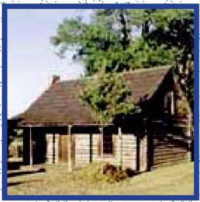
Chehalis-Centralia Airport


Chehalis, WA



airport master plan




CHEHALIS-CENTRALIA AIRPORT
Chehalis, Centralia, and Lewis County, Washington

AIRPORT MASTER PLAN

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August 2001

"The preparation of this document may have been supported, in part, through the Airport Improvement Program financial assistance from the Federal Aviation Administration (Project Number 3-53-0012-06) 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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Chehalis, Centralia, and Lewis County, Washington

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INTRODUCTION

The initial step in preparation of the Airport Master Plan for Chehalis-Centralia Airport (CLS) is the collection and analysis of pertinent information. This includes an inventory of existing conditions at Chehalis-Centralia Airport. Other essential data has been gathered that place the cities of Chehalis and Centralia and the airport, not only geographically, but also within the context of local and regional needs and demands. The inventory will provide a framework for all subsequent evaluations and proposed actions. This compilation of material includes the following:

- Airport setting, including locale, history, jurisdiction, climate, other airports, and previous studies.

- Physical inventories and descriptions of facilities and services now provided by the airport.

- An overview of existing regional plans and studies to determine their potential influence on the airport master plan.

- Background information pertaining to the twin cities of Chehalis and Centralia, the southwest Washington/Olympic Peninsula region, and Lewis County. Analysis of these areas also includes descriptions of recent development which have taken place in the airport environs and plans for future development which may impact the airport.

- Population and socioeconomic information which provides an indication of the market and possible future development.

This information has been obtained through on-site investigations of the airport and interviews with airport management, airport tenants, representatives of various government agencies, and local and regional economic agencies. Information was also made available through studies concerning the airport, including: the **Chehalis-Centralia Airport Master Plan** (1973), the **Chehalis-Centralia Airport Master Plan Update** (1992), airport statistical data provided by the **Chehalis-Centralia Airport Governing Board**, and the **Washington State Aviation Pavement Management Program Report for Chehalis-Centralia Airport** (August, 2000). City planning and zoning documents were utilized, as well as various internet web pages.

AIRPORT SETTING

The following discussion describes the physical location and historical background of the Chehalis-Centralia Airport. It also places it within the contexts of the national and state airspace systems.

LOCATION

As shown on **Exhibit 1A, Location Map**, the Chehalis-Centralia Airport is located at the western end of Lewis County in southwest Washington between the twin cities of Chehalis and Centralia. The twin cities are centrally located on a north-south axis between Seattle, Washington or Portland, Oregon, approximately 85 miles from each. The two cities are similarly equidistant from the natural scenic attractions of the Cascade Mountain Range to the east and the Pacific Ocean to the west. The Chehalis River borders the west side of each city as it flows north out of the Willapa Hills to the Pacific Ocean. A dike holds flood water in check along the west and north airport boundaries. Interstate Highway 5 is a north-south boundary on the east side of the airport, which also lies within the Chehalis River floodplain. The railroad to the east of the airport and highway act as a levee for the land to the west.

The Chehalis-Centralia Airport is situated in northwest of Chehalis and south of Centralia on the floodplain of the Chehalis River. The airport sits at an elevation of 174 feet above mean sea level. It consists of approximately 325 acres of land with a mix of uses both on and surrounding the airport property. The surrounding land uses include Interstate 5 to the east, the Riverside Country Club Golf Course on the west boundary along the river, single family residential housing on the south, and agricultural land north. Walmart, located on the east side of the airfield, has a long term lease of airport property. Washington Homes, K-Mart, and Washington State Highway Patrol are also located on the east side but are outside airport property.

Although the airport property lies entirely within the City of Chehalis, the airport is governed by the Chehalis-Centralia Airport Governing Board, consisting of representatives from Lewis County, the City of Chehalis and the City of Centralia.

Exhibit 1A
LOCATION MAP

00MP02-1A-12/14/00

The airport has direct access to Interstate Highway 5, the major north-south artery, not only of the state of Washington, but also for the west coast of the United States. The highway frontage road provides access to the businesses on the east side of the airport and links to West Street and then Airport Road, the city-county road that circumnavigates the west and north sides of the airport. Airport patrons must use the entrance off Airport Road on the west side of the airport.

As is shown on **Exhibit 1B, Airside Facilities**, Chehalis-Centralia Airport has a single runway, Runway 15-33. Airport facilities are discussed in greater detail below.

HISTORICAL AIRPORT DEVELOPMENT

Aviation activity has existed at the present site of the Chehalis-Centralia Airport as early as the 1930s. A turf strip served as an airfield at the time. In 1941 the City of Chehalis (which owned the 95 acres on which the airport was located). partnered with Lewis County to form a joint county-city airport. By agreement with the Civil Aeronautics Administration (CAA), the forerunner to the Federal Aviation Administration, the airfield could be used for emergency operations. In exchange the CAA would absorb the cost of improvement once Lewis County and the City of Chehalis purchased the additional needed property. The first airport commission was governed by the Board of County Commissioners, the Chehalis City Commissioners, and the Mayor of Centralia.

Upon the declaration of war (following the bombing of Pearl Harbor), the CAA determined that the airfield would be needed as part of the National Defense System. The City of Chehalis purchased additional land and the airfield was completed in 1943. The improvements included the construction of two 5,000 foot runways, concrete taxiways, and a levee and drainage system. The airfield was operated by the Navy for training and emergency landings.

After the war the airport was returned to the county and city. West Coast Airlines offered commercial air service to points on the west coast. Service continued at Chehalis-Centralia Airport until 1958.

