to Wasco County residents and farmers will require development of additional facilities. (*Source: Wasco County Transportation System Plan – Draft 2009*)

PUBLIC TRANSIT SERVICE

Public transportation service in the region is provided by Gorge TransLink, which is an alliance of providers offering transportation services throughout the Mid-Columbia River Gorge region. Gorge TransLink provides linkage between communities in Klickitat, Skamania, Hood River, Wasco, and Sherman counties. Gorge TransLink provides two basic kinds of service: dial-a-ride and fixed-route service.

Mount Adams Transportation Service is the main public transportation service for Klickitat County providing both dial-a-ride and a fixed route service. This service is operated by Klickitat County Senior Services, a county department, Monday through Friday from 6:00 a.m. to 6:00 p.m. This service originates in The Dalles and includes scheduled stops in Dallesport, Wishram, Maryhill, and Goldendale. Other service is available to points to the east and west.

The Gorge TransLink provides a connection to Greyhound stops located in Biggs, The Dalles, Hood River, Portland, Vancouver, and points east. This is an intercity bus service that travels along Interstate 84 through the Columbia River Gorge. Four to six trips are provided by Greyhound each day. Riders can connect to the national Greyhound network from this regional line.

REGIONAL CLIMATE AND GEOLOGY

Weather conditions must be considered in the planning and development of an airport, as daily operations are affected by local weather patterns. Temperature is a significant factor in determining runway length needs, while local wind patterns (both direction and speed) dictate the optimal orientation of the runway.

The climate in the region can vary greatly over just a few miles. The airport is located approximately 25 miles to the east of the summits of Mount Hood and Mount Adams. As a result, the airport is in the rain shadow of these Cascade volcanoes. The area is significantly drier than the Portland metropolitan area to the west. Annual precipitation to the west of the Cascades is as much as 45 inches per year, while to the east it is as little as 10 inches per year. The airport averages approximately 14 inches of precipitation per year.

During the summer months, the airport averages 88 degrees for a high temperature. The highs in the winter months are in the low 40s. The area experiences approximately 300 days of sunshine per year. A summary of climactic data is presented in **Table 1A**.

TABLE 1A
Climate Summary
The Dalles, OR

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
High Temp. Avg.	41	48	57	65	74	80	88	88	81	67	50	42
Low Temp. Avg.	30	32	37	43	50	56	61	61	52	42	35	30
Precip. Avg.(in.)	2.64	1.86	1.15	0.74	0.56	0.43	0.17	0.32	0.52	1.00	2.20	2.69

Source: The Weather Channel, www.weather.com

The airport is located within the Columbia Lava rock formation. This formation covers approximately 250,000 square miles and is the result of volcanic eruptions and lava flows from Mount Hood and Mount Adams. The official airport elevation is 247 feet above mean sea level (MSL), with portions of the airport elevation decreasing down to 200 feet MSL. As a point of reference, the normal elevation of the Columbia River nearest the airport is 74 feet MSL.

The western portion of airport property is relatively flat and accommodates the developed portions of the airport. The northern and southeastern portions of the airport have moderate slopes. The area to the east of the airport, approximately 100 feet from Runway 25 (elevation 242 feet) has a steep 40-foot drop to a gully. The terrain then rises again to an elevation of 240 feet approximately 700 feet from the runway end.

AIRPORT SYSTEM PLANNING ROLE

Airport planning exists on many levels: local, state, and national. Each level has a different emphasis and purpose. On the national level the Columbia Gorge Regional Airport is included in the *National Plan of Integrated Airport Systems* (NPIAS). On the state level the airport is included in both the *Oregon Aviation Plan* (2007) and in the Washington State Long-Term Air Transportation Study (LATS) that encompasses the *Washington Aviation System Plan* (2009). The local planning document is the airport master plan.

FEDERAL AIRPORT PLANNING

On the national level, the Columbia Gorge Regional Airport is included in the *National Plan of Integrated Airport Systems* (NPIAS). This federal plan identifies 3,356 existing airports which are considered significant to the national air transportation system. The NPIAS is published and used by the Federal Aviation Administration (FAA) in administering the Airport Improvement Program (AIP), which is the source of federal funds for airport improvement projects across the country. The AIP program is funded exclusively by user fees and user taxes, such as those on fuel and airline tickets. The 2009-2013 NPIAS estimates $49.7 billion is needed for airport development across the country over the next five years. An airport must be included in the NPIAS to be eligible for federal funding assistance through the AIP.

The NPIAS supports the FAA's strategic goals for safety, system efficiency, and environmental compatibility by identifying specific airport improvements. The current issue of the NPIAS identifies approximately $19.6 million in development needs over the next five years for Columbia Gorge Regional Airport. This figure is not a guarantee of federal funding; instead, this figure represents development needs as presented to the FAA in the annual airport capital improvement program.

Airports that apply for and accept AIP grants must provide grant assurances. These assurances include maintaining the airport facility safely and efficiently in accordance with specific conditions. The duration of the assurances depends on the type of airport, the useful life of the facility being developed, and other factors. Typically, the useful life for an airport development project is a minimum of 20 years. Thus, when an airport accepts AIP grants, they are obligated to maintain that facility in accordance with FAA standards for at least that long.

Of the $49.7 billion in airport development needs nationally, approximately 19 percent is designated for the 2,564 general aviation airports, as shown in **Table 1B**. General aviation airports average 35 based aircraft and account for 41 percent of the nation's general aviation fleet. Columbia Gorge Regional Airport is designated as a general aviation airport.

TABLE 1B
NPIAS Distribution of Activity

Number of Airports	Airport Type	% of Enplanements	% of Based Aircraft	% NPIAS Costs
522	Commercial Service	99.9	21	71
270	Relievers	0	28	10
2,564	General Aviation	0	41	19
3,356	Existing NPIAS Airports	99.9	90	100
16,459	Non-NPIAS Airports	0.1	10	0

Source: 2009-2013 National Plan of Integrated Airport Systems (NPIAS)

STATE AIRPORT PLANNING

Columbia Gorge Regional Airport is unusual in that the airport sponsor is comprised of two governmental entities in two different states. As a result both Washington and Oregon actively participate in planning for the airport.

Oregon Airport Planning

The airport is included in the *Oregon Aviation Plan 2007* (OAP). The OAP is a comprehensive evaluation of Oregon's aviation system and serves as a guide for future aviation development. The OAP defines the specific role of each airport in the state's aviation system and establishes funding and development needs. The OAP is periodically updated, with the previous version having been completed in 2000. Columbia Gorge Regional Airport is one of 97 public use airports within the state's aviation system plan.

The State of Oregon classifies public use airports by functional classification. They utilized the FAA's Airport Reference Code classification system (described in detail in Chapter Three - Facility Requirements), which is based on operational and physical criteria, and developed a unique set of performance measures to clearly demonstrate the types of facilities and services that should be provided at each airport category. The five airport classifications in the state are defined as follows:

• **Category I – Commercial Service Airports**

These airports support some level of scheduled commercial airline service in addition to a full range of general aviation aircraft. This includes both domestic and international destinations.

• **Category II – Urban General Aviation Airports**

These airports support all general aviation aircraft and accommodate corporate aviation activity, including business jets, helicopters, and other general aviation activity. The primary users are business related and service a large geographic region, or they experience high levels of general aviation activity.

• **Category III – Regional General Aviation Airports**

These airports support most twin and single engine aircraft, may accommodate occasional business jets, and support regional transportation needs.

• **Category IV – Local General Aviation Airports**

These airports primarily support single engine, general aviation aircraft, but are capable of accommodating smaller twin-engine general aviation aircraft. They also support local air transportation needs and special use aviation activities.

• **Category V – RAES (Remote Access/Emergency Service) Airports**

These airports primarily support single engine, general aviation aircraft, special use aviation activities, and access to remote areas or provide emergency service access.

The Columbia Gorge Regional Airport is classified as a Regional General Aviation Airport in the *Oregon Aviation Plan 2007*. The applicable design and performance criteria are listed in **Table 1C**.

Washington Airport Planning

The Columbia Gorge Regional Airport is included in the *Washington Aviation System Plan* (WASP). The WASP includes 138 public use airports, 65 of which are included in the federal NPIAS (including Columbia Gorge Regional Airport). The WASP classifies airports according to their roles in the state air transportation system in the following manner:

- **Commercial Service:** At least 2,500 scheduled passenger enplanements (boardings) per year for at least three years.

- **Regional Service:** Serve large or multiple communities; all NPIAS reliever airports; at least 40 based aircraft; a minimum runway length of 4,000 feet.

- **Community Service:** Serves a community; at least 25 based aircraft, paved runway

- **Local Service:** Serves a community, less than 20 based aircraft, has a paved runway.

- **Rural Essential Service:** Other land-based airports, including residential airparks.

- **Seaplane Bases:** Identified by the FAA as a seaplane base, unless it is a Commercial Service Airport.

TABLE 1C
Oregon Aviation Plan 2007
Design Criteria for Regional General Aviation Airports

	Minimum Criteria	Desired Criteria
Airside Facilities		
FAA-ARC	B-II	Varies
Runway Length	4,000	Varies
Runway Width	75	Varies
Pavement Type	Concrete or Asphalt	Concrete or Asphalt
Taxiways	Partial or Turnarounds	Full Parallel
Approach Type	Non-Precision	Precision
Visual Aids	One Runway End	Both Runway ends
Runway Lighting	MIRL	MIRL/HIRL
Taxiway Lighting	MITL	MITL/HITL
General Facilities		
Rotating Beacon	Yes	Yes
Lighted Wind Indicator	Yes	Yes
Weather Reporting	AWOS/ASOS	AWOS/ASOS
Hangared Aircraft Storage	75% of based aircraft	100% of based aircraft
Apron Parking/Storage	30% of daily transient	50% of daily transient
Terminal Building	Small meeting area	Yes
Auto Parking	Minimal	Moderate
Fencing	Terminal Area	Perimeter
Cargo	Space on existing apron	Designated apron area
Services		
Fuel	AvGas and Jet A	AvGas, Jet A, 24-hour
FBO	Full Service	Full Service, 24-hour
Ground Transportation	Courtesy Car	Rental, Taxi, or Other
Food Service	Vending	Vending
Restrooms	Yes	Yes
Pilot Lounge	Yes w/ weather reporting station	Yes w/ weather reporting station
Snow Removal	Yes	Yes
Telephone	Yes	Yes

Source: Oregon Aviation Plan 2007

The WASP identifies Columbia Gorge Regional Airport as a Regional Service airport. Regional Service Airports meet the following criteria:

- Have at least 40 based aircraft, unless the airport is required for coverage of lower density population areas.

- Have a runway at least 4,000 feet long, unless the airport is designated as a NPIAS *reliever*.
- Be separated from another Regional Service Airport or a comparable Commercial Service Airport by at least 30 minutes driving time, unless closer airports are justified by large population numbers within the service area.
- Have a minimum service area population of approximately 5,000 (90-minute driving time) and a maximum service area population of approximately 400,000 (60-minute driving time).

The Washington State airport classification system not only assigns airports based on their function and role, but also sets performance objectives. The performance objectives are used to evaluate facilities, services, and other factors important to preserving the airport system. **Table 1D** presents the performance objectives for Regional Service Airports such as Columbia Gorge Regional Airport.

TABLE 1D
Performance Objectives for Regional Service Airports
Washington Aviation System Plan

Operational Factors	
	Standard runway safety area
	Standard obstacle free zone
	Runway condition exceeds 75 PCI
	Taxiway condition exceeds 70 PCI
	Apron condition exceeds 70 PCI
	Clear threshold siting surface
Planning Document	
	Planning documents less than 7 years old
Land Use Compatibility Protection	
	Compatibility policies in local comprehensive plan
	Appropriate zoning designation for airport
	Land use controlled in runway protection zones
	Height and hazard zoning
	Zoning discourages incompatible development
Facilities	
	5,000 foot long runway
	Full length parallel taxiway
	Lower than 3/4-mile visibility minimum
	Visual glide slope indicators
	Weather reporting capability
Services	
	Jet A and Avgas
	Major maintenance services

PCI: Pavement Condition Index

Source: Washington Aviation System Plan (2009)

LOCAL AIRPORT PLANNING

The airport master plan is the primary local planning document. The master plan is intended to provide a 20-year vision for airport development based on aviation demand forecasts. Forecasts beyond five years become less reliable. It has been five years since the airport has prepared aviation demand forecasts. As a result, this is an appropriate time to update these forecasts and revisit the development assumptions from the previous airport master plan. This document is intended to replace/update the *2004 Airport Layout Plan Report* as the primary airport planning document for the City of The Dalles and Klickitat County.

ECONOMIC IMPACT

The airports in Oregon and Washington provide the states with a safe and efficient air transportation system and provide an important stimulus for economic development. Many of the state's businesses, large and small, rely on the aviation system to rapidly transport personnel, equipment, and supplies. In addition, the tourism industries in Oregon and Washington rely on aviation to support activities such as lodging, dining, retail, and entertainment.

As part of the Oregon Aviation Plan 2007, the economic contributions of airports and the aviation industry to the state was analyzed. The economic impacts of airports include direct on-airport impacts, off-airport visitor spending, and spin-off impacts (economic multipliers). The study also quantified economic impacts that were generated by the presence of the airport but may not be aviation-related, such as industrial or business parks. The economic impact is measured in terms of employment, wages, and business sales.

The aviation industry in Oregon accounted for 197,040 jobs, $6.8 billion in wages, and $24.4 billion in business sales. This figure includes the impact of the Port of Portland airports which account for approximately 30 percent of the state aviation impact. The Columbia Gorge Regional Airport contributed 38 jobs, $829,000 in wages, and $2.4 million in business sales.

The Washington State Department of Transportation – Aviation completed an economic impact study for the states airports in 2002. The methodology utilized is consistent with analytical models used by the Federal Aviation Administration (FAA), and employs the use of direct survey information and an input/output model (IMPLAN) as developed by the U.S. Department of Commerce to determine multipliers specific to the state of Washington for "secondary" economic impacts. In 2002, the airport supported 14 jobs, $218,000 in payroll, and $814,000 in economic activity (sales output. In 2010, WSDOT Aviation is updating the economic impact study for the states airports.

AIRSIDE FACILITIES

Airport facilities can be functionally classified into two broad categories:

airside and landside. The airside category includes those facilities which are needed for the safe and efficient movement of aircraft, such as runways, taxiways, lighting, and navigational aids. The landside category includes those facilities necessary to provide a safe transition from surface-to-air transportation, including aprons, hangars, terminal buildings, and various other support facilities.

Existing airside facilities are identified on **Exhibit 1B**. **Table 1E** summarizes airside facility data for Columbia Gorge Regional Airport.

TABLE 1E
Airside Facility Data
Columbia Gorge Regional Airport

	RUNWAY 12-30	RUNWAY 7-25
Runway Length	5,097'	4,647'
Runway Width	100'	100'
Runway Surface Material (Condition)	Asphalt (Good)	Asphalt (Good)
Runway Markings (Condition)	Basic (Good)	Basic (Good)/Precision (Good)
Runway Lighting	Medium Intensity (MIRL)	Medium Intensity (MIRL)
Displaced Threshold	200' (12)	440' (7)/196' (25)
Runway Load Bearing Strength (pounds)		
Single Wheel Loading (SWL)*	18,000	4,000
Taxiway Lighting	Reflectors	
Taxiway, Taxilanes & Apron Lighting	Centerline marking, Tie-down area marking	
Traffic Pattern	Standard Left	Standard Left
Approach Aids	REIL (30)	NA
Instrument Approach Aids	RNAV GPS-A (Circling)	RNAV GPS-A (Circling) LDA/DME – Rwy 25 (Copter) LDA/DME – Rwy. 25
Weather and Navigational Aids	Automated Surface Observation System (ASOS) Lighted Wind Cone Segmented Circle Airport Beacon Localizer Klickitat VOR/DME Remote Communications Outlet	

PAPI - Precision Approach Path Indicator
GPS - Global Positioning System
VOR - Very High Frequency Omni-directional Range
REIL - Runway End Identifier Lights
MALSR - Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights

* Estimate based on July 23, 2008 report, *Load Rating Analysis*, prepared by Pavement Services, Inc.

Source: Airport/Facility Directory – Northwest U.S. (August 27, 2009); Airport records.

RUNWAYS

Columbia Gorge Regional Airport is served by a two-runway system, both of which are constructed of asphalt. The primary runway, Runway 12-30, is 5,097 feet long by 100 feet wide. The Runway 12 end has an elevation of 210 feet MSL and the Runway 30 end is 239 feet MSL. This is a runway gradient of 0.6 percent. It is estimated that this runway accommodates approximately 70 percent of operations.

Crosswind Runway 7-25 is 4,647 feet long and 100 feet wide. This runway is strength rated at 4,000 pounds. The Runway 7 end has an elevation of 211 feet MSL and the Runway 25 end is 243 feet MSL. This is a runway gradient of 0.7 percent. It is estimated that this runway accommodates 30 percent of operations.

The landing threshold to Runway 12 is displaced 200 feet meaning those landing to Runway 12 have 4,897 feet available. Runway 7 is displaced 440 feet, and Runway 25 is displaced 196 feet. The Runway 25 displacement is intended to provide the required 300-foot runway safety area prior to landing. The other displacements are intended to provide clearance over potential obstructions on the approach to the runway ends.

The identified obstructions include the approach to Runway 12 which has 50-foot tall trees located 970 feet from the runway end and which require a 15:1 slope to clear. On the approach to Runway 7, there are 17-foot tall trees located 500 feet from the runway end which require a 17:1 slope to clear.

It should be noted that a third runway, Runway 2-20, was closed in 2005, as it was no longer needed to provide for crosswind coverage. A portion of this runway was converted to a taxiway to provide access to the Runway 25 threshold.

Both runways are "shed section" runways. This term means that the runways slope to one side to allow runoff. A more modern construction is to create a crown section, which provides drainage to either side of the runway, allowing runoff to both sides of the runway.

PAVEMENT STRENGTH

Current publications, including the FAA Airport/Facility Directory, place the pavement strength for both runways at 30,000 pounds single wheel loading (SWL), and 30,000 pounds dual wheel loading (DWL). These strength ratings refer to the configuration of the aircraft landing gear. For example, SWL indicates an aircraft with a single wheel on each landing gear.

In 2008, the airport engineer was contracted to conduct a pavement evaluation to determine the actual pavement condition. Utilizing deflection testing and runway core sampling, it was determined that the runways consist of approximately 2.5 inches of asphalt concrete over approximately 6.5 inches of sandy gravel.

Based on the results of the core sampling and deflection testing, the single wheel load bearing capacity for Runway 7-25 is estimated at 4,000 pounds. For Runway 12-30, the load bearing capacity is estimated at 18,000 pounds. These strength ratings do not preclude operations by aircraft with greater weight, but it does indicate that the life of the pavement will be significantly reduced. The airport does require prior permission for aircraft weighing more than the published 30,000 pounds.

PAVEMENT CONDITION

Every three years, the Oregon Department of Aviation performs inspections of the pavement conditions at

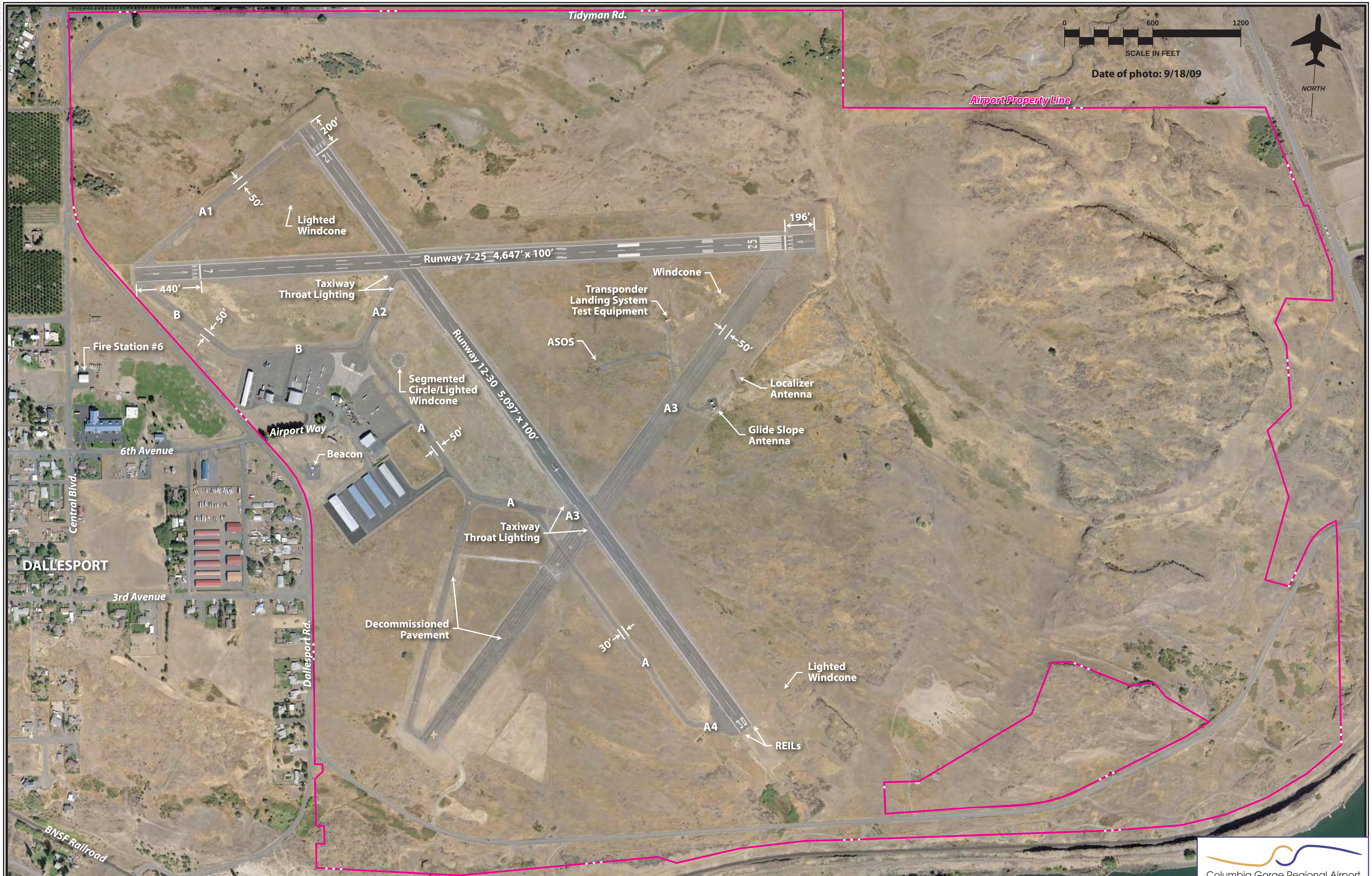

Exhibit 1B
AIRSIDE FACILITIES

the public use airports under its jurisdiction, including Columbia Gorge Regional Airport. The pavement maintenance management program was developed as part of the Oregon Continuous Aviation System Plan sponsored in part by the Oregon Department of Aviation and the FAA. The information and data generated ensures airport sponsors are in compliance with the requirements of FAA Grant Assurance Number 11, which states that any airport requesting federal funds for pavement improvement projects must have implemented a pavement maintenance management program.

The most recent inspection was on October 3, 2009. The inspections are conducted in compliance with FAA Advisory Circular (AC) 150/5380-6, *Guidelines and Procedures for Maintenance of Airport Pavements*. The inspection data is entered into the MicroPAVER software for analysis. Maintaining a MicroPAVER database ensures that the airport complies with the "record keeping and information retrieval" requirements of the FAA grant assurances.

The MicroPAVER software calculates a Pavement Condition Index (PCI) for each section of pavement on the airfield (runways, taxiway, and aprons). The program also generates forecasts of pavement condition five and 10 years into the future. The pavement condition index map for Columbia Gorge Regional Airport is presented on **Exhibit 1C**.

As of 2006, the majority of pavement composing the runways and taxiways was in "excellent" condition. This is to be expected since both runways received surface treatments and were striped in 2005. Over time the pavements can be expected to deteriorate. Still, by 2016, the runways and taxiways are forecast to still be in "good" condition, and the center and northwest aprons may be in "fair" condition. Generally, the runways and taxiways should be maintained at 70 PCI or greater and the other pavements should be at 55 or better. The MicroPAVER software also produces detailed reports on what on-going routine maintenance should be performed in order to maintain these condition levels.

Washington State conducts pavement condition inspections every five years. They conduct the inspections in much the same manner as Oregon utilizing the Pavement Condition Index. Currently, Washington State utilized the Oregon inspections for Columbia Gorge Regional Airport.

TAXIWAYS

In 2007, the airport installed new lighted taxiway directional signs. As a result, the taxiway designations have changed since the last airport layout plan was approved. Taxiway A1 is 50 feet wide and extends from the Runway 7 threshold to the Runway 12 threshold. Taxiway A2 is 50 feet wide and extends from the main terminal apron to the intersection of the two runways. Taxiway A3 is 50 feet wide and extends from the intersection with Taxiway A across Runway 12-30 and continues to the Runway 25 threshold.

The portion of Taxiway A3 to the east of Runway 12-30 is the converted portion of Runway 2-20. Taxiway A4 is 30 feet wide and is the angled portion of the taxiway leading to the Runway 30 threshold.

Taxiway A is the terminal area taxiway and it extends from near the fuel island southeast to the Runway 30 threshold. The portion of Taxiway A that extends from the main apron to the intersection with Taxiway A3 is 50 feet wide. From the intersection with Taxiway A3, Taxiway A is 30 feet wide and extends to Taxiway A4. Taxiway B is 50 feet wide and traverses the northwest apron edge, connecting the Runway 7 threshold to the intersection of Taxiway A2 and Taxiway A.

The layout and separation distance of the taxiways from the runway is an important consideration. At its maximum separation, Taxiway B is 575 feet from Runway 7-25. The portion of Taxiway B that extends to the Runway 7 threshold is angled. Taxiway A is 575 feet from Runway 12-30. Taxiway A, southeast of the intersection with Taxiway A3, is separated from Runway 12-30 by 300 feet. Taxiway A4 angles to meet the Runway 30 threshold. Taxiways A1 and A3 meet the threshold for Runways 7 and 25, respectively, at an angle. The taxilane providing access to the southwest T-hangar complex is designated Taxiway D and is 35 feet wide.

PAVEMENT MARKINGS

Pavement markings aid in the movement of aircraft along airport surfaces and identify closed or hazardous areas on the airport. Runway 25 has precision markings that include runway designations, threshold, fixed-distance aiming points, touchdown zone, edges, and centerline. Runway 7 has non-precision markings that include threshold, designation, centerline, and aiming point. Runway 12-30 provides basic markings which include the runway designations, runway centerline markings, and runway edge markings. Runways 7, 12, and 25 have displaced threshold markings as well.

Taxiway and apron centerline markings assist pilots when moving on these surfaces. The taxiways have standard yellow centerline markings.

In the northeast corner of the main apron, a white "H" designation is painted to identify the location for helicopter landings.

AIRFIELD LIGHTING

Airfield lighting systems extend an airport's usefulness into periods of darkness and/or poor visibility. A variety of lighting systems are installed at the airport for this purpose. These lighting systems, categorized by function, are summarized as follows:

Identification Lighting: The location of the airport at night is universally identified by a beacon. The rotating beacon projects two beams of light, one white and one green, 180 degrees apart. The beacon at Columbia Gorge Regional Airport is situated on the top of a 115-foot tall steel lat-

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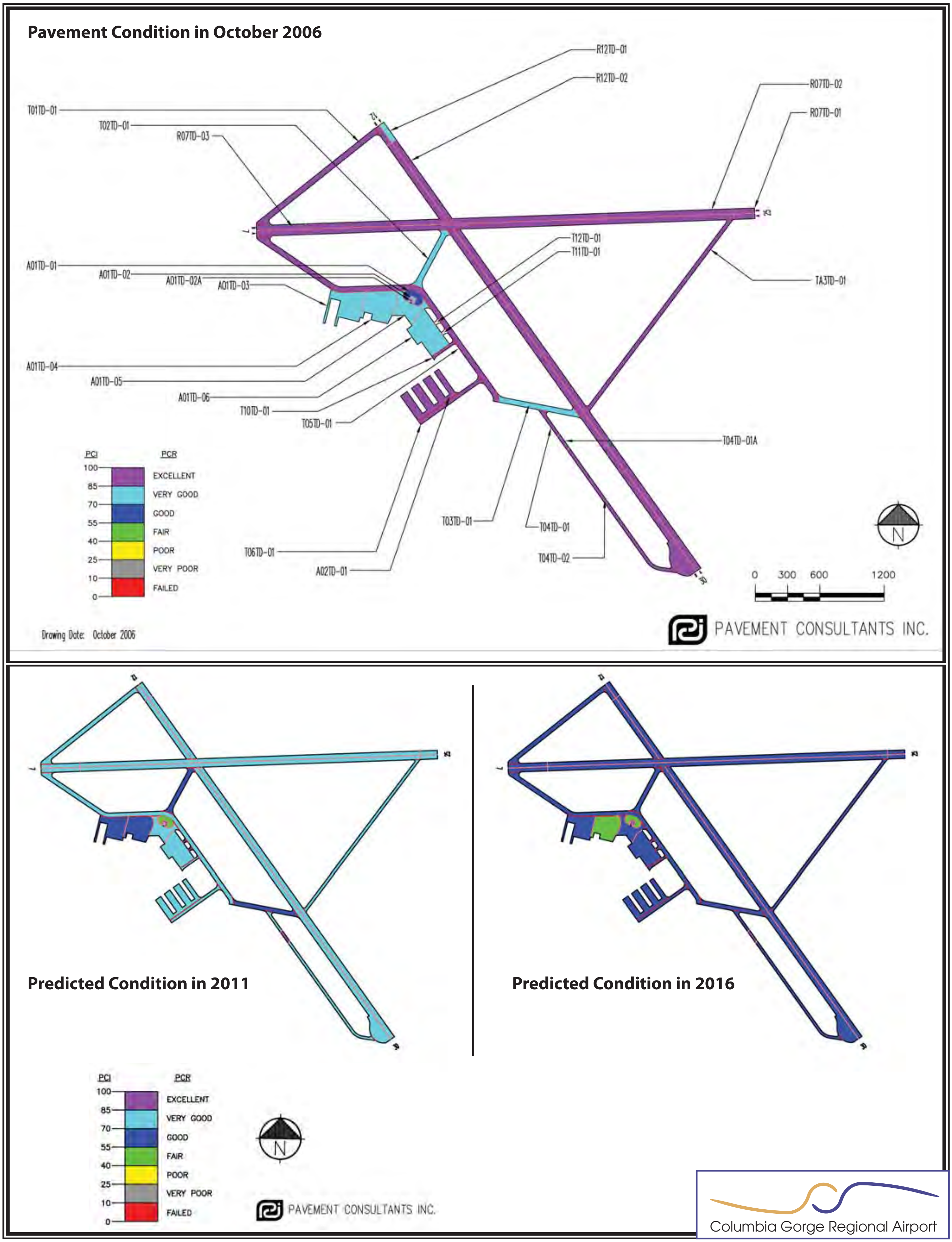

Exhibit 1C
CURRENT AND FUTURE PAVEMENT CONDITION

tice tower structure located at the western edge of the terminal area near the entrance road.

Runway and Taxiway Lighting: Runway lighting utilizes light fixtures placed near the edge of the pavement to define the lateral limits of the pavement. This lighting is essential for safe operations during night and/or times of low visibility in order to maintain safe and efficient access to and from the runway and aircraft parking areas.

Both runways are equipped with medium intensity runway lighting (MIRL). These are lights set atop poles that are approximately one foot above the ground. The light poles are frangible, meaning if one is struck by an object, such as an aircraft wheel, they can easily break away, thus limiting the potential damage to an aircraft. The runway lights are standard white in color. Some precision instrument runways have caution zone yellow edge lights in the last 2,000 feet of the runway. There are no caution zone lights at the airport. Runway threshold lighting identifies each runway end.

There is partial taxiway lighting located at the intersections of Taxiway A2 and A3 with Runway 12-30. This lighting, referred to as "throat lighting," does not extend the full length of these taxiways. This lighting is intended to provide positive visual verification of the location of these taxiway exits from the runway. There is no other taxiway lighting at the airport.

Visual Approach Lighting: Common visual approach aids include precision approach path indicator (PAPI) and visual approach slope indicator (VASI) lights. These approach aids consist of a system of lights located at various distances from the runway threshold, which when interpreted by the pilot, give them an indication of being above, below, or on the correct descent path to the runway. There are no visual approach lighting aids currently available at the airport.

Runway End Identification Lighting: Set to either side of the Runway 30 threshold is runway end identification lighting (REIL). REILs provide a visual identification of the runway end for landing aircraft. The system consists of two flashing light assemblies located approximately 40 feet to either side of the runway landing threshold. These flashing lights can be seen day or night for up to 20 miles depending on visibility conditions. Runway 30 is the only runway end equipped with REILs. The REILs are owned and maintained by the FAA.

Airfield Signs: Airfield identification signs assist pilots in identifying their location on the airfield and direct them to their desired location. The airfield signs are located at various intersections at the airport. Both runways have distance-to-go signs at 1,000-foot intervals to the side of the runways. All airfield signs are lighted.

Pilot-Controlled Lighting: The airfield lights are turned off at nighttime. Pilots can utilize the pilot-controlled lighting system (PCL) to activate the airfield lights from their aircraft through a series of clicks of their radio transmitter utilizing the CTAF frequency (123.0 MHz). The lights for both runways and the REILs are controllable through the system. Typically, the airfield lights will remain on for approximately 15 minutes.

WEATHER AND COMMUNICATION AIDS

Columbia Gorge Regional Airport has four wind socks, three of which are lit, on the airfield. Wind socks provide information to pilots regarding wind conditions, such as direction and speed. The main lighted windsock is located within the segmented circle immediately to the northeast of the terminal area apron. There are three additional supplemental wind cones. One is located to the northeast of the Runway 30 threshold and is lighted; one is to the southwest of the Runway 25 threshold and is also lighted; and the third is south of Runway 25 between the runway and Taxiway A3. Having four wind indicators spread out along the runway system is advantageous because pilots can determine wind conditions from anywhere on the runway/taxiway system.

A segmented circle provides traffic pattern information to pilots. The segmented circle is centrally located between Taxiway C and Runway 12-30.

Columbia Gorge Regional Airport is equipped with an Automated Surface Observing System (ASOS). An ASOS will automatically record weather conditions such as wind speed, wind gust, wind direction, temperature, dew point, altimeter setting, visibility, fog/haze condition, precipitation, and cloud height. This information is then transmitted at regular intervals (usually once per hour). Aircraft in the vicinity can receive this information if they have their radio tuned to the correct frequency (135.175 MHz). In addition, pilots and individuals can call a published telephone number and receive the information via an automated voice recording. The next closest automated weather broadcast is from the automated weather observation system (AWOS) located 16 nautical miles to the west at Ken Jernstedt Airfield (4S2) in Hood River, Oregon.

Columbia Gorge Regional Airport also utilizes the common traffic advisory frequency (CTAF). This radio frequency (123.0 MHz) is used by pilots in the vicinity of the airport to communicate with each other about approaches or take-offs from the airport. This frequency is also utilized to contact the airport fixed base operator (FBO). Seattle Center Approach and Departure Control are available via frequency 119.65 MHz.

The airport is also equipped with a Remote Communications Outlet (RCO). Due to the location of the airport, some aircraft on the ground may not be able to reach Seattle Center via the published frequency. The RCO provides a direct link with Seattle Center Approach and Departure Control via a different frequency (122.65 MHz). The RCO was established to provide ground-to-ground communications between air traffic control specialists and pilots at satellite airports for delivering enroute clearances, departure clearances, and acknowledging instrument flight rule cancellation or departure/landing times.

NAVIGATIONAL AIDS

Navigational aids are electronic devices that transmit radio frequencies, which pilots of properly equipped aircraft can translate into point-to-point guidance and position information. The types of electronic navigational aids available for aircraft flying in the vicinity of Columbia Gorge Regional Airport include a very high frequency omni-directional range (VOR) facility and the global positioning system (GPS).

The very high omni-directional range (VOR), in general, provides azimuth readings to pilots of properly equipped aircraft transmitting a radio signal at every degree to provide 360 individual navigational courses. Frequently, distance measuring equipment (DME) is combined with a VOR facility (VOR/DME) to provide distance as well as direction information to the pilot. Military tactical air navigation aids (TACANs) and civil VORs are commonly combined to form a VORTAC. The VORTAC provides distance and direction information to both civil and military pilots. The Klickitat VOR/DME is located approximately six miles to the north of the airport.

Global Positioning System (GPS) is an additional navigational aid for pilots. GPS was initially developed by the United States Department of Defense for military navigation around the world. GPS differs from a VOR in that pilots are not required to navigate using a specific ground-based facility. GPS uses satellites placed in orbit around the earth that transmit electronic radio signals, which pilots of properly equipped aircraft use to determine altitude, speed, and other navigational information. With GPS, pilots can navigate directly to any airport in the country and are not required to navigate using a ground-based navigational facility.

Loran-C is another point-to-point navigation system available to pilots. Where GPS utilizes satellite-based transmitters, Loran-C uses a system of ground-based transmitters.

AREA AIRSPACE

The Federal Aviation Administration (FAA) Act of 1958 established the FAA as the responsible agency for the control and use of navigable airspace within the United States. The FAA has established the National Airspace System (NAS) to protect persons and property on the ground and to establish a safe environment for civil, commercial, and military aviation. The NAS is defined as the common network of U.S. airspace, including air navigational facilities; airports and landing areas; aeronautical charts; associated rules, regulations, and procedures; technical information; and personnel and material. System components shared jointly with the military are also included as part of this system.

To ensure a safe and efficient airspace environment for all aspects of aviation, the FAA has established an airspace structure that regulates and establishes procedures for aircraft using the National Airspace System. The U.S. airspace structure provides for categories of airspace, controlled and uncontrolled, and identifies them as Classes A, B, C, D, E, and G as described below. **Exhibit 1D** generally illustrates each airspace type in three-dimensional form.

- Class A airspace is controlled airspace and includes all airspace from 18,000 feet MSL to Flight Level 600 (approximately 60,000 feet MSL).

- Class B airspace is controlled airspace surrounding high-activity commercial service airports (i.e., Seattle-Tacoma International Airport).

- Class C airspace is controlled airspace surrounding lower-activity commercial service (i.e., Portland, OR) and some military airports.

- Class D airspace is controlled airspace surrounding low-activity commercial service and general aviation airports with an airport traffic control tower (ATCT), such as Hillsboro Airport to the west of Portland.

All aircraft operating within Classes A, B, C, and D airspace must be in constant contact with the air traffic control facility responsible for that particular airspace sector.

- Class E airspace is controlled airspace surrounding an airport that encompasses all instrument approach procedures and low-altitude federal airways. Only aircraft conducting instrument flights are required to be in contact with air traffic control when operating in Class E airspace. While aircraft conducting visual flights in Class E airspace are not required to be in radio contact with air traffic control facilities, visual flight can only be conducted if minimum visibility and cloud ceilings exist.

- Class G airspace is uncontrolled airspace that does not require communication with an air traffic control facility.

Airspace within the vicinity of Columbia Gorge Regional Airport is depicted on **Exhibit 1E**. The airport operates in Class E airspace with a floor of 700 feet above ground level (AGL) and extending to 18,000 feet MSL. The terrain in the area helps define the limits of the Class E airspace. It should be noted that traditional transponder contact with air traffic control is not available below 500 feet in the airport vicinity because of the terrain.

Victor Airways

Victor Airways are designated navigational routes extending between VOR facilities. Victor Airways have a floor of 1,200 feet AGL and extend upward to an altitude of 18,000 feet MSL and are eight nautical miles wide. There

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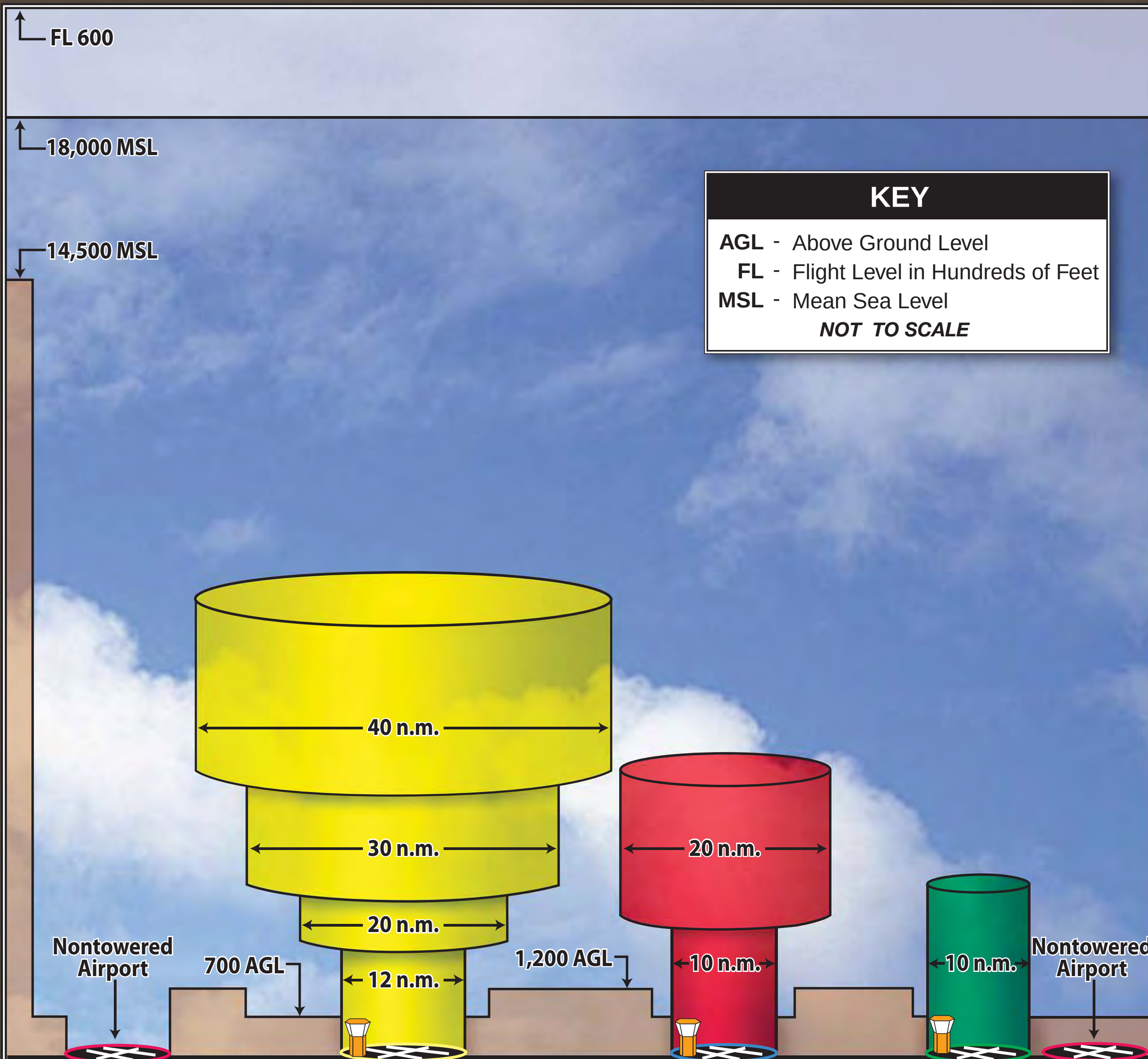
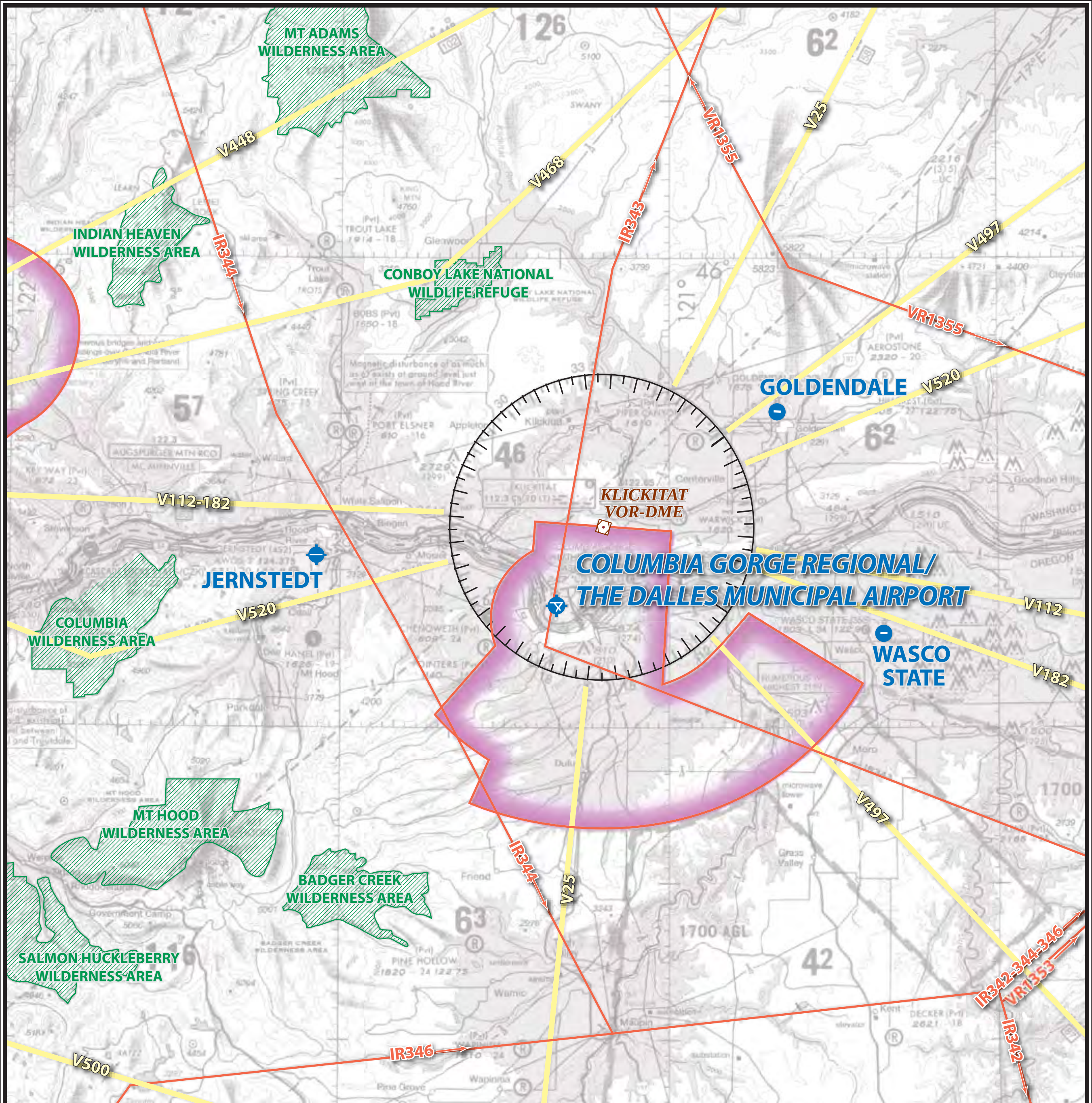


CLASSIFICATION	DEFINITION
CLASS A	Generally airspace above 18,000 feet MSL up to and including FL 600.
CLASS B	Generally multi-layered airspace from the surface up to 10,000 feet MSL surrounding the nation's busiest airports.
CLASS C	Generally airspace from the surface to 4,000 feet AGL surrounding towered airports with service by radar approach control.
CLASS D	Generally airspace from the surface to 2,500 feet AGL surrounding towered airports.
CLASS E	Generally controlled airspace that is not Class A, Class B, Class C, or Class D.
CLASS G	Generally uncontrolled airspace that is not Class A, Class B, Class C, Class D, or Class E.

Source: "Airspace Reclassification and Charting Changes for VFR Products," National Oceanic and Atmospheric Administration, National Ocean Service. Chart adapted by Coffman Associates from AOPA Pilot, January 1993.

Columbia Gorge Regional Airport

Exhibit 1D
AIRSPACE CLASSIFICATION



LEGEND

- Airport with hard-surfaced runways 1,500' to 8,069' in length
- Compass Rose
- VOR-DME
- Wilderness Area
- Class E Airspace with floor 700 ft. above surface
- Victor Airways
- Military

NORTH

NOT TO SCALE

Source: Seattle South Sectional Charts, US Department of Commerce, National Oceanic and Atmospheric Administration 12/18/08

Columbia Gorge Regional Airport

Exhibit 1E
AIRSPACE MAP

are numerous Victor Airways in the vicinity due to the location of the Klickitat VOR/DME located six miles to the north of the airport.

Military Operations Areas (MOAs)

A Military Operations Area (MOA) is an area of airspace designated for military training use. This is not restricted airspace as civil pilots can use the airspace. However, they should be on alert for the possibility of military traffic. A pilot may need to be aware that military aircraft can be found in high concentrations, conducting aerobatic maneuvers, and possibly operating at high speeds at lower elevations. The activity status of a MOA is advertised by a *Notice to Airmen* (NOTAM) and noted on Sectional Charts. The closest MOA to Columbia Gorge Regional Airport is the Boardman MOA located approximately 60 nautical miles to the east.

Military Training Routes

A Military Training Route, or MTR, is a specified training route for military pilot proficiency. Aircraft operate on the MTR at speeds in excess of 250 knots and up to 10,000 feet MSL. There are several MTRs in the vicinity, including IR343 that goes directly over the airport. General aviation pilots should be aware of the locations of the MTRs and exercise special caution if they need to cross them.

Restricted Areas

According to the FAA, "Restricted areas denote the existence of unusual, often invisible, hazards to aircraft such as artillery firing, aerial gunnery, or guided missiles. Penetration of restricted areas without authorization from the using or controlling agency may be extremely hazardous to the aircraft and its occupants." There is a designated restricted area (R-5701/5706) located within the Boardman MOA approximately 60 nautical miles to the east. The restricted area is associated with the Naval Weapons Systems Training Facility commonly referred to as the Boardman Bombing Range.

INSTRUMENT APPROACH PROCEDURES

Instrument approach procedures are a series of predetermined maneuvers established by the FAA using electronic navigational aids to assist pilots in locating and landing at an airport during low visibility and cloud ceiling conditions. The capability of an instrument approach is defined by the visibility and cloud ceiling minimums associated with the approach. Visibility minimums define the horizontal distance the pilot must be able to see to complete the approach. Cloud ceilings define the lowest level a cloud layer (defined in feet above the ground) can be situated for a pilot to complete the approach. If the observed visibility or cloud ceiling is below the minimums prescribed for the approach, the pilot cannot complete the instrument approach.

There are three instrument approaches for Columbia Gorge Regional Airport as presented in **Table 1F**.

TABLE 1F
Instrument Approach Data
Columbia Gorge Regional Airport

	WEATHER MINIMUMS BY AIRCRAFT TYPE					
	Category A		Category B		Categories C & D	
	CH	VIS	CH	VIS	CH	VIS
RNAV (GPS)-A						
Circling	1,100	1¼	1,000	1½	1,000	3
LDA/DME Rwy 25						
S-LDA/GS 25	1,200	2¾	1,200	2¾	NA	NA
Circling	1,200	3	1,200	3	NA	NA
Copter LDA/DME Rwy 25						
H-LDA/GA 25	600	1½				

Aircraft Categories are based on 1.3 times the stall speed in landing configuration as follows:
Category A: 0-90 knots (Cessna 172)
Category B: 91-120 knots (Beech craft King Air)
Category C: 121-140 knots (Canadair Challenger)
Category D: 141-166 knots (Gulfstream IV)

Abbreviations:
CH - Cloud Height (in feet above ground level)
VIS - Visibility Minimums (in miles)
GPS - Geographic Positioning System
Source: U.S. Terminal Procedures, Northwest (August 27, 2009)

The first instrument approach listed is the circling RNAV GPS approach. Utilizing on-board GPS, pilots can approach the airport and circle to the optimal runway for landing.

The next approach is a sophisticated variant of an instrument landing system (ILS) called the Localizer type Directional Aid (LDA). The Localizer Directional Aid (LDA) is an electronic beam used to guide aircraft to a specific point in space. It works similar to the localizer beam of an Instrument Landing System (ILS). Unlike an ILS, the LDA is not aligned with a runway. The beam is used as guidance through the clouds. After descending clear of the clouds, the pilot then abandons the course guidance and executes a sidestep type of maneuver to the runway of intended landing. At Columbia Gorge Regional Airport, the localizer antenna is offset from the runway by six degrees.

The last instrument approach is designed to be utilized by helicopters. The Copter LDA/DME Runway 25 approach utilizes the localizer antenna to guide helicopters to a specific point from which visual approaches are then permissible.

RUNWAY USE AND TRAFFIC PATTERNS

Columbia Gorge Regional Airport is situated at 247 feet MSL. All runways have a standard left hand traffic pattern. The traffic pattern altitude for all fixed-wing aircraft is 1,000 feet

AGL. The helicopter traffic pattern is designated at 500 feet AGL.

Runway use is dictated by prevailing wind conditions. Ideally, it is desirable for aircraft to land directly into the wind. The prevailing wind is from the northwest to the southeast. Therefore, Runway 12-30 is the primary runway experiencing approximately 70 percent of operations. Of this percentage, Runway 30 experiences approximately 65 percent of the operations while Runway 12 experiences approximately five percent. Runway 30 is also the calm wind runway. Runway 7-25 accommodates approximately 30 percent of the remaining operations, with an even split between the two ends.

LANDSIDE FACILITIES

Landside facilities are the ground-based facilities that support the aircraft and pilot/passenger handling functions. These facilities typically include the FBOs, aircraft storage hangars, aircraft maintenance hangars, aircraft parking aprons, and support facilities such as fuel storage, automobile parking, roadway access, and aircraft rescue and firefighting. Landside facilities are identified on **Exhibit 1F**.

AIRPORT BUSINESSES

The airport terminal building is centrally located, facing the main terminal area apron. The terminal building was constructed in 1943 and is two stories high. The main level includes a central gathering area, FBO desk, restrooms, and a small restaurant. The second floor is where airport administration is located. The terminal building is approximately 2,500 square feet.

The FBO is **Gorge Aviation Services**. Gorge Aviation Services offers fuel, ground support services, and pilot supplies. Gorge Aviation Services leases space within the terminal building as well as the conventional hangar immediately northwest of the terminal building. They sub-let this hangar to American Aerospace Engineering. They have two courtesy cars on-site. The FBO operates a flight school.

American Aerospace Engineering (AAE) occupies the 8,000 square-foot conventional hangar immediately north of the terminal building. AAE provides a comprehensive list of aviation related engineering services, including avionics, electrical engineering, flight testing, aerospace engineering, aircraft maintenance and repair, and mechanical engineering.

Life Flight Network occupies the 3,000 square foot Quonset hangar to the north of the terminal building. From this location, they base both a helicopter and a fixed wing aircraft (Aero Commander) for transport of critical patients for medical services. Life Flight has operations at several airports in Washington, Oregon, and Idaho and is a consortium of Oregon Health & Science University, Legacy Health, Saint Alphonsus Regional Medical Center, and Providence Health and Services.

Shearer Sprayers is an aerial application company that occupies the 6,000 square-foot hangar to the south of the terminal building. This hangar is currently used to store two turbine-powered single engine Air Tractor aircraft (models AT-402). Chemical loading of the aircraft takes place off-airport.

AIRCRAFT HANGAR FACILITIES

The airport has available either T-hangar units or bulk storage in conventional hangars. There are five T-hangar facilities. The oldest facility located on the north end of the main apron is of wood-frame construction and provides eight units. This facility, locally referred to as the Otis Hangars, is owned by the airport.

On the south end of the terminal area are four relatively new T-hangar facilities. These are identified as buildings A, B, C, and D. Building A was privately constructed in 1999 and provides 11 individual spaces. Buildings B and C have 11 units each and were constructed in 2004 by the airport. T-hangar building D was privately constructed in 2009 and provides 8 units. Three of the units have 42-foot bi-fold doors, one unit has a 45-foot bi-fold door, three units have 48-foot bi-fold doors, and one unit has a 60-foot bi-fold door. There are also two storage units with 12-foot garage doors.

There are three other hangars at the airport. To the south of the terminal building is a 6,000 square-foot hangar currently leased by Shearer Sprayers. To the immediate north is an 8,000 square-foot hangar currently leased by Gorge Aviation Services and sub-let to AAE. The Quonset hangar to the north of the AAE hangar is approximately 3,000 square feet and is leased by Life Flight Network. **Table 1G** summarized airport buildings.

TABLE 1G
Building Inventory
Columbia Gorge Regional Airport

Number	Building Type	Storage Units	Year Constructed	Condition	Ownership	Approx. Square Footage
1	T-Hangar (Otis Hangar)	8	1940s	Poor	Airport	9,600
2	Quonset Hut	Up to 2	1940s	Poor	Airport	3,000
3	Conventional	Up to 5	1940s	Poor	Airport	8,000
4	Terminal	NA	1943	Poor	Airport	2,400
5	Conventional	Up to 3	1950s	Poor	Airport	6,000
6	T-Hangar (A)	11	1999	Good	Private (Land lease)	12,500
7	T-Hangar (B)	11	2004	Excellent	Airport	12,500
8	T-Hangar (C)	11	2004	Excellent	Airport	12,500
9	T-Hangar (D)	10	2005	Excellent	Private (Land lease)	12,500

Source: Airport Records/Interviews

While most aircraft owners would prefer to store their aircraft in an enclosed hangar, some will elect to utilize outside aircraft tie-down positions. It is estimated that there are seven

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Exhibit 1F
LANDSIDE FACILITIES

aircraft that permanently utilize tie-down positions.

AIRCRAFT PARKING APRON

The total apron area is approximately 28,350 square yards. There are four distinct adjoining aprons that make up the total apron area. The south apron area is designated for transient aircraft parking. This apron is approximately 7,900 square yards and has 24 transient positions. These positions are spaced out to accommodate smaller single and multi-engine piston aircraft. This apron is constructed of asphalt.

The next apron area is centered on the airport terminal building and is approximately 7,000 square yards. The fuel farm and self serve pumps are located on this apron. This apron is utilized for circulation purposes and does not have any marked tie-down positions. This apron is primarily constructed of concrete.

The north apron area serves local tie-down needs and ingress/egress to two conventional type hangars. The apron fronting the AAE hangar is approximately 7,650 square yards. The apron fronting the Life Flight hangar is estimated at 5,800 square yards. These two aprons have 37 marked local tie-down positions.

AUTOMOBILE PARKING

There are approximately 45 terminal area vehicle parking spaces, including unmarked spaces. As with many general aviation airports, aircraft owners will typically drive their vehicle to their hangar location. There are no dedicated parking spaces near the hangars.

AIRCRAFT RESCUE AND FIREFIGHTING (ARFF)

As a general aviation facility, the airport is not required to have on airport firefighting capability. The closest fire station is Volunteer Fire District No. 6, located less than a minute from the airport in Dallesport. Through surplus government acquisition, four Oshkosh ARFF crash vehicles are stored at the fire station. At the time of this writing (October 2009), only one of these vehicles is operational. The intent is to have two of the vehicles operational with the remaining two available as parts vehicles.

These vehicles have storage capacity for water, dry chemical and aqueous firefighting foam (AFFF). One of the energy companies that utilize the airport maintains a supply of AFFF that can be quickly loaded to the crash vehicle in case of an emergency.

AIRPORT MAINTENANCE

The airport has a covered maintenance structure that is attached to the west side of the hangar occupied by AAE. Mowers and other equipment are stored here. The airport also utilizes space facing the main apron, immediately southeast of the terminal building, for outdoor storage of equipment.

UTILITIES

The developed areas on the west side of the airfield have water, sanitary sewer, electrical, and telephone service. Water is provided by the Dallesport Water District. A water well was dug and capped in the planned industrial/business park area to the south of the terminal area.

Sewer service was extended to the airport terminal area in 2002 by Klickitat County as part of a sewer upgrade project for Dallesport. The 8-inch sewer line enters the airport at the intersection of Dallesport Road and 6th Avenue. It extends approximately 650 feet to the airport terminal building. The main sewer line runs along the west side of Dallesport Road.

The Klickitat County Public Utility District provides electrical service to the airport. Telephone and data service is available from several carriers, but the airport currently uses Embarq through the city services network. Natural gas is not available at the airport, so a propane tank is located on the side of the terminal building primarily for use by the restaurant. The nearest natural gas pipeline is located along US Highway 197, approximately two miles by road from the terminal area.

FUEL FACILITIES

The airport owns an underground fuel storage system located under the main terminal area apron. Self serve Jet A and Avgas are available from these tanks. The Avgas tank has a 12,000 gallon capacity, and the Jet A tank is 10,000 gallons. The tanks were installed in 1999. The airport has a 3,000 gallon Jet A delivery truck. The airport FBO, Gorge Aviation Services, maintains the fuel farm and pays a $0.07 cent fuel flowage fee to the airport sponsors for the right to sell fuel on the airfield.

Table 1H presents the annual fuel sales for the airport for the last four years. From 2005 to 2006, there was a noticeable 38 percent jump in sales. This is the result of new T-hangars being completed and leased. Fuel sales dropped off slightly in 2007 and gained slightly in 2008. This trend appears to track with the overall national economy, which began a slowdown in 2007 and has been in an extended recession since December 2007.

TABLE 1H
Historic Fuel Sales (in gallons)
Columbia Gorge Regional Airport

	Jet A	100LL	Total
2005	NA	NA	60,989
2006	64,588	33,192	97,780
2007	59,534	26,325	85,859
2008	58,773	28,215	86,988

Source: Airport Records

FENCING

Portions of the terminal area are fenced with chain link with the majority of the perimeter fenced with three strand barbed wire. There are two access gates with key pads allowing authorized people to enter the north and south hangar areas. A manual vehicle gate is located to the immediate south of the terminal building.

SECURITY

The terminal building has four closed circuit security cameras located on each corner of the terminal building. Airport management is able to view the cameras from a terminal station located in the administrative offices in the terminal building. There is an additional camera on the second floor exterior of the terminal building that faces northwest. This camera was purchased by the airport through a security grant from the State of Washington. The airport is responsible for maintenance of this camera. Through an internet portal, the public can see images from the camera at http://www.wsdot.wa.gov/aviation/WebCam/Dalles.htm.

There is a residential manufactured home on the airport property near the airport entrance. This mobile home is occupied by an airport employee. After normal business hours, this employee is responsible for airport security and after-hours aircraft fueling.

ADDITIONAL AIRPORT DOCUMENTATION

The airport maintains several procedural documents which provide guidance for airport management on airport issues. The Rules and Regulations have been adopted for the orderly, safe, and efficient operation of the Columbia Gorge Regional Airport. Minimum standards for aeronautical activities have been made a part of the Rules and Regulations.

AREA LAND USE AND ZONING

Land uses in the vicinity of the airport can have a significant impact on airport operations and growth. The following section identifies baseline information relating to both existing and future land uses in the vicinity of Columbia Gorge Regional Airport. By understanding the land use issues surrounding the airport, more appropriate recommendations can be made for the future of the airport.

STATE AUTHORITY

The Washington State Department of Transportation – Aviation Division (WSDOT – Aviation) plays an active role in the preservation of general aviation airports. WSDOT Aviation assists local jurisdictions, airports, and other interests to protect public use airports from incompatible development by providing technical assistance and resources to support local decision making. The *Airport and Compatible Land Use Program* is continually being updated to reflect new research and planning methods to assist local jurisdictions. The most recent version was released May 6, 2010.

As outlined in the *Airport and Compatible Land Use Program*, the airport sponsor is responsible for implementing airport land use compatibility measures. Airport compatibility issues can be addressed in Countywide Planning Policies, Comprehensive Plans, Sub-Area Plans, Development Regulations/Zoning, and Environmental Documentation.

Two sections of the Revised Code of Washington (RCW) provide the legal framework for local jurisdictions to develop and enforce airport land use compatibility guidelines. The first is the Growth Management Act (GMA). Among other things, the GMA defines planning requirements for "essential public facilities" and designates airports as facilities of this type. The second law made land use compatibility a mandatory consideration in local planning. The details of these laws are codified in RCW Sections 36.7A.200 and 36.70.547, respectively.

FEDERAL AUTHORITY

All airports that accept federal development funds must agree to certain Grant Assurances. First and foremost the assurance that airport sponsors will continue to operate the airport as an airport. Grant Assurance No.21 relates to land use compatibility. It states, the airport sponsor "will take appropriate action, to the extent reasonable, including the adoption of zoning laws, to restrict the use of land adjacent to or in the immediate vicinity of the airport to activities and purposes compatible with normal airport operations, including landing and takeoff of aircraft."

The scope of an airport master plan is limited to airport property and the imaginary surfaces surrounding the runway system. Development of comprehensive land use policies and appropriate zoning ordinances is the responsibility of the local sponsor.

Because of the location of the airport on the north side of the Columbia River in Washington, it is important to identify land use considerations for both Klickitat County and the City of The Dalles. **Exhibit 1G** presents current land use zoning for portions of Klickitat County surrounding the airport and for the City of The Dalles.

The airport is located in the Airport Development District according to the Klickitat County Zoning Ordinance No. 62678, as amended. The intent of the District is to insure compatibility with adjacent properties and to enhance economic development. Permitted uses include airport facilities, aviation related businesses, aviation research and development, and aviation schools. Other conditionally permitted uses include restaurants, commercial recreation, offices, public utility facilities, fire and police stations, light industrial uses dependent on air transportation, and any other uses judged by the Board of Adjustment to be consistent with the airport's primary function. All planned uses of airport property must be consistent with applicable federal regulations.

Land use in the vicinity of the airport is a mixture of residential, commercial, industrial, and open space. To the immediate west of the airport is the unincorporated town of Dallesport with a 2007 population estimate of 1,239 residents. To the south are the Columbia River and the City of The Dalles. To the east are designated Open Space, Industrial Parks and General land uses. To the north is

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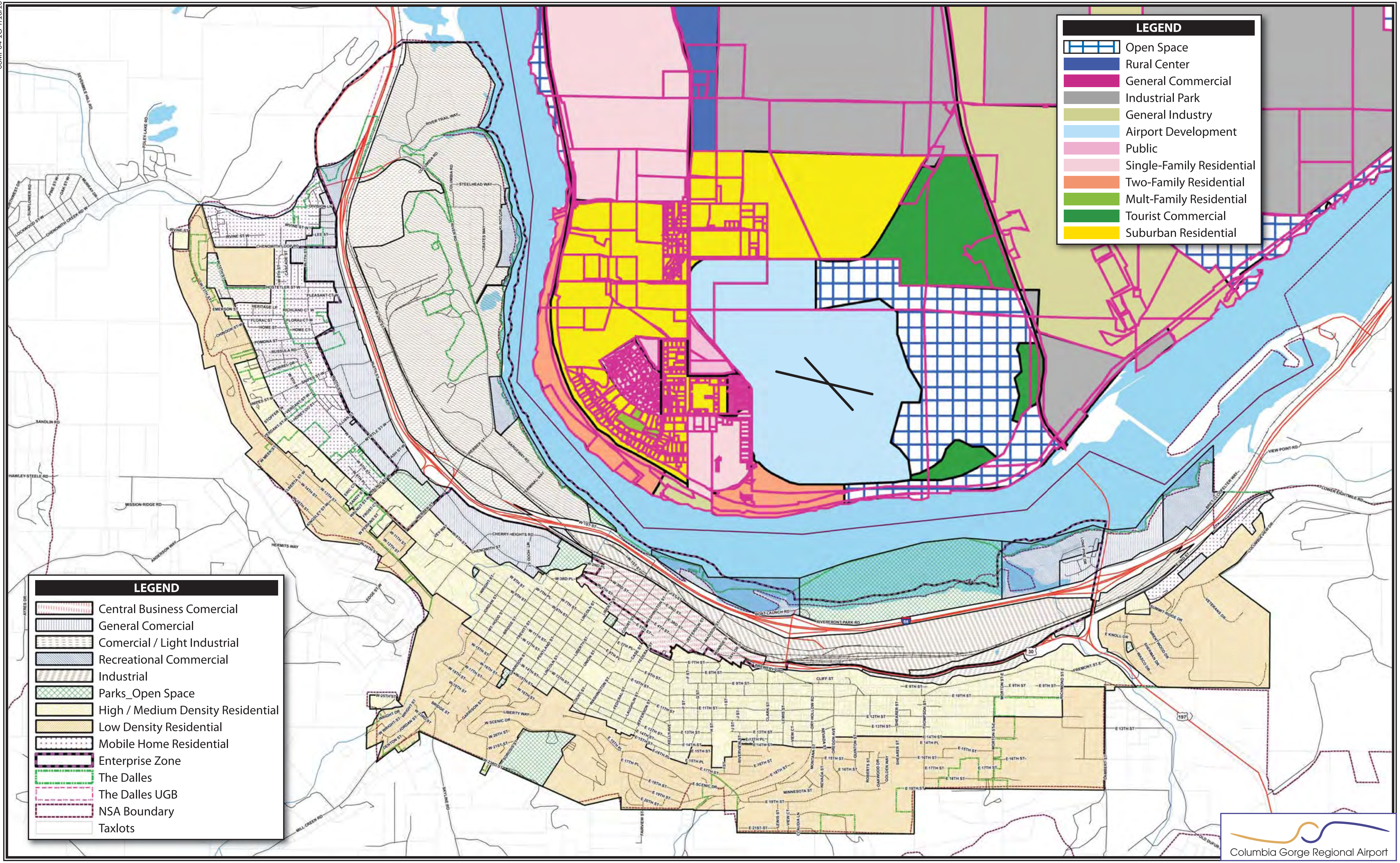

Exhibit 1G
AREA LAND USE ZONING

Suburban Residential, and Industrial Parks. A Tourist Commercial land use designation is located to the immediate northeast of the airport.

Section 2.17 of the Klickitat County Zoning Ordinance identifies the Airport Approach (AA) Zone. The purpose and function is to safeguard the public safety and welfare, and properties in, adjacent to, and surrounding the airport by placing height restrictions and other regulations. The AA zone is superimposed upon the zoning district and regulates the various types of potential airspace obstructions and other hazards which may interfere with safe airport operations. The definition of the AA zone is as follows:

- **AA Airport Approach Zones** - One foot in height for each 20 feet in horizontal distance beginning at a point 200 feet from and at the centerline elevation of the end of the runway and extending to a point 5,200 feet from the end of the runway; the AA approach zone is 250 feet wide at the point of beginning (200 feet past the end of the runway), broadening to 700 feet wide at a distance of 2,250 feet from the point of beginning, continuing at 700 feet wide from there to the end of the zone, this zone being bisected by the centerline of the runway.

Title 14 of the Code of Federal Regulations (CFR) Part 77, *Objects Affecting Navigable Airspace*, defines a series of imaginary surfaces surrounding airports. The imaginary surfaces consist of the approach zone, conical zones, transitional zones, and horizontal zones. Objects such as trees, towers, buildings, or roads which penetrate any of these surfaces may be considered by the FAA to be obstructions to safe air navigation. The AA zone generally conforms to these federal regulations.

PLANNED FUTURE LAND USE

The Columbia Gorge Regional Airport encompasses approximately 950 acres of property. The FAA requires that any airport property that could potentially be needed for long term aviation development be reserved. Typically, this includes property that could provide primary access to the runway and taxiway system.

WASHINGTON STATE LAND USE COMPATIBILITY

WSDOT Aviation assists local jurisdictions, airports, and other interests to protect public use airports from incompatible development by providing technical assistance and resources to support local decision-making. In 1996, the Washington State Legislature amended the *Washington State Growth Management Act* to require cities and counties to protect airports from incompatible development. Senate Bill 6422 was codified to RCW 35.63.250, 35A.63.270, 36.70.547, and 36.70A.510 to reflect these changes.

Through Washington State Senate Bill 6422, the state recognizes the inherent social and economic benefits of aviation. The law requires sponsors of public use airports to discourage the siting of land uses that are incompatible with the airport.

The property to the south of the terminal area has been planned as an airport industrial/business park. A binding site plan has been submitted to the county and is presented on **Exhibit 1H**. This site plan includes revisions based upon the recommended master plan concept presented in Chapter Five. The necessary revisions were identified during the alternatives analysis contained within Chapter Four.

Planning for the property to the east of the runway system, approximately 542 acres, includes a high-end golf course and resort facility. **Exhibit 1J** presents a draft of the concept. As can be seen, an 18-hole golf course is planned. The approach area leading to Runway 25 has been left as Open Space.

Three areas have been identified for residential development. The northernmost development area is planned for 145 single family homes. Just south of this is a planned community center and 22 attached villas (two residences per villa). Further to the south, west of the intersection of Dallesport Road and US Highway 197 is a complex of approximately 28 villas. On the bluff overlooking the Columbia River is a planned time-share complex containing 28 villas.

A vision for an on-airport executive hangar complex that provides access to the golf course clubhouse is also depicted on the exhibit. Several hangars are depicted, but much of the space is identified for transient aircraft parking. Under this vision, business executives could fly themselves and clients to the airport for business meetings that may include utilization of the golf course.

SERVICE AREA AND REGIONAL AIRPORTS

The proximity of other airports is largely the defining factor when describing an airport's service area. A review of public use airports in the region was made to identify and distinguish the types of air services provided in the region. Information pertaining to each airport was obtained from FAA Form 5010, *Airport Master Record*, as well as the web site www.airnav.com.

It is important to consider the capabilities and limitations of other airports when planning for future changes or improvements at Columbia Gorge Regional Airport. The following are those public use airports with asphalt or concrete runways that can serve general aviation aircraft. These airports are listed by their proximity to Columbia Gorge Regional Airport. **Table 1J** identifies the major characteristics of each airport.

Goldendale Municipal Airport (S20) is located 21 miles to the northeast of Columbia Gorge Regional Airport. Runway 7-25 is 3,491 feet long and constructed of asphalt. There are 10 based aircraft. There are no instrument approach procedures. Goldendale is a non-NPIAS airport.

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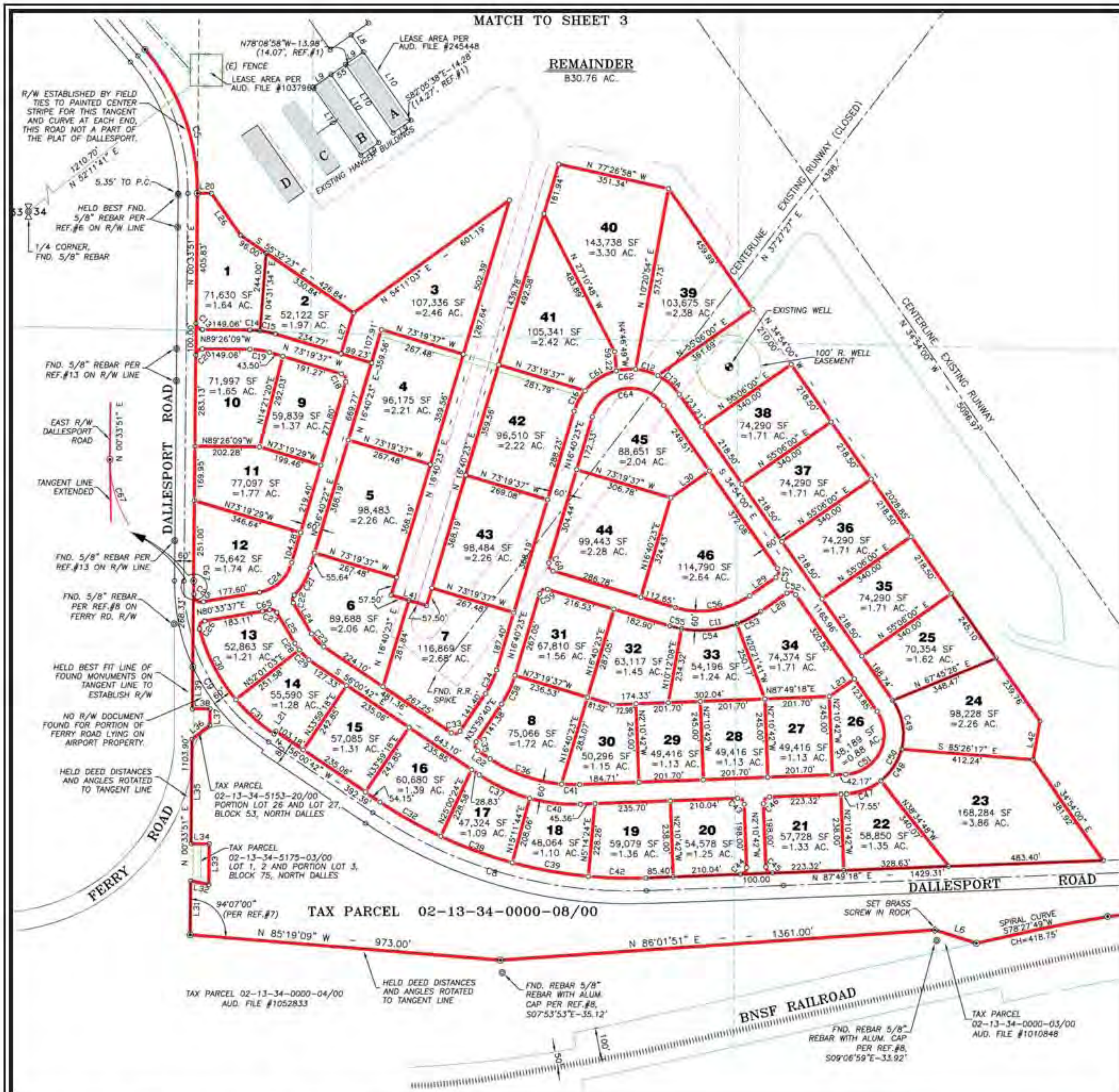

"BINDING SITE PLAN NO. BSP2007-01"

IN SECTIONS 26, 27, 28, 33, 34 AND 35,
TOWNSHIP 2 NORTH, RANGE 13 EAST, W.M.
DALLESPORT, KLICKITAT COUNTY, WASHINGTON

TENNESON ENGINEERING CORP.
CONSULTING ENGINEERS
3313 W. 2nd STREET, SUITE 100
THE DALLES, OREGON 97058
PH. 541-296-9177 FAX 541-296-6657

Survey	Calculation	Design	Date	Scale
B.R.H.	B.B.B.		3/16/2010	1"=200'
Drawn	DWG. No.	Checked & App.	Work Order No.	Sheet
S.D.H.	12694binding		12694	9 of 12

DATED THIS ______ DAY OF ______________, 20___
BINDING SITE PLAN FILED FOR RECORD AT THE REQUEST OF BENJAMIN B. BESEDA THIS ____ DAY OF __________, 20___ AT ________ AND RECORDED IN VOLUME ____ OF BINDING SITE PLANS, PAGE ____ RECORDS OF KLICKITAT COUNTY.

KLICKITAT COUNTY AUDITOR AUDITOR NO.

LEGEND:

- SET 5/8"ø X 30" REBAR WITH YELLOW PLASTIC CAP, "B BESEDA PLS 35092"
- FOUND MONUMENTS, AS NOTED.
- CALCULATED CORNERS, NOT SET.
- SET HUB & TACK.
- SET P.K. NAIL OR AS NOTED.
- SET BRASS SCREW AND WASHER, "PLS #35092"
- EXISTING FENCE LINE.

0' 100' 200' 400'
SCALE IN FEET

FOR REVIEW ONLY
BENJAMIN B. BESEDA STATE OF WASHINGTON 35092 REGISTERED PROFESSIONAL LAND SURVEYOR
OFFICE COPY

Columbia Gorge Regional Airport

Exhibit 1H
PROPOSED BUSINESS PARK

08MP04-1J-7/16/10

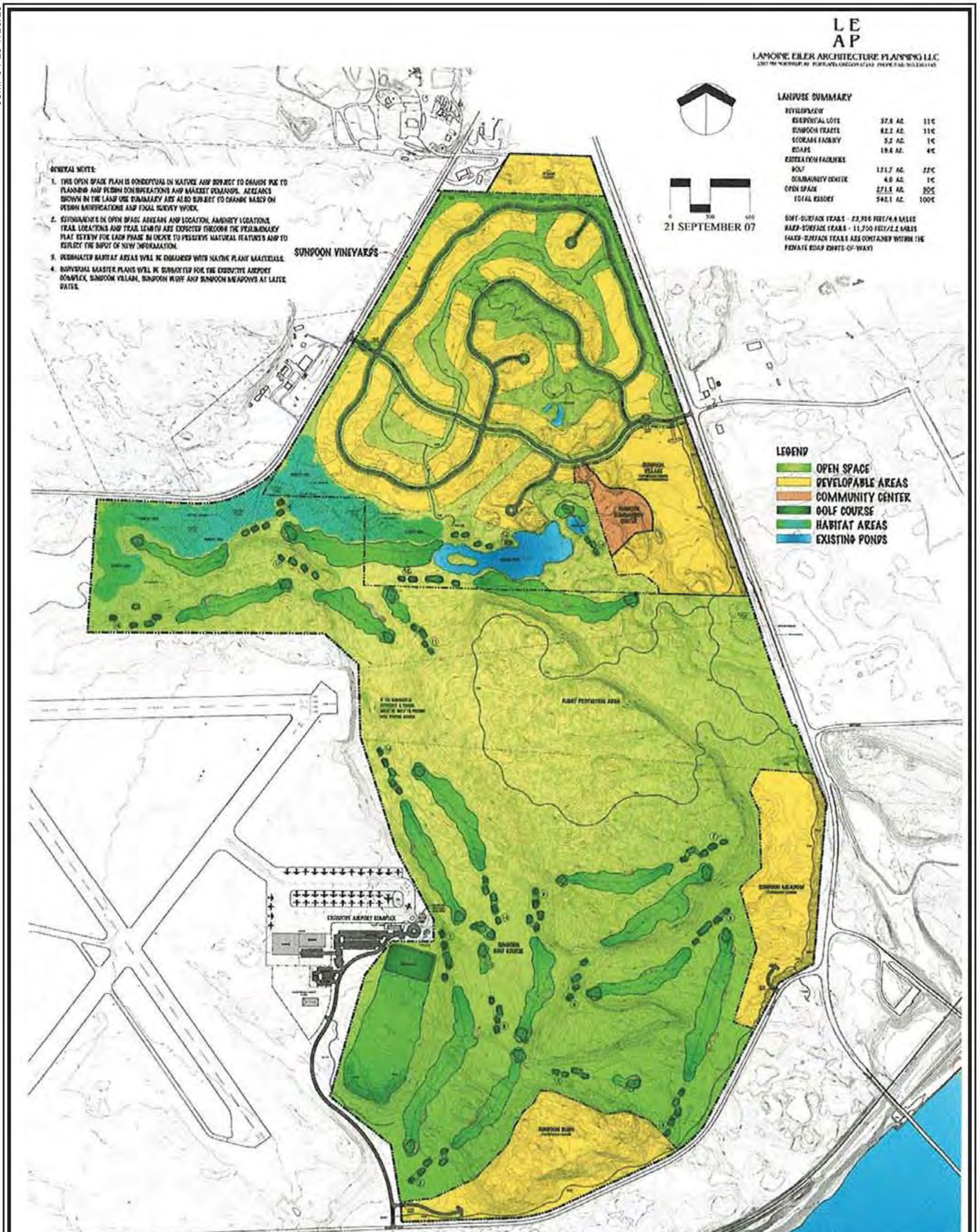

Exhibit 1J
PROPOSED
GOLF COURSE/RESORT

TABLE 1J
Public-Use Airport in the Columbia Gorge Region

Airport Name	Distance (miles)	Type	Longest Runway	Based Aircraft	Annual Ops	Services	IAP
Goldendale (S20)	21 NE	GA	3,491	10	5,100	Tie-downs; No fuel	No
Yakima Air Terminal (YKM)	72 NE	Comm.	7,604	162	50,000	Full GA	Yes
Ken Jernstedt (4S2)	16 W	GA	3,040	91	14,000	Avgas, maintenance, tie-downs	No
Wasco State (35S)	24 E	GA	3,450	6	2,400	Tie-downs; No fuel	No
Cascade Locks (CZK)	35 W	GA	1,800	0	1,500	Tie-downs; No fuel	No
Condon State (3S9)	48 SE	GA	3,500	11	3,800	Tie-downs; No fuel	No
Madras (S33)	65 S	GA	5,089	52	10,600	Full GA	Yes
Troutdale (TTD)	60 W	Reliever	5,399	154	105,000	Full GA	Yes

Source: www.airnav.com as accessed on 10-16-09

Yakima Air Terminal (YKM) is located 72 miles to the northeast. Yakima is a commercial service airport with a control tower. Horizon Air provides four flights per day to Seattle. The primary runway, Runway 9-27, is 7,604 feet long, and the crosswind runway, Runway 4-22, is 3,835 feet long. There are 162 based aircraft, including four jets. There are several instrument approach procedures including an ILS approach to Runway 27 that offers visibility minimums not lower than ½-mile.

Ken Jernstedt Airfield Airport (4S2) is located 16 miles to the west of Columbia Gorge Regional Airport. Runway 7-25 measures 3,040 feet in length, and there are 91 based aircraft. The airport offers Avgas, but Jet A fuel is not available. There are no instrument approaches.

Wasco State Airport (35S) is owned by the State of Oregon and is 24 miles to the east of Columbia Gorge Regional Airport. Wasco State Airport is within Sherman County, Oregon and is approximately 110 miles east of Portland. It serves the City of Wasco (year 2000 population of 381), a rural agricultural town in north central Oregon. The airport offers a 3,450-foot long asphalt runway. There are six single engine piston powered aircraft based at the airport. There is not an on-site manager or FBO, and fuel is not available. There are no published instrument approaches.

Cascade Locks State Airport (CZK) is located in Hood River County, Oregon, approximately 35 miles to the west of Columbia Gorge Regional Airport. Cascade Locks is not a NPIAS airport and is therefore not eligible for federal development grants. The runway is 1,800 feet in length and constructed of asphalt. There is no airport FBO or on-site management. There are no based aircraft. This airport primarily serves to provide access to the Columbia Gorge National Scenic Area and to provide air ambulance service as needed.

Condon State Pauling Field Airport (3S9) is 48 miles to the east-southeast of Columbia Gorge Regional Airport. It offers a 3,500-foot long concrete runway. The airport is owned by the state of Oregon and is home to 11 based single engine planes. There are no instrument approaches to the airport.

Madras Municipal Airport (S33) is approximately 65 miles south of The Dalles. Madras provides a two runway system with the longest runway being 5,089 feet in length. There are 52 based aircraft. The airport has a full service FBO offering both fuel types, aircraft parking, aircraft rental, minor maintenance, and aerial tours. They have a circling GPS instrument approach.

Portland-Troutdale Airport (TTD) is located on the eastern development ring of Portland, approximately 60 miles to the west of Columbia Gorge Regional Airport. Runway 7-25 is 5,399 feet long and constructed of asphalt. The airport is owned by the Port of Portland and provides an airport traffic control tower. It is estimated that there are 154 based aircraft, including two jets, 14 multi-engine, and nine helicopters. The airport experiences approximately 75,000 annual operations. One instrument approach is available, a GPS or NDB circling approach with visibility minimums not lower that 1¼-mile. The airport also has a full service FBO. Troutdale is nine miles to the east of Portland International Airport, and often experiences delays due to commercial traffic utilizing PDX.

The south parallel taxiway is planned to be relocated in order to meet FAA separation distance requirements. This will necessitate the removal of several T-hangar structures and one conventional hangar. It is estimated that 25 existing covered hangar positions will be lost in the short term. The airport has plans to replace these hangars with new hangars at another location on the field.

AIRPORT SERVICE AREA

The airport service area is a baseline geographical area from which future aviation demand (particularly based aircraft) is most likely to originate. Columbia Gorge Regional Airport is located in the state of Washington on the border with Oregon. Therefore, the service area will include portions of both states.

Different service areas for an airport can be defined for operators of smaller piston powered aircraft versus operators of larger turboprop and business jet aircraft. The Columbia Gorge Regional Airport is capable of accommodating most aircraft in the general aviation fleet, including the largest business jets on a limited basis. The closest airports that can also accommodate business jets are Yakima to the northeast (72 miles), Tri-Cities to the east (140 miles), Madras to the south (65 miles), and Portland to the west (69 miles). All of these are more than 60 miles away. At the same time, business jet operators are generally located in business centers. Therefore, the size or extent of the service area is not as important as the economy of the primary business center, which in this case, is The Dalles.

Owners of smaller piston powered aircraft have more choices. Jernstedt would limit the westward service area. Goldendale and Wasco State could limit the eastward service area. There is no comparable general aviation airport within 40 miles to the south as this is a sparsely populated area. Since none of these airports offer the full range of general aviation services that Columbia Gorge Regional Airport does, the service area would overlap with these airports to a certain extent.

Exhibit 1K presents a generalized service area for the Columbia Gorge Regional Airport. The service area would, at a minimum, include all of Klickitat County in Washington and Wasco County in Oregon. The distances to other airports with similar capabilities is so great in all directions that Columbia Gorge Regional Airport is somewhat unencumbered from attracting new based aircraft if facilities are available. This is evidenced by the fact that all the new hangars are currently full.

AIRPORT CAPITAL IMPROVEMENT HISTORY

As a NPIAS airport, Columbia Gorge Regional Airport is eligible for Federal Airport Improvement Program (AIP) grants as administered by the FAA. Over the last several years the FAA has participated in capital projects at the airport. The major projects have included the installation of airfield guidance signage including extension of electricity for lighting purposes. New runway lighting was installed on Runway 7-25 and replacement runway edge lighting was installed on Runway 12-30. The FAA is also participating in this master plan study.

Both the Oregon Department of Aviation and the Washington Aviation Department participate in development projects at the airport. Although the airport was not sponsored by a Washington entity until the year 2000 when Klickitat County joined in partnership with The Dalles, Oregon, the State of Washington has participated in development projects since the early 1970s. **Table 1K** presents the various development grants accepted by the airport since 2000.