The City of Chehalis annexed the airport property in 1959. The present governing board became organized in 1961, making the City of Centralia a full member. The first Airport Master Plan was completed in 1973. Among its recommendations were clear zone acquisition, installation of a nonprecision instrument approach, hangar construction, governance through an airport district, and development of surplus land for commercial and industrial use.

In 1983, a Medium Intensity Runway Lighting System (MIRL) was installed on Runway 15-33. Also at this time five acres south of the airport were purchased for a clear zone. An avigation easement for 32 acres north of the airport was also acquired for clear zone restriction. Four new hangars were constructed between 1985 and 1990. In 1990, the Airport Board (working with the FAA) identified its intent to close Runway 1-19, and it was subsequently closed.

The flood of 1990 brought record flooding to the Chehalis River Basin. The levee partially failed, inundating the airport, and causing extensive property damage. A higher capacity pump for the storm water drainage diversion system was installed.

New below-ground fuel storage tanks were installed to replace older tanks.

In recent history, the airport has seen much improvement. These are noted in the subsequent section OTHER STUDIES, *CHEHALIS-CENTRALIA AIRPORT MASTER PLAN UPDATE - 1992*.

The airport currently is served by Central Aircraft Repair as the airport Fixed Base Operator (FBO). They provide aircraft airframe and powerplant repair. Other services offered at Chehalis-Centralia Airport are flight instruction, aircraft rental, and aircraft charter. The Airport Board operates the fueling concession on the airport.

CLIMATE

Weather is a critical factor in airport planning and operations. Temperatures determine the length of runway needed for departure. Wind speed and direction determine runway alignment and use. Precipitation affects runway conditions. Cloud cover percentages and frequency of other climatic conditions affect visibility and the need for or use of instrument approaches and airfield lighting. The location of the twin cities of Chehalis and Centralia in southwest Washington between Pacific off shore weather and the Cascade Mountain range dictate much of the existing weather conditions. Climate statistics from the closest recording station, Olympia, Washington, have been used for Chehalis-Centralia Airport calculations.

The morning humidity averages 92 percent annually, while afternoon humidity averages 64 percent for a daily average of 78 percent. Total annual precipitation averages 50.59 inches. Of this precipitation amount 16.8 inches falls in the form of snow, with the highest accumulation during January. The normal daily mean temperature is 49.7 degrees Fahrenheit, typical of the Pacific Northwest climate. The mean maximum daily temperature averaged annually is 60.2 degrees Fahrenheit, with the mean high temperatures for the year recorded during July and August at 76.5 and 77.1 degrees respectively.

Some areas of the country typically experience more clouds and overcast than others. Olympia averages 228 cloudy days per year as calculated over the 54 year recording period. Morning fog is a frequent occurrence. Wind patterns for the southwest Washington area are typically from the south/ southwest.

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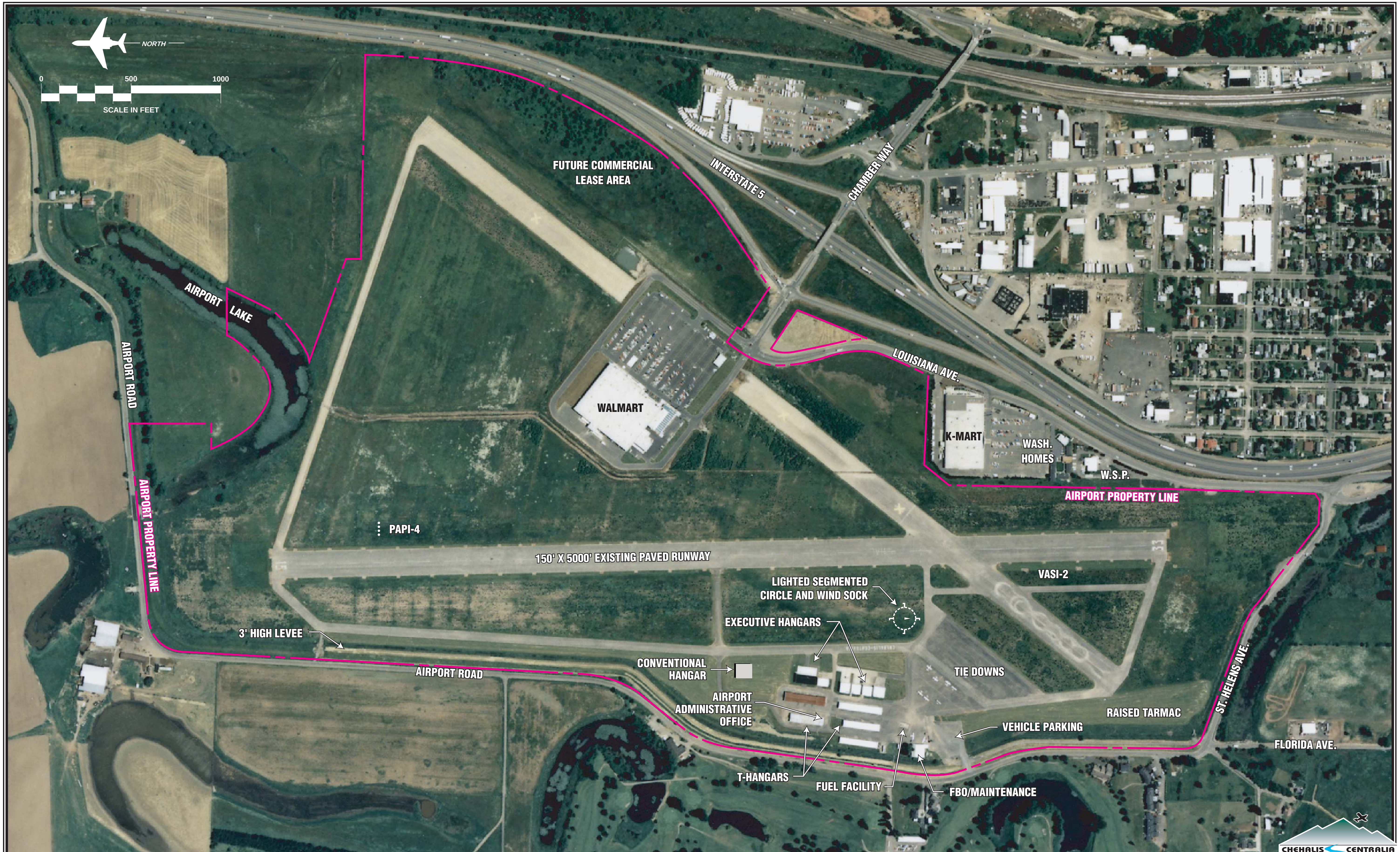