TABLE 1K
Recent Development Grants
Columbia Gorge Regional Airport

Year	Source	Project	Total
2000	PMP-Oregon	Pavement Rehab	$39,660
2000	Washington	Replace MIRL Runway 12-30	$8,000
2001	FAM-Oregon	Terminal building improvement for ADA compliance	$10,000
2002	Washington	Directional Signs, Reflectors, Striping	$4,111
2003	FAA Grant 16 Administered by Oregon	Install Runway 12-30 MIRL (phase 1)	$450,000 ($405,000 from FAA)
2004	FAA Grant 18 Administered by Oregon	Runway 12-30 rehab, MIRL (phase 1), MIRL Runway 7-25 (phase 1)	$194,737 ($185,000 from FAA)
2004	PMP-Oregon	Pavement Rehab	$52,426 ($5,242 from FAA)
2004	Washington	Water and Sewer Line Extension	$18,000
2005	FAA AIP Entitlement	Install Airfield Guidance Signs	$100,000
2005	FAA AIP Entitlement	Update Master Plan	$25,000
2005	FAA AIP Entitlement	Install Airfield Guidance Signs	$79,610
2005	FAA AIP Entitlement	Install Runway Lighting	$80,000
2005	FAA Grant 20- Administered by Oregon	Pavement Rehab	$230,303 ($23,030 from FAA)
2006	FAM-Oregon	Water and sewer to hangars	$15,000
2007	Washington	Security Camera System	$4,750
2008	PMP-Oregon	Pavement Rehab	$18,223 ($1,822 from FAA)
2008	Washington	Radios, Signs, Flashing Beacon	$2,500
2009	FAA AIP Entitlement	Update Master Plan	$150,000
2009	FAA AIP Entitlement	Update Master Plan	$75,000

PMP: Pavement management program
FAM: Financial Aid to Municipalities
FAA: Federal Aviation Administration
AIP: Airport Improvement Program
MIRL: Medium intensity runway lighting

Source: Federal grants from www.subsidyscope.com, state grants from Oregon and Washington

ENVIRONMENTAL INVENTORY

A review of the potential environmental impacts associated with proposed airport projects is an essential consideration in the Airport Master Plan process. The intent of this inventory is to identify potential environmental sensitivities or resources that might affect future improvements at the airport. The information contained in this section was obtained from internet resources, agency maps, and existing literature.

Research was conducted for each of the 23 environmental impact categories described within the FAA's *Environmental Desk Reference for Airport*

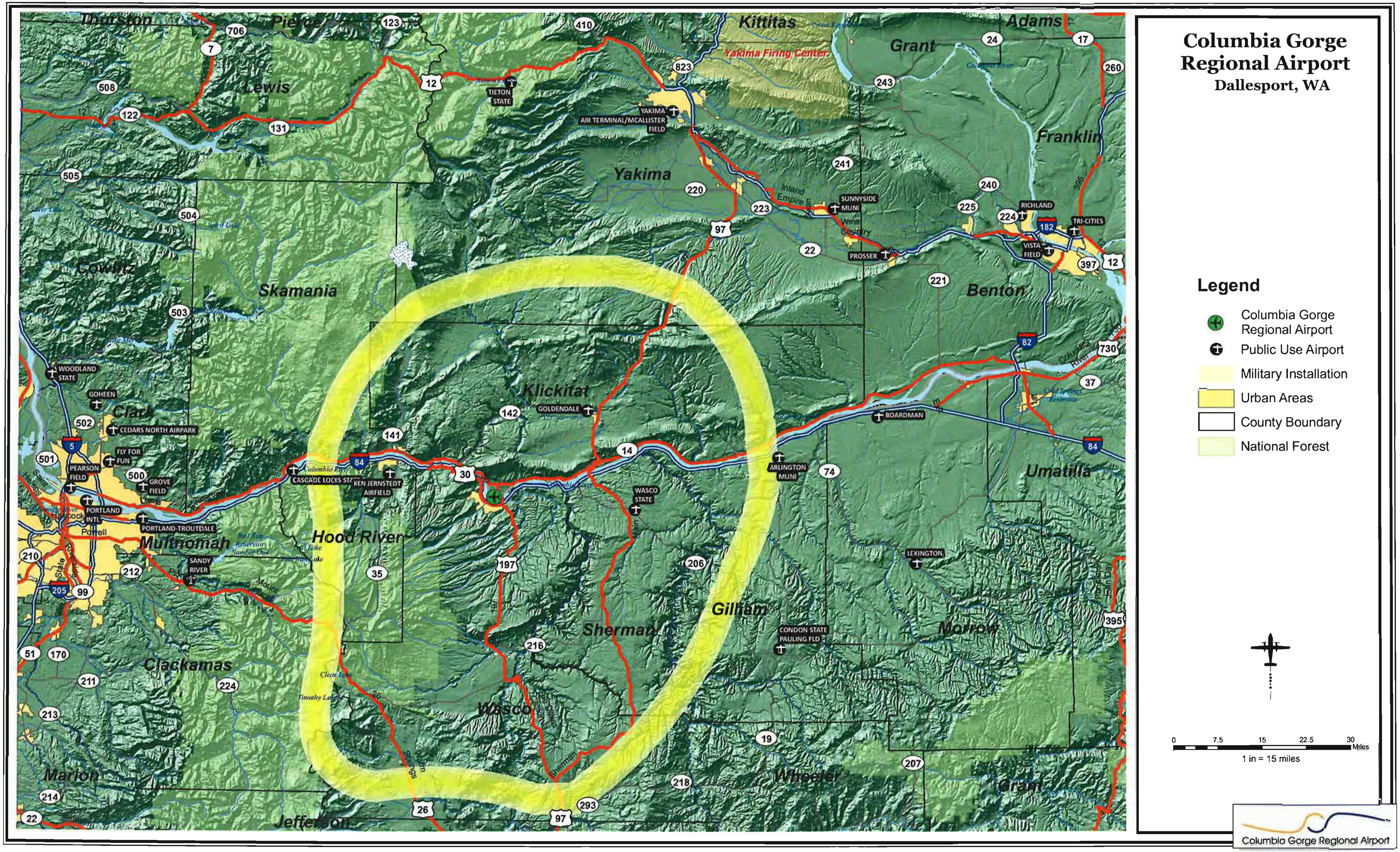

Exhibit 1K
AIRPORT SERVICE AREA

Actions. It was determined that the following resources are not present with the airport environs or cannot be inventoried:

- Resources Not Present
  - Coastal Resources (Coastal Barriers and Coastal Zones) – the airport is inland and not subject to any coastal restrictions.
  - Wild and Scenic Rivers – no federally designated wild or scenic rivers are located in proximity to the airport.
- Resources that were not inventoried
  - Construction Impacts
  - Energy Supply and Natural Resources
  - Noise
  - Social Impacts

The following sections provide a discussion of the remaining resource categories.

Air Quality

The U.S. Environmental Protection Agency (EPA) has adopted air quality standards that specify the maximum permissible short-term and long-term concentrations of various air contaminants. The National Ambient Air Quality Standards (NAAQS) consist of primary and secondary standards for six criteria pollutants which include: Ozone (O_3), Carbon Monoxide (CO), Sulfur Dioxide (SO_2), Nitrogen Oxide (NO), Particulate matter (PM_{10} and $PM_{2.5}$), and Lead (Pb). Various levels of review apply within both *National Environmental Policy Act* (NEPA) and permitting requirements. Potentially significant air quality impacts associated with an FAA project or action would be demonstrated by the project or action exceeding one or more of the NAAQS for any of the time periods analyzed.

According to the EPA's Greenbook, Klickitat County is in attainment for all criteria pollutants.[1]

Compatible Land Use

The compatibility of existing and planned land uses in the vicinity of an airport is usually associated with the extent of the airport's noise impacts. Typically, significant impacts will occur over noise-sensitive areas within the 65 DNL noise contour.

Land uses to the north-northeast, east, and south of the airport are undeveloped. The area immediately south of the airport is also undeveloped and beyond the undeveloped area is the Columbia River. West of the airport is the community of Dallesport, which primarily consists of residential land uses located on the west side of Dallesport Road. Additionally, industrial and commercial land uses are located along Dallesport Road within the vicinity of the airport. Immediately west of the airport on the east side of Dallesport Road is an undeveloped area planned for an airport business park.

Compatible land use also addresses nearby features that could pose a threat to safe aircraft operations by

[1] Environmental Protection Agency's (EPA) Greenbook, http://www.epa.gov/oar/oaqps/greenbk/, accessed November 2009

attracting wildlife (e.g., landfills and ponds). Located approximately one mile northeast of the airport is a solid waste transfer station that accepts solid and household hazardous waste; however, no solid or household hazardous waste is permanently stored at the site. Wetland areas, which may contain water, are located along the northern edge of the property. Additionally, as previously discussed, the Columbia River is located south and west of the airport. There are no data available regarding the past or present potential of wildlife hazards from any of these sources.

Department of Transportation: Section 4(f)

Section 4(f) properties include publicly owned land from a public park, recreational area, or wildlife and waterfowl refuge of national, state, or local significance; or any land from a historic site of national, state, or local significance.

The airport is surrounded by the Columbia River Gorge National Scenic Area which provides a wide range of recreation opportunities. No wildlife or waterfowl refuges are located in proximity to the airport. Further discussion regarding historic sites can be found later in this section.

Farmland

Under the *Farmland Protection Policy Act* (FPPA), federal agencies are directed to identify and take into account the adverse effects of federal programs on the preservation of farmland, to consider appropriate alternative actions which could lessen adverse effects, and to assure that such federal programs are, to the extent practicable, compatible with state or local government programs and policies to protect farmland. The FPPA guidelines developed by the U.S. Department of Agriculture (USDA) apply to farmland classified as prime or unique, or of state or local importance as determined by the appropriate government agency, with concurrence by the Secretary of Agriculture.

Information obtained from the Natural Resource Conservation Service's (NRCS) Web Soil Survey indicates soils of statewide importance are located throughout the airport property except for the western portions near the terminal area. The northern portion of the terminal area is classified as prime farmland if irrigated and the southern portion is classified as not prime farmland. The important farmlands are depicted on **Exhibit 1L**.

Fish, Wildlife, and Plants

A number of regulations have been established to ensure that projects do not negatively impact protected plants, animals, or their designated habitat. Section 7 of the *Endangered Species Act* (ESA), as amended, applies to federal agency actions and sets forth requirements for consultation to determine if the proposed action may affect a federally endangered or threatened species. The *Sikes Act* and various amendments authorize states to prepare statewide wildlife conservation plans for resources under their jurisdiction.

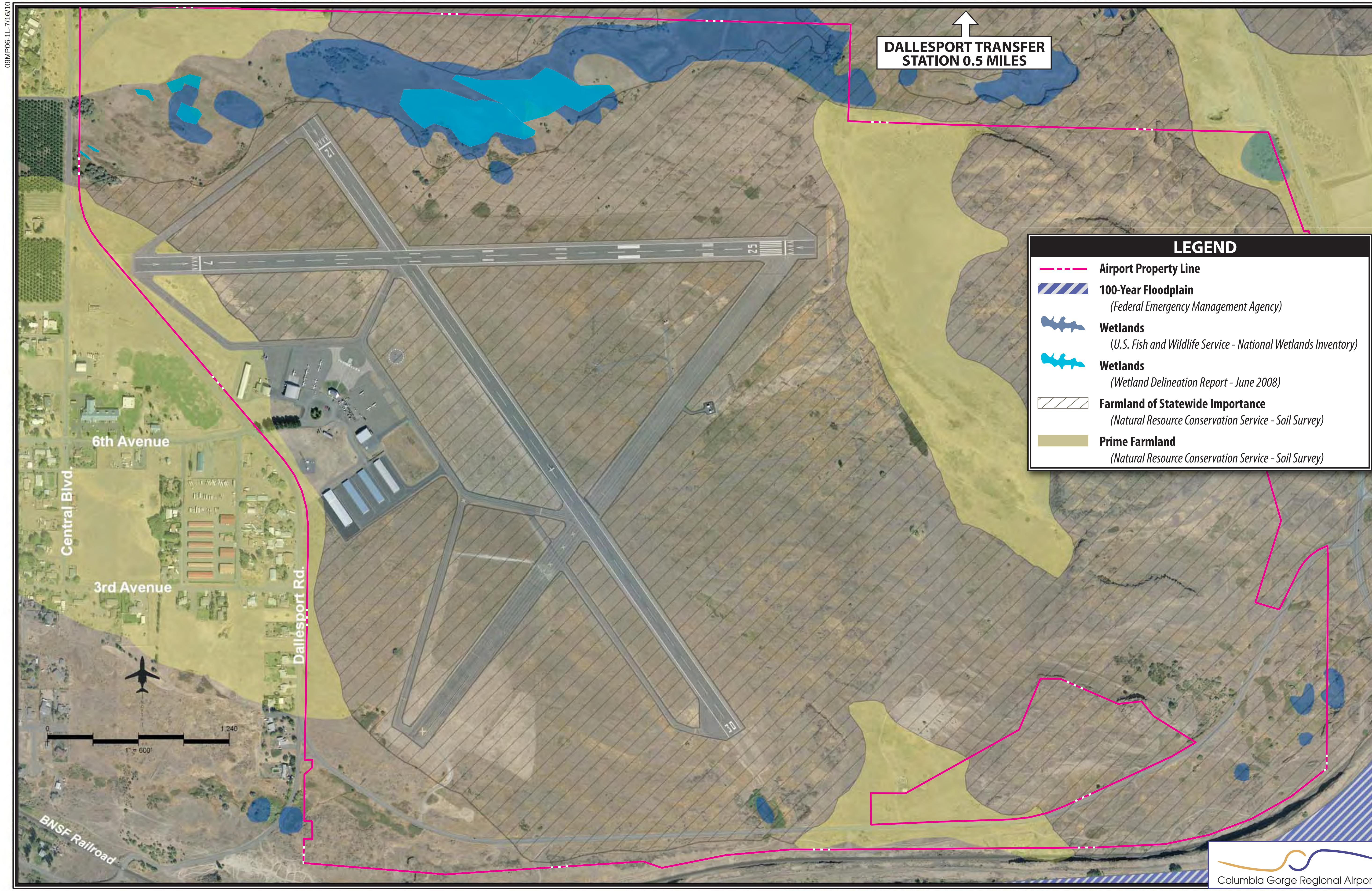

Exhibit 1L
ENVIRONMENTAL SENSITIVITIES

According to the U.S. Fish and Wildlife Service Upper Columbia Fish and Wildlife Office website, there are three species that are federally listed as threatened or endangered in Klickitat County. In addition, the Washington Department of Fish and Wildlife lists an additional 41 species that are either threatened or endangered for the entire state. These are listed in **Table 1L**.

TABLE 1L
State and Federally Listed Threatened or Endangered Species in Klickitat County, Washington

Common Name	Species	Federal Status	State Status
Ferruginous hawk	*Buteo regalis*	-	Threatened
Marbled murrelet	*Brachyramphus marmoratus*	-	Threatened
Sage grouse	*Centrocercus urophasianus*	-	Threatened
Sharp-tailed grouse	*Tympanuchus phasianellus*	-	Threatened
Lynx	*Lynx Canadensis*	-	Threatened
Mazama (Western) pocket gopher	*Thomomys mazama*	-	Threatened
Steller sea lion	*Eumetopias jubatus*	-	Threatened
Western gray squirrel	*Sciurus griseus*	-	Threatened
Green sea turtle	*Chelonia mydas*	-	Threatened
Loggerhead sea turtle	*Caretta caretta*	-	Threatened
Ferruginous hawk	*Buteo regalis*	-	Threatened
Marbled murrelet	*Brachyramphus marmoratus*	-	Threatened
Sage grouse	*Centrocercus urophasianus*	-	Threatened
Sharp-tailed grouse	*Tympanuchus phasianellus*	-	Threatened
Northern leopard frog	*Rana pipiens*	-	Endangered
Oregon spotted frog	*Rana pretiosa*	-	Endangered
American white pelican	*Pelecanus erythrorhynchos*	-	Endangered
Brown pelican	*Pelecanus occidentalis*	-	Endangered
Sandhill crane	*Grus Canadensis*	-	Endangered
Oregon spotted frog	*Rana pretiosa*	-	Endangered
American white pelican	*Pelecanus erythrorhynchos*	-	Endangered
Brown pelican	*Pelecanus occidentalis*	-	Endangered
Sandhill crane	*Grus Canadensis*	-	Endangered
Oregon spotted frog	*Rana pretiosa*	-	Endangered
American white pelican	*Pelecanus erythrorhynchos*	-	Endangered
Brown pelican	*Pelecanus occidentalis*	-	Endangered
Sandhill crane	*Grus Canadensis*	-	Endangered
Oregon spotted frog	*Rana pretiosa*	-	Endangered
American white pelican	*Pelecanus erythrorhynchos*	-	Endangered
Fin whale	*Baleonoptera physalus*	-	Endangered
Fisher	*Martes pennant*	-	Endangered
Gray wolf	*Canis lupus*	Endangered	Endangered
Grizzly bear	*Ursus arctos*	-	Endangered
Humpback whale	*Megaptera novaeangliae*	-	Endangered
Killer whale	*Orcinus orca*	-	Endangered
Pygmy rabbit	*Brachylagus idahoensis*	-	Endangered
Sea otter	*Enhydra lutris*	-	Endangered
Sei whale	*Baleonoptera borealis*	-	Endangered
Sperm whale	*Physeter macrocephalus*	-	Endangered
Woodland caribou	*Rangifer tarandus*	-	Endangered
Leatherback sea turtle	*Dermochelys coriacea*	-	Endangered
Western pond turtle	*Actinemys marmorata*	-	Endangered
Bull trout	*Salvelinus confluentus*	Threatened	-
Ute ladies'-tresses	*Spiranthes diluvialis*	Threatened	-

Source: USFWS online listed species database, http://www.fws.gov/easternwashington/species/countySppLists.html, accessed November 2009
Washington Department of Fish and Wildlife, http://wdfw.wa.gov/wildlife/management/endangered.html

Several of the listed species are unlikely to be present at the airport due to absence of suitable habitat. Species unlikely to be present at the airport include the sea lion, sea turtle, sea otter, and whale species which require aquatic habitat. Field surveys of the airport would be necessary to determine the potential presence of the remaining listed species.

Floodplains

Executive Order 11988 directs federal agencies to take action to reduce the risk of flood loss, minimize the impact of floods on human safety, health, and welfare, and restore and preserve the natural and beneficial values served by the floodplains.

A review of Federal Emergency Management Agency (FEMA) floodplain information indicates the airport is located outside of the 100-year floodplain. Immediately south of the airport, the area along the Columbia River is designated as 100-year floodplain, as indicated on **Exhibit 1L**.

Hazardous Materials, Pollution Prevention, and Solid Waste

Federal, state, and local laws regulate hazardous materials use, storage, transport, and disposal. These laws may extend to past and future landowners of properties containing these materials. In addition, disrupting sites containing hazardous materials or contaminates may cause significant impacts to soil, surface water, groundwater, air quality, and the organisms using these resources.

The EPA's *Enviromapper for Envirofacts* was consulted regarding the presence of impaired waters or regulated hazardous sites. According to the EPA *Enviromapper*, there are no known impaired waters or hazardous sites at the airport. The website indicates that the Dallesport Transfer Station, a solid waste management facility, located immediately northeast of the airport, is subject to EPA regulation. The location of the transfer station is depicted on **Exhibit 1L**.

Historical, Architectural, and Cultural Resources

Determination of a project's environmental impact to historic and cultural resources is made under guidance in the *National Historic Preservation Act* (NHPA) *of 1966*, as amended, the *Archaeological and Historic Preservation Act* (AHPA) *of 1974*, the *Archaeological Resources Protection Act* (ARPA), and the *Native American Graves Protection and Repatriation Act* (NAGPRA) *of 1990*. In addition, the *Antiquities Act of 1906*, the *Historic Sites Act of 1935*, and the *American Indian Religious Freedom Act of 1978* also protect historical, architectural, archaeological, and cultural resources. Impacts may occur when the proposed project causes an adverse effect on a property which has been identified (or is unearthed during construction) as having historical, architectural, archaeological, or cultural significance. In Washington, the Department of

Archaeology and Historic Preservation has oversight over laws and regulations regarding historical, architectural, archeological and cultural resources.

A review of the Washington Department of Archaeology and Historic Preservation indicates that there are no known or previously recorded significant archaeological sites on airport property[2].

Light Emissions and Visual Impacts

Airport lighting is characterized as either airfield lighting (i.e., runway, taxiway, approach and landing lights) or landside lighting (i.e., security lights, building interior lighting, parking lights, and signage). Generally, airport lighting does not result in significant impacts unless a high intensity strobe light, such as a Runway End Identifier Lighting (REIL), would produce glare on any adjoining site, particularly residential uses.

The existing light features of the airport are described in detail previously in this chapter.

Environmental Justice Areas

Environmental justice can be defined as ensuring that an action does not unfairly impact a minority race or families living under the poverty level. The EPA's *Environmental Justice Geographic Assessment Tool* was consulted regarding the presence of environmental justice areas within the airport environs. According to this resource, areas surrounding the airport do not include high percentages of low income or minority populations.

Water Quality

The *Clean Water Act* provides the authority to establish water quality standards, control discharges, develop waste treatment management plans and practices, prevent or minimize the loss of wetlands, and regulate other issues concerning water quality. Water quality concerns related to airport development most often relate to the potential for surface runoff and soil erosion, as well as the storage and handling of fuel, petroleum products, solvents, etc.

The Columbia River is located immediately south of the airport. This river is not considered impaired, and is not in violation of established water quality standards.

Congress mandates (under the *Clean Water Act*) implementation of the National Pollutant Discharge Elimination System (NPDES). This program addresses non-agricultural storm water discharges. Through the use of NPDES permits, certain procedures are required to prevent contamination of water bodies from storm water runoff. The EPA can delegate this permit authority to individual states. In Washington, the Washington Depart-

[2] Washington Department of Archaeology and Historic Preservation, http://www.dahp.wa.gov/pages/wisaardIntro.htm, accessed November 2009

ment of Ecology administers the NPDES program.

Wetlands

The U.S. Army Corps of Engineers regulates the discharge of dredged and/or fill material into waters of the United States, including adjacent wetlands, under Section 404 of the *Clean Water Act*. Wetlands are defined in Executive Order 11990, *Protection of Wetlands*, as "those areas that are inundated by surface or groundwater with a frequency sufficient to support and under normal circumstances does or would support a prevalence of vegetation or aquatic life that requires saturated or seasonably saturated soil conditions for growth and reproduction." Wetlands can include swamps, marshes, bogs, sloughs, potholes, wet meadows, river overflows, mud flats, natural ponds, estuarine areas, tidal overflows, and shallow lakes and ponds with emergent vegetation. Wetlands exhibit three characteristics: the soil is inundated or saturated to the surface at some time during the growing season (hydrology), has a population of plants able to tolerate various degrees of flooding or frequent saturation (hydrophytes), and soils that are saturated enough to develop anaerobic conditions during the growing season (hydric).

The National Wetlands Inventory, managed by the U.S. Fish and Wildlife Service, indicates presence of several wetland features north of Runway 7-25. In 2008, 120 acres of the airport, including the area north of Runway 7-25, was surveyed for wetlands. The survey report, prepared by Mark Yinger Associates, confirms the presence of features meeting the U.S. Army Corps of Engineers' definition of wetlands. Additionally, the National Wetlands Inventory indicates the presence of a wetland feature located southwest of Runway 12-30 along the extended runway centerline. The location of wetlands is depicted on **Exhibit 1L**.

SUMMARY

The information discussed in this inventory chapter provides a foundation upon which the remaining elements of the planning process will be constructed. Information on current airport facilities and utilization will serve as a basis, with additional analysis and data collection, for the development of forecasts of aviation activity and facility requirement determinations.

DOCUMENT SOURCES

As mentioned earlier, a variety of different sources were utilized in the inventory process. The following listing reflects a partial compilation of these sources. This does not include data provided by airport management as part of their records, nor does it include airport drawings and photographs which were referenced for information. On-site inventory and interviews with staff and tenants contributed to the inventory effort.

Airport/Facility Directory, Northwest U.S., U.S. Department of Transportation, Federal Aviation Administration, National Aeronautical Charting Office, expires 22 October, 2009.

Seattle Sectional Aeronautical Chart, U.S. Department of Transportation, Federal Aviation Administration, National Aeronautical Charting Office, expires 19 December 2009.

National Plan of Integrated Airport Systems (NPIAS), U.S. Department of Transportation, Federal Aviation Administration, 2009-2013.

U.S. Terminal Procedures, Northwest, U.S. Department of Transportation, Federal Aviation Administration, National Aeronautical Charting Office, expires 22 October 2009.

Columbia Gorge Regional Airport Layout Plan Report (2004-2024). Century West Engineering, et.al.

2010 Complete Economic and Demographic Data Source (CEDDS). Woods & Poole Economics, Washington, D.C.

The Dalles Comprehensive Land Use Plan. May 2007 Draft. Prepared by Winterbrook Planning.

Population Forecasts For The Dalles, Memo Dated May 2006. Prepared by ECONorthwest.

City of The Dalles: Economic Opportunities Analysis, prepared by ECONorthwest, April 2007.

Oregon Aviation Plan 2007. Oregon Department of Aviation. Accessed on September 9, 2009:
http://www.aviation.state.or.us/Aviation/index.shtml

Klickitat County Zoning Ordinance No. 62678, as amended. Accessed on September 9, 2009:
http://www.klickitatcounty.org/planning/

GorgeTransLink. Accessed on September 9, 2009:
http://www.gorgetranslink.com/

Wasco County Planning Department Accessed on September 9, 2009:
http://co.wasco.or.us/planning/planhome.html

Columbia Gorge Economic Development Association. Accessed on September 9, 2009:
http://www.cgeda.com/default.shtml

Mid-Columbia Economic Development District. Accessed on September 9, 2009:
http://www.mcedd.org/index.htm

Mid-Columbia Council of Governments. Accessed on September 9, 2009: http://www.mccog.com/

A number of websites were also used to collect information for the inventory chapter. These include the following:

FAA 5010 Airport Master Record Data:
www.airnav.com

U.S. Census Bureau:
www.census.gov

The City of The Dalles. Accessed on September 9, 2009:
http://www.ci.the-dalles.or.us/

Bureau of Economic Analysis, U.S. Department of Commerce: http://www.bea.gov/bea/regional/data.htm

GCR and Associates. Accessed on September 3, 2009: http://www.airportiq.com/default.htm

Columbia Gorge Regional Airport

Chapter Two

FORECASTS

FORECASTS

Columbia Gorge Regional Airport

An important factor when planning the future needs of an airport involves a definition of aviation demand that may reasonably be expected to occur in both the near term (five years) and long term (20 years). For a general aviation airport such as Columbia Gorge Regional Airport (DLS), forecasts of based aircraft and operations (takeoffs and landings) serve as the basis for facility planning.

The Federal Aviation Administration (FAA) has oversight responsibility to review and approve aviation forecasts developed in conjunction with airport planning studies. The FAA reviews such forecasts with the objective of comparing them to the FAA *Terminal Area Forecasts* (TAF) and the *National Plan of Integrated Airport Systems* (NPIAS). In addition, aviation activity forecasts are an important input to the benefit-cost analyses associated with some airport development projects.

FAA Order 5090.3C, *Field Formulation of the National Plan of Integrated Airport Systems*, dated December 4, 2004, says forecasts should be:

- Realistic
- Based on the latest available data
- Reflective of current conditions at the airport
- Supported by information in the study
- Able to provide adequate justification for airport planning and development

The forecast process for an airport master plan consists of a series of basic steps that can vary depending upon the issues to be addressed and the level of effort required to develop

the forecast. The steps include a review of previous forecasts, determination of data needs, identification of data sources, collection of data, selection of forecast methods, preparation of the forecasts, and evaluation and documentation of the results.

FAA Advisory Circular (AC) 150/5070-6B, *Airport Master Plans*, outlines six standard steps involved in the forecast process, including:

1) Obtain existing FAA and other related forecasts for the area served by the airport.

2) Determine if there have been significant local conditions or changes in the forecast factors.

3) Make and document any adjustments to the aviation activity forecasts.

4) Where applicable, consider the effects of changes in uncertain factors affecting demand for airport services.

5) Evaluate the potential for peak loads within the overall forecasts of aviation activity.

6) Monitor actual activity levels over time to determine if adjustments are necessary in the forecasts.

Aviation activity can be affected by many influences on the local, regional, and national levels, making it virtually impossible to predict year-to-year fluctuations of activity over 20 years with any certainty. Therefore, it is important to remember that forecasts are to serve only as guidelines, and planning must remain flexible enough to respond to a range of unforeseen developments.

The following forecast analysis for Columbia Gorge Regional Airport was produced following these basic guidelines. Existing forecasts, including the *2004 Airport Layout Plan Report*, are examined and compared against current and historic activity. The historical aviation activity is then examined along with other factors and trends that can affect demand. The intent is to provide an updated set of aviation-demand projections for Columbia Gorge Regional Airport that will permit the airport to make planning adjustments as necessary to maintain a viable, efficient, and cost-effective facility.

SOCIOECONOMIC CHARACTERISTICS

A variety of historical and forecast socioeconomic data has been collected for use in various elements of this master plan. This information provides essential background information for use in determining aviation service level requirements. Aviation forecasts are related to the population base and the economic strength of the region; therefore, it is necessary to have an understanding of socioeconomic outlook for the airport service area. As discussed in the previous chapter, the primary service area for the airport includes all of Klickitat and Wasco counties.

This section will present baseline statistical information related to socioeconomic indicators such as population, employment, and income. With this information, analysis will be undertaken to develop forecasts of future aviation that can be reasonably expected at Columbia Gorge Regional Airport.

Population is one of the most important elements to consider when planning for the future needs of the airport. Several sources were examined for population data including the U.S. Census Bureau, demographics produced by the respective states, and Woods & Poole Economics.

It is preferable to utilize local or regional data when it is available. For the City of The Dalles, several studies have been produced in conjunction with an update to the Comprehensive Plan. These studies include *City of The Dalles: Economic Opportunities Analysis*, prepared by ECONorthwest, April 2007, and *Population Forecasts for The Dalles*, dated May 2006, prepared by ECONorthwest. The Comprehensive Plan, utilizing the findings by ECONorthwest, was prepared by Winterbrook Planning.

ECONOMIC BASELINE

The economy of the Mid-Columbia Region is primarily rural in nature, and land use is predominantly agricultural. Wasco County's principal industries are agriculture (cereal grains, sweet cherries, apples, and livestock), lumber, manufacturing, electric power generation, transportation, and aluminum manufacturing. Wheat is the dominant field crop on the 190,000 acres of non-irrigated cropland. Of the 38,000 acres of irrigated land in the county, most are devoted to cherry orchards.

Wasco County, founded in 1854, covers an area of 2,396 square miles or 1,523,840 acres and contains six incorporated communities. It was named for the Wasco (or Wascopam) Indian tribe. Wasco County, Oregon had an estimated 2006 population of 23,712, down from 23,791 in 2000. The county seat is the City of The Dalles, with a population in 2000 of 12,156 making up 51.1% of the county's total population. Per capita personal income for Wasco County in 2004 was $24,958, under statewide and national figures of $30,561 and $33,050.

The major agricultural product of the City is sweet cherries. The Dalles is a producer for both domestic and overseas markets. There are in excess of 6,000 acres of sweet cherry trees around the City. Wheat is another important agricultural product with 50,000 acres currently in cultivation in The Dalles area. Additional agricultural products include cattle, hay, and fruits.

The City is a strategic home base for year-round recreation. Water sport enthusiasts will find boating, excellent fishing, and one of the finest wind surfing areas in the United States on the Columbia River. To the east are substantial opportunities to camp, fish, hike, and sightsee. To the west, ski enthusiasts have the opportunity to challenge the ski slopes of Mt. Hood where there are numerous resorts.

Klickitat County, Washington shares a similar economy to that of Wasco County, Oregon with the economy being dominated by agricultural industries. The leading agricultural products are wheat, alfalfa, barley, potatoes, and carrots. The county is a leading producer of fruit bearing trees and vines such apples, pears, cherries, grapes, peaches, and apricots. Livestock production is also common including beef and milk cows, sheep, and lambs.

Klickitat County was founded in 1859, with the county seat ultimately established in the City of Goldendale, approximately 25 miles to the northeast of the Columbia Gorge Regional Airport. The population of Klickitat County in 2000 was 19,161 and by 2008 it was estimated at 20,377. The population is spread over 1,872 square miles (about the size of Delaware) of mountain, range-land, canyon, and river in the South-Central part of Washington. The Columbia Gorge Regional Airport is physically located in Klickitat County.

THE DALLES ECONOMIC OPPORTUNITIES (ECONorthwest)

ECONorthwest developed a study titled "The City of the Dalles: Economic Opportunities Analysis" in 2007. The findings of the study are summarized as follows:

The mix of productive factors present in The Dalles, relative to other communities in the Columbia River Gorge, form The Dalles' comparative advantage. A primary comparative advantage in The Dalles is its access to transportation and its location within the Columbia River Gorge. This makes The Dalles attractive to residents and businesses that want to live and work in a community that has small-town character and scenic beauty but still needs to have access to any of several modes of transportation. Comparatively low housing costs are another important comparative advantage in The Dalles. The Dalles offers a lower-cost housing alternative to Hood River.

The following characteristics of The Dalles will affect the types of businesses most likely to locate in The Dalles:

- The presence and expected growth of the Columbia Gorge Regional Airport could help The Dalles attract businesses engaged in the manufacture and service of aircraft, avionics, and related equipment.

- The Dalles' semi-rural setting, access to I-84 and other modes of transportation, and workforce availability make The Dalles attractive to businesses in manufacturing. Examples include high-tech electronics, food processing, industrial equipment, recreational equipment, and other specialty manufacturing.

- Access to transportation, including the access to I-84, the railroad, barges, and the airport, makes The Dalles attractive to businesses in the warehousing and transportation sector. Large warehouse facilities that serve large areas appear to favor more central settings, such as the Willamette Valley. The Dalles is more likely to attract more modest facilities that serve a smaller geographic region or that specialize in fewer goods.

- The Dalles' attractive semi-rural setting and quality of life could make it a location for professional, scientific, and technical services, which are attracted to areas with high quality of life. Examples include software design, engineering, and research.

- The Dalles' setting within the Columbia River Gorge, access to a variety of outdoor recreation, and the growing presence of viniculture make The Dalles attractive to tourists. Industries that serve tourists, such as food services and accommodations, are likely to grow if tourism increases.

- The comparatively low cost and high availability of electricity, water, and high speed internet connection (via the Q-life fiber optic loop) could make The Dalles attractive to businesses engaged in specialty manufacturing or technology related businesses.

Cities exist in an economic hierarchy in which larger cities offer a wider range of goods and services than smaller cities. The location of a community relative to larger cities, as well as its absolute size, affects the mix of goods and services that can be supported by a small city. The Dalles' small size has implications for the types of retail and service firms most likely to locate in The Dalles:

- The Dalles is the largest city in the Gorge, and it will continue to serve as a regional center for retail, services, and government.

- As a regional center for retail shopping, The Dalles will experience demand for development of big-box and mid-sized retail stores, primarily for grocery, general merchandise, and home improvement stores. Because of its small population base, The Dalles is unlikely to have demand for large "category killer" retailers such as Petsmart or Borders Books.

- The Dalles will continue to be the location for regional institutions such as the Mid-Columbia Medical Center, the Columbia Gorge Community College, Wasco County Courthouse, and other government offices.

- Population growth in The Dalles will drive demand for more small and specialty retail shops and offices for business, professional, and health care services.

GROWTH INDUSTRIES IN THE DALLES (ECONorthwest)

Retail and Services. The state's forecast for nonfarm employment forecast for 2004 to 2014 projects that more than half of employment growth in Region 9, which includes Wasco County, will be in retail and services. As a regional center for retail and services, The Dalles may attract the following industries:

- The Dalles may be attractive to big-box and mid-sized retail stores but is unlikely to have the demand for large "category killer" retailers such as Petsmart or Borders Books.

- The Dalles may have growth in small and specialty retail shops and offices for business, professional, and health care services as population increases.

- The Dalles' setting within the Columbia River Gorge, access to a variety of outdoor recreation, and the growing presence of viniculture make The Dalles attractive to tourists. Industries that serve tourists, such as food services and accommodations, are likely to grow if tourism increases.

- The Dalles' may be attractive for firms engaged in professional, scientific and technical services, such as software design, engineering, and research.

Government. The state's forecast for nonfarm employment forecast for 2004 to 2014 projects that growth in government will account for about one-third of employment growth in Region 9, including Wasco County. The Dalles may see employment growth in government for the following reasons:

- The Dalles will continue to be the location for regional institutions such as the Columbia Gorge Community College, Wasco County Courthouse, and other government offices.

- The Dalles will have growth in local government as population increases. Assuming that families with young children locate in The Dalles, growth in local government is likely to be dominated by education.

Industrial. The state's forecast for nonfarm employment forecast for 2004 to 2014 projects that growth in industrial sectors will account for the smallest portion of employment growth in Region 9, which includes Wasco County. The Dalles has comparative advantages, such as location and access to transportation, that may contribute to the growth in employment in the following industries:

- The Dalles should be attractive for firms engaged in a range of specialty manufacturing, including aircraft, high-tech electronics, food processing, industrial equipment, and recreational equipment.

- The Dalles should also be attractive for firms engaged in warehousing and distribution. The Dalles is more likely to attract more modest facilities that serve a smaller geographic region or that specialize in fewer goods.

The Dalles may be attractive to industries that need large amounts of electricity from stable sources.

MAJOR EMPLOYERS (ECONorthwest)

As part of the study, ECONorthwest interviewed 10 major employers in The Dalles' Urban Growth Boundary (UGB). Of the 10 firms interviewed, three firms have expansion plans and expect to add between 80 and 90 jobs in the next few years. The Mid-Columbia Medical Center and Oregon Cherry Growers plan to continue to add between 40-60 employees per year for the next several years. The following is a list of major employers interviewed, and their responses regarding firm expansion plans.

- **Mid-Columbia Medical Center (735+ employees).** The Mid-Columbia Medical Center anticipates hiring about 30 employees per year as their facility expands. They are planning to build a new hospital in five or ten years. They own less than ten acres surrounding their current site. Their plans are uncertain at this point, but they may choose to purchase land to relocate the hospital to a new site. If they do so, they will select a site closer to Interstate 84.

- **Oregon Cherry Growers, Inc. (250+ employees in standard processing, 1,000+ during fresh harvesting).** The Oregon Cherry Growers do not plan to expand their facilities, but plan to hire 10-20 standard processing employees every year for the next several years.

- **Safeway Stores, Incorporated (180+ employees).** Safeway Stores recently expanded their facility and do not plan any additional expansions in the near future. They are constantly hiring because of heavy employee turnover, but this hiring should not add substantially to their current employment level.

- **Wasco County (175+ employees).** The County is keeping employment levels stable and has no plans to expand any facilities. The County owns a variety of sites in The Dalles' UGB, most of which they want to eventually sell to put the land back on the tax rolls.

- **Fred Meyer (160+ employees).** The Fred Meyer store at The Dalles is scheduled for a 26,000 square-foot expansion between 2006 and 2007. The expanded store will occupy the current site, and they expect to add about 40 employees after the expansion.

- **Northwest Aluminum Company (120+ employees).** Northwest Aluminum does not anticipate any job growth and does not plan to relocate or expand facilities. They own 440 acres of land in The Dalles; 220 of those acres are currently occupied by their facilities and the remaining 220 are for sale.

- **Columbia Basin Nursing Home (70+ employees).** Columbia Basin is a non-profit corporation that operates the Nursing Home on land owned by Wasco County. The facility currently does not plan for significant employee growth or expansion of their building, but if any of the existing nursing homes in the area go out of business Columbia Basin may expand to meet demand.

- **Kmart (65+ employees).** Kmart has no plans for expansion of employment or its facilities.

- **Region 9 Educational Service District (57+ employees).** The Region 9 ESD has no plans for expansion of employment or its facilities.

- **Precision Lumber Company (28+ employees).** Precision Lumber recently laid off a number of employees. They do not expect to increase employment but may expand their facility relatively soon on land they own or lease.

In addition to what was learned from employer interviews, information available on the Oregon Labor Market Information System (OLMIS) web site and through other interviews indicates that other firms plan to expand or add jobs in The Dalles:

- Google has purchased about 30 acres of land from the Port of The Dalles and expects to build a data warehousing facility on the property. They expect to eventually employ about 120 people in The Dalles (this project has been completed).

- Homeshield, a maker of components for windows and doors, has purchased land at the Port of the Dalles and expects to build a 65,000 square-foot manufacturing plant to fabricate window parts. Homeshield expects to expand this facility and add employees within three years.

- Home Depot opened a store in The Dalles in 2004 and has about 110 employees.

- The Columbia Gorge Regional Airport expects to grow over the next five years. According to airport staff, they have approximately 700 undeveloped acres. They hope to develop 200 acres for use by aviation related companies, including services and specialty manufacturing. They hope to develop the remaining 500 acres as a golf course and hotel complex. A developer is interested in this land and has a tentative agreement with the City to develop the hotel and golf course.

- Insitu is a company currently headquartered in Bingen, WA. Their primary business is the engineering and manufacture of an unmanned aircraft system. Interviews with community leaders have given insight to plans by the company to locate a new headquarters complex in the Columbia Gorge region. A search has been initiated for a location that could accommodate a 100,000 square-foot building complex. Property at the airport has been considered for this project.

DEMOGRAPHICS

A variety of historical and forecast socioeconomic data has been collected for use in various elements of this master plan. This information provides essential background information for use in determining aviation service level requirements. Aviation forecasts are related to the population base and the economic strength of the region; therefore, it is necessary to have an understanding of socioeconomic outlook for the airport service area.

This section will present baseline statistical information related to socioeconomic indicators such as population, employment, and income. With this information, analysis will be undertaken to develop forecasts of future aviation demand that can be reasonably expected at Columbia Gorge Regional Airport.

Population

In 2006-07, The Dalles made substantial revisions to the economic and residential elements of the Comprehensive Plan based on revised population and employment projections. Cities and counties are required to formally adopt population projections as part of their comprehensive plans. **Table 2A** presents historic population data for The Dalles and area counties.

TABLE 2A
Historic Population Trends

				Average Annual Growth Rate		
Area	**1980**	**1990**	**2000**	**80-90**	**90-00**	**80-00**
Oregon	2,633,156	2,842,321	3,421,399	0.77%	1.87%	1.32%
Wasco County	21,732	21,683	23,791	-0.02%	0.93%	0.45%
Hood River County	15,835	16,903	20,411	0.65%	1.90%	1.28%
Skamania County, WA	7,919	8,289	9,872	0.46%	1.76%	1.11%
The Dalles	10,820	11,060	12,156	0.22%	0.95%	0.58%

Source: Population Forecast for The Dalles, May 22, 2006 (ECONorthwest)

The *Population Forecast for The Dalles* (ECONorthwest, 2006) presents the population forecast for the City of The Dalles for the period 2006-2056. The forecast reaches a population of 23,740 by 2030. A 1.9 percent annual growth rate is assumed from 2006-2026, 1.3 percent from 2026-2046, and 0.9 percent from 2047-2056. For purposes of this master plan, population forecasts to 2030 will be considered. This rate is based on The Dalles' growth between 1980 and 2005, and the projection method is a deterministic method rather then a flat line projection.

The Dalles is currently the largest City in Wasco County, and will account for an increasingly large percentage of the county's population. The forecast results in The Dalles Urban Growth Boundary accounting for more than 65 percent of the Office Economic Analysis' (OEA) forecast population for Wasco County in 2040. Many of the factors that will influence growth in The Dalles will also affect Wasco County. Thus, it is reasonable to adjust the OEA figures to account for a higher rate of growth in The Dalles. **Table 2B** presents forecast population data for The Dalles and Wasco County.

TABLE 2B
Adjusted Population Forecast for The Dalles

Year	Wasco County*	Adjusted Wasco County	Wasco Adjusted AAGR 5-Year Intervals	The Dalles	The Dalles AAGR 05-30 5-Year Intervals
2005	23,420	23,420	NA	15,184	NA
2010	23,753	25,582	1.78%	16,682	1.90%
2015	24,297	27,944	1.78%	18,329	1.90%
2020	24,896	30,525	1.78%	20,137	1.90%
2025	25,670	33,346	1.78%	22,124	1.90%
2030	26,563	35,578	1.30%	23,740	1.42%
2035	27,522	37,737	1.19%	25,324	1.30%
2040	28,653	40,029	1.19%	27,013	1.30%

*Oregon Office of Economic Analysis

Source: Based on the OEA forecasts for Wasco County and projections for the Dalles' population by ECONorthwest

Employment

Analysis of a community's employment base can be valuable in determining the overall economic well-being of that community. In most cases, the community make-up and health are significantly impacted by the availability of jobs, the variety of employment opportunities, and the types of wages provided by local employers.

In addition to the trends in the local economy presented in the previous section, some qualitative judgments about future conditions can be made:

- Employment in Wasco County has grown faster than population since 1980. Demographic and employment data shows that Wasco County has a higher ratio of residents per job than in Oregon as a whole, in part because Wasco County has a larger share of older residents who are not part of the labor force. (ECONorthwest: *Economic Opportunities Analysis 2007*)

- The Dalles has been, and will continue to be, the employment center of Wasco County. The Dalles currently has almost 73 percent of the County's employment, but only 52 percent of its population. This pattern of employment growth will probably change somewhat - population growth in The Dalles is likely to outpace employment growth, reducing the gap between its share of employment and population. (ECONorthwest: *Economic Opportunities Analysis 2007*)

Based on these judgments, historic employment growth in Wasco County, and the population growth rates forecast for Wasco County and The Dalles, it appears that an appropriate assumption for the average annual rate of total employment growth is 1.6 percent for the next 20 years. **Table 2C** shows the results of applying this growth rate to the total employment base in The Dalles. The average annual growth rate in employment over the next 20 years is 1.6 percent.

TABLE 2C
Total Employment
The Dalles Urban Growth Boundary

	Historic		Forecast			AAGR
	2004	2006	2011*	2016*	2026	2006-2026
Retail and Services	6,398	6,604	7,150	7,740	8,800	1.45%
Industrial	1,703	1,758	1,903	2,060	2,708	2.18%
Government	1,447	1,490	1,617	1,751	2,031	1.56%
Total Employment	9,548	9,852	10,670	11,551	13,539	1.60%

*Interpolated
AAGR: Average annual growth rate
Source: The City of The Dalles: Economic Opportunities Analysis - April 2007 (Prepared by ECO-Northwest)

Income

Table 2D presents historical per capita personal income (PCPI) for the two counties and states. As indicated in the table, the PCPI growth trends have been in line with national trends. Income trends can often be an indicator of the growth potential of an airport. Between 2005 and 2009, income grew significantly in both counties, each exceeding the growth rates of their respective states. Income growth is forecast to continue to exceed that of the state through the 2030 planning period.

TABLE 2D
Income Trend and Projection

Year	Klickitat County	AAGR	Wasco County	AAGR	State of Washington	AAGR	State of Oregon	AAGR
Historic Trend								
2000	$24,444	NA	$25,643	NA	$34,447	NA	$30,457	NA
2005	$25,488	0.84%	$25,561	-0.06%	$35,192	0.43%	$30,677	0.14%
2009 *	$28,438	2.78%	$28,249	2.53%	$37,387	1.52%	$31,664	0.79%
Projection								
2015	$29,397	0.55%	$29,970	0.99%	$39,831	1.06%	$34,306	1.34%
2020	$31,307	1.27%	$32,137	1.41%	$42,174	1.15%	$36,749	1.39%
2030	$36,015	1.41%	$37,230	1.48%	$47,766	1.25%	$42,491	1.46%

*Estimate
Source: Woods & Poole - CEDDS; Per Capita Personal Income (2004)

AVIATION TRENDS

The forecasts developed for the airport must also consider national, regional, and local aviation trends. The following section describes the trends in aviation. This information is utilized both in statistical analysis and to aid the forecast preparer in making any manual adjustments to the forecasts.

NATIONAL TRENDS

Each year, the FAA publishes its national aviation forecast. Included in this publication are forecasts for large air carriers, regional air carriers, general aviation, and FAA workload measures. The forecasts are prepared to meet budgeting and planning needs of the constituent units of the FAA and to provide information that can be used by state and local authorities, the aviation industry, and the general public. The current edition, FAA *Aerospace Forecasts - Fiscal Years 2009-2025*, has been utilized in the generation of the aviation demand forecasts to follow.

Historically, aviation activity has closely followed the national economic outlook. With each passing month of 2008, "consumer confidence dipped as energy prices spiked, housing foreclosures climbed, credit tightened, and unemployment surged." This chain of events resulted in lower than expected demand for air travel. Nonetheless, the FAA continues to forecast long term aviation growth.

Since 2001, U.S. airlines have adjusted to the impacts of 9/11, concerns about international pandemics, airline bankruptcies, record high fuel prices, and the most significant economic downturn since the Great Depression (December 2007 – present). Yet, the number of passengers travelling is forecast to continue to grow over the long term, demonstrating the value of air transportation. The 2009 forecast calls for a sharp decline in activity in the near term, with a return to growth over the long term.

Measures of aviation demand such as available seat miles (ASMs) and revenue passenger miles (RPMs) are expected to drop 6.7 percent and 8.9 percent, respectively, in 2009. Both are anticipated to begin a growth trend in 2010, averaging 3.8 percent and 3.4 percent growth through 2025. Passenger enplanements are forecast to decline 7.8 percent in 2009 and then begin growing at 2.7 percent annually through 2025.

The economic downturn has also dampened the near-term prospects for the general aviation industry. After several consecutive years of growth, general aviation activity fell 5.6 percent in 2008. Worldwide shipments of new general aviation aircraft declined in 2008 for the first time since 2002 (down 6.7 percent). Piston aircraft shipments fell 20.7 percent, but turbine aircraft shipments increased by 16.7 percent. Total billings for general aviation aircraft were up 14.4 percent in 2008, demonstrating the sharp difference in demand between piston and turbine aircraft.

Economic Outlook

The FAA uses the most recent Administration forecasts to project domestic aviation demand. The National Bureau of Economic Research indicated that the U.S. officially entered a recession in December 2007. The Bureau of Economic Analysis reported that real gross domestic product (GDP) fell at an annual rate of 3.8 percent in the fourth quarter of 2008. The question for forecasters is how long the recession will continue. The combination of structural changes, particularly in the banking and housing sectors, monetary policy, and passage of the *American Recovery and Reinvestment Act* (Stimulus Package), are projected to lead the economy out of recession in the second half of 2009 at the earliest. Initially, the recovery is expected to be modest over the second half of 2009 with positive growth occurring through 2010 and beyond.

Between 2010 and 2013, U.S. GDP is projected to be above trend (3.8 percent) with rates ranging from 2.4 percent to 4.5 percent. Beyond 2013, U.S. GPD is forecast to balance around 2.6 percent.

General Aviation Industry Trends

In the years since the passage of the *General Aviation Revitalization Act of 1994* (federal legislation which limits the liability on general aviation aircraft to 18 years from the date of manufacture), it is clear that the Act has successfully infused new life into the general aviation industry. This legislation sparked an interest to renew the manufacturing of general aviation aircraft due to the reduction in product liability, as well as renewed optimism for the industry. After the passage of this legislation, annual shipments of new aircraft rose every year between 1994 and 2000. According to the General Aviation Manufacturers Association (GAMA), between 1994 and 2000 general aviation aircraft shipments increased at an average annual rate of more than 18 percent, increasing from 1,132 shipments in 1994, to 3,147 shipments in 2000.

According to figures published by GAMA, worldwide manufacturers of general aviation aircraft delivered 3,969 aircraft in 2008. This represented the first year-over-last decline in shipments since 2001. **Table 2E** presents historical data related to aircraft shipments. After years of sustained growth, piston aircraft shipments declined in 2008, while turbine aircraft continued to grow.

The trend in general aviation manufacturing and billing over the previous eight years is clear. After a drop in total aircraft manufactured from 2001 through 2003, strong growth has occurred each year beginning in 2004. From 2003 through 2007, worldwide net billings have grown by 55 percent. In 2007, business jet manufacturing reached more than 1,000 units for the first time. Also notable is the resurgence of both turboprop and multi-engine piston aircraft.

TABLE 2E
Annual General Aviation Airplane Shipments
Manufactured Worldwide and Factory Net Billings

Year	Total	SEP	MEP	TP	J	Net Billings ($ billions)
2000	3,147	1,877	103	415	752	13,496
2001	2,998	1,645	147	422	784	13,868
2002	2,677	1,591	130	280	676	11,778
2003	2,686	1,825	71	272	518	9,998
2004	2,961	1,999	52	319	591	11,918
2005	3,590	2,326	139	375	750	15,156
2006	4,053	2,513	242	412	886	18,815
2007	4,272	2,417	258	459	1138	21,811
2008	3,969	1,943	176	535	1315	24,837

SEP - Single Engine Piston; MEP - Multi-Engine Piston; TP - Turboprop; J - Turbofan/Turbojet
Source: General Aviation Manufacturers Association 2008 Stat Book

Many capable general aviation and reliever airports have seen an upward trend in activity by business jets. There are numerous factors that have led to this trend including the growth of fractional aircraft ownership and a desire by frequent travelers to save time by avoiding commercial service airports. **Table 2F** presents growth trends in fractional aircraft ownership.

TABLE 2F
Fractional Aircraft and Share Owners

Year	Number of Aircraft	Number of Shares
2000	574	2,810
2001	689	3,601
2002	780	4,244
2003	286	4,516
2004	870	4,765
2005	945	4,828
2006	984	4,863
2007	1,030	5,168
2008	1,094	5,179

Source: GAMA 2008 Stat Book

Honeywell Corporation also tracks the general aviation industry. Their second quarter publication, dated August 4, 2009, shows a steep decline in aircraft production. In the first half of 2009, total general aviation shipments fell 45.8 percent, from 1,918 units in 2008 to 1,039 in 2009. Total billings were down 21.7 percent. Piston-powered shipments totaled 434 units compared to 1,034 units delivered in the first half of 2008, a 58 percent decline. Turboprops were down 13.6 percent from 221 in the first half of 2008 to 191 in 2009. Business jet shipments totaled 414 units in the first half of 2009, a 37.6 percent decrease over the 663 units delivered in the first half of 2008.

In October 2009, Honeywell published its 18th annual Aerospace Business Aviation Outlook. In the report it was noted that business jet shipments for 2009 are expected to be approximately 800, down from 1,139 in 2008. Deliveries in 2010 are expected to decline further to below 700. The report indicates that potential buyers of general aviation aircraft are delaying that purchase until the economy has clearly turned around. Honeywell anticipates that this pent-up demand will improve the outlook for order intake and new jet deliveries beyond the 2011 timeframe.

FAA General Aviation Forecasts

The FAA forecasts of general aviation activity assume that business use of general aviation aircraft will continue to expand at a more rapid pace than that for personal/sport use. Corporate use of fractional and charter aircraft continues to be practical alternatives to commercial travel due to time savings.

The active general aviation fleet is projected to increase at an average annual rate of 1.0 percent over the 17-year FAA forecast period, growing from 234,015 in 2008 to 275,230 by 2025. The more expensive and sophisticated turbine fleet is projected to grow 4.8 percent annually from 11,400 in 2008 to 25,165 in 2025. Conversely, the number of active piston-powered aircraft is projected to decrease from a total of 165,720 in 2008 to 164,550 in 2025. Multi-engine piston aircraft representing 11 percent of total piston aircraft is forecast to decline 1.0 percent annually, while single engine piston aircraft are forecast to grow 0.1 percent over the same timeframe. **Exhibit 2A** presents the FAA forecast for U.S. active general aviation aircraft.

FAA forecasts of general aviation operations (takeoffs and landings) are categorized as local and itinerant with local operations being those within the traffic pattern airspace of an airport and itinerant being those aircraft with a destination away from the airport. General aviation activity at FAA air traffic facilities (including FAA contract towers) fell 5.6 percent in 2008. This was the steepest decline since 2003. Itinerant general aviation operations have been steadily declining since 2000 from a high of 22.844 million to a current low of 17.368 million in 2008. Itinerant operations are forecast to continue to contract at 3.5 percent annually through 2010, then grow at 1.5 percent from 2010-2020.

Local operations are forecast to follow a similar trend contracting at 2.6 percent from 2008-2010, and then growing at 0.3 percent annually thereafter. Air taxi and commuter operations are forecast to follow a similar trend to itinerant general aviation activity contracting 2.9 percent from 2008-2010 followed by an average annual growth rate of 1.5 percent through 2025.

As discussed, general aviation activity typically follows the state of the national economy. As of this writing (October 2009), there are indications that some sectors of the economy are beginning to change. Monthly job losses have declined significantly from early in the year. The stock market has rebounded to reclaim nearly half the losses experienced in the winter of 2008-2009. At the same time, unemployment continues to rise and is expected to peak at above 10 percent nationally before a reversal is expected.

The conclusion to be drawn is that recession has had a severe and negative impact on general aviation activity across the country. Some economic indicators are beginning to reverse the trend as of October 2009. The FAA forecasts do take into account the economic collapse that occurred in late 2008 and they forecast the economy showing growth again in 2010.

REGIONAL AND LOCAL AVIATION

Both the states of Oregon and Washington have a vested interest in the Columbia Gorge Regional Airport. Therefore, both states engage in planning and development for the airport. In Oregon, the Columbia Gorge Regional Airport is included in the *Oregon Aviation Plan* (OAP 2007). The airport is also included in the *Washington State Long-Term Air Transportation Study* (LATS 2009).

The OAP 2007 forecast methodology was approved by the FAA. Columbia Gorge Regional Airport based aircraft were estimated at 57 in 2005, and forecast to increase to 73 by 2025. This equates to an annual growth rate of 1.27 percent. Total operations were estimated at 29,600 in 2005 and were forecast to grow to 44,750 by 2025. The annual growth rate for operations is 2.09 percent.

The LATS 2009 provides forecasts of aviation demand for the state with a base year of 2005. In 2005, approximately 8,100 general aviation aircraft based at public use airports in Washington State. This is projected to reach 9,700 in 2015 and 11,800 by 2030. From 2005 to 2030, this represents an annual growth rate of 1.49 percent. The Southwest Washington Regional Transportation Council (RTC) includes nine airports and is forecast to experience an average annual growth rate in based aircraft of 1.95 percent from 2025-2030. General aviation operations in Washington State were estimated at 3.0 million in 2005 and are forecast to reach 4.4 million in 2030, representing an average annual growth of 1.6 percent. Total operations in the Southwest Washington RTC is forecast to have an annual growth rate of 1.81 percent from 2005-2030.

AVIATION FORECAST METHODOLOGY

The development of aviation forecasts proceeds through both analytical and judgmental processes. A series of mathematical relationships is tested to establish statistical logic and rationale for projected growth. However, the judgment of the forecast analyst, based upon professional experience, knowledge of the aviation industry, and assessment of the local situation, is important in the final determination of the preferred forecast.

Beyond five years, the predictive reliability of the forecasts can diminish. Therefore, it is prudent for the airport to update the forecasts, reassess the assumptions originally made, and revise the forecasts based on the current airport and industry conditions. Facility and financial planning usually require at least a 10-year preview, since it often takes several years to complete a major facility development program. However, it is important to use forecasts which do not overestimate revenue-generating capabilities

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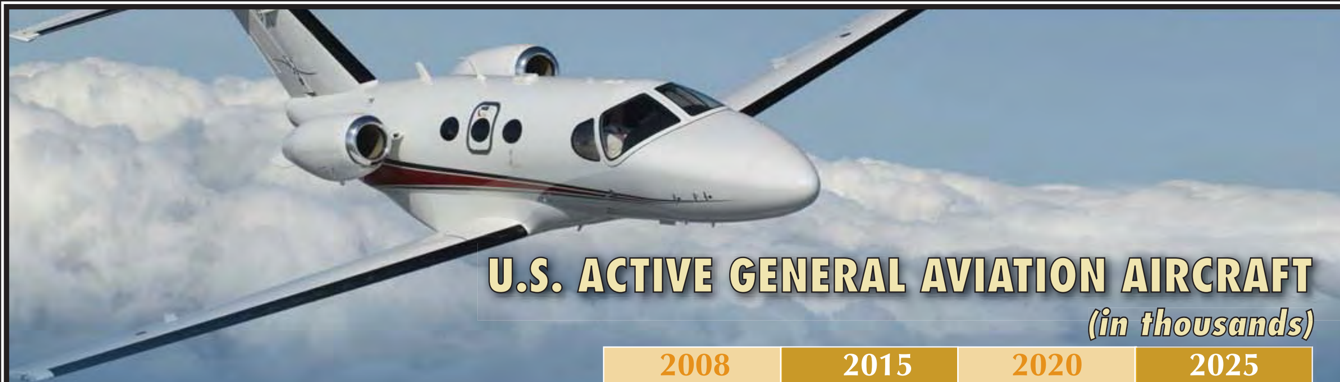
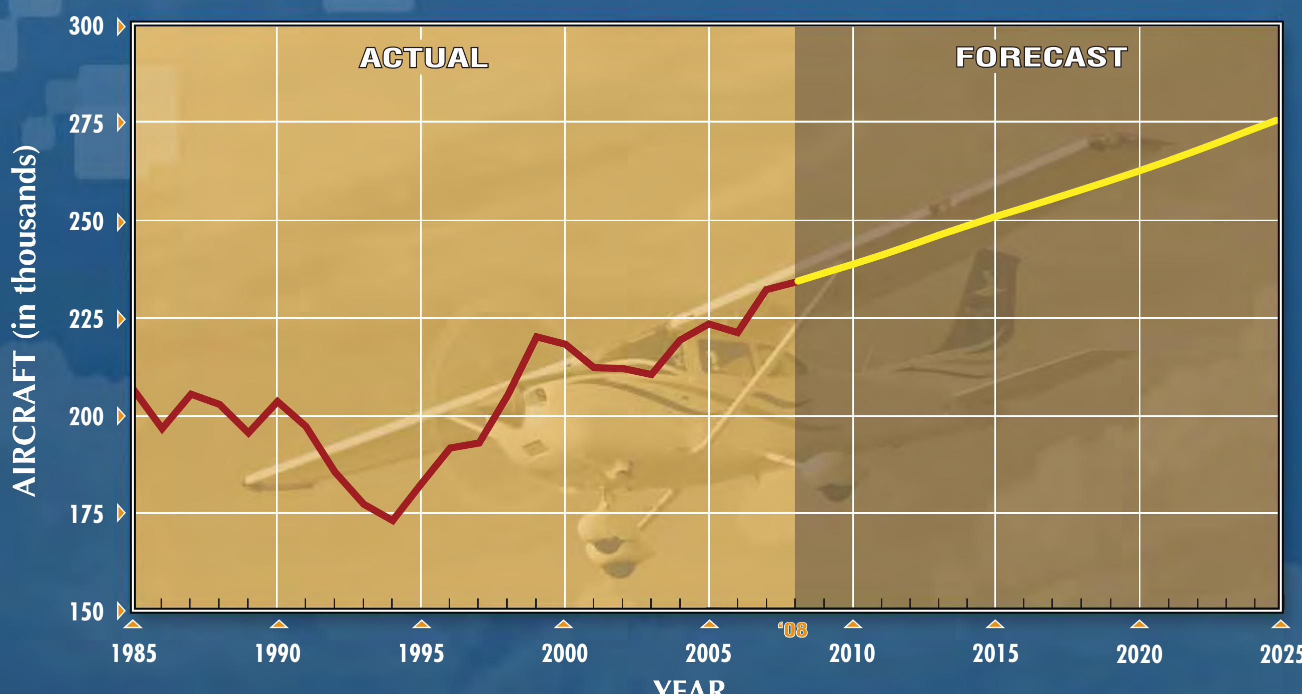


U.S. ACTIVE GENERAL AVIATION AIRCRAFT

(in thousands)

	2008	2015	2020	2025
FIXED WING				
PISTON				
Single Engine	146.6	143.5	144.9	148.5
Multi-Engine	19.1	17.9	17.0	16.0
TURBINE				
Turboprop	9.6	10.5	11.5	12.2
Turbojet	11.4	17.1	20.9	25.2
ROTORCRAFT				
Piston	3.1	4.6	5.3	5.9
Turbine	7.1	9.0	9.9	10.9
EXPERIMENTAL	24.1	29.1	32.0	34.6
SPORT AIRCRAFT	7.0	12.7	14.4	15.9
OTHER	6.0	6.1	6.0	6.0
TOTAL	234.0	250.5	261.8	275.2



Source: FAA Aerospace Forecasts, Fiscal Years 2009-2025.

Notes: An active aircraft is one that has a current registration and was flown at least one hour during the calendar year.

Columbia Gorge Regional Airport

Exhibit 2A
U.S. ACTIVE GENERAL AVIATION
AIRCRAFT FORECASTS

or understate demand for facilities needed to meet public (user) needs.

A wide range of factors are known to influence the aviation industry and can have significant impacts on the extent and nature of activity occurring in both the local and national markets. Technological advances in aviation have historically altered and will continue to change the growth rates in aviation demand over time. A recent example is the substantial growth in the production and delivery of business jet aircraft, which resulted in a growth rate that far exceeded expectations. Such changes are difficult to predict but over time reasonable growth trends can be identified. Using a broad spectrum of demographic, economic, and industry data, forecasts for Columbia Gorge Regional Airport have been developed. Several standard statistical methods have been employed to generate various projections of aviation demand.

Trend line projections are probably the simplest and most familiar of the forecasting techniques. By fitting growth curves to historical demand data, then extending them into the future, a basic trend line projection is produced. A basic assumption of this technique is that outside factors will continue to affect aviation demand in much the same manner as in the past. As broad as this assumption may be, the trend line projection does serve as a reliable benchmark for comparing other projections.

Correlation analysis provides a measure of a direct relationship between two separate sets of historic data. Should there be a reasonable correlation between the data, further evaluation using regression analysis may be employed.

Regression analysis measures the statistical relationship between dependent and independent variables yielding a "correlation coefficient." The correlation coefficient (Pearson's "r") measures association between the changes in a dependent variable and independent variable(s). If the r-squared (r^2) value (coefficient determination) is greater than 0.90, it indicates good predictive reliability. A value below 0.90 may be used with the understanding that the predictive reliability is lower.

Market share analysis involves a historical review of airport activity as a percentage, or share, of a larger regional, state, or national aviation market. A historical market share trend is determined providing an expected market share for the future. These shares are then multiplied by the forecasts of the larger geographical area to produce a market share projection. This method has the same limitations as trend line projections, but can provide a useful check on the validity of other forecasting techniques.

Utilizing these statistical methods, available existing forecasts, and analyst expertise, forecasts of aviation demand for Columbia Gorge Regional Airport have been developed. The remainder of this chapter presents the aviation demand forecasts and includes activity in two broad categories: based aircraft and annual operations.

GENERAL AVIATION FORECASTS

The number of based aircraft is the most basic indicator of general aviation demand. By developing a forecast of based aircraft, the needs of the airport can be forecast more accurately. One method of forecasting based aircraft at an airport is to examine local aircraft ownership, or aircraft registrations in the airport's service area. The primary service area for aircraft basing at Columbia Gorge Regional Airport is Klickitat and Wasco counties.

COUNTY REGISTERED AIRCRAFT

The owner of an aircraft is required to register that aircraft and receive a unique N-number to be prominently painted on the aircraft. The N-number is often referred to as the tail number since most aircraft have the number painted on the tail. This aircraft data is maintained by the FAA and is available to the public. A review of this database provides reliable historical information regarding the number and type of aircraft registered within the approximate airport service area. Utilizing this historical aircraft registration data, forecasts of future aircraft registrations can be made. With a forecast of registered aircraft, a projection of based aircraft can be made.

Aircraft registration data for Klickitat and Wasco counties was obtained going back to 1995 and is presented in **Table 2G**. In 1995, there were 141 registered aircraft in the two counties which has grown to 189 by 2009. Over this time period, there was an average of slightly more than three new aircraft registrations per year. In 2000, there were 183 registered aircraft, which steadily rose to 197 in 2008. Registrations have dropped back to 189 in 2009.

TABLE 2G
Registered Aircraft Fleet Mix in Two-County Area
Klickitat County, WA, and Wasco County, OR

Year	Single Engine Piston	Multi-Engine Piston	Turboprop	Jet	Helicopter	Other	Total
1995	128	5	0	0	6	2	141
1996	136	4	1	0	5	2	148
1997	144	4	2	0	5	2	157
1998	151	7	1	0	6	3	168
1999	152	6	1	0	6	3	168
2000	163	7	2	1	6	4	183
2001	158	6	6	1	8	4	183
2002	160	6	7	1	8	4	186
2003	152	3	13	2	7	3	180
2004	150	3	16	2	5	2	178
2005	159	3	14	2	4	2	184
2006	172	6	2	1	4	3	188
2007	172	5	3	1	5	6	192
2008	172	6	6	3	4	6	197
2009*	162	5	7	1	6	8	189
Annual Growth Rate 1995-2009:			**1.97%**				
Annual Growth Rate 2000-2009:			**0.32%**				

*Through October 2009
Source: FAA Aircraft Registry Database; FAA Census of U.S. Civil Aircraft

Exhibit 2B graphically depicts aircraft registrations in the two counties by location between 1995 and 2009. In 1995, 47.5 percent of the registered aircraft, or 67, were within 10 miles of the airport. By 2009, 82 registrations were within 10 miles, equating to 43.4 percent. The percentage of aircraft between 10 and 20 miles increased from 19.9 to 23.3 percent. Aircraft registrations within the 20-mile ring have remained level at approximately 67 percent between 1995 and 2009.

The historic annual growth rate in registered aircraft in the two counties shows a distinction between growth in the 1990s and growth in the 2000s. The majority of growth occurred in the years (1995-2000) immediately following reform legislation concerning liability on the manufacturer of general aviation aircraft. From 1995 through 2000, registrations grew 4.4 percent annually. From 2000 to 2009, the annual growth rate was 0.32 percent. Over the whole timeframe from 1995 to 2009, the annual growth rate is 1.97 percent annually.

Several forecasts of registered aircraft for the two-county area have been developed and are presented on **Table 2H.** The first simply considers the historical growth trend since 2000, which is 0.82 percent annually. By extending this trend out over the next 20 years, a forecast of 199 registered aircraft by 2015 and 224 registered aircraft by 2030 results.

The next forecast considers maintaining a constant number of registered aircraft per 1,000 people in The Dalles (11.54 registrations per 1,000 people). This results in 212 registrations in 2015, 232 in 2020, and 274 in 2030. This is an annual growth rate of 1.79 percent.

A third forecast compared the percent of registration with the number of U.S. active general aviation aircraft as forecast by the FAA. Utilizing a constant share of 0.08 percent, 198 registrations resulted in 2015, 208 in 2020, and 229 in 2030. This is an annual growth rate of 0.91 percent.

Several statistical trends and regressions were also considered. For this type of analysis, an r^2 value is generated. This value is a measure of the statistical reliability of the analysis. Generally, r^2 values greater than 0.9 percent indicate a strong correlation between variables and, therefore, a greater statistical reliability.

The first of these statistical analyses is a trend line in which a forecast is developed by statistically "fitting" an "average" line over the historical data and extending that line into the future. This method resulted in a poor correlation with an r^2 value of 0.60 percent. This resulted in a forecast of 204 registrations for 2015, 213 for 2020, and 231 for 2029.

The next analysis utilized socioeconomic data for population and employment as independent variables and registered aircraft as the dependant variable. When comparing The Dalles population to registered aircraft, an r^2 value of 0.52 percent resulted. When employment in the county was established as the independent variable, an r^2 value of 0.63 resulted. Both of these are below the threshold for statistical reliability; therefore, a multiple regression utilizing both population and employment was considered. This resulted in a slightly higher r^2 value of 0.73 percent. Each of these had very similar registered aircraft projections. Because these statistical measures did not return an r^2 value greater than 0.90 percent, none were utilized further.

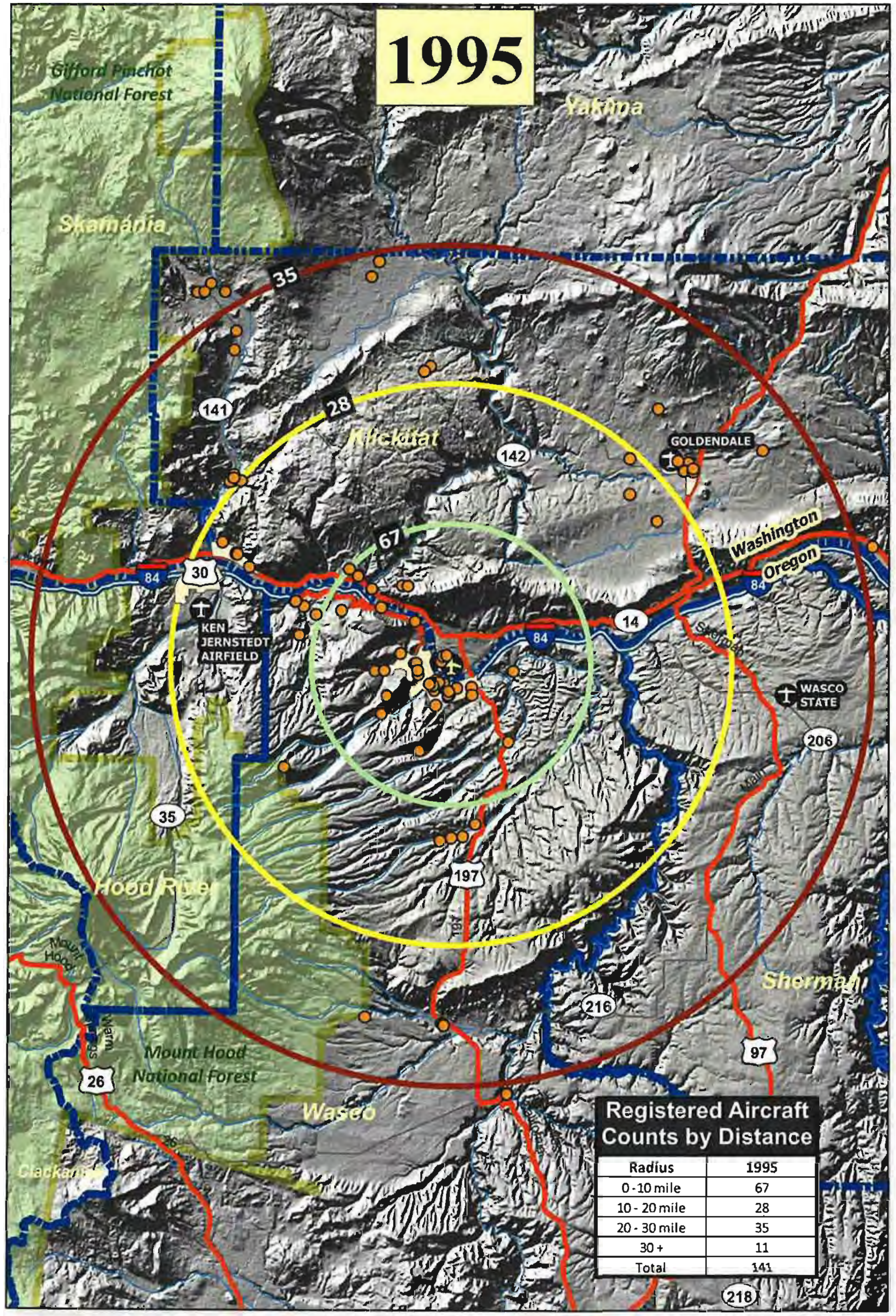
TABLE 2H
Registered Aircraft Projections
Columbia Gorge Regional Airport

Year	Two-County Registrations[1]	U.S. Active Aircraft[2]	Percent of U.S. Active Aircraft	The Dalles Population[3]	Aircraft Per 1,000 Population
2000	183	217,533	0.084%	12,156	15.054
2001	183	211,446	0.087%	12,709	14.399
2002	186	211,244	0.088%	13,287	13.999
2003	180	209,606	0.086%	13,891	12.958
2004	178	219,319	0.081%	14,523	12.256
2005	184	224,262	0.082%	15,184	12.118
2006	188	221,942	0.085%	15,472	12.151
2007	192	231,606	0.083%	15,766	12.178
2008	197	234,015	0.084%	16,066	12.262
2009	189	236,235	0.080%	16,371	11.545
Historical Growth Scenario 0.82% (2000-2008)					
2015	199	248,105	0.080%	18,329	10.831
2020	207	259,475	0.080%	20,137	10.271
2030	224	285,941	0.079%	23,740	9.455
Annual Growth Rate 2009-2030: 0.82%					
Constant Aircraft Per 1,000 Population The Dalles					
2015	212	248,105	0.085%	18,329	11.545
2020	232	259,475	0.090%	20,137	11.545
2030	274	285,941	0.096%	23,740	11.545
Annual Growth Rate 2009-2030: 1.79%					
Constant Market Share of U.S. Fleet					
2015	198	248,105	0.080%	18,329	10.830
2020	208	259,475	0.080%	20,137	10.309
2030	229	285,941	0.080%	23,740	9.636
Annual Growth Rate 2009-2030: 0.91%					
SELECTED FORECAST					
2015	205	248,105	0.083%	18,329	11.184
2020	220	259,475	0.085%	20,137	10.925
2030	240	285,941	0.084%	23,740	10.110
Annual Growth Rate 2009-2030: 1.06%					

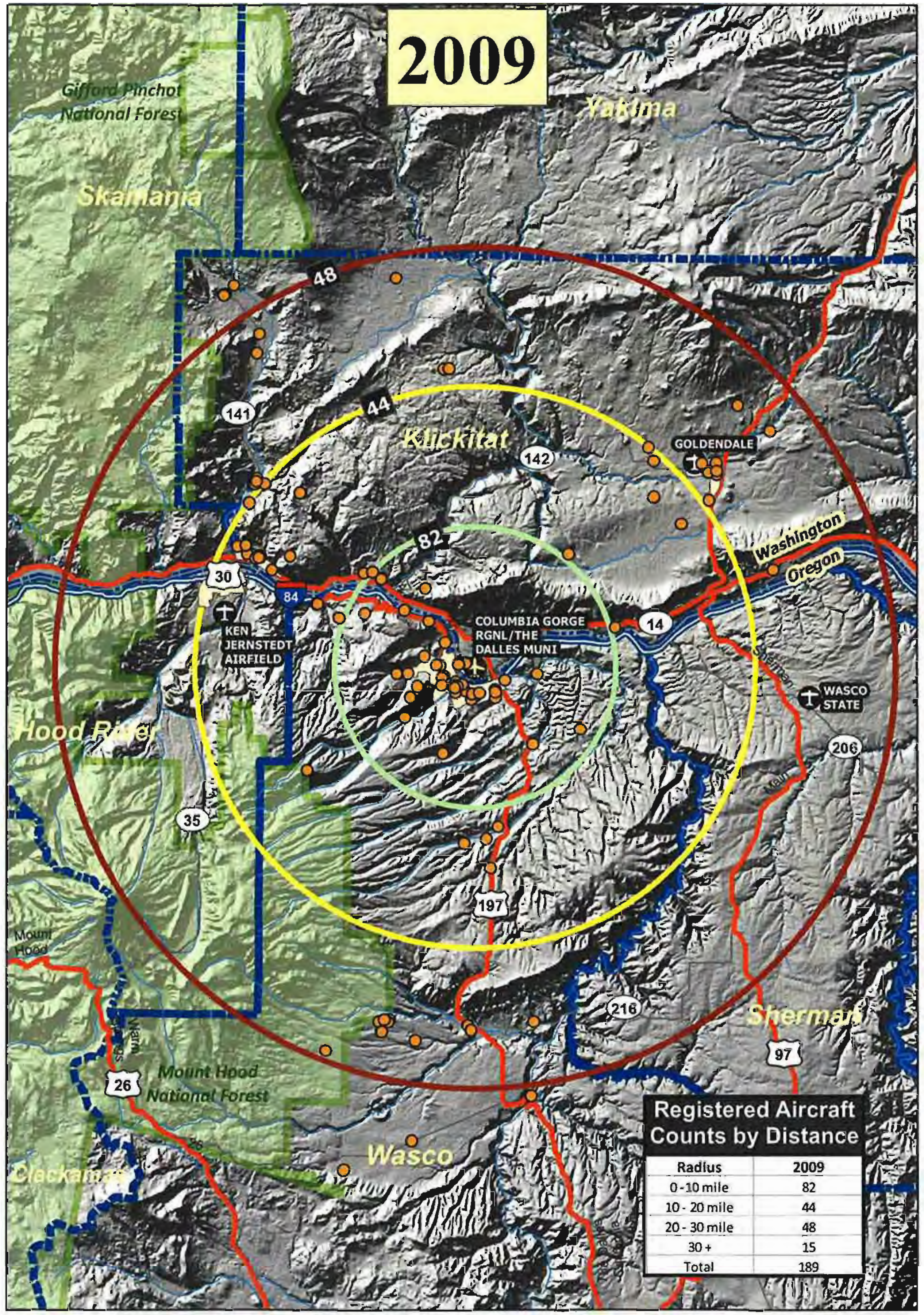
[1]*FAA Aircraft Registry Database; FAA Census of U.S. Civil Aircraft*
[2]*FAA Aerospace Forecast for Fiscal Years 2009-2025*
[3]*Population Forecast for The Dalles - ECONorthwest May 2006*

Registered Aircraft 1995-2009

Klickitat County, WA
Wasco County, OR



Radius	1995
0 - 10 mile	67
10 - 20 mile	28
20 - 30 mile	35
30 +	11
Total	141



Radius	2009
0 - 10 mile	82
10 - 20 mile	44
20 - 30 mile	48
30 +	15
Total	189

Legend

- Registered Aircraft
- Urban Areas
- Waterways
- County Boundary
- National Forest

Buffer Radius

30 miles
20 miles
10 miles

0 5 10 15 20
Miles

Columbia Gorge Regional Airport

Exhibit 2B
KLICKITAT COUNTY WA AND WASCO COUNTY OREGON REGISTERED AIRCRAFT LOCATION MAP

The selected forecast is an approximate average of the three forecasts considered useful. This forecast considers 205 registrations by 2015, 220 by 2020, and 240 by 2030. The selected forecast results in an annual growth rate of 1.06 percent. **Exhibit 2C** graphically presents the registered aircraft projections and the selected forecast.

Now that registered aircraft have been forecast, a based aircraft forecast for Columbia Gorge Regional Airport can be developed.

BASED AIRCRAFT

Identifying the current number of based aircraft is critical to the master plan analysis yet it can be challenging for several reasons. First, historical records of based aircraft were not required by the FAA until 2008. Second, historical based aircraft records for the airport have not been actively maintained over the years. Since most of the hangar spaces at the airport are owned and leased by the airport, a reasonable estimate of the current based aircraft can be determined.

In consultation with airport management, a 2009 based aircraft figure of 68 has been determined. There are 51 T-hangar positions, 50 of which are filled. There are 61 tie-down positions, 12 of which are leased. The hangar to the south of the terminal building houses two Air Tractors (model AT-402). The hangar to the immediate northwest houses three aircraft and the Quonset hut hangar houses the life flight helicopter (typically on the ramp).

In 2008, the FAA contracted with a private consulting firm, GCR & Associates, to collect and catalog the number of based aircraft across the country. This information is now on-line at http://www.basedaircraft.com/bacounts.

The FAA has recently begun utilizing this data as a starting point for forecast approval consideration. Since the forecasts generated in this study will be submitted to the FAA for approval, it is imperative that the based aircraft figure be as accurate as possible. The GCR data shows a based aircraft figure of 66 in 2009.

Several other forecasts have been developed for the airport in the recent past. This includes the FAA *Terminal Area Forecast* (published December 2008), the *2004 Airport Layout Plan (ALP) Report*, the *2007 Oregon Aviation Plan (OAP)*, the *2009 Long Term Air Transportation Study (LATS)* from the Washington Department of Transportation – Aviation Division. Finally, FAA form 5010, *Airport Master Record*, identifies 65 based aircraft for 2009.

New Based Aircraft Projections

Utilizing market share ratios, two new based aircraft forecasts are presented in **Table 2J**. The first forecast maintains a constant 35.98 percent market share of the registered aircraft in the two-counties as based aircraft at Columbia Gorge Regional Airport. This results in 74 based aircraft in 2015, increasing to 86 based aircraft by 2030. An increasing projection has also been developed that continues the historical trend. This forecast increases the airports market share of registered aircraft from a base year of 37 percent to 43 percent by 2030.

TABLE 2J
Based Aircraft Forecasts as a Share of Registrations
Columbia Gorge Regional Airport

Year	Two-County Registered Aircraft	Percent Based at The Dalles	Number Based at DLS (TAF)
2000	183	23.50%	43
2001	183	22.95%	42
2002	186	25.27%	47
2003	180	26.67%	48
2004	178	23.60%	42
2005	184	30.98%	57
2006	188	30.32%	57
2007	192	29.69%	57
2008	197	29.44%	58
2009	189	35.98%	68*
Annual Growth Rate 2000-2009: 4.69%			
Constant Share Forecast			
2015	205	35.98%	74
2020	220	35.98%	79
2030	240	35.98%	86
Annual Growth Rate 2009-2030: 1.14%			
Increasing Share Forecast			
2015	205	37.00%	76
2020	220	39.00%	86
2030	240	43.00%	103
Annual Growth Rate 2009-2030: 2.01%			

*Airport Records
Source: Coffman Associates analysis

Table 2K presents the two market share forecasts along with the existing based aircraft forecasts. As can be seen, each of the comparison forecasts under-estimates the 2009 base year based aircraft figure, therefore the annual growth rates can provide guidance for determining a selected based aircraft forecast.

The lowest growth rate forecast is the 2004 ALP Report. The 2030 based aircraft forecast from this report, as extrapolated from 2022, is 74 and an annual growth rate of 0.92 percent. This represents the low end forecast, which is not surprising since it is the oldest forecast and it was completed before some of the newest hangars had been constructed.

The high end forecast is the increasing market share of registered aircraft in the two-county service area. This forecast results in an annual growth rate of 2.01 percent. This represents the addition of 35 new based aircraft over the next 20 years.

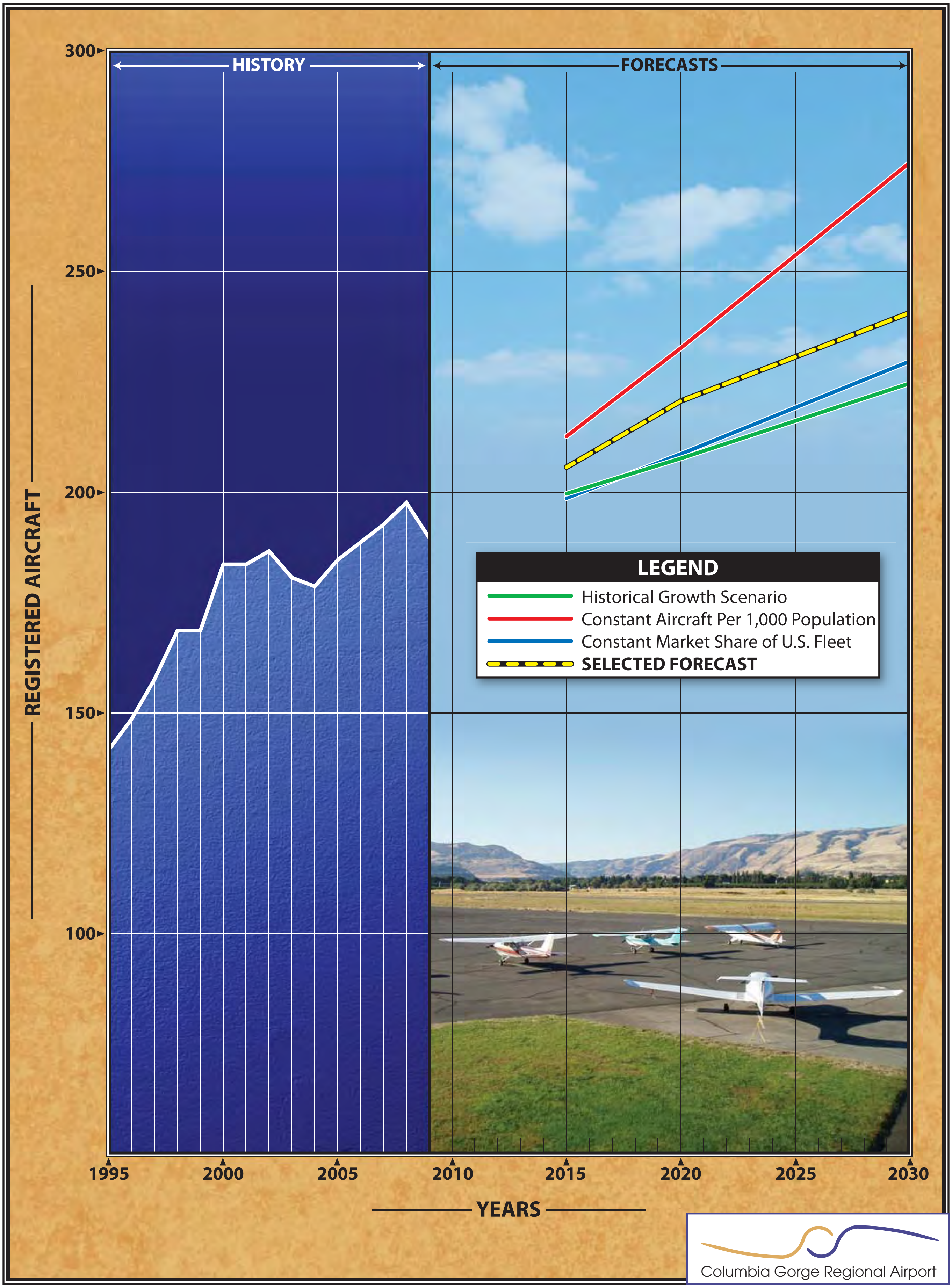


Exhibit 2C
REGISTERED AIRCRAFT FORECAST
TWO COUNTY SERVICE AREA

TABLE 2K Based Aircraft Forecast Summary Columbia Gorge Regional Airport					
	2009 (Base Year)	2015	2020	2030	AAGR 2009-2030
Market Share of County Registered Aircraft					
Constant Share (36%)	68	74	79	86	1.14%
Increasing Share (37-43%)	68	76	86	103	2.01%
Comparison Projections*					
FAA TAF	59	64	73	85	1.75%
2004 ALP Report	61	64	68	74	0.92%
2007 OAP	61	66	69	79	1.24%
2009 LATS	61	64	68	76	1.05%
SELECTED FORECAST	**68**	**75**	**82**	**95**	**1.60%**

TAF: Terminal Area Forecast
ALP: Airport Layout Plan
OAP: Oregon Aviation Plan
LATS: Long Term Air Transportation Study (Washington)
* Figures interpolated and extrapolated to plan years.