Exhibit 1B
AIRPORT FACILITIES

AREA AIRPORTS

There are a number of nearby public and private airports providing various degrees of service within the operating vicinity of Chehalis-Centralia Airport, as indicated on **Exhibit 1C, Area Airspace**. Information is provided in **Table 1A** for those public airfields within a 35-mile radius of Chehalis-Centralia Airport. The following information is found in the table: associated city, distance from Chehalis-Centralia Airport, longest runway, availability of an instrument approach, and the number of based aircraft (per latest airport master record).

TABLE 1A
Area Airports

Airport/City	Distance nm (from CLS)	Longest Runway	ILS	Based Aircraft
Chehalis-Centralia Airport/Chehalis, Centralia	**0**	**5,000'**	**NO**	**68**
Toledo-Winlock (TDO)/Toledo	14	4,960'	NO	72
Olympia (OLM)/Olympia	18	5,419'	YES	176
Spanaway (S44)/Tacoma	35	2,724'	NO	60
Kelso Longview(KLS)/Kelso	34	4,391'	NO	87
Strom (39P)/ Morton	32	1,800'	NO	3

Source: Airport Master Records (latest available information).

OTHER STUDIES

CHEHALIS-CENTRALIA AIRPORT MASTER PLAN UPDATE - 1992

The Chehalis-Centralia Airport Master Plan Update (September, 1992) proposed several improvements at the airport to accommodate the forecast increase in airport traffic:

- Repair and maintain the surface of Runway 15/33 and its support taxiways;
- Remove the evergreen trees and other obstructing trees to restore the object free area to Runway 15/33 and the approach surface of Runway 33;
- Install a nonprecision instrument approach to Runway 15;
- Upgrade and install lighting and signage to meet FAA standards;
- Initiate overall airport operations and maintenance program to improve surface storm drainage facilities and levee maintenance;

- Relocate the airport entrance and regrade, pave, and stripe the existing parking area;

- Construct a new terminal building with added space for administration and FBO offices, crash, fire and rescue facilities, and a café;

- Construct two additional hangars; and

- Promote the leasing of appropriate airport property for commercial and industrial land uses.

In response to the master plan recommendations Chehalis-Centralia Airport applied for and received funding through the Airport Improvement Program. The result of the 1997 Airport Improvement Project: Runway Rehabilitation and Taxiway Construction Project, was to construct the following improvements:

- Rehabilitation of Runway 15/33;

- Removal of the Visual Approach Slope Indicator (VASI) lights at Runway 15 and install Precision Approach Path Indicator (PAPI) lights;

- Relocation of the segmented circle and installation of a new lighted windsock;

- Removal of Taxiway T-5;

- Construction of a partial parallel Taxiway (T-A, A-3); and

- Installation of new signage and ground lighting.

NATIONAL PLAN OF INTEGRATED AIRPORT SYSTEMS (NPIAS)

Other programs for aviation planning are conducted at the federal and state levels.

Chehalis-Centralia Airport is classified in the FAA's **National Plan of Integrated Airport Systems (NPIAS)** as a General Aviation (GA) airport. This inclusion within the NPIAS allows the airport to be eligible for Airport Improvement Program funding. According to the NPIAS, of the 3,344 existing NPIAS airports across the country, 2,472 are classified as general aviation. General aviation accounts for the bulk of civil aircraft operations. It includes all facets of aviation except for commercial and military observations. General aviation airports handle 37 percent of all active general aviation aircraft.

WASHINGTON STATE AVIATION SYSTEM PLAN (WSASP)

The Washington State Aviation System Plan (WSASP) is developed by the Washington State Department of Transportation (WSDOT), Aviation Division to address statewide airport facilities needs. The two primary functions of the System Plan are to identify the physical facility needs for the state's system of airports and to serve as a decision-making tool for the distribution of funds through the Local Airport Aid Program and the Airport Improvement Program.