Source: Coffman Associates analysis

The selected forecast is the approximate average of the two market share forecasts and would represent the addition of 27 new airplanes to the airport over the next 20 years. This is an annual growth rate of 1.6 percent. The selected forecast has an annual growth rate lower than that of the FAA TAF but higher than the state plans and the 2004 ALP report.

There are several additional factors that support a growth scenario at Columbia Gorge Regional Airport. There is a lack of airports directly competing for aviation demand in the service area, particularly for business aviation. The economic outlook is optimistic for The Dalles as described in detail in Chapter One. The national economic recession is forecast to end by early 2010. The planned resort development could lead to an increase in aviation demand. The airport also has a recent history of filling new hangars. **Exhibit 2D** presents the based aircraft forecasts and the selected forecast.

BASED AIRCRAFT FLEET MIX PROJECTIONS

Knowing the aircraft fleet mix expected to utilize the airport is necessary to properly plan facilities that will best serve the level and type of activity occurring at the airport. As detailed previously, the growth areas in the general aviation fleet nationally is in turboprop and jet aircraft, as well as helicopters. Single engine piston-powered aircraft are forecast to grow slightly, while multi-engine piston aircraft are forecast to decrease slightly. Growth within each based aircraft category at the airport has been determined, in part, by comparison with national projections and consideration of local economic conditions.

On the local level, an examination of the registered aircraft fleet mix for the two-county service area was conducted and is presented in **Table 2L**. Over the last 15 years, single engine aircraft have represented approximately 88 percent and have shown relatively steady growth. Multi-engine piston-powered aircraft have represented approximately five percent over the same time period and have shown no growth. Turboprops showed a spike in registrations in 2003, and then fell back to previous levels by 2006. Helicopters have remained flat in terms of growth.

TABLE 2L
Two-County Registered Aircraft Fleet Mix Projections

Year	SEP	%	MEP	%	TP	%	J	%	R	%	O	%	Total
1995	128	90.78%	5	3.55%	0	0.00%	0	0.00%	6	4.26%	2	1.42%	141
1996	136	91.89%	4	2.70%	1	0.68%	0	0.00%	5	3.38%	2	1.35%	148
1997	144	91.72%	4	2.55%	2	1.27%	0	0.00%	5	3.18%	2	1.27%	157
1998	151	89.88%	7	4.17%	1	0.60%	0	0.00%	6	3.57%	3	1.79%	168
1999	152	90.48%	6	3.57%	1	0.60%	0	0.00%	6	3.57%	3	1.79%	168
2000	163	89.07%	7	3.83%	2	1.09%	1	0.55%	6	3.28%	4	2.19%	183
2001	158	86.34%	6	3.28%	6	3.28%	1	0.55%	8	4.37%	4	2.19%	183
2002	160	86.02%	6	3.23%	7	3.76%	1	0.54%	8	4.30%	4	2.15%	186
2003	152	84.44%	3	1.67%	13	7.22%	2	1.11%	7	3.89%	3	1.67%	180
2004	150	84.27%	3	1.69%	16	8.99%	2	1.12%	5	2.81%	2	1.12%	178
2005	159	86.41%	3	1.63%	14	7.61%	2	1.09%	4	2.17%	2	1.09%	184
2006	172	91.49%	6	3.19%	2	1.06%	1	0.53%	4	2.13%	3	1.60%	188
2007	172	89.58%	5	2.60%	3	1.56%	1	0.52%	5	2.60%	6	3.13%	192
2008	172	87.31%	6	3.05%	6	3.05%	3	1.52%	4	2.03%	6	3.05%	197
2009	162	85.71%	5	2.65%	7	3.70%	1	0.53%	6	3.17%	8	4.23%	189
Avg.		88.55%		2.91%		2.91%		0.54%		3.25%		1.84%	
FLEET MIX PROJECTIONS													
2015	175	85.50%	6	3.00%	8	3.75%	2	0.75%	6	3.00%	8	4.00%	205
2020	184	83.50%	7	3.00%	9	4.00%	3	1.25%	9	4.00%	9	4.25%	220
2030	193	80.50%	7	3.00%	12	5.00%	4	1.75%	12	5.00%	11	4.75%	240

SEP-Single Engine Piston; MEP-Multi-engine Piston; TP-Turboprop; J-Jet; R-Rotor (Helicopter); O-Other
Source: Coffman Associates analysis of FAA Aircraft Registry Database

A base year (2009) fleet mix has been determined from interviews with airport management. There are 57 single engine piston aircraft and two (2) multi-engine piston aircraft. There are five (5) turboprop aircraft which includes two Air Tractors (model 402), one Rockwell Aero Commander 690, a Piper Meridian, and a TBM 850. There are four (4) based helicopters. There are currently no based business jets. There are a total of 68 based aircraft.

Based in part on national and local fleet mix data, a forecast of the future based aircraft fleet mix at Columbia Gorge Regional Airport can be made. As presented in **Table 2M**, single-engine piston-powered aircraft will

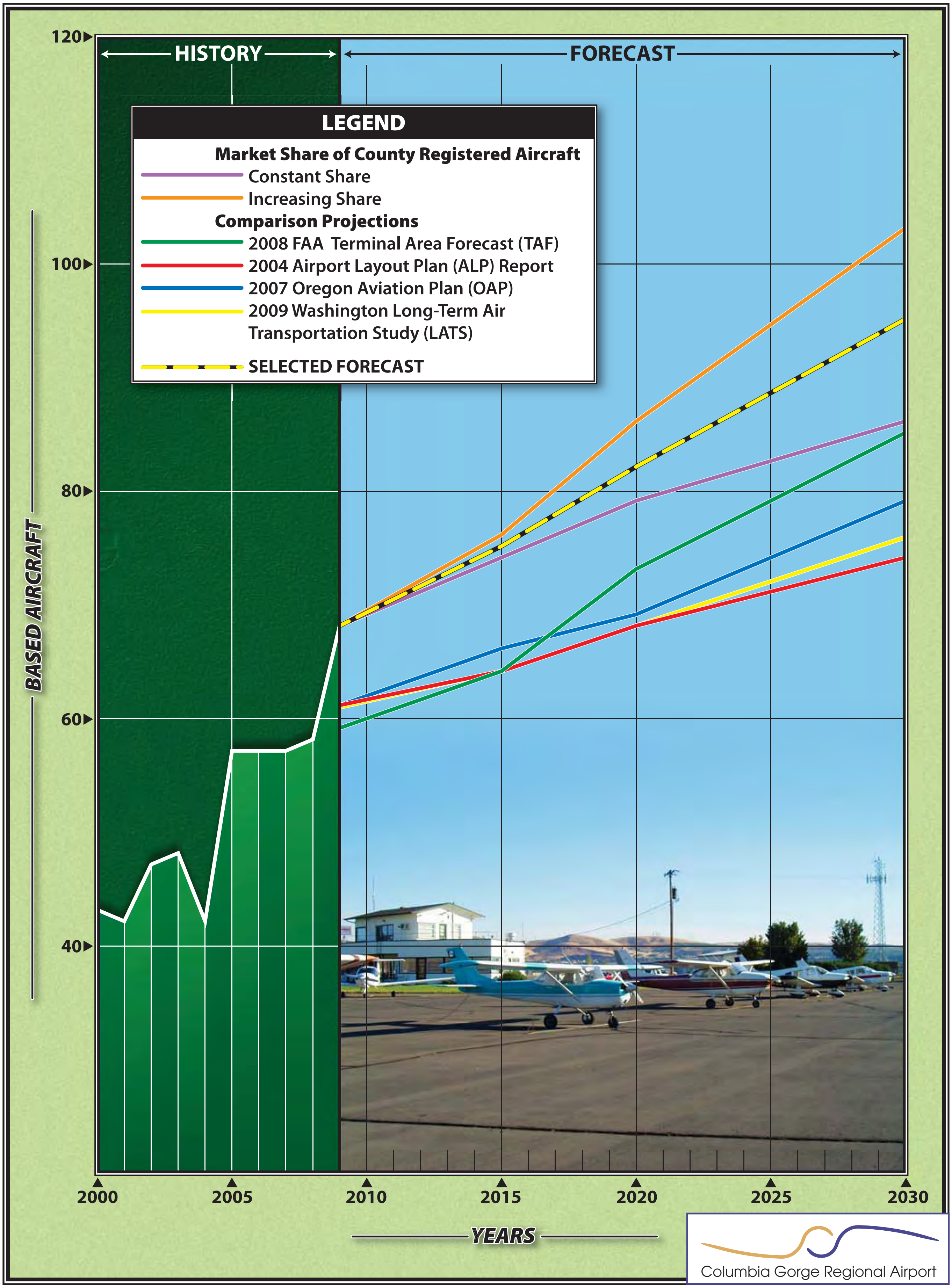


Exhibit 2D
BASED AIRCRAFT FORECAST

continue to account for the vast majority of based aircraft at the airport. Over the course of the 20-year planning period, turboprops, jets, and helicopters are forecast to grow as a percent of total based aircraft. Single and multi-engine piston-powered aircraft are forecast to drop slightly as a percent of the mix.

TABLE 2M
Based Aircraft Fleet Mix
Columbia Gorge Regional Airport

Aircraft Type	2009	Percent	2015	Percent	2020	Percent	2030	Percent
Single Engine Piston	57	83.82%	62	82.67%	66	80.49%	77	81.05%
Multi-Engine Piston	2	2.94%	2	2.67%	3	3.66%	3	3.16%
Turboprop	5	7.35%	6	8.00%	7	8.54%	7	7.37%
Jet	0	0.00%	1	1.33%	1	1.22%	2	2.11%
Helicopters	4	5.88%	4	5.33%	5	6.10%	6	6.32%
Total	**68**	**100.00%**	**75**	**100.00%**	**82**	**100.00%**	**95**	**100.00%**

Source: Coffman Associates analysis of FAA Registered Aircraft Database

ANNUAL OPERATIONS

Airport operations can be characterized as local or itinerant. A local operation is a takeoff or landing performed by an aircraft that operates within sight of the airport, or which executes simulated approaches or touch-and-go operations at the airport. Itinerant operations are those performed by aircraft with a specific origin or destination away from the airport. Generally, local operations are characterized by training operations. Historically, 70 percent of the operations at Columbia Gorge Regional Airport have been itinerant in nature, with the remaining 30 percent characterized as local.

Operations at an airport are further classified as general aviation, air taxi/other, air carrier, or military. Air taxi is generally considered on-demand service that includes charter and fractional activity. This is considered itinerant in nature. Air carrier activity is scheduled passenger operations, which is not currently available at Columbia Gorge Regional Airport. Military activity is not unusual at general aviation airports and can include both local and itinerant. There is evidence of military activity at the airport. Typically, itinerant operations increase with business and commercial use as business aircraft are used primarily to transport people from one location to another.

Columbia Gorge Regional Airport is a non-towered facility. This means that actual operations counts are not readily available. Therefore, estimates must be made based on interviews with airport operators and management and from historical documentation. **Table 2N** presents the most current forecasts of total operations for the airport. None of these previous forecasts include projections for air taxi or military activity.

TABLE 2N Existing Total Operations Forecasts Columbia Gorge Regional Airport				
Year	**2004 ALP**	**2007 OAP**	**2008 TAF**	**2009 LATS**
2009	35,791	33,337	32,043	35,792
2010	36,143	34,343	32685	36,143
2015	37,898	37,511	36,091	37,898
2020	39,997	40,970	39,855	39,997
2025	42,421	44,750	44,008	42,338
2030	44,993	48,877	48,312	44,460
AAGR 2009-2030	1.10%	1.84%	1.97%	1.04%

ALP: Airport Layout Plan Report
OAP: Oregon Aviation Plan
TAF: Terminal Area Forecast
LATS: Washington Long-Term Air Transportation Study
Note: All Figures interpolated to plan years.

Source: Coffman Associates analysis

Itinerant General Aviation Operations

Table 2P outlines the history of itinerant general aviation operations at Columbia Gorge Regional Airport in relation to the total general aviation itinerant operations at towered airports in the United States. The Columbia Gorge Regional Airport market share, as a percentage of general aviation itinerant operations at towered airports across the country, increased from a low of 0.0898 percent in 2002, to a high of 0.1388 percent in 2009. This increase in the percentage share is reflective of growing itinerant operations at the airport, while total U.S. itinerant operations were generally declining. The national decline in total general aviation itinerant operations since 2002 is forecast to begin trending upward in 2010 and continue increasing through 2025. During a period where national general aviation itinerant operations were on the decline, Columbia Gorge Regional Airport realized an increase, and an overall increase in market share.

Several statistical analyses were conducted to generate forecasts of itinerant general aviation operations. An increasing market share forecast of U.S. itinerant operations was first developed that is consistent with the historical trend. This forecast resulted in an increase from 22,429 itinerant operations in 2009 to 34,135 in 2030, an average annual increase of 2.02 percent.

A second market share of U.S. itinerant operations was developed which held the 2009 ratio constant through 2030. This resulted in 30,566 operations in 2030. This forecast is not in keeping with the general growth trend in itinerant operations at the airport and, therefore, represents a low end forecast.

TABLE 2P
General Aviation Itinerant Operations Forecast
Columbia Gorge Regional Airport

Year	DLS GA Itinerant Ops[1]	US GA Itinerant Ops*	Market Share Itinerant Ops	DLS Based Aircraft[1]	Itinerant Ops Per Based Aircraft
2002	19,270	21,450,500	0.0898%	47	410
2003	19,755	20,231,300	0.0976%	48	412
2004	20,233	20,007,200	0.1011%	42	482
2005	20,718	19,315,100	0.1073%	57	363
2006	21,133	18,741,100	0.1128%	57	371
2007	21,556	18,577,200	0.1160%	57	378
2008	21,988	17,367,900	0.1266%	58	379
2009	22,429	16,160,100	0.1388%	59	380
Increasing Market Share (AGR = 2.02%)					
2015	24,257	17,326,100	0.1400%	75	323
2020	27,114	18,699,100	0.1450%	82	331
2030	34,135	22,022,486	0.1550%	95	359
Constant Market Share of 2009 Percent (AGR = 1.48%)					
2015	24,047	17,326,100	0.1388%	75	321
2020	25,953	18,699,100	0.1388%	82	316
2030	30,566	22,022,486	0.1388%	95	322
Constant Operations Per Based Aircraft (AGR = 2.29%)					
2015	28,511	17,326,100	0.1646%	75	380
2020	31,173	18,699,100	0.1667%	82	380
2030	36,114	22,022,486	0.1640%	95	380
Selected Forecast (AGR = 1.94%)					
2015	25,600	17,326,100	0.1478%	64	400
2020	28,100	18,699,100	0.1503%	73	385
2030	33,600	22,022,486	0.1526%	85	395

[1] Historical data from FAA Terminal Area Forecast (TAF)
* 2030 figure is extrapolated utilizing the 2010-2020 average annual growth rate.
AGR = Average Growth Rate from 2009 to 2030

A third forecast was developed that maintained a constant number of operations per based aircraft. In 2009, the airport has experienced 380 itinerant operations per based aircraft. When extending this ratio, the long range forecast results in 36,114 itinerant operations.

The selected forecast is an average of the three new forecasts developed for this master plan. By 2015, 25,600 annual itinerant general aviation operations are forecast. This is an average annual growth of 2.23 percent. By the long term planning period, itinerant operations are forecast to reach 33,600. The annual growth rate from 2009 to 2030 is 1.94 percent. The FAA desires that the operations forecast be within a 10 percent range of the TAF. The selected forecast meets this requirement.

Comparative Itinerant Operations Forecasts

Table 2Q presents the four most recent forecasts of aviation demand for the airport. Each of these forecasts is presented in the plan years of this master plan and has been interpolated and extrapolated as necessary. This comparison shows that there is a general consensus among the various forecasts related to the operations at the airport. The selected forecast appears to be within a reasonable range.

TABLE 2Q
Existing Comparative Itinerant Operations Forecasts
Columbia Gorge Regional Airport

Year	DLS GA Itinerant Ops[1]	US GA Itinerant Ops*	Market Share Itinerant Ops	DLS Based Aircraft	Itinerant Ops Per Based Aircraft
Oregon Aviation Plan 2007 (AGR = 1.84%)					
2009	23,336	16,160,100	0.1444%	61	383
2015	26,258	17,326,100	0.1515%	66	398
2020	28,679	18,699,100	0.1534%	69	416
2030	34,214	22,022,486	0.1554%	79	433
2004 ALP Report (AGR = 1.10%)					
2009	25,054	16,160,100	0.1550%	61	411
2015	26,529	17,326,100	0.1531%	64	415
2020	27,998	18,699,100	0.1497%	68	412
2030	31,495	22,022,486	0.1430%	74	426
FAA TAF Forecast (AGR = 1.97%)					
2009	22,429	16,160,100	0.1388%	59	380
2015	25,263	17,326,100	0.1458%	64	395
2020	27,897	18,699,100	0.1492%	73	382
2030	33,818	22,022,486	0.1536%	85	398
2009 LATS (AGR = 1.04%)					
2009	25,054	16,160,100	0.1550%	61	411
2015	26,529	17,326,100	0.1531%	64	415
2020	27,998	18,699,100	0.1497%	68	412
2030	31,122	22,022,486	0.1413%	76	410

* 2030 figure is extrapolated utilizing the 2010-2020 average annual growth rate.
AGR = Average Growth Rate from 2009 to 2030

Local General Aviation Operations

Local operations are generally considered training or touch-and-go operations. The rules governing pilot certification require a certain number of flight hours as well as landings and take-offs to maintain a pilot's license. The presence of a flight school at the airport can have a significant impact on the number of these operations. Recently, a flight school was established at the airport. There are approximately six full-time students. The new flight school is affiliated with a national flight training business and is actively marketing locally.

The airport provides many features that are attractive to pilots, especially the presence of instrument approaches, including the LDA/GS approach to Runway 25. This is a non-precision approach utilizing an offset localizer and glide slope antenna to provide vertical and horizontal positional information. This is the most sophisticated instrument approach within 60 miles of the airport.

The local general aviation operations forecast is developed with much the same methodology as the itinerant general aviation operations forecast. **Table 2R** presents the several forecasts and the selected forecast.

TABLE 2R
General Aviation Local Operations Forecast
Columbia Gorge Regional Airport

Year	DLS GA Local Ops	US GA Local Ops*	Market Share Local Ops	DLS Based Aircraft[1]	Local Ops Per Based Aircraft
2002	8,260	16,172,800	0.0511%	47	176
2003	8,467	15,292,100	0.0554%	48	176
2004	8,672	14,960,400	0.0580%	42	206
2005	8,880	14,845,900	0.0598%	57	156
2006	9,058	14,378,900	0.0630%	57	159
2007	9,240	14,557,300	0.0635%	57	162
2008	9,425	13,921,400	0.0677%	58	163
2009	9,614	13,184,900	0.0729%	59	163
Increasing Market Share (AGR = 1.43%)					
2015	10,287	13,273,200	0.0775%	75	137
2020	10,825	13,531,700	0.0800%	82	132
2030	12,953	14,392,000	0.0900%	95	136
Constant Market Share of 2009 Percent (AGR = 0.42%)					
2015	9,678	13,273,200	0.0729%	75	129
2020	9,867	13,531,700	0.0729%	82	120
2030	10,494	14,392,000	0.0729%	95	110
Constant Operations Per Based Aircraft 2009 (AGR = 1.87%)					
2015	12,221	13,273,200	0.0921%	75	163
2020	13,362	13,531,700	0.0987%	82	163
2030	15,480	14,392,000	0.1076%	95	163
Selected Forecast (AGR = 1.45%)					
2015	10,700	13,273,200	0.0806%	64	167
2020	11,400	13,531,700	0.0842%	73	156
2030	13,000	14,392,000	0.0903%	85	153

[1] Historical data from FAA Terminal Area Forecast (TAF)
* 2030 figure is extrapolated utilizing the 2010-2020 average annual growth rate.
AGR = Average Growth Rate from 2009 to 2030

The first forecast is an increasing market share of U.S. local operations. Over the previous 10 years, the airport has shown an increase in local operations even as national local operations have decreased. A reasonable planning envelope emerged considering the two other new forecasts. The low end is defined by a constant share of U.S. local operations and a high end results from maintaining a constant number of local operations per based aircraft. The several available comparative forecasts show the range to be reasonable.

The selected forecast is an approximate average of the three new forecasts. In 2015, 10,700 local operations are forecast. This is forecast to steadily increase to 13,000 local operations in 2030. **Exhibit 2E** presents graphs of local and itinerant forecasts including the selected forecast for each.

Table 2S presents the four most recent forecasts of aviation demand for the airport. Each of these forecasts is presented in the plan years of this master plan and has been interpolated and extrapolated as necessary. This comparison shows that there is a general consensus among the various forecasts related to the operations at the airport. The selected forecast appears to be within a reasonable range.

TABLE 2S
Existing Comparative Local Operations Forecasts
Columbia Gorge Regional Airport

Year	DLS GA Local Ops	US GA Local Ops*	Market Share Local Ops	DLS Based Aircraft	Local Ops Per Based Aircraft
Oregon Aviation Plan 2007 (AGR = (1.84%)					
2009	10,001	13,184,900	0.0759%	61	164
2015	11,253	13,273,200	0.0848%	66	171
2020	12,291	13,531,700	0.0908%	69	178
2030	14,663	14,392,000	0.1019%	79	186
2004 ALP Report (AGR = 1.10%)					
2009	10,737	13,184,900	0.0814%	61	176
2015	11,369	13,273,200	0.0857%	64	178
2020	11,999	13,531,700	0.0887%	68	176
2030	13,498	14,392,000	0.0938%	74	182
FAA TAF Forecast (AGR = 1.97%)					
2009	9,614	13,184,900	0.0729%	59	163
2015	10,828	13,273,200	0.0816%	64	169
2020	11,958	13,531,700	0.0884%	73	164
2030	14,494	14,392,000	0.1007%	85	171
2009 LATS (AGR = 1.04%)					
2009	10,738	13,184,900	0.0814%	61	176
2015	11,369	13,273,200	0.0857%	64	178
2020	11,999	13,531,700	0.0887%	68	176
2030	13,338	14,392,000	0.0927%	76	176

* 2030 figure is extrapolated utilizing the 2010-2020 average annual growth rate.
AGR = Average Growth Rate from 2009 to 2030

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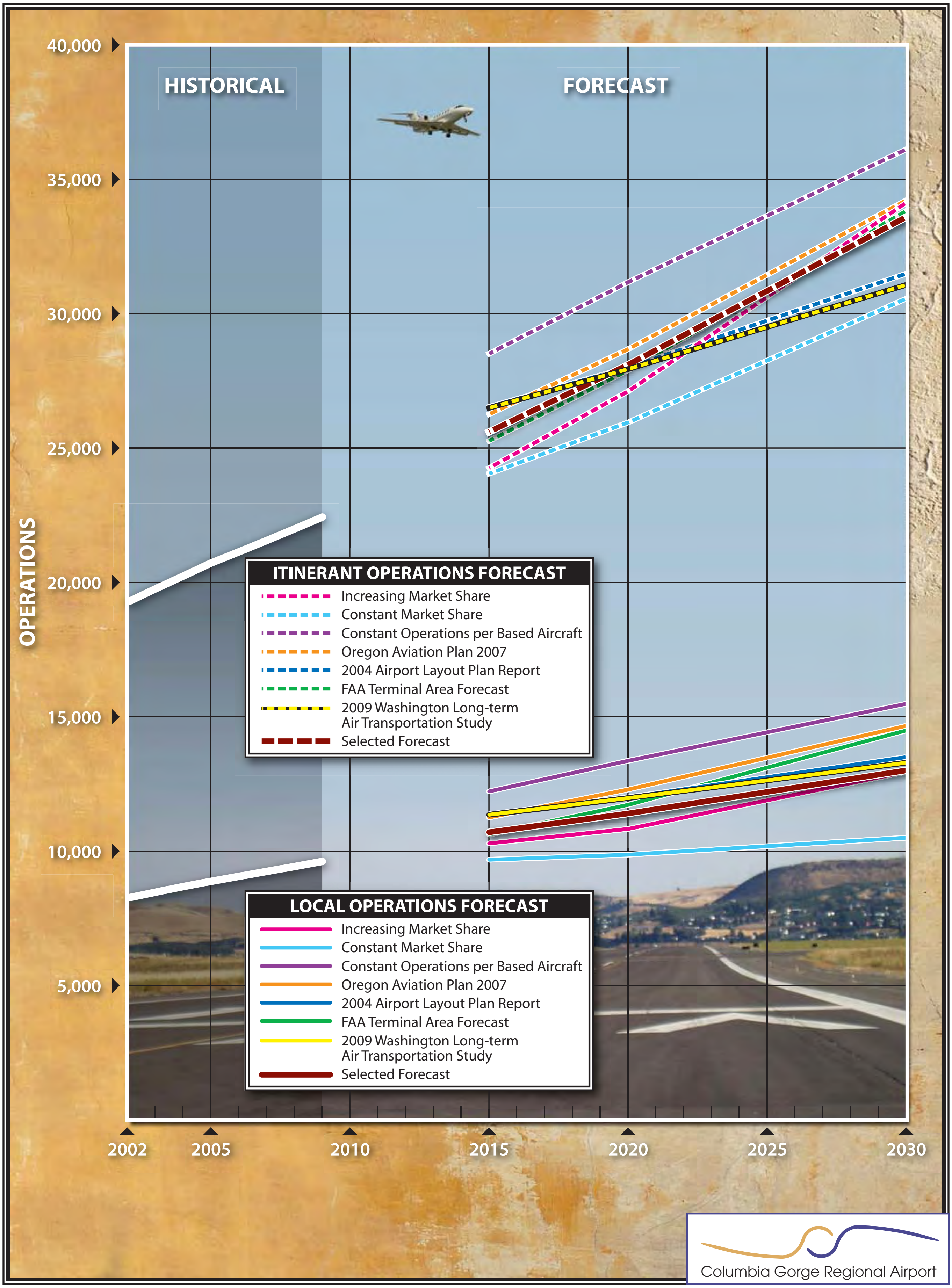


Exhibit 2E
ITINERANT AND LOCAL GENERAL AVIATION OPERATIONS FORECASTS

Air Taxi Operations

The air taxi category includes aircraft involved in on-demand passenger, small parcel transport, and air ambulance activity. This category of operations is regulated under Federal Aviation Regulations (FAR) Part 135. The *2004 Airport Layout Plan Report* and the 2007 *Oregon Aviation Plan* did not specifically forecast air taxi operations. The FAA TAF does have a category for air taxi but for Columbia Gorge Regional Airport, no forecast is provided. Therefore, a baseline estimate must be made based on interviews with airport management and businesses.

Life Flight Network operates an air ambulance helicopter and a fixed wing, twin-engine, Aero Commander from the airport. On average, they will experience one call per day throughout a year. Utilization is estimated at 50 percent between the helicopter and the fixed-wing aircraft. This translates to 365 operations per aircraft per year or 730 total annual operations.

Operators of fractional aircraft typically operate under FAR Part 135. Information related to how often these operators utilize the airport is limited. One source, www.airportiq.com, tracks flight plans that have been opened and closed on the ground. Any flight plans that are closed in the air, which is common if visual conditions exist, are not logged to a specific airport. This data was obtained for Columbia Gorge Regional Airport. The results showed that operators of fractionally owned aircraft do utilize the airport. Over the past several years, records have identified approximately 100 operations per year. This figure would represent the minimum.

The airport is located in a region of the country where energy production is extensive. Several of these companies utilize the airport as a starting point to do aerial monitoring of wind farms and other energy production infrastructure. Most of these operations are by helicopter. It is estimated that operations by these companies represent at least 1,300 annual operations. With a total count of 2,180 annual operations, air taxi represents an additional 10 percent of itinerant operations.

Table 2T presents the air taxi operations forecast. The forecast is based on 10 percent of itinerant operations being air taxi in nature. The FAA does forecast air taxi operations nationally and that figure is presented for comparative purposes. The forecast shows an annual growth rate from 2009 to 2030 of 2.14 percent. This figure is in line with the overall growth rate for itinerant operations at the airport of 1.94 percent.

TABLE 2T
Other/Air Taxi Forecasts

Year	Other/Air Taxi Operations	DLS Itinerant Operations	U.S. Air Taxi/ Commuter Operations	Percent
2009	2,180	22,429	10,270,800	0.0212%
FORECAST (AGR = 2.14%)				
2015	2,600	25,600	11,282,000	0.0230%
2020	2,800	28,100	11,985,100	0.0234%
2030*	3,400	33,600	13,788,266	0.0247%

* 2030 U.S. Air Taxi figure extrapolated at 1.5% annual growth
AGR = Annual Growth Rate
Sources: FAA TAF; FAA Aerospace Forecasts FY 2009-2025

Military Operations

At some general aviation airports, military operations can be common. Columbia Gorge Regional Airport does not experience regular military operations. The FAA TAF forecasts 1,000 itinerant military operations annually from 2001 through 2025. The previous master plan also included this figure. For planning purposes, this master plan will include 1,000 military itinerant operations for each of the plan years.

The Army National Guard 113th Aviation Regiment is based at the Eastern Oregon Regional Airport near Pendleton, Oregon, approximately 130 miles to the east of The Dalles. This unit flies CH-47 helicopters, the Chinook. They will utilize the Columbia Gorge Regional Airport on occasion, primarily to train with the instrument approaches. Gray Army Airfield is located at Fort Lewis, Washington, approximately 40 miles south of Seattle. The Columbia Gorge Regional Airport frequently sees activity from Blackhawk helicopters from the Gray Army Airfield.

Annually during the summer, the military teams up with local law enforcement and the Drug Enforcement Agency (DEA) to conduct exercises from the airport. They will base at the airport for several weeks and conduct missions to find illegal drug farms.

Overall, operations by military aircraft are estimated at 1,000 annually. Forecasts of military activity are difficult because the mission can change quickly. These forecasts will consider a constant 250 local and 750 itinerant military operations annually.

Operations Fleet Mix

Estimating the number of operations by aircraft type helps to identify necessary facility requirements and various environmental impacts. Operations by multi-engine, turboprop, and business jet aircraft are considered itinerant in nature. In an effort to generally estimate the number of operations by aircraft type, the airport staff began documenting N-numbers, aircraft type, date, and time of itinerant operations. This effort began in September 2009.

The results show that helicopters account for approximately 17 percent of total itinerant operations. Discussions with airport staff indicate that most of these operations are associated with the energy companies monitoring power lines or ferrying employees to more remote wind farms. Business jet activity represents approximately three percent of operations and turboprops represented eight percent. **Table 2U** presents the fleet mix operations forecast.

TABLE 2U
Fleet Mix Operations Forecast
Columbia Gorge Regional Airport

	2009	2015	2020	2030
Local Operations				
Piston (~92%)	9,064	10,050	10,650	12,050
Helicopter (~8%)	800	900	1,000	1,200
Total Local	9,864	10,950	11,650	13,250
Itinerant Operations[1]				
Single Piston (69%)	17,498	19,976	21,839	26,048
Multi-Piston (3%)	761	869	950	1,133
Turboprop (8%)	2,029	2,316	2,532	3,020
Jet (3%)	761	869	950	1,133
Helicopters (17%)	4,311	4,922	5,381	6,418
Total Itinerant	25,359	28,950	31,650	37,750
Total Operations	35,223	39,900	43,300	51,000

[1]Itinerant operations percent based on airport manual count.
Source: Coffman Associates analysis

Peaking Operations

Many aspects of facility planning relate to levels of peak activity. For example, the appropriate size of a terminal building can be estimated by determining the number of people that could reasonably be expected to use the facility at a given time. The following planning definitions apply to the peak periods:

- **Peak Month** -- The calendar month when peak aircraft operations occur.
- **Design Day** -- The average day in the peak month.
- **Busy Day** -- The busy day of a typical week in the peak month.
- **Design Hour** -- The peak hour within the design day.

It is important to note that only the peak month is an absolute peak within a given year. All other peak periods will be exceeded at various times during the year. The peak period forecasts represent reasonable planning standards that can be applied without overbuilding or being too restrictive.

Without the availability of records from a tower, peak periods must be estimated. The forecast of peak month operations assumes approximately 10 percent of annual operations. This is typical for a general aviation airport that does not have extreme seasonal changes to activity levels.

The design day was then calculated by dividing the peak month operations by 30. The busy day has been estimated at 40 percent higher than the average day in the peak month and was calculated by multiplying the design day by 1.4. Design hour operations were calculated at 17.5 percent of design day operations. **Table 2V** summarizes the general aviation peak activity forecasts.

TABLE 2V
Peak Operations Forecast
Columbia Gorge Regional Airport

	2008	2014	2019	2029
Annual Operations	35,223	39,900	43,300	51,000
Peak Month (10%)	3,522	3,990	4,330	5,100
Busy Day	164	186	202	238
Design Day	117	133	144	170
Design Hour (17.5%)	21	23	25	30

Source: Coffman Associates analysis

Annual Instrument Approaches

An instrument approach, as defined by the FAA, is "an approach to an airport with the intent to land by an aircraft in accordance with an Instrument Flight Rule (IFR) flight plan, when visibility is less than three miles and/or when the ceiling is at or below the minimum initial approach altitude." To qualify as an instrument approach, aircraft must land at the airport after following one of the published instrument approach procedures in less than visual conditions. Forecasts of annual instrument approaches (AIAs) provide guidance in determining an airport's requirements for navigational aid facilities such as an ILS. It should be noted that practice or training approaches do not count as annual AIAs.

During poor weather conditions, pilots are less likely to fly and rarely would perform training operations. As a result, an estimate of the total number of AIAs can be made based on a percent of itinerant operations regardless of the frequency of poor weather conditions. An estimate of two percent of itinerant operations is utilized to forecast AIAs at Columbia Gorge Regional Airport as presented in **Table 2W**.

TABLE 2W **Annual Instrument Approach (AIAs) Projections** **Columbia Gorge Regional Airport**			
	AIAs	**Itinerant Operations**	**Ratio**
2015	579	28,950	2.00%
2020	633	31,650	2.00%
2030	755	37,750	2.00%
Source: Coffman Associates analysis			

In the future, Columbia Gorge Regional Airport will be increasingly utilized by larger and more sophisticated aircraft (as is the trend nationally). Also, the increased availability of low-cost navigational equipment could allow for smaller and less-sophisticated aircraft to utilize instrument approaches. National trends indicate an increasing percentage of instrument approaches given the greater availability of approaches at airports with GPS and the availability of more cost-effective equipment.

SUMMARY

This chapter has outlined the various activity levels that might reasonably be anticipated over the planning period. **Exhibit 2F** presents a summary of forecasted data. The baseline year for forecast data is 2009. The forecasting effort extends 20 years to the year 2030.

Columbia Gorge Regional Airport is a general aviation airport experiencing approximately 35,000 operations in 2009. The airport has a two-runway system with the primary runway, Runway 12-30, measuring 5,097 feet in length and the secondary runway, Runway 7-25 measuring 4,647 feet. Runway 25 supports an unusual non-precision instrument approach with an offset localizer and glide slope antenna. This approach improves the capability of the airport in times of poor weather conditions.

General aviation activity often trends with national and local economies. The country has been in a recessionary period since December 2007, and activity at both commercial service airports and general aviation airports has been down. The Columbia Gorge Regional Airport has, to date, weathered the economic downturn fairly well. Operations have continued to trend upward, and all but one of the available hangar positions is full.

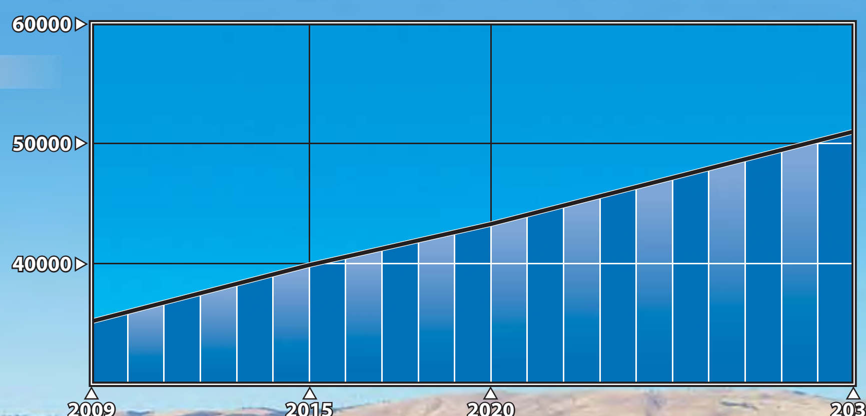
The aviation demand forecasts generally follow a historical growth trend at the airport. Based aircraft are forecast to grow from 68 in 2009 to 95 in 2030. Operations are forecast to grow from 35,000 in 2009 to 51,000 in 2030. The fleet mix at the airport is projected to continue to be dominated by smaller piston-powered aircraft. In the future, the airport is forecast to see the addition of at least one business jet, and a few more turboprops and helicopters.

The next step in the master plan process is to use the forecasts to determine development needs for the airport through 2030. Chapter Three – Facility Requirements will address airside elements, such as safety areas, runway, taxiways, lighting, and navigational aids, as well as landside requirements, including hangars, aircraft aprons, and support services. As a general observation, Columbia Gorge Regional Airport is well-positioned for growth into the future. The local economy is forecast to be strong and there are no airports that compete significantly within 60 miles. The remaining portions of the master plan will lay out how that growth can be accommodated in an orderly, efficient, and cost-effective manner.

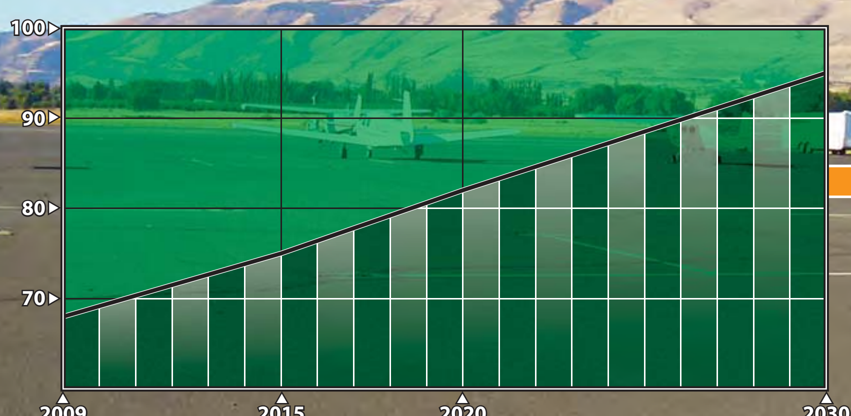
08MP04-2F-7/16/10

	ACTUAL	FORECAST		
ANNUAL OPERATIONS	**2009**	**2015**	**2020**	**2030**
General Aviation				
Itinerant	22,429	25,600	28,100	33,600
Local	9,614	10,700	11,400	13,000
Military				
Itinerant	750	750	750	750
Local	250	250	250	250
Air Taxi (Itinerant)	2,180	2,600	2,800	3,400
Total Itinerant	**25,359**	**28,950**	**31,650**	**37,750**
Total Local	**9,864**	**10,950**	**11,650**	**13,250**
TOTAL OPERATIONS	**35,223**	**39,900**	**43,300**	**51,000**
BASED AIRCRAFT	**2009**	**2015**	**2020**	**2030**
Single Engine	57	62	66	77
Multi-Engine	2	2	3	3
Turboprop	5	6	7	7
Business Jet	0	1	1	2
Helicopter	4	4	5	6
TOTAL BASED AIRCRAFT	**68**	**75**	**82**	**95**
Instrument Approaches (AIAs)	NA	579	633	755

Annual Operations



Based Aircraft



Columbia Gorge Regional Airport

Exhibit 2F
FORECAST SUMMARY

Columbia Gorge Regional Airport

Chapter Three

FACILITY REQUIREMENTS

FACILITY REQUIREMENTS

To properly plan for the future of Columbia Gorge Regional Airport, it is necessary to translate forecast aviation demand into the specific types and quantities of facilities that can adequately serve this identified demand. This chapter uses the results of the forecasts presented in Chapter Two, as well as established planning criteria, to determine the airfield (i.e., runways, taxiways, navigational aids, marking and lighting) and landside (i.e., hangars, aircraft parking apron, and automobile parking) facility requirements.

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

PLANNING HORIZONS

An updated set of aviation demand forecasts for Columbia Gorge Regional Airport has been established. These activity forecasts include annual operations, based aircraft, fleet mix, and peaking characteristics. With this information, specific components of the airfield and landside system can be evaluated to determine their capacity to accommodate future demand.

Cost-effective, efficient, and orderly development of an airport should rely more upon actual demand at an airport than on a time-based forecast figure. In order to develop a master plan that is demand-based rather than time-based, a series of planning hori-

zon milestones have been established that take into consideration the reasonable range of aviation demand projections.

It is important to consider that the actual activity at the airport may be higher or lower than what the annualized forecast portrays. By planning according to activity milestones, the resultant plan can accommodate unexpected shifts or changes in the area's aviation demand. It is important for the plan to accommodate these changes so that airport officials can respond to unexpected changes in a timely fashion.

The most important reason for utilizing milestones is it allows airport management to make decisions and develop facilities according to need generated by actual demand levels. The demand-based schedule provides flexibility in development, as development schedules can be slowed or expedited according to demand at any given time over the planning period. The resultant plan provides airport officials with a financially responsible and needs-based program. The planning milestones essentially correlate to the five, ten, and twenty-year periods used in the previous chapter.

CRITICAL AIRCRAFT

The selection of appropriate Federal Aviation Administration (FAA) design standards for the development and location of airport facilities is based primarily upon the characteristics of the aircraft which are currently using or are expected to use the airport. The critical design aircraft is used to define the design parameters for the airport. The critical design aircraft is defined as the most demanding category of aircraft, or family of aircraft, which conducts at least 500 operations per year at the airport. Planning for future aircraft use is of particular importance since design standards are used to plan separation distances between facilities. These future standards must be considered now to ensure that short term development does not preclude the long range potential needs of the airport.

The FAA has established a coding system to relate airport design criteria to the operational and physical characteristics of aircraft expected to use the airport. This airport reference code (ARC) has two components. The first component, depicted by a letter, is the aircraft approach category and relates to aircraft approach speed (operational characteristic); the second component, depicted by a Roman numeral, is the airplane design group and relates to aircraft wingspan (physical characteristic). Generally, aircraft approach speed applies to runways and runway-related facilities, while airplane wingspan primarily relates to separation criteria involving taxiways, taxilanes, and landside facilities.

According to FAA Advisory Circular (AC) 150/5300-13, *Airport Design*, an aircraft's approach category is based upon 1.3 times its stall speed in landing configuration at that aircraft's maximum certificated weight. The airplane design group (ADG) is based upon either the aircraft's wingspan or tail height, whichever is greater. For example, an aircraft may fall in ADG II for wingspan but ADG III for tail height. This aircraft would be classified under ADG-III. **Table 3A** presents the components of the airport reference code.

TABLE 3A
Airport Reference Code

Aircraft Approach Category		
Category	*Speed*	
A	< 91 Knots	
B	91- < 121 Knots	
C	121- < 141 Knots	
D	141- <166 Knots	
E	≥ 166 Knots	
Airplane Design Group[1]		
Group	*Tail Height (ft)*	*Wingspan (ft)*
I	< 20	< 49
II	20- < 30	49- < 79
III	30- < 45	70- < 118
IV	45- < 60	118- < 171
V	60- < 66	171- < 214
VI	66- < 80	214- < 262

[1] Utilize the most demanding category.
Source: FAA AC 150/5300-13, Airport Design

Exhibit 3A summarizes representative aircraft by ARC. As shown on the exhibit, the airport does not currently, nor is it expected to, regularly serve aircraft in ARCs C-IV, D-IV, or D-V. These large transport aircraft are used by commercial carriers, which do not currently use, nor are they expected to use, the airport through the planning period. Some of the largest business jets such as the Gulfstream V fall in ARC D-III and are capable of operating at the airport under certain conditions.

In order to determine airfield design requirements, the critical aircraft and critical ARC should first be determined then appropriate airport design criteria can be applied. This begins with a review of aircraft currently using the airport and those expected to use the airport through the 20-year planning period.

CURRENT CRITICAL AIRCRAFT

The critical design aircraft is defined as the most demanding category of aircraft which conduct 500 or more itinerant operations at the airport each year. In some cases, more than one specific make and model of aircraft comprises the airport's critical design aircraft. One category of aircraft may be the most critical in terms of approach speed, while another is most critical in terms of wingspan and/or tail height, which affects runway/taxiway width and separation design standards.

General aviation aircraft using the airport include a variety of small single and multi-engine piston-powered aircraft, turboprops, and occasionally turbojet aircraft. While the airport is used by a number of helicopters, they are not included in this determination as they are not assigned an ARC.

The majority of the based aircraft are single and multi-engine piston-powered aircraft which fall within approach categories A and B and ADG I. To determine if the current ARC for the airport is larger than A/B-I, an analysis of both based and transient activity by larger turboprops and business jets was undertaken.

There are no business jets based at the airport currently. There are five turboprop aircraft based at the airport: two Air Tractor 402s, a TBM850, a Rockwell Aero Commander 690, and a Piper Meridian. Each of these aircraft falls in ARC B-I. Therefore, the based turboprops would justify, at a minimum, ARC B-I. An examination of itinerant activity, from two primary sources was also undertaken.

A subscription service from www.airportiq.com provides data on flight plans. The data available includes aircraft owner, aircraft type, N-number, origin, destination, date, and time-of-day. The database only captures those flight plans that are opened and closed on the ground. It is common for pilots to either open or close a flight plan while in the air, particularly when operating in visual conditions. Therefore, the data captured represents a minimum level of activity and actual activity is higher. Nonetheless, from this database, it can be determined what types of aircraft utilize the airport. **Table 3B** is a sampling of the types of larger aircraft that have utilized the airport over the last several years.

TABLE 3B
Business Jet and Turboprop Activity
Columbia Gorge Regional Airport

Owner	Aircraft Type	Aircraft Model	Aircraft ARC
Bank of America	Jet	Cessna 525	B-I
Cardinal Glass Industries	Jet	Cessna 560XL	B-II
Swanson Aviation	Jet	Cessna 680	C-II
Valley Jet, LLC	Jet	IAI G-200	C-II
GC Air, LLC	Jet	G-IV	D-II
Wells Fargo	Jet	Hawker 800XP	C-II
V3, LLC	Jet	Lear 60	D-I
Wilson Construction	Jet	Cessna 525	B-I
First Union Commercial Corp.	Jet	Gulfstream IV	D-II
Cardinal IG Co.	Turboprop	King Air 200	B-II
Hawker Beechcraft Corp.	Turboprop	King Air 200	B-II
PC Aviation, LLC	Turboprop	King Air 90	B-II
Summit Projects, Inc	Turboprop	Piper 46-350P	A-I
U.S. Dept. of Energy	Turboprop	King Air 300	B-II

Source: www.airportiq.com

As can be seen, a wide variety of businesses and government agencies use the airport. Aircraft as large as the Gulfstream IV (D-II) were identified in the database. More common business jet activity is seen from those in ARC C-II and below. Airport management has indicated that some of the largest business jets including the Gulfstream V (D-III) have utilized the airport.

The previous Airport Layout Plan (ALP) indicated that the ARC was B-II for both runways. This determination was based primarily on acoustical counts taken at the airport in 1999 through the State of Oregon. The acoustical counts estimated multi-engine operations (including turbine) at 2,646 and business jet operations at 75. Assuming these operations were

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A-I

- Beech Baron 55
- **Beech Bonanza**
- Cessna 150
- Cessna 172
- Cessna Citation Mustang
- Eclipse 500
- Piper Archer
- Piper Seneca

C-I, D-I

- Beech 400
- **Lear 25, 31, 35, 45, 55, 60**
- Israeli Westwind
- HS 125-400, 700

B-I *less than 12,500 lbs.*

- Beech Baron 58
- Beech King Air 100
- Cessna 402
- **Cessna 421**
- Piper Navajo
- Piper Cheyenne
- Swearingen Metroliner
- Cessna Citation I

C-II, D-II

- Cessna Citation III, VI, VIII, X
- **Gulfstream II, III, IV**
- Canadair 600
- ERJ-135, 140, 145
- CRJ-200, 700, 900
- Embraer Regional Jet
- Lockheed JetStar

B-II *less than 12,500 lbs.*

- **Super King Air 200**
- Cessna 441
- DHC Twin Otter

C-III, D-III

- ERJ-170, 190
- Boeing Business Jet
- B 727-200
- **B 737-300 Series**
- MD-80, DC-9
- Fokker 70, 100
- A319, A320
- Gulfstream V
- Global Express

B-I, B-II *over 12,500 lbs.*

- Super King Air 350
- Beech 1900
- Jetstream 31
- Falcon 10, 20, 50
- Falcon 200, 900
- **Citation II**, III, IV, V
- Saab 340
- Embraer 120

C-IV, D-IV

- **B-757**
- B-767
- C-130
- DC-8-70
- DC-10
- MD-11
- L1011

A-III, B-III

- DHC Dash 7
- **DHC Dash 8**
- DC-3
- Convair 580
- Fairchild F-27
- ATR 72
- ATP

D-V

- **B-747** Series
- B-777

Note: Aircraft pictured is identified in bold type.

Columbia Gorge Regional Airport

Exhibit 3A
AIRPORT REFERENCE CODES

largely split between B-I and B-II, it was determined that operations by aircraft in ARC B-II represented at least 1,325 operations at the airport.

A more recent sampling of activity at the airport was begun in September 2009 and continues to the present. The airport FBO is manually tracking itinerant activity. From September 17 to October 26, 2009, B-II or larger aircraft included the King Air 200, Citation X, Hawker 4000, Citation 550, Citation 560XL, Beechjet 400, and IAI Astra. Some of these aircraft are operating under weight restrictions because of the runway length.

Given the wide variety of turboprop and business jets that operate at the airport, a critical aircraft falling into ARC B-II is reasonable. By meeting this design standard, the airport can meet the needs of all turboprop aircraft and approximately 50 percent of the business jet fleet. Larger business jets can and do operate at the airport but on a less frequent basis. If an extension of the runway system were needed, it would be these aircraft that would drive the need. **Therefore, the current critical aircraft is determined to be in ARC B-II.**

FUTURE CRITICAL AIRCRAFT

The aviation demand forecasts indicate the potential for continued growth in business jet and turboprop activity at the airport. This includes the forecast addition of at least one based business jet in the short term and up to two jets by the long term. Based turboprops are also expected to increase.

The type and size of the business jet activity in the future is difficult to precisely identify. Factors such as the forecast population and employment growth in the airport service area, the proximity and level of service at other regional airports, and development at the airport can influence future activity. One of the development factors could be the construction of a golf and residential resort, as presented in Chapter One. Part of this plan is to include an apron and terminal building facility on the east side of the airport. Such a facility would potentially attract more business jets to the airport.

Increased activity by larger business jets would drive the need to meet more stringent design standards, including any expansion of the runway and taxiway system. The forecasts do not point to large business jets representing the critical aircraft within the planning period. **Therefore, this master plan will consider the long term critical aircraft to remain in ARC B-II.**

AIRFIELD REQUIREMENTS

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

- Safety Area Design Standards
- Runways
- Taxiways
- Navigational Approach Aids
- Lighting, Marking, and Signage

SAFETY AREA DESIGN STANDARDS

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

The entire RSA, OFZ, POFZ, and OFA should be under the direct ownership of the airport sponsor to ensure these areas remain free of obstacles and can be readily accessed by maintenance and emergency personnel. It is not required that the RPZ be under airport ownership, but it is strongly recommended. An alternative to outright ownership of the RPZ is the purchase of avigation easements (acquiring control of designated airspace within the RPZ) or having sufficient land use control measures in places which ensure the RPZ remains free of incompatible development. **Exhibit 3B** presents the various safety areas and highlights those areas where the safety areas are non-standard.

Dimensional standards for the various safety areas associated with the runways are a function of the type of aircraft (ARC) expected to use the runways as well as the approved instrument approach capability. Both runways should meet the design standards for frequent activity by aircraft in ARC B-II. The approach with the best minimums is the circling GPS approach which offers visibility minimums as low as 1¼-mile. Runway 25 offers a sophisticated LDA/glide slope instrument approach but the visibility minimum is 2¾-miles. The cloud ceiling for both of these instrument approaches is higher than 1,000 feet which defines visual flight conditions.

Runway Safety Area (RSA)

The RSA is defined in FAA Advisory Circular (AC) 150/5300-13, *Airport Design,* as a "surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of undershoot, overshoot, or excursion from the runway." The RSA is centered on the runway and dimensioned in accordance to the approach speed of the critical aircraft using the runway. The FAA requires the RSA to be cleared and graded, drained by grading or storm sewers, capable of accommodating the design aircraft and fire and rescue vehicles, and free of obstacles not fixed by navigational purpose.

The FAA has placed a higher significance on maintaining adequate RSA at all airports. Under Order 5200.8, effective October 1, 1999, the FAA established the *Runway Safety Area Program.* The Order states, "The objective of the Runway Safety Area Program is that all RSAs at federally-obligated airports…shall conform to the standards contained in Advisory Circular 150/5300-13, *Airport Design*,

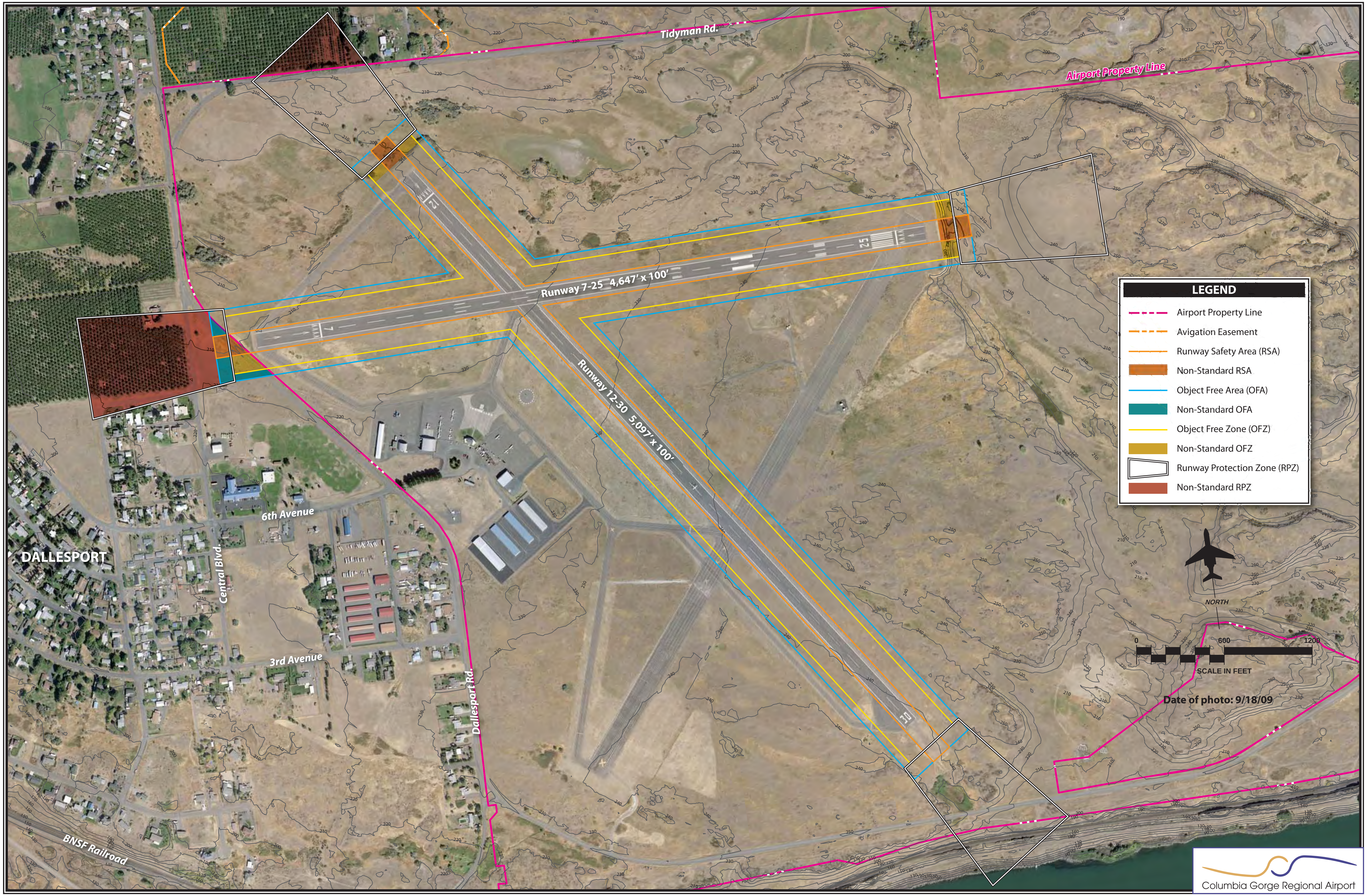

Exhibit 3B
AIRFIELD SAFETY AREAS

to the extent practicable." Each Regional Airports Division of the FAA is obligated to collect and maintain data on the RSA for each runway at the airport and perform airport inspections.

Table 3C presents the FAA design standards as they apply to Columbia Gorge Regional Airport. The airport should meet the standards associated with ARC B-II now and into the future. The table also presents the design standards for ARC C-II if the airport ever transitioned to the next level of design aircraft. This information is simply for comparative purposes as this master plan does not forecast a transition to ARC C-II within the 20-year scope.

TABLE 3C
Runway Design Standards
Columbia Gorge Regional Airport

	FAA Standards		Current Airport Condition
Design Standard	**B-II**	**C-II***	**B-II**
Applicable Approach	**> 1 Mile**	**> 1 Mile**	**> 1 Mile**
RUNWAYS			
Runway Width	75	100	100
Runway Shoulder Width	10	10	10
Runway Safety Area			
Width	150	500	Non-Standard
Length Beyond End	300	1,000	Non-Standard
Length Prior to Landing	300	600	300
Runway Object Free Area			
Width	500	800	Non-Standard
Length Beyond End	300	1,000	Non-Standard
Runway Obstacle Free Zone			
Width	400	400	Non-Standard
Length Beyond End	200	200	Non-Standard
Runway Centerline to:			
Holding Position	200	250	200
Parallel Taxiway	240	300	>240
Aircraft Parking Area	250	400	>250

* For comparative purposes only
Source: FAA AC 150/5300-13, Airport Design

The RSA for both runways should be 150 feet wide and extend 300 feet beyond the runway ends. The length beyond the runway ends is measured from the end of the runway, and not the location of the displaced landing thresholds. The existing RSA extends approximately 100 feet behind (to the northwest) of the Runway 12 pavement end before it is penetrated by a fence line and bushes. The RSA beyond the Runway 30 end appears to meet the design standards.

The RSA behind the Runway 25 end extends approximately 100 feet before the terrain drops significantly. The RSA grading standard is a maximum of three percent within the first 200 feet of RSA beyond the runway end and five percent over the length of the RSA beyond the runway end.

The RSA beyond the Runway 7 pavement end is penetrated by the perimeter fence approximately 50 feet from the runway end. Because of the angle of Dallesport Road compared to the runway, the width of the RSA is also penetrated in this area.

Object Free Area (OFA)

The runway OFA is "a two-dimensional ground area, surrounding runways, taxiways, and taxilanes, which is clear of objects except for objects whose location is fixed by function (i.e., airfield lighting)." The OFA does not have to be graded and level like the RSA; instead, the primary requirement for the OFA is that no object in the OFA, penetrate the lateral elevation of the RSA. The runway OFA is centered on the runway, extending out in accordance to the critical aircraft design category utilizing the runway.

For a B-II runway with visual approaches or an instrument approach with visibility minimums of not less than 1-mile, such as the runways at Columbia Gorge Regional Airport, the FAA calls for the OFA to be 500 feet wide, centered on the runway, and extend 300 feet beyond the runway ends. The length of the OFA beyond the runway ends is the same as the RSA.

The OFA behind Runway 12 is penetrated by bushes and a fence line in much the same manner as the RSA in this area. The OFA appears to be in compliance behind the Runway 30 end. The OFA behind the Runway 25 end appears to be in compliance since there is not a grading standard for the OFA as there is for the RSA. The OFA behind the Runway 7 end is penetrated by the perimeter fence and Dallesport Road. This also negatively impacts the width of the OFA.

Obstacle Free Zones (OFZ)

The OFZ is an imaginary volume of airspace which precludes object penetrations, including taxiing and parked aircraft. The only allowance for OFZ obstructions is navigational aids mounted on frangible bases which are fixed in their location by function such as airfield signs. The OFZ is established to ensure the safety of aircraft operations. If the OFZ is obstructed, the airport's approaches could be removed or approach minimums could be increased.

For all runways serving aircraft over 12,500 pounds, the OFZ is 400 feet wide, centered on the runway, and extends 200 feet beyond the runway ends. This standard applies to both runways at the airport. The OFZ is non-standard behind the Runway 7 end due to the penetration of the fence and Dallesport Road.

Precision Obstacle Free Zone (POFZ)

For runways providing a vertically guided approach, a precision obstacle free zone (POFZ) is required. The POFZ is defined as "a volume of airspace above an area beginning at the runway threshold, at the threshold elevation, and centered on the extended runway centerline, 200 feet long by 800 feet wide." The POFZ is only in effect when the following operational conditions are met:

1. Vertically guided approach

2. Reported ceiling below 250 feet and/or visibility less than three-quarters-of-a-statute-mile

3. An aircraft on final approach within two (2) miles of the runway threshold

When these conditions are met, aircraft holding for take-off must hold in such a position so that neither the fuselage nor the tail of the aircraft penetrates the POFZ. The wings of the aircraft are allowed to penetrate the surface. Runway 25 has a vertically guided approach but the visibility minimum is 2¾-mile, thus POFZ standards will not apply to Columbia Gorge Regional Airport.

Runway Protection Zones (RPZ)

The RPZ is a trapezoidal area centered on the runway, typically beginning 200 feet beyond the runway end. The RPZ has been established by the FAA to provide an area clear of obstructions and incompatible land uses, in order to enhance the protection of approaching aircraft as well as people and property on the ground. The RPZ is comprised of the central portion of the RPZ and the controlled activity area. The dimensions of the RPZ vary according to the visibility minimums serving the runway and the type of aircraft (design aircraft) operating on the runway. The dimensions of the RPZs at Columbia Gorge Regional Airport are presented in **Table 3D**.

TABLE 3D
Runway Protection Zones
Columbia Gorge Regional Airport

	All Runways	
Visibility Minimum	> 1-mile	> 1-mile
Airport Reference Code	B-II	C-II*
Inner Width	500	500
Outer Width	700	1,010
Length	1,000	1,700

* For comparative purposes only
Source: FAA AC 150/5300-13, Airport Design

The central portion of the RPZ extends from the beginning to the end of the RPZ, is centered on the runway centerline, and is the width of the OFA. Only objects necessary to aid air navigation, such as approach lights, are allowed in this portion of the RPZ. Wildlife attractants, fuel farms, places of public assembly, and residences are prohibited from the RPZs. The remaining portions of the RPZ, the controlled activity areas, have strict land use limitations. FAA AC 150/5300-13, *Airport Design*, specifically allows surface parking facilities but they are discouraged. All other uses are prohibited.

As previously discussed, where possible, the airport should have positive control over all safety areas including the RPZs. Currently, portions of the RPZs serving Runways 12, 30, and 7 extend beyond the airport property line.

Runway/Taxiway Separation

The design standards for the separation between runways and parallel taxiways are determined by the critical aircraft and the instrument approach visibility minimum. The current critical aircraft is represented by those aircraft in ARC B-II. The separation standard is 240 feet from the runway centerline to the parallel taxiway centerline. All parallel taxiways meet or exceed this standard.

AIRFIELD CAPACITY

A demand/capacity analysis measures the capacity of the airfield facilities (i.e., runways and taxiways) in order to identify and plan for additional development needs. Columbia Gorge Regional Airport's multi-runway system can provide up to 230,000 annual operations under ideal conditions. Due to times when the airport is closed, typically due to weather, a more reasonable capacity is identified as approximately 210,000 annual operations.

FAA Order 5090.3B, *Field Formulation of the National Plan of Integrated Airport Systems* (NPIAS), indicates that improvements to capacity should be considered when operations reach 60 percent of the airfield's annual service volume (ASV). If the projected long range planning horizon level of 51,000 operations comes to fruition, the airfield's ASV will reach 24 percent. As a result, there is not a need for additional runways or other capacity improvements.

RUNWAYS

The adequacy of the existing runway system at Columbia Gorge Regional Airport has been analyzed from a number of perspectives, including runway orientation, runway length, pavement strength, width, and adherence to safety area standards. From this information, requirements for runway improvements were determined for the airport.

Runway Orientation

The airport is served by two intersecting runways. A third runway was closed and converted into a taxiway in 2005. Runway 12-30 is orientated in a northwest to southeast manner, intersecting Runway 7-25 approximately 1,800 feet from the Runway 7 pavement end. Runway 7-25 is oriented in an east to west manner, and intersects Runway 12-30 approximately 1,100 feet from the Runway 12 pavement end.

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

FAA Advisory Circular 150/5300-13, *Airport Design,* recommends that a crosswind runway should be made available when the primary runway orientation provides for less than 95 percent wind coverage for specific crosswind components. The 95 percent wind coverage is computed on the basis of the crosswind component not exceeding 10.5 knots (12 mph) for ARCs A-I and B-I; 13 knots (15 mph) for ARCs A-II and B-II; and 16 knots (18 mph) for ARC C-I through D-II.

Weather data specific to the airport was obtained from the NOAA National Climatic Data Center. This data was collected from the on-field automated surface observation system (ASOS) over a continuous 10-year period from 1998 to 2009. A total of 87,558 observations of wind direction and other data points were made.

Runway 12-30 provides 95.08 percent wind coverage for 10.5 knot crosswinds, 97.77 percent coverage at 13 knots, and 99.34 percent at 16 knots. Runway 7-25 provides for 90.66 percent wind coverage at 10.5 knots, 95.88 percent at 13 knots, and 98.78 percent at 16 knots. **Exhibit 3C** presents a wind rose of the data developed following FAA guidance.

At a minimum, the airport should maintain the two runway system. Runway 12-30 provides the greatest length, which is necessary when considering the increasing usage of the airport by larger aircraft needing more runway length. Runway 7-25 provides the only instrument approach with vertical and horizontal guidance. If the approach could be relocated to the Runway 30 end the airport could remain viable with a single runway, but mountainous terrain prevents this possibility. Therefore, Runway 12-30 and 7-25 should be maintained and should both be capable of accommodating operations by the critical aircraft group to the greatest extent practicable.

Runway Length

Runway 12-30 is the primary runway and is 5,097 feet in length. Runway 7-25 is the crosswind runway measuring 4,647 feet in length. The determination of runway length requirements for the airport is based on five primary factors:

- Mean maximum temperature of the hottest month
- Airport elevation
- Runway gradient
- Critical aircraft type expected to use the airport
- Stage length of the longest nonstop destination (specific to larger aircraft)

The mean maximum daily temperature of the hottest month for Columbia Gorge Regional Airport is 89 degrees Fahrenheit (F). The airport elevation is 247 feet above mean sea level (MSL). The runway end elevation difference is 32 feet for Runway 7-25 and 28.5 feet for Runway 12-30. Runway 12-30 has a longitudinal gradient of 0.7 percent, while Runway 7-25 has a 0.6 percent longitudinal gradient, both of which conform to FAA design standards. For aircraft in approach categories A and B, the runway longitudinal gradient cannot exceed two percent. For aircraft in approach categories C and D, the maximum allowable longitudinal runway gradient is 1.5 percent.

The first step in evaluating runway length requirements is to determine general runway length requirements for the majority of aircraft operating at the airport. The majority of operations at Columbia Gorge Regional Airport consist of small aircraft weighing less than 12,500 pounds. According to runway length charts in AC 150/5325-4B, *Runway Length Requirements for Airport Design*, 100 percent of small aircraft with fewer than 10 passenger seats can operate on a 3,800-foot long runway. Small aircraft with 10 or more passenger seats require a runway length of 4,100 feet. Both runways provide adequate length to meet the needs of the predominant airport operators.

Runway length requirements for business jets weighing less than 60,000 pounds have also been calculated. These calculations take into consideration the runway gradient and landing length requirements for contaminated runways (wet). AC 150/5325-4B stipulates that runway length determination for business jets consider a grouping of airplanes with similar operating characteristics. The AC provides two separate "family groupings of airplanes" each based upon their representative percentage of aircraft in the national fleet. The first grouping is those business jets that make up 75 percent of the national fleet and the second group is those making up 100 percent of the national fleet. **Table 3E** presents a partial list of aircraft in each aircraft grouping. A third group considers business jets weighing more than 60,000 pounds. Runway length determination for these aircraft must be based on the performance characteristics of the individual aircraft.

TABLE 3E
Business Jet Categories for Runway Length Determination

75 percent of the national fleet	MTOW	75-100 percent of the national fleet	MTOW	Greater than 60,000 pounds	MTOW
Lear 35	20,350	Lear 55	21,500	Gulfstream II	65,500
Lear 45	20,500	Lear 60	23,500	Gulfstream IV	73,200
Cessna 550	14,100	Hawker 800XP	28,000	Gulfstream V	90,500
Cessna 560XL	20,000	Hawker 1000	31,000	Global Express	98,000
Cessna 650 (VII)	22,000	Cessna 650 (III/IV)	22,000		
IAI Westwind	23,500	Cessna 750 (X)	36,100		
Beechjet 400	15,800	Challenger 604	47,600		
Falcon 50	18,500	IAI Astra	23,500		

MTOW: Maximum Take Off Weight
Source: FAA AC 150/5325-4B, Runway Length Requirements for Airport Design

Table 3F presents the results of the runway length analysis developed following the guidance provided in FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design*. To accommodate 75 percent of the business jet fleet, a runway length of 5,500 feet is recommended. This length is de-

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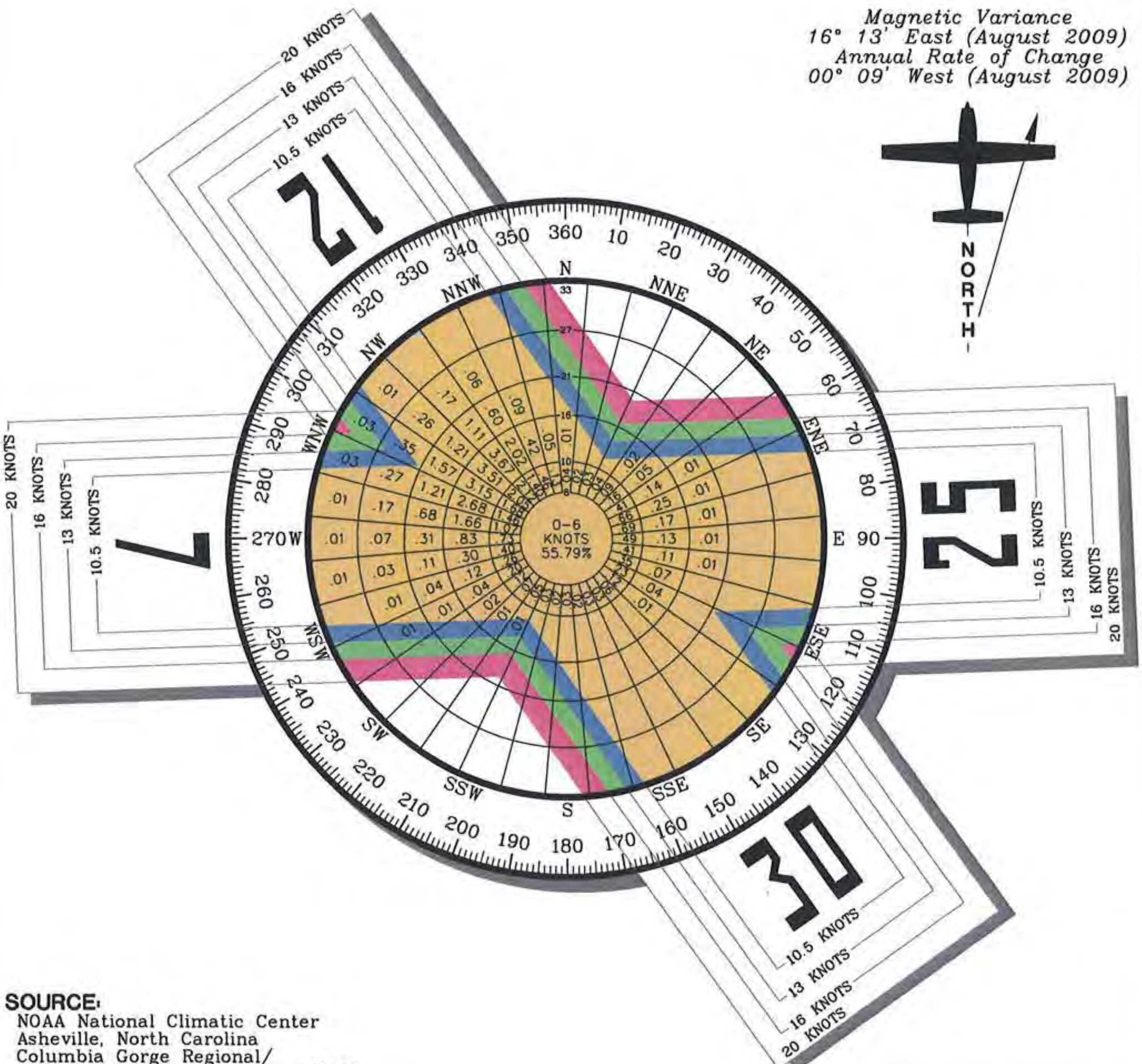
ALL WEATHER WIND COVERAGE

Runways	10.5 Knots	13 Knots	16 Knots	20 Knots
Runway 7-25	*90.66%*	*95.88%*	*98.78%*	*99.86%*
Runway 12-30	*95.08%*	*97.77%*	*99.34%*	*99.87%*
Combined	*99.70%*	*99.96%*	*100.00%*	*100.00%*

Magnetic Variance
16° 13' East (August 2009)
Annual Rate of Change
00° 09' West (August 2009)



SOURCE:
NOAA National Climatic Center
Asheville, North Carolina
Columbia Gorge Regional/
The Dalles Municipal Airport (DLS)
Dalles Port, Washington

OBSERVATIONS:
87,558 All Weather Observations
10/1998-08/2009

Columbia Gorge Regional Airport

Exhibit 3C
WIND ROSE

rived from a raw length of 4,800 feet that is adjusted, as recommended, for runway gradient, and consideration of landing length needs on a contaminated runway (wet and slippery). Dry runways would require approximately 5,100 feet of runway length to accommodate 75 percent of the business jets. Utilization of the 90 percent useful load characteristics is not allowed unless specific justification exists.

TABLE 3F
Recommended Runway Lengths
Columbia Gorge Regional Airport

Airport and Runway Data	
Airport Elevation	247 feet above mean sea level
Average high monthly temperature	89 degrees (August)
Runway gradient*	31.6' Runway 7-25
Runway Length Recommended for Airport Design	
Category of Aircraft	**Runway Length**
Small airplanes with less than 10 passenger seats	
95 percent of these small airplanes	3,200’
100 percent of these small airplanes	3,800’
Small airplanes with 10 or more passenger seats	4,100’
Business jets of 60,000 pounds or less	
75% of fleet at 60% useful load	**5,500'**
100% of fleet at 60% useful load	6,000'
75% of fleet at 90% useful load	7,000'
100% of fleet at 90% useful load	9,000'
Business jets of more than 60,000 pounds	6,100’

* Difference in feet between runway end elevations.
Note: Runway lengths above 30 feet are rounded up to the nearest 100 feet.
Source: FAA AC 150/5325-4B, Runway Length Requirements for Airport Design.

To accommodate business jets in the 75 to 100 percent category, a runway length of 6,000 feet is recommended. The recommended runway length to accommodate business jets weighing greater than 60,000 pounds is 6,100 feet. Without specific justification of an operations need, these runway length requirements cannot be utilized.

Columbia Gorge Regional Airport will continue to experience operations by business jets. According to the forecast presented in Chapter Two, at least one business jet could base at the airport in the short term and two are forecast by the long term. The operations fleet mix estimated current business jet operations at 761 annually with growth to 1,133 by the long term. Without actual evidence of the type of business jets, it is assumed that the majority of these operations will be by those falling in the 75 percent category. Therefore, to accommodate landing length requirements of business jets in the 75 percent category on a wet runway, a minimum runway length of 5,500 feet is recommended. Alternatives to be developed in Chapter Four will consider the possibilities of extending one runway to this length.

Runway Width

Both runways are 100 feet wide having been reduced in recent years from 150 feet. According to the design criteria for ARC B-II airports, the runways need to be at least 75 feet wide. The runways have been maintained at 100 feet in width due to ever increasing activity by larger turboprop and business jet aircraft. Maintaining the runways at a 100-foot width preserved the growth potential for the airport; therefore, this width should be maintained.

Runway Strength

An important feature of airfield pavement is its ability to withstand repeated use by aircraft. The FAA Airport/Facility Directory places the pavement strength for both runways at 30,000 pounds single wheel loading (SWL), and 30,000 pounds dual wheel loading (DWL). These strength ratings refer to the configuration of the aircraft landing gear. For example, SWL indicates an aircraft with a single wheel on each landing gear.

In 2008, the airport engineer was contracted to conduct a pavement evaluation to determine the actual pavement condition. Utilizing deflection testing and runway core sampling, it was determined that the runways consist of approximately 2.5 inches of asphalt concrete over approximately 6.5 inches of sandy gravel.

Based on the results of the core sampling and deflection testing, the single wheel load bearing capacity for Runway 7-25 is estimated at 4,000 pounds. For Runway 12-30, the load bearing capacity is estimated at 18,000 pounds. These strength ratings do not preclude operations by aircraft with greater weight but it does indicate that the life of the pavement will be significantly reduced. The airport does require prior permission for aircraft weighing more than the published 30,000 pounds.

The airport should consider capital projects that increase the strength rating of both runways to at least 30,000 pounds SWL and 60,000 pounds DWL.

The report says an approximate overlay of between 4.5 and 5.0 inches of asphalt for both runways would be needed to accommodate operations by aircraft weighing up to 50,000 pounds.

TAXIWAYS

As is common with many former military airfields, the taxiway layout and design is not uniform. Guidance from the FAA of taxiway layouts is presented in AC 150/5300-13, *Airport Design* and *Engineering Brief No. 75: Incorporation of Runway Incursion Prevention into Taxiway and Apron Design*. The engineering brief recommends taxiways to intersect the runway at a 90-degree angle in order to improve pilot situational awareness by increasing visibility to both ends of the runway. The brief also discourages multiple taxiways and/or runway intersections.

At Columbia Gorge Regional Airport, there are several locations where taxiways angle to intersect with the runway. There are also several locations where multiple taxiways intersect in one location. The airfield design plan will reduce these conflict points and improve safety.

The taxiway width standard for a critical aircraft in ADG II is 35 feet. The critical design aircraft currently and into the future is anticipated to remain in ADG II; therefore, taxiways should be at least 35 feet wide. The taxiways vary in width at Columbia Gorge Regional Airport. Historically, the FAA has supported continued maintenance of taxiways that exceed design standards because the cost to remove a portion of the width and relocate lighting can exceed the cost of long term maintenance. The alternatives discussion will address the taxiway layout and provide alternate layouts to improve safety.

INSTRUMENT NAVIGATIONAL AIDS

Runway 25 has an LDA/DME instrument approach that provides vertical and horizontal guidance from an offset localizer antenna and a glide slope antenna. This approach provides for visibility minimums as low 2¾-miles and cloud ceilings of 1,200 feet for A and B aircraft only. This approach was implemented in 2005 by the FAA following an Environmental Assessment that included analysis of the area airspace. This approach is likely the best instrument approach the airport is going to be able to obtain primarily due to the mountainous terrain.

The airport also has a circling GPS approach that provides for visibility minimums not lower than 1¼-miles for small aircraft in approach category A and 1½-miles in approach category B. The approach is also authorized for use by pilots operating aircraft in approach categories C and D but the visibility minimum is 3 miles.

The airport is located in the Columbia River Gorge which results in a loss of direct communication with air traffic control when aircraft are below approximately 500 feet. Several solutions may be available to alleviate this problem.

The FAA has begun a rollout of the Surveillance and Broadcast Services (SBS) program. Approximately 800 SBS ground-based radio stations are planned to be installed by 2013. The system automatically transmits the equivalent of ground-based radar coverage and real time local and regional weather information.

Another element related to the SBS system is the Wide Area Multilateration (WAM) system. Utilizing several ground-based remote sensors to determine aircraft position, this information is provided to the pilots and air traffic control to help pilots navigate in mountainous terrain. This system is new in 2009 and is initially being rolled out in Juneau, Alaska and in portions of Colorado.

VISUAL NAVIGATION AIDS

The airport beacon, located just west of the terminal building, provides for rapid identification of the airport. The beacon should be maintained through the planning period.

Runway end identification lights (REIL) are strobe lights set to either side of the runway. These lights provide rapid identification of the runway threshold. REILs should be installed at runway ends not currently providing an approach lighting system but supporting instrument operations. REILs are located on the end of Runway 30 and should be maintained. REILS should also be considered for Runway 25.

Precision approach path indicator (PAPI) lights provide pilots with visual descent information to the runway touchdown zone. There are no visual approach path aids at the airport currently. Analysis in the alternatives chapter will utilize the new airport mapping to determine if PAPIs are feasible for approaches to Runways 25 and 30.

A summary of the airside needs at Columbia Gorge Regional Airport is presented on **Exhibit 3D**.

LANDSIDE REQUIREMENTS

Landside facilities are those necessary for the handling of aircraft and passengers while on the ground. These facilities provide the essential interface between the air and ground transportation modes. The capacity of the various components of each element was examined in relation to projected demand to identify future landside facility needs. This includes components for general aviation needs such as:

- Aircraft Hangars
- Aircraft Parking Aprons
- General Aviation Terminal
- Auto Parking and Access
- Airport Support Facilities

HANGARS

Utilization of hangar space varies as a function of local climate, security, and owner preferences. The trend in general aviation aircraft, whether single or multi-engine, is toward more sophisticated aircraft (and consequently, more expensive aircraft); therefore, many aircraft owners prefer enclosed hangar space to outside tie-downs.

The demand for aircraft storage hangars is dependent upon the number and type of aircraft expected to be based at the airport in the future. For planning purposes, it is necessary to estimate hangar requirements based upon forecast operational activity. However, hangar development should be based upon actual demand trends and financial investment conditions.

While a majority of aircraft owners prefer enclosed aircraft storage, a number of based aircraft owners will still tie-down outside (due to the lack of hangar availability, hangar rental rates, and/or operational needs). Therefore, enclosed hangar facilities do not necessarily need to be planned for each based aircraft. At Columbia Gorge Regional Airport, it is estimated that 83 percent of the based aircraft are currently stored in hangars (12 tie-down aircraft). If facilities are available, it is estimated that 91 percent will be stored in a hangar in the short term (7 tie-down aircraft), 92 percent in the intermediate term (7 tie-down aircraft), and 95 percent in the long term (5 tie-down aircraft).

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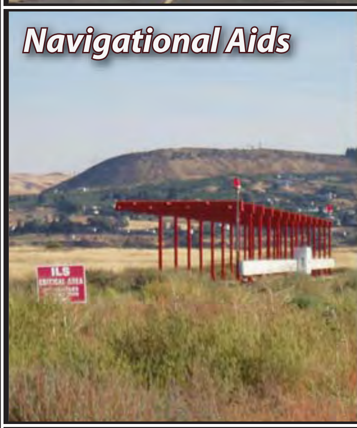
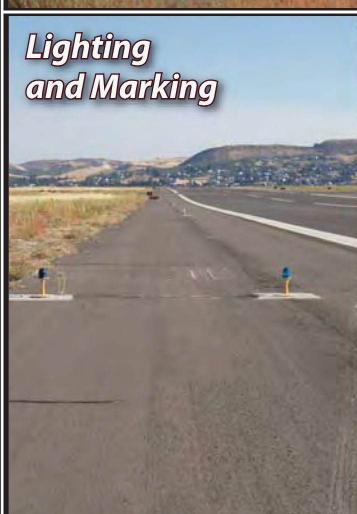
CATEGORY	AVAILABLE	SHORT TERM	LONG TERM
Runways 	**Runway 12-30** ARC B-II 5,097' x 100' 18,000# SWL 18,000# DWL Non-standard safety areas **Runway 7-25** ARC B-II 4,647' x 100' 4,000# SWL 4,000# DWL Non-standard safety areas	**Runway 12-30** ARC B-II Same 30,000# SWL 60,000# DWL Standard safety areas **Runway 7-25** Same Same 30,000# SWL 60,000#DWL Standard safety areas	**Runway 12-30** ARC B-II 5,500' x 100' Same Same Same **Runway 7-25** Same Same Same Same Same
Taxiways 	Vary from 30' to 50' wide Angled Threshold Taxiways	Uniform 50' width Evaluate Right-angle Threshold Taxiways	Same Same
Navigational Aids 	RCO, ASOS, Segmented Circle **Runway 12-30** GPS-A (Circling) **Runway 7-25** GPS-A (Circling) LDA/DME Rwy 25	Same **Runway 12-30** Same **Runway 7-25** Same Same	SBS Radio Station **Runway 12-30** GPS Straight-In (Rwy 30), if feasible **Runway 7-25** GPS Straight-In (Rwy 25), if feasible ILS Straight-In (Rwy 25), if feasible
Lighting and Marking 	Rotating beacon Three lighted windcones MITL Throat Lighting MIRL **Runway 12-30** Basic marking REIL (30) **Runway 7-25** Precision marking	Same Same Full MITL Same **Runway 12-30** Same Same Add PAPI (Rwy 30), if feasible **Runway 7-25** Same Add PAPI (Rwy 25), if feasible	Same Same Same Same **Runway 12-30** Same Same Same **Runway 7-25** Same Same

KEY

PAPI - Precision Approach Path Indicator
GPS - Global Positioning System
DME - Direction Measuring Equipment
REIL - Runway End Identification Lights
MIRL - Medium Intensity Runway Lighting
MITL - Medium Intensity Taxiway Lighting
ASOS - Automated Surface Observation System
RCO - Remote Communications Outlet

Columbia Gorge Regional Airport

Exhibit 3D
AIRSIDE REQUIREMENTS

There are three general types of aircraft storage hangars: T-hangars, box-hangars, and conventional hangars. T-hangars are similar in size and will typically house one single engine piston powered aircraft. Some multi-engine aircraft owners may elect to utilize these facilities as well. There are typically many T-hangar units "nested" within a single structure. There are 51 T-hangar units at the airport. For determining future aircraft storage needs, a planning standard of 1,200 square feet per based aircraft is utilized for T-hangars.

Box hangars are open-space facilities with no interfering supporting structure. Box hangars can very in size and can either be attached to others or be standalone hangars. Typically, box hangars will house larger multi-engine, turboprop, or jet aircraft. For planning purposes, the Quonset hut is considered a box hangar with the capability of housing two aircraft. For future planning, a standard of 2,500 square feet per aircraft is utilized for box hangars.

Conventional hangars are the familiar large hangars with open floor plans that can store several aircraft. At Columbia Gorge Regional Airport, there are two conventional hangars, one to the immediate north of the terminal building and one to the south. For planning purposes, the northern conventional hangar has the capability to house up to five aircraft but currently houses three. The conventional hangar to the south can house up to three but currently houses the two Air Tractor spray aircraft. For future planning needs, 2,500 square feet per aircraft is utilized for conventional hangars.

There is a total of 61 possible enclosed aircraft storage spaces with 57 of those spaces currently occupied. Three of the four remaining spaces are located within the conventional hangars that are leased to a single entity whose businesses are not aircraft storage. Therefore, the theoretical space available in the conventional hangars is not available to the general public.

Table 3G presents the need for aircraft storage based on the demand forecasts. Assumptions have been made on owner preferences for a storage type based on trends at general aviation airports. More sophisticated aircraft such as multi-engine, turboprop, and jets are assumed to be in a hangar. Half of the helicopters are also assumed to be in hangars. Tie-down aircraft are assumed to be single engine piston and the remaining half of the helicopters.

A portion of executive and conventional hangars often are utilized for maintenance activities or for office space. A planning standard of 175 square feet per based aircraft is considered for these purposes and is considered in addition to the aircraft storage needs.

It is estimated that there is 78,600 square feet of hangar space available currently. In the short term, there is a forecast need for 11 additional aircraft storage positions and 43,400 square feet of hangar space. The results of the forecasts show that this hangar space is needed in the form of box and conventional hangars. By the intermediate term, an additional 16,000 square feet of storage space is needed to accommodate an additional seven based aircraft. By the long term, a total of 163,000 square feet of storage space is needed from a mix of T-hangars, box hangars, and conventional hangars, to accommodate a total of 90 based aircraft to be stored.

It should be noted that these hangar requirements are general in nature based on the aviation demand forecasts. The actual need for hangar space will further depend on the actual usage within hangars. For example, some hangars may be utilized entirely for non-aircraft storage; yet from a planning standpoint, they have an aircraft storage capacity. Therefore, the needs of an individual user may differ from the calculated space necessary.

TABLE 3G
Hangar Needs
Columbia Gorge Regional Airport

	Available	Forecast Need		
	Base Year	Short Term	Intermediate Term	Long Term
Total Based Aircraft	68	75	82	95
Aircraft In Hangars	56	68	75	90
T-Hangars (1,200 s.f.)				
Single Engine		46	49	60
Multi-Engine		0	1	1
Turbo/Jet		0	0	0
Helicopter		0	0	0
Total T-hangar Positions	51	46	50	61
Total T-hangar Area	59,600	55,000	60,000	73,000
Total Square Feet Needed		0	400	13,400
Conventional Hangars (2,500 s.f.)				
Single Engine		5	6	7
Multi-Engine		1	1	1
Turbo/Jet		4	4	5
Helicopter		1	1	1
Total Conventional Hangar Positions	8	11	12	14
Total Conventional Hangar Area	13,000	26,000	31,000	35,000
Total Square Feet Needed		13,000	18,000	22,000
Box Hangars (2,500 s.f.)				
Single Engine		6	6	8
Multi-Engine		1	1	1
Turbo/Jet		3	4	4
Helicopter		1	2	2
Total Box Hangar Positions	2	11	13	15
Total Box Hangar Area	3,000	28,000	33,000	38,000
Total Square Feet Needed		25,000	30,000	35,000
Maintenance Hangars and Area	3,000	13,000	14,000	17,000
Total Hangar Positions	**61/57***	**68**	**75**	**90**
Total Hangar Area (s.f.)	**78,600**	**122,000**	**138,000**	**163,000**
Total Hangar Area Need (s.f.)		**43,400**	**16,000**	**25,000**

* Theoretical positions available are 61 based on area calculations. Actual usage is 57 positions.

AIRCRAFT PARKING APRON

The aircraft parking apron is an expanse of paved area intended for aircraft parking and circulation. Typically, a main apron is centrally located near the airside entry point, such as a terminal building. Ideally, the main apron is large enough to accommodate transient airport users as well as a portion of locally based aircraft. Often smaller aprons are available adjacent to FBO hangars and at other locations around the airport. The apron layout at Columbia Gorge Regional Airport follows this typical pattern.

The apron to the south of the terminal building is designated for transient aircraft. There are 24 tie-down positions sized for small aircraft on this 7,900 square yard apron. The central apron is approximately 7,000 square yards and is utilized for circulation and for fueling. There are no designated parking positions in this area. There are two aprons to the northwest of the terminal building with 37 local tie-down positions sized for small aircraft. These two aprons total approximately 13,450 square yards. There are no designated large aircraft parking positions designated at the airport currently. Excluding the central circulation apron, there is a total of 21,350 square yards of apron parking available.

FAA Advisory Circular 150/5300-13, *Airport Design*, suggests a methodology by which transient apron requirements can be determined from knowledge of busy-day operations. At Columbia Gorge Regional Airport, the number of itinerant spaces required was determined to be approximately 13 percent of the busy-day itinerant operations. This results in a current need for 15 itinerant aircraft parking spaces. By the long term planning period, 23 spaces are estimated to be needed.

A planning criterion of 800 square yards per aircraft was applied to determine future transient apron area requirements for single and multi-engine aircraft. For turboprops and business jets (which can be much larger), a planning criterion of 1,600 square yards per aircraft position was used. The current need for transient apron area is 14,100 square yards. By the long term planning period, approximately 22,000 square yards is necessary.

For planning purposes, 85 percent of transient spaces are estimated to be needed for non-jet aircraft, which is in line with airport activity levels. This results in a current need for two designated large aircraft spaces. By the long term planning period, there is a need for a total of four large aircraft spaces.

An aircraft parking apron should provide space for the number of locally based aircraft that are not stored in hangars, transient aircraft, and for maintenance activity. For local tie-down needs, an additional ten spaces are identified for maintenance activity. Maintenance activity would include the movement of aircraft into and out of hangar facilities and temporary storage of aircraft on the ramp. Currently, a total of 22 local positions are needed (12 based plus 10 additional).

Total apron parking requirements are presented in **Table 3H**. Currently, there are 24 transient positions available for single and multi-engine aircraft and none designated for larger business aircraft. The calculated need for transient parking is 14,100 square yards, and there is 7,900 square yards currently available. The need for transient position and apron area are both forecast to increase through the planning period.

TABLE 3H
Aircraft Apron Requirements
Columbia Gorge Regional Airport

			FORECAST		
	Currently Available (2009)	**Calculated Need (2009)**	**Short Term**	**Intermediate Term**	**Long Term**
Local Apron Positions	37	22	17	17	15
Local Apron Area (s.y.)	13,450	14,000	11,000	11,000	10,000
Transient Apron Positions	24	15	18	19	23
Piston Transient Positions	24	13	15	16	19
Turbine Transient Positions	0	2	3	3	4
Transient Apron Area (s.y.)	7,900	14,100	16,100	17,700	22,000
Central Circulation Apron	7,000	7,000	7,000	7,000	7,000
Total Apron Area (s.y.)	28,350	35,100	34,100	35,700	39,000

The apron area designated for local tie-downs and maintenance activity appears adequate through the long term planning period. This is primarily due to the assumption that as more hangars are constructed, a greater percentage of those who currently tie-down will transition to an enclosed hangar. The transient apron provides an adequate number of positions for small aircraft but there are no designated positions for larger aircraft. In addition, more transient apron area may be needed to allow for greater clearances between aircraft. It should be noted that while it is preferred to designate between itinerant and local apron areas, on busier days, apron area can be cross-utilized to accommodate the mix experienced on that day.

GENERAL AVIATION TERMINAL FACILITIES

General aviation terminal facilities have several functions. Space is required for a pilots' lounge, flight planning, concessions, management, and storage. More advanced airports will have leasable space in the terminal building for such features as a restaurant, FBO line services, and other needs. This space is not necessarily limited to a single, separate terminal building, but can include space offered by FBOs in their hangars for these functions and services.

The methodology used in estimating general aviation terminal facility needs is based on the number of airport users expected to utilize general aviation facilities during the design hour. General aviation space requirements were then based upon providing 120 square feet per design hour itinerant passenger. Design hour itinerant passengers are determined by multiplying design hour itinerant operations by the number of passengers on the aircraft (multiplier). An increasing passenger count (from 1.9 to 2.3) is used to account for the likely increase in the number of passengers utilizing general aviation services. **Table 3J** outlines the general aviation terminal facility space requirements for Columbia Gorge Regional Airport.

TABLE 3J
General Aviation Terminal Area Facilities
Columbia Gorge Regional Airport

	Existing	Short Term	Intermediate Term	Long Term
Design Hour Operations	21	23	25	30
Design Hour Itinerant Operations	15	17	18	22
Multiplier	1.9	2.0	2.1	2.3
Total Design Hour Itinerant Passengers	29	33	38	51
General Aviation Building Space (s.f.)	2,500	4,000	5,000	6,000

The terminal building at Columbia Gorge Regional Airport, constructed in 1943, provides approximately 2,500 square feet of space. This includes space leased for a small restaurant operation. Interviews with airport management have indicated that the current size of the building is constraining. The forecasts confirm this by indicating that, at a minimum, 4,000 square feet may be needed in the short term and 6,000 feet in the long term. The feasibility of either expanding the existing building or construction of a new building will be explored in the alternatives chapter.

In addition, the airport terminal building is the entrance to the community for most air passengers utilizing the airport. It should be assumed that these passengers include decision-makers who may be considering investment in the community. Therefore, it is recommended that the airport sponsor be cognizant of the appearance of the airport and the terminal building in particular.

SUPPORT REQUIREMENTS

Various facilities that do not logically fall within classifications of airside or landside facilities have also been identified. These other areas provide certain functions related to the overall operation of the airport.

AUTOMOBILE PARKING

Planning for adequate automobile parking is a necessary element for any airport. Parking needs can effectively be divided between transient airport users and locally based users. Transient users include those employed at the airport and visitors, while locally based users primarily include those attending to their based aircraft. A planning standard of 1.9 times the design hour passenger count provides the minimum number of vehicle spaces needed for transient users. Locally based parking spaces are calculated as one-half the number of based aircraft.

At Columbia Gorge Regional Airport, there are approximately 45 vehicle parking spaces available near the terminal building. Each of the airport business hangars has vehicle parking available. A planning standard of 400 square feet is utilized to determine total vehicle parking space necessary. This includes area needed for circulation and handicap clearances. Parking requirements for the airport are summarized in **Table 3K**.

TABLE 3K
GA Vehicle Parking Requirements
Columbia Gorge Regional Airport

	Existing	Short Term	Intermediate Term	Long Term
Design Hour Itinerant Passengers	29	33	38	51
GA Itinerant Spaces		60	69	92
GA Based Spaces		38	41	48
Itinerant Parking Area (s.f.)		24,000	28,000	37,000
GA Based Parking Area (s.f.)		15,000	16,000	19,000
Total GA Parking Area (s.f.)	18,000	39,000	44,000	56,000
Total Parking Spaces	45	98	110	139

There appears to be a need in the short term for additional vehicle parking spaces. Parking should be made available in close proximity to the terminal building and airport businesses. In an effort to limit the level of vehicle traffic on the aircraft movement areas, many general aviation airports are providing separate parking in support of facilities with multiple aircraft parking positions, such as T-hangars. Vehicle parking spaces will be considered in conjunction with additional facility needs in the alternatives chapter.

AIRCRAFT RESCUE AND FIREFIGHTING (ARFF) FACILITIES

Only those airports that are certificated under Title 14 Code of Federal Regulations, Part 139, are required to have on-site firefighting capabilities. Columbia Gorge Regional Airport is not a Part 139 airport and, therefore, is not required to have on-site firefighting capabilities. Instead, local fire departments respond to airport emergencies.

The closest fire station is Volunteer Fire District No. 6 located less than a minute from the airport in Dallesport. There is an operations Oshkosh ARFF crash vehicle at the fire station. This vehicle has storage capacity for water, dry chemical, and aqueous firefighting foam (AFFF). Other traditional firefighting equipment is also available.

A location on airport property to the west of the terminal building has been identified for a future fire station. The alternatives chapter will analyze if this is the best location for this facility.

FUEL STORAGE

Columbia Gorge Regional Airport has underground fuel storage tanks located under the central apron in proximity to the self-serve fuel island. There is a 10,000-gallon Avgas tank and a 12,000-gallon tank for Jet A fuel. These tanks are owned by the airport and fuel management is undertaken by the airport FBO.

In recent years, underground fuel tanks have caused environmental concerns. A tank that develops a crack or leak can go unnoticed and the ground soil and environment can be damaged. While relocation of the tanks to an aboveground position is not legally required at this time, at the first opportunity the airport should take this step.

Additional fuel storage capacity should be planned when the airport is unable to maintain an adequate supply and reserve. While each airport determines their own desired reserve, a 14-day reserve is common for general aviation airports. When additional capacity is needed, it should be planned in 10,000 to 12,000 gallon increments. Common fuel tanker trucks have an 8,000-gallon capacity. While the current capacity appears to be adequate to meet the needs of the airport, future operational activity levels could necessitate additional capacity needs. The alternatives chapter will examine the relocation of the underground tanks with a doubling of capacity.

A summary of landside and support needs is presented on **Exhibit 3E**.

SUMMARY

The intent of this chapter has been to outline the facilities required to meet potential aviation demand projected for Columbia Gorge Regional Airport for the next 20 years. In an effort to provide a more flexible master plan, the yearly forecasts from Chapter Two have been converted to planning horizon levels. The short term roughly corresponds to a five-year time frame, the intermediate term is approximately 10 years, and the long term is 20 years. By utilizing planning horizons, airport management can focus on demand indicators for initiating projects and grant requests rather than on specific dates in the future.

The current and future critical design aircraft (500 or more annual operations), fall in airport reference code B-II. Representative aircraft include many turboprops such as the King Air 300 and some smaller business jets such as the Cessna Citation models 500, 550, and 560. The forecasts indicate that operations at the airport will continue to grow with an increase in activity by all aircraft types including turboprops and business jets.

The airfield system, including the current maximum runway length of 5,097 feet, meets the needs of the critical aircraft. To accommodate a greater percentage of business jets, a runway extension to 5,500 feet should be considered. This would likely be an intermediate or long term need unless one or several business jets base at the airport in the short term.

On the landside, the airport has been very proactive in recent years. Over 40 new T-hangar positions have been constructed in the last 10 years and all of them are full. Additional hangar space is needed to accommodate forecast growth. It is recommended that the airport diversify its hangar offerings by focusing on medium-sized box hangars or an additional conventional hangar.

The next chapter, Alternatives, will examine potential improvements to the airfield system. Most of the alternatives discussion will focus on those capital improvements that would require federal grant funds. Other projects of local concern will also be presented. On the land side, several facility layouts that meet the forecast demands over the next 20 years will be presented. Ultimately, an overall airport layout vision that is well beyond the 20-year scope of the master plan will be developed.

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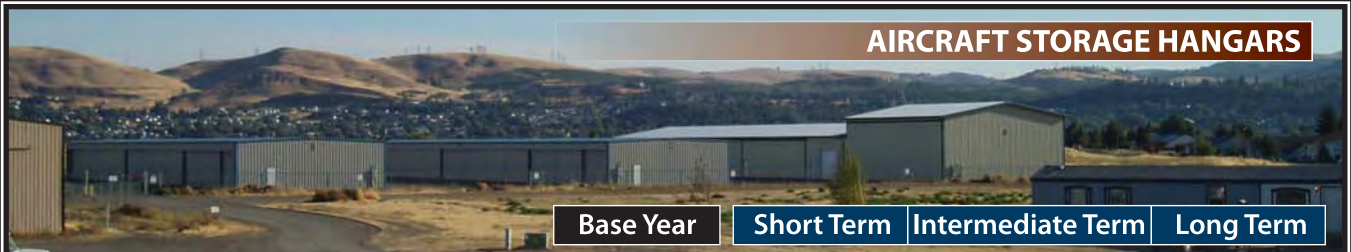

AIRCRAFT STORAGE HANGARS

	Base Year	Short Term	Intermediate Term	Long Term
Based Aircraft	**68**	**75**	**82**	**95**
Aircraft to be tied down	12	7	7	5
Aircraft to be Hangared				
Single Engine	47	57	62	75
Multi-Engine	2	2	3	3
Turbo/Jet	5	7	8	9
Rotor	2	2	3	3
Total to be Hangared	**56**	**68**	**75**	**90**
Hangar Positions				
T-Hangar Positions	51	46	50	61
Box Hangar Positions	2	11	13	15
Conventional Hangar Positions	8	11	12	14
Hangar Area				
T-Hangars (s.f.)	59,600	55,000	60,000	73,000
Conventional Hangar (s.f.)	13,000	26,000	31,000	35,000
Box Hangar (s.f.)	3,000	28,000	33,000	38,000
Maintenance Area (s.f.)	3,000	13,000	14,000	17,000
Total Hangar Area	***78,600***	***122,000***	***138,000***	***163,000***

AIRCRAFT PARKING APRON AREA

	Base Year	Short Term	Intermediate Term	Long Term
Local Apron Positions	37	17	17	15
Local Apron Area (s.y.)	*13,450*	*11,000*	*11,000*	*10,000*
Transient Apron Positions	24	18	19	23
Piston Transient Positions	24	15	16	19
Turbine Transient Positions	0	3	3	4
Transient Apron Area (s.y.)	*7,900*	*16,100*	*17,700*	*22,000*
Circulation Apron (s.y.)	*7,000*	*7,000*	*7,000*	*7,000*
Total Apron Area (s.y)	***28,350***	***34,100***	***35,700***	***39,000***

GENERAL AVIATION TERMINAL SERVICES

	Base Year	Short Term	Intermediate Term	Long Term
Auto Parking				
Spaces	45	98	110	139
Area (s.f.)	18,000	39,000	44,000	56,000
Terminal Building				
Area (s.f.)	2,500	4,000	5,000	6,000

Source: Coffman Associates Analysis

Columbia Gorge Regional Airport

Exhibit 3E
LANDSIDE FACILITY REQUIREMENTS

Columbia Gorge Regional Airport

Chapter Four

ALTERNATIVES

ALTERNATIVES

Columbia Gorge Regional Airport

In the previous chapter, airside and landside facilities required to satisfy the demand through the long range planning period were identified. The next step in the planning process is to evaluate reasonable ways these facilities can be provided. There can be countless combinations of design alternatives, but the alternatives presented here have been limited by the negotiated scope of services and are those with the perceived greatest potential for implementation.

Any development proposed for a master plan is evolved from an analysis of projected needs for a set period of time. Though the needs were determined by utilizing industry accepted statistical methodologies, unforeseen future events could impact the timing of the needs identified. The master planning process attempts to develop a viable concept for meeting the needs caused by projected demands for the next 20 years. However, no plan of action should be developed which may be inconsistent with the future goals and objectives of Klickitat County and the City of The Dalles and its citizens, who have a vested interest in the development and operation of the airport.

The development alternatives for Columbia Gorge Regional Airport can be categorized into two functional areas: the **airside** (runways, navigational aids, taxiways, etc.) and **landside** (hangars, apron, and terminal area). Within each of these areas, specific capabilities and facilities are required or desired. In addition, the utilization of airport property to provide revenue support for the airport and to benefit the economic development and well-

being of the regional area must be considered.

Each functional area interrelates and affects the development potential of the others. Therefore, all areas are examined individually and then coordinated as a whole to ensure the final plan is functional, efficient, and cost-effective. The total impact of all these factors on the existing airport must be evaluated to determine if the investment in Columbia Gorge Regional Airport will meet the needs of the community, both during and beyond the 20-year planning period.

The alternatives considered are compared using environmental, economic, and aviation factors to determine which of the alternatives will best fulfill the local aviation needs. With this information, as well as the input from various airport stakeholders, a final airport concept can evolve into a realistic development plan.

AIRPORT DEVELOPMENT OBJECTIVES

Prior to identifying objectives specifically associated with development of Columbia Gorge Regional Airport, non-development alternatives are briefly considered. Non-development alternatives include a "no-build" or "do-nothing" alternative, the transfer of services to another existing airport or the development a new airport at a new location.

The Columbia Gorge Regional Airport plays a critical role in the economic development of the region and plays an important role in the continuity of the national aviation network. There is significant public and private investment at the airport. Pursuit of a non-development alternative would slowly devalue these investments, lead to infrastructure deterioration, and potentially the loss of significant levels of federal funding for airport improvements. Ultimately, the safety of aircraft, pilots, and persons on the ground could be jeopardized. Therefore, the non-development alternatives are not further considered.

It is the goal of this effort to produce a balanced airside and an appropriate landside aircraft storage mix to best serve forecast aviation demands. However, before defining and evaluating specific alternatives, airport development objectives should be considered. As owner and operator, Klickitat County and The City of The Dalles provide the overall guidance for the operation and development of the airport. It is of primary concern that the airport is marketed, developed, and operated for the betterment of the community and its users. With this in mind, the following development objectives have been defined for this planning effort:

- To preserve and protect public and private investments in existing airport facilities.

- To develop a safe, attractive, and efficient aviation facility in accordance with applicable federal, state, and local regulations.

- To develop a balanced facility that is responsive to the current and long term needs of all general aviation users.

- To be reflective and supportive of the long term planning efforts currently applicable to the region.

- To develop a facility with a focus on self-sufficiency in both operational and developmental cost recovery.

- To ensure that future development is environmentally compatible.

AIRSIDE PLANNING ISSUES

Generally, airside issues relate to those airport elements that contribute to the safe and efficient transition of aircraft and passengers from air transportation to the landside facilities at the airport. This includes the established design standard for the airport, the instrument approach capability, the capacity of the airfield, the length and strength of the runways, and the layout of the taxiways. Each of these elements was introduced in the previous chapters. This chapter will examine airside issues specific to Columbia Gorge Regional Airport. These will then be applied to several airside development alternatives. **Exhibit 4A** presents a summary of the airside and landside elements.

VISUAL APPROACH AIDS

Certain approach aids provide information to pilots to indicate if they are on the correct glide path to the runway for landing. A common visual approach aid is a precision approach path indicator (PAPI) light system. The system consists of two, three, or four boxes of lights in a single row, set perpendicular to the runway, that provide a visual indication of an aircraft's position on the glide path for the associated runway. The PAPI is positioned to the side of the runway usually about 1,000 feet from the runway threshold. The PAPI system lights can be seen up to five miles during the day and twenty miles at night.

Each box of lights is equipped with an optical apparatus that splits light output into two segments, red and white. Depending on the angle of approach, the lights will appear either red or white to the pilot. Ideally, the total of lights will change from white to half red, moving in succession from the runway side to the outer side. The pilot will have reached the normal glide path (usually three degrees) when there is an even split in red and white lights. If an aircraft is beneath the glide path, red lights will outnumber white; if an aircraft is above the glide path, more white lights are visible.

Columbia Gorge Regional Airport does not currently have any visual approach aids. Because of the variety of aircraft that operate at the airport, up to and including the largest business jets, a PAPI is recommended. A limiting factor of installing a PAPI at Columbia Gorge Regional Airport is the elevation of the surrounding terrain. As part of this master plan, an examination of the general parameters for a PAPI installed to serve each runway end was examined.

The technical specifications for PAPI installation are available in Federal Aviation Administration (FAA) Order 6850.2A, *Visual Guidance Lighting Systems*. According to the order, the PAPI obstacle clearance surface has been established to provide the pilot with a minimum clearance over obstacles during approach and must remain clear of obstructions. The surface itself begins on the runway centerline, approximately 300 feet in front of the PAPI system (closer to the threshold), and proceeds outward to a distance of four statute miles. The glide path rises at a three degree slope and encompasses a 20 degree fan (10 degrees to either side of centerline). If a site survey determines that there is an obstacle penetration that cannot be moved or lowered, then the glide path angle must be changed either by moving the PAPI system farther away from the runway threshold or by increasing the glide path angle.

Exhibit 4B presents the results of the PAPI analysis for Columbia Gorge Regional Airport. As can be seen, a three degree glide path to Runways 25, 30, and 7 is penetrated by the surrounding terrain. The three degree glide path to Runway 12 is clear of terrain obstruction. The exhibit shows that the glide path angle necessary to clear the highest point within the PAPI fan would exceed four degrees. While there is no specific FAA guidance to prevent the installation of a PAPI with a greater than four degree glide path, a full area airspace study would need to be undertaken to determine if a PAPI to any of these three runway ends would be feasible.

As indicated, the traditional three degree glide path for Runway 12 is clear of terrain penetrations. A PAPI would be feasible for this runway end. The benefit of installing a PAPI to Runway 12 would need to be weighed against the cost and maintenance of the system, especially since Runway 12 is the least utilized runway for approaches.

RUNWAY LINE-OF-SIGHT

In FAA Advisory Circular (AC) 150/5300-13, *Airport Design,* the FAA has developed line-of-sight standards for runways. Along individual runways, any two points located five feet above the runway centerline must be mutually visible for the entire runway length. However, if a full-length parallel taxiway is available, then the line-of-sight between any two points (five feet above the runway) need only be half the runway length. **Exhibit 4C** presents a preliminary line-of-sight analysis of the runways.

Runways are rarely flat and many are not a straight plane surface. It is common for runways to have moderate undulations. Such is the case at Columbia Gorge Regional Airport where the runway profiles are closer to a bell curve than to a flat plane. The new airport mapping produced in conjunction with this master plan shows that the high point of Runway 12-30 is located near the intersection with Tax-

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AIRSIDE PLANNING ISSUES

- Consideration of PAPIs
- Runway Line of Sight
- Runway Length
- Safety Area Design Standards
- Landing Thresholds and Declared Distances
- Critical Aircraft
- Taxiway Layout
- Instrument Approach Capability

LANDSIDE PLANNING ISSUES

- Airport Land Use
- Separation of Activity Levels
- Location and Types of Future Hangars
- East Side Development
- Fuel Storage Alternatives
- On-Airport Fire Station

Columbia Gorge Regional Airport

Exhibit 4A
AIRPORT PLANNING ISSUES

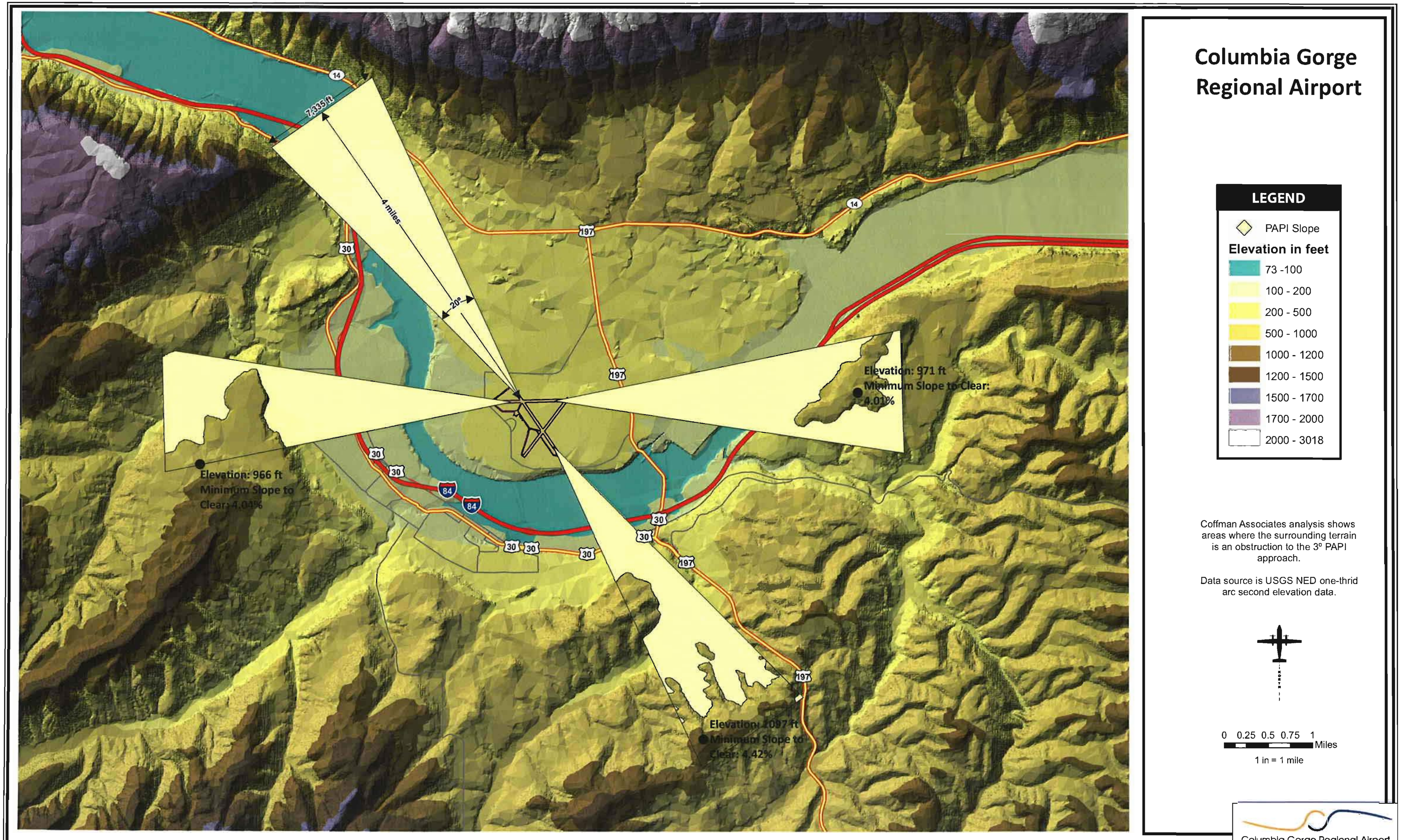
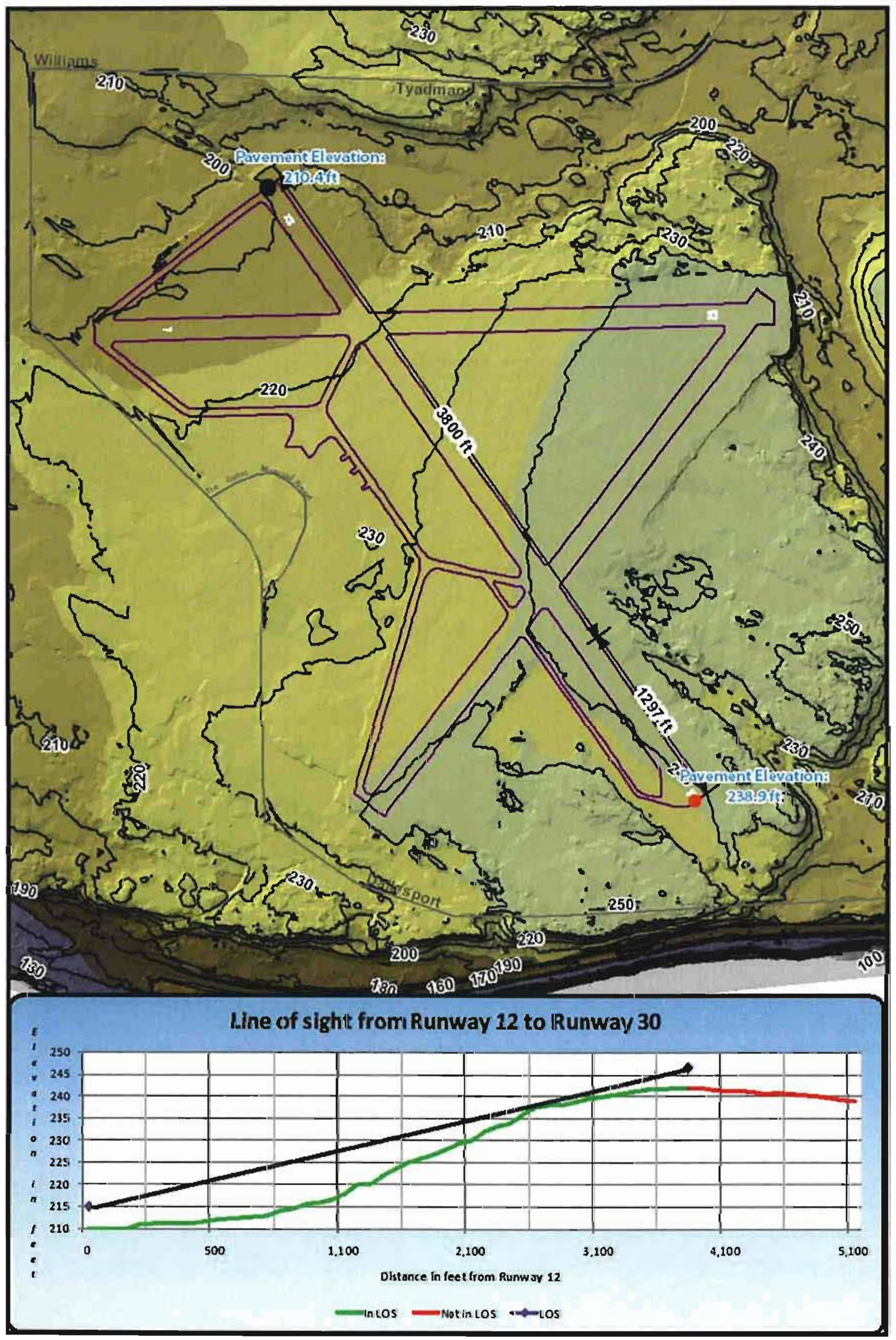
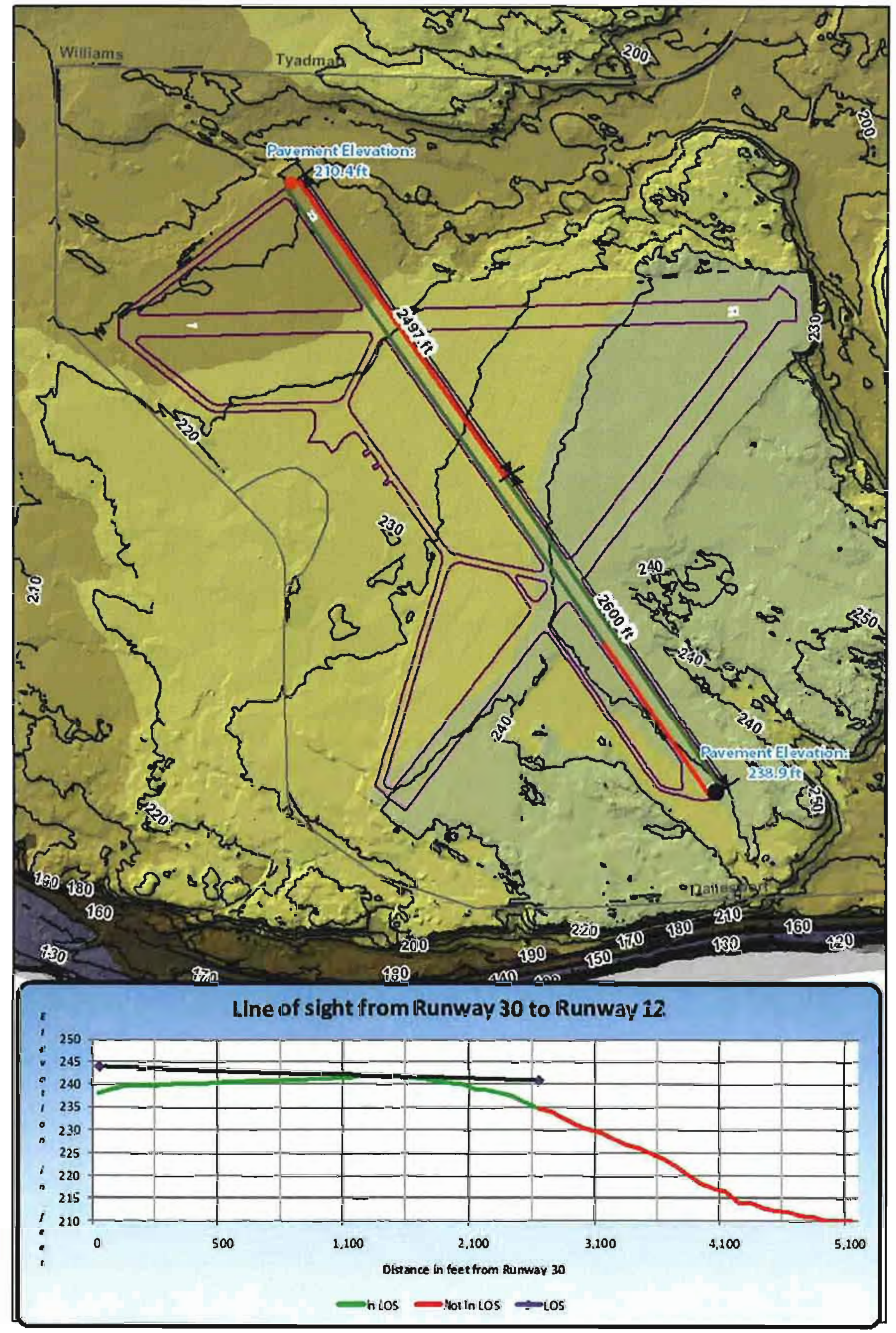


Exhibit 4B
PAPI SLOPE TERRAIN IMPACTS





Columbia Gorge Regional Airport

LEGEND

- Does not have line of sight*
- Has line of sight*
- Observer Location
- Target Location

Elevation dataset created from survey prepared on 11/03/09 by David C. Smith and Associates INC.

* *Line of sight analysis by Coffman Associates according to standard set forth in AC 150-5300-13 (Airport Design).*

Maps set to uniform scale of:

1 inch = 1,000 feet

0 500 1,000 1,500 2,000
Feet

Columbia Gorge Regional Airport

Exhibit 4C
LINE OF SIGHT

iway A3, and that both runway ends are lower in elevation than this point.

From an observation point five feet above the Runway 12 threshold, the line-of-sight extends approximately 3,800 feet down the runway. The remaining runway length does not meet the line-of-sight standard due to the hump in the runway. An observer located five feet above the Runway 30 threshold has a line-of-sight of approximately 2,600 feet.

Runway 7-25 also has a line-of-sight issue. An observer standing on the Runway 7 end has visibility for 4,475 feet then the Runway 25 end dips below the acceptable visibility line. An observer standing on the Runway 25 end is able to only see approximately 1,875 feet.

The runway line-of-sight issue is complex. A full evaluation of alternatives should be conducted to determine a viable solution. The inclusion of a full-length parallel taxiway does reduce the magnitude of the line-of-sight penetration for Runway 12-30, but it is still not standard. The airport capital improvement program, to be presented in Chapter Six will include an evaluation study of the line-of-sight issue.

A second line-of-sight consideration, called the runway visibility zone, is necessary for intersecting runways. The runway visibility zone is created from imaginary lines connecting the four runways' visibility points. The location of the runway visibility points on each runway are a factor of the distance from the threshold to the intersection. The runway visibility zone is recommended to be clear of object penetrations so that any two observers (five feet above the ground) are mutually visible anywhere within the zone. The runway visibility zone is depicted on each of the airside alternatives.

RUNWAY LENGTH ISSUES

Columbia Gorge Regional Airport provides a two runway system. The primary runway, Runway 12-30, is 5,097 feet long. The crosswind runway, Runway 7-25, is 4,647 feet. The runway length has been shown to be adequate to accommodate all small aircraft weighing less than 12,500 pounds. These types of aircraft represent the vast majority of activity at the airport. The airport also receives activity from large turboprops and business jets weighing more than 12,500 pounds.

The critical design aircraft is that group of similar aircraft types that will account for 500 annual operations. It was determined in Chapter Three – Facility Requirements that the current critical design aircraft is in airport reference code (ARC) B-II. The forecasts of aviation activity suggest the critical design aircraft will remain in ARC B-II through the 20-year scope of this master plan.

The operational fleet mix indicates that the airport currently experiences more than 500 annual business jet operations; therefore, business jet activity is critical to determine runway length requirements. To accommodate 75 percent of business jets at 60 percent useful load, the FAA recommends a runway length of 5,100 feet for dry runways and 5,500 feet for wet runways. The need for additional runway length (beyond 5,500 feet) can be justified when the critical design aircraft shifts to a large business jet (ARC C-II and larger). In this case, the airport would need to accommodate 100 percent of the business jets at 60 percent load. This results in a minimum runway length of 5,800 feet in both wet and dry conditions.

Table 4A shows the FAA classification of business jets. Of the business jet operations at Columbia Gorge Regional Airport, the majority are by those in the 75 percent category. All business jets are capable of operating on the runway length available, but the larger business jets may be weight restricted.

TABLE 4A
Business Jets Planning Statistics

Aircraft Make	Aircraft Model	ARC	MTOW#	Aircraft Make	Aircraft Model	ARC	MTOW#
Airplanes that Make Up 75 Percent of the Fleet				**Airplanes that Make Up 75 Percent of the Fleet**			
Aerospatiale	SN-601 Corvette	B-I	14,550	Hawker	600	C-II	25,000
BAe	125-700	C-II	24,200	Sabreliner	40	B-I	18,650
Beech Jet	400A	C-I	16,100	Sabreliner	60	C-I	20,200
Beech Jet	Premier I	C-I	12,500	Sabreliner	75a/80	C-II	23,300
Cessna	500 Citation/501 Citation S	B-I	11,850	Sabreliner	T-39	B-I	17,760
Cessna	Citation I/II/III	B-I	10,600				
Cessna	525A II (CJ-2)/525B	B-II	12,500	**Airplanes that Make Up 100 Percent of the Fleet**			
Cessna	550 Citation Bravo	B-II	14,800	BAe	Corporate 800/1000		
Cessna	550 Citation II	B-II	15,100	Bombardier	Challenger 600	C-II	41,250
Cessna	551 Citation II/Special	B-II	15,100	Bombardier	Challenger 604	C-II	47,600
Cessna	552 Citation	B-II	15,100	Bombardier	Challenger 300	C-II	38,850
Cessna	560 Citation Encore	B-II	16,830	Cessna	S550 Citation S/II	B-II	12,500
Cessna	560/560 XL Citation Excel	B-II	20,000	Cessna	650 Citation III/IV	C-II	21,000
Cessna	560 Citation V Ultra	B-II	16,300	Cessna	750 Citation X	C-II	36,100
Cessna	650 Citation VII	B-II	22,000	Dassault	Falcon 900C/900EX	C-II	45,500
Cessna	680 Citation Sovereign	C-II	30,300	Dassault	Falcon 2000/2000EX	C-II	41,000
Dassault	Falcon 10	B-I	18,740	IAI	Astra 1125 (G-150)	C-II	23,500
Dassault	Falcon 20	B-II	28,660	IAI	Galaxy 1126 (G-200)	C-II	34,850
Dassault	Falcon 50/50 EX	B-II	37,480	Learjet	45XR	C-I	20,200
Dassault	Falcon 900/900B	B-II	45,500	Learjet	55/55B/55C	C-I	21,500
Eclipse	Eclipse 500	A-I	5,950	Learjet	60	D-I	23,500
IAI	Jet Commander 1121	C-I	23,500	Hawker	125-1000 Horizon	C-II	36,000
IAI	Westwind 1123/1124	C-I	23,500	Hawker	800/800XP	C-II	28,000
Learjet	20 Series	C-I	15,000	Sabreliner	65/75	C-II	24,000
Learjet	31/31A/31A ER	C-I	16,500	**Airplanes over 60,000 pounds**			
Learjet	35/35A/36/36A	C-I	18,300	Bombardier	CL-700 Global Express	C-III	96,000
Learjet	40/45	C-I	20,200	Gulfstream	II	D-II	65,300
Mitsubishi	Mu-300 Diamond	B-I	14,630	Gulfstream	III	C-II	68,700
Raytheon	390 Premier	B-I	12,500	Gulfstream	IV (G-350, G-450)	D-II	71,780
Hawker	400/400XP	C-II	23,300	Gulfstream	V (G-500, G-550)	D-III	89,000

ARC: Airport Reference Code; MTOW: Maximum Certified Takeoff Weight (pounds)
Source: AC 150/5325-4B, Runway Length Requirements for Airport Design

The airfield alternatives analysis will consider the most feasible runway to extend to a length of 5,500 feet in order to accommodate 75 percent of business jets at 60 percent useful load under wet conditions. Since the current length of Runway 12-30 meets the runway length requirement (5,100 feet) under dry conditions, an extension of either runway to 5,500 feet would need to be justified by 500 actual operations by business jets under wet conditions. Since rainy conditions are not prevalent in the region, any runway extension would be an intermediate to long term project.

A runway extension project could also be justified by a transition in the critical aircraft from ARC B-II to ARC C-II. A transition such as this most commonly occurs if one or several large business jets base at the airport. Depending on the type of large business jets to base at the airport, a total runway length of up to 6,100 feet could be justified. This scenario would have a significant impact on the applicable design standards. For example, the runway safety area beyond the runways would increase from 300 feet to 1,000 feet. Future updates to this master plan should monitor and assess the potential transition of the applicable critical design aircraft.

RUNWAY SAFETY AREA (RSA) CONSIDERATIONS

The runway safety area (RSA) is a designated area surrounding the runways. According to the FAA, the RSA is to 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 RSA because of their function (in aiding air navigation).

The dimension of the RSA surrounding the runway is a function of the critical aircraft. The current and future critical aircraft is in ARC B-II. The existing B-II RSA should be 150 feet wide (centered on the runway) and extend 300 feet beyond each end of the runway.

FAA Order 5300.1F, *Modification of Agency Airport Design, Construction, and Equipment Standards*, indicates in Paragraph 6.d the following:

". . . Runway safety areas at both certificated and non-certificated airports that do not meet dimensional standards are subject to FAA Order 5200.8, *Runway Safety Area Program.* Modification of Standards is not issued for nonstandard runway safety areas."

The FAA placed a greater emphasis on meeting RSA standards with the publication of FAA Order 5200.8, *Runway Safety Area Program,* in 1999, following congressional direction. The Order states in Paragraph 5, "The object of the Runway Safety Area Program is that all RSAs at federally obligated airports and all RSAs at airports certified under 14 Code of Federal Regulations (CFR) Part 139 shall conform to the standards contained in AC 150/5300-13, *Airport Design*, to the extent practicable."

The Order goes on to state in Paragraph 8.b:

"The Regional Airports Division Manager shall review all data collected for each RSA in Paragraph 7, along with the supporting documentation prepared by the region for that RSA, and make one of the following determinations:

(1) The existing RSA meets the current standards contained in AC 150/5300-13, *Airport Design*.

(2) The existing RSA does not meet the current standards, but it is practicable to improve the RSA so that it will meet current standards.

(3) The existing RSA can be improved to enhance safety, but the RSA will still not meet current standards.

(4) The existing RSA does not meet current RSA standards, and it is not practicable to improve the RSA."

The findings of this master plan will aid the Regional Airports Division Manager for the FAA's Northwest Mountain Region in making a determination on the existing condition of RSAs at Columbia Gorge Regional Airport.

Appendix 2 of FAA Order 5200.8 provides direction for an RSA determination. This includes the alternatives that must be evaluated. Paragraph 3 of Appendix 2 states:

"The first alternative that must be considered in every case is constructing the traditional graded runway safety area surrounding the runway. Where it is not practicable to obtain the entire safety area in this manner, as much as possible should be obtained. Then the following alternatives shall be addressed in the supporting documentation:

- Construct the traditional graded runway safety area surrounding the runway.
- Relocation, shifting, or realignment of the runway.
- Reduction in runway length where the existing runway length exceeds that which is required for the existing or projected design aircraft.
- A combination of runway relocation, shifting, grading, realignment, or reduction.
- Implementation of declared distances.

- Installation of Engineered Materials Arresting Systems (EMAS).”

As discussed previously in Chapter Three – Facility Requirements and visually presented on Exhibit 3B, the RSA behind Runways 25, 12, and 7 do not meet the FAA standard. The alternatives evaluation will provide the most viable solutions to rectify the non-standard RSA conditions.

DECLARED DISTANCES

Declared distances are the effective runway distances that the airport operator declares available for take-off run, take-off distance, accelerate stop distance, and landing distance requirements. Declared distances are defined as the following:

Take-off run available (TORA) - The length of the runway declared available and suitable to accelerate from brake release to lift-off, plus safety factors.

Take-off distance available (TODA) - The TODA plus the length of any remaining runway or clearway beyond the far end of the TORA available to accelerate from brake release past lift-off, to start of take-off climb, plus safety factors.

Accelerate-stop distance available (ASDA) - The length of the runway plus stopway declared available and suitable to accelerate from break release to take-off decision speed, and then decelerate to a stop, plus safety factors.

Landing distance available (LDA) - The distance from the threshold to complete the approach, touchdown, and decelerate to a stop, plus safety factors.

The TORA and TODA are generally equal to the actual runway length as a clearway is not provided at the airport. The ASDA and the LDA are the primary considerations in determining the runway length available for use by aircraft, as these calculations must consider providing the RSA to standard in operational calculations. The ASDA and LDA can be figured as the usable portions of the runway length less the distance required to maintain adequate RSA beyond the ends of the runway or prior to the landing threshold. By regulation, 300 feet of RSA is required beyond both runway ends for ASDA and LDA calculations.

The purpose of declared distances is to provide an equivalent runway safety area (RSA), object free area (OFA), and runway protection zone (RPZ) in accordance with design standards at existing constrained airports where it is otherwise impracticable to meet standards. Declared distances are also employed where there are obstructions in the runway approaches and/or departure surfaces that the airport is unable to remove. When a landing threshold is displaced, it is the airport’s responsibility to publish the declared distances in the Airport/Facility Directory.

Table 4B presents two sets of declared distances for Columbia Gorge Regional Airport. The first set relates to the existing runway markings. The second set is what the declared distances should be based on providing 300 feet of RSA beyond each runway end. It should be noted that neither of these are currently published. **Exhibit 4D** shows a visual depiction of the declared distances.

When considering the actual declared distances, the ASDA for Runway 12 is the entire runway length of 5,097 feet because pilots can begin their takeoff run at the end of the runway and the full 300 feet of RSA is available beyond the Runway 30 threshold. The LDA for Runway 12 is the runway length less the landing threshold displacement. The ASDA and LDA for Runway 30 is 4,897 feet. This is because only 100 feet of RSA is available beyond the Runway 12 end.

TABLE 4B
Declared Distances (in feet)
Columbia Gorge Regional Airport

Runways	Declared Distances as Marked		Actual Declared Distances	
	ASDA	LDA	ASDA	LDA
Runway 12	5,097	4,897	5,097	4,897
Runway 30	5,097	5,097	4,897	4,897
Runway 7	4,647	4,207	4,451	4,011
Runway 25	4,647	4,451	4,347	4,151

ASDA: Accelerate-stop distance available
LDA: Landing distance available
Source: FAA AC 150/5300-13, Airport Design, Change 15

When taking off on Runway 7, the ASDA is 4,451 feet, which is calculated by taking the runway length and subtracting the area beyond the Runway 25 threshold needed for RSA. The LDA to Runway 7 is 4,011 feet, as the landing threshold is displaced 440 feet.

When utilizing Runway 25 for takeoff, 4,347 feet is available since 300 feet of RSA is needed beyond the Runway 7 end. Since the end of Runway 7 is the beginning of the RSA penetration (fence line), there is effectively no RSA available. When landing to Runway 25, the LDA available is further reduced to 4,151 feet due to the displaced landing threshold.

Prior FAA approval for implementation of declared distances is always required and will not be approved in conjunction with a runway extension. Basically, airports cannot build into a situation where declared distances are necessary. A primary goal of the alternatives analysis is to position the runway system so that declared distances are not necessary. The FAA supports removing the need for declared distances as long as there is not a negative impact to operations.

AIRSIDE DEVELOPMENT ALTERNATIVES

The alternatives to be presented next consider meeting airport design stan-

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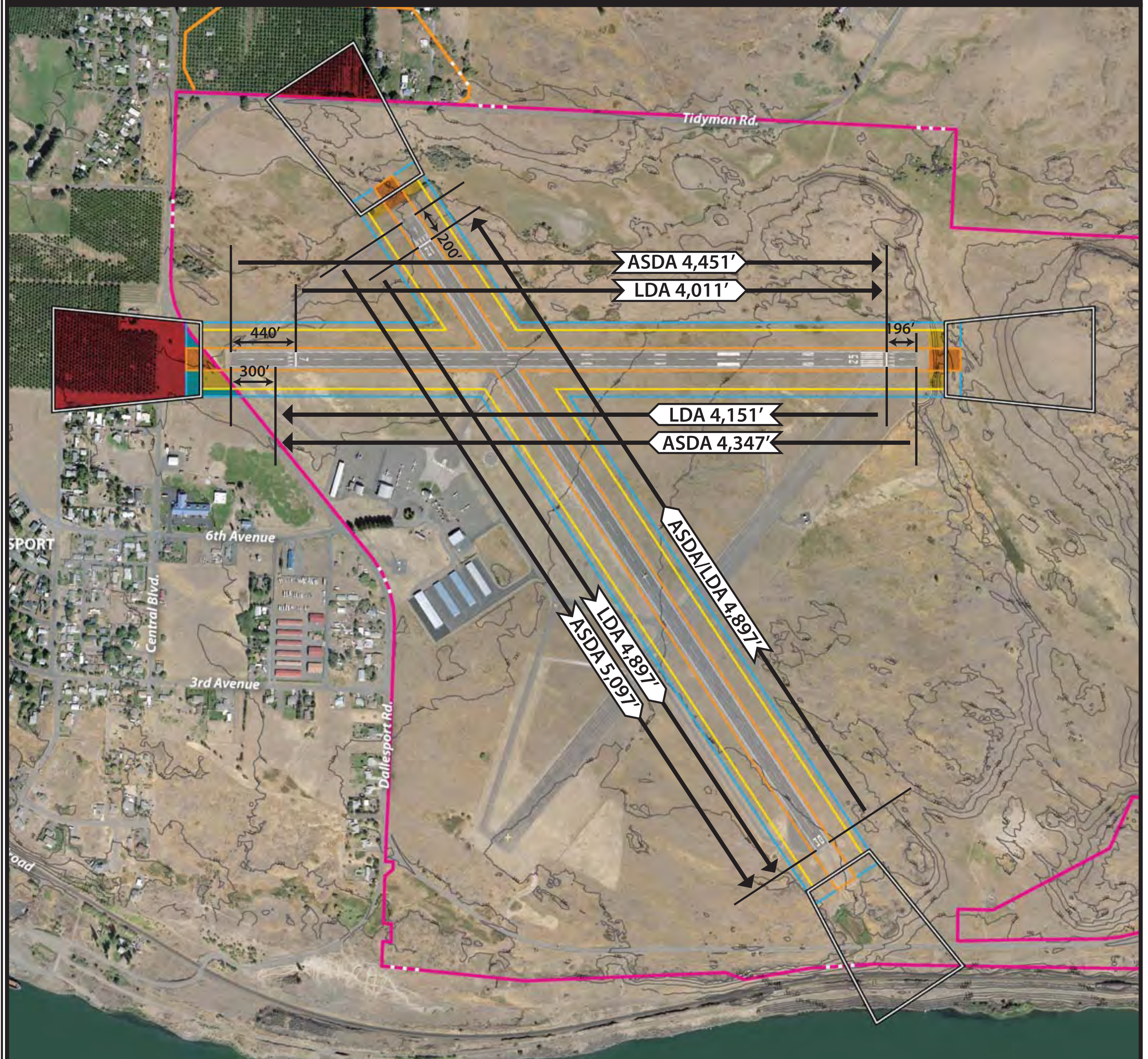
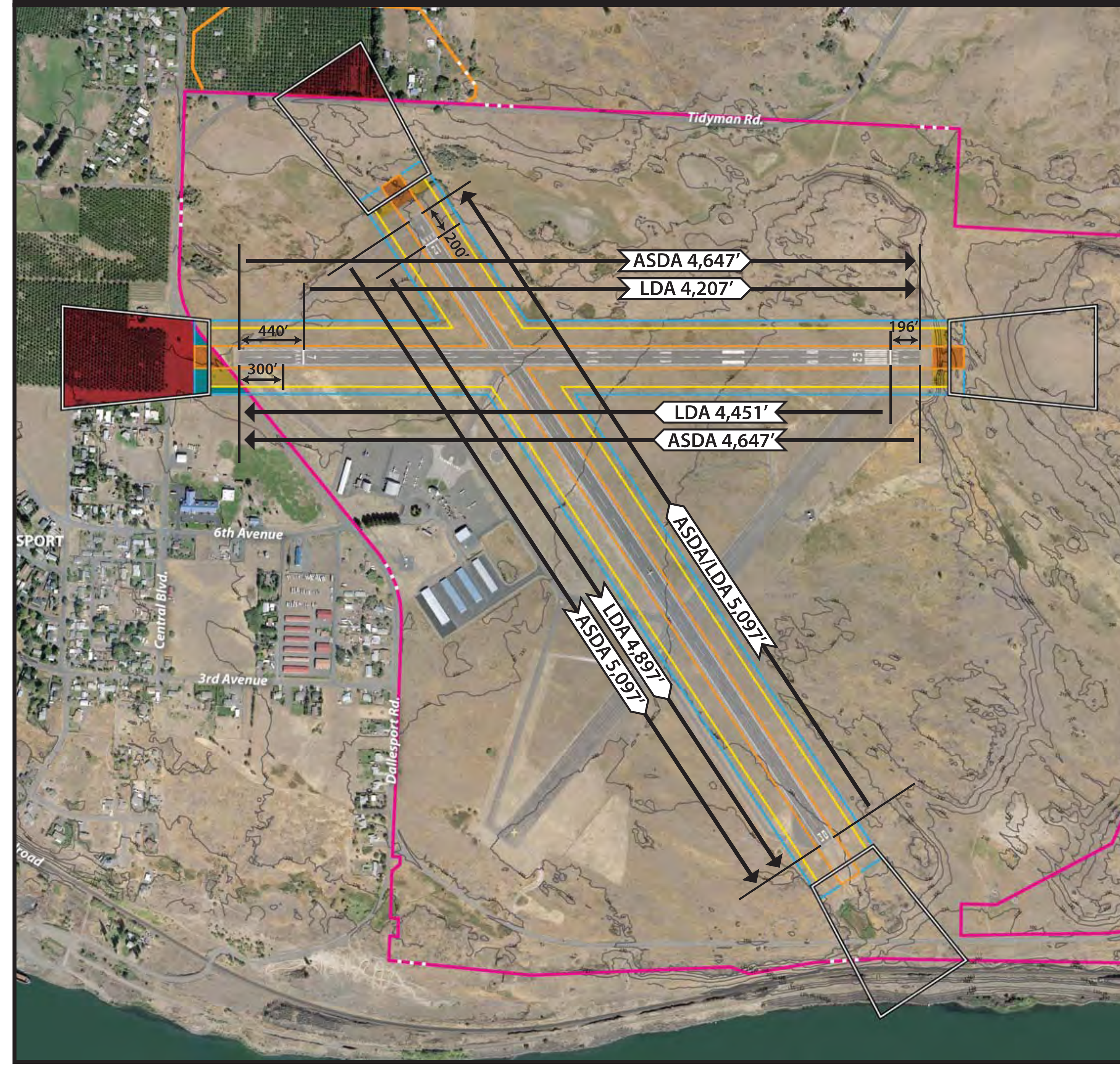
ACTUAL DECLARED DISTANCES



DECLARED DISTANCES AS MARKED



LEGEND

- Airport Property Line
- Avigation Easement
- Runway Safety Area (RSA)
- Non-Standard RSA
- Object Free Area (OFA)
- Non-Standard OFA
- Object Free Zone (OFZ)
- Non-Standard OFZ
- Runway Protection Zone (RPZ)
- Non-Standard RPZ

DECLARED DISTANCES (in feet)

Runways	Declared Distances as Marked		Actual Declared Distances	
	ASDA	LDA	ASDA	LDA
Runway 12	5,097	4,897	5,097	4,897
Runway 30	5,097	5,097	4,897	4,897
Runway 7	4,647	4,207	4,451	4,011
Runway 25	4,647	4,451	4,347	4,151

ASDA: Accelerate-stop distance available
LDA: Landing distance available

Source: FAA AC 150/5300-13, Airport Design, Change 15

NORTH

0 1000 2000
SCALE IN FEET

Date of photo: 9/18/09

Columbia Gorge Regional Airport

Exhibit 4D
DECLARED DISTANCES

dards, particularly as they relate to the RSA, OFA, RPZ, and obstacle free zone (OFZ). The current operational activity level indicates that Columbia Gorge Regional Airport is an ARC B-II airport. The forecast growth over the next 20 years indicates that the airport will remain in this design category.

The possible alternatives are limitless, but the airside alternatives presented are believed to be those that best consider all factors specific to the airport, while being financially reasonable and within FAA standards. The recommended development plan, which will be presented in Chapter Five, will likely be a combination of critical elements from several of these alternatives.

Each of the alternatives identifies the airport property along the flight line as areas that should be exclusively reserved for aviation-related activity. The landside alternatives discussion will provide more detail related to land uses on airport property. The landside alternatives will show potential building and hangar layouts needed to meet long term aviation demand at the airport.

AIRSIDE ALTERNATIVE 1

The first alternative is presented on **Exhibit 4E**. This alternative considers the impact of extending Runway 12-30 to the north an additional 403 feet in order to bring the total runway length to 5,500 feet. This is the preferred runway to extend based on the predominant winds, but it does not have a straight-in instrument approach.

Threshold Siting Surface Impact

There are several imaginary surfaces that extend from the runway end that must be considered with analyzing potential impact of a runway extension. Of particular concern is the threshold siting surface (TSS). The TSS for Runway 12 begins 200 feet from the runway end, is 400 feet wide on its inner portion and extends outward and upward at a 20:1 slope. The surface extends to a distance of 10,000 feet. This surface must be clear of obstructions.

Tidyman Road presents an object penetration to the TSS when the runway is extended 403 feet to the north. In order for the TSS to be clear, a portion of the road would need to be relocated, of lowered, as shown on **Exhibit 4E**.

Exhibit 4F shows the technical analysis associated with the TSS to the extended runway end. When considering clearances over Tidyman Road, an additional 15 feet is added to the road elevation to account for vehicular traffic.

The TSS leading to Runway 7 is currently and would remain penetrated by Dallesport Road by approximately 10 feet. FAA AC 150/5300-13, *Airport Design*, provides mitigating alternatives for existing TSS penetrations. The alternatives are:

- The object is removed or lowered to preclude penetration of applicable threshold siting surface;

- The threshold is displaced to preclude penetration of the applicable threshold siting surfaces, with a resulting shorter landing distance; or

- The glidepath angle (GPA) and/or threshold crossing height (TCH) is/are modified, or a combination of threshold displacement and GPA/TCH increase is accomplished.

- Visibility minimums are raised.

- Night operations are prohibited unless the obstruction is lighted or an approved visual glidepath indicator is used.

Since the TSS penetration of Dallesport Road is an existing condition and the location of the landing threshold is not planned to change in this alternative, there would be no additional impact to the TSS leading to Runway 7. For Runway 7, this alternative fixes the non-standard RSA and OFA. The TSS remains penetrated by Dallesport Road. Because of the TSS penetration, a straight-in instrument approach to Runway 7 would not be possible under this alternative.

Runway Safety Area Impact

The existing RSA behind Runway 12 does not meet standard. Currently, it extends approximately 100 feet behind the runway end before the grade becomes non-standard and it is penetrated by a fence line. When planning this extension, the RSA would be improved to meet standard.

On the Runway 7 end the RSA is penetrated by Dallesport Road. In this alternative, the RSA is brought up to standard by relocating the runway end to the existing displaced landing threshold. This would require the removal of approximately 440 feet of runway length. A new threshold access taxiway would then need to be constructed. Relocating the runway end in this manner would allow both the RSA and OFA to remain on airport property.

The RSA for Runway 25 does not meet standard due to the significant terrain change approximately 100 feet from the runway end. This airfield alternative assumes that the standard graded RSA would be supplied. The Runway 30 RSA meets standard.

Taxiway Layout

As discussed in Chapter Three - Facility Requirements, improvements to the taxiway system can be made. There are several options available depending on the overall airfield alternatives. A new threshold taxiway is planned to connect to Runway 12. Parallel Taxiway A is planned to be extended from the intersection with Taxiway A3 to the Runway 12 threshold taxiway. Development of this taxiway would eliminate several non-standard elements on the airfield.

Taxiway A1 is an angled taxiway extending from the Runway 7 end to the

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Exhibit 4E
AIRFIELD ALTERNATIVE 1

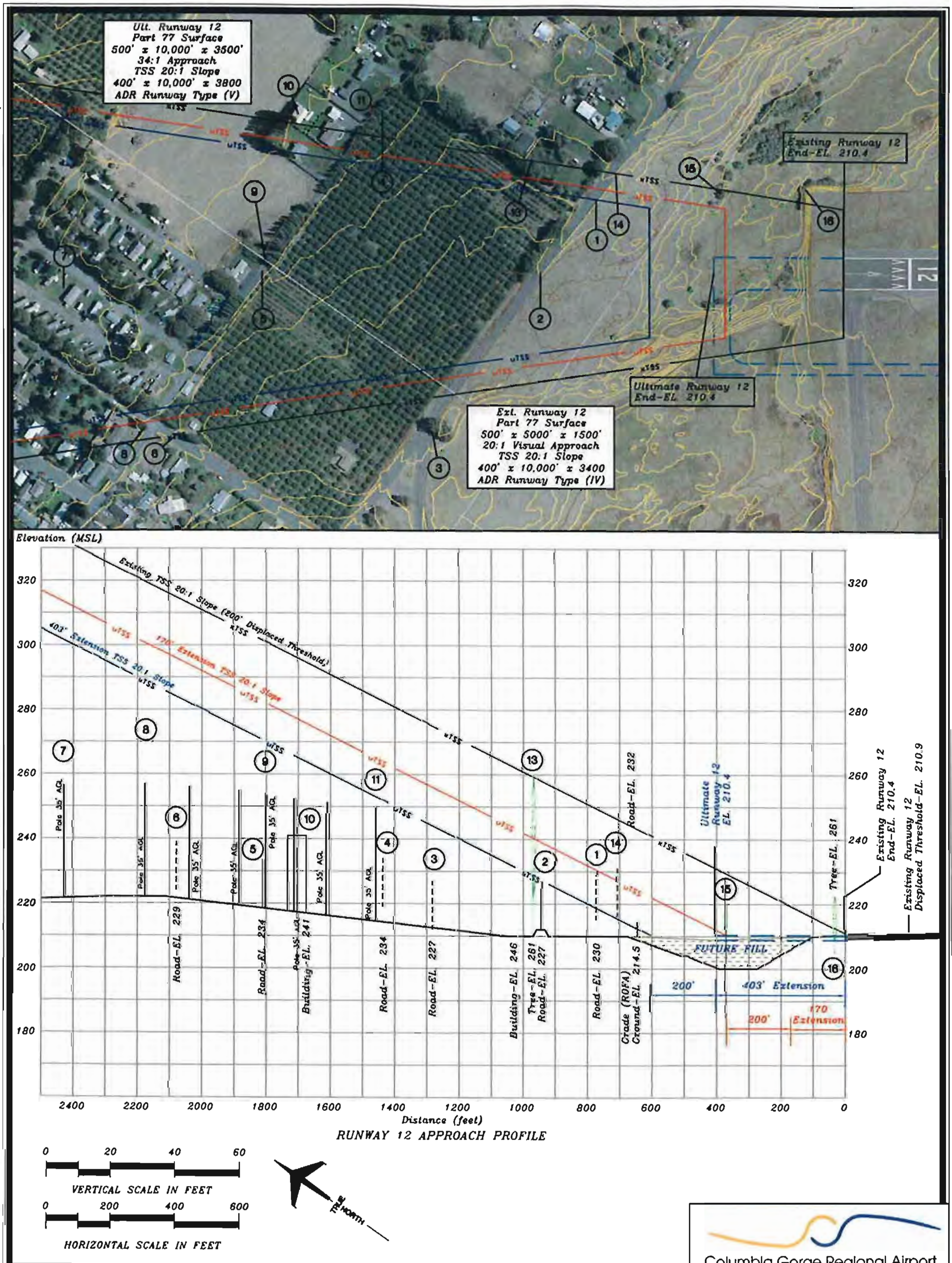

Exhibit 4F
RUNWAY 12 EXTENSION IMPACTS

Runway 12 end. The angled nature of this taxiway can be eliminated with the construction of the parallel taxiway. Taxiway A2 currently meets at the intersection of the two runways. Design standards discourage this layout. The extension of parallel Taxiway A would allow for a portion of Taxiway A2 (at the runway intersection) to be removed. A new taxiway exit from Runway 12-30 would then connect to the remaining portion of Taxiway A2.

With the relocation of the Runway 7 end to the current landing threshold, approximately 440 feet of runway is unusable. The FAA encourages unusable pavements to be removed. To this end, this pavement is planned to be removed along with a portion of Taxiway B. This portion of Taxiway B is angled and should be re-designed to provide a right-angle entrance to Runway 7.

The threshold taxiways to both Runways 25 and 30 are also angled taxiways. New right-angled threshold taxiways with aircraft hold aprons are planned.

Property Acquisition

Planning includes the identification of property adjacent to the airport that is recommended for acquisition by the airport. Some property acquisition would be necessary to allow for the various airfield improvements (e.g., runway extension). Other property recommended for acquisition includes the RPZ. As discussed in Chapter Three – Facility Requirements, the RPZs should be under the control of the airport where possible. In lieu of fee simple ownership of the RPZs, avigation easements are acceptable. Nonetheless, this master plan recommends fee simple ownership of the RPZ, even if an easement already exists.

In the first alternative, the RPZ for Runway 7 extends to the west of Dallesport Road. This encompasses approximately 11.3 acres. The RPZ for Runway 12 extends beyond Tidyman Road. With the potential 403-foot extension of Runway 12 and the relocation of Tidyman Road, approximately 13.1 acres would need to be acquired. The RPZ for Runway 30 extends south across airport property and over the bluffs of the Columbia River. This area is undevelopable due to the bluffs, so a recommendation for acquisition is not made. The RPZ for Runway 25 remains on airport property.

It should be noted that the minimum property acquisition necessary for each alternative has been identified. Where splitting of a parcel would obviously negatively impact the remaining portion of the parcel, it is assumed that the entire parcel would be acquired.

Alternative Summary

This first alternative has some notable advantages and disadvantages. An advantage is that the primary runway can be extended to 5,500 feet. The taxiway layout can be improved to increase the level of safety and efficiency of the airfield. This alternative allows for Dallesport Road, west of Runway 7, to be maintained in its current location while the Runway 7 RSA is brought up to standard.

The primary disadvantage is that Runway 7-25 would be reduced in length from 4,647 feet to 4,207 feet. The airport would need to acquire property to the north of Tidyman Road and a portion of the road would need to be relocated in order to allow for approach clearances.

AIRSIDE ALTERNATIVE 2

The second airside alternative, presented on **Exhibit 4G**, considers extending Runway 7-25 to 5,500 feet. Runway 7-25 has the only straight-in (with offset localizer) instrument approach. Therefore, it makes sense to extend the runway with the most sophisticated instrument approach in order to better accommodate operators of aircraft that would typically utilize the approach and may need additional landing length.

In this alternative, consideration of the maximum extension to the east without negatively impacting the localizer and glideslope critical areas was given. A maximum extension of 531 feet is planned on the Runway 25 end with the remaining 322 feet being applied to the Runway 7 end. It should be noted that the instrument approach would need to be recalibrated and possibly relocated to accommodate the longer runway. This could mean the approach would need to be decommissioned for as much as 18 months.

To accommodate the additional runway length on the Runway 7 end, Dallesport Road would need to be relocated, as shown in the exhibit. The relocation of Dallesport Road would require some property acquisition, including at least seven homes on the south side of 7th Avenue and one home associated with the orchard to the west of Dallesport Road. The property to be acquired is approximately 30.6 acres.

The Runway 12 RPZ currently extends beyond Tidyman Road. While the airport owns an avigation easement over this property, it is still recommended that the 3.7 acres within the RPZ be acquired. Relocation of Tidyman Road is not necessary in this alternative.

The RSA for each runway end is planned to be prepared in a manner that meets FAA standard. In addition to the extension of both ends of Runway 7-25, 300 feet beyond the ends would be graded to standard. The RSA beyond Runway 12 would also be improved. The RSA beyond Runway 30 already meets standard.

Taxiway and Apron Layout

The taxiway layout presented shows a full-length parallel taxiway associated with each runway. The taxiways are situated 300 feet from the runways. This distance exceeds the separation requirement of 240 feet for a B-II airport with instrument approaches with greater than ¾-mile visibility minimums. Setting taxiways at this dis-

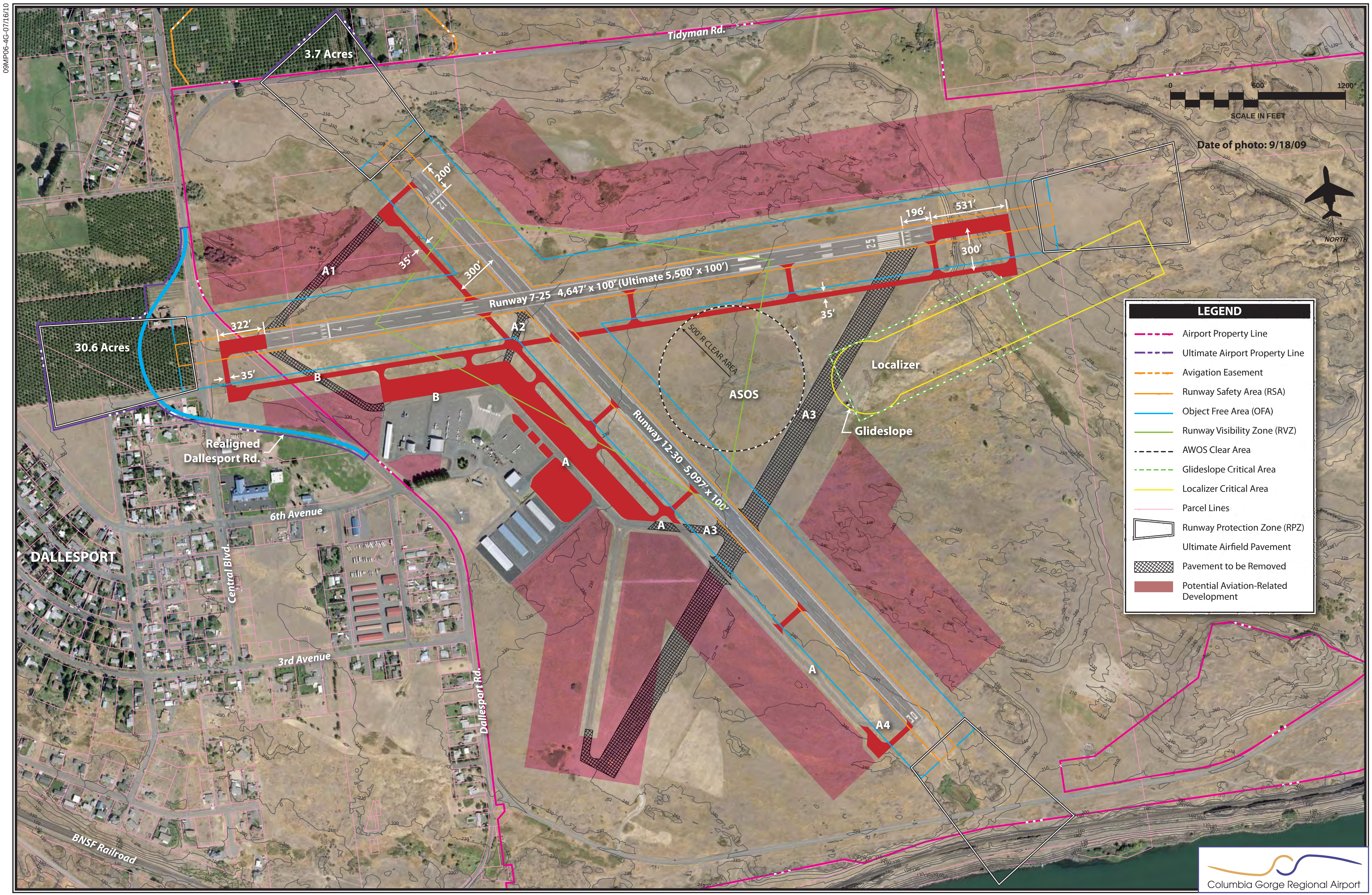

Exhibit 4G
AIRFIELD ALTERNATIVE 2

tance allows for future airport growth including either a transition to a critical aircraft in ARC C-II, or the introduction of an instrument approach with ¾-mile visibility or lower. While neither of these conditions is anticipated, it is appropriate to plan beyond the 20-year scope of the master plan for some elements.

The planning standard for taxiway width at a B-II airport is 35 feet. All future taxiways are planned to this standard. Portions of Taxiways A and B are currently 50 feet wide. It is reasonable to maintain these taxiways at this width.

The taxiway layout will allow the removal of the existing angled taxiways. Several new entrance/exit taxiways are planned at appropriate intervals along each runway. The taxiways providing access from the parallel taxiway to the terminal area apron are off-set from those connecting to the runway. This is an FAA recommended layout that reduced the potential for runway incursion by forcing pilots to make a turn prior to entering the runway. Hold aprons are also planned at each runway threshold.

Portions of Taxiways A and B are separated from the runway by 560 and 580 feet respectively. Planning for full-length parallel taxiways allows the airport to reclaim unused area in the terminal area to a depth of approximately 150 feet. This area would allow for an expansion of the terminal area apron.

Alternative Summary

Airfield Alternative 2 provides a vision for the airfield that meets many of the goals of this alternatives exercise. It is shown that Runway 7-25 can be extended to a length of 5,500 feet, which would allow the airport to meet the needs of most small and medium sized business jets. The longer runway will also extend the capability of large business jets that are typically weight restricted.

The RSAs for both runways are planned to be graded and extended to meet FAA design standards. This effort, along with obstruction removal where applicable, eliminates the need for displaced landing thresholds or declared distances.

A new taxiway layout is presented that includes full-length parallel taxiways for both runways. Under this design, all angled taxiways may be eliminated, thus meeting FAA goals. Aircraft holding aprons are also planned at the runway thresholds.

AIRSIDE ALTERNATIVE 3

Airside Alternative 3 is a variation on the first alternative and is presented on **Exhibit 4H**. This alternative considers a runway extension to Runway 12-30 that does not necessitate the relocation of Tidyman Road. To accomplish this, the runway is extended to the north 170 feet and the remaining 233 feet is added to the south. With the extension to Runway 12, the RPZ would expand slightly to encompass a total of 6.4 acres to the north of Tidyman Road. Currently this RPZ encompasses 3.7 acres.

Extension of Runway 30, 233 feet to the south, would have a terrain impact to the TSS. This area would need to be graded to meet TSS standards. **Exhibit 4J** shows the TSS clearances for this alternative.

New threshold taxiways are planned to both ends, thus eliminating the current angled taxiways. Taxiway A is planned to connect from the Runway 12 threshold to the intersection with Taxiway A2, completing the parallel taxiways. A new runway exit taxiway is also planned which will allow for the closure of that portion of Taxiway A2 that currently connects at the intersection of the two runways. The only remaining angled taxiway is A3. This taxiway is preserved in order to provide a cost effective alternative to maintaining access to the Runway 25 threshold.

Runway 7-25 currently has displaced landing thresholds on both ends. This effectively reduces operational runway length. As the only runway with a straight-in instrument approach it is valuable to maintain as much runway length as possible, but it should be noted that this approach is approved for category A and B aircraft and not larger C and D aircraft.

An analysis was undertaken to determine if the landing thresholds could be relocated back to the pavement ends. On the Runway 25 end, the RSA would need to be brought up to grade standards. A new right-angled threshold taxiway is then planned.

On the Runway 7 end, it is not possible to relocate the threshold to the pavement end without impacting Dallesport Road. In this alternative, consideration was given to shifting a portion of Dallesport Road and utilizing the Central Boulevard alignment to carry vehicular traffic. This shift would be the least impactful to the airports neighbors as no homes or business would need to be acquired for the road relocation. A total of 22.6 acres to the west of Dallesport Road would need to be acquired. Most of this is encompassed by the Runway 7 RPZ.

The analysis of the threshold siting surface indicates that Dallesport Road would still be a penetration if the landing threshold were relocated to the pavement end. Therefore, to clear the TSS the landing threshold is shifted approximately 38 feet to the east. In this alternative, the excess pavement is removed, thus reducing the runway length from 4,609 feet to 4,467 feet. This alternative would eliminate the need for a displaced landing threshold and declared distances.

Two other options are available when considering the Runway 7 end that would avoid the need to shorten the runway. The first would be to relocate a portion of Dallesport Road at least 38 feet to the west. Another option would be to implement declared distances and relocate the Runway 7 landing threshold 38 feet to the east.

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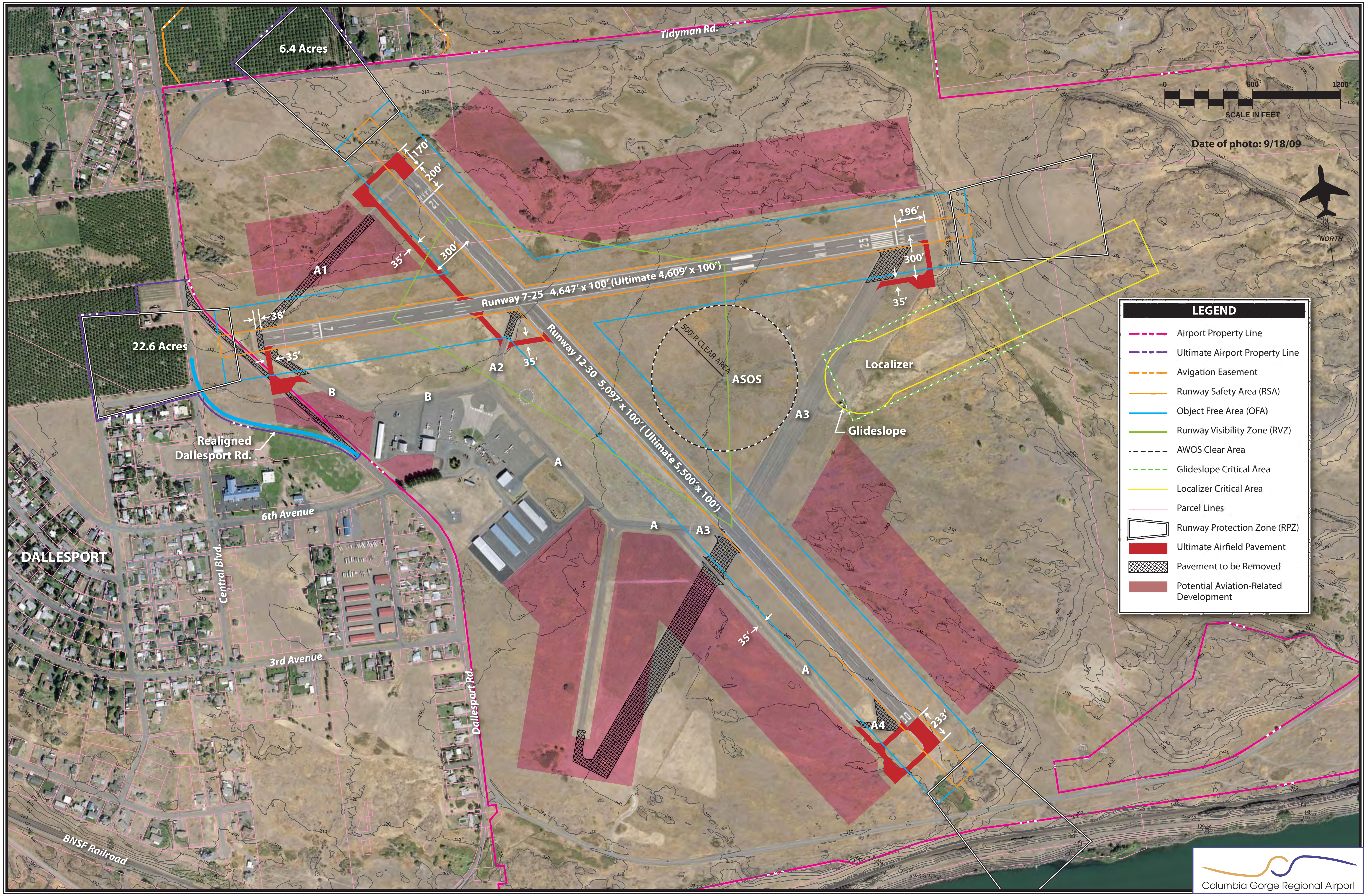

Exhibit 4H
AIRFIELD ALTERNATIVE 3

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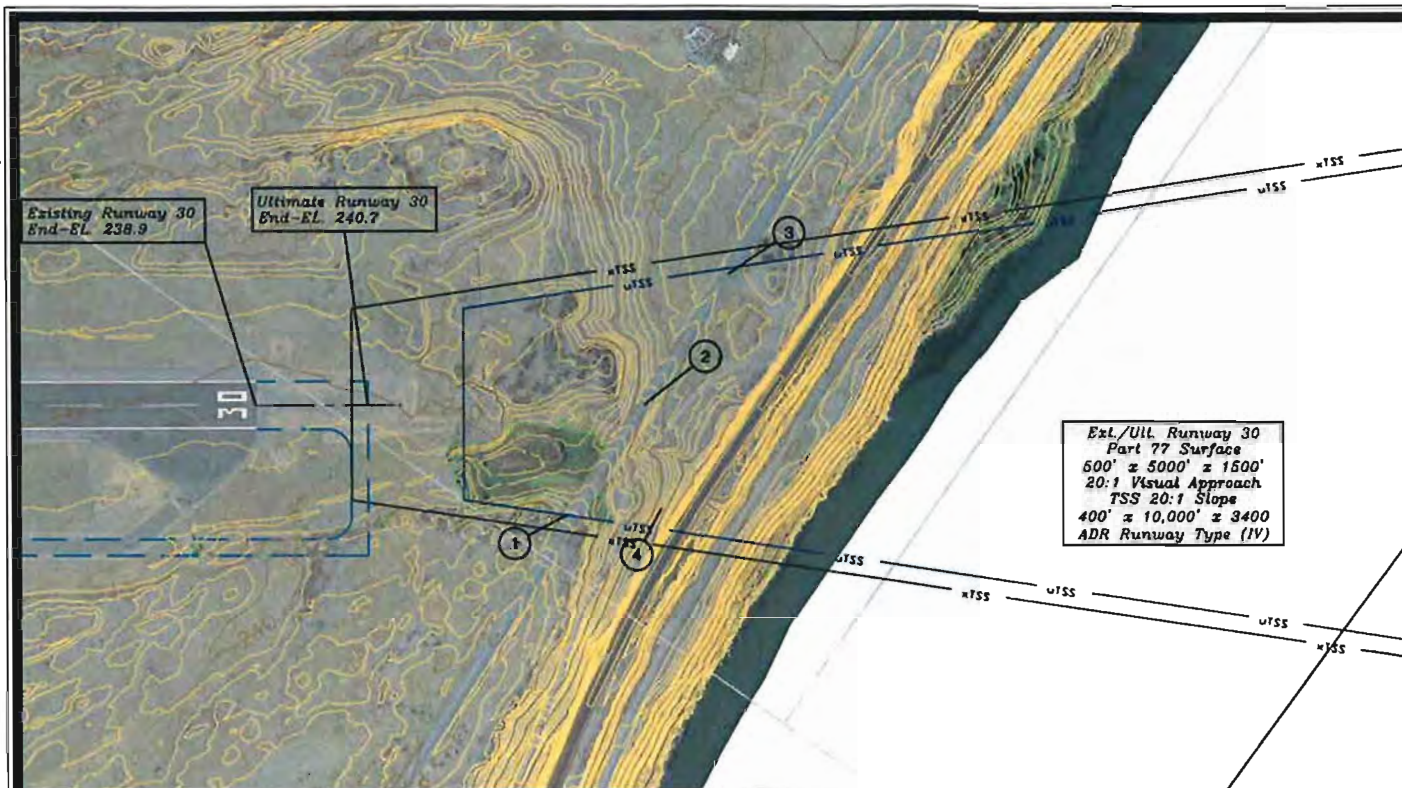

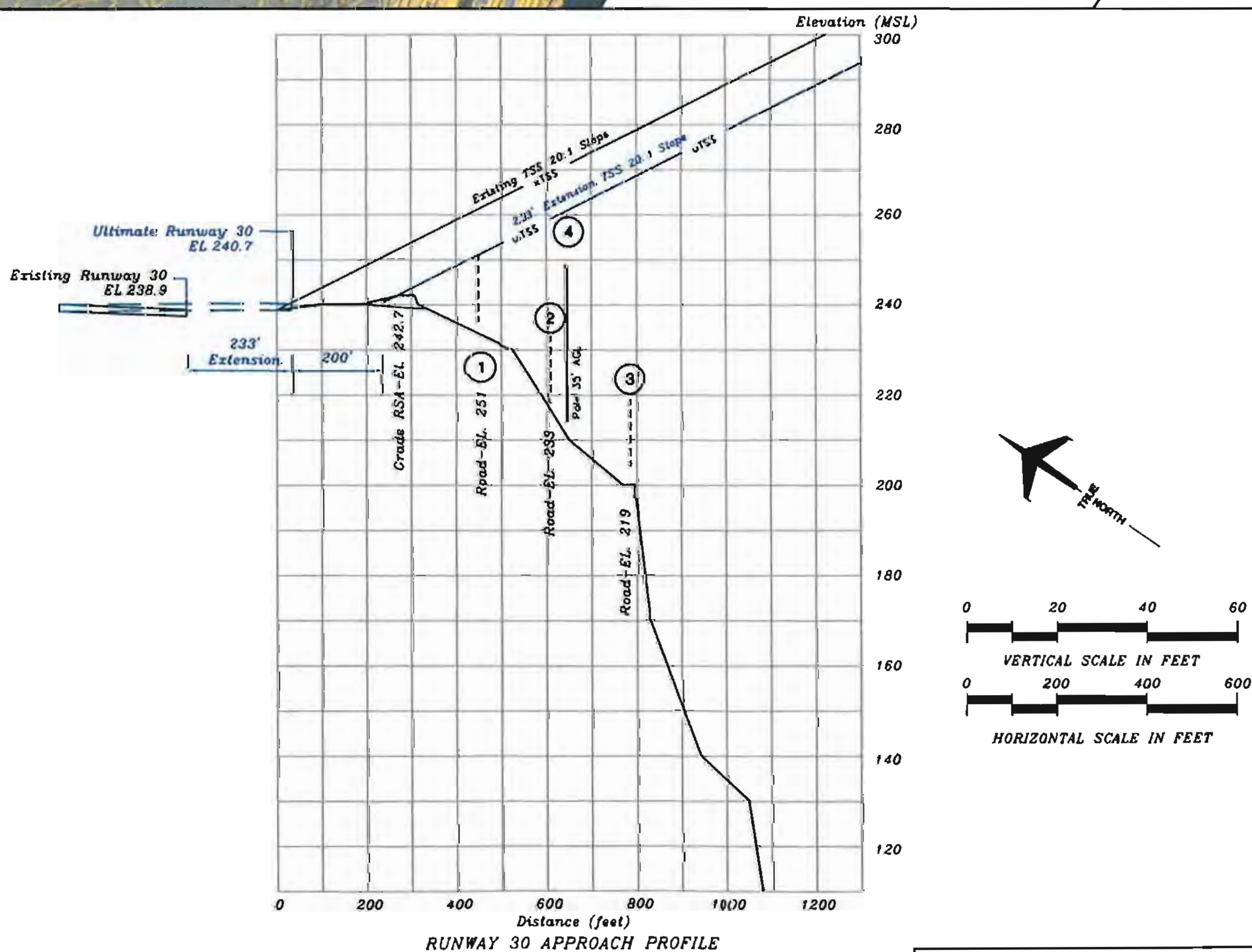

Columbia Gorge Regional Airport

Exhibit 4J
RUNWAY 30 EXTENSION IMPACTS

This option is not ideal as a central goal of the alternatives analysis is to eliminate the need for displaced landing thresholds and declared distances.

Alternative Summary

Airfield Alternative 3 is a variation on the first alternative. In this alternative, the extension of Runway 12-30 to 5,500 feet in length is accomplished by extending both ends. The benefit of this is that Tidyman Road would remain clear of the TSS and would not have to be relocated.

In an effort to eliminate the need for displaced landing thresholds or declared distances, Dallesport Road is realigned and the runway is shortened by 38 feet. This option would have the least impact to the neighboring community.

All angled taxiways except A3 are removed. Taxiway A3 is maintained in order to provide access to the Runway 25 threshold.