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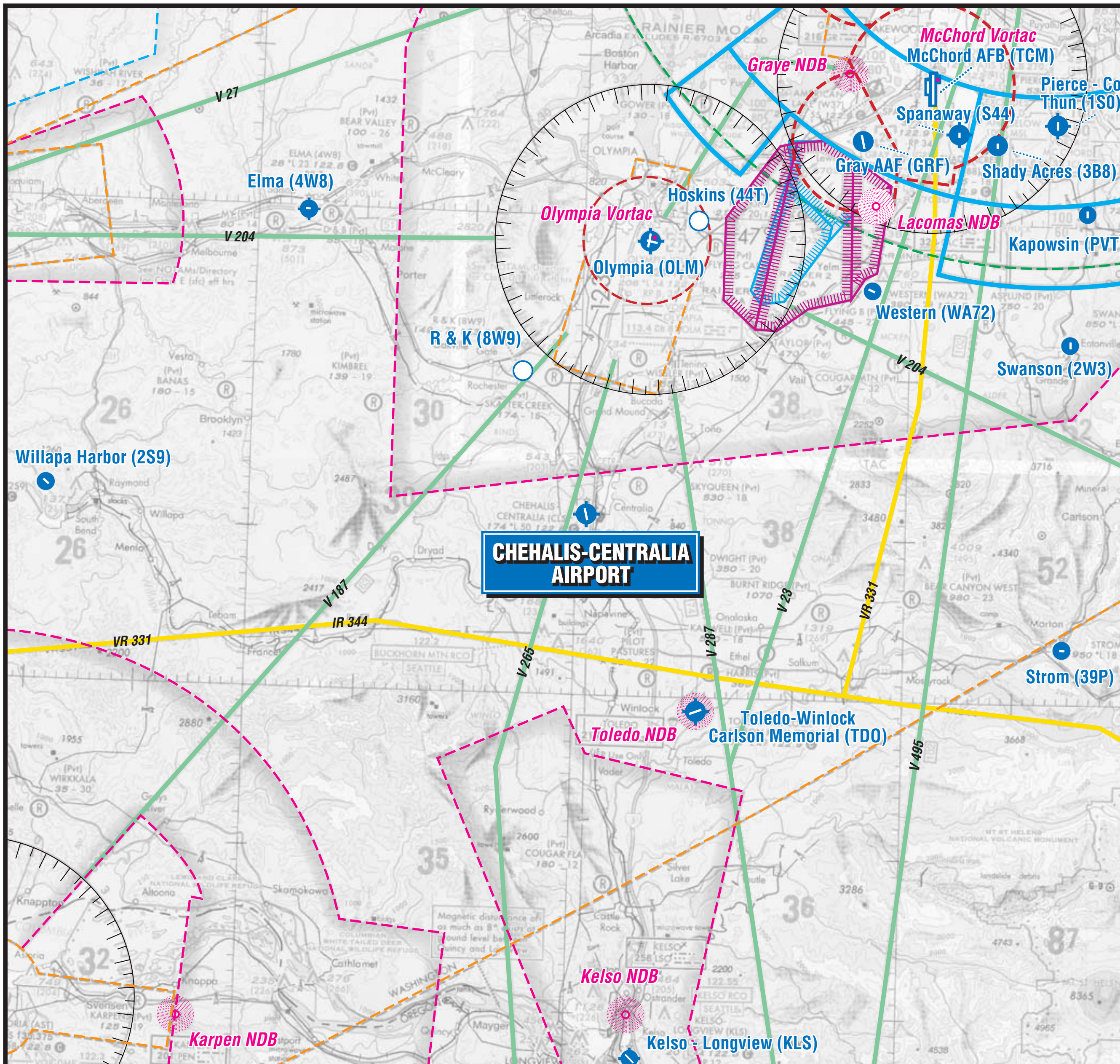

LEGEND

- Airport with other than hard-surfaced runways
- Airports with hard-surfaced runways 1,500 ft. to 8,069 ft.
- Airports with hard-surfaced runways greater than 8,069 ft. or some multiple runways less than 8,069 ft.
- Non-Directional Radiobeacon (NDB)
- Compass Rose
- Victor Airways
- Military Training Routes
- Military Operations Area (MOA)
- Prohibited, Restricted, Warning, and Alert Areas
- Class B Airspace
- Mode C Veil
- Class D Airspace
- Class E Airspace
- Class E Airspace with floor 700' above surface
- Class E Airspace with floor 1,200' or greater above surface

NORTH

NOT TO SCALE

Source: Seattle Sectional Aeronautical Chart
National Oceanic and Atmospheric Administration (NOAA)
Effective Date: June15, 2000

CHEHALIS CENTRALIA AIRPORT

Exhibit 1C
AREA AIRSPACE

Based upon the survey data contained in the System Plan, the availability of grant funding, and the ability of the local sponsor to match the grant, the WSDOT and the FAA, respectively, prioritize the program grants.

AIRPORT FACILITIES

This section describes the existing facilities at the Chehalis-Centralia Airport. Facilities are presented as follows:

- Airside Facilities
- Landside Facilities

AIRSIDE FACILITIES

Airside facilities needed for the safe and efficient movement of aircraft include: runways, taxiways, airfield lighting, and navigational aids. In most cases, airside facilities dictate the types and levels of aviation activity capable of operating at an airport. Landside facilities include terminal buildings, aircraft parking aprons, hangars, aviation-related businesses, and automobile access and parking.

An aerial view of the airside facilities at the airport is shown on **Exhibit 1B**, **Airside Facilities**. **Table 1B** summarizes key airside facility data for the airport, especially regarding runway and navigational information. A discussion on other key airside facilities is provided below.

The WSDOT Aviation Division has recently updated the *Washington State Aviation Pavement Management Program Reports* (also referred to as the *Pavement Management Report*) for the statewide airport system. Using these reports, each airport (including Chehalis-Centralia) is able to evaluate the condition and recommended maintenance program for each paved surface of the airfield. This extensive report, concluded in August 2000, has been relied upon for a portion of the following runway and taxiway information.

Runways

The airport is served by Runway 15-33, oriented northwest to southeast. The runway, which is 5,000 feet long and 150 feet wide, is constructed of concrete. The strength of the runway is rated at 30,000 pounds for single (SWL) and dual wheel (DWL) type landing gear. The runway is also strength rated at 85,000 for dual tandem wheel loading (DTWL). The runway was rehabilitated in 1997, including recutting and joint sealing the surface. According to the pavement condition indices reported in the *Pavement Management Report*, the runway will remain in good condition through 2010.