AIRSIDE ALTERNATIVE 4

Airside Alternative 4, presented on **Exhibit 4K**, considers the impact of extending the Runway 7 end to a total runway length of 5,500 feet. Extending Runway 7 would preserve the current instrument approach to Runway 25, an approach that is complex in design and was difficult to obtain. Extending to the west would also take advantage of the relatively flat terrain.

The extension of Runway 7 by 853 feet would necessitate a significant rerouting of Dallesport Road, as shown on the exhibit. Approximately 44.8 acres, which encompasses 13 homes, the orchard business, and the fire department building, would need to be acquired. It should be noted that the FAA prefers that roads not be in the RPZs. Existing roads within the RPZ (but not the OFA or RSA) are generally acceptable to the FAA, but when extending a runway, the FAA would likely look to relocate the road entirely outside the RPZ.

The taxiway layout is similar to that of Alternative 2, in that two full length parallel taxiways are provided. All angled taxiways are removed, thus removing line-of-sight issues. Each of the RSAs are planned to be graded to meet standard. The main apron is expanded to take advantage of the additional space created by the parallel taxiways.

Alternative Summary

This alternative provides for the extension of Runway 7-25 to the west in order to take advantage of the relative flat terrain to the west. The challenge is that the community of Dallesport is impacted the most in this alternative. This impact should be weighed against the operational benefit.

CUT AND FILL COMPARISON

As part of this master planning effort, new aerial mapping of the airport was undertaken. With this data, estimates of the volume of cut and fill related to the ends of the runway for each alternative have been made. As might be expected, Alternative 2 that includes extension of Runway 25 to the east would require the most amount of earthwork. Approximately 390,000 cubic yards of fill would be required for this alternative, while approximately 100,000 cubic yards would be necessary for each of the other three alternatives. The cost difference is estimated to be approximately $1.3 million. **Table 4C** presents the cut and fill volume comparison.

TABLE 4C
Cut and Fill Estimates
Columbia Gorge Regional Airport Alternatives

	Alt. 1	**Cost Estimate**	**Alt. 2**	**Cost Estimate**	**Alt. 3**	**Cost Estimate**	**Alt. 4**	**Cost Estimate**
Runway 12								
Cut	2,218	$13,306			0	$0	0	$0
Fill	101,886	$611,314			72,187	$433,122	36,305	$217,832
Subtotal	104,104	$624,620			72,187	$433,122	36,305	$217,832
Runway 30								
Cut					14,631	$87,787		
Fill					8,440	$50,639		
Subtotal					23,071	$138,426		
Runway 7								
Cut			36,431	$218,583			89,997	$539,979
Fill			18,916	$113,495			20,759	$124,556
Subtotal			55,347	$332,078			110,756	$664,535
Runway 25								
Cut	14,661	$87,968	6,136	$36,817	13,860	$83,162	101,782	$610,691
Fill	107,522	$645,133	381,409	$2,288,452	108,054	$648,322	704	$4,224
Subtotal	122,183	$733,101	387,545	$2,325,269	121,914	$731,484	102,486	$614,915
TOTAL	**226,287**	**$1,357,721**	**442,892**	**$2,657,347**	**217,172**	**$1,303,032**	**249,547**	**$1,497,282**

Note: Cut and fill totals are in cubic yards. Cost estimates are based on $6 per cubic yard.
Source: Coffman Associates analysis utilizing GIS.

AIRSIDE SUMMARY

The primary goal of the alternatives analysis has been to meet FAA design standards and analyze the capability of the airport to support an ultimate runway length of 5,500 feet. Each of the alternatives accomplishes these goals. Therefore, it is prudent to consider the potential impacts that each alternative will have. **Table 4D** presents a summary matrix of the physical and environmental impacts that the airside alternatives may have.

Any extension of Runway 7-25 to the west will have the greatest impact. Alternatives 2 and 4 both require the relocation of Tidyman Road, impacting homes in Dallesport. The relocation of Dallesport Road, as shown on these two alternatives, would likely require further analysis.

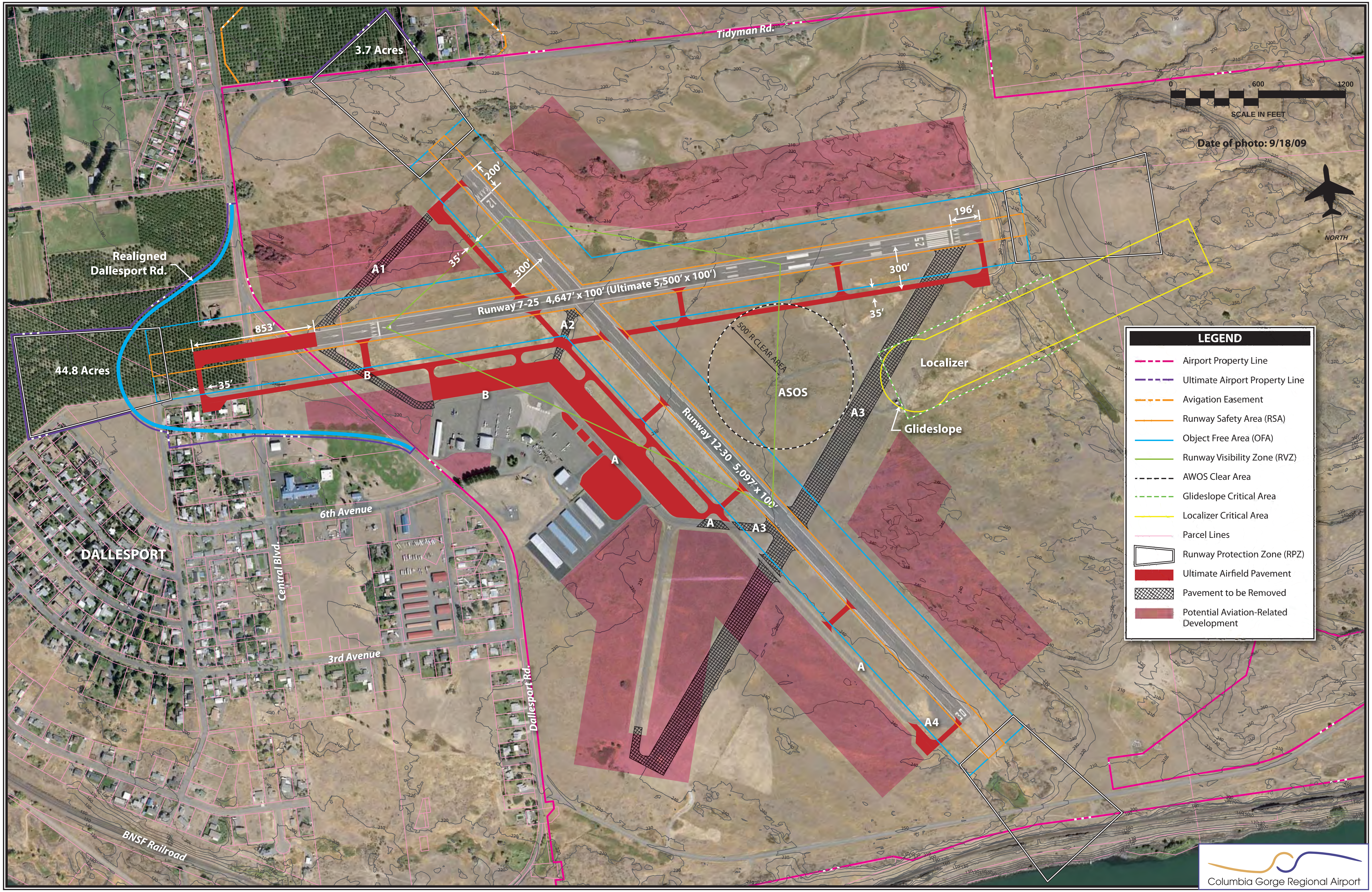

Exhibit 4K
AIRFIELD ALTERNATIVE 4

TABLE 4D
Summary Matrix of Airside Alternatives
Columbia Gorge Regional Airport

	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4
RUNWAY 12				
Extension	Extend 403'	NA	Extend 170'	NA
Physical Impacts	Relocate Tidyman Road; Acquire 2 homes and orchard.	NA	None	NA
Environmental Impacts	Potential Wetland impact.	NA	Potential Wetland impact.	NA
RUNWAY 30				
Extension	NA	NA	233'	NA
Physical Impacts	NA	NA	None	NA
Environmental Impacts	NA	NA	NA	NA
RUNWAY 7				
Extension	Shorten by 440'	Extend 322'	Shorten Runway by 38'	Extend 853'
Physical Impacts	Negatively impact operations, potentially making Runway 25 less useful.	Relocate Dallesport Road; Acquire 4 homes and an orchard.	Modestly impact operations; Relocate Dallesport Road to Central Blvd. alignment.	Relocate Dallesport Road; Acquire 10 homes and fire station.
Environmental Impacts	None	Potential Dallesport overflights increase; Acquire 4 homes. Road closer to school.	Limited impacts; Road closer to school.	Significant impact to Dallesport; Increase overflights; Road closer to school.
RUNWAY 25				
Extension	NA	Extend 531'	NA	NA
Physical Impacts	NA	Recalibrate LDA/GS approach; Extensive fill.	NA	NA
Environmental Impacts	None	None	None	None
EARTHWORK				
Cut and Fill Volume (cubic yards)	226,287	442,891	217,172	249,547

Alternative 3 presented an option to extend primary Runway 12-30 with limited impact to the surrounding neighborhood. The only impact outside airport property is that the Runway 12 RPZ extends to encompass approximately 2.5 additional acres north of Tidyman Road. This area is currently within an avigation easement owned by the airport. It appears that this option would not have significant environmental impacts.

Extension of Runway 25 to the east presents significant challenges. The LDA/GS instrument approach is very valuable to the airport. Any extension of Runway 25 may impact this approach. The approach would need to be recalibrated and redesigned. This could result in the loss of the approach for up to 18 months. The worst case scenario would be the loss of the approach. Negatively impacting this instrument approach should be avoided.

Extension of the Runway 25 end requires significant earthwork. There is a significant drop in elevation from the runway end that requires more than 440,000 cubic yards of cut and fill. This is more than twice as much as any of the other alternatives.

LANDSIDE PLANNING ISSUES

Generally, landside issues relate to those airport facilities necessary, or desired, for the safe and efficient parking and storage of aircraft, movement of passengers and pilots to and from aircraft, airport land use, and overall revenue support functions. In addition, elements such as fueling capability, availability of services, and emergency response are also considered in the landside functions.

Landside planning issues, summarized on **Exhibit 4A**, will focus on facility locating strategies following a philosophy of separating activity levels. The number of structures and the storage capacity available is limited. Therefore, it is important to plan for an appropriate mix of smaller T-hangars, box hangars, and larger conventional hangars.

The orderly development of the airport terminal area (those areas parallel to the runway and along the flight line) can be the most critical, and probably the most difficult, development to control on the airport. A development approach of "taking the path of least resistance" can have a significant effect on the long term viability of an airport. Allowing development without regard to a functional plan can result in a haphazard array of buildings and small ramp areas, which will eventually preclude the most efficient use of valuable space along the flight line.

Activity in the terminal area should be divided into three categories at an airport. The high-activity area should be planned and developed as the area providing aviation services on the airport. An example of a high-activity area is the aircraft parking apron, which provides outside storage and circulation of aircraft. In addition, large conventional hangars housing fixed base operators (FBOs), other airport businesses, or used for aircraft storage would be considered high-activity uses. A conventional hangar structure in the high-activity area should be a minimum of 6,400 square feet (80 feet by 80 feet). If space is available, it is more common to plan these hangars for up to 200 feet by 200 feet. The best location for high-activity areas is along the flight line near midfield, for ease of access to all areas of the airfield.

The medium-activity category defines the next level of airport use and primarily includes corporate aircraft operators that may desire their own executive or conventional hangar storage on the airport. A hangar in the medium-activity use area should be at least 50 feet by 50 feet, or a minimum of 2,500 square feet. The best location for medium-activity use is off the immediate flight line, but still with ready access to the runway/taxiway system. Typically, these areas will be adjacent to the high-activity areas. Parking and utilities such as water and sewer should also be provided in this area.

The low-activity use category defines the area for storage of smaller single and twin-engine aircraft. Low-activity users are personal or small business aircraft owners who prefer individual space in T-hangars or small executive hangars. Low-activity areas should be located in less-conspicuous areas or to the ends of the flight line. This use category will require electricity, but may not require water or sewer utilities.

In addition to the functional compatibility of the terminal area, the proposed development concept should provide a first-class appearance for Columbia Gorge Regional Airport. Consideration to aesthetics should be given high priority in all public areas, as the airport can many times serve as the first impression a visitor may have of the community.

The existing terminal area at Columbia Gorge Regional Airport has, for the most part, followed the separation of activity levels philosophy. The terminal building faces a central ramp area with hangar areas located to the sides. Larger, high-activity hangars are immediately adjacent the main apron and lower-activity box and T-hangars are set farther to the sides.

Ideally, terminal area facilities at general aviation airports should follow a linear configuration parallel to the primary runway. The linear configuration allows for maximizing available space, while providing ease of access to terminal facilities from the airfield. Each landside alternative will address development issues, such as the separation of activity levels and efficiency of layout. Each of the landside alternatives will address the forecast needs from the previous chapter of this plan.

AIRPORT LAND USE

The Columbia Gorge Regional Airport currently encompasses approximately 945 acres. As the airport has accepted grants for capital improvements from the FAA, the airport sponsor has agreed to certain "grant assurances." Grant assurances related to land use assure that airport property will be reserved for aeronautical purposes. If the airport sponsors wish to sell (release) airport land or lease airport land for a non-aeronautical purpose (land-use change), they must petition the FAA for approval. The Airport Layout Plan and the Airport Property Map must then be updated to reflect the sale or land-use change of the identified property.

Land Use Change

A land-use change permits land to be leased for non-aeronautical purposes. A land-use change does not authorize the sale of airport land. Leasing airport land to produce revenue from non-aeronautical uses allows the land to earn revenue for the airport as well as serve the interests of civil aviation by making the airport as selfsustaining as possible. Airport sponsors may petition for a land use change for the following purposes:

- So that land that is not needed for aeronautical purposes can be leased to earn revenue from non-aviation uses. This is land that is clearly surplus to the airport's aviation needs.

- So that land that cannot be used for aeronautical purposes can be leased to earn revenue from non-aviation uses. This is land that cannot be used by aircraft or where there are barriers or topography that prevents an aviation use.

- So that land that is not presently needed for aeronautical purposes can be rented on a temporary basis to earn revenue from non-aviation uses.

A land-use change shall not be approved by the FAA if the land has a present or future airport or aviation purpose, meaning the land has a clear aeronautical use. If land is needed for aeronautical purposes, a land-use change is not justified. Ordinarily, land on or in proximity to the flight line and airport operations area is needed for aeronautical purposes and should not be used for non-aviation purposes.

The proceeds derived from the land-use change must be used exclusively for the benefit of the airport. The proceeds derived from the land-use change may not be used for a non-airport purpose. The proceeds cannot be diverted to the airport sponsor's general fund or for general economic development unrelated to the airport.

At a minimum, Columbia Gorge Regional Airport should reserve the flight line adjacent to all runways for future aeronautical purposes. The alternatives have generally identified those areas that should be reserved for aviation uses.

Release of Airport Property

A release of airport property would entail the sale of land that is not needed for aeronautical purposes currently or into the future. The following documentation is required to be submitted to the FAA for consideration of a land release:

1. What is requested?
2. What agreement(s) with the United States are involved?
3. Why the release, modification, reformation or amendment is requested?
4. What facts and circumstances justify the request?
5. What requirements of state or local law or ordinance should be provided for in the language of an FAA issued document if the request is consented to or granted?
6. What property or facilities are involved?
7. How the property was acquired or obtained by the airport owner.
8. What is the present condition and what present use is made of any property or facilities involved?
9. What use or disposition will be made of the property or facilities?
10. What is the appraised fair market value of the property or facilities?

Appraisals or other evidence required to establish fair market value.

11. What proceeds are expected from the use or disposition of the property and what will be done with any net revenues derived?
12. A comparison of the relative advantage or benefit to the airport from sale or other disposition as opposed to retention for rental income?

Each request should have a scaled drawing attached showing all airport property and airport facilities which are currently obligated for airport purposes by agreements with the United States. Other exhibits supporting or justifying the request, such as maps, photographs, plans and appraisal reports, should be attached, as appropriate.

As presented in Chapter One – Inventory, there are plans for the development of a golf course/resort on a portion of undeveloped airport property. The airport is currently working with the FAA to release two tracts totaling 38.8 acres to allow for development of a time-share community associated with the resort. Neither of these tracts is necessary to accommodate future aviation demand at the airport. The remaining airport property intended for the golf course/resort is planned to be leased and not sold. The airport land use map that will be included as part of the airport layout plan set, will include those areas of airport property that should be reserved for aeronautical purposes and those areas available for non-aviation leases or excess to aviation needs.

VEHICULAR ACCESS AND PARKING

A planning consideration for any airport master plan is the segregation of vehicles and aircraft operational areas. This is both a safety and security consideration for the airport. Aircraft safety is reduced and accident potential increased when vehicles and aircraft share the same pavement surfaces. Vehicles contribute to the accumulation of debris on aircraft operational surfaces, which increases the potential for Foreign Object Damage (FOD), especially for turbine-powered aircraft. The potential for runway incursions is increased, as vehicles may inadvertently access active runway or taxiway areas if they become disoriented once on the aircraft operational area (AOA). Airfield security may be compromised as there is loss of control over the vehicles as they enter the secure AOA. The greatest concern is for public vehicles, such as delivery vehicles and visitors, which may not fully understand the operational characteristics of aircraft and the markings in place to control vehicle access. The best solution is to provide dedicated vehicle access roads to each landside facility that is separated from the aircraft operational areas with security fencing.

The segregation of vehicle and aircraft operational areas is supported by FAA guidance established in June 2002. FAA AC 150/5210-20, *Ground Vehicle Operations on Airports*, states, "The control of vehicular activity on the airside of an airport is of the highest importance." The AC further states, "An airport operator should limit vehicle operations on the movement areas of the airport to only those vehicles necessary to support the operational activity of the airport."

The landside alternatives for Columbia Gorge Regional Airport have been developed to reduce the need for vehicles to cross an apron or taxiway area. Dedicated vehicle parking areas, which are outside the airport fence line, are considered for all potential hangars.

FUEL FACILITIES

The existing fuel storage is located in underground tanks below the fuel island on the main apron. The airport FBO operators have indicated a desire to have the fuel storage facilities relocated to an aboveground facility. Aboveground fuel tanks can be easier to maintain, in some cases. A leak can be identified more quickly with aboveground tanks. As a revenue generating item, fuel facilities are not eligible for federal grant funding. Appropriate locations for a replacement fuel farm will be identified in the alternatives to be presented.

AIRPORT INDUSTRIAL PARK

As discussed in Chapter One – Inventory, a binding site plan for an airport business/industrial park has been submitted to Klickitat County for review. Those parcels that are planned to have frontage to the taxiway/taxilane system must be reserved for aviation use exclusively to conform to FAA grant assurances.

Exhibit 4L shows the parcel layout of the binding site plan for the industrial/business park as revised in March 2010. This site plan takes into consideration various master plan recommendations and airport design standards. The parcels allow for the taxiway object free area (OFA) associated with Taxiway A (65.5 feet from the taxiway centerline), to remain clear of objects. A taxilane is planned to be extended into the industrial/business park. The taxilane OFA is 57.5 feet from the taxilane centerline.

It should be noted that the extension of the taxilane into the business park is not necessary to provide aviation-related parcels to meet forecast demand. The parcels along Taxiway A as well as parcels 2, 3, and 4 meet and exceed the long term forecast need for aviation parcels.

BUILDING RESTRICTION LINE

The building restriction line (BRL) identifies suitable building area locations on the airport. The BRL encompasses the RPZs, the OFA, the runway visibility zone, NAVAID critical areas, areas required for terminal instrument procedures, and other areas necessary for meeting airport line-of-sight.

Two primary factors contribute to the determination of the BRL: type of runway (utility or other-than-utility) and the capability of the instrument approaches. As a regional airport supporting business jet operations, Columbia Gorge Regional Airport is an

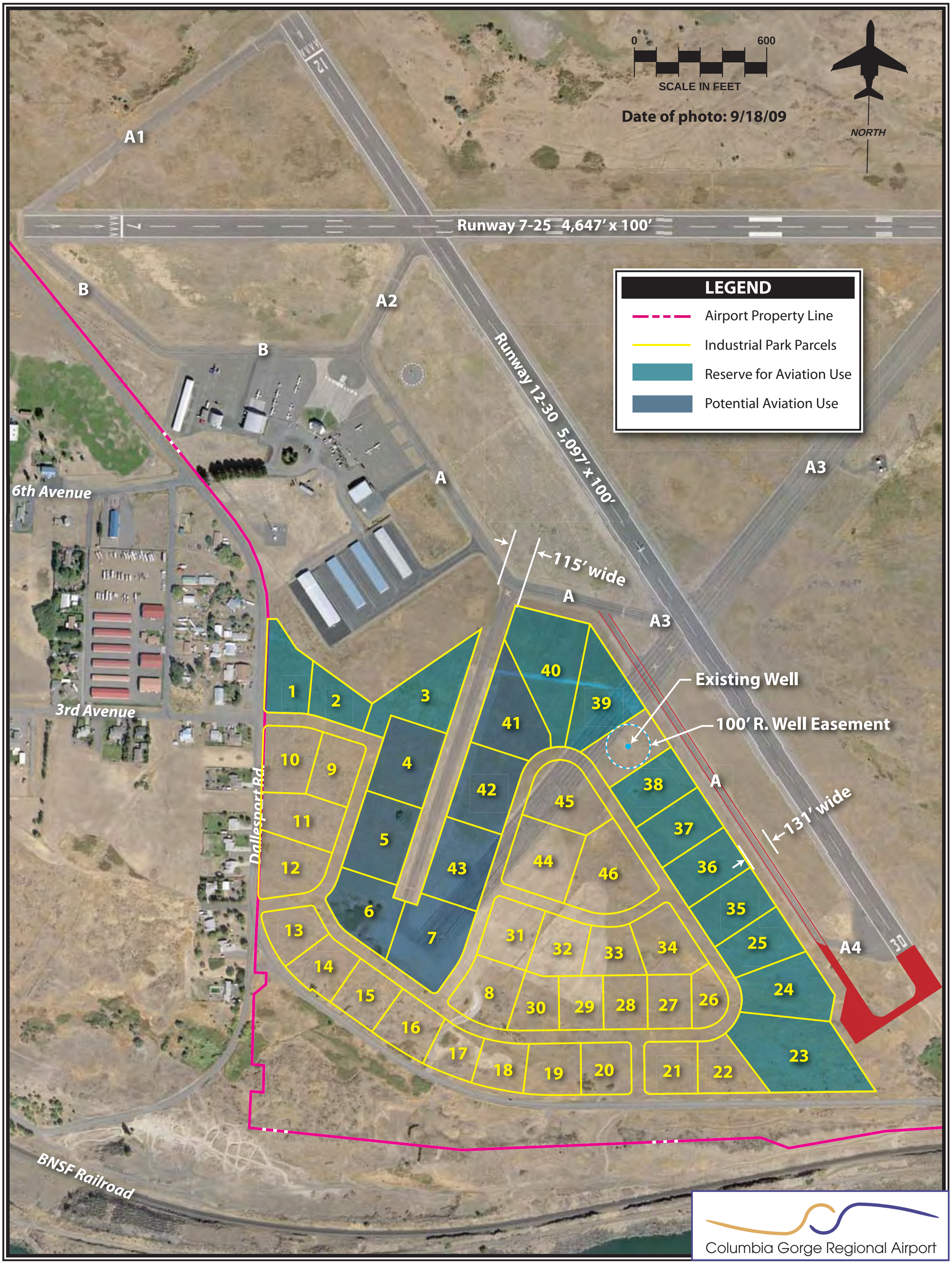

Exhibit 4L
INDUSTRIAL PARK

"other-than-utility" airport. The instrument approach provides for visibility minimums greater than ¾-mile.

The BRL is also set by the allowable height of airport buildings. At Columbia Gorge Regional Airport, the BRL is 495 feet from the runway centerlines for buildings no taller than 35 feet.

LANDSIDE ALTERNATIVES

As presented in Chapter Three – Facility Requirements, the airport has approximately 79,000 square feet of hangar space currently available. In the short term, an additional 43,000 square feet of space is forecast to be needed. Through the long term, a total of 84,000 square feet is forecast to be needed. In terms of aircraft storage mix, box hangar and conventional hangar space is the highest priority, while a need for more T-hangars is realized in the intermediate and long term.

LANDSIDE ALTERNATIVE A

Landside Alternative A, presented on **Exhibit 4M**, presents a building layout that utilizes the existing pavements and access points to the greatest extent possible. The T-hangar complex to the south of the terminal building is replicated on the southeast side of the access taxiway. By replicating this layout, the airport is able to build off of the existing taxiway, thereby minimizing expenses associated with new taxiways. The first three structures are T-hangars encompassing 12,500 square feet each. The fourth structure is a connected box hangar encompassing approximately 15,000 square feet.

To the east of the T-hangar complex is an open space that could accommodate larger conventional hangars as shown. These hangars are approximately 10,000 square feet each. This location is ideal for high activity airport businesses. A total of 102,500 square feet of new hangar space is proposed.

The location of a new fire station is shown in the north terminal area. This fire station is intended to serve the surrounding community as well as airport needs. An aboveground fuel farm is also identified. This location would allow refueling tankers to make delivery without traversing the main aircraft ramp.

LANDSIDE ALTERNATIVE B

Landside Alternative B considers a longer range vision for the terminal area. A new terminal building is envisioned to the south of the existing building. This location would allow the current terminal building to remain open to the public while the new building is being constructed. The building depicted is approximately 9,000 square feet. This size building would allow for some leasable space, including a restaurant. **Exhibit 4N** presents the second landside alternative.

Ideally, hangars are arranged in a linear fashion facing the nearest runway. The hangars north of the terminal building are slightly askew and are not perpendicular to either runway. This alternative considers maintaining the existing hangars and filling in with new hangars.

A large conventional hangar is situated between the old terminal building and the large conventional hangar to the north. This hangar is approximately 8,800 square feet. Further to the north is a location identified for individual box hangars. As depicted, there are four hangars that each encompasses 3,500 square feet, and a smaller hangar that is approximately 2,500 feet. These hangar types are popular with owners, particularly those that utilize a multi-engine, turboprop, or small business jet.

The T-hangar/box hangar complex is enhanced in this alternative by extending the taxilane to make room for nine box hangars and two conventional hangars. This layout is once again maximizing use of the existing taxilanes. A total of 52,800 square feet is made available in addition to the 37,500 square feet from the three T-hangar buildings.

A new idea presented here is to extend the taxilane and apron that currently provides access to the hangar fronting the transient apron. This would allow for the introduction of three new hangars and a total of 14,400 square feet of storage space. A total of 144,400 square feet is shown in this alternative.

LANDSIDE ALTERNATIVE C

Landside Alternative C, presented on **Exhibit 4P**, considers a facility layout that takes advantage of the additional apron space that can be gained through the development of parallel taxiways that are 300 feet from the runway centerline. A replacement terminal building is shown that is constructed in front of the current terminal building. This would allow the existing terminal building to remain in place until the new building is completed.

Two new conventional hangars, each encompassing 10,000 square feet, are then located to the sides of the new terminal building. These conventional hangars would be high activity airport business hangars. The current conventional hangar to the north is shown as remaining in place; ultimately this hangar too could be replaced.

The Quonset hut and the T-hangar building to the north are planned for redevelopment; in this case being replaced by two more large conventional hangars. In total, this alternative provides for 77,500 square feet of hangar space, which includes redeveloping approximately 15,000 square feet.

LANDSIDE SUMMARY

Some portions of the existing hangar layout at Columbia Gorge Regional

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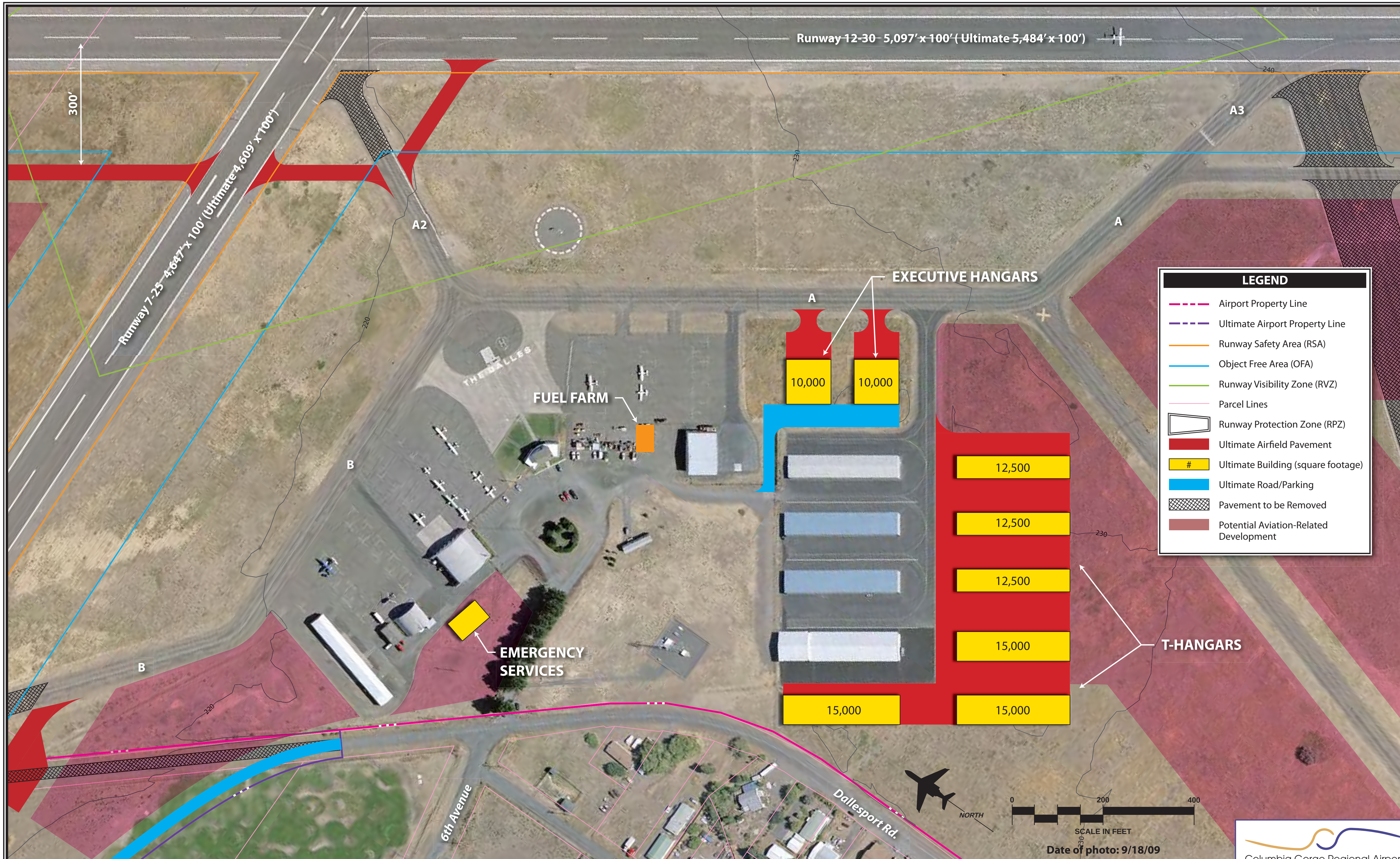

Exhibit 4M
LANDSIDE ALTERNATIVE A

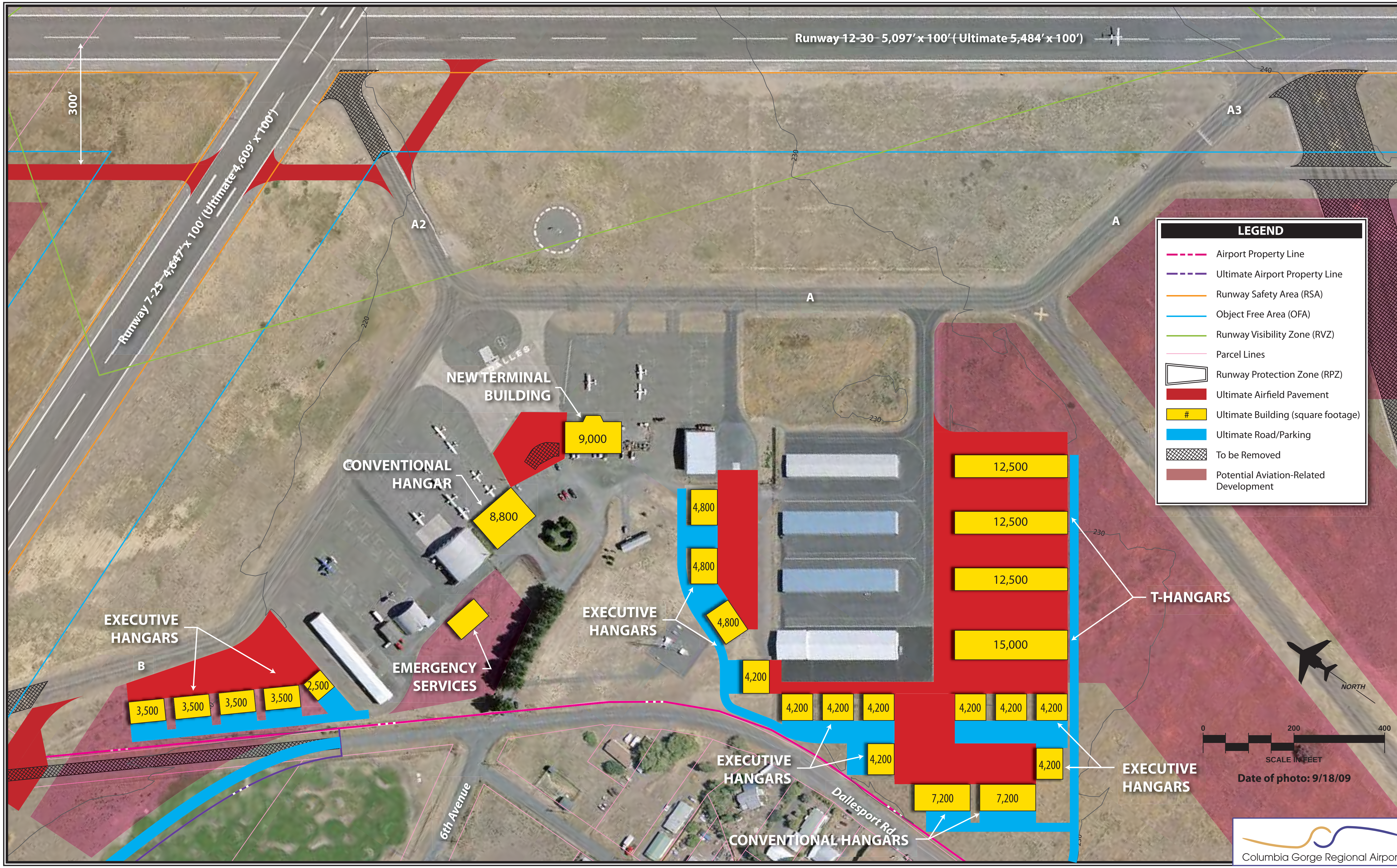

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Exhibit 4N
LANDSIDE ALTERNATIVE B

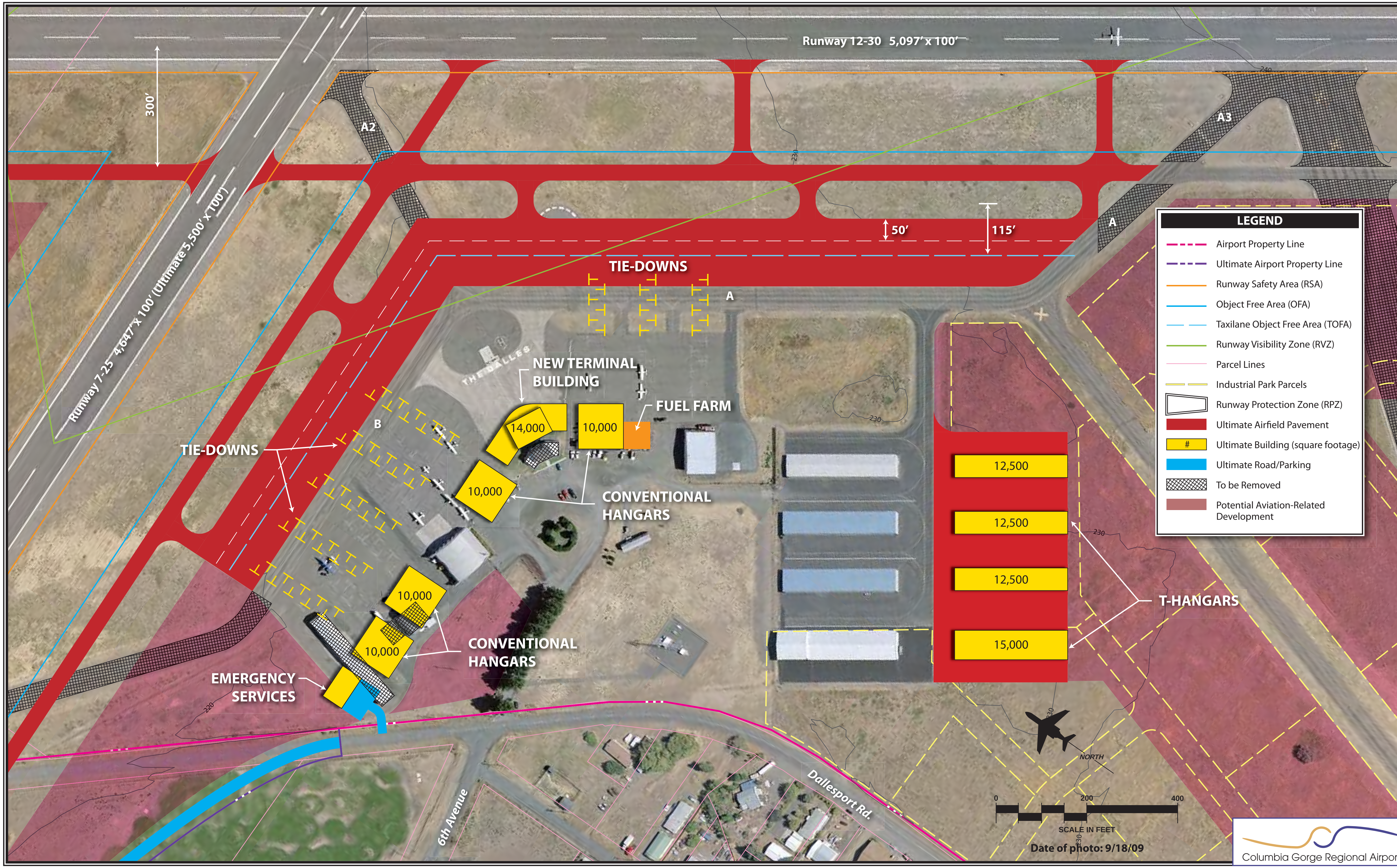

Exhibit 4P
LANDSIDE ALTERNATIVE C

Airport follow normal convention for efficiency of layout, while other areas do not. The T-hangar complex on the south maximizes the available space and provides a central location for these types of hangars. Each of the alternatives replicates this layout by providing a mirror image development across the taxilane.

The existing hangar development surrounding the terminal building does not provide the same level of efficiency. The hangars on the north are not perpendicular to the runway and there is not a clear building restriction line. Nonetheless, the terminal building location is ideal as it is the central focal point of the airport.

As discussed in Chapter Three – Facility Requirements, the airport is forecast to need approximately 43,000 square feet of new hangar space in the next five years and 84,000 over the next 20 years. **Table 4E** presents a summary of the total hangar area proposed for each alternative.

TABLE 4E
Landside Hangar Summary
Columbia Gorge Regional Airport

	Alternative A	Alternative B	Alternative C
T-Hangar	37,500	37,500	37,500
Box Hangar	45,000	83,700	15,000
Conventional Hangar	20,000	23,200	40,000
Redevelopment	0	0	(15,000)
Total	102,500	144,400	77,500

The landside alternatives are intended to help guide airport development decisions. Several areas of the airport terminal area have been identified for specific use types. Large conventional hangars intended to support aviation businesses should be located on the main central apron. Medium activity private box hangars should be set to the side of the high activity areas. T-Hangars or connected box hangars are low activity centers and should be co-mingled to the greatest extent possible.

ALTERNATIVES SUMMARY

Several development alternatives related to both the airside and the landside have been presented. Some of the alternatives have been developed for the purpose of determining viability, such as the extension of Runway 7. While an extension of Runway 7 can be done, it would likely be the most expensive and have the greatest negative impact to the citizens on Dallesport. Therefore, Airside Alternative 3 presents the most viable alternative for a runway extension, by adding 170 feet to the north end of Runway 12-30 and 233 feet to the south end.

The extension of Runway 12-30 in this manner does not require the airport to relocate any roads or purchase additional property. This is also the primary runway and the runway with the greatest percentage of wind coverage. The primary draw-back to extending this runway is the lack of straight-in instrument approaches. It should be noted that this runway is available for circling approaches. The circling approach, in fact, provides better visibility and cloud ceiling minimums than the LDA/GS approach to Runway 25.

Two alternatives were presented related to the disposition of Runway 7-25 if Runway 12-30 is the designated extended runway. The first option shortened the runway by 440 feet in order to provide adequate RSA and approach clearance over Dallesport Road. The second option would relocate a portion of Dallesport Road to the Central Blvd. alignment in order to provide for RSA. The runway would still need to be shortened by 38 feet to allow for approach clearances. A third option would relocate Dallesport Road slightly farther to the west of the Central Blvd alignment, in order to allow for approach clearances.

The taxiway system at Columbia Gorge Regional Airport should be improved to increase safety and efficiency. The angled threshold taxiways should be replaced with right-angled taxiways. A new taxiway leading from Taxiway A2 to the Runway 12 threshold should be constructed, thereby making a full-length parallel Taxiway A to the primary runway. Ultimately, a parallel taxiway to Runway 7-25 could be needed as well.

The landside alternatives identify specific areas of the terminal area and provide recommendation for how they should be planned for development. As a general rule, facilities serving a similar activity level should be grouped together. New T-hangars should be located to the south of the terminal area adjacent to the current T-hangar complex. Conventional hangars should be utilized as high activity airport businesses and should be centrally located. Box hangars should occupy those medium activity areas.

Now that several alternatives for both the airside and landside have been presented, it is possible to combine these elements into a preliminary concept, as shown on **Exhibit 4Q.** This exhibit represents a starting point for final concept discussions.

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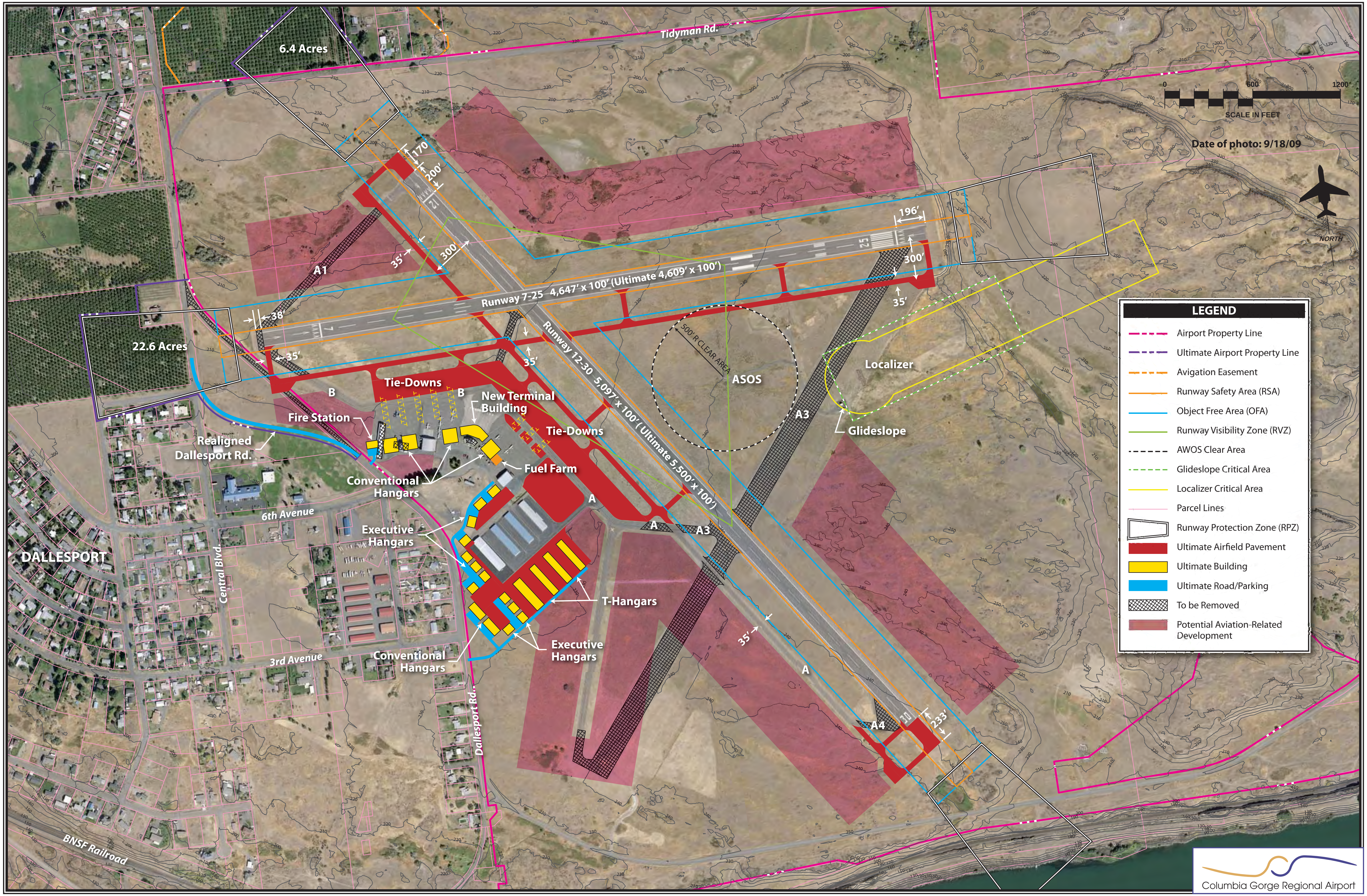

Exhibit 4Q
PRELIMINARY MASTER PLAN CONCEPT

Columbia Gorge Regional Airport

Chapter Five

RECOMMENDED MASTER PLAN CONCEPT

RECOMMENDED MASTER PLAN CONCEPT

The airport master planning process for Columbia Gorge Regional Airport (DLS) has evolved through the development of forecasts of future demand, an assessment of future facility needs, and an evaluation of airport development alternatives to meet those future facility needs. The planning process has included the development of draft working papers which were presented to the Planning Advisory Committee (PAC) and discussed at several coordination meetings and a public information workshop.

The PAC is comprised of several constituencies with an investment or interest in Columbia Gorge Regional Airport. These groups included representatives from the Federal Aviation Administration (FAA), City of The Dalles, Klickitat County, state aviation representatives from Washington and Oregon, airport businesses, and local and national aviation associations. This diverse group has provided extremely valuable input into the recommended plan.

In the previous chapter, several development alternatives were analyzed to explore options for the future growth and development of Columbia Gorge Regional Airport. The development alternatives have been refined into a single recommended concept for the master plan. This chapter describes, in narrative and graphic form, the recommended direction for the future use and development of Columbia Gorge Regional Airport.

RECOMMENDED MASTER PLAN CONCEPT

The recommended master plan concept incorporates elements from each of the airside and landside alternatives presented in the previous chapter. This concept provides the airport with the ability to meet the increasing demands on the airport by larger corporate aircraft while also providing adequate space for smaller piston aircraft operators. The recommended master plan concept, as shown on **Exhibit 5A**, presents the ultimate configuration for the airport that preserves and enhances the role of the airport while meeting FAA design standards. A phased program to implement the recommended development concept will be presented in Chapter Six - Capital Improvement Program. The following sub-sections will describe the recommended master plan concept in detail.

AIRSIDE CONCEPT

The FAA has established design criteria to define the physical dimensions of runways and taxiways, as well as the imaginary surfaces surrounding them which protect the safe operation of aircraft at the airport. These design standards also define the separation criteria for the placement of landside facilities.

As discussed previously, the design criteria primarily center on the airport's critical design aircraft. The critical aircraft is the most demanding aircraft or family of aircraft which currently, or are projected to, conduct 500 or more itinerant operations (take-offs and landings) per year at the airport. Factors included in airport design are an aircraft's wingspan, approach speed, tail height and, in some cases, the instrument approach visibility minimums for each runway. The FAA has established the Airport Reference Code (ARC) to relate these critical aircraft factors to airfield design standards.

Analysis conducted in Chapter Three - Facility Requirements concluded that the current critical aircraft is defined by aircraft falling in ARC B-II. These aircraft are represented by turboprops and many small business jets. The future critical aircraft is projected to remain within ARC B-II, but be defined primarily by small and medium sized business jets.

While airfield elements, such as runway length and safety areas, must meet design standards associated ARC B-II, landside elements can be designed to accommodate specific categories of aircraft. For example, a taxilane into a T-hangar area only needs to meet the object free area (OFA) width standard for smaller single and multi-engine piston aircraft (ARC A-I and B-I) expected to utilize the taxilane, not those for the larger business jets representing the overall critical aircraft for the airport.

Table 5A presents the design standards to be applied to the runways at Columbia Gorge Regional Airport. It also highlights those areas where the runway does not currently meet FAA design standards. The following discussion will describe the recommended master plan concept in detail and the proposed solutions to meeting design standards.

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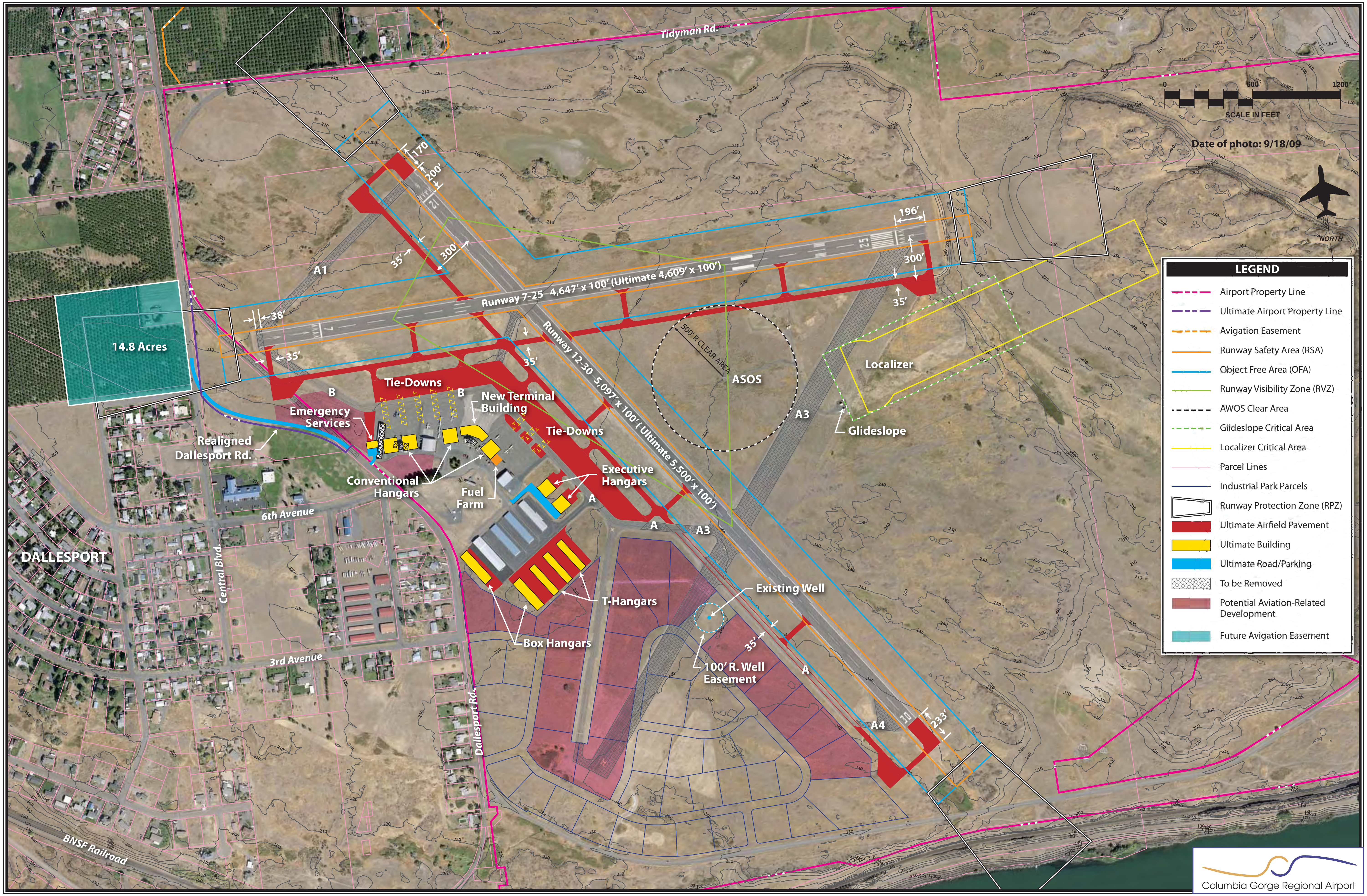

Exhibit 5A
MASTER PLAN CONCEPT

TABLE 5A **Airfield Planning Design Standards (Ultimate)** **Columbia Gorge Regional Airport**		
	FAA Standards	**Current Condition**
Design Standard	**B-II**	**B-II**
Applicable Approach	**> 1 Mile**	**> 1 Mile**
RUNWAYS		
Runway Width	75	100
Runway Shoulder Width	10	10
Runway Safety Area		
Width	150	Non-Standard
Length Beyond End	300	Non-Standard
Length Prior to Landing	300	300
Runway Object Free Area		
Width	500	Non-Standard
Length Beyond End	300	Non-Standard
Runway Obstacle Free Zone		
Width	400	Non-Standard
Length Beyond End	200	Non-Standard
Runway Centerline to:		
Holding Position	200	200
Parallel Taxiway	240	>240
Aircraft Parking Area	250	>250
TAXIWAYS		
Width	35	30-50
Shoulder Width	10	10
Safety Area Width	79	79
Object Free Area Width	131	131
Edge Safety Margin	7.5	7.5
Taxilane Object Free Area	115	115
Taxiway Centerline to:		
Fixed or Movable Object	65.5	65.5
Parallel Taxiway/Taxilane (Centerline)	105	105
RUNWAY PROTECTION ZONES		
Inner Width	500	500
Outer Width	700	700
Length	1,000	1,000

All measurements in feet
Source: FAA AC 150/5300-13, Airport Design

Instrument Approaches

The location of the airport within the valley created by the Columbia River presents difficulties when trying to improve the instrument approaches. In 2006, the airport installed a localizer and a glide slope antenna. Due to the surrounding terrain, these instruments are offset from the runway and the resulting instrument approach is offset. As a result, the lowest visibility minimum is 2¾-miles and the cloud ceiling minimums are 1,200 feet. This approach is also only available to aircraft in approach categories A and B. A circling Area Navigation (RNAV) Global Positioning System (GPS) instrument approach is available that offers visibility minimums as low as 1¼-miles for approach category A aircraft, 1½-miles for approach category B, and three miles for approach category C aircraft.

While these instrument approaches may be the best the airport can currently obtain, future technological advances may allow for straight-in instrument capability. For planning purposes, straight-in instrument non-precision approaches are planned for Runways 12, 30, and 7. Runway 25 is also planned to remain a non-precision approach, although the minimums may be improved in the future. It should be noted that the FAA undertook extensive research when installing the localizer and glide slope antenna and determined that the above-referenced minimums for Runway 25 were the best that could be implemented.

In the future, as technology advances, particularly GPS technology, there may be some opportunity for improved approaches. The airport should monitor these advances and maintain discussions with the FAA. Future planning studies should also reassess the possibility of improved instrument approaches.

Visual Approach Aids

Visual approach aids are those ground based facilities that help pilots identify the airport and the runway ends. Visual approach aids include Runway End Identifier Lights (REILs), Precision Approach Path Indicators (PAPIs), and various styles of approach lighting systems. The *Oregon Aviation Plan* (2007) identifies Columbia Gorge Regional Airport as deficient in this area.

Analysis in the alternatives chapter indicated that the airport could support a traditional PAPI on the approach to Runway 12 with a three degree glide path. A PAPI is also considered for the approach to Runway 30, but the glide path will have to be non-traditional. Nonetheless, PAPIs are considered for both ends of Runway 12-30.

Where an approach lighting system is not considered, REILs should be installed to help pilots rapidly identify the runway ends. REILs are available on the Runway 30 end. Since Runway 25 supports the offset instrument, it too should have REILs.

Runway Length

As discussed in Chapter Three – Facility Requirements, Runway 12-30 is currently 5,097 long, and this length meets the needs of most operators, including 75 percent of the business jet fleet at 60 percent useful load. Under some circumstances, a runway length of 5,500 feet would be beneficial. These conditions would include very hot days or rainy days where additional length may be needed for turbine landing operations.

As presented on the recommended concept, an extension of primary Runway 12-30 to a length of 5,500 feet is planned. To accomplish this with minimal impact to existing roads and residences, approximately 170 feet is added to the Runway 12 end and the remaining 233 feet is added to the Runway 30 end.

The length of Runway 7-25 is reduced slightly in order to allow for approach clearance over Dallesport Road. Currently, the landing threshold to Runway 7 is displaced by 440 feet. Once Dallesport Road is relocated, this threshold can be relocated to the west approximately 402 feet. This action would allow for the runway to meet runway safety area (RSA), OFA, and obstacle free zone (OFZ) standards and to provide approach clearance.

Runway Strength

Recent runway strength testing indicated that Runway 12-30 has a single-wheel load bearing strength (SWL) of 18,000 pounds. The SWL for Runway 7-25 was estimated at 4,000 pounds SWL. The runways should be capable of withstanding repeated activity by the heaviest aircraft in ARC B-II. Many business jets with a single wheel on each landing strut are in ARC B-II and exceed 25,000 pounds. The minimum runway strength recommended is 30,000 pounds. The airport also sees activity by business jets with two wheels on each landing gear strut. Therefore, the dual-wheel load bearing strength should be 60,000 pounds.

Some of the largest and heaviest business jets, including the Gulfstream IV and V, Challenger 600s, and Falcon 2000s occasionally operate at the airport. When the runway strengthening project is in the design phase consideration may be given to extending the strength of the runway to 60,000 pounds SWL and 90,000 pounds DWL.

Safety Areas

The Facility Requirements chapter discussed the requirements for the RSA, OFA, OFZ, and the runway protection zones (RPZ). Of particular concern is the RSA, which must meet FAA design standard to the greatest extent possible. The RSA at Columbia Gorge Regional Airport is centered on the runway and should be 150 feet wide and extend 300 feet off each runway end.

The analysis presented in the alternatives chapter showed that the most reasonable method to meeting RSA standards is to simply fill and grade the RSA to standard. At the time of this safety improvement, the OFA and OFZ should also be considered.

The RPZ is a trapezoidal area beginning 200 feet from the runway end and extending out in accordance with the operational activity at the airport and the instrument approach visibility minimums. The function of the RPZ is to enhance the protection of people and property on the ground. The FAA recommends the airport have positive control of the RPZ through fee-simple ownership if possible. Portions of the RPZs serving Runways 12, 7, and 30 extend off airport property. An avigation easement for the Runway 7 RPZ is recommended. The RPZ extending off airport property south of Runway 30 is undevelopable and does not pose an incompatibility to the airport. Therefore, the Runway 30 RPZ is not recommended for acquisition.

Taxiways

The taxiway layout at Columbia Gorge Regional Airport is not uniform and presents some safety concerns. The primary safety concern is the angled nature of the intersections with the runway thresholds. This reduces pilot visibility. Therefore, a primary feature of the taxiway layout in the recommended plan is that all angled taxiways are removed and are replaced by 90-degree angled intersections.

The width of the taxiways should also be uniform. The portion of Taxiway A leading to the Runway 30 threshold is only 30 feet wide. The plan recommends widening this to 35 feet. All new taxiways are planned at a width of 35 feet. Some portions of Taxiway A near the terminal area are currently 50 feet wide. These are planned to remain at this width.

The runway/taxiway separation standard for an ARC B-II airport is 240 feet. The parallel taxiways currently meet or exceed this standard. The southern portion of Taxiway A is situated 300 feet from the runway. This separation distance meets the standard for ARC C-II airports. While a transition to this ARC is not forecast in the master plan, the airport does receive some activity from business jets in this category. Future parallel taxiways are planned at 300 feet of separation.

Full length parallel taxiways are planned to both runways. These taxiways will improve the efficiency of aircraft movements and make additional terminal area space available.

Entrance and exit taxiways to the runways are staggered from those taxiways that lead to aircraft parking areas. This design layout is intended to reduce the possibility of runway incursions by forcing pilots to maneuver their aircraft onto the parallel taxiway before entering the runway environment. FAA Engineering Brief No. 75 (EB-75) recommends improving taxiway and apron layouts for enhanced safety, and the *FAA Northwest Mountain Region Plan – 2010* reflects this as a stated goal.

Taxiway Edge Lighting

The Oregon Aviation Plan indicates that regional airports should have full taxiway lighting. Currently, Columbia Gorge Regional Airport only has "throat" taxiway lighting at two intersections with the runway. This lighting should be expanded to all taxiways.

Declared Distances

FAA Advisory Circular (AC) 150/5300-13, *Airport Design*, Change 15, makes it clear that any airport with a displaced landing threshold has to implement declared distances. Columbia Gorge Regional Airport has displaced landing thresholds on Runways 7, 25, and 12. The reasons for displacing a landing threshold are not always documented, but can include inadequate RSA, OFA, OFZ, and obstruction to the approach.

The process for implementing declared distances is to write a letter to the FAA planner or engineer with responsibility for the airport, requesting that declared distances be published in the official Airport/Facility Directory. Exhibit 4D showed the applicable declared distances for the airport. A primary goal of the master plan concept is to position the runway system so that declared distances are not necessary. This is accomplished by removing any obstruction to the runway and upgrading the RSA, OFA, and OFZ to standard.

Airside Conclusion

Significant improvements are planned for Columbia Gorge Regional Airport that will enhance safety and position the airport for growth. The activity levels currently and within the 20-year planning horizon indicate that the airport should meet design standards associated with ARC B-II.

At times, a runway length of 5,500 feet could be necessary to accommodate the largest business jets included in the ARC B-II critical aircraft group. This is the length determined to fully accommodate 75 percent of business jets at 60 percent useful load, which is FAA's criteria for accommodating business jet activity. Runway 12-30 is planned to be extended from 5,097 feet to 5,500 feet by adding 170 feet to the north end and 233 feet to the south end. By splitting the extension between the two ends, there is no additional impact to the existing roads beyond Runway 12-30.

Another goal is to meet design standards for the RSA, OFA, and OFZ. These standards are not met to varying degrees beyond Runways 7, 25, and 12. Providing fill and grading the area 300 feet beyond the runway ends is the recommended solution to meeting safety area standards.

The existing landing threshold displacements limit the operational length for both runways. The extension and grading of the area beyond the ends of Runway 12, 30, and 25 will allow the threshold to be placed at the pavement ends. On the Runway 7 end, Dallesport Road is planned to be shifted to the west to meet safety area standards. The Runway 7 landing threshold can then be relocated back approximately 362 feet. The operational length available for Runway 7 will increase, but the physical length of the runway will be reduced by 38 feet. This is necessary to provide for a clear threshold siting surface leading to Runway 7.

Another goal of the airside plan is the removal of angled taxiways leading to the runway thresholds. Threshold taxiways that are at 90-degrees to the Runway provide greater visibility for pilots. In addition, both runways are planned for full length parallel taxiways situated at 300 feet from the runway centerlines.

The airside concept as planned would bring the airport into compliance with FAA design standards. It will also provide the maximum capability for the airport while maintaining standards associated with ARC B-II.

LANDSIDE CONCEPT

The primary goal of landside facility planning is to provide adequate aircraft storage space to meet forecast needs while also maximizing operational efficiencies and land uses. Achieving this goal yields a development scheme which segregates aircraft activity levels while maximizing the airport's revenue potential. **Exhibit 5A** also depicts the recommended landside development plan for the airport.

Hangars

The recommended concept shows the location for certain hangar types. Following the philosophy of separation of activity levels, larger high-activity conventional hangars are located facing the main apron. Lower activity T-hangars and box/executive hangars are set farther from the main apron and grouped together. **Table 5B** presents the total hangar positions and area provided in the master plan concept.

TABLE 5B
Hangar Space Planned
Columbia Gorge Regional Airport

	Current Supply Estimate	20-Year Supply Forecast	Total 20-year Need	Provided in Master Plan
Based Aircraft	68	75	82	95
Positions				
T-Hangar Positions	51	61	10	21
Box Hangar Positions	2	15	13	11
Conventional Hangar Positions	8	14	6	18
Hangar Area Requirements (s.f.)				
T-Hangar Hangar Area	59,600	73,000	13,400	28,700
Box Hangar Area	3,000	38,000	35,000	28,500
Conventional Hangar Area	13,000	35,000	22,000	44,000
Maintenance Area Reserve	3,000	17,000	14,000	16,000
Total Hangar Storage Area (s.f.)	78,600	163,000	84,400	117,200

Source: Coffman Associates analysis

As can be seen from the table, the master plan concept provides approximately 117,200 square feet of hangar space. The need over the course of the next 20 years is estimated at 84,600 square feet. Therefore, the hangar layout presented represents a vision for the airport that extends beyond the scope of this master plan. The reason for this is to provide airport decision makers with dedicated areas on the airport that should be reserved for certain hangar types. For example, the T-hangar area should remain reserved for T-hangars even beyond the scope of the master plan.

The hangar layout shown on the exhibit meets the separation of activity levels philosophy. On the main central ramp are located larger conventional hangars intended to accommodate fixed base operator (FBO) type activities. Hangar development space that is located on the main ramp and in close proximity to the terminal building should be reserved for high-activity uses such as an FBO or bulk aircraft storage. T-hangars and box hangars should be located farther away from the main terminal area.

The overall plan for the terminal apron area is to redevelop aging facilities, as feasible. When undertaking redevelopment, the opportunity exists to orient replacement facilities toward the runway. The Otis T-hangars (aged wooden frame 8-unit T-hangar facility) and the Quonset hut hangar could be replaced by conventional hangars as shown. The main conventional hangar just north of the existing terminal building is in good shape and is planned to remain. Between this conventional hangar and the terminal building is an undeveloped open space. This space is planned to accommodate another conventional hangar. Immediately south of the terminal building is another undeveloped area planned for another conventional hangar.

A replacement terminal building is planned in the location of the existing terminal building. As discussed previously, the existing terminal building is nearly 70 years old and does not meet facility codes for modern public buildings. A replacement terminal building will also serve as a "front door" to the region and as such it should be of a quality that reflects well upon the region. The building footprint shown is approximately 14,000 square feet, but an initial construction is planned to approximately 8,000 square feet to accommodate growth over the next 10-15 years.

Moving farther south there is an undeveloped parcel in front of the T-hangars that is planned for two medium sized box hangars. These would be ideal for use as corporate hangars. The location is somewhat removed from the terminal area apron, yet still provides ready access to the runway system.

The existing T-hangar and box hangar area is planned for expansion. This is a great location for these lower activity uses. As shown, three of the facilities are T-hangars and two are connected box hangar facilities.

As stated, the layout presented exceeds the forecast need for hangar storage space during the 20-year scope of the master plan. Nonetheless, by depicting a long term vision, airport management and potential developers can make informed decisions on what type of hangar to use and where to locate. For example, based on the concept, a private hangar builder should be directed to a location planned to accommodate their planned hangar type.

Property Acquisition

Planning for growth of the airport includes the consideration of strategic property acquisition of adjacent lands in order to allow for facility expansion or for the protection of the function and role of the airport. The FAA supports and provides reimbursement for necessary property acquisition. The reimbursements are provided when the land is necessary for airport development or protection. Basically, the FAA supports and funds immediate land acquisition needs but does not support "land-banking" of land that may or may not be needed in the future.

The RPZ serving Runway 12 extends off airport property to the north. The airport currently owns an avigation easement in this area. This easement should provide the protection the airport needs to prevent obstructions. With the easement, the airport is able to top trees or prevent other structures from being constructed in the approach. While the FAA recommends ownership of RPZ lands, this property is utilized as an active orchard. In the future, if the land use has the potential to change, or if the property becomes available for sale, the airport may want to consider purchasing the property in fee simple.

Property to the west of Dallesport Road falls within the RPZ for Runway 7. This property is also used as an orchard. In the short term, the airport should acquire avigation easement rights in order to protect the RPZ from any approach penetrations. Approximately 15 acres is recommended for the easement. If the land use has the potential to change, the airport may want to consider fee simple acquisition.

Business Park Plans

Based on the earlier findings of this master plan and the recommended concept, the airport has revised the binding site plan for the airport business park located in the southwest corner of airport property. The revised site plan is shown on **Exhibit 5A**. The new site plan provides for adequate taxiway object free area, including around the extension of Taxiway A, the planned hold apron adjacent to Runway 30, and the taxiway extending into the business park. The new plan also excludes areas reserved for future T-hangars/box hangars.

Those parcels that are adjacent to the taxiway system must be reserved for aviation-related businesses. Parcels that do not have taxiway access can accommodate any compatible business and does not have to be in the aviation industry. These parcels would bring land lease revenue to the airport.

Resort and Golf Course Plans

The planned use of excess airport property for a golf course and resort is a unique opportunity for the Columbia Gorge Regional Airport. As discussed previously, the airport has more land than is needed for aviation purposes. The proposed resort and golf course has been overlaid onto the recommended concept and is presented on **Exhibit 5B**.

The resort layout, as proposed, includes leasing airport property that should remain under the direct positive control of the airport. Of particular concern are the Runway 25 RSA and RPZ, and the critical areas associates with the localizer and glideslope antenna. Each of these areas should remain exclusively under airport control.

Support Facilities

The existing fuel farm is located below ground on the main apron. This location provides a central location and self-serve capabilities, but it also presents its own set of challenges. One challenge is monitoring for potential leaks, which can be difficult. When replacement is needed, it is recommended that the fuel farm be moved to above ground. As shown on the exhibit, the future fuel farm is situated in such a fashion that could maintain the self-serve function while eliminating the need for fuel trucks to enter the aircraft movement areas.

In the northwest terminal area, space is reserved for a new dual purpose emergency services facility that can serve community needs as well as airport

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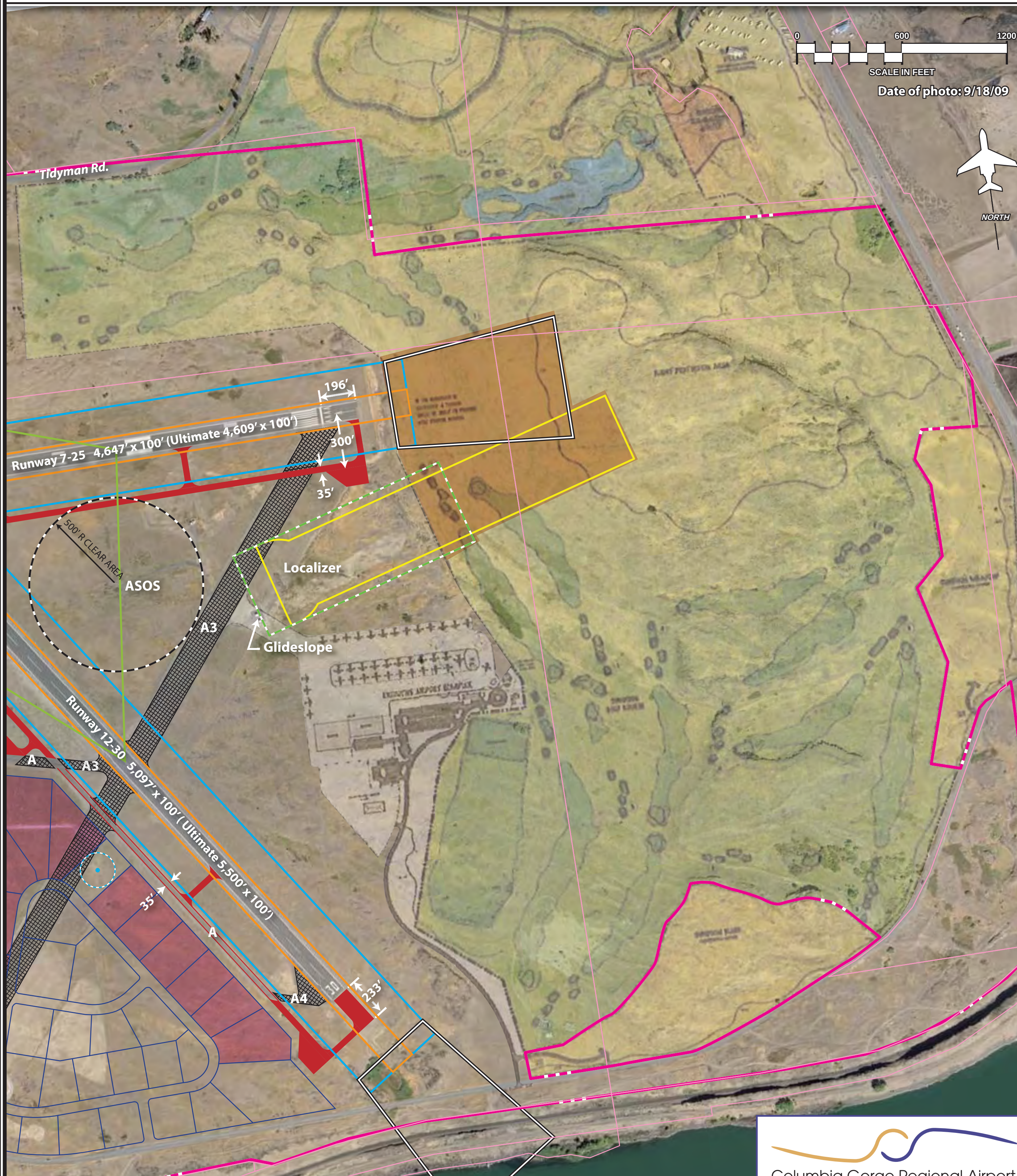
LEGEND

Airport Property Line	AWOS Clear Area	Ultimate Airfield Pavement
Runway Safety Area (RSA)	Glideslope Critical Area	To Be Removed
Object Free Area (OFA)	Localizer Critical Area	Potential Aviation-related Development
Runway Visibility Zone (RVZ)	Parcel Lines	Restricted Development
Industrial Park Parcels	Runway Protection Zone (RPZ)	



Columbia Gorge Regional Airport

Exhibit 5B
RESORT AND GOLF COURSE DETAIL

needs. The location identified would provide ready access to Dallesport Road as well as the airfield.

SUMMARY

The recommended master plan concept has been developed with significant input from the PAC. The PAC included representation from the FAA, state aviation agencies, airport management, airport businesses, and various economic development agencies, The Dalles, and Klickitat County. This plan provides the necessary development to accommodate and satisfy the anticipated growth over the next 20 years and beyond.

The recommended concept provides for projects that address both airside (runways and taxiways) and landside (hangars) needs. On the airside, the top priority is meeting safety design standards. Currently, the RSA beyond Runways 25, 7, and 12 are nonstandard. The master plan identifies methods to bring these safety areas up to standard while minimizing the impact to the existing runway system. The RSA behind Runways 12 and 25 are planned to be filled and brought up to grading standards. The RSA behind Runway 7 traverses Dallesport Road. It is recommended that Dallesport Road be rerouted to provide the required safety area.

Runway 12-30 is 5,098 feet long, which meets the needs of the critical aircraft (that grouping of general aviation aircraft that represent 500 or more annual itinerant operations), now and into the future. To fully meet the needs of 75 percent of the business jet fleet at 60 percent useful load, a runway length of 5,500 feet is recommended. The master plan reflects this need by planning for the extension of Runway 12-30 in both directions. The purpose of extending both ends is to eliminate the need for further road relocations to accommodate airport needs.

The taxiway system includes several intersections that do not provide optimal peripheral views for pilots. The FAA recommends that 90-degree taxiway intersections be planned to provide pilots better visibility. The improvements to the taxiway system remove angled entrance/exit to the runway. Other taxiway improvements include the ultimate development of full length parallel taxiways to both runways.

On the landside, a variety of hangar types are planned, including T-hangars, box/executive hangars, and conventional hangars. These planned hangars are strategically located to provide for maximum separation of activity levels. As such, planned conventional hangars are located on the main apron area, while lower activity box and T-hangars are located farther from the main apron.

A new terminal building is planned in approximately the same location as the existing terminal building. The existing terminal building does not meet the standards of current building codes or the standards of general aviation functions. In addition, a terminal building should be an aesthetically pleasing entrance to the region.

The next chapter of this master plan will consider strategies for funding the recommended improvements and will provide a reasonable schedule for undertaking the projects based on demand over the course of the next 20 years.

Columbia Gorge Regional Airport

Chapter Six

CAPITAL IMPROVEMENT PROGRAM

CAPITAL IMPROVEMENT PROGRAM

The analyses completed in previous chapters evaluated development needs at the airport over the next 20 years and beyond, based on forecast activity and operational efficiency. Next, basic economic, financial, and management rationale is applied to each development item so that the feasibility of each item contained in the plan can be assessed.

The presentation of the capital improvement program (CIP) has been organized into two sections. First, the airport development schedule and CIP cost estimate is presented in narrative and graphic form. Second, capital improvement funding sources on the federal, state, and local levels are identified and discussed.

AIRPORT DEVELOPMENT SCHEDULES AND COST SUMMARIES

Now that the recommended concept has been developed and specific needs and improvements for the airport have been established, the next step is to determine a realistic schedule (implementation timeline) and the associated costs for the plan. This section will examine the overall cost of each item in the development plan and present a development schedule. The recommended improvements are grouped by planning horizon: short term, intermediate term, and long term. The short term planning horizon is further subdivided into yearly increments. **Table 6A** summarizes

key milestones for each of the three planning horizons.

A key aspect of this planning document is the use of demand-based planning milestones. Projects should be considered based on actual demand levels within the next five years. As short term horizon activity levels are reached, it will then be time to program for the intermediate term based upon the next activity milestones. Similarly, when the intermediate term milestones are reached, it will be time to program for the long term activity milestones.

TABLE 6A
Planning Horizon Summary
Columbia Gorge Regional Airport

	Base Year	Short Term	Intermediate Term	Long Term
General Aviation Activity				
Based Aircraft	68	75	82	95
Annual Operations				
Itinerant	22,429	25,600	28,100	33,600
Local	9,614	10,700	11,400	13,000
Total General Aviation Operations				
Air Taxi Activity				
Itinerant	2,180	2,600	2,800	3,400
Military Activity				
Itinerant	750	750	750	750
local	250	250	250	250
Total Operations	35,223	39,900	43,300	51,000

Source: Coffman Associates analysis

Many development items included in the recommended concept will need to follow demand indicators. For example, the plan includes construction of new hangar aprons and taxilanes. Based aircraft will be the indicator for additional hangar needs. If based aircraft growth occurs as projected, additional hangars should be constructed to meet the demand. Often this potential growth is tracked with a hangar waiting list.

If growth slows or does not occur as forecast, some projects may be delayed. As a result, capital expenditures will be undertaken as needed, which leads to a responsible use of capital assets.

Some development items do not depend on demand, such as meeting design standards for runway safety area (RSA). Safety related projects should be programmed in a timely manner regardless of the forecast growth in activity. Other items, such as pavement maintenance, should be addressed in a scheduled manner and are not dependant on reaching aviation demand milestones. These types of projects typically are more associated with day-to-day operations.

As a master plan is a conceptual document, implementation of the capital projects should only be undertaken after further refinement of their design and costs through architectural and engineering analyses. Moreover, some projects may require extensive infrastructure improvements (i.e., drainage improvements, extension of utilities, etc.), that may take more than one year to complete.

Once the list of necessary projects was identified and refined, project specific cost estimates were developed. The cost estimates include design, engineering, construction administration, and contingencies that may arise on the project. Capital costs presented here should be viewed only as estimates subject to further refinement during design. Nevertheless, these estimates are considered sufficient for planning purposes. Cost estimates for each of the development projects in the capital improvement plan are in current (2010) dollars. **Exhibit 6A** presents the proposed CIP for Columbia Gorge Regional Airport. **Exhibit 6B** presents the CIP overlaid onto the airport aerial photograph and broken out into planning horizons.

SHORT TERM IMPROVEMENTS

2011 Projects

As with all capital projects funded in whole or part by federal funds, environmental considerations must be undertaken. The level of documentation necessary for each project must be determined in consultation with the Federal Aviation Administration (FAA). There are three major levels of environmental review to be considered under the *National Environmental Policy Act* (NEPA): categorical exclusion (CATEX), environmental assessment (EA), or environmental impact statement (EIS). Each level requires more time to complete and more detailed information. Guidance on what level of documentation is required for a specific project is provided in FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures*. Projects such as property acquisition and runway extensions require, at a minimum, an EA.

The first line item in the CIP provides an amount for environmental documentation associated with short term projects. It should be noted that environmental documents typically have a shelf life of three years before they need to be updated if an associated project has not yet been undertaken. Therefore, this line item may be spread over several years depending on the project considered.

On larger and more time consuming projects, preliminary engineering can be undertaken prior to the planned year of construction. A line item for preliminary engineering of the planned 2012 projects is identified in the 2011 plan year. This preliminary engineering should cover the Runway 12-30 reconstruction and extension, the extension of Taxiway A to the

Runway 12 threshold, the Runway 12 RSA improvement, and the Taxiway A widening.

The next project planned for 2011 is related to bringing the Runway 7 RSA up to standard. As shown in the master plan concept, relocating Dallesport Road slightly to the west will accomplish this goal. To this end, a portion of the property to the west of the existing Dallesport Road alignment will need to be transferred to the airport.

In 1980, approximately 19.5 acres of property to the west of Dallesport Road was transferred from the airport (by the City of The Dalles acting as airport sponsor) to Klickitat County for development of a public park. Approximately 6.6 acres of the northern portion of this property was to remain undeveloped in order to maintain approach protection to Runway 7.

Since this time, FAA design standards have changed and it is now necessary for a portion of this property to be transferred back to the airport in order to meet the FAA design standards and to preserve the current runway length. It is recommended that nine acres be transferred back to the airport. This area encompasses the property that would be located on the east side of the relocated Dallesport Road. A modest line item has been included in order to cover any legal fees necessary to formerly transfer the recommended portion of property from Klickitat County to the airport. Through this action, the RSA standard can be met and the Runway 7-25 pavement can be maintained, and the operational length can be enhanced.

The next project is the construction of a new set of T-hangars to accommodate forecast growth in based aircraft at the airport. As presented, a 12,500 square foot facility is planned with 11 units. The estimated cost of the facility includes surrounding access pavement. While the CIP identifies the cost for T-hangar construction as being the responsibility of the airport sponsor, this can also be accomplished through private development.

Ongoing maintenance of airport surfaces is considered throughout the plan. It is required by the FAA that airports that accept public funds, such as Columbia Gorge Regional Airport, maintain the useful life of their pavements. Because of the nature of pavement wear, some years may require a larger investment in rehabilitation; therefore, the CIP simply allocates an average yearly estimate of $25,000 for ongoing pavement maintenance.

2012 Projects

Fiscal Year 2012 is planned for major construction activity at the airport. The CIP identifies several projects but they are all inter-related. Each of the projects identified for 2012 could be lumped into one single large project. In an effort to clearly identify what is recommended, the projects have been divided into segments. This approach could also benefit funding availability

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	PROJECT DESCRIPTION	PROJECT COST	FAA ELIGIBLE	LOCAL SHARE
SHORT TERM PROGRAM (0-5 YEARS)				
2011				
1	Environmental Documentation	$250,000	$237,500	$12,500
2	Preliminary Design Runway 12-30 Reconstruct	$350,000	$332,500	$17,500
3	Transfer Property West of Airport Back to Airport	$10,000	$0	$10,000
4	Construct T-Hangar	$799,000	$0	$799,000
5	Pavement Maintenance	$25,000	$22,500	$1,250
2011	**TOTAL**	**$1,434,000**	**$592,500**	**$840,250**
2012				
6	Reconstruct/Strengthen/Lengthen Runway 12-30 (Fix LOS)	$6,625,000	$6,293,750	$331,250
7	Taxiway A Extension to Rwy 12/Threshold Reconstruct	$1,081,000	$1,026,950	$64,860
8	Widen/Strengthen Taxiway A	$1,379,000	$1,310,050	$82,740
9	Taxiway A Rwy 30 Threshold	$589,000	$559,550	$35,340
10	Runway 12 RSA Improvement	$675,000	$641,250	$33,750
11	Pavement Maintenance	$25,000	$23,750	$1,250
2012	**TOTAL**	**$10,374,000**	**$9,855,300**	**$549,190**
2013				
12	Replacement Emergency Generator	$150,000	$142,500	$7,500
13	Relocate Dallesport Road	$731,000	$694,450	$36,550
14	Rehabilitate Taxilane into Business Park	$118,000	$112,100	$5,900
15	Perimeter Fencing	$420,000	$399,000	$21,000
16	Pavement Maintenance	$25,000	$23,750	$1,250
2013	**TOTAL**	**$1,444,000**	**$1,371,800**	**$72,200**
2014				
17	Runway 7-25 Right-Angled Threshold Taxiways	$2,886,000	$2,741,700	$173,160
18	Runway 25 RSA Improvement	$1,078,000	$1,024,100	$53,900
19	REIL Runway 25	$42,000	$37,800	$2,100
20	Pavement Maintenance	$25,000	$23,750	$1,500
2014	**TOTAL**	**$4,031,000**	**$3,827,350**	**$230,660**
2015				
21	PAPIs Runway 12-30	$112,000	$106,400	$5,600
22	RPZ Property Easement Acquisition (15 acres)	$28,000	$25,200	$2,800
23	Pavement Maintenance	$25,000	$22,500	$2,500
2015	**TOTAL**	**$165,000**	**$154,100**	**$10,900**
TOTAL SHORT TERM PROGRAM		**$17,448,000**	**$15,801,050**	**$1,703,200**
INTERMEDIATE TERM PROGRAM (6-10 YEARS)				
1	Construct T-Hangar	$799,000	$0	$799,000
2	Add Fuel Farm	$300,000	$0	$300,000
3	Construct Terminal Building	$1,512,000	$0	$1,512,000
4	Pavement Maintenance	$125,000	$118,750	$6,250
TOTAL INTERMEDIATE TERM PROGRAM		**$2,736,000**	**$118,750**	**$2,617,250**
LONG TERM PROGRAM (11-20 YEARS)				
1	Reconstruct/Strengthen Runway 7-25 (Fix LOS)	$4,890,000	$4,645,500	$244,500
2	Parallel Taxiway Runway 7-25	$2,310,000	$2,194,500	$115,500
3	Expand Apron	$3,473,000	$3,299,350	$173,650
4	Construct T-Hangar	$799,000	$0	$799,000
5	Extend Taxiway A (Apron Area)	$1,181,000	$1,121,950	$59,050
6	Remove Taxiway A3	$303,000	$287,850	$15,150
7	Pavement Maintenance	$250,000	$237,500	$12,500
TOTAL LONG TERM PROGRAM		**$13,206,000**	**$11,786,650**	**$1,419,350**
TOTAL PROGRAM COSTS		**$33,390,000**	**$27,706,000**	**$5,740,000**

Note: Totals may not equal due to rounding

Columbia Gorge Regional Airport

Exhibit 6A
CAPITAL IMPROVEMENT PROGRAM

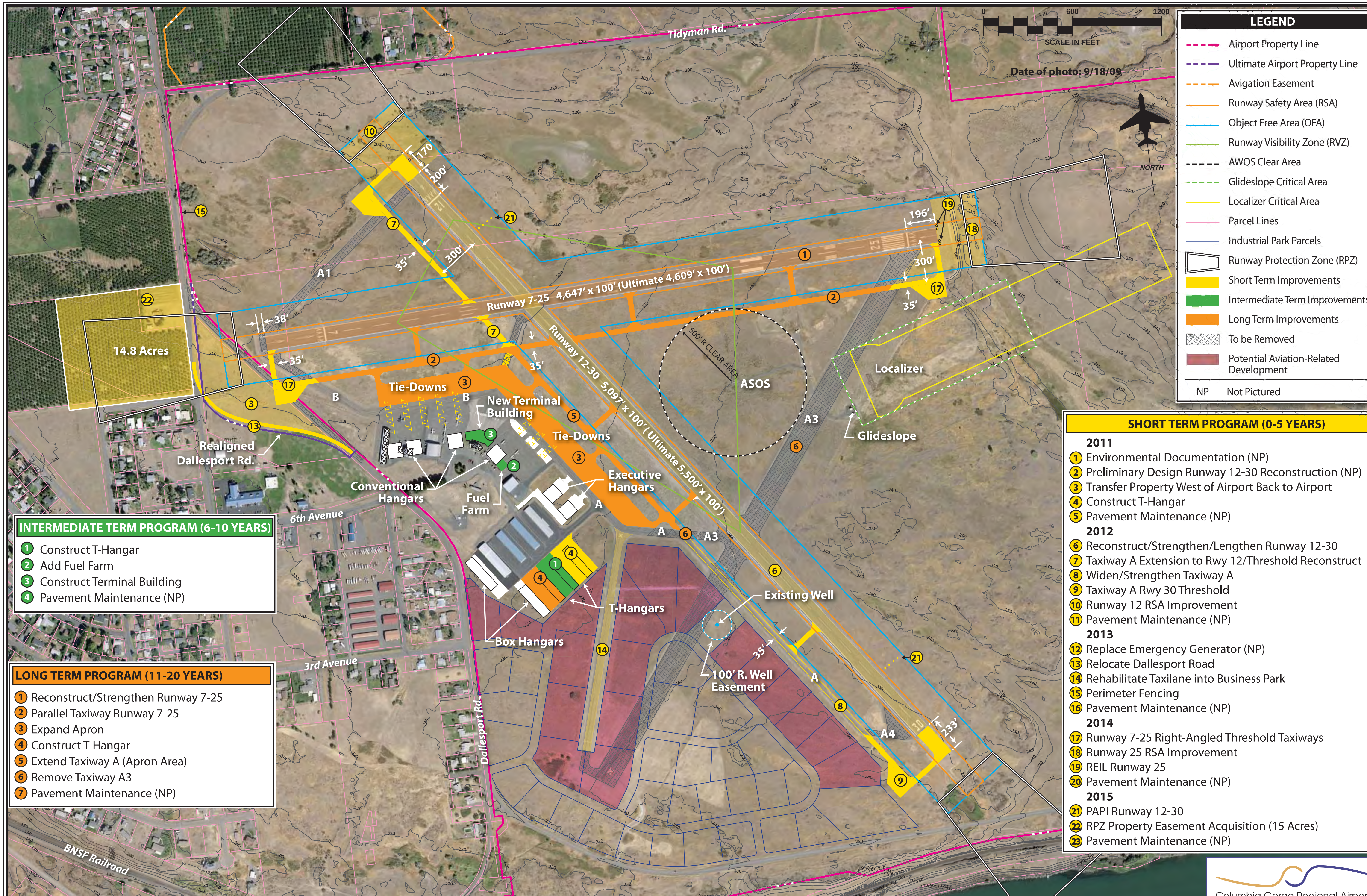

Exhibit 6B
DEVELOPMENT STAGING

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since several grants may be needed to undertake the planned improvements.