Taxiways

As previously stated, the *Pavement Management Report* for Chehalis-Centralia Airport has evaluated the pavement condition of all paved surfaces, including the taxiways. For recording purposes the current taxiways that serve the airfield have been designated by two alternate sets of numbers, corresponding to either a newer or older taxiway system. The new taxiways are designated with a "T". The old system of taxiways are designated with "T0". An exception to this is T04 which was newly constructed in 1997. Taxiway areas are indicated by number on **Table 1C, Pavement Conditions**.

TABLE 1B
Airside Facilities Data
Chehalis-Centralia Airport

	Runway 15-33
Runway Length (feet)	5,000
Runway Width (feet)	150
Runway Surface Material	PCC
Surface Treatment	None
Runway Load Bearing Strength (lbs.)	
Single/Dual Wheel Loading (SWL/DWL)	30,000
Dual Tandem Wheel Loading (DTWL)	85,000
Runway Markings	Basic
Runway Lighting	MIRL
Taxiway Lighting	Reflectors/MITL (intersections)
Approach Lighting	R15 - PAPI-4L R33 - REIL, VASI-2L
Visual Aids	Rotating Beacon Lighted Windcone Segmented Circle
Navigational Aids	None

VASI-Visual Approach Slope Indicator
PAPI-Precision Approach Path Indicator
REIL-Runway End Identification Lights
MIRL-Medium Intensity Runway Lighting
MITL- Medium Intensity Taxiway Lighting

Sources: Airport Facility Directory, Northwest U.S. (November, 2000); Conversations with airport personnel.

Chehalis-Centralia Airport has a partial parallel taxiway (TA) that accesses Runway 15-33, as depicted on **Exhibit 1B, Airport Facilities**. Taxiway TA is a fifty foot wide portland cement concrete taxiway which runs the length of the runway on the west side of the airport from the end of Runway 15 3,958 feet to the terminal area. This taxiway serves the terminal and hangar facilities.

TABLE 1C
Pavement Conditions - Chehalis-Centralia Airport

PAVEMENT AREAS	AREA (SF)	CONDITION *	5 YEAR ACTION	COST
APRON AREAS				
A01	9,492	3	Reconstruct	$23,800
A02	13,314	25	Reconstruct	33,400
AA-01	2,630	98	Fog Seal	132
AA-02	4,300	70		
AB-01	1,964	86	Slurry Seal	786
AB-02	4,400	51		
AC	2,312	18	Reconstruct	5,800
AD-01	911	38		
AD-02	4,000	30	Reconstruct	10,000
AD-03	4,950	26	Reconstruct	12,400
AD-04	5,141	43		
AD-05	3,375	16	Reconstruct	8,470
AD-06	5,223	54	Reconstruct	6,480
AFBO	53,100	52	Overlay	65,800
APRON 01	11,835	90	Slurry Seal	4,730
APRON 02	71,325	85	Slurry Seal	28,500
APRON 03	134,094	94	Slurry Seal	53,600
RUNWAYS				
R15-33	750,000	68		
TAXIWAYS				
T-01-01	12,853	81		
T-01-02	10,556	36	Fog Seal	528
T-02	15,639	67	Fog Seal	782
T-03	22,733	83		
T-04-01	11,211	100	Fog Seal	1,122
T-04-02	25,835	100	Fog Seal	2,580
T-05-01	4,122	57	Overlay + Fog Seal	5,316
T-05-02	2,045	94	Slurry Seal	818
T-05-03	1,931	87	Slurry Seal	772
T-06	11,098	73	Slurry Seal	4,440
T2	14,896	83	Slurry Seal	5,960
T3	16,372	100	Fog Seal	1,638
T4	153,969	58	Reseal Joints	56,500
T5-01	30,293	61	Reseal Joints	10,200
T5-02	61,506	70	Reseal Joints	21,000
TA (MAIN)	199,860	62	Reseal Joints	71,900
TL	110,343	56		37,400
Total 5 Year Maintenance Budget				$521,544

Washington State Aviation Pavement Management Report, Aug. 2000
*Based on a ranking where 1 is the lowest and 100 is the highest ranking possible.

Taxiway T2 is a connecting taxiway, constructed of asphaltic concrete, that allows aircraft to exit the runway from midfield. T2 connects to TA which it crosses to become old taxiway one (T01).

Taxiway T3 is an additional connecting taxiway that is 335 feet x 40' which allows aircraft to exit from Runway 15. It is also connects to the leg of TA as it turns eastward. Taxiway T04 T's into T3 to complete a parallel system, running the length of the remainder of the runway. This asphaltic concrete taxiway is 965 feet x 35 feet and divided into two sections by taxiway T4.

Taxiway T4 is the end of the abandoned crosswind runway. The portland cement concrete surface is 1,085 feet x 140 feet and cuts a diagonal from Runway 15 to Taxiway T5.

Taxiway T5 is a connecting taxiway that connects taxiway surface from the southbound end of Taxiway TA through the apron/tie-down area to the south end of Runway 15-33. Section 1 of T5 consists of 667 feet x 45 feet of asphaltic concrete surface. Section 2 has 1160 feet x 50 feet of asphaltic concrete surface.

Taxiway L is located on the north end of the airfield, running east-west. Taxiway L connects Runway 15-33 with the surface of the abandoned runway, now the area of commercial development. TL is constructed of portland cement concrete and is 2,435 feet in length x 50 feet in width.