The major project considered for 2012 is the reconstruction of Runway 12-30. As documented, this runway has a strength rating of only 18,000 pounds single wheel loading. The critical aircraft for the airport includes many business jets that exceed this weight. The runway also has a line of sight issue, meaning visibility from one end to the other does not meet standard. The runway currently does not have a crown along the runway centerline. Having a crown on the runway centerline is the current design standard to allow water runoff to be more evenly disbursed. (Note: The FAA and the airport engineer are currently [2010] working to determine if a runway crown is necessary for Runway 12-30) This project considers reconstruction, lengthening, and strengthening of the runway.

The next project is closely associated with the previous runway project. A new taxiway is planned from the intersection with Taxiway A2, near the terminal area ramp extending to the new Runway 12 threshold. By constructing this new taxiway segment, angled Taxiway A1 and a portion of angled Taxiway A2 can be removed, thereby improving pilot visibility and meeting current taxiway design standards.

The next project is the construction of the south end of Taxiway A leading to the new Runway 30 threshold. Currently this taxiway does not meet the width standard of 35 feet and the taxiway is not strength rated to meet the demands of the critical design aircraft. This project includes an aircraft hold apron.

A high priority project for the airport is the improvement of the Runway 12 RSA. As part of the project to extend Runway 12, the RSA should be improved to meet standard. Compacted fill material needs to be brought in to build up the 300-foot RSA to standard behind the runway end.

2013 Projects

The airport has, on occasion, experienced power failures which have effectively closed the airport at night. Airport management has indicated that a new backup generator is necessary to maintain operational safety and capacity in the event of future power failures. Therefore, a line item is reserved for a new generator.

Provided the airport has been able to successfully re-acquire the property located to the west of the Runway 7 end, the airport can now improve the Runway 7 RSA by relocating Dallesport Road. This project plans to shift Dallesport Road to the west utilizing the Central Avenue alignment. The RSA can then be cleared and graded to standard. The existing baseball field is planned to be preserved.

The airport is well along in designing a business park on airport property. Those parcels that are located adjacent to taxiways and the apron should be reserved for aviation-related businesses. To this end, a taxiway is planned to be extended into the business park to increase the number of parcels available for hangar development.

The last project considered is the need for perimeter fencing around the airport. Currently, only a portion of the terminal area has adequate fencing. Much of the airport has only three strand barbed wire or no fencing at all. In order to provide greater airport security and prevent wildlife intrusion, a six-foot high chain-link fence with three strand barbed-wire is planned.

2014 Projects

The 2014 projects focus on safety related projects and improvements intended to meet design standards for Runway 7-25. In the previous year, the RSA for Runway 7 was improved. The projects in this year include RSA improvement on the Runway 25 end and construction of standard right-angled threshold taxiways. The right-angled taxiways include the cost hold aprons, taxiway lighting, and marking.

Runway 25 provides a localizer/glideslope non-precision instrument approach for approach category A and B aircraft. This approach is offset by six degrees due to the surrounding terrain. In order to help pilots readily identify the runway end, Runway End Identification Lights (REILs) are planned. These strobe lights are positioned to the side of the runway and pilots can see them at a distance of up to 20 miles. These lights can be shielded to eliminate light impacts to nearby residents.

2015 Projects

The first project of the 2015 CIP is the installation of Precision Approach Path Indicator (PAPI) lights on both ends of Runway 12-30. Previous analysis demonstrated that a traditional three-degree glidepath can be implemented on the approach to Runway 12. A traditional glide-path to Runway 30 would penetrate the surrounding terrain. Therefore, a higher glidepath angle would be necessary for the PAPI on Runway 30. Further engineering will be required to determine exactly what the glidepath will need to be.

The next project considered is the acquisition of easement rights on the approach to Runway 7. An avigation easement will allow the airport to proactively prevent any approach obstructions leading to Runway 7. Ultimately, the airport may want to purchase this property if it comes up for sale, but the existing land use (orchard) is currently compatible with airport operations.

Short Term Summary

The list of short term projects includes those of highest priority for the airport. Of particular concern is the nonstandard RSA beyond the ends of Runways 7, 12, and 25. These need to be filled in with embankment and graded to meet design standard. These projects are also associated with other improvements including taxiway construction and runway lengthening. By improving the RSA's, the displaced landing thresholds can be relocated back to the runway ends, thereby gaining additional operational runway length.

Several projects identified for the short term planning period address safety issues related to Runway 12-30. This runway is planned to be lengthened by 403 feet to provide adequate length for the critical design aircraft (B-II business jets). The runway itself is planned to be reconstructed to a strength rating of at least 30,000 pounds single wheel loading (SWL) (currently 18,000 pounds SWL). The angled taxiways leading to the runway thresholds are planned to be replaced with 90-degree threshold taxiways. Other taxiway improvements are planned, including removing a portion of Taxiway A2 so that the five-point intersection at the runway intersection can be eliminated.

Final planned improvements in the short term include enhancements to the approaches to the runway ends. REILs are planned for the Runway 25 end to provide quick runway end identification for pilots. This is particularly important for this runway end as it currently supports an instrument approach. The addition of PAPIs to both ends of primary Runway 12-30 is also planned. Ultimately, this runway may support instrument approaches as well.

The short term projects total approximately $17.5 million. Approximately $15.8 million is eligible for FAA grant funding. The remaining $1.7 million would be the responsibility of the airport sponsor.

INTERMEDIATE TERM IMPROVEMENTS

Planning new projects beyond a five year timeframe can be challenging. Project need is heavily dependant upon local demand and the economic outlook of the aviation industry. Therefore, intermediate term projects are grouped together to represent years 6-10. The use of planning horizons to group potential airport projects provides the airport flexibility to accelerate those projects that are needed immediately and delay those projects that no longer have a high priority. The projects are prioritized based on the aviation forecasts, but these priorities may change.

Several intermediate term projects are necessary based on demand and need for the airport. The first is the construction of a new set of T-hangars. Most revenue generating facilities at airports are not eligible for federal funding. If all other airfield improvements have been completed, then some funding could be available for hangar construction, but it is a low priority for the FAA. Therefore, hangar construction is assumed to be the responsibility of the airport sponsor.

A replacement fuel farm is considered that would have Jet A and Avgas tanks as well as a self-serve capability. This fuel farm would replace the existing underground facility located on the main terminal area ramp. Proper containment would be necessary for the new fuel farm.

The largest and most significant project planned for the intermediate planning horizon is the construction of a replacement terminal building. There is a great need to replace the existing facility that is nearly 70 years old, does not meet current design standards, and is too small to meet current demand. In addition, a prominent terminal building acts as an entrance to the community for potential investors.

Intermediate term projects total approximately $2.7 million. Since most of the projects identified are not eligible for FAA funding, approximately $2.6 million would be the responsibility of the airport sponsor.

LONG TERM IMPROVEMENTS

The first project considered in the long term planning horizon is the reconstruction of Runway 7-25. This runway faces similar strength and line-of-site issues to that of Runway 12-30. The reconstruction project is planned to increase the strength rating from 4,000 pounds SWL to at least 30,000 pounds SWL. The line-of site issues would also be corrected.

The next project is the completion of a full length parallel taxiway. It should be noted that, by design standard, once a parallel taxiway is constructed for Runway 7-25, the runway would meet the line-of-site standard, but it would be improved significantly.

The parallel taxiway would also serve the purpose of improving the efficiency of ground movements to and from the runway. Once the parallel taxiway is constructed, there would no longer be a need for Taxiway A3 to access the Runway 25 threshold. Taxiway A3 could then be removed or utilized for access to future east side airport development.

At this stage in the development plan, the central portion of Taxiway A is planned to be shifted to a distance of 300 feet from Runway 12-30. This project completes the full parallel taxiway system. Once this taxiway shift is complete then the main terminal area apron can be expanded as needed. Because of the distance from the existing Taxiway A to the Runway 12-30 centerline (nearly 600 feet), there is an opportunity to expand the usable apron toward the runway.

Remaining projects in the long term planning horizon include the construction of additional hangars. Once again, hangars should only be undertaken if there is existing demand on a waiting list. While T-hangar construction is shown as the responsibility of the airport sponsor, there are opportunities for private developers to undertake the project.

The long term projects total approximately $13.2 million, of which approximately $11.8 million is eligible for FAA funding. Approximately $1.4 million would then be the responsibility of the airport sponsor.

CAPITAL IMPROVEMENT SUMMARY

The CIP is intended as a road map to airport improvements to help guide the airport sponsor, the FAA, and the state aviation departments on needed projects. The plan as presented will meet the forecast demand over the next 20-years and, in many respects, beyond.

The total 20-year CIP proposes approximately $33.4 million in airport development. Of this total, approximately $27.7 would be eligible for FAA grant funding, and the remaining $5.7 would be the responsibility of the airport sponsor.

CAPITAL IMPROVEMENT FUNDING SOURCES

Financing capital improvements at the airport will not rely solely on the financial resources of the airport or the co-sponsors. Capital improvement funding is available through various grant-in-aid programs on both the state and federal levels. Historically, Columbia Gorge Regional Airport has received federal and state grants. While some years more funds could be available, the CIP was developed with project phasing in order to remain realistic and within the range of anticipated grant assistance. The following discussion outlines key sources of funding potentially available for capital improvements at Columbia Gorge Regional Airport.

FEDERAL GRANTS

Through federal legislation over the years, various grant-in-aid programs have been established to develop and maintain a system of public airports across the United States. The purpose of this system and its federally based funding is to maintain national defense and to promote interstate commerce. The most recent legislation affecting federal funding was enacted in late 2003 and is titled *Century of Flight Authorization Act of 2003,* or Vision 100.

The four-year bill covered FAA fiscal years 2004, 2005, 2006, and 2007. Airport Improvement Program (AIP) funding was authorized at $3.4 billion in 2004, $3.5 billion in 2005, $3.6 billion in 2006, and $3.7 billion in 2007. This bill provided the FAA the opportunity to plan for longer term projects versus one-year reauthorizations. As of spring 2010, a new multi-year bill has not been passed, but several continuing resolutions have maintained funding for priority airport projects.

The source for AIP funds is the Aviation Trust Fund. The Aviation Trust Fund was established in 1970 to provide funding for aviation capital investment programs (aviation development, facilities and equipment, and research and development). The Aviation Trust Fund also finances the operation of the FAA. It is funded by user fees, including taxes on airline tickets, aviation fuel, and various aircraft parts. The Aviation Trust Fund is also up for reauthorization.

Funding for AIP eligible projects is undertaken through a cost sharing arrangement in which FAA provides up to 95 percent of the cost and the airport sponsor invests the remaining five percent. In exchange for this level of funding, the airport sponsor is required to meet various grant assurances, including maintaining the improvement for its useful life, usually 20 years.

Entitlement Funds

Federal funds are distributed each year by the FAA from appropriations by Congress. A portion of the annual distribution is to commercial service airports based upon minimum enplanement levels of at least 10,000 passengers annually.

General aviation airports can receive up to $150,000 each year in Non-Primary Entitlement (NPE) funds (National Plan of Integrated Airport Systems [NPIAS] inclusion is required for general aviation entitlement funding). It should be noted that some versions of the current bills moving through Congress do not include future NPE funds. In the past, Columbia Gorge Regional Airport has received NPE funding. The sponsor can spend the given year, plus up to three accumulated years for a maximum of $600,000.

Discretionary Funds

The remaining AIP funds are distributed by the FAA based on the priority of the projects for which they have requested federal assistance through discretionary apportionments. A national priority ranking system is used to evaluate and rank each airport project. Those projects with the highest priority from airports across the country are given preference in funding. High priority projects include those related to meeting design standards, capacity improvements, and other safety enhancements.

Under the AIP program, examples of eligible development projects include the airfield, public aprons, and access roads. Additional buildings and structures may be eligible if the function of the structure is to serve airport operations in a non-revenue generating capacity, such as maintenance facilities. Some revenue enhancing structures, such as T-hangars, may be eligible if all airfield improvements have been made but the priority ranking of these facilities is very low.

Whereas entitlement monies are guaranteed on an annual basis, discretionary funds are not assured. If the combination of entitlement, discretionary, and airport sponsor match does not provide enough capital for planned development, projects may be delayed.

Other supplemental funding sources are described in the following subsections.

FAA Facilities and Equipment (F&E) Program

The Airway Facilities Division of the FAA administers the Facilities and Equipment (F&E) Program. This program provides funding for the installation and maintenance of various navigational aids and equipment of the national airspace system. Under the F&E program, funding is provided for FAA airport traffic control towers (ATCTs), enroute navigational aids, on-airport navigational aids, and approach lighting systems.

While F&E still installs and maintains some navigation aids, on-airport facilities at general aviation airports has not been a priority. Therefore, airports are often requesting funding assistance for navigational aids through AIP and then maintaining the equipment on their own. This is likely the avenue that Columbia Gorge Regional Airport will have to take to install the REILs and PAPIs recommended in the plan.

STATE AID TO AIRPORTS

Both Oregon and Washington make direct investment in airports within their respective states. Columbia Gorge Regional Airport is in the unique position of being sponsored by the City of the Dalles in Oregon, and Klickitat County in Washington. Therefore, the airport is eligible for various funding programs in each state.

State of Oregon

*Connect*Oregon

*Connect*Oregon is an initiative first introduced in 2005 by the Oregon Legislature to invest in air, rail, marine, and transit infrastructure. The program is focused on improving the connections between the highway system and other modes of transportation to better integrate the multi-modal system, improve the flow of commerce, and remove delays. The first installment of this program provided $100 million for 43 projects. The program was renewed at similar funding levels in both 2007 and 2009. The most recent installment of the program includes a commitment to set aside at least five percent of the total for rural airports in the state and no less than 10 percent to each of five regions. This insures that funding is distributed throughout the state, and that airports in different regions don't have to compete for funding with all Oregon airports.

Funding for the program is from lottery-based bonds, sold by the Oregon Department of Administrative Services, deposited into Oregon's Multimodal Transportation Fund, and administered by the Oregon Department of Transportation Local Government Section. Projects eligible for Oregon's Highway Fund are not eligible for *Connect*Oregon, which gives aviation projects less competition for funding (Oregon Department of Aviation).

Of the 43 projects funded under *ConnectOregon* I (as the 2005 bill is known), 10 were aviation projects. Projects included runway relocation, runway extension, air cargo facilities, maintenance facilities, terminal improvements, and aircraft services and fueling. Funding also went to a multi-region project of installing Automatic Dependent Surveillance – Broadcast (ADS-B) transceivers at various airports in the state. Similar aviation projects were funded with *ConnectOregon* II (2007) and III (2009).

Financial Aid to Municipalities (FAM)

The Oregon Department of Aviation's *FAM Grant Program* is designed to fund planning, development, and capital improvements at airports across the state. Oregon municipalities meeting certain criteria are eligible to apply for these grants. These grants are capped at $25,000 and can be used for matching FAA grants or other projects not generally eligible for FAA funding.

Pavement Maintenance Program (PMP)

The PMP program is a state-funded aid program intended to assist airports in undertaking preventative maintenance. A local match is required depending on the category of the airport as defined in the *Oregon Aviation Plan*. The most recent recommended match for a Regional airport, such as Columbia Gorge Regional Airport, was 10 percent. In addition, the Oregon Department of Aviation (through a subcontractor) inspects 66 Oregon airports, including Columbia Gorge Regional Airport, for pavement condition. This database of information helps airports meet FAA grant assurances for maintaining airport pavements.

State of Washington

Airport Aid Grant Program

The Washington State Department of Transportation (WSDOT) – Division of Aviation provides grants for capital improvements to many of the state's 138 public airports. The Airport Aid Grant Program has two categories of funding. The first provides half of the local match, or 2.5 percent, for FAA funded projects. The second category allows for WSDOT to fund airport projects directly. Direct funding is only available for those projects that the FAA is unable to fund in the current cycle and some FAA ineligible items, such as fuel farms. In 2009, through the *Airport Aid Grant Program*, WSDOT Aviation awarded approximately $900,000, which helped leverage more than $11.2 million in federal funding.

The maximum amount WSDOT Aviation can award to an individual airport sponsor is $250,000, which requires a local match of five percent. Eligible projects are divided into three major categories: 1) pavement; 2) safety; 3) maintenance, operations, and planning (MO&P). Typical pavement projects include crack sealing, slurry sealing, fog sealing, overlays, reconstructions, extensions, widening or other alterations to the aircraft movement surface. Repairs or reconstructions to turf surfaces are considered eligible under this category. Typical safety projects include airspace obstruction clearing, runway safety area or object free area clearing, installation of wind indicators, marking, lighting, signing, reflectors, RPZ/approach surface land acquisition, NAVAIDs, approach aids, weather reporting, and fencing or drainage improvements. Typical MO&P projects include weed control, grounds maintenance, vehicles and equipment (e.g., snow removal, tractors, mowers, etc.) fuel system installations, fire suppression systems, airport master planning, airport layout planning, and environmental reviews or documentation. The MO&P category also includes grant funding for security improvements such as flood lights, access control gates, surveillance cameras, and pay phones.

This funding source cannot be used for construction of private hangars or other private revenue producing structures. Other projects such as terminal buildings, utility infrastructure, and access roads are typically not eligible to receive state funding.

Other Washington Funding Sources

In 2005, the Washington Legislature directed the Joint Legislative Audit & Review Committee (JLARC) to assemble an inventory of state grant and loan programs that assist local governments and others in developing their infrastructure. The inventory includes 75 separate programs. These programs provided more than $1 billion in grants and loans for infrastructure projects in 2005. The inventory is organized into three volumes. Potential sources for transportation infrastructure grants and loans are identified in volume two. More information on these programs can be found at the following web site:
http://www.leg.wa.gov/JLARC/AuditAndStudyReports/2006/Pages/06-11.aspx

The Washington Department of Commerce also provides guidance and grant assistance in several areas that could be beneficial to airports. This includes land use planning, infrastructure planning, and assistance with public financing of public projects. Further information can be obtained at the following web site:
http://www.commerce.wa.gov/site/657/default.aspx

LOCAL FUNDING

The balance of project costs, after consideration has been given to grants, must be funded through local resources. The goal of the airport is to generate enough revenue to cover all operating and capital expenditures. As with many general aviation airports, this is not always possible and other financial methods will be needed.

There are several alternatives for local financing options for future development at the airport, including airport revenues, direct funding from the airport sponsors, issuing bonds, and leasehold financing. These strategies could be used to fund the local matching share, or complete the project if grant funding cannot be arranged. The capital improvement program has assumed that some landside facility development would be privately developed.

There are several municipal bonding options available, including general obligation bonds, limited obligation bonds, and revenue bonds. General obligation bonds are a common form of municipal bond which is issued by voter approval, is secured by the full faith and credit of the county, and future tax revenues are pledged to retire the debt. As instruments of credit and because the community secures the bonds, general obligation bonds reduce the available debt level of the community. Due to the community pledge to secure and pay general obligation bonds, they are the most secure type of municipal bond and are generally issued at lower interest rates and carry lower costs of issuance. The primary disadvantage of general obligation bonds is that they require voter approval and are subject to statutory debt limits. This requires that they be used for projects that have broad support among the voters, and that they are reserved for projects that have the highest public priorities.

In contrast to general obligation bonds, limited obligation bonds (sometimes referred to as self-liquidating bonds) are secured by revenues from a local source. While neither general fund revenues nor the taxing power of the local community is pledged to pay the debt service, these sources may be required to retire the debt if pledged revenues are insufficient to make interest and principal payments on the bonds. These bonds still carry the full faith and credit pledge of the local community and are considered, for the purpose of financial analysis, as part of the debt burden of the local community. The overall debt burden of the local community is a factor in determining interest rates on municipal bonds.

There are several types of revenue bonds, but in general, they are a form of municipal bond which is payable solely from the revenue derived from the operation of a facility that was constructed or acquired with the proceeds of the bonds. For example, a lease revenue bond is secured with the income from a lease assigned to the repayment of the bonds. Revenue bonds have become a common form of financing airport improvements. Revenue bonds present the opportunity to provide those improvements without direct burden to the taxpayer. Revenue bonds normally carry a higher interest rate because they lack the guarantees of general and limited obligation bonds.

Leasehold financing refers to a developer or tenant financing improvements under a long term ground lease. The obvious advantage of such an arrangement is that it relieves the community of all responsibility for raising the capital funds for improvements. However, the private development of facilities on a ground lease, particularly on property owned by a government agency, produces a unique set of concerns.

In particular, it is more difficult to obtain private financing as only the improvements and the right to continue the lease can be claimed in the event of a default. Ground leases normally provide for the reversion of improvements to the airport at the end of the lease term, which reduces their potential value to a lender taking possession. Also, companies that want to own their property as a matter of financial policy may not locate where land is only available for lease.

Airport Revenue

Airports are capable of generating revenue since they can be operated as a business and not just a public amenity. Columbia Gorge Regional Airport generates revenue from several sources, including hangar rental, ground leases, and fuel flowage fees. An examination of the fee structure for airport revenue sources was undertaken.

The airport owns most of the hangars on the airport and leases space to airport users. The rates charged for the hangars are within the expected norm for an airport like Columbia Gorge Regional Airport. The Otis hangars (north apron eight-unit T-hangar facility) generate approximately $165 per month per unit. Newer T-hangars to the south generate $265 per unit per month. Box and conventional hangar lease rates range from $0.20 to $0.30 per square foot per month. Ground lease rates are currently $0.23 per square foot per year. The aircraft storage lease rates are reasonable and should be maintained. Over time, lease agreements should provide for adjustment based on common indices such as the Consumer Price Index (CPI).

The airport has revenue sources other than hangar or ground leases. The airport receives revenue for leasing space to the cellular companies to allow their equipment on the beacon tower. The fixed base operator (FBO) pays a monthly fee for counter/office space in the terminal building. The FBO also pays a fuel flowage fee.

FINANCING CONCLUSION

The CIP previously presented indicated a need for approximately $16.7 million in airport improvements in the next five years. The only revenue source that is currently guaranteed is the federal non-primary entitlement funding of up to $150,000 annually. Clearly, other revenue sources will need to be identified in order to accomplish the projects identified in the CIP. Airport management should work with the FAA to pursue discretionary grants. They should also work with both state aviation agencies to fund priority projects.

SUMMARY

The best means to begin implementation of the recommendations in this master plan is to first recognize that planning is a continuous process that does not end with completion and approval of this document. Rather, the ability to continuously monitor the existing and forecast status of airport activity must be provided and maintained. The issues upon which this master plan is based will remain valid for a number of years. The primary goal is for the airport to best serve the air transportation needs of the region, while continuing to be economically self-sufficient.

The actual need for facilities is most appropriately established by airport activity levels rather than a specified date. For example, projections have been made as to when additional hangars may be needed at the airport. In reality, however, the time frame in which the development is needed may be substantially different. Actual demand may be slower to develop than expected. On the other hand, high levels of demand may establish the need to accelerate the development. Although every effort has been made in this master planning process to conservatively estimate when facility development may be needed, aviation demand will dictate when facility improvements need to be delayed or accelerated.

The real value of a usable master plan is in keeping the issues and objectives in the minds of the managers and decision-makers so that they are better able to recognize change and its effect. In addition to adjustments in aviation demand, decisions made as to when to undertake the improvements recommended in this master plan will impact the period that the plan remains valid. The format used in this plan is intended to reduce the need for formal and costly updates by simply adjusting the timing. Updating can be done by the manager, thereby improving the plan's effectiveness.

In summary, the planning process requires the airport management to consistently monitor the progress of the airport in terms of aircraft operations and based aircraft. Analysis of aircraft demand is critical to the timing and need for new airport facilities. The information obtained from continually monitoring airport activity will provide the data necessary to determine if the development schedule should be accelerated or decelerated.

Columbia Gorge Regional Airport

Appendix A

GLOSSARY OF TERMS

Glossary of Terms

A

ABOVE GROUND LEVEL: The elevation of a point or surface above the ground.

ACCELERATE-STOP DISTANCE AVAILABLE (ASDA): See declared distances.

ADVISORY CIRCULAR: External publications issued by the FAA consisting of nonregulatory material providing for the recommendations relative to a policy, guidance and information relative to a specific aviation subject.

AIR CARRIER: An operator which: (1) performs at least five round trips per week between two or more points and publishes flight schedules which specify the times, days of the week, and places between which such flights are performed; or (2) transports mail by air pursuant to a current contract with the U.S. Postal Service. Certified in accordance with Federal Aviation Regulation (FAR) Parts 121 and 127.

AIRCRAFT: A transportation vehicle that is used or intended for use for flight.

AIRCRAFT APPROACH CATEGORY: A grouping of aircraft based on 1.3 times the stall speed in their landing configuration at their maximum certificated landing weight. The categories are as follows:

- Category A: Speed less than 91 knots.
- Category B: Speed 91 knots or more, but less than 121 knots.
- Category C: Speed 121 knots or more, but less than 141 knots.
- Category D: Speed 141 knots or more, but less than 166 knots.
- Category E: Speed greater than 166 knots.

AIRCRAFT OPERATION: The landing, takeoff, or touch-and-go procedure by an aircraft on a runway at an airport.

AIRCRAFT OPERATIONS AREA (AOA): A restricted and secure area on the airport property designed to protect all aspects related to aircraft operations.

AIRCRAFT OWNERS AND PILOTS ASSOCIATION: A private organization serving the interests and needs of general aviation pilots and aircraft owners.

AIRCRAFT RESCUE AND FIRE FIGHTING: A facility located at an airport that provides emergency vehicles, extinguishing agents, and personnel responsible for minimizing the impacts of an aircraft accident or incident.

AIRFIELD: The portion of an airport which contains the facilities necessary for the operation of aircraft.

AIRLINE HUB: An airport at which an airline concentrates a significant portion of its activity and which often has a significant amount of connecting traffic.

AIRPLANE DESIGN GROUP (ADG): A grouping of aircraft based upon wingspan. The groups are as follows:

- Group I: Up to but not including 49 feet.
- Group II: 49 feet up to but not including 79 feet.
- Group III: 79 feet up to but not including 118 feet.
- Group IV: 118 feet up to but not including 171 feet.
- Group V: 171 feet up to but not including 214 feet.
- Group VI: 214 feet or greater.

AIRPORT AUTHORITY: A quasi-governmental public organization responsible for setting the policies governing the management and operation of an airport or system of airports under its jurisdiction.

AIRPORT BEACON: A navigational aid located at an airport which displays a rotating light beam to identify whether an airport is lighted.

AIRPORT CAPITAL IMPROVEMENT PLAN: The planning program used by the Federal Aviation Administration to identify, prioritize, and distribute funds for airport development and the needs of the National Airspace System to meet specified national goals and objectives.

AIRPORT ELEVATION: The highest point on the runway system at an airport expressed in feet above mean sea level (MSL).

AIRPORT IMPROVEMENT PROGRAM: A program authorized by the Airport and Airway

Improvement Act of 1982 that provides funding for airport planning and development.

AIRPORT LAYOUT DRAWING (ALD): The drawing of the airport showing the layout of existing and proposed airport facilities.

AIRPORT LAYOUT PLAN (ALP): A scaled drawing of the existing and planned land and facilities necessary for the operation and development of the airport.

AIRPORT LAYOUT PLAN DRAWING SET: A set of technical drawings depicting the current and future airport conditions. The individual sheets comprising the set can vary with the complexities of the airport, but the FAA-required drawings include the Airport Layout Plan (sometimes referred to as the Airport Layout Drawing (ALD), the Airport Airspace Drawing, and the Inner Portion of the Approach Surface Drawing, On-Airport Land Use Drawing, and Property Map.

AIRPORT MASTER PLAN: The planner's concept of the long-term development of an airport.

AIRPORT MOVEMENT AREA SAFETY SYSTEM: A system that provides automated alerts and warnings of potential runway incursions or other hazardous aircraft movement events.

AIRPORT OBSTRUCTION CHART: A scaled drawing depicting the Federal Aviation Regulation (FAR) Part 77 surfaces, a representation of objects that penetrate these surfaces, runway, taxiway, and ramp areas, navigational aids, buildings, roads and other detail in the vicinity of an airport.

AIRPORT REFERENCE CODE (ARC): A coding system used to relate airport design criteria to the operational (Aircraft Approach Category) to the physical characteristics (Airplane Design Group) of the airplanes intended to operate at the airport.

AIRPORT REFERENCE POINT (ARP): The latitude and longitude of the approximate center of the airport.

AIRPORT SPONSOR: The entity that is legally responsible for the management and operation of an airport, including the fulfillment of the requirements of laws and regulations related thereto.

AIRPORT SURFACE DETECTION EQUIPMENT: A radar system that provides air traffic controllers with a visual representation of the movement of aircraft and other vehicles on the ground on the airfield at an airport.

AIRPORT SURVEILLANCE RADAR: The primary radar located at an airport or in an air traffic control terminal area that receives a signal at an antenna and transmits the signal to air traffic control display equipment defining the location of aircraft in the air. The signal provides only the azimuth and range of aircraft from the location of the antenna.

AIRPORT TRAFFIC CONTROL TOWER (ATCT): A central operations facility in the terminal air traffic control system, consisting of a tower, including an associated instrument flight rule (IFR) room if radar equipped, using air/ground communications and/or radar, visual signaling and other devices to provide safe and expeditious movement of terminal air traffic.

AIR ROUTE TRAFFIC CONTROL CENTER: A facility which provides en route air traffic control service to aircraft operating on an IFR flight plan within controlled airspace over a large, multi-state region.

AIRSIDE: The portion of an airport that contains the facilities necessary for the operation of aircraft.

AIRSPACE: The volume of space above the surface of the ground that is provided for the operation of aircraft.

AIR TAXI: An air carrier certificated in accordance with FAR Part 121 and FAR Part 135 and authorized to provide, on demand, public transportation of persons and property by aircraft. Generally operates small aircraft "for hire" for specific trips.

AIR TRAFFIC CONTROL: A service operated by an appropriate organization for the purpose of providing for the safe, orderly, and expeditious flow of air traffic.

AIR ROUTE TRAFFIC CONTROL CENTER (ARTCC): A facility established to provide air traffic control service to aircraft operating on an IFR flight plan within controlled airspace and principally during the en route phase of flight.

AIR TRAFFIC CONTROL SYSTEM COMMAND CENTER: A facility operated by the FAA which is responsible for the central flow control, the central altitude reservation system, the airport reservation position system, and the air traffic service contingency command for the air traffic control system.

AIR TRAFFIC HUB: A categorization of commercial service airports or group of commercial service airports in a metropolitan or urban area based upon the proportion of annual national enplanements existing at the airport or airports. The categories are large hub, medium hub, small hub, or non-hub. It forms the basis for the apportionment of entitlement funds.

AIR TRANSPORT ASSOCIATION OF AMERICA: An organization consisting of the principal U.S. airlines that represents the interests of the airline industry on major aviation issues before federal, state, and local government bodies. It promotes air transportation safety by coordinating industry and governmental safety programs and it serves as a focal point for industry efforts to standardize practices and enhance the efficiency of the air transportation system.

ALERT AREA: See special-use airspace.

ALTITUDE: The vertical distance measured in feet above mean sea level.

ANNUAL INSTRUMENT APPROACH (AIA): An approach to an airport with the intent to land by an aircraft in accordance with an IFR flight plan when visibility is less than three miles and/or when the ceiling is at or below the minimum initial approach altitude.

APPROACH LIGHTING SYSTEM (ALS): An airport lighting facility which provides visual guidance to landing aircraft by radiating light beams by which the pilot aligns the aircraft with the extended centerline of the runway on his final approach and landing.

APPROACH MINIMUMS: The altitude below which an aircraft may not descend while on an IFR approach unless the pilot has the runway in sight.

APPROACH SURFACE: An imaginary obstruction limiting surface defined in FAR Part 77 which is longitudinally centered on an extended runway centerline and extends outward and upward from the primary surface at each end of a runway at a designated slope and distance based upon the type of available or planned approach by aircraft to a runway.

APRON: A specified portion of the airfield used for passenger, cargo or freight loading and unloading, aircraft parking, and the refueling, maintenance and servicing of aircraft.

AREA NAVIGATION: The air navigation procedure that provides the capability to establish and maintain a flight path on an arbitrary course that remains within the coverage area of navigational sources being used.

AUTOMATED TERMINAL INFORMATION SERVICE (ATIS): The continuous broadcast of recorded non-control information at towered airports. Information typically includes wind speed, direction, and runway in use.

AUTOMATED SURFACE OBSERVATION SYSTEM (ASOS): A reporting system that provides frequent airport ground surface weather observation data through digitized voice broadcasts and printed reports.

AUTOMATED WEATHER OBSERVATION STATION (AWOS): Equipment used to automatically record weather conditions (i.e. cloud height, visibility, wind speed and direction, temperature, dew point, etc.)

AUTOMATIC DIRECTION FINDER (ADF): An aircraft radio navigation system which senses and indicates the direction to a non-directional radio beacon (NDB) ground transmitter.

AVIGATION EASEMENT: A contractual right or a property interest in land over which a right of unobstructed flight in the airspace is established.

AZIMUTH: Horizontal direction expressed as the angular distance between true north and the direction of a fixed point (as the observer's heading).

B

BASE LEG: A flight path at right angles to the landing runway off its approach end. The base leg normally extends from the downwind leg to the intersection of the extended runway centerline. See "traffic pattern."

BASED AIRCRAFT: The general aviation aircraft that use a specific airport as a home base.

BEARING: The horizontal direction to or from any point, usually measured clockwise from true north or magnetic north.

BLAST FENCE: A barrier used to divert or dissipate jet blast or propeller wash.

BLAST PAD: A prepared surface adjacent to the end of a runway for the purpose of eliminating the erosion of the ground surface by the wind forces produced by airplanes at the initiation of takeoff operations.

BUILDING RESTRICTION LINE (BRL): A line which identifies suitable building area locations on the airport.

C

CAPITAL IMPROVEMENT PLAN: The planning program used by the Federal Aviation Administration to identify, prioritize, and distribute Airport Improvement Program funds for airport development and the needs of the National Airspace System to meet specified national goals and objectives.

CARGO SERVICE AIRPORT: An airport served by aircraft providing air transportation of property only, including mail, with an annual aggregate landed weight of at least 100,000,000 pounds.

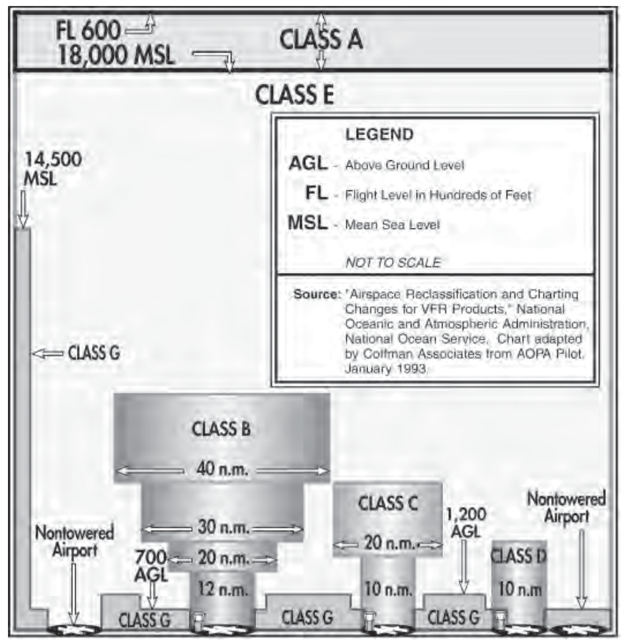
CATEGORY I: An Instrument Landing System (ILS) that provides acceptable guidance information to an aircraft from the coverage limits of the ILS to the point at which the localizer course line intersects the glide path at a decision height of 100 feet above the horizontal plane containing the runway threshold.

CATEGORY II: An ILS that provides acceptable guidance information to an aircraft from the coverage limits of the ILS to the point at which the localizer course line intersects the glide path at a decision height of 50 feet above the horizontal plane containing the runway threshold.

CATEGORY III: An ILS that provides acceptable guidance information to a pilot from the coverage limits of the ILS with no decision height specified above the horizontal plane containing the runway threshold.

CEILING: The height above the ground surface to the location of the lowest layer of clouds which is reported as either broken or overcast.

CIRCLING APPROACH: A maneuver initiated by the pilot to align the aircraft with the runway for landing when flying a predetermined circling instrument approach under IFR.



CLASS A AIRSPACE: See Controlled Airspace.

CLASS B AIRSPACE: See Controlled Airspace.

CLASS C AIRSPACE: See Controlled Airspace.

CLASS D AIRSPACE: See Controlled Airspace.

CLASS E AIRSPACE: See Controlled Airspace.

CLASS G AIRSPACE: See Controlled Airspace.

CLEAR ZONE: See Runway Protection Zone.

COMMERCIAL SERVICE AIRPORT: A public airport providing scheduled passenger service that enplanes at least 2,500 annual passengers.

COMMON TRAFFIC ADVISORY FREQUENCY: A radio frequency identified in the appropriate aeronautical chart which is designated for the purpose of transmitting airport advisory information and procedures while operating to or from an uncontrolled airport.

COMPASS LOCATOR (LOM): A low power, low/medium frequency radio-beacon installed in conjunction with the instrument landing system at one or two of the marker sites.

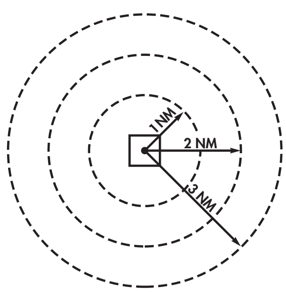
CONICAL SURFACE: An imaginary obstruction-limiting surface defined in FAR Part 77 that extends from the edge of the horizontal surface outward and upward at a slope of 20 to 1 for a horizontal distance of 4,000 feet.

CONTROLLED AIRPORT: An airport that has an operating airport traffic control tower.

CONTROLLED AIRSPACE: Airspace of defined dimensions within which air traffic control services are provided to instrument flight rules (IFR) and visual flight rules (VFR) flights in accordance with the airspace classification. Controlled airspace in the United States is designated as follows:

- **CLASS A**: Generally, the airspace from 18,000 feet mean sea level (MSL) up to but not including flight level FL600. All persons must operate their aircraft under IFR.

- **CLASS B**: Generally, the airspace from the surface to 10,000 feet MSL surrounding the nation's busiest airports. The configuration of Class B airspace is unique to each airport, but typically consists of two or more layers of air space and is designed to contain all published instrument approach procedures to the airport. An air traffic control clearance is required for all aircraft to operate in the area.



- **CLASS C**: Generally, the airspace from the surface to 4,000 feet above the airport elevation (charted as MSL) surrounding those airports that have an operational control tower and radar approach control and are served by a qualifying number of IFR operations or passenger enplanements. Although individually tailored for each airport, Class C airspace typically consists of a surface area with a five nautical mile (nm) radius and an outer area with a 10 nautical mile radius that extends from 1,200 feet to 4,000 feet above the airport elevation. Two-way radio communication is required for all aircraft.

- **CLASS D**: Generally, that airspace from the surface to 2,500 feet above the air port elevation (charted as MSL) surrounding those airports that have an operational control tower. Class D airspace is individually tailored and configured to encompass published instrument approach procedure . Unless otherwise authorized, all persons must establish two-way radio communication.

- **CLASS E**: Generally, controlled airspace that is not classified as Class A, B, C, or D. Class E airspace extends upward from either the surface or a designated altitude to the overlying or adjacent controlled airspace. When designated as a surface area, the airspace will be configured to contain all instrument procedures. Class E airspace encompasses all Victor Airways. Only aircraft following instrument flight rules are required to establish two-way radio communication with air traffic control.

- **CLASS G**: Generally, that airspace not classified as Class A, B, C, D, or E. Class G airspace is uncontrolled for all aircraft. Class G airspace extends from the surface to the overlying Class E airspace.

CONTROLLED FIRING AREA: See special-use airspace.

CROSSWIND: A wind that is not parallel to a runway centerline or to the intended flight path of an aircraft.

CROSSWIND COMPONENT: The component of wind that is at a right angle to the runway centerline or the intended flight path of an aircraft.

CROSSWIND LEG: A flight path at right angles to the landing runway off its upwind end. See "traffic pattern."

D

DECIBEL: A unit of noise representing a level relative to a reference of a sound pressure 20 micro newtons per square meter.

DECISION HEIGHT: The height above the end of the runway surface at which a decision must be made by a pilot during the ILS or Precision Approach Radar approach to either continue the approach or to execute a missed approach.

DECLARED DISTANCES: The distances declared available for the airplane's takeoff runway, takeoff distance, accelerate-stop distance, and landing distance requirements. The distances are:

- **TAKEOFF RUNWAY AVAILABLE (TORA)**: The runway length declared available and suitable for the ground run of an airplane taking off.

- **TAKEOFF DISTANCE AVAILABLE (TODA)**: The TORA plus the length of any remaining runway and/or clear way beyond the far end of the TORA.

- **ACCELERATE-STOP DISTANCE AVAILABLE (ASDA)**: The runway plus stopway length declared available for the acceleration and deceleration of an aircraft aborting a takeoff.

- **LANDING DISTANCE AVAILABLE (LDA)**: The runway length declared available and suitable for landing.

DEPARTMENT OF TRANSPORTATION: The cabinet level federal government organization consisting of modal operating agencies, such as the Federal Aviation Administration, which was established to promote the coordination of federal transportation programs and to act as a focal point for research and development efforts in transportation.

DISCRETIONARY FUNDS: Federal grant funds that may be appropriated to an airport based upon designation by the Secretary of Transportation or Congress to meet a specified national priority such as enhancing capacity, safety, and security, or mitigating noise.

DISPLACED THRESHOLD: A threshold that is located at a point on the runway other than the designated beginning of the runway.

DISTANCE MEASURING EQUIPMENT (DME): Equipment (airborne and ground) used to measure, in nautical miles, the slant range distance of an aircraft from the DME navigational aid.

DNL: The 24-hour average sound level, in Aweighted decibels, obtained after the addition of ten decibels to sound levels for the periods between 10 p.m. and 7 a.m. as averaged over a span of one year. It is the FAA standard metric for determining the cumulative exposure of individuals to noise.

DOWNWIND LEG: A flight path parallel to the landing runway in the direction opposite to landing. The downwind leg normally extends between the crosswind leg and the base leg. Also see "traffic pattern."

E

EASEMENT: The legal right of one party to use a portion of the total rights in real estate owned by another party. This may include the right of passage over, on, or below the property; certain air rights above the property, including view rights; and the rights to any specified form of development or activity, as well as any other legal rights in the property that may be specified in the easement document.

ELEVATION: The vertical distance measured in feet above mean sea level.

ENPLANED PASSENGERS: The total number of revenue passengers boarding aircraft, including originating, stop-over, and transfer passengers, in scheduled and nonscheduled services.

ENPLANEMENT: The boarding of a passenger, cargo, freight, or mail on an aircraft at an airport.

ENTITLEMENT: Federal funds for which a commercial service airport may be eligible based upon its annual passenger enplanements.

ENVIRONMENTAL ASSESSMENT (EA): An environmental analysis performed pursuant to the National Environmental Policy Act to determine whether an action would significantly affect the environment and thus require a more detailed environmental impact statement.

ENVIRONMENTAL AUDIT: An assessment of the current status of a party's compliance with applicable environmental requirements of a party's environmental compliance policies, practices, and controls.

ENVIRONMENTAL IMPACT STATEMENT (EIS): A document required of federal agencies by the National Environmental Policy Act for major projects are legislative proposals affecting the environment. It is a tool for decision-making describing the positive and negative effects of a proposed action and citing alternative actions.

ESSENTIAL AIR SERVICE: A federal program which guarantees air carrier service to selected small cities by providing subsidies as needed to prevent these cities from such service.

F

FEDERAL AVIATION REGULATIONS: The general and permanent rules established by the executive departments and agencies of the Federal Government for aviation, which are published in the Federal Register. These are the aviation subset of the Code of Federal Regulations.

FEDERAL INSPECTION SERVICES: The provision of customs and immigration services including passport inspection, inspection of baggage, the collection of duties on certain imported items, and the inspections for agricultural products, illegal drugs, or other restricted items.

FINAL APPROACH: A flight path in the direction of landing along the extended runway centerline. The final approach normally extends from the base leg to the runway. See "traffic pattern."

FINAL APPROACH AND TAKEOFF AREA (FATO). A defined area over which the final phase of the helicopter approach to a hover, or a landing is completed and from which the takeoff is initiated.

FINAL APPROACH FIX: The designated point at which the final approach segment for an aircraft landing on a runway begins for a non-precision approach.

FINDING OF NO SIGNIFICANT IMPACT (FONSI): A public document prepared by a Federal agency that presents the rationale why a proposed action will not have a significant effect on the environment and for which an environmental impact statement will not be prepared.

FIXED BASE OPERATOR (FBO): A provider of services to users of an airport. Such services include, but are not limited to, hangaring, fueling, flight training, repair, and maintenance.

FLIGHT LEVEL: A designation for altitude within controlled airspace.

FLIGHT SERVICE STATION: An operations facility in the national flight advisory system which utilizes data interchange facilities for the collection and dissemination of Notices to Airmen, weather, and administrative data and which provides pre-flight and in-flight advisory services to pilots through air and ground based communication facilities.

FRANGIBLE NAVAID: A navigational aid which retains its structural integrity and stiffness up to a designated maximum load, but on impact from a greater load, breaks, distorts, or yields in such a manner as to present the minimum hazard to aircraft.

G

GENERAL AVIATION: That portion of civil aviation which encompasses all facets of aviation except air carriers holding a certificate of convenience and necessity, and large aircraft commercial operators.

GENERAL AVIATION AIRPORT: An airport that provides air service to only general aviation.

GLIDESLOPE (GS): Provides vertical guidance for aircraft during approach and landing. The glideslope consists of the following:

1. Electronic components emitting signals which provide vertical guidance by reference to airborne instruments during instrument approaches such as ILS; or

2. Visual ground aids, such as VASI, which provide vertical guidance for VFR approach or for the visual portion of an instrument approach and landing.

GLOBAL POSITIONING SYSTEM (GPS): A system of 24 satellites used as reference points to enable navigators equipped with GPS receivers to determine their latitude, longitude, and altitude.

GROUND ACCESS: The transportation system on and around the airport that provides access to and from the airport by ground transportation vehicles for passengers, employees, cargo, freight, and airport services.

H

HELIPAD: A designated area for the takeoff, landing, and parking of helicopters.

HIGH INTENSITY RUNWAY LIGHTS: The highest classification in terms of intensity or brightness for lights designated for use in delineating the sides of a runway.

HIGH-SPEED EXIT TAXIWAY: A long radius taxiway designed to expedite aircraft turning off the runway after landing (at speeds to 60 knots), thus reducing runway occupancy time.

HORIZONTAL SURFACE: An imaginary obstruction- limiting surface defined in FAR Part 77 that is specified as a portion of a horizontal plane surrounding a runway located 150 feet above the established airport elevation. The specific horizontal dimensions of this surface are a function of the types of approaches existing or planned for the runway.

I

INITIAL APPROACH FIX: The designated point at which the initial approach segment begins for an instrument approach to a runway.

INSTRUMENT APPROACH PROCEDURE: A series of predetermined maneuvers for the orderly transfer of an aircraft under instrument flight conditions from the beginning of the initial approach to a landing, or to a point from which a landing may be made visually.

INSTRUMENT FLIGHT RULES (IFR): Procedures for the conduct of flight in weather conditions below Visual Flight Rules weather minimums. The term IFR is often also used to define weather conditions and the type of flight plan under which an aircraft is operating.

INSTRUMENT LANDING SYSTEM (ILS): A precision instrument approach system which normally consists of the following electronic components and visual aids:

1. Localizer.
2. Glide Slope.
3. Outer Marker.
4. Middle Marker.
5. Approach Lights.

INSTRUMENT METEOROLOGICAL CONDITIONS: Meteorological conditions expressed in terms of specific visibility and ceiling conditions that are less than the minimums specified for visual meteorological conditions.

ITINERANT OPERATIONS: Operations by aircraft that are not based at a specified airport.

K

KNOTS: A unit of speed length used in navigation that is equivalent to the number of nautical miles traveled in one hour.

L

LANDSIDE: The portion of an airport that provides the facilities necessary for the processing of passengers, cargo, freight, and ground transportation vehicles.

LANDING DISTANCE AVAILABLE (LDA): See declared distances.

LARGE AIRPLANE: An airplane that has a maximum certified takeoff weight in excess of 12,500 pounds.

LOCAL AREA AUGMENTATION SYSTEM: A differential GPS system that provides localized measurement correction signals to the basic GPS signals to improve navigational accuracy integrity, continuity, and availability.

LOCAL OPERATIONS: Aircraft operations performed by aircraft that are based at the airport and that operate in the local traffic pattern or within sight of the airport, that are known to be departing for or arriving from flights in local practice areas within a prescribed distance from the airport, or that execute simulated instrument approaches at the airport.

LOCAL TRAFFIC: Aircraft operating in the traffic pattern or within sight of the tower, or aircraft known to be departing or arriving from the local practice areas, or aircraft executing practice instrument approach procedures. Typically, this includes touch and-go training operations.

LOCALIZER: The component of an ILS which provides course guidance to the runway.

LOCALIZER TYPE DIRECTIONAL AID (LDA): A facility of comparable utility and accuracy to a localizer, but is not part of a complete ILS and is not aligned with the runway.

LONG RANGE NAVIGATION SYSTEM (LORAN): Long range navigation is an electronic navigational aid which determines aircraft position and speed by measuring the difference in the time of reception of synchronized pulse signals from two fixed transmitters. Loran is used for en route navigation.

LOW INTENSITY RUNWAY LIGHTS: The lowest clas- sification in terms of intensity or brightness for lights designated for use in delineating the sides of a runway.

M

MEDIUM INTENSITY RUNWAY LIGHTS: The middle classification in terms of intensity or brightness for lights designated for use in delineating the sides of a runway.

MICROWAVE LANDING SYSTEM (MLS): An instrument approach and landing system that provides precision guidance in azimuth, elevation, and distance measurement.

MILITARY OPERATIONS: Aircraft operations that are performed in military aircraft.

MILITARY OPERATIONS AREA (MOA): See special-use airspace

MILITARY TRAINING ROUTE: An air route depicted on aeronautical charts for the conduct of military flight training at speeds above 250 knots.

MISSED APPROACH COURSE (MAC): The flight route to be followed if, after an instrument approach, a landing is not affected, and occurring normally:

1. When the aircraft has descended to the decision height and has not established visual contact; or

2. When directed by air traffic control to pull up or to go around again.

MOVEMENT AREA: The runways, taxiways, and other areas of an airport which are utilized for taxiing/hover taxiing, air taxiing, takeoff, and landing of aircraft, exclusive of loading ramps and parking areas. At those airports with a tower, air traffic control clearance is required for entry onto the movement area.

N

NATIONAL AIRSPACE SYSTEM: The network of air traffic control facilities, air traffic control areas, and navigational facilities through the U.S.

NATIONAL PLAN OF INTEGRATED AIRPORT SYSTEMS: The national airport system plan developed by the Secretary of Transportation on a biannual basis for the development of public use airports to meet national air transportation needs.

NATIONAL TRANSPORTATION SAFETY BOARD: A federal government organization established to investigate and determine the probable cause of transportation accidents, to recommend equipment and procedures to enhance transportation safety, and to review on appeal the suspension or revocation of any certificates or licenses issued by the Secretary of Transportation.

NAUTICAL MILE: A unit of length used in navigation which is equivalent to the distance spanned by one minute of arc in latitude, that is, 1,852 meters or 6,076 feet. It is equivalent to approximately 1.15 statute mile.

NAVAID: A term used to describe any electrical or visual air navigational aids, lights, signs, and associated supporting equipment (i.e. PAPI, VASI, ILS, etc.)

NAVIGATIONAL AID: A facility used as, available for use as, or designed for use as an aid to air navigation.

NOISE CONTOUR: A continuous line on a map of the airport vicinity connecting all points of the same noise exposure level.

NON-DIRECTIONAL BEACON (NDB): A beacon transmitting nondirectional signals whereby the pilot of an aircraft equipped with direction finding equipment can determine his or her bearing to and from the radio beacon and home on, or track to, the station. When the radio beacon is installed in conjunction with the Instrument Landing System marker, it is normally called a Compass Locator.

NON-PRECISION APPROACH PROCEDURE: A standard instrument approach procedure in which no electronic glide slope is provided, such as VOR, TACAN, NDB, or LOC.

NOTICE TO AIRMEN: A notice containing information concerning the establishment, condition, or change in any component of or hazard in the National Airspace System, the timely knowledge of which is considered essential to personnel concerned with flight operations.

O

OBJECT FREE AREA (OFA): An area on the ground centered on a runway, taxiway, or taxilane centerline provided to enhance the safety of aircraft operations by having the area free of objects, except for objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes.

OBSTACLE FREE ZONE (OFZ): The airspace below 150 feet above the established airport elevation and along the runway and extended runway centerline that is required to be kept clear of all objects, except for frangible visual NAVAIDs that need to be located in the OFZ because of their function, in order to provide clearance for aircraft landing or taking off from the runway, and for missed approaches.

ONE-ENGINE INOPERABLE SURFACE: A surface emanating from the runway end at a slope ratio of 62.5:1. Air carrier airports are required to maintain a technical drawing of this surface depicting any object penetrations by January 1, 2010.

OPERATION: The take-off, landing, or touch-and-go procedure by an aircraft on a runway at an airport.

OUTER MARKER (OM): An ILS navigation facility in the terminal area navigation system located four to seven miles from the runway edge on the extended centerline, indicating to the pilot that he/she is passing over the facility and can begin final approach.

P

PILOT CONTROLLED LIGHTING: Runway lighting systems at an airport that are controlled by activating the microphone of a pilot on a specified radio frequency.

PRECISION APPROACH: A standard instrument approach procedure which provides runway alignment and glide slope (descent) information. It is categorized as follows:

- **CATEGORY I (CAT I)**: A precision approach which provides for approaches with a decision height of not less than 200 feet and visibility not less than 1/2 mile or Runway Visual Range (RVR) 2400 (RVR 1800) with operative touchdown zone and runway centerline lights.

- **CATEGORY II (CAT II)**: A precision approach which provides for approaches with a decision height of not less than 100 feet and visibility not less than 1200 feet RVR.

- **CATEGORY III (CAT III)**: A precision approach which provides for approaches with minima less than Category II.

PRECISION APPROACH PATH INDICATOR (PAPI): A lighting system providing visual approach slope guidance to aircraft during a landing approach. It is similar to a VASI but provides a sharper transition between the colored indicator lights.

PRECISION APPROACH RADAR: A radar facility in the terminal air traffic control system used to detect and display with a high degree of accuracy the direction, range, and elevation of an aircraft on the final approach to a runway.

PRECISION OBJECT FREE AREA (POFA): An area centered on the extended runway centerline, beginning at the runway threshold and extending behind the runway threshold that is 200 feet long by 800 feet wide. The POFA is a clearing standard which requires the POFA to be kept clear of above ground objects protruding above the runway safety area edge elevation (except for frangible NAVAIDS). The POFA applies to all new authorized instrument approach procedures with less than 3/4 mile visibility.

PRIMARY AIRPORT: A commercial service airport that enplanes at least 10,000 annual passengers.

PRIMARY SURFACE: An imaginary obstruction limiting surface defined in FAR Part 77 that is specified as a rectangular surface longitudinally centered about a runway. The specific dimensions of this surface are a function of the types of approaches existing or planned for the runway.

PROHIBITED AREA: See special-use airspace.

PVC: Poor visibility and ceiling. Used in determining Annual Service Volume. PVC conditions exist when the cloud ceiling is less than 500 feet and visibility is less than one mile.

R

RADIAL: A navigational signal generated by a Very High Frequency Omni-directional Range or VORTAC station that is measured as an azimuth from the station.

REGRESSION ANALYSIS: A statistical technique that seeks to identify and quantify the relationships between factors associated with a forecast.

REMOTE COMMUNICATIONS OUTLET (RCO): An unstaffed transmitter receiver/facility remotely controlled by air traffic personnel. RCOs serve flight service stations (FSSs). RCOs were established to provide ground-to-ground communications between air traffic control specialists and pilots at satellite airports for delivering en route clearances, issuing departure authorizations, and acknowledging instrument flight rules cancellations or departure/landing times.

REMOTE TRANSMITTER/RECEIVER (RTR): See remote communications outlet. RTRs serve ARTCCs.

RELIEVER AIRPORT: An airport to serve general aviation aircraft which might otherwise use a congested air-carrier served airport.

RESTRICTED AREA: See special-use airspace.

RNAV: Area navigation - airborne equipment which permits flights over determined tracks within prescribed accuracy tolerances without the need to overfly ground-based navigation facilities. Used en route and for approaches to an airport.

RUNWAY: A defined rectangular area on an airport prepared for aircraft landing and takeoff. Runways are normally numbered in relation to their magnetic direction, rounded off to the nearest 10 degrees. For example, a runway with a magnetic heading of 180 would be designated Runway 18. The runway heading on the opposite end of the runway is 180 degrees from that runway end. For example, the opposite runway heading for Runway 18 would be Runway 36 (magnetic heading of 360). Aircraft can takeoff or land from either end of a runway, depending upon wind direction.

RUNWAY ALIGNMENT INDICATOR LIGHT: A series of high intensity sequentially flashing lights installed on the extended centerline of the runway usually in conjunction with an approach lighting system.

RUNWAY END IDENTIFIER LIGHTS (REIL): Two synchronized flashing lights, one on each side of the runway threshold, which provide rapid and positive identification of the approach end of a particular runway.

RUNWAY GRADIENT: The average slope, measured in percent, between the two ends of a runway.

RUNWAY PROTECTION ZONE (RPZ): An area off the runway end to enhance the protection of people and property on the ground. The RPZ is trapezoidal in shape. Its dimensions are determined by the aircraft approach speed and runway approach type and minima.

RUNWAY SAFETY AREA (RSA): 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 VISIBILITY ZONE (RVZ): An area on the airport to be kept clear of permanent objects so that there is an unobstructed line of- site from any point five feet above the runway centerline to any point five feet above an intersecting runway centerline.

RUNWAY VISUAL RANGE (RVR): An instrumentally derived value, in feet, representing the horizontal distance a pilot can see down the runway from the runway end.

S

SCOPE: The document that identifies and defines the tasks, emphasis, and level of effort associated with a project or study.

SEGMENTED CIRCLE: A system of visual indicators designed to provide traffic pattern information at airports without operating control towers.

SHOULDER: An area adjacent to the edge of paved runways, taxiways, or aprons providing a transition between the pavement and the adjacent surface; support for aircraft running off the pavement; enhanced drainage; and blast protection. The shoulder does not necessarily need to be paved.

SLANT-RANGE DISTANCE: The straight line distance between an aircraft and a point on the ground.

SMALL AIRPLANE: An airplane that has a maximum certified takeoff weight of up to 12,500 pounds.

SPECIAL-USE AIRSPACE: Airspace of defined dimensions identified by a surface area wherein activities must be confined because of their nature and/or wherein limitations may be imposed upon aircraft operations that are not a part of those activities. Special-use airspace classifications include:

- **ALERT AREA**: Airspace which may contain a high volume of pilot training activities or an unusual type of aerial activity, neither of which is hazardous to aircraft.

- **CONTROLLED FIRING AREA**: Airspace wherein activities are conducted under conditions so controlled as to eliminate hazards to nonparticipating aircraft and to ensure the safety of persons or property on the ground.

- **MILITARY OPERATIONS AREA (MOA)**: Designated airspace with defined vertical and lateral dimensions established outside Class A airspace to separate/segregate certain military activities from instrument flight rule (IFR) traffic and to identify for visual flight rule (VFR) traffic where these activities are conducted.

- **PROHIBITED AREA**: Designated airspace within which the flight of aircraft is prohibited.

- **RESTRICTED AREA**: Airspace designated under Federal Aviation Regulation (FAR) 73, within which the flight of aircraft, while not wholly prohibited, is subject to restriction. Most restricted areas are designated joint use. When not in use by the using agency, IFR/VFR operations can be authorized by the controlling air traffic control facility.

- **WARNING AREA**: Airspace which may contain hazards to nonparticipating aircraft.

STANDARD INSTRUMENT DEPARTURE (SID): A preplanned coded air traffic control IFR departure routing, preprinted for pilot use in graphic and textual form only.

STANDARD INSTRUMENT DEPARTURE PROCEDURES: A published standard flight procedure to be utilized following takeoff to provide a transition between the airport and the terminal area or en route airspace.

STANDARD TERMINAL ARRIVAL ROUTE (STAR): A preplanned coded air traffic control IFR arrival routing, preprinted for pilot use in graphic and textual or textual form only.

STOP-AND-GO: A procedure wherein an aircraft will land, make a complete stop on the runway, and then commence a takeoff from that point. A stop-and-go is recorded as two operations: one operation for the landing and one operation for the takeoff.

STOPWAY: An area beyond the end of a takeoff runway that is designed to support an aircraft during an aborted takeoff without causing structural damage to the aircraft. It is not to be used for takeoff, landing, or taxiing by aircraft.

STRAIGHT-IN LANDING/APPROACH: A landing made on a runway aligned within 30 degrees of the final approach course following completion of an instrument approach.

T

TACTICAL AIR NAVIGATION (TACAN): An ultrahigh frequency electronic air navigation system which provides suitably-equipped aircraft a continuous indication of bearing and distance to the TACAN station.

TAKEOFF RUNWAY AVAILABLE (TORA): See declared distances.

TAKEOFF DISTANCE AVAILABLE (TODA): See declared distances.

TAXILANE: The portion of the aircraft parking area used for access between taxiways and aircraft parking positions.

TAXIWAY: A defined path established for the taxiing of aircraft from one part of an airport to another.

TAXIWAY SAFETY AREA (TSA): A defined surface alongside the taxiway prepared or suitable for reducing the risk of damage to an airplane unintentionally departing the taxiway.

TERMINAL INSTRUMENT PROCEDURES: Published flight procedures for conducting instrument approaches to runways under instrument meteorological conditions.

TERMINAL RADAR APPROACH CONTROL: An element of the air traffic control system responsible for monitoring the en-route and terminal segment of air traffic in the airspace surrounding airports with moderate to high levels of air traffic.

TETRAHEDRON: A device used as a landing direction indicator. The small end of the tetrahedron points in the direction of landing.

THRESHOLD: The beginning of that portion of the runway available for landing. In some instances the landing threshold may be displaced.

TOUCH-AND-GO: An operation by an aircraft that lands and departs on a runway without stopping or exiting the runway. A touch-and go is recorded as two operations: one operation for the landing and one operation for the takeoff.

TOUCHDOWN: The point at which a landing aircraft makes contact with the runway surface.

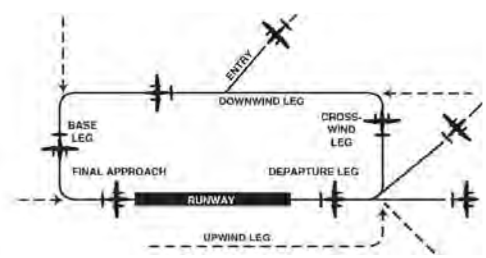
TOUCHDOWN AND LIFT-OFF AREA (TLOF): A load bearing, generally paved area, normally centered in the FATO, on which the helicopter lands or takes off.

TOUCHDOWN ZONE (TDZ): The first 3,000 feet of the runway beginning at the threshold.

TOUCHDOWN ZONE ELEVATION (TDZE): The highest elevation in the touchdown zone.

TOUCHDOWN ZONE (TDZ) LIGHTING: Two rows of transverse light bars located symmetrically about the runway centerline normally at 100- foot intervals. The basic system extends 3,000 feet along the runway.

TRAFFIC PATTERN: The traffic flow that is prescribed for aircraft landing at or taking off from an airport. The components of a typical traffic pattern are the upwind leg, crosswind leg, downwind leg, base leg, and final approach.



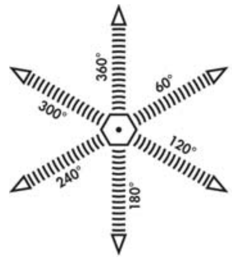
U

UNCONTROLLED AIRPORT: An airport without an air traffic control tower at which the control of Visual Flight Rules traffic is not exercised.

UNCONTROLLED AIRSPACE: Airspace within which aircraft are not subject to air traffic control.

UNIVERSAL COMMUNICATION (UNICOM): A nongovernment communication facility which may provide airport information at certain airports. Locations and frequencies of UNICOM's are shown on aeronautical charts and publications.

UPWIND LEG: A flight path parallel to the landing runway in the direction of landing. See "traffic pattern."



V

VECTOR: A heading issued to an aircraft to provide navigational guidance by radar.

VERY HIGH FREQUENCY/ OMNIDIRECTIONAL RANGE (VOR): A ground-based electronic navigation aid transmitting very high frequency navigation signals, 360 degrees in azimuth, oriented from magnetic north. Used as the basis for navigation in the national airspace system. The VOR periodically identifies itself by Morse Code and may have an additional voice identification feature.

VERY HIGH FREQUENCY OMNI-DIRECTIONAL RANGE/ TACTICAL AIR NAVIGATION (VORTAC): A navigation aid providing VOR azimuth, TACAN azimuth, and TACAN distance-measuring equipment (DME) at one site.

VICTOR AIRWAY: A control area or portion thereof established in the form of a corridor, the centerline of which is defined by radio navigational aids.

VISUAL APPROACH: An approach wherein an aircraft on an IFR flight plan, operating in VFR conditions under the control of an air traffic control facility and having an air traffic control authorization, may proceed to the airport of destination in VFR conditions.

VISUAL APPROACH SLOPE INDICATOR (VASI): An airport lighting facility providing vertical visual approach slope guidance to aircraft during approach to landing by radiating a directional pattern of high intensity red and white focused light beams which indicate to the pilot that he is on path if he sees red/white, above path if white/white, and below path if red/red. Some airports serving large aircraft have three-bar VASI's which provide two visual guide paths to the same runway.

VISUAL FLIGHT RULES (VFR): Rules that govern the procedures for conducting flight under visual conditions. The term VFR is also used in the United States to indicate weather conditions that are equal to or greater than minimum VFR requirements. In addition, it is used by pilots and controllers to indicate type of flight plan.

VISUAL METEOROLOGICAL CONDITIONS: Meteorological conditions expressed in terms of specific visibility and ceiling conditions which are equal to or greater than the threshold values for instrument meteorological conditions.

VOR: See "Very High Frequency Omnidirectional Range Station."

VORTAC: See "Very High Frequency Omnidirectional Range Station/Tactical Air Navigation."

W

WARNING AREA: See special-use airspace.

WIDE AREA AUGMENTATION SYSTEM: An enhancement of the Global Positioning System that includes integrity broadcasts, differential corrections, and additional ranging signals for the purpose of providing the accuracy, integrity, availability, and continuity required to support all phases of flight.

AC: advisory circular

ADF: automatic direction finder

ADG: airplane design group

AFSS: automated flight service station

AGL: above ground level

AIA: annual instrument approach

AIP: Airport Improvement Program

AIR-21: Wendell H. Ford Aviation Investment and Reform Act for the 21st Century

ALS: approach lighting system

ALSF-1: standard 2,400-foot high intensity approach lighting system with sequenced flashers (CAT I configuration)

ALSF-2: standard 2,400-foot high intensity approach lighting system with sequenced flashers (CAT II configuration)

AOA: Aircraft Operation Area

APV: instrument approach procedure with vertical guidance

ARC: airport reference code

ARFF: aircraft rescue and fire fighting

ARP: airport reference point

ARTCC: air route traffic control center

ASDA: accelerate-stop distance available

ASR: airport surveillance radar

ASOS: automated surface observation station

ATCT: airport traffic control tower

ATIS: automated terminal information service

AVGAS: aviation gasoline - typically 100 low lead (100L)

AWOS: automated weather observation station

BRL: building restriction line

CFR: Code of Federal Regulation

CIP: capital improvement program

DME: distance measuring equipment

DNL: day-night noise level

DWL: runway weight bearing capacity of aircraft with dual-wheel type landing gear

DTWL: runway weight bearing capacity of aircraft with dual-tandem type landing gear

FAA: Federal Aviation Administration

FAR: Federal Aviation Regulation

FBO: fixed base operator

FY: fiscal year

GPS: global positioning system

GS: glide slope

HIRL: high intensity runway edge lighting

IFR: instrument flight rules (FAR Part 91)

ILS: instrument landing system

IM: inner marker

LDA: localizer type directional aid

LDA: landing distance available

LIRL: low intensity runway edge lighting

LMM: compass locator at ILS outer marker

LORAN: long range navigation

MALS: midium intensity approach lighting system with indicator lights

MIRL: medium intensity runway edge lighting

MITL: medium intensity taxiway edge lighting

MLS: microwave landing system

MM: middle marker

MOA: military operations area

MSL: mean sea level

NAVAID: navigational aid

NDB: nondirectional radio beacon

NM: nautical mile (6,076.1 feet)

NPES: National Pollutant Discharge Elimination System

NPIAS: National Plan of Integrated Airport Systems

NPRM: notice of proposed rule making

ODALS: omnidirectional approach lighting system

OFA: object free area

OFZ: obstacle free zone

OM: outer marker

PAC: planning advisory committee

PAPI: precision approach path indicator

PFC: porous friction course

PFC: passenger facility charge

PCL: pilot-controlled lighting

PIW public information workshop

PLASI: pulsating visual approach slope indicator

POFA: precision object free area

PVASI: pulsating/steady visual approach slope indicator

PVC: poor visibility and ceiling

RCO: remote communications outlet

REIL: runway end identifier lighting

RNAV: area navigation

RPZ: runway protection zone

RSA: runway safety area

RTR: remote transmitter/receiver

RVR: runway visibility range

RVZ: runway visibility zone

SALS: short approach lighting system

SASP: state aviation system plan

SEL: sound exposure level

SID: standard instrument departure

SM: statute mile (5,280 feet)

SRE: snow removal equipment

SSALF: simplified short approach lighting system with runway alignment indicator lights

STAR: standard terminal arrival route

SWL: runway weight bearing capacity for aircraft with single-wheel tandem type landing gear

TACAN: tactical air navigational aid

TAF: Federal Aviation Administration (FAA) Terminal Area Forecast

TLOF: Touchdown and lift-off

TDZ: touchdown zone

TDZE: touchdown zone elevation

TODA: takeoff distance available

TORA: takeoff runway available

TRACON: terminal radar approach control

VASI: visual approach slope indicator

VFR: visual flight rules (FAR Part 91)

VHF: very high frequency

VOR: very high frequency omni-directional range

VORTAC: VOR and TACAN collocated

Columbia Gorge Regional Airport

Appendix B

FORECAST APPROVAL

U.S. Department
of Transportation

Federal Aviation Administration

Seattle Airports District Office
1601 Lind Avenue, S. W., Ste 250
Renton, Washington 98055-4056

27 November, 2009

Mr. Jim Lehman
Airport Manager
Columbia Gorge Regional/
The Dalles Municipal Airport
PO Box 285
Dallesport, WA 98617

Dear Mr. Lehman:

Airport Improvement Program (AIP) Project Number 3-41-0059-006
Approval of Activity Forecasts – Columbia Gorge Regional Airport Master Plan Update

I have reviewed the Inventory, Forecasts, and Facility Requirements chapters for The Dalles Municipal Airport Master Plan Update submitted by Mr. Patrick Taylor of Coffman, Associates.

I find adequate justification exists for the figures cited in the Forecasts of Aviation Activity and hereby approve the Forecast Summary. The aforementioned chapters appear to be both well-researched and well-written, and I believe that you and your Consultant are off to a good start.

The following changes are recommended to the text in order of presentation:

1. Pg 1-15 – Nav Aids: The Transponder Landing System (TLS) is to be decommissioned and removed and should not be identified as a navigational aid to be used by the public.
2. Pg 1-25 – Service Area: "Brazoria County Airport" is mentioned twice. Please replace.
3. Pg 2-28 – Table 2Q: Should read, "related 'to' the operations…"
4. Pg 2-29 – The LDA/GS is a non-precision approach procedure.
5. Pg 2-33 – I believe that the ANG UH-60 helicopters are based at Gray Army Airfield and not McCord AFB as is noted.
6. Pg 2-36 – LDA/GS should read "non-precision" vice precision.
7. Exhibit 3-A, Aircraft category A-I: Aircraft pictured is a Beechcraft Bonanza (not a Baron 55 as appears in bold type).
8. Pgs 3-11 and 3-15: Change precision to read: non-precision.

If you have any questions, please feel free to contact me at: 425.227.2649 or by e-mail at: bruce.fisher@faa.gov.

Sincerely,

Bruce C. Fisher

Bruce C. Fisher
Airport Planner, Oregon / Idaho

cc: Mr. Patrick Taylor, Coffman Assoc.

Columbia Gorge Regional Airport

Appendix C

AIR CARRIER ANALYSIS
14 CFR PART 139

Appendix C
AIR CARRIER ANALYSIS
14 CFR PART 139

Columbia Gorge Regional Airport

Prior to June 9, 2004, Title 14 of the Code of Federal Regulations (CFR) Part 139 applied to airports that had scheduled or unscheduled air carrier operations in aircraft with a seating capacity of more than 30 passenger seats. Under the 2004 amendments, 14 CFR Part 139 also now applies to airports with scheduled air carrier operations in aircraft with a seating capacity of more than nine passenger seats. If an airport has only unscheduled air carrier operations in aircraft with a seating capacity of less than 31 passenger seats, Part 139 does not apply.

Previously, airports were issued an Airport Operating Certificate (AOC) or a Limited Airport Operating Certificate (LOAC) corresponding to either scheduled or unscheduled air carrier operations. These certificates have now been replaced with a single AOC that covers operation of a Class I, II, III, or IV airport. The class of airport is determined by the seating capacity of the air carrier aircraft and the schedule of service. The class of airport will be discussed in detail later in this document.

The purpose of this report is to analyze potential compliance with these new regulations as they apply to the Columbia Gorge Regional Airport. This report summarizes each section of the 14 CFR Part 139 regulations and what would need to be done at Columbia Gorge Regional Airport to comply with this regulation.

CLASSIFICATION

In order to apply for an AOC, the airport must provide written documentation to the Federal Aviation Administration (FAA) Northwest Mountain Region Airports Division that there is currently air carrier service or that air carrier service will begin on a certain date. Without air carrier service, this regulation does not apply. During periods when there is no air carrier service, the airport's AOC becomes inactive.

As mentioned above, the 14 CFR Part 139 certification requirements applicable to Columbia Gorge Regional Airport will relate to the type of aircraft serving the airport. In helping to define the airport's class, it is important to understand the distinction between the definition of large and small air carrier aircraft.

- A large air carrier aircraft is designed for 31 passenger seats or more.
- A small air carrier aircraft is designed for 10 to 30 passenger seats.

Note: 14 CFR Part 139 does not apply to airports served by scheduled air carrier aircraft with nine seats or less and/or unscheduled air carrier aircraft with 30 seats or less.

14 CFR Part 139 defines four airport classifications as follows:

- **Class I** - an airport certificated to serve scheduled operations of large air carrier aircraft that also can serve unscheduled passenger operations of large air carrier aircraft and/or scheduled operations of small air carrier aircraft. A Class I airport may serve any class of air carrier operations.
- **Class II** - an airport certificated to serve scheduled operations of small air carrier aircraft and the unscheduled passenger operations of large air carrier aircraft. A Class II airport cannot serve scheduled large air carrier aircraft.
- **Class III** - an airport certificated to serve scheduled operations of small air carrier aircraft. A Class III airport cannot serve scheduled or unscheduled large air carrier aircraft. **(This would be the most likely classification for Columbia Gorge Regional Airport).**
- **Class IV** - an airport certificated to serve unscheduled passenger operations of large air carrier aircraft. A Class IV airport cannot serve scheduled large or small air carrier aircraft.

Note: The FAA will only allow an airport to be certificated for the type of operations currently occurring at the airport.

14 CFR PART 139 CERTIFICATION OF AIRPORTS

The following sections of this report will examine each section of 14 CFR Part 139. A summary of the regulation is provided, as well as an explanation of what Columbia Gorge Regional Airport would need to do to be in compliance with these regulations. Deadlines for compliance are noted. Worksheets to help with record keeping are provided where applicable.

SUBPART A – GENERAL

139.1 Applicability

This regulation applies to airports serving scheduled air carrier operations in aircraft designed for more than nine passenger seats or airports serving unscheduled air carrier operations in aircraft designed for more than 30 passenger seats, and are located in any state of the United States, the District of Columbia, or any territory or possession of the United States.

139.3 Delegation of authority.

The FAA Administrator has the authority to issue, deny, and revoke the AOC to specific levels of management within the Office of Airports. In most cases, this will be the Regional Airports Division Manager.

139.5 Definitions.

AFFF means aqueous film forming foam agent.

Air carrier aircraft means an aircraft that is being operated by an air carrier and is categorized as either a large air carrier aircraft if designed for at least 31 passenger seats or a small air carrier aircraft if designed for more than nine passenger seats but less than 31 passenger seats, as determined by the aircraft type certificate issued by a competent civil aviation authority.

Air carrier operation means the takeoff or landing of an air carrier aircraft and includes the period of time from 15 minutes before until 15 minutes after the takeoff or landing.

Airport means an area of land or other hard surface (excluding water) that is used or intended to be used for the landing and takeoff of aircraft, including any buildings and facilities.

Airport Operating Certificate means a certificate, issued under this part, for operation of a Class I, II, III, or IV airport.

Average daily departures means the average number of scheduled departures per day of air carrier aircraft computed on the basis of the busiest three consecutive calendar months of the immediately preceding 12 consecutive calendar months. However, if the average daily departures are expected to increase, then "average daily departures" may be determined by planned rather than current activity in a manner authorized by the Administrator.

Certificate holder means the holder of an Airport Operating Certificate issued under this part.

Class I airport means an airport certificated to serve scheduled operations of large air carrier aircraft that can also serve unscheduled passenger operations of large air carrier aircraft and/or scheduled operations of small air carrier aircraft.

Class II airport means an airport certificated to serve scheduled operations of small air carrier aircraft and the unscheduled passenger operations of large air carrier aircraft. A Class II airport cannot serve scheduled large air carrier aircraft.

Class III airport means an airport certificated to serve scheduled operations of small air carrier aircraft. A Class III airport cannot serve scheduled or unscheduled large air carrier aircraft.

Class IV airport means an airport certificated to serve unscheduled passenger operations of large air carrier aircraft. A Class IV airport cannot serve scheduled large or small air carrier aircraft.

Clean agent means an electrically nonconducting volatile or gaseous fire extinguishing agent that does not leave a residue upon evaporation and has been shown to provide extinguishing action equivalent to halon 1211 under test protocols of FAA Technical Report DOT/FAA/AR-95/87.

Heliport means an airport, or an area of an airport, used or intended to be used for the landing and takeoff of helicopters.

Index means the type of aircraft rescue and firefighting equipment and quantity of fire extinguishing agent that the certificate holder must provide in accordance with Sec. 139.315.

Joint-use airport means an airport owned by the United States that leases a portion of the airport to a person operating an airport specified under Sec. 139.1(a).

Movement area means the runways, taxiways, and other areas of an airport that are used for taxiing, takeoff, and landing of aircraft, exclusive of loading ramps and aircraft parking areas.

Regional Airports Division Manager means the airport's division manager for the FAA region in which the airport is located.

Safety area means a defined area comprised of either a runway or taxiway and the surrounding surfaces that is prepared or suitable for reducing the risk of damage to aircraft in the event of an undershoot, overshoot, or excursion from a runway or the unintentional departure from a taxiway.

Scheduled operation means any common carriage passenger-carrying operation for compensation or hire conducted by an air carrier for which the air carrier or its representatives offers in advance the departure location, departure time, and arrival location. It does not include any operation that is conducted as a supplemental operation under 14 CFR Part 121 or public charter operations under 14 CFR Part 380.

Shared-use airport means a U.S. Government-owned airport that is co-located with an airport specified under Sec. 139.1(a) and at which portions of the movement areas and safety areas are shared by both parties.

Unscheduled operation means any common carriage passenger-carrying operation for compensation or hire, using aircraft designed for at least 31 passenger seats, conducted by an air carrier for which the departure time, departure location, and arrival location are specifically negotiated with the customer or the customer's representative. It includes any passenger-carrying supplemental operation conducted under 14 CFR Part 121 and any passenger-carrying public charter operation conducted under 14 CFR Part 380.

Wildlife hazard means a potential for a damaging aircraft collision with wildlife on or near an airport. As used in this part, "wildlife" includes feral animals and domestic animals out of the control of their owners.

139.7 Methods and procedures for compliance.

An airport that receives an AOC must comply with the requirements of subparts C and D of Part 139. FAA Advisory Circulars (AC) present acceptable methods and procedures, but not the only means, for demonstrating compliance with the applicable regulations. The FAA will consider other methods of demonstrating compliance. The method or procedure must be approved by the Airport Certification Safety Inspector (ACSI) and included in your Airport Certification Manual (ACM).

SUBPART B – CERTIFICATION

139.101 General requirements.

Based upon the most likely class determination discussed in previous paragraphs (Class III), the airport must comply with 14 CFR Part 139 to establish scheduled airline service. This requires obtaining an AOC and getting an approved ACM.

139.103 Application for certificate.

Two signed copies of the ACM and one signed copy of Form 5280-1.

139.105 Inspection authority.

The ACSI is allowed to inspect the airport at any time to ensure compliance with this regulation and the airport's approved ACM. These inspections may be unannounced and may include tests to determine compliance with the applicable parts. Failure to allow these inspections or tests may result in civil penalties or certificate action.

139.107 Issuance of certificate.

Columbia Gorge Regional Airport is entitled to a certificate if there is air carrier service, the airport has submitted all the documentation as outlined under section 139.103, and the airport is equipped and able to provide a safe airport operating environment in accordance with the approved ACM and any other provisions imposed by the FAA to ensure safety in air transportation. Once approved, the certificate will be mailed to the operating entity with the effective date.

139.109 Duration of certificate.

Once issued, the AOC is good indefinitely unless it is surrendered or it is suspended or revoked by the FAA.

139.111 Exemptions.

An airport may petition the FAA for an exemption from any requirement of Part 139 including Airport Rescue and Firefighting (ARFF). These requests for exemption must be in writing and submitted at least 120 days before the proposed effective date of the exemption. An exact detail of what must be included in the request and the necessary procedures are outlined under 139.111(b) and (c) and 14 CFR Part 11.

Exemptions, if approved, will be time limited and normally not exceed one year. An exemption is not a permanent fix. Airports should work towards full compliance and the termination of the exemption.

Also, an exemption is not a "Modification of Standards" which is covered in FAA Order 5300.1, "Approval Level for Modification of Agency Airport Design and Construction Standards." Questions about "Exemptions" and "Modification of Standards" should be addressed to the ACSI.

139.113 Deviations.

Without prior approval, an airport may deviate from any of the requirements of subpart D of this regulation or the ACM to the extent necessary to deal with an emergency that is required to protect life or property.

Within 14 days after the emergency that caused a deviation, the airport must provide a written description of the deviation to the Regional Airports Division Manager.

SUBPART C – AIRPORT CERTIFICATION MANUAL

139.201 General Requirements.

An airport must have and comply with an approved ACM. The ACM must contain all the elements contained in 139.203. AC 150/5210-21 provides a format for the ACM that is acceptable to the FAA. The airport must maintain a complete and current copy at all times. The airport will also need to provide a copy to the ACSI. Therefore, the original and all changes must be submitted in duplicate.

In addition, the airport must provide the ACM to all airport personnel responsible for its implementation. This includes air carriers, fixed base operator (FBO) personnel, and emergency response personnel. Personnel should be trained on the contents of the ACM and expected to comply with its provisions.

139.203 Contents of Airport Certification Manual.

The ACM is a description of the operating procedures, facilities and equipment, responsibility assignments, and any other information needed by personnel concerned with operating the airport on how they need to comply with the provisions of subpart D of Part 139.

As evident from the chart below, the ACM elements are the same for Class I, II, and III airports. The primary differences between a Class I and Class III AOC are as follows:

- Class I airports are required to conduct a full scale emergency exercise every three years. Class III airports are not required to conduct a full-scale emergency exercise.
- Class III airports can pursue exemptions from Airport Rescue and Fire Fighting (ARFF) requirements. Class I airports cannot.

REQUIRED AIRPORT CERTIFICATION MANUAL ELEMENTS				
Manual elements	**Class I**	**Class II**	**Class III**	**Class IV**
1. Lines of succession of airport operational responsibility	X	X	X	X
2. Each current exemption issued to the airport from the requirements of this part	X	X	X	X
3. Any limitations imposed by the Administrator	X	X	X	X
4. A grid map or other means of identifying locations and terrain features on and around the airport that are significant to emergency operations	X	X	X	X
5. The location of each obstruction required to be lighted or marked within the airport's area of authority	X	X	X	X
6. A description of each movement area available for air carriers and its safety areas, and each road described in § 139.319(k) that serves it	X	X	X	X
7. Procedures for avoidance of interruption or failure during construction work of utilities serving facilities or NAVAIDS that support air carrier operations	X	X	X	
8. A description of the system for maintaining records, as required under § 139.301	X	X	X	X
9. A description of personnel training, as required under § 139.303	X	X	X	X
10. Procedures for maintaining the paved areas, as required under § 139.305	X	X	X	X
11. Procedures for maintaining the unpaved areas, as required under § 139.307	X	X	X	X
12. Procedures for maintaining the safety areas, as required under §139.309	X	X	X	X
13. A plan showing the runway and taxiway identification system, including the location and inscription of signs, runway markings, and holding position markings, as required under §139.311	X	X	X	X
14. A description of, and procedures for maintaining, the marking, signs, and lighting systems, as required under § 139.311	X	X	X	X
15. A snow and ice control plan, as required under § 139.313	X	X	X	

REQUIRED AIRPORT CERTIFICATION MANUAL ELEMENTS				
Manual elements	**Class I**	**Class II**	**Class III**	**Class IV**
16. A description of the facilities, equipment, personnel, and procedures for meeting the aircraft rescue and firefighting requirements, in accordance with §§ 139.315, 139.317 and 139.319	X	X	X	X
17. A description of any approved exemption to aircraft rescue and firefighting requirements, as authorized under § 139.111	X	X	X	X
18. Procedures for protecting persons and property during the storing, dispensing, and handling of fuel and other hazardous substances and materials, as required under § 139.321	X	X	X	X
19. A description of, and procedures for maintaining, the traffic and wind direction indicators, as required under § 139.323	X	X	X	X
20. An emergency plan as required under § 139.325	X	X	X	X
21. Procedures for conducting the self-inspection program, as required under § 139.327	X	X	X	X
22. Procedures for controlling pedestrians and ground vehicles in movement areas and safety areas, as required under § 139.329	X	X	X	
23. Procedures for obstruction removal, marking, or lighting, as required under § 139.331	X	X	X	X
24. Procedures for protection of NAVAIDS, as required under § 139.333	X	X	X	
25. A description of public protection, as required under § 139.335	X	X	X	
26. Procedures for wildlife hazard management, as required under § 139.337	X	X	X	
27. Procedures for airport condition reporting, as required under § 139.339	X	X	X	X
28. Procedures for identifying, marking, and lighting construction and other unserviceable areas, as required under § 139.341	X	X	X	
29. Any other item that the Administrator finds is necessary to ensure safety in air transportation	X	X	X	X

It is imperative that the ACM describe the actual conditions and operations at the airport. If changes occur, the manual must be updated in accordance with 139.205. As part of the ACSI inspection, a pre-inspection review of the ACM will always be accomplished. Remember that the ACM must be kept current at all times.

139.205 Amendment of Airport Certification Manual.

An "amendment" to the ACM is a significant change in the method of compliance to Part 139 by the airport operator. Simple changes to names, phone numbers, and minor wording corrections constitute a "revision." These revisions must still be submitted to the ACSI for approval in a timely manner, but do not constitute an actual amendment.

The ACM is formally amended either at the discretion of the certificate holder or at the request of the FAA. Examples of what constitutes an amendment are major changes to the Emergency or Wildlife Hazard Management Plans, change in ARFF index, or an addition of a new runway. All proposed amendments by the certificate holder must be submitted in writing to the ACSI at least 30 days prior to the effective date of the amendment unless a shorter time period is allowed by the FAA.

If the FAA initiates the amendment, the proposed amendment will be provided to the airport operator in writing. There will be at least seven days to respond. After review of the airport operators' response, the FAA will issue a final amendment that becomes effective not less than 30 days after the certificate holder receives it. The FAA can issue an immediate amendment if there is an emergency situation requiring such action. The airport can petition the FAA within 30 days of such an emergency amendment to reconsider the emergency situation or the amendment itself.