The other taxiways of older construction, designated by a T with a zero preceding the number (ex. T01), vary by date of construction and surface condition. These predominantly serve the terminal, apron, hangar, and tie-down areas. Section 1 of taxiway T-01 is 575 feet in length x 20 feet in width and is constructed of asphaltic concrete. Section 2 is 557 feet x 20 feet and is constructed of asphaltic concrete. Taxiway T-02 was reconstructed in 1982 of asphaltic concrete. T-02 is 706 feet x 15' and serves the hangar area, connecting T-01 and T-05. T-03 also serves the hangar area connecting to T-01 and T-05. T-03 is 743 feet x 20 feet and constructed of asphaltic concrete. T-04 is of new construction and has been discussed previously in this section. T-05 connects hangar areas to the main taxiway T-A and has been reconstructed of asphaltic concrete in three segments that are 313 feet in length x 18 feet in width.

Pavement Markings

Pavement markings are used on runway and taxiway surfaces to identify a specific runway, runway threshold, centerline, hold line, or an edge line. Runways are marked with white markings in accordance with the type of approach available (e.g. visual, nonprecision, or precision) to each runway end.

The airport pavement markings on Runway 15-33 at Chehalis are visual markings, that is, they identify the airfield to the extent of the needs for a visual approach only. These identify the runway, runway centerline, threshold, and edge lines. Aiming point markings (two rectangular shaped white stripes on each side of the runway centerline) are also located on either runway end, one thousand feet from the threshold.

Yellow taxiway and apron taxilane centerline markings are provided to assist way-finding and aircraft maneuvering on the ground.

Airfield Lighting

Airport lighting systems extend the capability of airport use into periods of darkness and/or poor visibility. Several lighting systems are installed at the airport for this purpose. These lighting systems, categorized by function, are described below.

Identification Lighting: The location of the airport at night is universally indicated by the rotating beacon. A rotating beacon displays flashes of alternating white and green light to identify a public airport. The rotating beacon, illustrated on **Exhibit 1B**, is located west of the terminal alongside the existing entrance road. A lighted windcone and segmented circle, located on the west side of the runway just north of Taxiway 3, allows visual confirmation of surface winds and runway traffic patterns.

Pavement Edge Lighting: Pavement edge lighting utilizes light fixtures placed near the pavement edge to define the lateral limits of the runway or taxiway. Medium intensity runway lights (MIRL) are currently installed on Runway 15-33. Taxiway intersections are served by medium intensity taxiway lights (MITL) and reflectors are used to mark taxiways.

Runway End Identification Lighting: Runway end identifier lights (REILs) provide rapid and positive identification of the approach end of a runway. REILs are typically used on runways without more sophisticated approach lighting systems. The REILs systems consist of two synchronized flashing lights, located laterally on each side of the runway facing the approach aircraft. REILs are installed on Runway 33.

Approach Lighting: Approach lighting is installed for the purpose of giving landing aircraft descent guidance to the end of the runway. Approach lighting can aid in both visual and instrument landings. At Chehalis-Centralia Airport the two box visual approach slope indicator (VASI) is located to the left of the approach end of Runway 33. The VASI indicates vertical alignment to aircraft on final approach.

Precision Approach Path Indicator lights, or PAPIs, also provide vertical guidance. The PAPIs are installed to the left of Runway 15 to aid approaching traffic. PAPI's have four lights to indicate vertical path. The PAPIs are set at 4.5 degrees due to trees in the approach.

LANDSIDE FACILITIES

Landside facilities are those providing support to the operation of aircraft and are essential to the aircraft and pilot/passenger handling functions. They typically consist of terminal buildings, ground services, aircraft parking apron, hangars, fuel service, and automobile parking. Landside facilities are outlined in the following section and are depicted on **Exhibit 1D, Landside Facilities**.

Terminal Facilities

The general aviation facility is located on the west side of the airport. Although the airfield has no formal terminal facility, two separate areas fulfill the function of the terminal. Space in Hangar D is used for airport management offices. Central Aircraft Repair is located in Building N, southwest of the fuel pumps. This serves as the maintenance building and also serves as the pilot's lounge with snack and restroom facilities.

Aircraft Apron Areas

The *Pavement Management Report* has very painstakingly quantified the airport surfaces and qualified their condition, including the apron areas. The report enumerates eighteen separate apron areas for Chehalis-Centralia Airport. Aprons 1, 2, 3, and the FBO apron area constitute the main aircraft parking/tie down areas for both local and transient traffic. These areas provide 53 tie down spaces, with room to accommodate sixteen more. **Table 1C, Pavement Conditions** not only denotes the apron areas, but also restates the findings of the pavement conditions as reported in the *Pavement Management Report* for each surface at Chehalis-Centralia Airport. The table also indicates costs for improvements associated with a recommended five year improvement plan from 2001-2005.

A complete pavement section study taken from the *Washington State Aviation Pavement Management Report* can be found in **Appendix C** of this Master Plan.

Aircraft Hangar Facilities

Hangar facilities at Chehalis-Centralia Airport are located on the west side of the airport. These consist of T-hangars as well as executive box hangars. The five T-hangars are lettered B, C, D, E, and F. Hangar E is a shade type T-hangar with open sides, containing eight spaces. Hangar F is a shed type T-hangar with enclosure on three sides, also housing eight aircraft stalls. The remaining three T-hangars have eight spaces each, including the area provided for the airport offices.

The executive box hangars are lettered A, G, H, I, J, K, L, and M. These are all individually owned or leased. Some of these house multiple aircraft. Pacific Cataract and Laser Institute (PCLI) owns Hangars L and M, which are 2,500 square feet each. PCLI also owns the only conventional style hangar facility on the airfield. Hangar K is 7,200 square feet.

AIRPORT SUPPORT FACILITIES

Fuel Facilities

Chehalis-Centralia Airport has two below ground fuel storage tanks. These store 6,000 gallons each of Jet A and 100LL fuel. The self serve pumps allow 24 hour self-service.

Exhibit 1D
LANDSIDE FACILITIES

UTILITIES

A critical element of land/airport facility development capability is the availability and quality of utility services. The airport's water service is supplied via the municipal city system. Commercial development on the east side of the airfield is hooked into the city sanitary sewer system, while the west side remains on a septic system.

AREA AIRSPACE, NAVIGATIONAL AIDS, AND AIR TRAFFIC CONTROL

The 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 and efficient airspace environment for civil, commercial, and military aviation. The NAS is defined as the common network of U.S. airspace, including air navigation facilities; airports and landing areas; aeronautical charts; associated rules, regulations and procedures; technical information; personnel and material. System components shared jointly with the military are also included.

AIRSPACE STRUCTURE

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 and identifies them as Classes A, B, C, D, E, and G.

Class A airspace is high level 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 such as Seattle Tacoma International Airport. Class C airspace is controlled airspace surrounding lower activity commercial service and some military airports that are tower controlled (ATCT). Portland International is contained within Class C airspace. Class D airspace is controlled airspace surrounding low activity commercial service and general aviation airports with an airport traffic control tower.

All aircraft operating within Class A, B, C, and D airspace must be in constant contact with the air traffic control facility responsible for the particular airspace. Class E airspace is controlled airspace 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. Class G airspace is uncontrolled airspace. Airspace in the vicinity of Chehalis-Centralia Airport is depicted on **Exhibit 1C, Area Airspace**, as taken from the Seattle Sectional Air Chart, June, 2000. The airport is located in uncontrolled, Class G airspace.

Aircraft enroute or departing Chehalis-Centralia Airport may use VOR navigational facilities. The VOR or VORTAC facilities, depicted on **Exhibit 1C**, provide a system of Federal Airways, also referred to as Victor Airways. Victor Airways have been established to allow assured navigational capability along corridors of airspace eight miles wide and extending upward from 1,200 feet AGL to 18,000 feet MSL between VOR facilities. For further discussion of Victor Airways refer to the following enroute navigational aids.

TERMINAL AREA AND ENROUTE NAVIGATIONAL AIDS

Navigational aids are electronic devices that transmit radio frequencies which are received by pilots of properly equipped aircraft. These transmissions are translated into point-to-point guidance and position information. The types of navigational aids available for aircraft flying between airports include, the very high frequency omnidirectional range **(VOR)** facility which can also be equipped with Distance Measuring Equipment **(DME)**; nondirectional radio beacon **(NDB)**; and the global positioning system **(GPS)**.

The VOR, in general, provides azimuth readings to pilots of properly equipped aircraft by transmitting a radio signal at every degree to provide 360 individual navigational courses. Frequently, distance measuring equipment (DME) is combined with a VOR facility to provide distance as well as direction information to the pilot. In addition, military tactical air navigation aids (TACANs) and civil VORs are commonly combined to form a VORTAC. A VORTAC provides distance and direction information to civil and military pilots. VORs can be positively identified by a series of Morse code transmissions that spell the three letter identifier.

The several regional VOR facilities and their locations with respect to Chehalis-Centralia Airport are listed below.

OLYMPIA (OLM) VORTAC is located onfield at Olympia Airport, 18 nautical miles north of Chehalis-Centralia Airport. The signal may be intercepted on a radio frequency of 113.4 Megaherz.

ASTORIA (AST) VOR is located onfield at Astoria Airport, 48 nautical miles southwest of Chehalis-Centralia Airport. The signal is intercepted on a frequency of 114.0 Megaherz.

BATTLE GROUND (BGN) VOR is located 58 nautical miles south of Chehalis-Centralia Airport and 10 nautical miles north of Portland International Airport. The signal is intercepted on a frequency of 116.60 Megaherz.

NEWBURG (UBG) VOR is located 80 nautical miles south of the Chehalis-Centralia Airport and uses a signal frequency of 117.40 Megaherz.

McCHORD (TCM) VORTAC is located 35 nautical miles of the Chehalis-Centralia Airport and uses a signal frequency of 109.6 Megaherz.

Chehalis-Centralia Airport is also situated among several Victor Airways.

V 165 passes within several miles of the airport and allows guaranteed navigation from the Olympia VORTAC (OLM) to Newburg VOR (UBG). Just west of Chehalis is V 287 which provides navigation to/from OLM and Battle Ground VOR (BTG), north of Portland. V 23 provides guidance between McChord VORTAC (TCM) and the Battle Ground VOR after intercepting V 287. V 187 provides navigation between Astoria VOR-DME and Olympia VORTAC.

The **NDB** transmits nondirectional radio signals whereby the pilots of properly equipped aircraft can determine the bearing to or from the NDB facility and then "home" or track to or from the station. The Chehalis-Centralia Airport is served by these NDBs:

NDB Name	Identifier	Heading/Distance (nm) to CLS
Toledo	TDO	311/13.8
Lacamas	LAC	201/26.4
Kelso	LSO	334/31.4
Mason County	MNC	154/34.6

GPS is an additional navigational aid for pilots enroute to the airport, as well as an instrument approach aid. GPS was initially developed by the United States Department of Defense for military navigation around the world. Increasingly, over the last few years, GPS has been utilized to a greater extent in civilian aircraft. GPS uses satellites placed in orbit around the globe to transmit electronic signals which are used by properly equipped aircraft to determine altitude, speed, and navigational information. GPS allows pilots to directly navigate to any airport in the country, eliminating the need for a specific navigational facility.