SUBPART D – OPERATIONS

139.301 Records.

An airport is required to maintain certain records for specified periods of time. These records must be in a manner prescribed in the applicable section of Part 139 and as authorized by the ACSI. These records must be made available during inspection. The period of time these records must be maintained is as follows (in consecutive calendar months):

Personnel training (24 Months)
Emergency personnel training (24 Months)
Airport tenant fueling inspection (12 Months)
Airport tenant fueling agent training (12 Months)
Self-inspection (6 Months)
Movement areas and safety areas training (24 Months)
Accident and incident (12 months)
Airport Condition (6 Months)
Any additional records deemed necessary by the ACSI

What constitutes acceptable records will be covered under the appropriate section.

139.303 Personnel.

An airport must provide sufficient and qualified personnel to comply with the requirements of Part 139 and the ACM. The important point here is that there must be a balance between the number of personnel an airport employs and the training/experience level these personnel possess. Personnel who access movement areas and safety areas to perform their duties must be properly trained and equipped to their job. This training must be accomplished prior to commencement of their duties and at least once every 12 consecutive calendar months.

Neither the ACSI nor other FAA offices will dictate to an airport what constitutes sufficient qualified personnel. The number of personnel an airport operator needs is that which is required to meet, maintain, and operate the airport at the minimum safety standards set forth in Part 139. The conditions found on the airport are what an ACSI must base their determination on as to whether there are sufficient qualified personnel. An ACSI can observe personnel while performing their duties and, if necessary, even test personnel on their knowledge of a subject appropriate to their responsibilities.

Also, having numerous employees may meet the test of sufficiency, but inadequate training may leave an individual less than qualified. A training program is a mandatory requirement and must include the requirements of Part 139 and the ACM. Records of this training must be kept for 24 consecutive calendar months. The curriculum for the initial and recurrent training must include the areas specified in this part and a description must be included in the ACM. The FAA may require additional subject areas for training as appropriate.

An airport may use an independent organization or designee to comply with the requirements of this part and the ACM, but this arrangement would have to be approved by the ACSI and this organization or designee would still have to meet the same requirements.

139.305 Paved areas.

All pavements available for air carrier use, including runways, taxiways, loading ramps, and parking areas must be maintained to meet the required specifications of this part. Although there is a specific criterion, any pavement cracks or variations that could impair an air carrier aircraft's directional control is a violation of this part and needs to be immediately addressed. A good self-inspection program is important to identifying potential problem areas before they exceed standards. These inspections should be conducted in varying weather conditions, such as heavy rain, to determine if the pavement is draining properly and to identify areas where ponding is occurring so that these areas can be repaired.

The airport should have a regular maintenance program in place to remove mud, dirt, sand, loose aggregate, debris, foreign objects, rubber deposits and other contaminates as well as repair cracks, holes, and deterioration. Any crack or surface variation that produces loose aggregate or other contaminants shall be immediately repaired. The airport should work with the FAA Airport District Office (ADO) to procure funding for major repairs and reconstructions, but this does not relieve the airport of its responsibility to make immediate repairs or restrict air carrier use if necessary.

AC 150/5380-6, *Guidelines and Procedures for Maintenance of Airport Pavements*, provides an introduction to airport pavement maintenance and is a good starting point for airport personnel. Also, AC 150/5380-7, *Pavement Management System*, describes the components of a Pavement Management System.

Runways 12-30 and 7-25 are available for small air carrier use. However, these runways do not currently meet FAA design standards for line-of-sight along the length of the runway. The Master Plan has recommended capital projects to bring both runways into compliance with this design standard. Taxiways A and B serve the two runways, and capital projects in the Master Plan have been recommended to make each taxiway parallel to their respective runways for the entire runway length.

139.307 Unpaved areas.

There are no unpaved areas for potential air carrier operations.

139.309 Safety areas.

A safety area is an area comprised of either a runway or taxiway and the surrounding surfaces that is prepared or suitable for reducing the risk of damage to aircraft in the event of an undershoot, overshoot, or excursion from a runway or the unintentional departure from a taxiway. Safety area design and dimensional standards shall be provided and maintained for each runway and taxiway that is available for air carrier use.

Safety areas must be cleared and graded and have no potentially hazardous ruts, humps, depressions, or other surface variations. They should also allow for water to adequately drain, preventing accumulation. The safety area is there to support an aircraft without causing major damage. Safety areas should also be able to support ARFF equipment under dry conditions.

No objects may be located in the safety area unless they are located there specifically for their function. Usually, items located in the safety areas are limited to signs, lighting, and navigational aids. Items that are approved to remain in the safety areas shall be on frangible structures with the frangible point no higher then three inches above the grade.

Currently, safety areas beyond three runway ends (7, 25, and 12) do not meet design standards on the airport. The Master Plan has recommended capital projects in the short-term planning period to eliminate the non-standard conditions.

AC 150/5300-13, *Airport Design*, paragraph 305 and Appendix 8 discuss Runway Safety Areas (RSA) and paragraph 403 discusses Taxiway Safety Areas (TSA).

139.311 Marking, signs, and lighting.

Airports must provide and maintain a marking system for air carrier operations. This includes marking runways for the approach with the lowest authorized minimums, taxiway centerlines and edge markings as appropriate, holding position markings and marking instrument landing system (ILS) critical areas. Markings must be provided and maintained so that pilots can easily see them. Maintaining markings means to have a scheduled maintenance program to repaint faded, chipped, or worn markings. This includes the addition of glass beads on all required markings and the outlining of markings with a black border on light colored pavements. Markings should also be kept clean and free of rubber deposits. AC 150/5340-1, *Standards for Airport Markings*, contains the acceptable standards for airport markings at airports with air carrier operations.

Columbia Gorge Regional Airport is equipped with an LDA/DME approach to Runway 25. Runway 25 has precision markings, while Runways 7, 12, and 30 have basic markings. Edge markings and holding position markings are consistent with standards.

Airports must provide and maintain a sign system for air carrier operations. This sign system must include signs identifying taxiing routes, holding position signs, and ILS critical area signs. For Class III airports, only holding position signs, and instrument landing system (ILS) critical area signs must be internally illuminated. Other signs must be lighted if they are installed on a lighted runway or taxiway. Signs must be properly positioned appropriate to their size and must be maintained so that pilots can easily read them. Maintaining signs includes replacing worn or faded panels and keeping them clear of snow and vegetation. An airport sign plan must be submitted to the ACSI for approval and included in the ACM. AC 150/5340-18, *Standards for Airport Sign Systems*, provides guidance for the type of airport signs.

Current holding position marking and signage is located at a distance of 200 feet from runway centerlines, consistent with standards.

Airports must provide and maintain a lighting system for air carrier operations when the airport is open at night or during periods of reduced visibility. This system must include runway lights that meet the specifications for the takeoff and landing minimums of the runway and one taxiway lighting system. In addition to runway and taxiway lighting, an airport is required to have an airport beacon, approach lighting that meets the specifications for takeoff and landing minimums unless this lighting is provided and maintained by the FAA, and obstruction marking and lighting as appropriate. AC 150/5340-24, *Runway and Taxiway Edge Lighting System*, describes acceptable standards for the design, installation, and maintenance of runway and taxiway edge lighting systems.

Runways 7-25 and 12-30 have medium intensity runway lighting (MIRL), and medium intensity taxiway lighting (MITL) is available at taxiway throats. The airport has a rotating beacon.

The airport is responsible for maintaining its marking, lighting, and signs. This means that that they should be clean, unobscured, and clearly visible at all times. Any faded, missing, or nonfunctional items should be repaired or replaced. Marking, lighting, and signs are used by pilots and need to be easily seen and able to provide an accurate reference to the user.

FAA Advisory Circulars that provide assistance with compliance with this section are listed below.

AC 150/5340-21, *Airport Miscellaneous Lighting Visual Aids*, describes the standards for the system design, installation, inspection, testing, and maintenance of airport miscellaneous visual aids (i.e., airport beacons, beacon towers, wind cones, wind tees, and obstruction lights).

AC 150/5340-26, *Maintenance of Airport Visual Aid Facilities*, provides recommended guidelines for maintenance of airport visual aid facilities.

AC 150/5340-27A, *Air-to-Ground Radio Control of Airport Lighting Systems*, contains the FAA standard operating configurations for air-to-ground radio control of airport lighting systems.

AC 150/5345-44F, *Specification for Taxiway and Runway Signs*, contains a specification for lighted and unlighted signs to be used on taxiways and runways.

139.313 Snow and ice control.

A snow and ice control plan is needed in an area where measurable snow and icing conditions occur at least once a year. This plan must be approved by the ACSI and becomes an enforceable part of the ACM. When snow and/or icing conditions occur, the airport must execute the approved plan.

139.315 Aircraft Rescue and Firefighting (ARFF): Index determination:

The length of air carrier aircraft and the average scheduled daily departures of air carrier aircraft determine ARFF index. The minimum ARFF index will always be Index A.

Below is the length of air carrier aircraft that make up a particular index:

(1) Index A includes aircraft less than 90 feet in length.
(2) Index B includes aircraft at least 90 feet but less than 126 feet in length.
(3) Index C includes aircraft at least 126 feet but less than 159 feet in length.
(4) Index D includes aircraft at least 159 feet but less than 200 feet in length.
(5) Index E includes aircraft at least 200 feet in length.

Small turboprops such as the Embraer 120 and Bombardier Q200 fall within Index A, as do small regional jets such as the Bombardier CRJ 200 and Embraer 135.

Paragraph (e) of this section allows for a Class III airport to comply with this section if they can provide a level of safety comparable to Index A, the procedure is approved by the ACSI, and if it is documented in the ACM. The alternate compliance must include the criteria listed in paragraph 139.315(e)(i-iv).

Note: Determination of ARFF index is used to determine the minimum ARFF equipment and agents that must be available for air carrier operations to occur on an airport.

139.317 Aircraft rescue and firefighting: Equipment and agents.

Once the ARFF index has been determined, a determination of the minimum type and number of ARFF vehicles, the type and number of pounds of dry chemical, the amount of Halon 1211 or clean agent (referred to as agent/s) that must be on the truck(s), and the amount of aqueous film forming foam (AFFF) and water that must be available on the truck(s) is determined. Refer to 139.317(a-e) for applicable index requirements.

All trucks used to comply with index B and above must be equipped with a turret. This section also specifies the foam discharge rate and the agent discharge rate for each vehicle (139.317(f-g)). Other extinguishing agents may be used only if they are approved by the ACSI and in amounts that provide the same level of firefighting capability.

Vehicles must be able to carry enough AFFF to mix with twice the amount of water the vehicle is required to carry.

FAA Advisory Circulars that may assist with compliance with this section are listed below.

AC 150/5210-6C, *Aircraft Fire and Rescue Facilities and Extinguishing Agents* outlines scales of protection considered as the recommended level compared with the minimum level in Federal Aviation Regulation (F.A.R.) Part 139.49 and tells how these levels were established from test and experience data.

AC 150/5220-4, *Water Supply Systems for Aircraft Fire and Rescue Protection* provides guidance for the selection of a water source and standards for the design of a distribution system to support ARFF service operations on airports.

AC 150/5220-10C *Guide Specification for Water/Foam Aircraft Rescue and Firefighting Vehicles* contains performance standards, specifications, and recommendations for the design, construction, and testing of a family of ARFF vehicles.

AC 150/5220-19, *Guide Specification for Small Agent Aircraft Rescue and Fire Fighting Vehicles* contains performance standards, specifications, and recommendations for the design, construction, and testing of a family of small, dual agent ARFF vehicles.

AC 150/5220-10C, *Guide Specification for Water/Foam Aircraft Rescue and Firefighting Vehicles* contains performance standards, specifications, and recommendations for the design, construction, and testing of a family of ARFF vehicles.

AC 150/5210-13A, *Water Rescue Plans, Facilities, and Equipment* provides guidance to assist airport operators in preparing for water rescue operations.

AC 150/5210-15, *Airport Rescue and Firefighting Station Building Design* provides standards and guidance for planning, designing, and constructing an airport rescue and firefighting station.

AC 150/5210-19, *Driver's Enhanced Vision System (DEVS)* contains performance standards, specifications, and recommendations for DEVS.

AC 150/5220-4B, *Water Supply Systems for Aircraft Fire and Rescue Protection* provides guidance for the selection of a water source and standards for the design of a distribution system to support ARFF service operations on airports.

139.319 Aircraft Rescue and Firefighting: Operational requirements.

It is required that an airport, during air carrier operations (defined as the period of time 15 minutes before until 15 minutes after the takeoff or landing) provide the ARFF capability for their required index. If the average daily departures or the length of aircraft changes such that the index increases, the airport is required to meet the ARFF required by the increased ARFF index. If there is reduction in average daily departures or the length of aircraft, the airport may reduce its index by following the procedures under section 139.319(d)(1-3).

ARFF vehicles are required to be ready and capable to meet their intended requirements as required by 139.319(g)(1-3) and the response requirements of 139.319(h)(1-2). The ACSI will initiate a timed response drill during inspections. Vehicles must also be equipped with the necessary radios to communicate with all required parties as outlined in 139.319(e)(1-4), and they must be appropriately marked and lighted in accordance with 139.319(f)(1-2).

ARFF personnel must be trained and equipped to perform their duties. Personnel training includes initial and recurrent training with a curriculum that is approved by the ACSI and includes all the elements of 139.319(i)(2)(i-xi) and (3).

Initial Training. Prior to any person assuming ARFF duties, they must have completed initial training as outlined above. It is not acceptable to simply take a structural firefighter and assign them to ARFF duties without additional training. Initial training may be accomplished during an initial ARFF training course offered by an approved facility or internally using an approved curriculum. The internal curriculum must be approved by the ACSI. Initial training is not complete until the individual has participated in at least one live-fire drill. Initial ARFF training records are kept as long as the person is employed and will be made available during each inspection.

Recurrent Training. Once an ARFF person has completed initial training, they must receive recurrent instruction every 12 consecutive calendar months using an approved curriculum. The Aircraft Rescue and Fire Fighting (ARFF) Computer-Based Training (CBT) CD is an excellent supplement to the curriculum but should not be considered all-inclusive. Practical application with the airport's equipment, airport familiarization, driving on the airport, and duties under the airport emergency plan are just a few areas that cannot be fully taught using the CD. ARFF personnel must also participate in at least one live-fire drill every 12 consecutive calendar months. The live-fire drill must be accomplished at an approved training facility or in a manner acceptable to the ACSI.

An airport is required to maintain a record of all recurrent training given to each individual for 24 consecutive calendar months and these records will be made available during each inspection.

Medical Services. The airport is required to have at least one individual available during air carrier operations that has been trained and is current in basic emergency medical services as outlined in 139.319(i)(4). The individual must have received at least 40 hours of training in the required topics and a record of this training must be maintained for 24 consecutive calendar months and made available for inspection. The emergency medical person does not have to be an ARFF person and they do not need to meet the timed response requirements. Off-airport personnel, such as an ambulance service, may be used if a reasonable response time is assured. How the airport will meet this requirement must be approved by the ACSI and documented in the ACM.

The airport must also meet the requirements of 139.319(i)(5 & 6) with regards to hazardous materials guidance and maintaining emergency access roads.

FAA Advisory Circulars that may assist with compliance with this section are listed below.

AC 150/5210-17, *Programs for Training of Aircraft Rescue and Firefighting Personnel* provides information on courses and reference materials for training of ARFF personnel and Change 1, AC 150/5210-17. Change 1 changed the AC to reflect a new source for the FAA Standard Basic Aircraft Rescue and Firefighting Curriculum and to update other sources of training programs.

Note: An Aircraft Rescue and Fire Fighting (ARFF) Computer-Based Training (CBT) CD is available from the ACSI.

AC 150/5210-18, *Systems for Interactive Training of Airport Personnel* provides guidance in the design of systems for interactive training of airport personnel.

AC 150/5210-7C, *Aircraft Rescue and Firefighting Communications* provides guidance for planning and implementing the airport ARFF Communications systems.

AC 150/5210-14A, *Airport Fire and Rescue Personnel Protective Clothing* was developed to assist airport management in the development of local procurement specifications for an acceptable, cost-effective proximity suit for use in aircraft rescue and firefighting operations.

139.321 Handling and storing of hazardous substances and materials.

The airport is required to establish and maintain acceptable fire safety standards for handling fuel servicing on the airport. This includes storing and dispensing fuel. These standards must be approved by the ACSI and included in the ACM. It is recommended that the airport adopt NFPA 407, Standard for Aircraft Fuel Servicing (current edition) as the standard for the airport. 139.321(b)(1-7) lists the minimum standards that must be addressed if NFPA 407 is not adopted.

Once the standards are approved and adopted, the airport, as a fueling agent, if applicable, and all other fueling agents on the airport including Part 121 and Part 135 certificated air carriers, must comply with the standards. To ensure compliance, the airport must inspect the trucks and storage and dispensing facilities every three consecutive calendar months. The inspection records must be maintained for 12 consecutive calendar months. The inspection results should show the discrepancies found and the corrective action taken. Regardless of the inspections, the airport must require fueling agents to immediately correct any noncompliance with a standard. If the fueling agent cannot correct the deficiency in a reasonable period of time, the airport will notify the ACSI.

All fueling agents shall have at least one supervisor that has completed an approved fuel-training course in fire safety. A list of nationally approved courses is attached. The individual must complete the training prior to initial performance of duties or be enrolled in a course that will be completed within 90 days of starting work. They must also receive recurrent training every 24 consecutive calendar months. Any training courses other than the nationally approved courses must be reviewed and approved by the ACSI as acceptable. The inspector will want to see documentation of the training.

The supervisor must provide initial on-the-job training and recurrent instruction every 24 consecutive calendar months to all other employees that are responsible for handling fuel in any manner. Once every 12 consecutive calendar months, the fueling agent must provide the airport written confirmation that all training has been accomplished. The written confirmation must be maintained for 12 consecutive calendar months and should include the name of the person receiving the training and the date the training occurred.

The attached forms can also be used to track and record the quarterly inspections required by this part. These inspections can be performed by someone other than airport staff, such as the Fire Marshall. The ACM must state who will be responsible for these inspections.

AC 150/5230-4 *Aircraft Fuel Storage, Handling, and Dispensing On Airports* provides guidance in this area.

139.323 Traffic and wind direction indicators.

An airport must have a wind cone that provides surface wind direction information to pilots and supplemental wind cones at each end of all air carrier runways or at a point visible to a pilot during final approach and prior to takeoff. If the airport is open at night, it must be lighted.

There is no control tower at Columbia Gorge Regional Airport. A segmented circle with lighted wind cone is located between the ramp and Runway 12-30. Supplemental lighted and unlighted wind cones are located near each runway end. Each of the two runways are lighted and REILs are installed on Runway 30.

FAA Advisory Circulars that may assist with compliance with this section are listed below.

AC 150/5340-5B, *Segmented Circle Airport Marker System* sets forth standards for a system of airport marking consisting of certain pilot aids and traffic control devices.

AC 150/5340-23B, *Supplemental Wind Cones* describes criteria for the location and performance of supplemental wind cones.

139.325 Airport Emergency Plan.

The airport is required to write and maintain an Airport Emergency Plan (AEP). The plan is designed to minimize personal injury and damage to property in the event of an emergency situation. All parties that have a role in the plan should participate in the development of the plan. AC 150/5200-31A, *Airport Emergency Plan* provides guidance for the preparation and implementation of emergency plans at civil airports. The AEP may be written using the guidance provided in the AC and must include all applicable parts of 139.325(b-f).

The plan will be submitted in two copies to the ACSI for approval. The AEP Review Checklist must be completed and included with the submission of the AEP. The ACSI will review the plan and, once approved, it will become part of the ACM.

Once completed, the AEP must be coordinated with all parties that have responsibilities under the plan. All airport personnel having duties and responsibilities under the plan must be trained on their assignments under the plan. Once every 12 consecutive calendar months, the plan must be reviewed with all parties that have responsibilities under the plan. This is the opportunity to get everyone together and go through the plan page by page to ensure everyone is familiar with their duties and that the information in the plan is accurate. The airport should keep a participant list as well as minutes of the meeting. Any changes to the plan should be immediately submitted to the ACSI for approval.

Every 36 consecutive calendar months, all Class I airports must hold a full-scale emergency plan exercise. Class II, III and IV airports do not need to complete this requirement; however, it is recommended. The AEP Exercise Evaluation Checklist should be used to prepare and evaluate the exercise. The purpose of the full-scale exercise is to test the effectiveness of the AEP through a response of the airport and its mutual aid for a disaster at the airport. All planning, execution, and evaluation documentation should be maintained for inspection purposes.

FAA Advisory Circulars that may assist with compliance with this section are listed below.

AC 150/5200-12B, *Fire Department Responsibility in Protecting Evidence at the Scene of an Aircraft Accident* furnishes general guidance for the airport, employees, airport management, and other personnel responsible for firefighting and rescue operations on the proper presentation of evidence at the scene of an aircraft accident.

AC 150/5210-2A, *Airport Emergency Medical Facilities and Services* provides information and advice so that airports may take specific voluntary preplanning actions to assure at least minimum first-aid and medical readiness appropriate to the size of the airport in terms of permanent and transient personnel.

139.327 Self-inspection program.

The self-inspection program is considered the cornerstone of compliance with many of the sections of Part 139. The airport must perform an inspection daily unless otherwise authorized by the ACSI and approved in the ACM. If there is air carrier service on any given day, including weekends and holidays, an inspection must be performed. The inspection schedule is required to be included in the ACM. Inspections will also be completed when required by unusual conditions or an aircraft accident/incident. Usually the inspections are recorded on an inspection checklist that is an approved part of the ACM. The inspection record must include the conditions found and the corrective action that was taken to fix the discrepancy. Each daily-recorded inspection must be maintained for 12 consecutive calendar months.

Personnel trained to identify noncompliance with all the areas that are being inspected must complete self-inspections. These personnel must be trained in accordance with 139.303 and receive initial and recurrent instruction. This initial instruction must be documented and maintained for the duration of the employee's employment. Recurrent training must be completed every 12 consecutive calendar months. Training records shall be maintained for 24 consecutive calendar months. Instruction must include the following:

1) Airport familiarization, including airport signs, marking and lighting
2) Airport emergency plan
3) Notice to Airmen (NOTAM) notification procedures
4) Procedures for pedestrians and ground vehicles in movement areas and safety areas
5) Discrepancy reporting procedures
6) A reporting system to ensure prompt correction of unsafe airport conditions noted during the inspection.

Note: A person sent to inspect the airport that is not thoroughly familiar with the requirements of Part 139 and all applicable ACs may provide an inaccurate report and potentially provide airport management with a false sense of well-being. If, during an annual certification inspection, discrepancies are discovered that should have been identified under the self-inspection program, the airport should reevaluate the self-inspection process, training, and/or personnel conducting the inspections.

All personnel responsible for self-inspections should be thoroughly familiar with the contents of AC 150/5200-18B, *Airport Safety Self-Inspection* and AC 150/5200-29, *Announcement of Availability: Airport Self-Inspection Videotape* (which may be obtained through the ACSI).

It is critical that the self-inspection program is tied to the airport condition reporting system. The use of the NOTAM system is acceptable, but an additional system to immediately notify air carriers directly may be necessary. In some cases, the information or NOTAM may have to be hand delivered, faxed or e-mailed directly to the air carrier in order to ensure prompt notification. The air carriers should also be notified as soon as the discrepancy is corrected.

139.329 Pedestrians and Ground Vehicles.

The only pedestrians or ground vehicles that should be allowed to be in the movement areas (runway and taxiways) and safety areas are those that are absolutely necessary for airport operations. The airport is responsible for limiting access to the movement areas to authorized personnel and vehicles only. Normally, this limits the access to rescue, maintenance, and inspection activities. Construction would be considered maintenance, but the airport must ensure that the construction safety plan is in compliance with this section. Wherever possible, service roads should be constructed to alleviate vehicles such as fuel trucks from entering the movement areas.

The airport must establish and implement procedures for access to the operational movement and safety areas. This means that the airport must establish a driver's training program that includes provisions for all personnel that may have to drive or walk in the movement/safety areas. The training program must be approved and included in the ACM. It must also include the consequences that the airport will enforce if an individual does not follow the rules. This training must be documented and the documentation must be maintained for 24 consecutive calendar months.

The Columbia Gorge Regional Airport air carrier movement area would be defined as Runways 12-30 and 7-25, and Taxiways A, A1, A2, A3, A4, and B. The driver of any vehicle which might cross any of these areas would require ground vehicle training.

It should be noted that not all tenants gaining access through the fence would require ground vehicle training. Tenants accessing T-hangars or other buildings on the airport would not require training.

FAA Advisory Circulars that may assist with compliance with this section are listed below.

AC 150/5210-20, *Ground Vehicle Operations on Airports* contains guidance to airport operators developing ground vehicle operation training programs.

AC 150/5210-5B, *Painting, Marking, and lighting of Vehicles Used on an Airport* provides guidance, specifications, and standards in the interest of airport personnel safety and operational efficiency for painting, marking, and lighting of vehicles operating in the airport operations areas.

139.331 Obstructions.

Any objects that are within the airport's authority that have been determined by the FAA to be an obstruction must be removed, marked, or lighted unless an FAA aeronautical study has determined that it is not necessary. If the object has not had an FAA aeronautical study, the airport is required to initiate the study. The airport must have procedures in place for the identification of obstructions to the applicable Part 77 imaginary surfaces. Applicability of airport authorities will be determined on a case-by-case basis.

FAA Advisory Circulars that may assist with compliance with this section are listed below.

AC 150/5340-21, *Airport Miscellaneous Lighting Visual Aids* describes the standards for the system design, installation, inspection, testing, and maintenance of airport obstruction lights.

AC 150/5345-43E, *Specification for Obstruction Lighting Equipment* contains the FAA specification for obstruction lighting equipment.

139.333 Protection of NAVAIDS.

The airport must prevent the construction of facilities near NAVAIDS and air traffic control facilities that would derogate the signal or operation of the facility. This includes electronic and visual facilities.

This is usually accomplished with signage and restricting access to the airport to those authorized to use the airport and through defining safety measures during construction.

139.335 Public protection.

The airport must have safeguards to prevent inadvertent entry to the movement areas by unauthorized person or vehicles. Fencing that meets Transportation Security Administration (TSA) regulations are acceptable to meet the requirements of this section. The airport must also provide reasonable protection of persons and property from jet blast. The airport perimeter fencing would need to be upgraded.

139.337 Wildlife hazard management.

Wildlife hazard management at airports is a critical issue that, if taken lightly, poses a serious threat to life and property. For this reason, airports are required to take immediate action to alleviate wildlife hazards any time they are detected.

If an airport has any of the occurrences listed in 139.337(b)(1-4), they are required to have a wildlife hazard assessment. The wildlife hazard assessment usually starts with an initial consultation and possibly a site visit. The consultation and/or site visit will determine the need for a complete wildlife hazard assessment. If it is required, the wildlife hazard assessment must be completed by an individual as specified under 139.337(c) and include the items listed under 139.337(c)(1-5). Wildlife hazard assessments and plans are eligible for Airport Improvement Plan (AIP) funding and need to be coordinated with the ADO.

The wildlife hazard assessment is submitted to the ACSI, who will determine if there is a need for a wildlife hazard management plan. If it is determined that a plan is required, the certificate holder must write a plan using the assessment as a guide. The plan is submitted to the ACSI for approval and is implemented by the airport. Section 139.337(e) and (f) will be followed in the development, writing and implementation of the plan.

All airport personnel that may be required to execute the plan must be trained on its implementation, and the airport must evaluate the effectiveness of the plan at least every 12 consecutive calendar months or whenever additional occurrences that triggered the assessment occur.

If an airport has an advisory for wildlife in the Airport Facility Directory (AFD), they will be required to have an initial consultation and site visit. If it is determined that a wildlife hazard assessment is required, then one must be performed.

FAA Advisory Circulars that may assist with compliance with this section are listed below.

AC 150/5200-33, *Hazardous Wildlife Attractants on or Near Airports* provides guidance on locating certain land uses having the potential to attract hazardous wildlife to or in the vicinity of public-use airports.

AC150/5200-32, *Announcement of Availability: Bird Strike Incident/Ingestion Report* explains the nature of the revision of FAA Form 5200-7, Bird Strike Incident/Ingestion Report and how it can be obtained.

AC 150/5200-34, *Construction or Establishment of Landfills near Public Airports* contains guidance on complying with new Federal statutory requirements regarding the construction or establishment of landfills near public airports.

<u>*139.339 Airport condition reporting.*</u>

The airport is required to collect and disseminate the airport condition to all air carriers. They can use the NOTAM system or another system approved by your ACSI to accomplish this requirement. Airport conditions that may affect the safe operations of air carriers are listed under section 139.339(c)(1-9). The airport must keep a record of each dissemination of airport condition to air carriers for 12 consecutive calendar months.

FAA Advisory Circulars that may assist with compliance with this section are listed below.

AC 150/5200-28B, *Notices to Airmen (NOTAMS) for Airport Operators* provides guidance for use of the NOTAM system in airport condition reporting.

<u>*139.341 Identifying, marking, and lighting construction and other unserviceable areas.*</u>

The airport is responsible for the marking and lighting of construction and unserviceable areas, construction equipment and roadways, and areas adjacent to a NAVAID that may cause the derogation of the signal or failure of the NAVAID. They must also include procedures for avoiding damage to existing utilities and other underground facilities.

The best way to comply with this section is to have a thorough construction safety plan. The safety plan must include all the items required by this section.

FAA Advisory Circulars that may assist with compliance with this section are listed below.

AC 150/5345-55, *Lighted Visual Aid to Indicate Temporary Runway Closure* provides guidance in the design of a lighted visual aid to indicate temporary runway closure.

139.343 Noncomplying conditions.

An airport must limit air carrier operations to only those parts of the airport that are safe for air carrier operations. If any of the requirements of subpart D cannot be met to the extent that unsafe conditions exist on the airport, it is the responsibility of the airport to close those areas to air carrier use until they are brought back into compliance.

Example: Disabled aircraft or vehicles on a runway or taxiway, taxi routes with inadequate wing tip clearance, or parking aprons that will not support the weight or turning radius due to design or condition.

SUMMARY

Several projects (as recommended in the Master Plan) need to be undertaken to ensure that the airfield system complies with FAA design standards. In addition, the following steps would need to be taken for 14 CFR Part 139 compliance at Columbia Gorge Regional Airport:

1. Prepare and submit a Class III ACM to the FAA (139.203).
2. Prepare ground vehicle operating rules and regulations and a ground vehicle training program (139.329).
3. Prepare a training program for airport personnel involved with Part 139 implementation (139.303/327).
4. Ensure that FBOs comply with the fuel training requirements (139.321).
5. Develop a record-keeping system (139.301/303) for the following:
    a. Personnel training (24 Months)
    b. Emergency personnel training (24 Months)
    c. Airport tenant fueling inspection (12 Months)
    d. Airport tenant fueling agent training (12 Months)
    e. Self-inspection (6 Months)
    f. Movement areas and safety areas training (24 Months)
    g. Accident and incident (12 months)
    h. Airport Condition (6 Months)
6. Prepare and submit an Airport Emergency Plan (AEP) to the FAA (139.325).
7. Acquire an ARFF vehicle and comply with ARFF training and operational requirements (139.315/317/319).

Columbia Gorge Regional Airport

Appendix D

ENVIRONMENTAL OVERVIEW

Appendix D
ENVIRONMENTAL OVERVIEW

A review of the potential environmental impacts associated with proposed airport projects is an essential consideration in the Airport Master Plan process. The primary purpose of this section is to review the proposed improvement program at Columbia Gorge Regional Airport to determine whether the proposed developments identified in the master plan could, individually or collectively, have the potential to significantly affect the quality of the environment. The information contained in this section was obtained from previous studies, various internet websites, and analysis by the consultant.

Construction of any and all improvements depicted on the Airport Layout Plan (ALP) will require compliance with the *National Environmental Policy Act* (NEPA) *of 1969*, as amended. This includes privately funded projects in addition to those projects receiving federal funding. For projects not "categorically excluded" under Federal Aviation Administration (FAA) Order 1050.1E, *Environmental Impacts: Policies and Procedures*, compliance with NEPA is generally satisfied through the preparation of an Environmental Assessment (EA). In instances where significant environmental impacts are expected, an Environmental Impact Statement (EIS) may be required.

An environmental inventory is included in Chapter One to provide baseline information about the airport environs. This appendix provides an overview of the potential impacts to the existing resources resulting from implementation of the planned improvements outlined in the master plan. While this portion of the master plan is not designed to satisfy the NEPA requirements, it is intended to supply a preliminary review of environmental issues that would need to be analyzed in more detail within the environmental review processes. This evaluation considers all environmental categories required as outlined within FAA Order 1050.1E, *Environmental Impacts, Policies and Procedures* and FAA Order 5050.4B, *National Environmental Policy Act* (NEPA) *Implementation Instructions for Airport Actions.*

The following sections provide a description of the environmental resources which could be impacted by the proposed ultimate airport development depicted on Exhibit 5A. Through a review of previous environmental studies and resource agency websites, it was determined that the following resources are not present within the airport environs or cannot be inventoried:

- Coastal Barriers
- Coastal Zone Management Areas
- Construction Impacts
- Energy Supply, Natural Resources, and Sustainable Design
- Secondary (Induced) Impacts
- Wild and Scenic Rivers

AIR QUALITY

Air quality in a given location is described by the concentrations of various pollutants in the atmosphere. The significance of a pollution concentration is determined by comparing it to the state and federal air quality standards. In 1971, the U.S. Environmental Protection Agency (EPA) established standards that specify the maximum permissible short-term and long-term concentrations of various air contaminants. The National Ambient Air Quality Standards (NAAQS) consist of primary and secondary standards for six criteria pollutants which include: Ozone (O_3), Carbon Monoxide (CO), Sulfur Dioxide (SO_2), Nitrogen Oxide (NO), Particulate matter (PM_{10} and $PM_{2.5}$), and Lead (Pb).

Based on both federal and state air quality standards, a specific geographic area can be classified as either an “attainment,” “maintenance,” or “non-attainment” area for each pollutant. The threshold for non-attainment designation varies by pollutant. According to the EPA’s Greenbook, Klickitat County is classified as an attainment area for all criteria pollutants.

A number of planned projects at the airport could result in temporary impacts to air quality during construction. Temporary impacts would result during the construction of improvements including: relocation of Dallesport Road, terminal building construction, Taxiway A improvements, fuel farm construction, Runway 7-

25 reconstruction and parallel taxiway construction, and the reconstruction of Runway 12-30. Emissions from the operation of construction vehicles and fugitive dust from pavement removal are common air pollutants during construction. During evaluation of these specific projects, an emissions inventory, prepared with the use of the FAA's Emission and Dispersion Modeling System or the Environmental Protection Agency's NONROAD or Mobile6 emission models may be required. The results of the inventory would be compared to established thresholds to determine if implementation of the proposed projects would result in an air quality impact. More permanent air quality impacts will result from the forecasted increase in operations at the airport. As the number of operations increase, these potential impacts may need to be evaluated as part of any required environmental documentation for planned projects.

DEPARTMENT OF TRANSPORTATION SECTION 4(f) RESOURCES

Section 4(f) properties include publicly owned land from a public park, recreational area, or wildlife and waterfowl refuge of national, state, or local significance, or any land from a historic site of national, state, or local significance.

Based on a review of local mapping, none of the proposed airport improvements will result in direct impacts to Section 4(f) resources. The parcels of land west of the airport identified for fee simple or avigation easement acquisition are privately owned and are not identified as a public park, recreational area, or wildlife and waterfowl refuge of national, state, or local significance, or land from a historic site of national, state, or local significance. Additionally, indirect impacts to Section 4(f) resources are not anticipated due to the distance between the airport and area parks and recreational facilities.

FISH, WILDLIFE, AND PLANTS

Biotic resources include the various types of plants and animals that are present in a particular area. The term also applies to rivers, lakes, wetlands, forests, and other habitat types that support plants, birds, and/or fish. Typically, development in areas such as previously disturbed airport property, populated places, or farmland would result in minimal impacts to biotic resources.

The U.S. Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS) are charged with overseeing the requirements contained within Section 7 of the *Endangered Species Act*. This Act was put into place to protect animal or plant species whose populations are threatened by human activities. Along with the FAA, the FWS and the NMFS review projects to determine if a significant impact to these protected species will result with implementation of a proposed project. Significant impacts occur when the proposed action could jeopardize the continued existence of a protected species or would result in the destruction or adverse modification of federally designated critical habitat in the area.

The *Sikes Act* and various amendments authorize states to prepare statewide wildlife conservation plans, and the Department of Defense (DOD) to prepare similar plans, for resources under their jurisdiction. Airport improvement projects should be checked for consistency with the State or DOD Wildlife Conservation Plans where such plans exist.

Table D1 depicts federally and state listed threatened and endangered species for Klickitat County. According to the U.S. FWS Upper Columbia Fish and Wildlife Office website, there are three species that are federally listed as threatened or endangered in Klickitat County. In addition, the Washington Department of Fish and Wildlife lists an additional 41 species as threatened or endangered.

TABLE D1
State and Federally Listed Threatened or Endangered Species in Klickitat County, Washington

Common Name	Species	Federal Status	State Status
Ferruginous hawk	*Buteo regalis*	-	Threatened
Marbled murrelet	*Brachyramphus marmoratus*	-	Threatened
Sage grouse	*Centrocercus urophasianus*	-	Threatened
Sharp-tailed grouse	*Tympanuchus phasianellus*	-	Threatened
Lynx	*Lynx canadensis*	-	Threatened
Mazama (Western) pocket gopher	*Thomomys mazama*	-	Threatened
Steller sea lion	*Eumetopias jubatus*	-	Threatened
Western gray squirrel	*Sciurus griseus*	-	Threatened
Green sea turtle	*Chelonia mydas*	-	Threatened
Loggerhead sea turtle	*Caretta caretta*	-	Threatened
Ferruginous hawk	*Buteo regalis*	-	Threatened
Marbled murrelet	*Brachyramphus marmoratus*	-	Threatened
Sage grouse	*Centrocercus urophasianus*	-	Threatened
Sharp-tailed grouse	*Tympanuchus phasianellus*	-	Threatened
Northern leopard frog	*Rana pipiens*	-	Endangered
Oregon spotted frog	*Rana pretiosa*	-	Endangered
American white pelican	*Pelecanus erythrorhynchos*	-	Endangered
Fin whale	*Baleonoptera physalus*	-	Endangered
Fisher	*Martes pennanti*	-	Endangered
Gray wolf	*Canis lupus*	Endangered	Endangered
Grizzly bear	*Ursus arctos*	-	Endangered
Humpback whale	*Megaptera novaeangliae*	-	Endangered
Killer whale	*Orcinus orca*	-	Endangered
Pygmy rabbit	*Brachylagus idahoensis*	-	Endangered
Sea otter	*Enhydra lutris*	-	Endangered
Sei whale	*Baleonoptera borealis*	-	Endangered
Sperm whale	*Physeter macrocephalus*	-	Endangered
Woodland caribou	*Rangifer tarandus*	-	Endangered
Leatherback sea turtle	*Dermochelys coriacea*	-	Endangered
Western pond turtle	*Actinemys marmorata*	-	Endangered
Bull trout	*Salvelinus confluentus*	Threatened	-
Ute ladies'-tresses	*Spiranthes diluvialis*	Threatened	-

Source: FWS online listed species database, http://www.fws.gov/easternwashington/species/countySppLists.html, accessed November 2009
Washington Department of Fish and Wildlife, http://wdfw.wa.gov/wildlife/management/endangered.html

Several of the listed species are unlikely to be present at the airport due to absence of suitable habitat. Species unlikely to be present at the airport include the bull trout, sea lion, sea turtle, sea otter, and whale species which require aquatic habitat. Additionally, the habitat range of the gray wolf does not include Washington or Oregon and therefore it is unlikely to be present within the project area.

Planned airport development projects that would require the development of relatively undisturbed land include: relocation of Dallesport Road, portions of the Runway 7-25 threshold taxiways, the extension of the Runway 12-30 parallel taxiway, and expansion of the terminal apron. Field surveys may be required to determine the potential for the presence of protected species for these projects. Additionally, coordination with the U.S. FWS and/or the Washington Department of Fish and Wildlife may be necessary to determine the extent, if any, of field investigations prior to undertaking any of the planned improvements.

FARMLAND

The *Farmland Protection Policy Act* (FPPA) was enacted to preserve farmland. FPPA guidelines apply to farmland classified as prime or unique, or of state or local importance as determined by the appropriate government agency, with concurrence by the Secretary of Agriculture.

According to information obtained from the United States Department of Agriculture's National Resource Conservation Service (NRCS) website, soils of statewide importance are located throughout the airport property, except for the western portions near the terminal area. The northern portion of the terminal area is classified as prime farmland, if irrigated, and the southern portion is classified as not prime farmland. The areas designated as prime farmland if irrigated would be exempt from FPPA as no irrigation system exists for this area. Additionally, those areas classified as soils of statewide importance are identified as urban on the Klickitat County NRCS soil map, and therefore could be exempt from FPPA requirements. Portions of the property identified for acquisition on the east side of the airport are classified as prime farmland. Further coordination with the NRCS may be required prior to the land acquisition project to determine if it is subject to FPPA requirements.

FLOODPLAINS

As defined in FAA Order 1050.1E, floodplains consist of "lowland and relatively flat areas adjoining inland and coastal water including flood prone areas of offshore islands, including at a minimum, that area subject to one percent or greater chance of flooding in any given year." Federal agencies are directed to take action to reduce the risk of flood loss, minimize the impact of floods on human safety, health and welfare, and restore and preserve the natural and beneficial values served by floodplains. Floodplains have natural and beneficial values, such as providing ground water recharge, water quality maintenance, fish, wildlife, plants, open space, natural beauty, outdoor recreation, agriculture, and forestry. FAA Order 1050.1E (12) (c) indicates that "if the proposed action and reasonable alternatives are not within the limits of a base floodplain (100-year flood area)," that it may be assumed that there are no floodplain impacts. The limits of base floodplains are determined by Flood Insurance Rate Maps (FIRM) prepared by the Federal Emergency Management Agency (FEMA).

A review of FEMA floodplain information indicates that the airport is located outside of the 100-year floodplain. None of the proposed airport improvements will occur within the 100-year floodplain for the Columbia River.

HAZARDOUS MATERIALS, POLLUTION PREVENTION, AND SOLID WASTE

Federal, state, and local laws regulate hazardous materials use, storage, transport, and disposal. These laws may extend to past and future landowners of properties containing these materials. In addition, disrupting sites containing hazardous materials or contaminates may cause significant impacts to soil, surface water, groundwater, air quality, and the organisms using these resources.

The EPA's *Enviromapper for Envirofacts*[1] was consulted regarding the presence of impaired waters or regulated hazardous sites. No impaired waters are located on or in the vicinity of the airport. According to the site, there are no SUPERFUND hazardous waste sites located within the vicinity of the airport.

An environmental due diligence audit (EDDA) may be required for the area identified for acquisition to determine the presence of any recognized environmental conditions (RECs). An REC is defined by the American Society for Testing and Materials as the presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances, or petroleum products into the ground, groundwater, or surface water of a property.

A construction-related National Pollutant Discharge Elimination System (NPDES) permit may be required prior to on-airport construction projects. The permit requires a Notice of Intent for all construction activities disturbing one or more acre of land. In conjunction with the NPDES, a Storm Water Pollution Prevention Plan (SWPPP) may be required to outline the best management practices to be used to minimize impacts to storm water conveyance systems.

[1] http://www.epa.gov/enviro/emef/, Accessed March 2010.

HISTORICAL AND CULTURAL RESOURCES

Determination of a project's impact to historical and cultural resources is made in compliance with the *National Historic Preservation Act* (NHPA) *of 1966*, as amended for federal undertakings. A historic property is defined as any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places (NRHP). Properties or sites having traditional religions or cultural importance to Native American Tribes may also qualify.

Planned airport development projects that would require the development of relatively undisturbed land include: relocation of Dallesport Road and portions of the Runway 7-25 threshold taxiways, the extension of the Runway 12-30 parallel taxiway, and expansion of the terminal apron. Field surveys may be required to determine the potential for historic properties in the airport environs. Additionally, coordination with the Washington Department of Archaeology and Historic Preservation may be necessary to determine the extent, if any, of field investigations prior to undertaking any of the planned improvements. Projects such as the fuel farm, terminal building, and emergency services building are planned for areas that are relatively disturbed and regularly maintained; therefore, it is not anticipated that impacts to historical sites would occur with these projects.

NOISE

Per federal regulation, the Yearly Day-Night Average Sound Level (DNL) is used in this study to assess aircraft noise. DNL is the metric currently accepted by the FAA, EPA, and Department of Housing and Urban Development (HUD) as an appropriate measure of cumulative noise exposure. These three agencies have each identified the 65 DNL noise contour as the threshold of incompatibility. Noise exposure contours are overlaid on maps of existing and planned land uses to determine areas that may be affected by aircraft noise at or above 65 DNL. The noise exposure contours are developed using the FAA-approved Integrated Noise Model (INM) which accepts inputs for several airport characteristics including: aircraft type, operations, flight tracks, time of day, and topography.

Exhibit D1 depicts the existing condition noise exposure contours for Columbia Gorge Regional Airport. As shown on the exhibit, the 65 DNL noise contour remains entirely on airport property. The existing 65 DNL noise contour does not encompass any noise-sensitive land uses based on a review of aerial photography for the area. **Exhibit D2** depicts the forecast 2015 condition noise contours. As with the existing condition, the 65 DNL noise contour remains on airport property does not affect any noise-sensitive land uses. **Exhibit D3** depicts the forecast 2030 condition noise contours. As with the existing condition and 2015 conditions, the 65

DNL noise contour remains on airport property and does not affect any noise-sensitive land uses.

COMPATIBLE LAND USE

The compatibility of existing and planned land uses in the vicinity of an airport is typically associated with the extent of the airport's noise impacts. Noise impacts are generally evaluated by comparing the extent and airport's noise exposure contours to the land uses within the immediate vicinity of the airport. As previously discussed, the existing and future noise contours for Columbia Gorge Regional Airport do not affect any noise-sensitive land uses.

LIGHT EMISSIONS AND VISUAL IMPACTS

Airport lighting is characterized as either airfield lighting (i.e., runway, taxiway, approach and landing lights) or landside lighting (i.e., security lights, building interior lighting, parking lights, and signage). Generally, airport lighting does not result in significant impacts unless a high intensity strobe light, such as a Runway End Identifier Light (REIL), would produce glare on any adjoining site, particularly residential uses.

Visual impacts relate to the extent that the proposed development contrasts with the existing environment and whether a jurisdictional agency considers this contrast objectionable. The visual sight of aircraft, aircraft contrails, or aircraft lights at night, particularly at a distance that is not normally intrusive, should not be assumed to constitute an adverse impact.

Additional security lighting may be constructed as part of the planned apron and hangar developments. These lights would be shielded and focused on the aprons and hangars to minimize increases in off-airport illumination.

The planned runway end identifier lights for Runway 25 will change lighting in areas east of the airport. Presently, there are no light-sensitive land uses, such as residences, located within the area immediately south of the airport; therefore, no impacts are anticipated with implementation of this project.

Additionally, the Runway 12 precision approach path indicator light system (PAPI) will alter lighting north of the airport. Residences located on the north side of Tidyman Road are approximately 1,200 feet north of the proposed PAPI. However, due to the distance between the light source and the residences, no impacts are anticipated with implementation of this project.

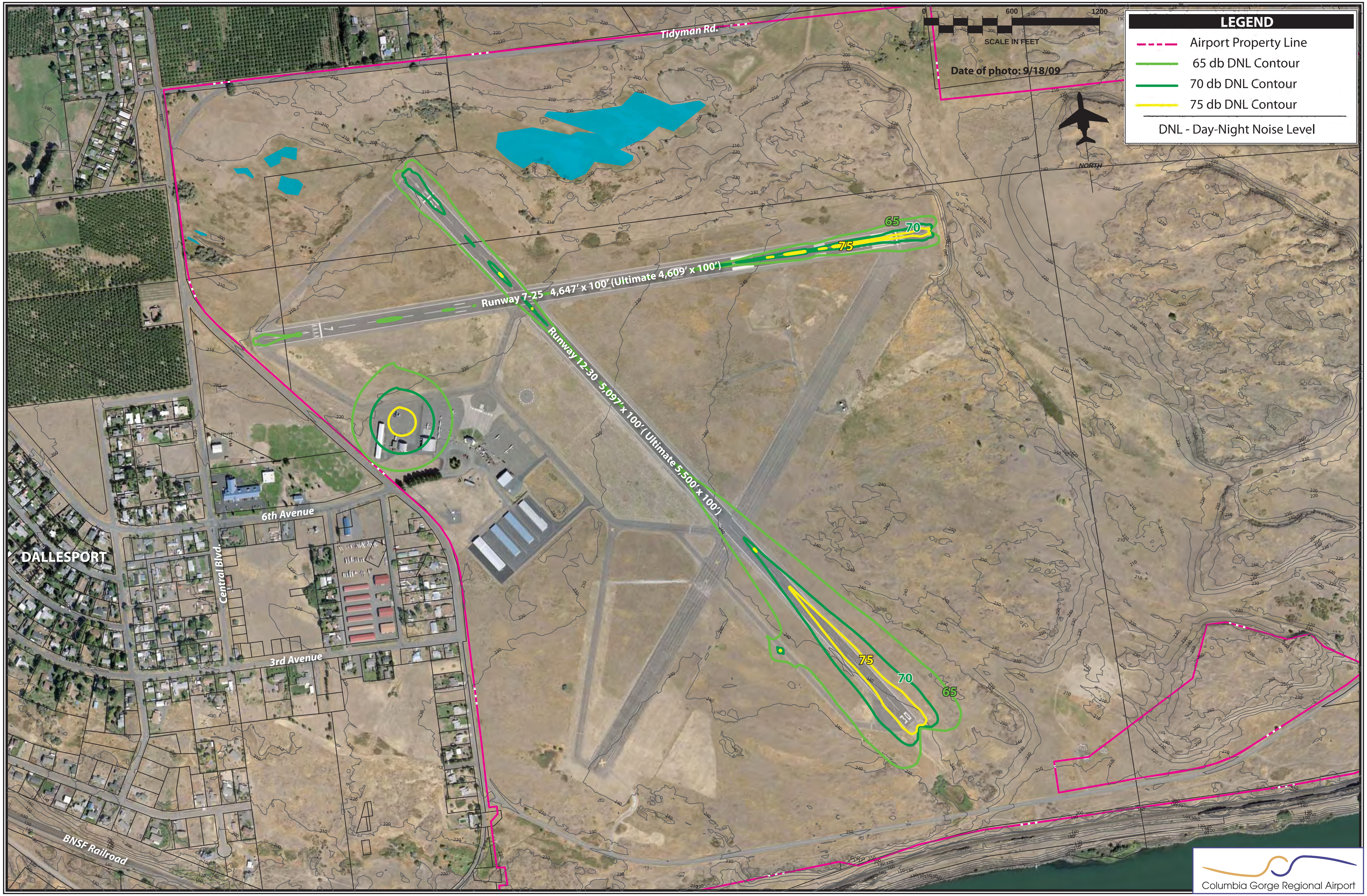


Exhibit D1
2010 NOISE CONTOURS

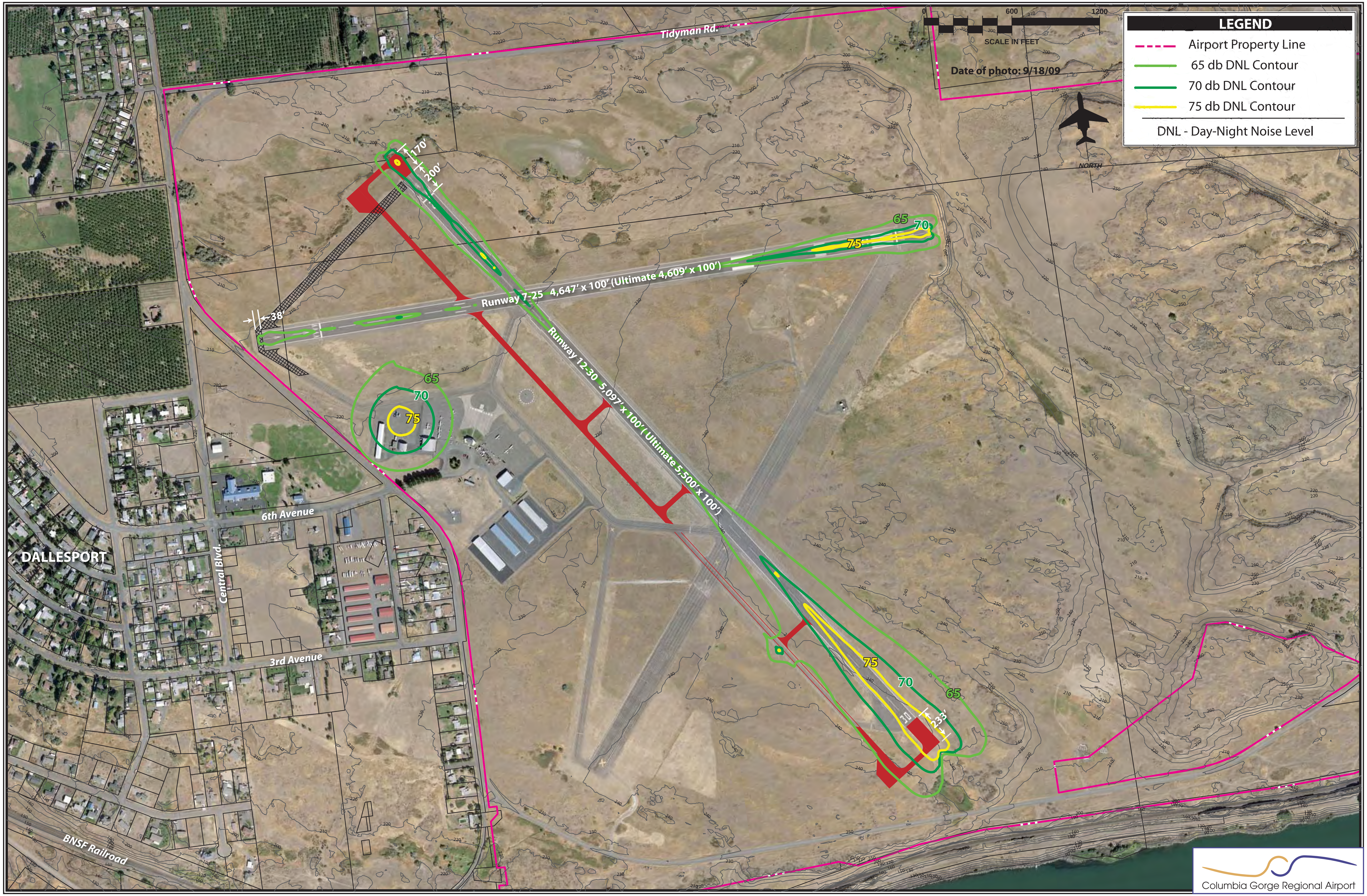


Exhibit D2
2015 NOISE CONTOURS

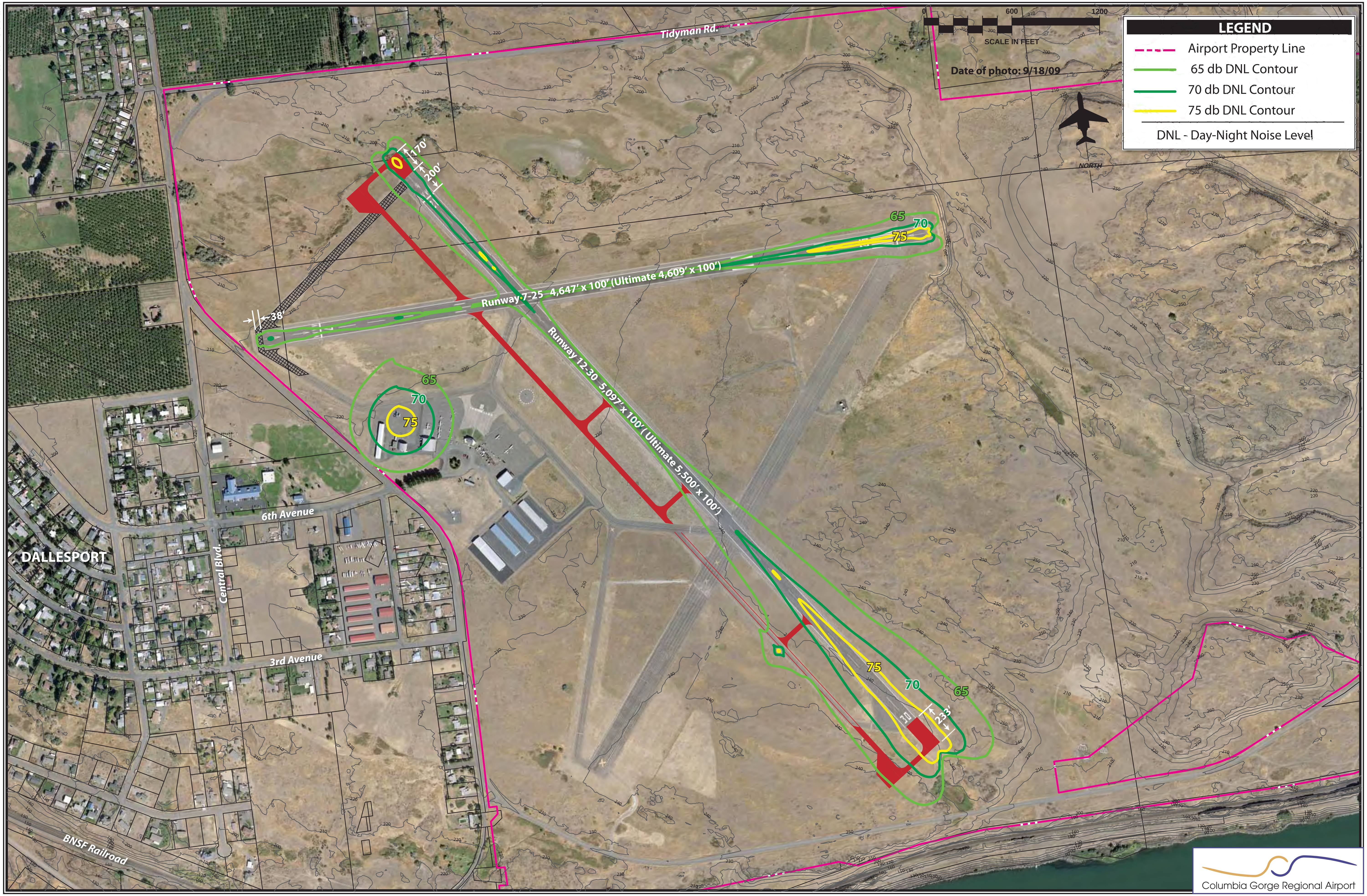


Exhibit D3
2030 NOISE CONTOURS

SOCIOECONOMIC IMPACTS, ENVIRONMENTAL JUSTICE, AND CHILDREN'S ENVIRONMENTAL HEALTH AND SAFETY RISKS

Socioeconomic impacts known to result from airport improvements are often associated with relocation activities or other community disruptions, including alterations to surface transportation patterns, division or disruption of existing communities, interferences with orderly planned development, or an appreciable change in employment related to the project.

The acquisition of real property or displacing people or businesses is required to conform to the *Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970* (URARPAPA). These regulations mandate that certain relocation assistance services be made available to owners/tenants of the properties. As indicated on Exhibit 5A, one seven-acre area is identified for acquisition to accommodate hangar development and development parcels. The planned acquisition area does not include any residences or businesses. Acquisition of these parcels will require conformance with the regulations outlined in URARPAPA.

Executive Order 12898, *Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations,* and the accompanying Presidential Memorandum, and Order DOT 5610.2, *Environmental Justice*, require FAA to provide for meaningful public involvement by minority and low-income populations, as well as analysis that identifies and addresses potential impacts on these populations that may be disproportionately high and adverse.

According to the U.S. Census Bureau, the block group[2] that includes the airport, the airport environs do not contain high percentages (above 50 percent) of minority populations or high percentages of residents below the poverty level.

Pursuant to Executive Order 13045, *Protection of Children from Environmental Health Risks and Safety Risks,* federal agencies are directed to identify and assess environmental health and safety risks that may disproportionately affect children. These risks include those that are attributable to products or substances that a child is likely to come in contact with or ingest, such as air, food, drinking water, recreational waters, soil, or products to which they may be exposed.

During construction of the projects outlined within the master plan, appropriate measures should be taken to prevent access by unauthorized persons to construction project areas. Additionally, best management practices should be implemented to decrease environmental health risks to children.

[2] U.S. Census Bureau, http://www.census.gov/, accessed March 2010

WETLANDS AND WATERS OF THE U.S.

The U.S. Army Corps of Engineers (USACE) regulates the discharge of dredge and/or fill material into waters of the United States, including adjacent wetlands, under Section 404 of the *Clean Water Act*.

Wetlands are defined by Executive Order 11990, *Protection of Wetlands*, as "those areas that are inundated by surface or groundwater with a frequency sufficient to support and under normal circumstances does or would support a prevalence of vegetation or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction." Categories of wetlands include swamps, marshes, bogs, sloughs, potholes, wet meadows, river overflows, mud flats, natural ponds, estuarine area, tidal overflows, and shallow lakes and ponds with emergent vegetation. Wetlands exhibit three characteristics: hydrology, hydrophytes (plants able to tolerate various degrees of flooding or frequent saturation), and poorly drained soils.

A Wetland Delineation Report was prepared for the northwestern portion of Columbia Gorge Regional Airport in June 2008. The location of wetlands identified during field surveys of this area are identified on **Exhibit D4**. Seven wetlands are present in the survey area totaling 9.8 acres. As shown on **Exhibit D4**, airport improvements included in the master plan will not disturb the identified wetlands in the northwest portion of the airport. Additionally, according to the National Wetlands Inventory maintained by the FWS, a wetland area is located at the southern end of Runway 12-30. The location of the wetland area is identified on **Exhibit D4**. This area may be affected as part of the Runway Safety Area grading associated with the proposed southerly extension of Runway 12-30. Field surveys and coordination with the USACE may be necessary during the environmental documentation process for development in areas that have not been surveyed to determine the presence of jurisdictional wetlands within those areas.

WATER QUALITY

The *Clean Water Act* provides the authority to establish water quality standards, control discharges, develop waste treatment management plans and practices, prevent or minimize the loss of wetlands, and regulate other issues concerning water quality. Water quality concerns related to airport development most often relate to the potential for surface runoff and soil erosion, as well as the storage and handling of fuel, petroleum products, solvents, etc.

The EPA's Enviromapper website indicates that there are no impaired streams within the vicinity of the airport.

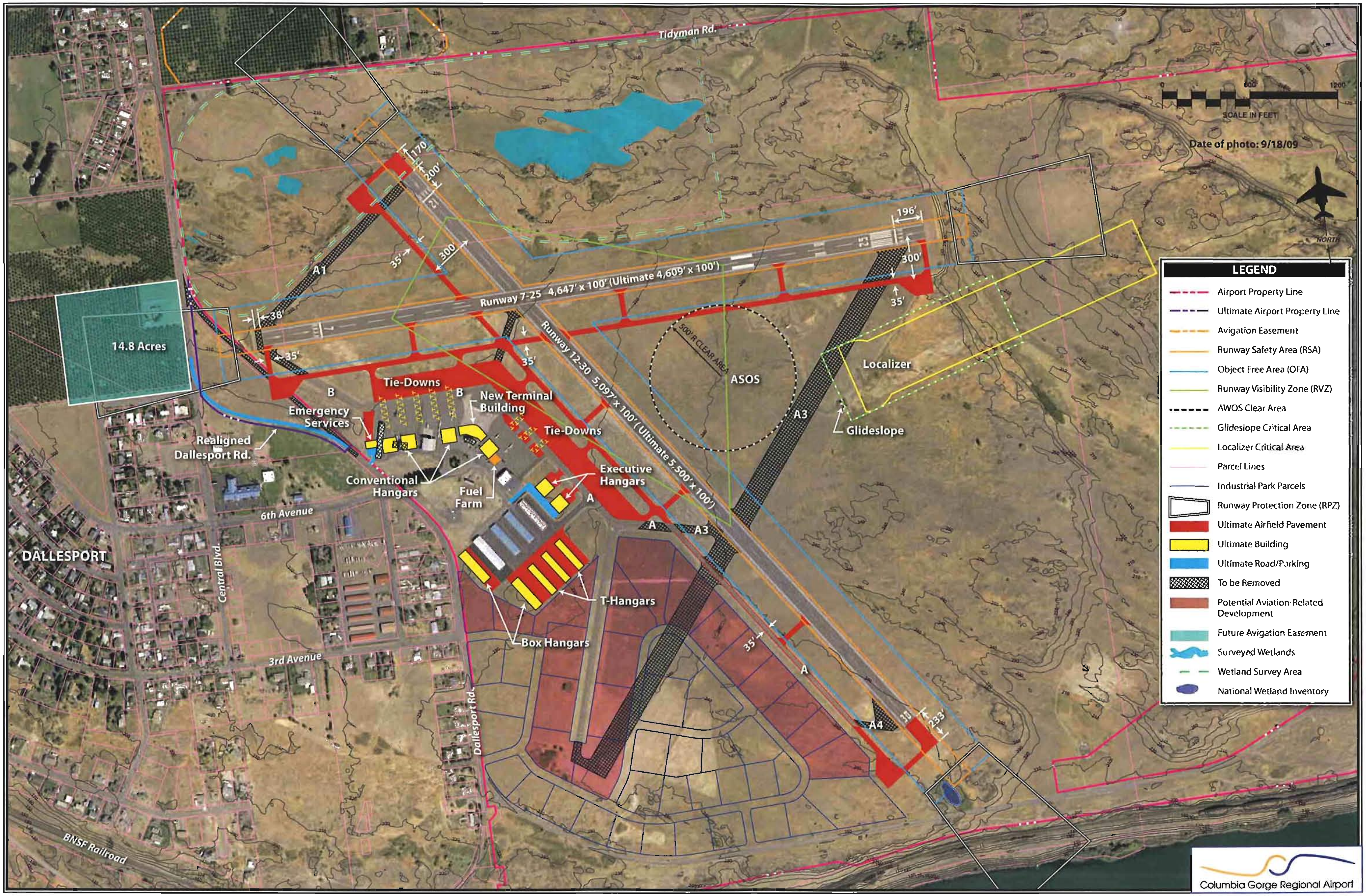


Exhibit D4
MASTER PLAN CONCEPT WITH WETLANDS

During construction of any of the planned improvements at the airport, it is suggested that mitigation measures from FAA Advisory Circular 150/5370-10A, *Standards for Specifying Construction of Airports, Item P-156, Temporary Air and Water Pollution, Soil Erosion and Siltation Control*, be incorporated into project design specifications to further mitigate potential water quality impacts. These standards include temporary measures to control water pollution, soil erosion, and siltation through the use of berms, fiber mats, gravels, mulches, slope drains, and other erosion control methods.

DRINKING WATER

The quality of the drinking water available to the airport and the adjacent Town of Dallesport is an important environmental consideration. In 1974, Congress enacted the *Safe Drinking Water Act* (SDWA) with the goal of ensuring safe drinking water for all users of public supplies. The EPA has the regulatory authority to enforce the Act and has directed states to develop a Wellhead Protection Program (WHP) in order to maximize the safety of the water supply at the local level. The Dallesport Water District has developed a WHP for their service area which includes the airport.

The WHP includes the following elements:

- A susceptibility assessment.
- Identification of the WHP Time-of-Travel (TOT) zones.
- An inventory of potential contaminant sources and land use activities.
- A discussion of the management strategy.
- Contingency and emergency response planning.
- Supporting information and documentation.

There are two Dallesport Water District wellheads that are in close proximity to the airport. The first, identified as Well No. 3, is on the west of Dallesport Road near the intersection with 6th Avenue. This wellhead is approximately 700 feet from the airport terminal building. The second, Well No. 2, is located approximately 500 feet further to the west along 6th Avenue. The airport also has a new well located in the planned business park that may ultimately be connected to the Dallesport Water District distribution network.

Exhibit D5 is a map contained within the WHP narrative report that identifies the one, five, and ten year TOT zones. Time of travel refers to the amount of time it takes a particle of groundwater entering the aquifer at the boundary of the WHP zone to reach the well after one, five, or ten years of pumping.

Two items at the airport were identified as items of concern. The first is an external heating oil tank located outside the Life Flight Services hangar. This tank does not have secondary containment and sits on a gravel base. The second is a long strip trench that drains storm water runoff from the main apron to a catch basin. The strip trench is adjacent to the airport fuel station as well as heavy equipment and aircraft parking areas. While not specifically identified in the WHP narrative report, the existing underground fuel farm and fueling island is within a few feet of the ten-year TOT.

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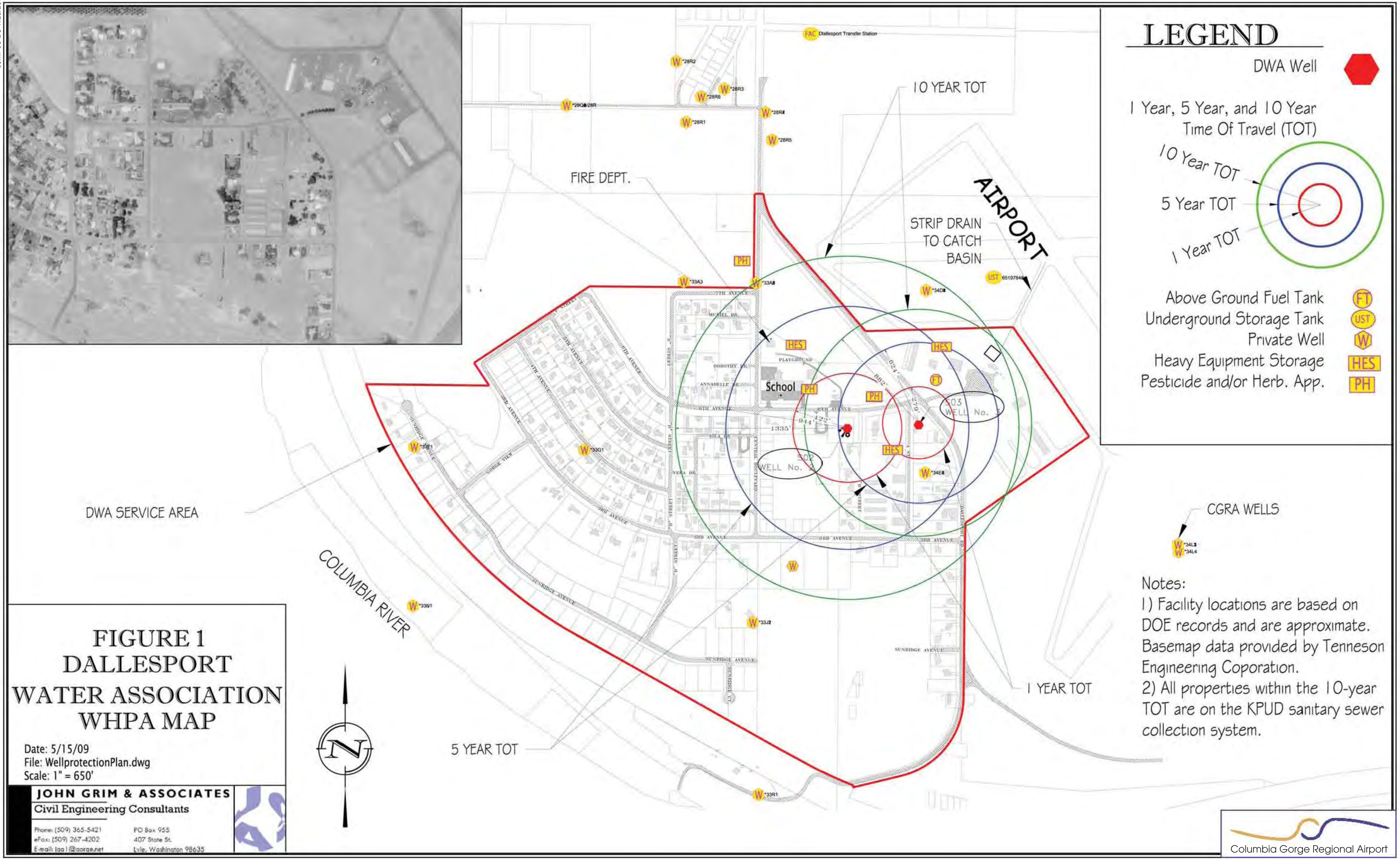


Exhibit D5
WELLHEAD PROTECTION
PROGRAM MAP

Columbia Gorge Regional Airport

Appendix E

AIRPORT PLANS

As part of this master plan, the Federal Aviation Administration (FAA) requires the development of several computer drawings detailing specific parts of the airport and its environs. These drawings were created on a computer-aided drafting system (CAD) and serve as the official depiction of the current and planned condition of the airport. These drawings will be delivered to the FAA for their review and inspection. The FAA will critique the drawings from a technical perspective to be sure all applicable federal regulations are met. The FAA will use the CAD drawings as the basis and justification for funding decisions.

It should be noted that the FAA requires that any changes to the airfield (i.e., runway and taxiway system, etc.) be represented on the drawings. The landside configuration developed during this master planning process is also depicted on the drawings, but the FAA recognized that landside development is much more fluid and dependent upon developer needs. Thus, an updated drawing set is not typically necessary for future landside alterations.

The following is a description of the CAD drawings included with this master plan.

AIRPORT LAYOUT PLAN

An official Airport Layout Plan (ALP) drawing has been developed for Columbia Gorge Regional Airport, a draft of which is included in this appendix. The ALP drawing graphically presents the existing and ultimate airport layout plan. The ALP drawing will include such elements as the physical airport features, wind data tabulation, location of airfield facilities (i.e., runways, taxiways, navigational aids), and existing general aviation development (and commercial development for air carrier airports). Also presented on the ALP are the runway safety areas, airport property boundary, and revenue support areas. The ALP is used by the FAA to determine funding eligibility for future capital projects.

The computerized plan provides detailed information on existing and future facility layouts on multiple layers that permit the user to focus on any section of the airport at a desired scale. The plan can be used as base information for design and can be easily updated in the future to reflect new development and more detail concerning existing conditions as made available through design surveys.

FAR PART 77 AIRSPACE DRAWING

Federal Aviation Regulation (F.A.R.) Part 77, *Objects Affecting Navigable Airspace*, was established for use by local authorities to control the height of objects near airports. The FAR Part 77 Airspace Drawing included in this master plan is a graphic depiction of this regulatory criterion. The FAR Part 77 Airspace Drawing is a tool to aid local authorities in determining if proposed development could present a hazard to aircraft using the airport. The FAR Part 77 Airspace Drawing can be a critical tool for the airport sponsor's use in reviewing proposed development in the vicinity of the airport.

The airport sponsors should do all in their power to ensure development stays below the FAR Part 77 surfaces to protect the role of the airport. The following discussion will describe those surfaces that make up the recommended FAR Part 77 surfaces at Columbia Gorge Regional Airport.

The FAR Part 77 Airspace Drawing assigns three-dimensional imaginary surfaces associated with the airport. These imaginary surfaces emanate from the runway centerline(s) and are dimensioned according to the visibility minimums associated with the approach to the runway end and size of aircraft to operate on the runway. The FAR Part 77 imaginary surfaces include the primary surface, approach surface, transitional surface, horizontal surface, and conical surface. Each surface is described as follows:

Primary Surface

The primary surface is an imaginary surface longitudinally centered on the runway. The primary surface extends 200 feet beyond each runway end. The elevation of any point on the primary surface is the same as the elevation along the nearest associated point on the runway centerline. Under FAR Part 77 regulations, the primary surface for both runways is 500 feet wide.

Approach Surface

An approach surface is also established for each runway end. The approach surface begins at the same width as the primary surface, extends upward and outward from the primary surface end, and is centered along an extended runway centerline. The approach surface leading to each runway is based upon the type of approach available (instrument or visual) or planned.

In an effort to protect the airport from future adjacent incompatible land uses, approach surfaces with instrument approach procedures are planned to each runway end. The approach slope dimensions are based on a non-precision instrument approach with greater than ¾-miles visibility. The approach surface extends from the primary surface at a 34:1 slope to a distance of 10,000 feet and a width of 3,500 feet.

Transitional Surface

Each runway has a transitional surface that begins at the outside edge of the primary surface at the same elevation as the runway. The transitional surface also connects with the approach surfaces of each runway. The surface rises at a slope of 7 to 1, up to a height 150 feet above the highest runway elevation. At that point, the transitional surface is replaced by the horizontal surface.

Horizontal Surface

The horizontal surface is established at 150 feet above the highest elevation of the runway surface. Having no slope, the horizontal surface connects the transitional and approach surfaces to the conical surface at a distance of 10,000 feet from the end of the primary surfaces of each runway.

Conical Surface

The conical surface begins at the outer edge of the horizontal surface. The conical surface then continues for an additional 4,000 feet horizontally at a slope of 20 to 1. Therefore, at 4,000 feet from the horizontal surface, the elevation of the conical surface is 350 feet above the highest airport elevation.

APPROACH SURFACE PROFILE DRAWINGS

The runway profile drawing presents the entirety of the FAR Part 77 approach surface to the runway ends. It also depicts the runway centerline profile with elevations. This drawing provides profile detail that the Airspace Drawing does not. The profile drawings also depict the existing and future Threshold Siting Surface.

INNER APPROACH SURFACE DRAWINGS

The Inner Portion of the Approach Surface Drawing contains the plan and profile view of the inner portion of the approach surface to the runway and a tabular listing of all surface violations. The drawing also contains other approach surfaces, such as the threshold siting surface. Detailed obstruction and facility data is provided to identify planned improvements and the disposition of obstructions. A drawing of each runway end is provided.

TERMINAL AREA DRAWING

The terminal area drawing is a larger scale plan view drawing of existing and planned aprons, buildings, hangars, parking lots, and other landside facilities. It is prepared in accordance with FAA AC 150/5300-13, *Airport Design*.

AIRPORT LAND USE DRAWING

The objective of the Airport Land Use Drawing is to coordinate uses of the airport property in a manner compatible with the functional design of the airport facility. Airport land use planning is important for orderly development and efficient use of available space. There are two primary considerations for airport land use planning. These are to secure those areas essential to the safe and efficient operation of the airport and to determine compatible land uses for the balance of the property which would be most advantageous to the airport and community.

In the development of an airport land use plan for Columbia Gorge Regional Airport, the airport property was broken into several large general tracts. Each tract was analyzed for specific site characteristics, such as tract size and shape, land characteristics, and existing land uses. The availability of utilities and the accessibility to various transportation modes were also considered. Limitations and constraints to development such as height and noise restrictions, runway visibility zones, and contiguous land uses were analyzed next. Finally, the compatibility of various land uses in each tract was analyzed.

The depiction of on-airport land uses on this drawing becomes the official FAA acceptance of current and future land uses. For Columbia Gorge Regional Airport, all airport property adjacent to the taxiways and runways is planned for aviation purposes.

AIRPORT PROPERTY MAP

The Airport Property Map provides information on property under airport control and is therefore subject to FAA grant assurances. The various recorded deeds that make up the airport property are listed in tabular format. The primary purpose of the drawing is to provide information for analyzing the current and future aeronautical use of land acquired with federal funds.

DEPARTURE SURFACE DRAWING

For runways supporting instrument operations, such as Runway 25, a separate drawing depicting the departure surface is required. The departure service, also called the one engine inoperable (OEI) obstacle identification surface (OIS) is a surface emanating from the departure end of the runway to a distance of 10,200 feet. The inner width is 1,000 feet and the outer width is 6,466 feet. On January 1, 2009, the FAA required that the airport have this drawing completed. The departure surface information should be made available to any commercial operator at the airport.

There are three recommended methods to mitigate penetrations to this surface:

1. The object is removed or lowered.
2. The Takeoff Distance Available (TODA) is decreased (i.e., pilots are instructed to lift off prior to the runway end in order to avoid the obstruction.
3. Instrument departure minimums are raised.

Existing obstacles of 35 feet or less would not require mitigation; instead, new departure procedures may be introduced or existing departure procedures may be altered or no action may be taken.

DRAFT ALP DISCLAIMER

The ALP set has been developed in accordance with accepted FAA standards. The ALP set has not yet been approved by the FAA and is subject to FAA airspace review. Land use and other changes may result.

AIRPORT LAYOUT PLANS

Prepared For The City Of The Dalles, Oregon and Klickitat County, Washington

Columbia Gorge Regional Airport Dallesport, Washington

INDEX OF DRAWINGS

PRELIMINARY

July 2010

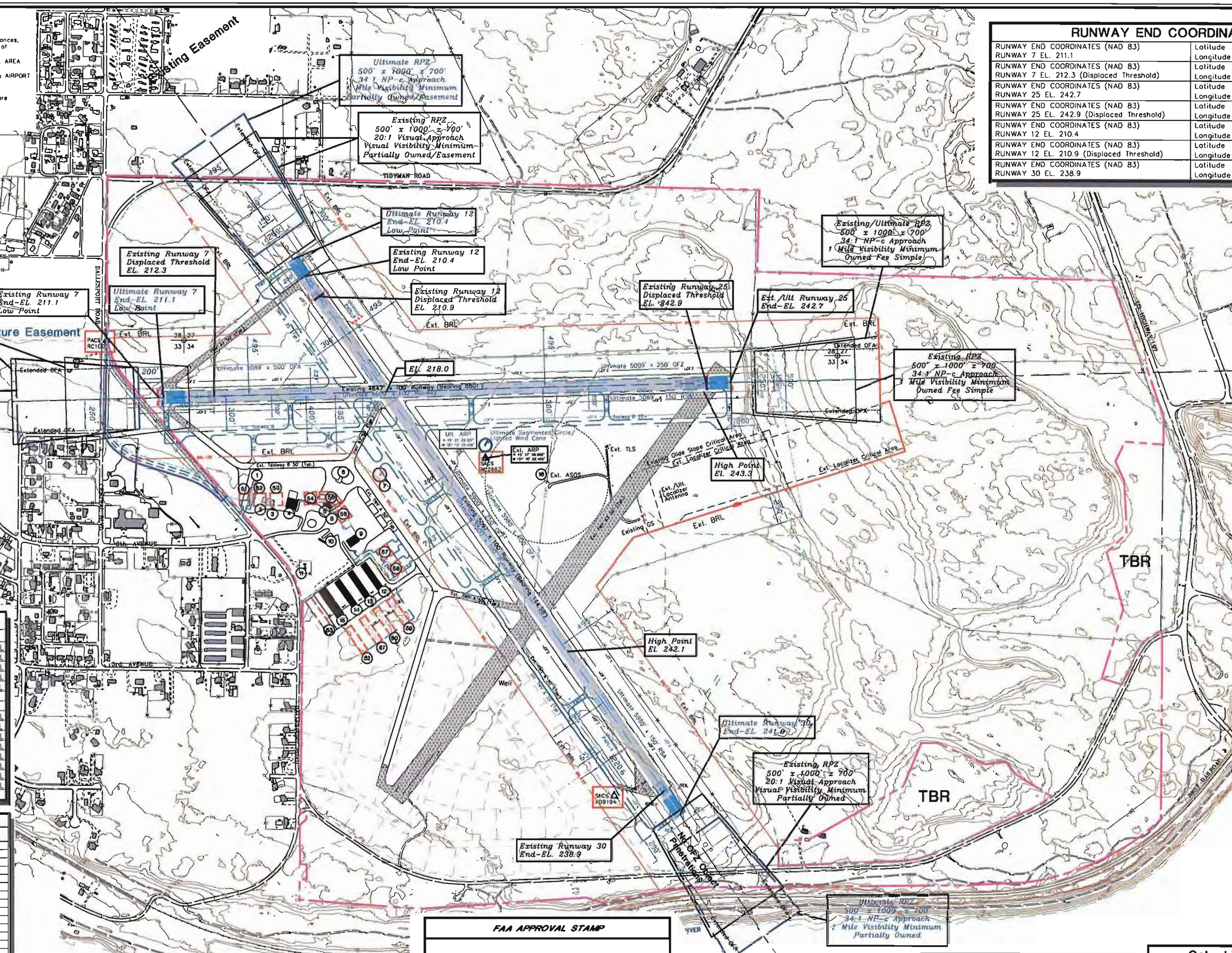
Date of Photo: 9/18/2009

PRECISION APPROACH ENGINEERING

Coffman Associates Airport Consultants www.coffmanassociates.com

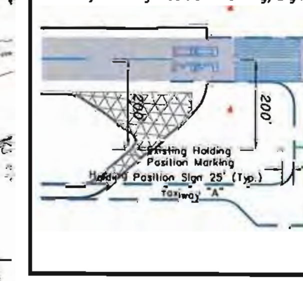
GENERAL NOTES:

1. Depiction of features and objects, including related elevations and clearances, Within the runway approach surfaces are depicted on the Inner Portion of Runway Approach Surface Drawings.
2. Details concerning terminal improvements are depicted on the TERMINAL AREA DRAWING.
3. Recommended land uses within the airport environs are depicted on the AIRPORT LAND USE DRAWING.
4. Photography Dated September 18, 2009.
5. Existing/ultimate fence along existing/ultimate Property Line except where shown.
6. TBR: To be released.



RUNWAY END COORDINATES (NAD 83)

RUNWAY END COORDINATES (NAD 83) RUNWAY 7 EL. 211.1	Latitude Longitude	N 45° 37' 14.890" W 121° 10' 40.860"	N 45° 37, 14.903" W 121° 10' 40.326"
RUNWAY END COORDINATES (NAD 83) RUNWAY 7 EL. 212.3 (Displaced Threshold)	Latitude Longitude	N 45° 37' 15.050" W 121° 10' 34.680"	Remove
RUNWAY END COORDINATES (NAD 83) RUNWAY 25 EL. 242.7	Latitude Longitude	N 45° 37' 16.490" W 121° 09' 35.530"	SAME
RUNWAY END COORDINATES (NAD 83) RUNWAY 25 EL. 242.9 (Displaced Threshold)	Latitude Longitude	N 45° 37' 16.420" W 121° 09' 38.280"	Remove
RUNWAY END COORDINATES (NAD 83) RUNWAY 12 EL. 210.4	Latitude Longitude	N 45° 37' 24.700" W 121° 10' 24.380"	N 45° 37' 26.068" W 121° 10' 25.766"
RUNWAY END COORDINATES (NAD 83) RUNWAY 12 EL. 210.9 (Displaced Threshold)	Latitude Longitude	N 45° 37' 23.090" W 121° 10' 22.750"	Remove
RUNWAY END COORDINATES (NAD 83) RUNWAY 30 EL. 238.9	Latitude Longitude	N 45° 36' 43.690" W 121° 09' 42.820"	N 45° 36' 41.817" W 121° 09 40.922"



Ultimate Buildings/Facilities

NO.	Description/Elevation (MSL)	
50	Hangar	25' AGL
51	Hangar	25' AGL
52	Hangar	25' AGL
53	Hangar	25' AGL
54	Hangar	25' AGL
55	Hangar	25' AGL
56	Hangar	25' AGL
57	Hangar	25' AGL
58	Hangar	25' AGL
59	T-Hangar (10 units)	22' AGL
60	T-Hangar (10 units)	22' AGL
61	T-Hangar (10 units)	22' AGL
62	Box Hangar	22' AGL
63	Box Hangar	22' AGL

Existing Buildings/Facilities

NO.	Description/Elevation (MSL)	
1	T-Hangar (10 units) (Otis)	239 MSL
2	Quonset Hut Hangar	236 MSL
3	Quonset Hut Hangar	246 MSL
4	Hangar (AAE)	248 MSL
5	Terminal Building	251 MSL
6	Fuel Island	N/A
7	Segmented Circle	–
8	Equipment Storage	239 MSL
9	Hangar (Shearer Sprayers)	251 MSL
10	Resident Security	239 MSL
11	Airport Beacon	332 MSL
12	T-Hangar (10 units)	245 MSL
13	T-Hangar (10 units)	247 MSL
14	T-Hangar (10 units)	247 MSL
15	T-Hangar (10 units)	259 MSL
16	ASOS	–

LEGEND

EXISTING	ULTIMATE	DESCRIPTION
None		ULTIMATE ROAD
None		ABANDONED PAVEMENT (To Be Removed)
		AIRPORT REFERENCE POINT (ARP)
	Same	AIRPORT ROTATING BEACON
		BUILDING
	Same	DRAINAGE
		FACILITY CONSTRUCTION
None	PAPI-4	NAVIGATIONAL AID INSTALLATION (PAPI-4)
REIL	REIL	RUNWAY END IDENTIFICATION LIGHTS
		RUNWAY THRESHOLD LIGHTS
	Same	SECTION CORNER
		SEGMENTED CIRCLE/WIND INDICATOR
	Same	TOPOGRAPHY (2009)
	Same	ASOS
		HOLDING POSITION MARKING
	Same	DIRT ROAD
		FENCING
		AIRPORT PROPERTY LINE/with FENCE
BRL		BUILDING RESTRICTION LINE (BRL)
EXTENDED OFA		EXTENDED OBJECT FREE AREA
		PARCELS
uRVZ		ULTIMATE RUNWAY VISIBILITY ZONE
uOFZ		ULTIMATE OBSTACLE FREE ZONE
uRSA		ULTIMATE RUNWAY SAFETY AREA
uOFZ		ULTIMATE OBSTACLE FREE ZONE
		EXISTING/ULTIMATE TREES
		SURVEY MONUMENT (PACS/SACS)
		RUNWAY SHADE
	Same	TIE-DOWNS
		RUNWAY PROTECTION ZONE (RPZ)

OBSTACLE FREE ZONE (OFZ) OBJECT PENETRATIONS

OBJECT	PENETRATION	DISPOSITION
Road & Fence at Runway 7 end	Yes	Relocate
Fence at Runway 12 end	Yes	Relocate
Fence at Runway 25 end	Yes	Relocate

THRESHOLD SITING SURFACE OBJECT PENETRATIONS

OBJECT	PENETRATION	DISPOSITION
Road at Runway 7 end	Yes	Relocate
Trees at Runway 12 end	Yes	Remove Trees
Bluff at Runway 30	Yes	No Action

FAA APPROVAL STAMP

TRUE NORTH
16° 6' East

Magnetic Declination
16° 6' East (April 2010)
Annual Rate of Change 9' West

0 400 800 1200
SCALE IN FEET

FOR APPROVAL BY:

City of The Dalles DATE:

Klickitat County DATE:

SURVEY CONTROL STATIONS

DESIGNATION/PID	LATITUDE	LONGITUDE
DLS A SACS AD9194	45° 37' 17.135" N	121° 10' 41.027" W
DLS ARP SACS RC2662	45° 37' 6.651" N	121° 10' 2.500" W
K 425 PACS RC1007	45° 36' 36.499" N	121° 09' 48.937" W

No.	REVISIONS	DATE	BY	APP'D.
3	-	-	-	-
2	-	-	-	-
1	Airport Layout Plan Updated	11/04	CWEC	-

"THE PREPARATION OF THESE DOCUMENTS WAS FINANCED IN PART THROUGH A PLANNING GRANT FROM THE FEDERAL AVIATION ADMINISTRATION AS PROVIDED UNDER SECTION 505 OF THE AIRPORT AND AIRWAY IMPROVEMENT ACT OF 1982, AS AMENDED. THE CONTENTS DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICY OF THE FAA. ACCEPTANCE OF THESE DOCUMENTS BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT ON THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED HEREIN, NOR DOES IT INDICATE THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH APPROPRIATE PUBLIC LAWS."

Columbia Gorge Regional Airport

AIRPORT LAYOUT PLAN

PRELIMINARY

The Dalles, Oregon & Klickitat County, Washington

PLANNED BY: Patrick C. Taylor | DETAILED BY: Larry D. Johnson

APPROVED BY: Stephen C. Wagner | July 19, 2010 | SHEET 2 OF 11

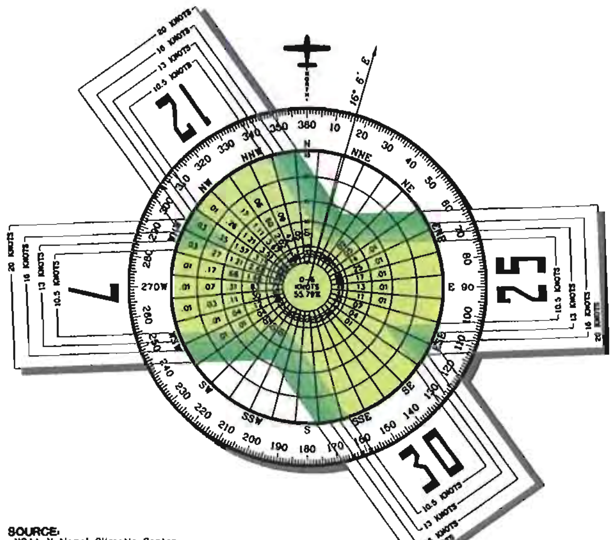
PRECISION APPROACH ENGINEERING

Coffman Associates Airport Consultants www.coffmanassociates.com

Coffman Associates-LDJ dls_alp.dwg Monday August 2 2010 4:04pm

ALL WEATHER WIND COVERAGE

RUNWAYS	10.5 Knots 12 MPH	13 Knots 15 MPH	16 Knots 18 MPH	20 Knots 23 MPH
Runway 7-25	90.66%	95.88%	98.78%	99.86%
Runway 12-30	96.08%	97.77%	99.34%	99.87%
Combined	99.70%	99.96%	100.00%	100.00%

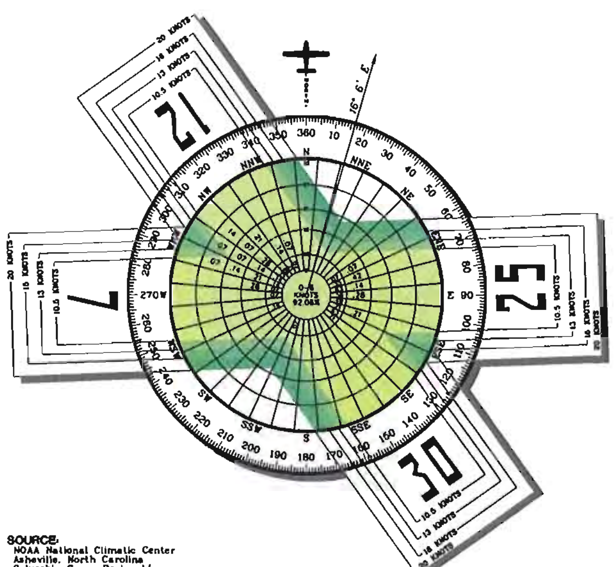


SOURCE:
NOAA National Climatic Center
Asheville, North Carolina
Columbia Gorge Regional/
The Dalles Municipal Airport (DLS)
Dalles Port, Washington

OBSERVATIONS:
87,558 All Weather Observations
10/1998-08/2009

IFR WEATHER WIND COVERAGE

RUNWAYS	10.5 Knots 12 MPH	13 Knots 15 MPH	16 Knots 18 MPH	20 Knots 23 MPH
Runway 7-25	99.25%	99.51%	99.86%	100.00%
Runway 12-30	98.97%	99.56%	99.96%	100.00%
Combined	99.96%	100.00%	100.00%	100.00%



SOURCE:
NOAA National Climatic Center
Asheville, North Carolina
Columbia Gorge Regional/
The Dalles Municipal Airport (DLS)
Dalles Port, Washington

OBSERVATIONS:
1,427 IFR CAT-I Observations
10/1998-08/2009

AIRPORT DATA

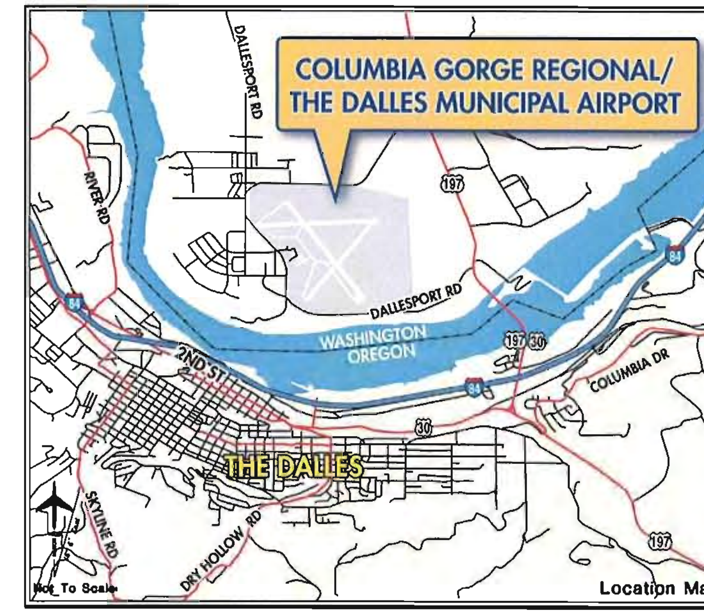
OWNER: The Dalles, Oregon, USA	AIRPORT NPIAS CODE: GA
CITY: The Dalles, Oregon, USA	COUNTY: KLICKITAT
RANGE: R13E TOWNSHIP: T2N	

Columbia Gorge Regional/The Dalles Municipal Airport (DLS)		EXISTING	ULTIMATE
AIRPORT SERVICE LEVEL		General Aviation	SAME
AIRPORT REFERENCE CODE		B-II	B-II
DESIGN AIRCRAFT		King Air 200	King Air 200
AIRPORT ELEVATION (Vert. Datum: NAVD88)		243.3 MSL	243.3 MSL
MEAN MAXIMUM TEMPERATURE OF HOTTEST MONTH		89° (July)	89° (July)
AIRPORT REFERENCE POINT (ARP) COORDINATES (Horz. Datum: NAD83)	Latitude	N 45° 37' 06.800"	N 45° 37' 09.301"
	Longitude	W 121° 10' 02.400"	W 121° 10' 05.434"
AIRPORT INSTRUMENT APPROACH GPS APPROACH		RNAV (GPS)-A LDA/DME (Rwy 25) COPTER LDA/DME LOC/GS	RNAV (GPS)-A LDA/DME (Rwy 25) COPTER LDA/DME LOC/GS (Rwy 25) RNAV (GPS) Rwy 7 RNAV (GPS) Rwy 12 RNAV (GPS) Rwy 30
AIRPORT and TERMINAL NAVIGATIONAL AIDS		Airport Beacon	Airport Beacon
GPS AT AIRPORT		Yes	SAME

RUNWAY DATA

RUNWAY DATA	Runway 7-25 EXISTING		Runway 7-25 ULTIMATE		Runway 12-30 EXISTING		Runway 12-30 ULTIMATE	
AIRCRAFT APPROACH CATEGORY-DESIGN GROUP	B-II		B-II		B-II		B-II	
CRITICAL AIRCRAFT	King Air 200		King Air 200		King Air 200		King Air 200	
WINGSPAN OF CRITICAL AIRCRAFT	54.5'		54.5'		54.5'		54.5'	
UNDERCARRIAGE WIDTH OF CRITICAL AIRCRAFT	17.2'		17.2'		17.2'		17.2'	
APPROACH SPEED (KNOTS) OF CRITICAL AIRCRAFT	200 knots		200 knots		200 knots		200 knots	
MAX. CERTIFIED TAKEOFF WEIGHT (LBS.) OF CRITICAL AIRCRAFT	12,500 lbs		12,500 lbs		12,500 lbs		12,500 lbs	
RUNWAY EFFECTIVE GRADIENT	0.7%		0.7%		0.6%		0.6%	
RUNWAY MAXIMUM GRADIENT	0.7%		0.7%		0.6%		0.6%	
RUNWAY CENTERLINE TO PARALLEL RUNWAY CENTERLINE	N/A		N/A		N/A		N/A	
TAXIWAY CENTERLINE TO FIXED OR MOVABLE OBJECT	65.5'		65.5'		65.5'		65.5'	
TAXIWAY WINGTIP CLEARANCE	26'		26'		26'		26'	
RUNWAY CENTERLINE TO PARALLEL TAXIWAY CENTERLINE	240'		240'		240'		240'	
RUNWAY DIMENSIONS (L X W)	4647' x 100'		4609' x 100'		5097' x 100'		5500' x 100'	
RUNWAY TRUE BEARING (SURVEYED)	88.01°/ 268.01°		88.01°/ 268.01°		144.58°/ 324.59°		144.58°/ 324.59°	
RUNWAY WIND COVERAGE (16 KNOTS/18 MPH)	98.78%		98.78%		99.34%		99.34%	
RUNWAY MAXIMUM ELEVATION/HIGH POINT OF RUNWAY	243.9' MSL		243.9' MSL		242.1 MSL		242.1 MSL	
ELEVATION OF RUNWAY LOW POINT	210.8 MSL		210.8 MSL		210.4 MSL		210.4 MSL	
RUNWAY LIGHTING	MIRL		MIRL		MIRL		MIRL	
RUNWAY SURFACE TYPE	Asphalt		Asphalt		Asphalt		Asphalt	
RUNWAY PAVEMENT STRENGTH (IN THOUSAND LBS.)[1]	4(S)		30(S), 60(DW)		18(S)		30(S), 60(DW)	
LINE OF SIGHT REQUIREMENT MET	No		Yes		No		Yes	
TAXIWAY WIDTH	35'		35'		35'		35'	
TAXIWAY LIGHTING	Reflectors		MITL		Reflectors/Throat Lights		MITL	
TAXIWAY MARKING	Centerline		Centerline		Centerline		Centerline	
TAXIWAY SURFACE MATERIAL	Asphalt		Asphalt		Asphalt		Asphalt	
TAXIWAY SAFETY AREA WIDTH	79'		79'		79'		79'	
TAXIWAY OBJECT FREE AREA WIDTH	131'		131'		131'		131'	
TAXIWAY HOLDING POSITION MARKING/HOLDSIGN	200'		200'		200'		200'	
	RUNWAY 7	RUNWAY 25	RUNWAY 7	RUNWAY 25	RUNWAY 12	RUNWAY 30	RUNWAY 12	RUNWAY 30
PART 77 CATEGORY	BV	NP-C	NP-C	NP-C	BV	BV	NP-C	NP-C
PART 77 APPROACH SLOPE	20:1	34:1	34:1	34:1	20:1	20:1	34:1	34:1
RUNWAY INSTRUMENTATION	Visual	Nonprecision	Nonprecision	Nonprecision	Visual	Visual	Nonprecision	Nonprecision
RUNWAY END MARKING	Visual	Precision	Visual	Nonprecision	Visual	Visual	Nonprecision	Nonprecision
RUNWAY BLAST PAD	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
RUNWAY APPROACH VISIBILITY MINIMUMS (LOWEST)	Visual	1 mile	1 mile	1 mile	Visual	Visual	1 mile	1 mile
RUNWAY APPROACH LIGHTING	None	None	None	None	None	None	None	None
PRECISION OBJECT FREE ZONE (800' X 200')	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
THRESHOLD SITING REQUIREMENTS (APPENDIX 2)	Rwy Type 4	Rwy Type 5	Rwy Type 5	Rwy Type 5	Rwy Type 4	Rwy Type 4	Rwy Type 5	Rwy Type 5
THRESHOLD SITING SURFACE OBJECT PENETRATIONS	YES	Yes	NO	NO	Yes	Yes	NO	Yes
ELEVATION (NAVD88) OF RUNWAY ENDS	211.1 MSL	242.7 MSL	211.1 MSL	242.7 MSL	210.4 MSL	238.9 MSL	210.4 MSL	241.0
RUNWAY THRESHOLD DISPLACEMENT	440' (Dspld)	196' (Dspld)	N/A	N/A	200' (Dspld)	None	N/A	N/A
RUNWAY DISPLACED THRESHOLD ELEVATION (NAVD 88)	212.3 MSL	242.9 MSL	N/A	N/A	210.9 MSL	N/A	N/A	N/A
ELEVATION (NAVD88) OF RUNWAY TOUCHDOWN ZONE	239.5 (TDZE)	243.3 (TDZE)	234.0 (TDZE)	243.3 (TDZE)	240.3 (TDZE)	242.1 (TDZE)	240.3 (TDZE)	242.1 (TDZE)
RUNWAY SAFETY AREA (RSA BEYOND STOP END)	300'	300'	300'	300'	300'	300'	300'	300'
RUNWAY SAFETY AREA WIDTH	150'	150'	150'	150'	150'	150'	150'	150'
RUNWAY OBJECT FREE AREA (OFA BEYOND STOP END)	300'	300'	300'	300'	300'	300'	300'	300'
RUNWAY OBJECT FREE AREA WIDTH	500'	500'	500'	500'	500'	500'	500'	500'
RUNWAY OBSTACLE FREE ZONE (BEYOND STOP END)	200'	200'	200'	200'	200'	200'	200'	200'
RUNWAY OBSTACLE FREE ZONE WIDTH	250'	250'	250'	250'	250'	250'	250'	250'
TAKEOFF RUN AVAILABLE (TORA)	4647'	4647'	4609'	4609'	5097'	5097'	5500'	5500'
TAKEOFF DISTANCE AVAILABLE (TODA)	4647'	4647'	4609'	4609'	5097'	5097'	5500'	5500'
ACCELERATE-STOP DISTANCE AVAILABLE (ASDA)	4207'	4451'	4609'	4609'	4897'	5097'	5500'	5500'
LANDING DISTANCE AVAILABLE (LDA)	4207'	4451'	4609'	4609'	4897'	5097'	5500'	5500'
ELECTRONIC NAVIGATIONAL AIDS	Visual	LDA/DME LOC/GS	RNAV (GPS)	LDA/DME LOC/GS	Visual	Visual	RNAV (GPS)	RNAV (GPS)
RUNWAY VISUAL NAVIGATIONAL AIDS	None	None	None	REIL	None	REIL	PAPI-4	PAPI-4 REIL

1 PAVEMENT STRENGTHS ARE EXPRESSED IN SINGLE (S), DUAL (D), DUAL TANDEM (DT), AND/OR DOUBLE DUAL TANDEM (DDT) WHEEL LOAD CAPACITIES.
2 (Third Party SURVEY 8/18/2005)



No.	REVISIONS	DATE	BY	APP'D.
3	-	-	-	-
2	-	-	-	-
1	Airport Layout Plan Updated	11/04	CWEC	-

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Columbia Gorge Regional Airport

AIRPORT DATA SHEET

PRELIMINARY

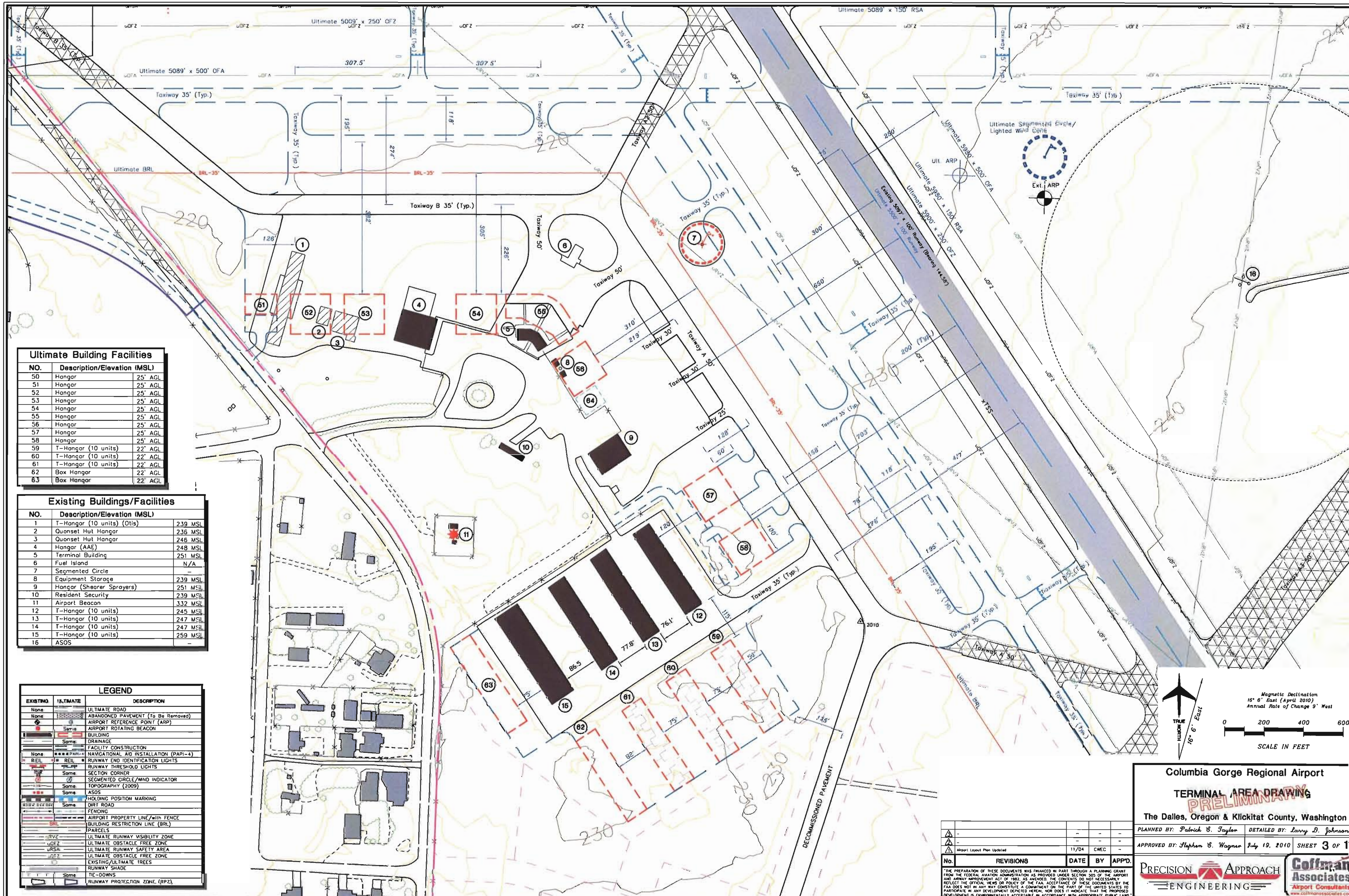
The Dalles, Oregon & Klickitat County, Washington

PLANNED BY: Patrick C. Taylor | DETAILED BY: Larry D. Johnson

APPROVED BY: Stephen C. Wagner | July 19, 2010 | SHEET 1 OF 11

PRECISION APPROACH ENGINEERING

Coffman Associates Airport Consultants www.coffmanassociates.com



Ultimate Building Facilities

NO.	Description/Elevation (MSL)	
50	Hangar	25' AGL
51	Hangar	25' AGL
52	Hangar	25' AGL
53	Hangar	25' AGL
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61	T-Hangar (10 units)	22' AGL
62	Box Hangar	22' AGL
63	Box Hangar	22' AGL

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NO.	Description/Elevation (MSL)	
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2	Quonset Hut Hangar	236 MSL
3	Quonset Hut Hangar	246 MSL
4	Hangar (AAE)	248 MSL
5	Terminal Building	251 MSL
6	Fuel Island	N/A
7	Segmented Circle	–
8	Equipment Storage	239 MSL
9	Hangar (Shearer Sprayers)	251 MSL
10	Resident Security	239 MSL
11	Airport Beacon	332 MSL
12	T-Hangar (10 units)	245 MSL
13	T-Hangar (10 units)	247 MSL
14	T-Hangar (10 units)	247 MSL
15	T-Hangar (10 units)	259 MSL
16	ASOS	–

LEGEND

EXISTING	ULTIMATE	DESCRIPTION
None		ULTIMATE ROAD
None		ABANDONED PAVEMENT (To Be Removed)
		AIRPORT REFERENCE POINT (ARP)
	Same	AIRPORT ROTATING BEACON
		BUILDING
	Same	DRAINAGE
		FACILITY CONSTRUCTION
None	PAPI-4	NAVIGATIONAL AID INSTALLATION (PAPI-4)
REIL	REIL	RUNWAY END IDENTIFICATION LIGHTS
		RUNWAY THRESHOLD LIGHTS
	Same	SECTION CORNER
		SEGMENTED CIRCLE/WIND INDICATOR
	Same	TOPOGRAPHY (2009)
	Same	ASOS
		HOLDING POSITION MARKING
	Same	DIRT ROAD
		FENCING
		AIRPORT PROPERTY LINE/with FENCE
BRL		BUILDING RESTRICTION LINE (BRL)
		PARCELS
uRVZ		ULTIMATE RUNWAY VISIBILITY ZONE
uOFZ		ULTIMATE OBSTACLE FREE ZONE
uRSA		ULTIMATE RUNWAY SAFETY AREA
uOFZ		ULTIMATE OBSTACLE FREE ZONE
		EXISTING/ULTIMATE TREES
		RUNWAY SHADE
	Same	TIE-DOWNS
		RUNWAY PROTECTION ZONE (RPZ)

No.	REVISIONS	DATE	BY	APP'D.
3	-	-	-	-
2	-	-	-	-
1	Airport Layout Plan Updated	11/04	CWEC	-

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Columbia Gorge Regional Airport

TERMINAL AREA DRAWING

PRELIMINARY

The Dalles, Oregon & Klickitat County, Washington

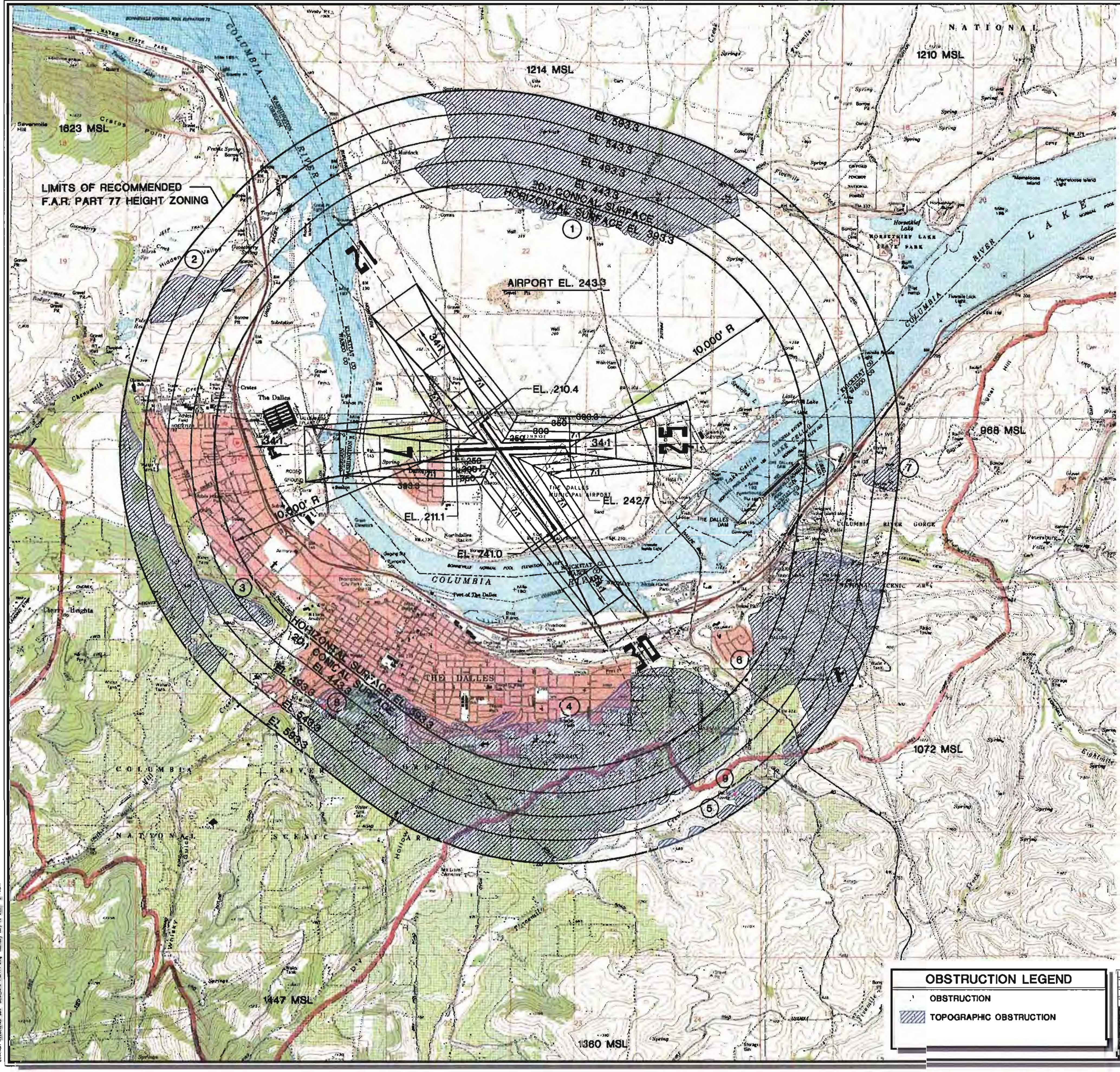
PLANNED BY: Patrick C. Taylor | DETAILED BY: Larry D. Johnson

APPROVED BY: Stephen C. Wagner | July 19, 2010 | SHEET 3 OF 11

PRECISION APPROACH ENGINEERING

Coffman Associates Airport Consultants www.coffmanassociates.com

Coffman Associates-LDJ dls_tap.dwg Monday July 19 2010 @ 47am

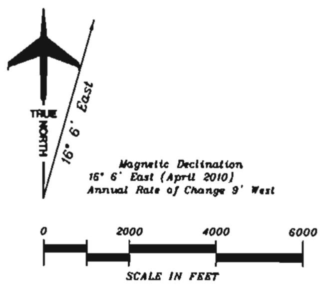


OBSTRUCTION TABLE

Description/Elevation	Obstructed Part 77 Surface	Surface Elevation	Object Penetration	Proposed Object Disposition
1. TERRAIN EL 440 (UP TO 1040 MSL)	Horizontal Surface Conical Surface	393.3 MSL 593.3 MSL	46.7' 446.7'	NO ACTION
2. TERRAIN EL 640	Conical Surface	511.0 MSL	129'	NO ACTION
3. TERRAIN EL 530	Conical Surface	437.0 MSL	93'	NO ACTION
4. TERRAIN EL 940	Horizontal Surface Conical Surface	393.3 MSL 438.0 MSL	546.7' 502'	NO ACTION
5. TERRAIN EL 720	Conical Surface	593.3 MSL	126.7'	NO ACTION
6. TERRAIN EL 480 (UP TO 680 MSL)	Horizontal Surface Conical Surface	393.3 MSL 593.3 MSL	86.7' 286.7	NO ACTION
7 TERRAIN EL 750	Conical Surface	585 MSL	165'	NO ACTION
8. RADIO TOWERS EL 709	Conical Surface	490 MSL	219'	NO ACTION
9. RADIO TOWERS EL 830	Conical Surface	560 MSL	270'	NO ACTION

GENERAL NOTES:

1. Obstructions, clearances, and locations are calculated from ultimate runway end elevations and ultimate approach surfaces, unless otherwise noted. Road obstructions reflect a safety clearance of 10' for dirt Roads or private Roads, 15' for noninterstate Roads, 17' for interstate Roads, and 23' for railroad.
2. Depiction of features and objects within the primary, transitional, and horizontal Part 77 surfaces, is illustrated on the AIRPORT AIRSPACE DRAWINGS.
3. Depiction of features and objects within the outer portion of the approach surfaces, is illustrated on the APPROACH SURFACE PROFILES.
4. Depiction of features and objects within the inner portion of the approach surfaces, is illustrated on the INNER PORTION OF THE RUNWAY APPROACH SURFACE DRAWINGS.



OBSTRUCTION LEGEND

- OBSTRUCTION
- TOPOGRAPHIC OBSTRUCTION

No.	REVISIONS	DATE	BY	APP'D.
3	-	-	-	-
2	-	-	-	-
1	Airport Layout Plan Updated	11/04	CWEC	-

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Columbia Gorge Regional Airport

AIRPORT AIRSPACE DRAWING

PRELIMINARY

The Dalles, Oregon & Klickitat County, Washington

PLANNED BY: Patrick C. Taylor | DETAILED BY: Larry D. Johnson

APPROVED BY: Stephen C. Wagner | July 19, 2010 | SHEET 4 OF 11

PRECISION APPROACH ENGINEERING

Coffman Associates Airport Consultants www.coffmanassociates.com

GENERAL NOTES:

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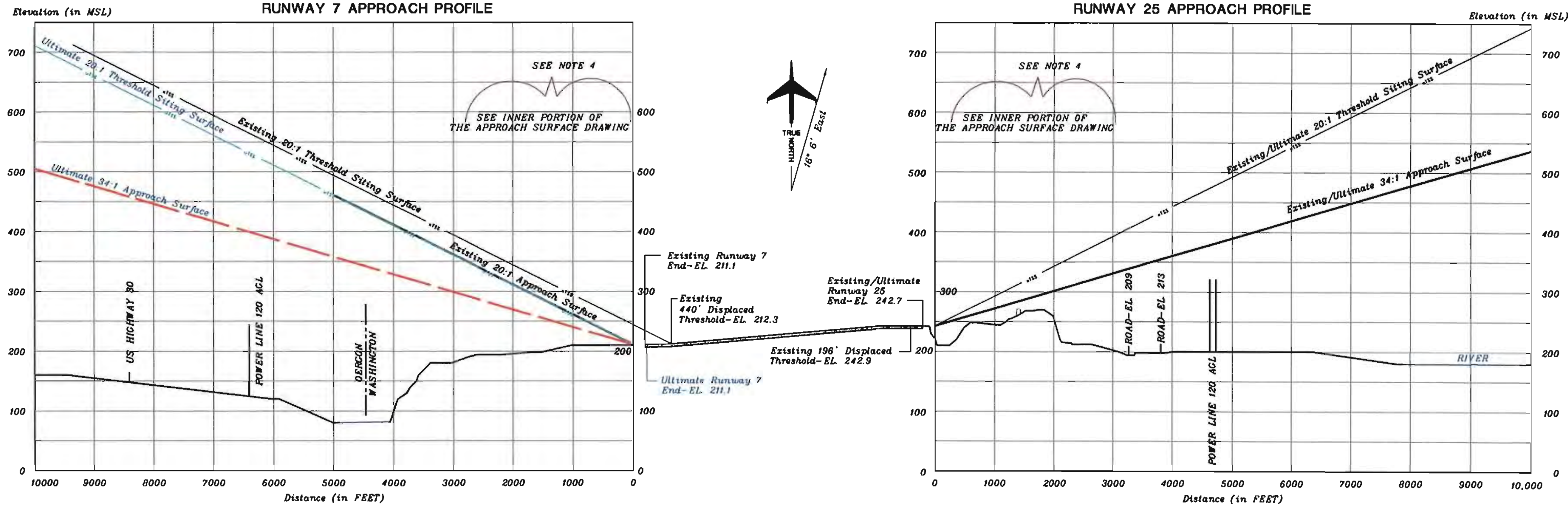

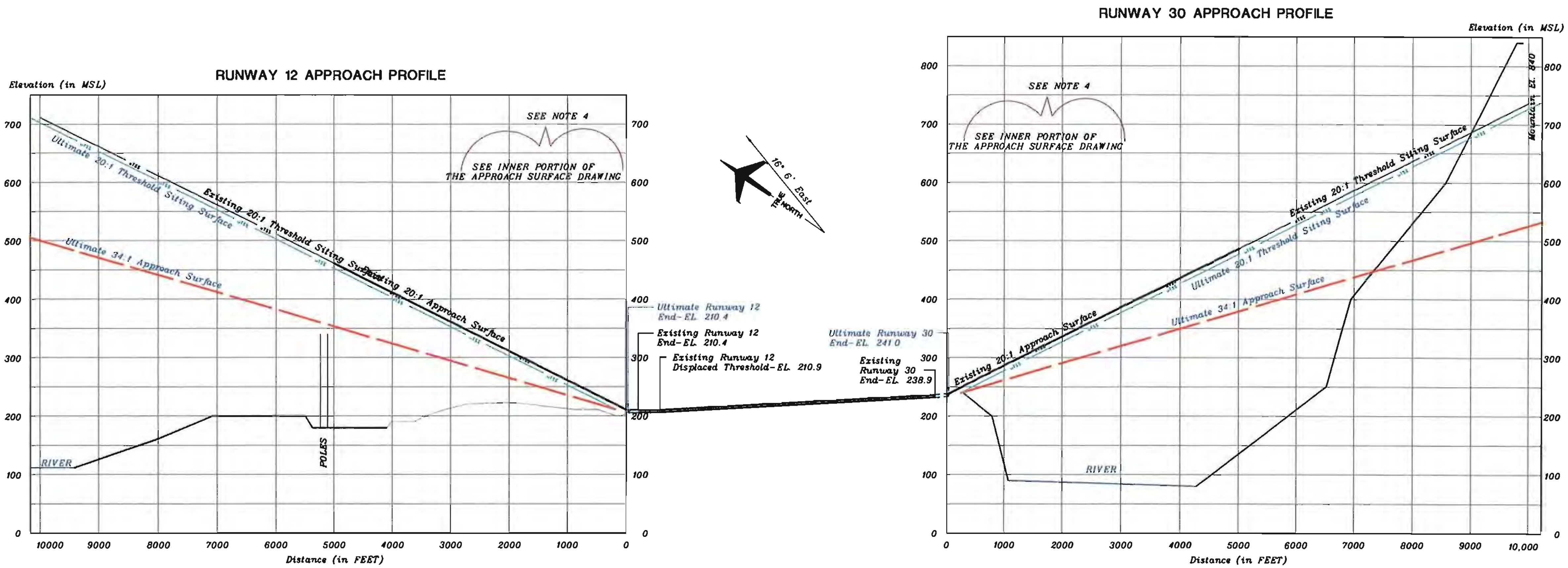

OBSTRUCTION TABLE

Runway 7 Object Description/Elevation	Ult. 34:1 Approach	Ext. 20:1 Approach	Ult. 20:1 TSS Penetration	Proposed Object Disposition
None				

OBSTRUCTION TABLE

Runway 25 Object Description/Elevation	Ult. 34:1 Approach	Ext. 20:1 Approach	Ult. 20:1 TSS Penetration	Proposed Object Disposition
None				

OBSTRUCTION TABLE

Runway 12 Object Description/Elevation	Ult. 34:1 Approach	Ext. 20:1 Approach	Ult. 20:1 TSS Penetration	Proposed Object Disposition
None				

OBSTRUCTION TABLE

Runway 30 Object Description/Elevation	Ult. 34:1 Approach	Ext. 20:1 Approach	Ult. 20:1 TSS Penetration	Proposed Object Disposition
1. Bluff El. 840	390'	N/A	176'	Request Aeronautical Study

Magnetic Declination
16° 6' East (April 2010)
Annual Rate of Change 9' West

0 100 200 300
VERTICAL SCALE IN FEET

0 1000 2000 3000
HORIZONTAL SCALE IN FEET

No.	REVISIONS	DATE	BY	APP'D.
3	-	-	-	-
2	-	-	-	-
1	Airport Layout Plan Updated	11/04	CWEC	-

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Columbia Gorge Regional Airport

RUNWAY 7-25 & RUNWAY 12-30 APPROACH SURFACE PROFILE

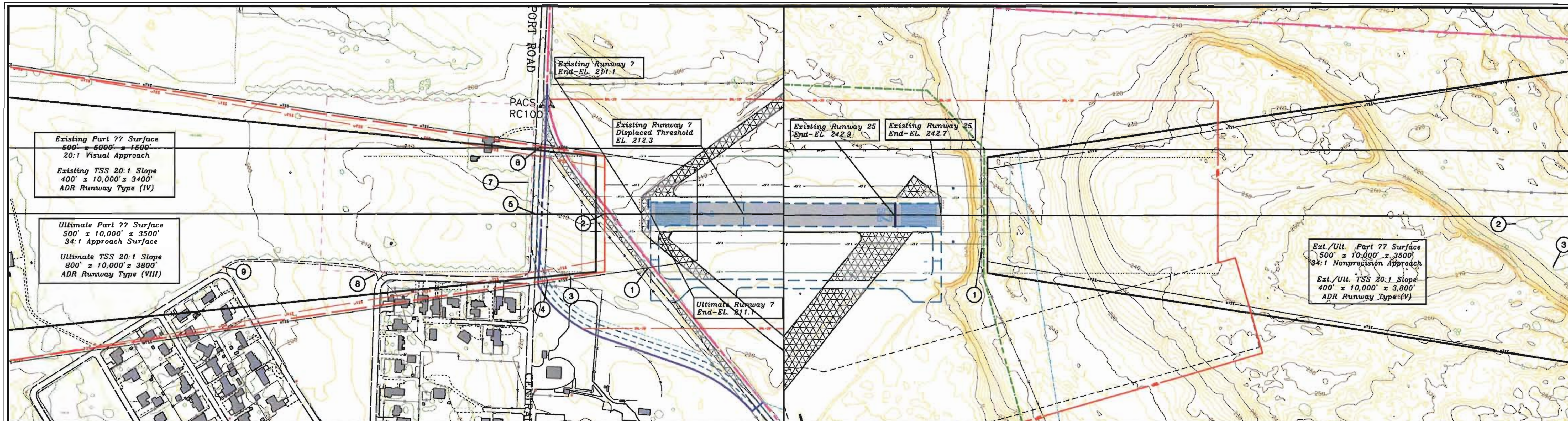
PRELIMINARY

The Dalles, Oregon & Klickitat County, Washington

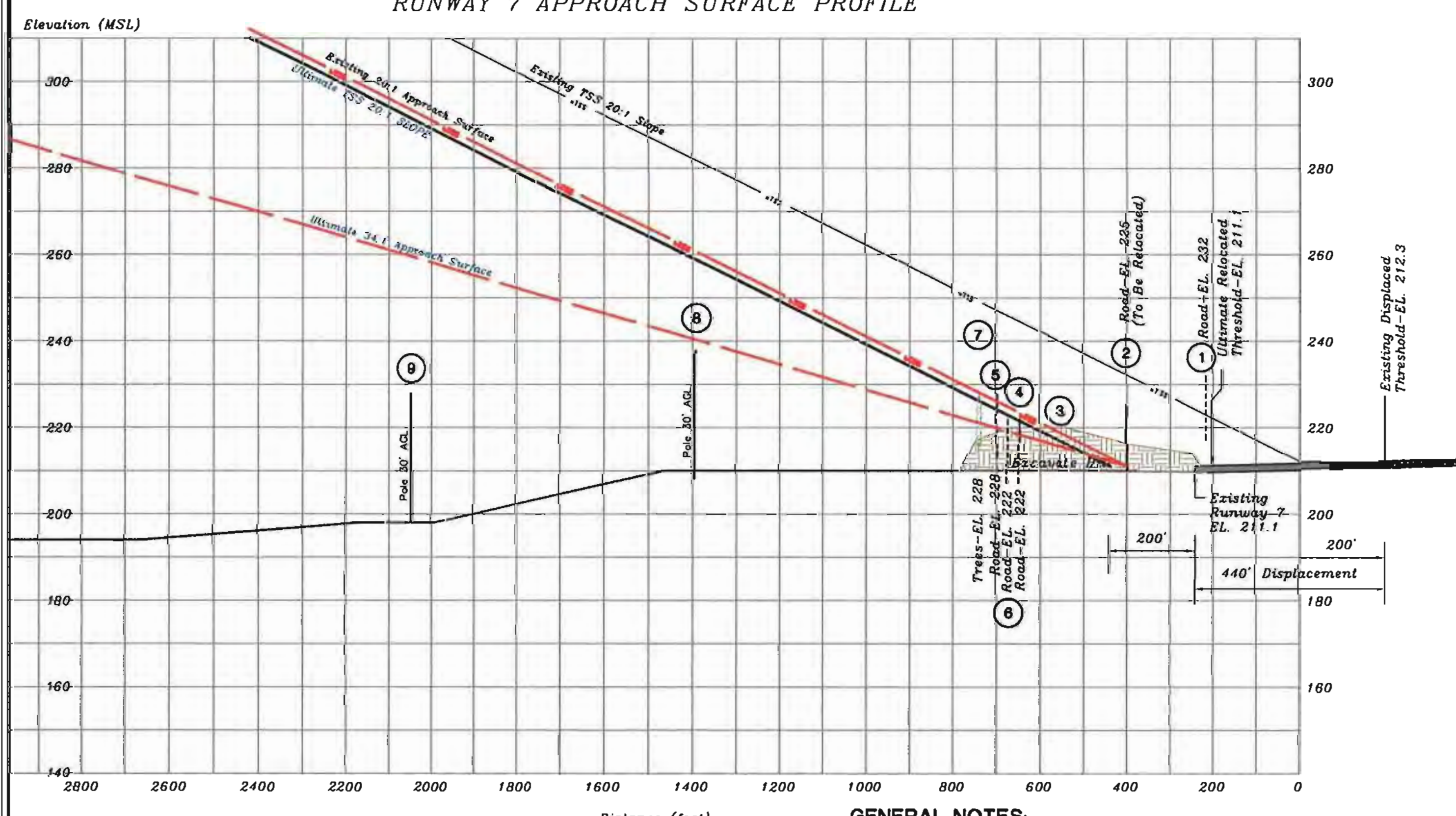
PLANNED BY: Patrick C. Taylor | DETAILED BY: Larry D. Johnson
APPROVED BY: Stephen C. Wagner | July 19, 2010 | SHEET 5 OF 11

PRECISION APPROACH ENGINEERING

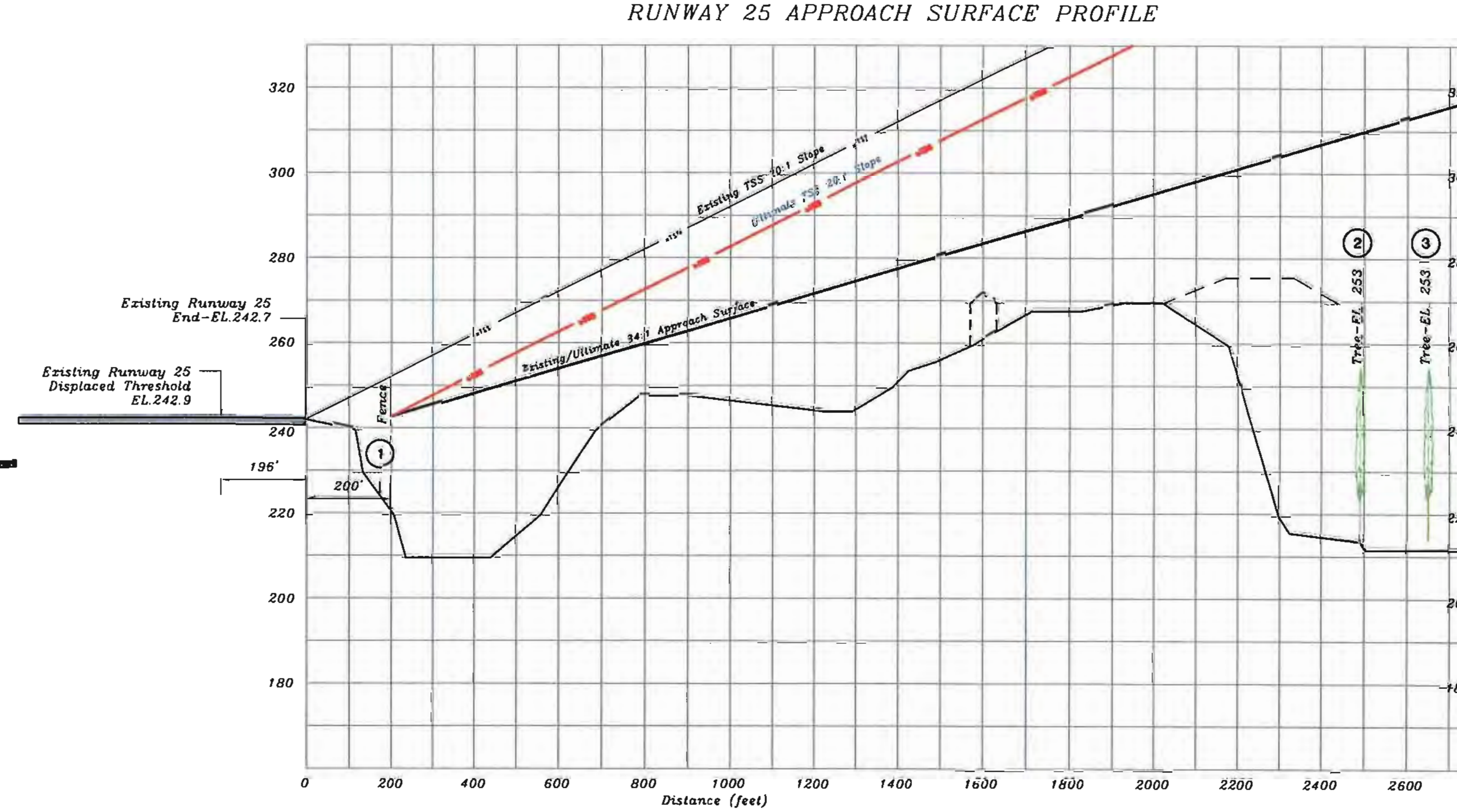
Coffman Associates Airport Consultants www.coffmanassociates.com



RUNWAY 7 APPROACH SURFACE PROFILE



RUNWAY 25 APPROACH SURFACE PROFILE



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OBSTRUCTION TABLE

Runway 7 Object Description/Elevation	Obstructed Part 77 Surface	Object Penetration	TSS 20:1 Penetration	Proposed Object Disposition
1. Road EL. 232	34:1 Approach	N/A	9'	Relocate
2. Road EL. 225	34:1 Approach	14'	14'	Relocate
3. Hill EL. 220	34:1 Approach	10'	10'	Excavate 13'
4. Road EL. 222	34:1 Approach	2.6'	No	Lower Road
5. Road EL. 228	34:1 Approach	8'	2'	Lower Road
6. Road EL. 222	34:1 Approach	3.6'	No	Lower Road
7. Tree EL. 229	34:1 Approach	7'	No	Remove Trees

OBSTRUCTION TABLE

Runway 25 Object Description/Elevation	Obstructed Part 77 Surface	Object Penetration	TSS 20:1 Penetration	Proposed Object Disposition
– None	–	–	–	–

TRUE NORTH

16° 6' East

Magnetic Declination 16° 6' East (April 2010) Annual Rate of Change 9' West

VERTICAL SCALE IN FEET: 0, 20, 40, 60

HORIZONTAL SCALE IN FEET: 0, 200, 400, 600

No.	REVISIONS	DATE	BY	APP'D.
3	-	-	-	-
2	-	-	-	-
1	Airport Layout Plan Updated	11/04	CWEC	-

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Columbia Gorge Regional Airport

INNER PORTION OF RUNWAY 7-25 APPROACH SURFACE DRAWING

PRELIMINARY

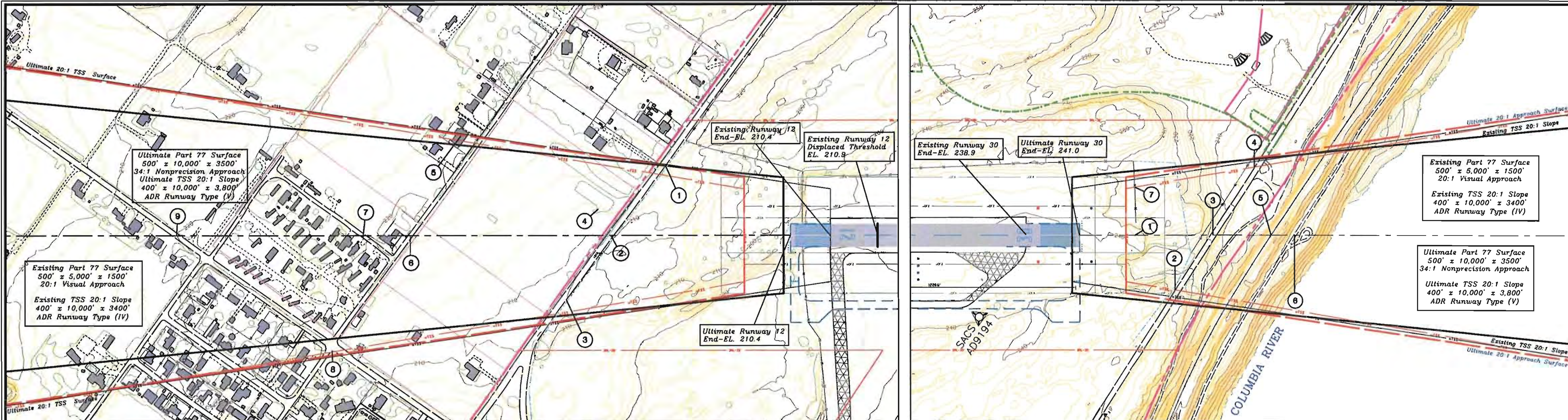
The Dalles, Oregon & Klickitat County, Washington

PLANNED BY: Patrick C. Taylor | DETAILED BY: Larry D. Johnson

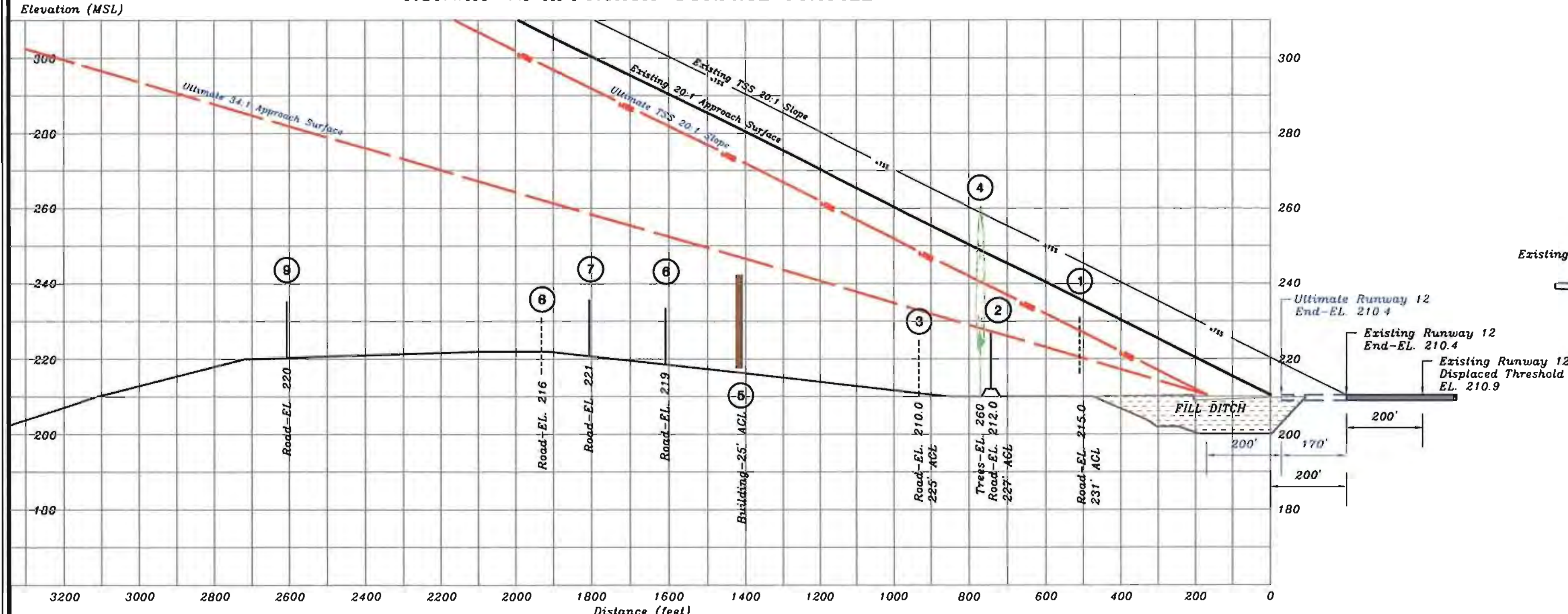
APPROVED BY: Stephen C. Wagner | July 19, 2010 | SHEET 6 OF 11

PRECISION APPROACH ENGINEERING

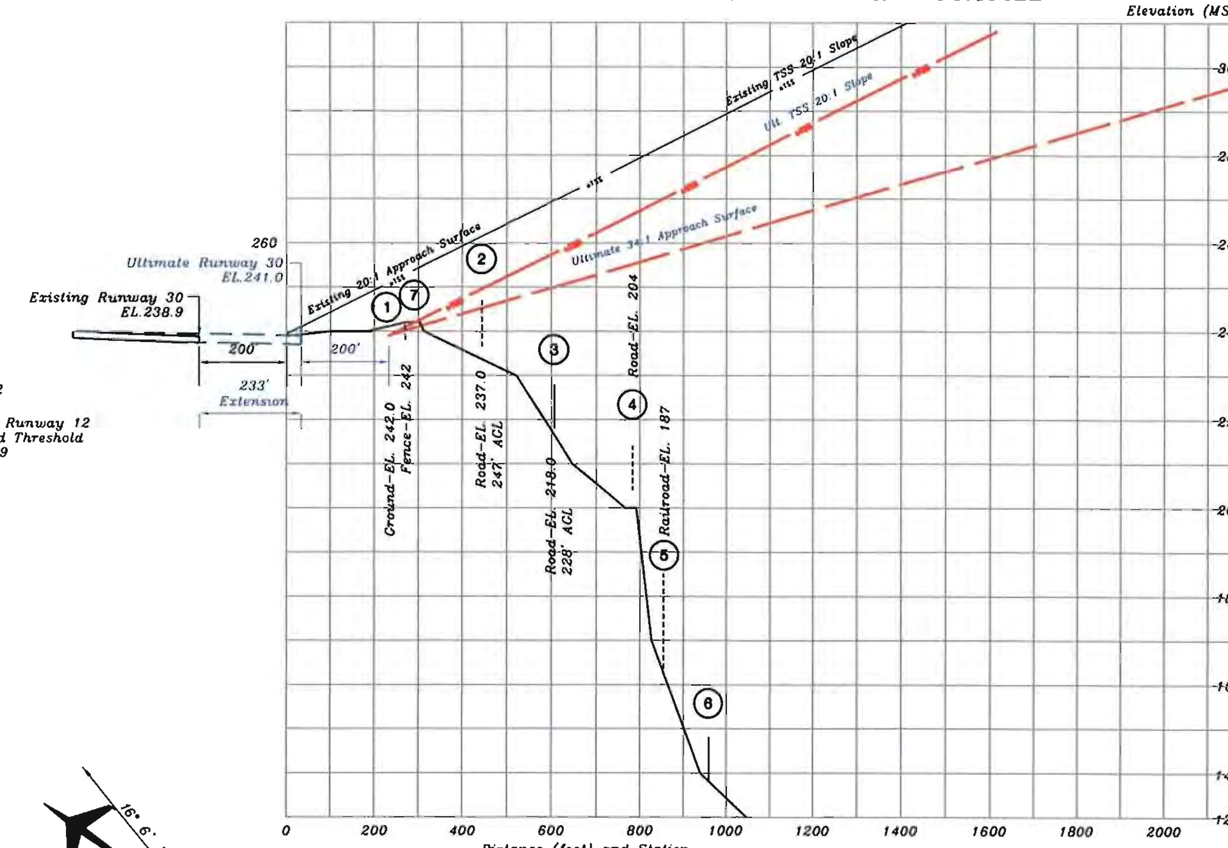
Coffman Associates Airport Consultants www.coffmanassociates.com

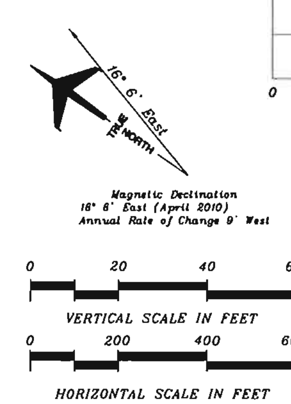


RUNWAY 12 APPROACH SURFACE PROFILE



RUNWAY 30 APPROACH SURFACE PROFILE





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OBSTRUCTION TABLE

Runway 12 Object Description/Elevation	Obstructed Part 77 Surface	Object Penetration	TSS 20:1 Penetration	Proposed Object Disposition
1. Road EL. 231	34:1 Approach	10.6	2.4	Request Aeronautical Study
4. Trees EL. 261	34:1 Approach	33'	21'	Remove Trees

OBSTRUCTION TABLE

Runway 30 Object Description/Elevation	Obstructed Part 77 Surface	Object Penetration	TSS 20:1 Penetration	Proposed Object Disposition
1. Ground-EL. 244	34:1 Approach	3'	No	Excavate
2. Road-EL. 247	34:1 Approach	2'	No	No Action (Private Rd.)
7. Fence-EL. 242	34:1 Approach	1'	1'	Relocate

No.	REVISIONS	DATE	BY	APP'D.
3	-	-	-	-
2	-	-	-	-
1	Airport Layout Plan Updated	11/04	CWEC	-

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Columbia Gorge Regional Airport

INNER PORTION OF RUNWAY 12-30 APPROACH SURFACE DRAWING

PRELIMINARY

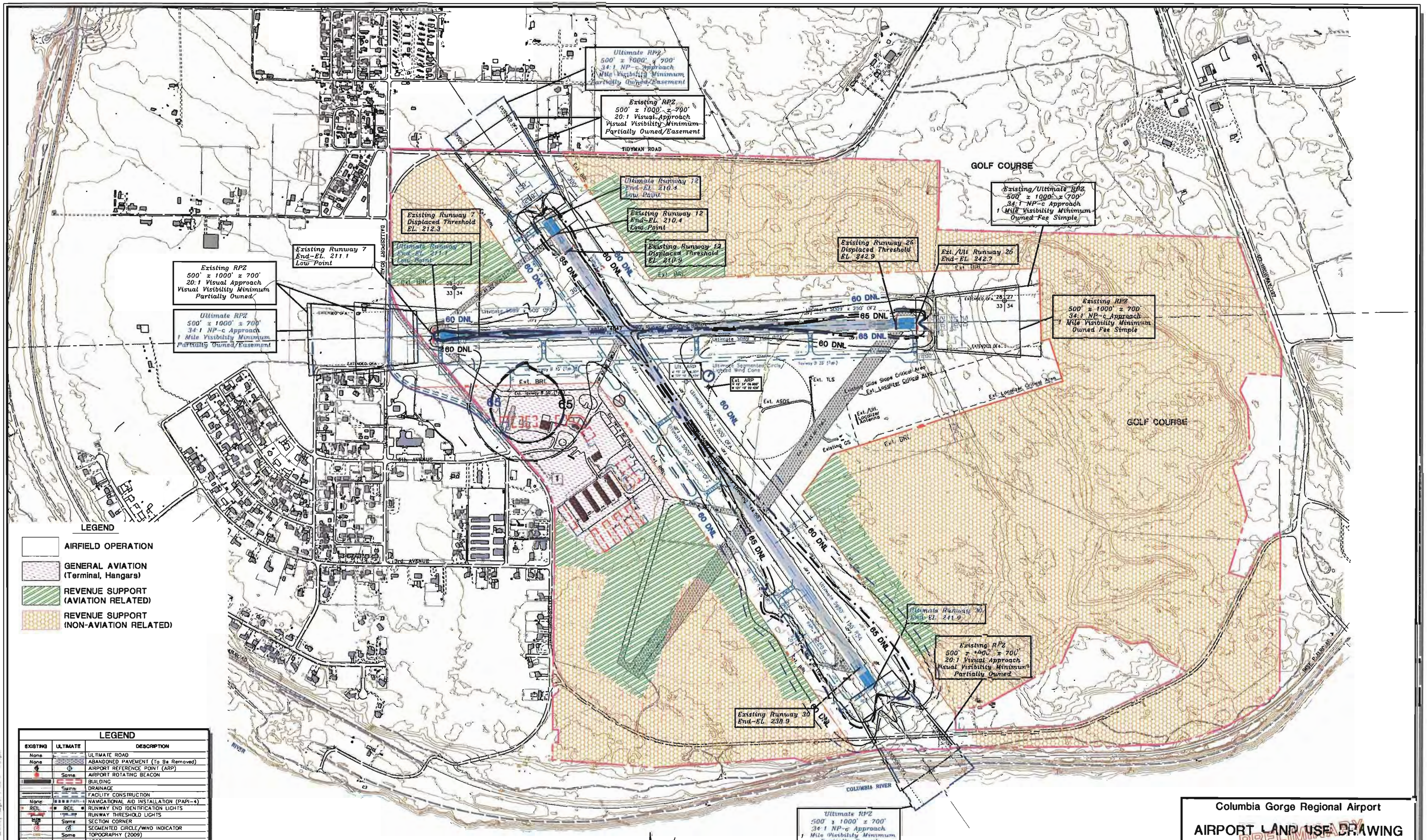
The Dalles, Oregon & Klickitat County, Washington

PLANNED BY: Patrick C. Taylor | DETAILED BY: Larry D. Johnson

APPROVED BY: Stephen C. Wagner | July 19, 2010 | SHEET 7 OF 11

PRECISION APPROACH ENGINEERING

Coffman Associates Airport Consultants www.coffmanassociates.com



LEGEND

	AIRFIELD OPERATION
	GENERAL AVIATION (Terminal, Hangars)
	REVENUE SUPPORT (AVIATION RELATED)
	REVENUE SUPPORT (NON-AVIATION RELATED)

LEGEND

EXISTING	ULTIMATE	DESCRIPTION
None		ULTIMATE ROAD
None		ABANDONED PAVEMENT (To Be Removed)
		AIRPORT REFERENCE POINT (ARP)
	Same	AIRPORT ROTATING BEACON
		BUILDING
	Same	DRAINAGE
		FACILITY CONSTRUCTION
None	PAPI-4	NAVIGATIONAL AID INSTALLATION (PAPI-4)
REIL	REIL	RUNWAY END IDENTIFICATION LIGHTS
		RUNWAY THRESHOLD LIGHTS
	Same	SECTION CORNER
		SEGMENTED CIRCLE/WIND INDICATOR
	Same	TOPOGRAPHY (2009)
	Same	ASOS
		HOLDING POSITION MARKING
	Same	DIRT ROAD
		FENCING
		AIRPORT PROPERTY LINE/with FENCE
BRL		BUILDING RESTRICTION LINE (BRL)
		PARCELS
uRVZ		ULTIMATE RUNWAY VISIBILITY ZONE
uOFZ		ULTIMATE OBSTACLE FREE ZONE
uRSA		ULTIMATE RUNWAY SAFETY AREA
uOFZ		ULTIMATE OBSTACLE FREE ZONE
		RUNWAY SHADE
		RUNWAY PROTECTION ZONE (RPZ)

NOISE CONTOURS

65 DNL — 2015 NOISE CONTOUR 65 DNL
60 DNL — 2015 NOISE CONTOUR 60 DNL
65 DNL — 2030 NOISE CONTOUR 65 DNL
60 DNL — 2030 NOISE CONTOUR 60 DNL

TRUE NORTH
16° 6' East

Magnetic Declination
16° 6' East (April 2010)
Annual Rate of Change 0' West

0 400 800 1200
SCALE IN FEET

No.	REVISIONS	DATE	BY	APP'D.
3	-	-	-	-
2	-	-	-	-
1	Airport Layout Plan Updated	11/04	CWEC	-

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Columbia Gorge Regional Airport

AIRPORT LAND USE DRAWING

PRELIMINARY

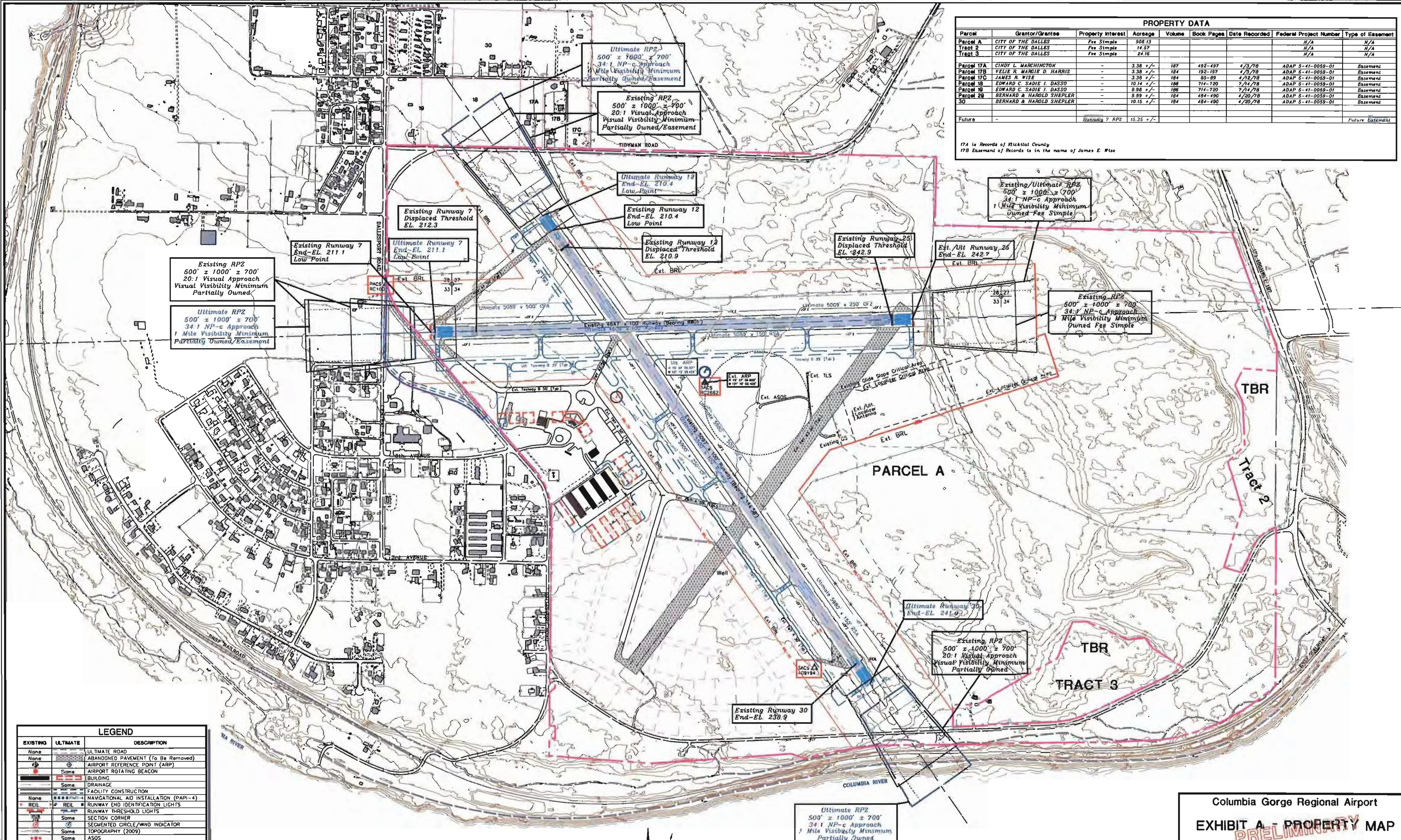
The Dalles, Oregon & Klickitat County, Washington

PLANNED BY: Patrick C. Taylor | DETAILED BY: Larry D. Johnson

APPROVED BY: Stephen C. Wagner | July 19, 2010 | SHEET 8 OF 11

PRECISION APPROACH ENGINEERING

Coffman Associates
Airport Consultants
www.coffmanassociates.com



PROPERTY DATA

Parcel	Grantor/Grantee	Property Interest	Acreage	Volume	Book Pages	Date Recorded	Federal Project Number	Type of Easement
Parcel A	CITY OF THE DALLES	Fee Simple	908.13				N/A	N/A
Tract 2	CITY OF THE DALLES	Fee Simple	14.57				N/A	N/A
Tract 3	CITY OF THE DALLES	Fee Simple	24.16				N/A	N/A
Parcel 17A	CINDY L. MARCHINGTON	-	3.38 +/-	187	492-497	4/3/78	ADAP 5-41-0059-01	Easement
Parcel 17B	VELIE R. MARGIE D. HARRIS	-	3.38 +/-	184	192-197	4/3/78	ADAP 5-41-0059-01	Easement
Parcel 17C	JAMES R. WISE	-	3.38 +/-	184	85-89	4/12/78	ADAP 5-41-0059-01	Easement
Parcel 18	EDWARD C. SADIE I. DASSO	-	10.14 +/-	186	714-720	7/14/78	ADAP 5-41-0059-01	Easement
Parcel 19	EDWARD C. SADIE I. DASSO	-	9.98 +/-	186	714-720	7/14/78	ADAP 5-41-0059-01	Easement
Parcel 29	BERNARD & HAROLD SHEPLER	-	9.99 +/-	184	484-490	4/20/78	ADAP 5-41-0059-01	Easement
30	BERNARD & HAROLD SHEPLER	-	10.15 +/-	184	484-490	4/20/78	ADAP 5-41-0059-01	Easement
Future	-	Runway 7 RPZ	15.35 +/-					Future Easement

17A is Records of Klickitat County
17B Easement of Records is in the name of James E. Wise

LEGEND

EXISTING	ULTIMATE	DESCRIPTION
None		ULTIMATE ROAD
None		ABANDONED PAVEMENT (To Be Removed)
		AIRPORT REFERENCE POINT (ARP)
	Same	AIRPORT ROTATING BEACON
		BUILDING
	Same	DRAINAGE
		FACILITY CONSTRUCTION
None	PAPI-4	NAVIGATIONAL AID INSTALLATION (PAPI-4)
REIL	REIL	RUNWAY END IDENTIFICATION LIGHTS
		RUNWAY THRESHOLD LIGHTS
	Same	SECTION CORNER
		SEGMENTED CIRCLE/WIND INDICATOR
	Same	TOPOGRAPHY (2009)
	Same	ASOS
		HOLDING POSITION MARKING
	Same	DIRT ROAD
		FENCING
		AIRPORT PROPERTY LINE/with FENCE
BRL		BUILDING RESTRICTION LINE (BRL)
		PARCELS
uRVZ		ULTIMATE RUNWAY VISIBILITY ZONE
uOFZ		ULTIMATE OBSTACLE FREE ZONE
uRSA		ULTIMATE RUNWAY SAFETY AREA
uOFZ		ULTIMATE OBSTACLE FREE ZONE
		RUNWAY SHADE
		RUNWAY PROTECTION ZONE (RPZ)

Coffman Associates-LDJ dls_alp.dwg Monday August 2 2010 4:04pm

GENERAL NOTES:

1. Depiction of features and objects, including related elevations and clearances, Within the runway approach surfaces are depicted on the Inner Portion of Runway Approach Surface Drawings.
2. Details concerning terminal improvements are depicted on the TERMINAL AREA DRAWING.
3. Recommended land uses within the airport environs are depicted on the AIRPORT LAND USE DRAWING.
4. Photography Dated September 18, 2009.
5. Existing/ultimate fence along existing/ultimate Property Line except where shown.
6. TBR: To be released.

No.	REVISIONS	DATE	BY	APP'D.
3	-	-	-	-
2	-	-	-	-
1	Airport Layout Plan Updated	11/04	CWEC	-

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Columbia Gorge Regional Airport

EXHIBIT A - PROPERTY MAP

PRELIMINARY

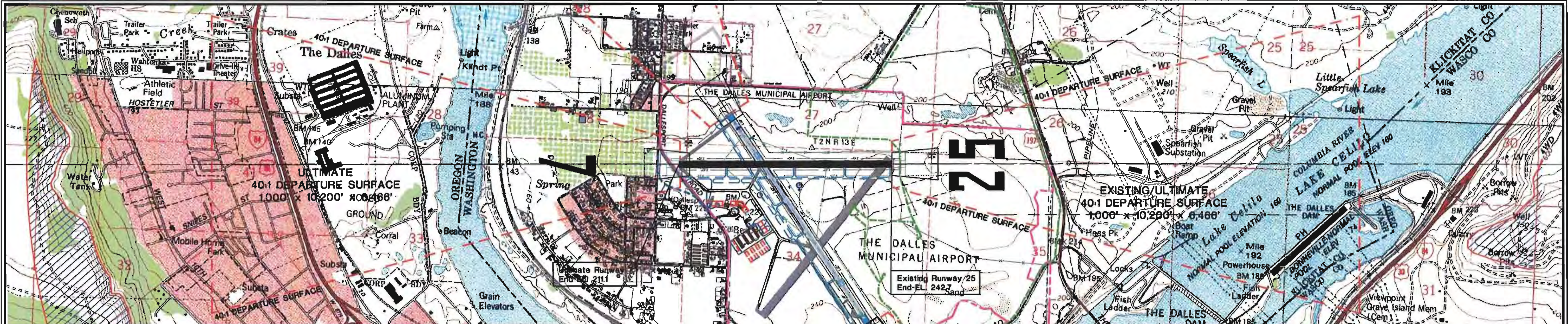
The Dalles, Oregon & Klickitat County, Washington

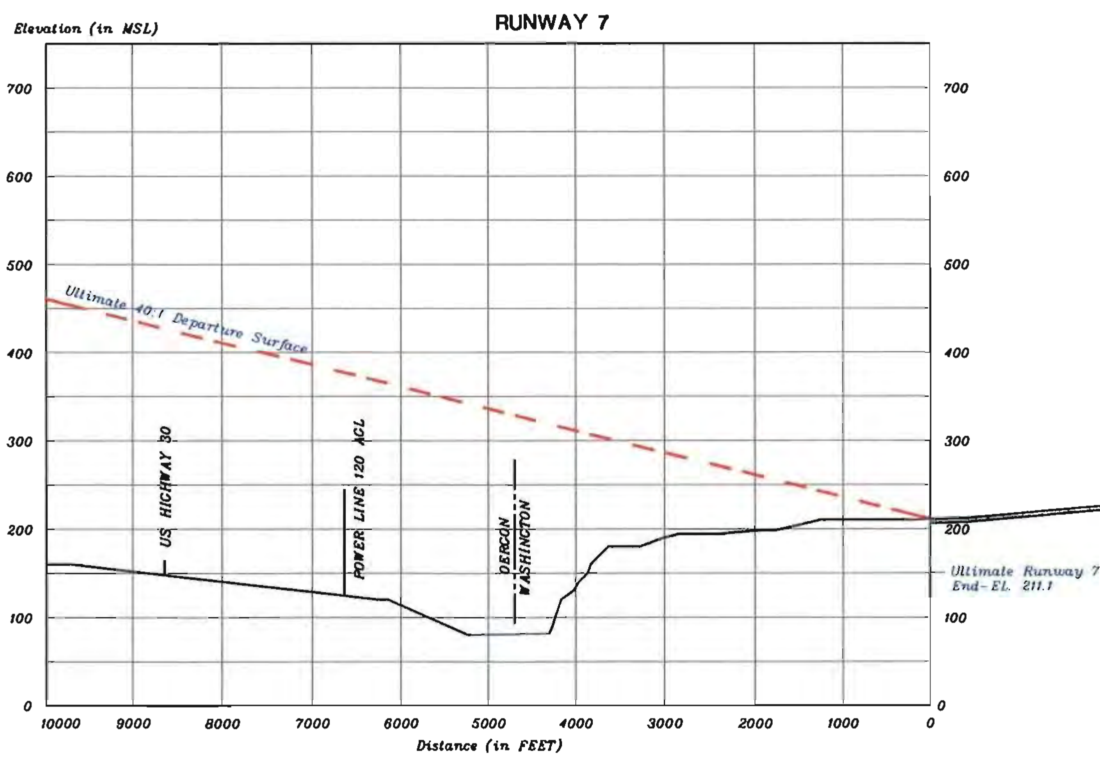
PLANNED BY: Patrick C. Taylor | DETAILED BY: Larry D. Johnson

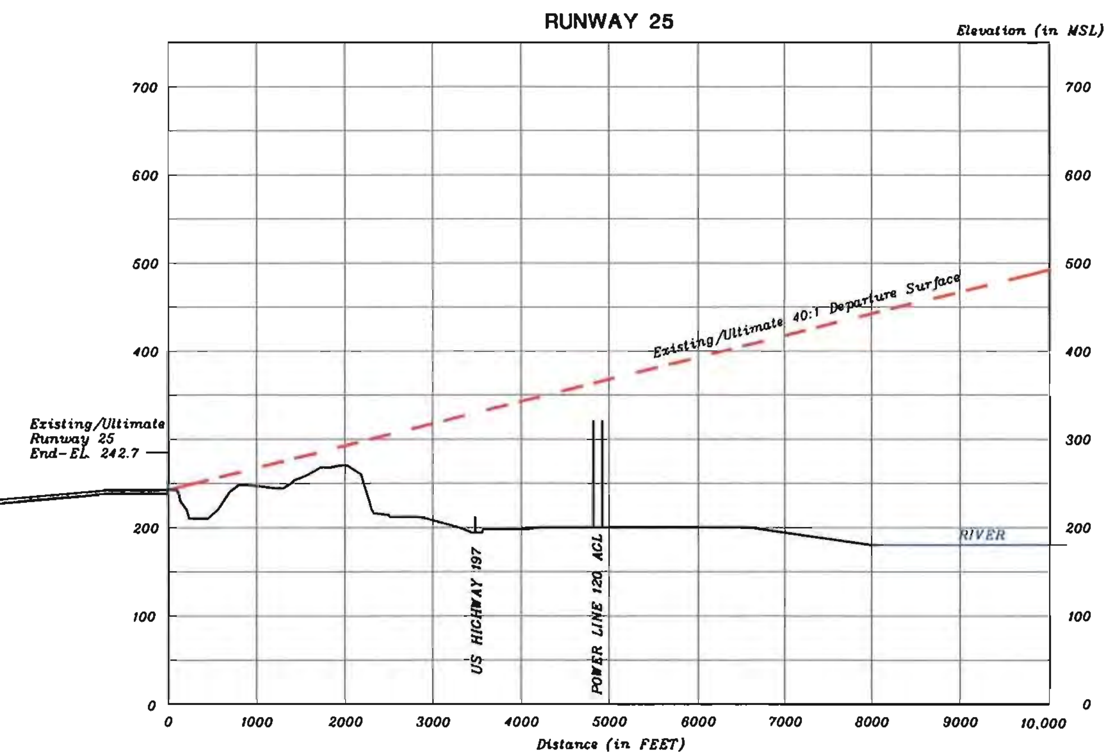
APPROVED BY: Stephen C. Wagner | July 19, 2010 | SHEET 9 OF 11

PRECISION APPROACH ENGINEERING

Coffman Associates Airport Consultants www.coffmanassociates.com







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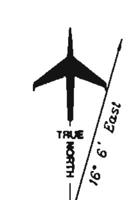
OBSTRUCTION TABLE

Runway 7 Object Description/Elevation	Obstructed TERP Surface	Ultimate Penetration	Existing Penetration	Proposed Object Disposition
None				

OBSTRUCTION TABLE

Runway 25 Object Description/Elevation	Obstructed TERP Surface	Ultimate Penetration	Existing Penetration	Proposed Object Disposition
None				



Magnetic Declination
16° 6' East (April 2010)
Annual Rate of Change 9' West

0 100 200 300
VERTICAL SCALE IN FEET

0 1000 2000 3000
HORIZONTAL SCALE IN FEET

No.	REVISIONS	DATE	BY	APP'D.
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Columbia Gorge Regional Airport

RUNWAY 7-25
40:1 DEPARTURE SURFACE PROFILE

PRELIMINARY

The Dalles, Oregon & Klickitat County, Washington

PLANNED BY: Patrick E. Taylor | DETAILED BY: Larry D. Johnson
APPROVED BY: Stephen E. Wagner | July 19, 2010 | SHEET 10 OF 11

PRECISION APPROACH ENGINEERING
Coffman Associates Airport Consultants
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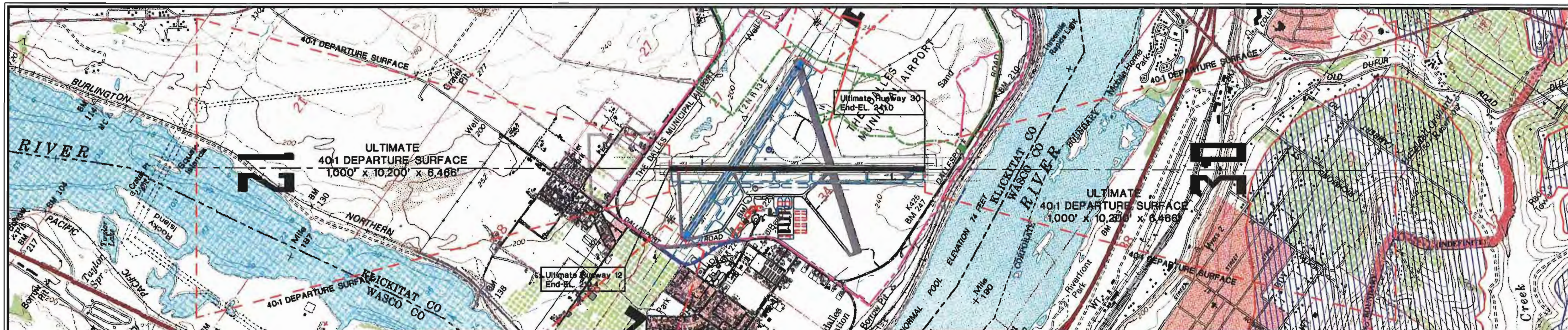

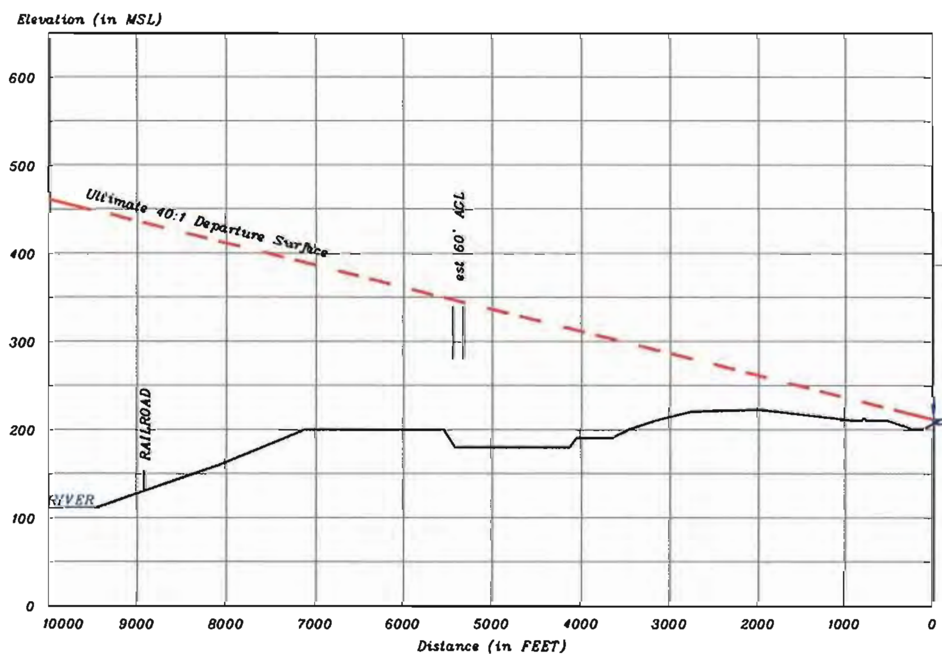

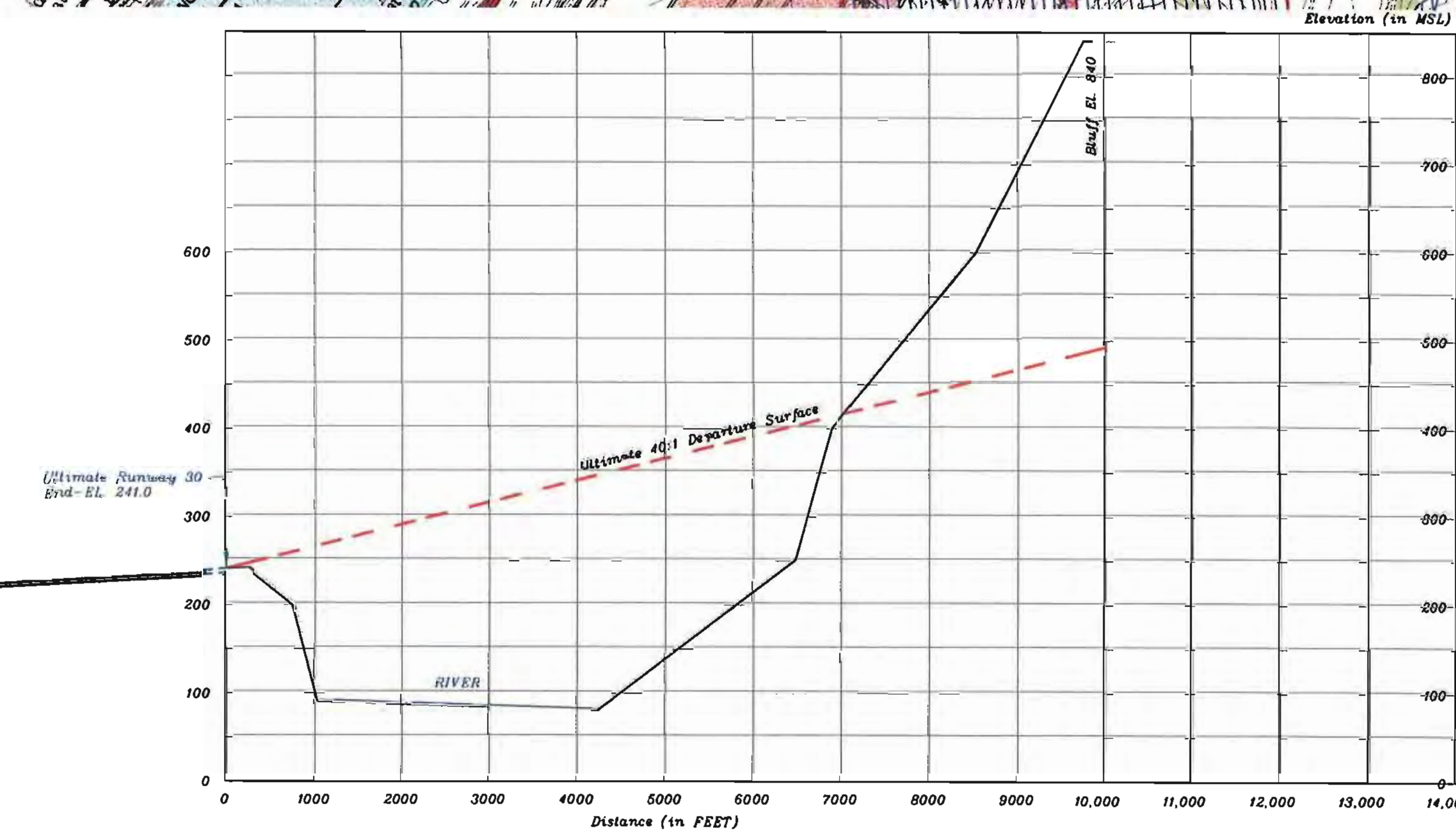

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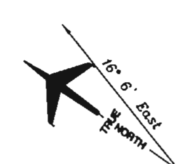
OBSTRUCTION TABLE

Runway 12 Object Description/Elevation	Obstructed TERP Surface	Ultimate Penetration	Existing Penetration	Proposed Object Disposition
None				

OBSTRUCTION TABLE

Runway 30 Object Description/Elevation	Obstructed TERP Surface	Ultimate Penetration	Existing Penetration	Proposed Object Disposition
1. Bluff El. 840	40:1	426'	No	Request Aeronautical Study



Magnetic Declination
16° 6' East (April 2010)
Annual Rate of Change 9' West

0 100 200 300
VERTICAL SCALE IN FEET

0 1000 2000 3000
HORIZONTAL SCALE IN FEET

No.	REVISIONS	DATE	BY	APP'D.
3	-	-	-	-
2	-	-	-	-
1	Airport Layout Plan Updated	11/04	CWEC	-

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Columbia Gorge Regional Airport

RUNWAY 12-30
40:1 DEPARTURE SURFACE PROFILE

PRELIMINARY

The Dalles, Oregon & Klickitat County, Washington

PLANNED BY: Patrick S. Taylor | DETAILED BY: Larry D. Johnson
APPROVED BY: Stephen S. Wagner | July 19, 2010 | SHEET 11 OF 11

PRECISION APPROACH ENGINEERING

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