The FAA is proceeding with a program to gradually replace all traditional enroute navigational aids with GPS. Currently, Chehalis-Centralia Airport is not served by a GPS or other instrument approach to either Runway 15 or 33; however, the airport has applied to FAA for an instrument approach to Runway 15.

Instrument Approach Procedures

When the visibility and cloud ceilings deteriorate to a point where visual flight can no longer be conducted, aircraft must follow published instrument approach procedures to locate and land at the airport. The different minimum requirements for visibility and cloud ceilings are varied dependent on the approach speed of the aircraft. These are noted by Category type: A- 0-90 knots, B - 91-120 knots, C - 121-140 knots, or D - 141-165 knots. Aircraft following instrument flight rules (IFR) are required to follow approach and landing instructions from the associated Approach Control facility.

Instrument Departure Procedures

Aircraft departing the airport using instrument flight rules are required to contact and receive instruction from the designated Departure Control facility. An aircraft would, then, fly assigned headings and altitudes. Ultimately the aircraft is "handed off" to the Air Route Traffic Control Center with authority over that flight sector.

AIR ROUTE TRAFFIC CONTROL CENTER (ARTCC)

The FAA has established 21 Air Route Traffic Control Centers (ARTCC) in the continental United States to control aircraft operating under instrument flight rules (IFR) within controlled airspace on the enroute phase of flight. An ARTCC assigns specific routes and altitudes along federal airways to maintain separation and orderly air traffic flow. Centers use radio communication and long range radar with automatic tracking capability to provide enroute air traffic services. Typically, the ARTCC splits its airspace into sectors and assigns a controller or team of controllers to each sector. As an aircraft travels through the ARTCC, one "hands off" control to another. Each sector guides the aircraft using discrete radio frequencies. Seattle ARTCC is responsible for enroute control of all aircraft operating under IFR and arriving and departing the local airspace.

LOCAL AIR TRAFFIC CONTROL

Although Chehalis-Centralia Airport is not served by an airport traffic control tower (ATCT), pilots can broadcast their intention and position on the common traffic advisory frequency (CTAF) channel 122.8 Megaherz (Mhz), also called UNICOM.

AREA LAND USE AND ZONING

Land use is important to the existing and potential needs of the airport. By understanding the land use issues on and surrounding the airport property, more appropriate recommendations can be made for the future.

EXISTING LAND USES

The Chehalis-Centralia Airport lies within the north city limits of Chehalis and completely within city property boundaries. This can be observed on **Exhibit 1B, Airside Facilities**. Land use surrounding the airport is mixed. The surrounding land uses include Interstate 5 to the east, the Riverside Country Club Golf Course on the west boundary along the river, single family residential housing on the south, and agricultural land north. Property adjacent to Interstate 5 consists of several commercial uses, including Walmart, K-Mart, Washington Homes, and the Washington State Highway Patrol. Only Walmart is located on airport property.

LAND USE ZONING

The land use zoning for the airport facilities surfaces is designated as Essential Public Facility zoning. This includes airport surface reserved for airfield activity, including the land up to the no build line on the east. East of this line, within airport property and bordered by Interstate 5, is land designated as General Commercial. The new zoning designations were effective January 24, 2000.

Compatible land use zoning has also been prepared in draft form by the WDOT-Aviation Division. The zoning establishes aircraft accident safety zones around the airport and in the runway approaches based upon the existing runway length.

HEIGHT AND HAZARD ZONING

Use of the existing properties and planned future uses of land near the Chehalis-Centralia Airport include height and hazard considerations. The City of Chehalis has passed obstruction zoning regulations governing the heights of structures and objects of natural growth around the airport to enhance safety of aircraft in flight and objects on the ground. Also, the ordinance considers the potential conflicts an obstruction could pose on existing and future approach minimums at the airport.

The language of the height and hazard zoning ordinance borrows from Federal Aviation Regulation (F.A.R.) Part 77, **Objects Effecting Navigable Airspace**. F.A.R. Part 77 assigns three-dimensional imaginary areas to the runway in accordance to the type of aircraft and approach minimums being served. These imaginary surfaces emanate from the runway centerline and are dimensioned to protect approaching and departing aircraft from potential hazard of obstructions. Should this master plan recommend changes to runway length and/or approaches, the ordinance may need to be updated.

SOCIOECONOMIC CHARACTERISTICS

A variety of historical and forecast socioeconomic data, related to Chehalis, Centralia, and Lewis County was collected for use in various elements of this master plan. This information is essential in determining aviation service level requirements, as well as forecasting the number of based aircraft and aircraft activity at the airport. Aviation forecasts are normally related to the population base, economic strength of the region, and the ability of the region to sustain a strong economic base over an extended period of time.

POPULATION

Airports are support facilities to the cities and regions that they serve. Therefore, the population and economic structure of the attending communities are critical factors to consider when planning airport facilities. In this analysis consideration will be given, not only to the cities of Centralia and Chehalis, but also Lewis County. **Table 1D, Historical Socioeconomic Data** below also includes statistics for the broader region for comparison.

Population data presented in **Table 1D** was obtained from **The Complete Economic and Demographic Data Source** (**CEDDS 2000**) by Woods and Poole Economics, Inc. and the **State of Washington Office of Financial Management**, September, 2000.

As indicated in **Table 1D,** the population for Lewis County has increased at an average annual growth rate of 1.37 percent between 1970 and 2000 (estimated). This rate closely mirrors the state average for the same time period, a 1.76 percent annual increase. Thurston County, which encompasses the Olympia MSA with a higher population and employment base, experienced the highest annual growth percentage of the two counties recorded at 3.26 percent, almost double the state average. Population growth for the twin cities has lagged behind state and county growth, ranging from a 0.98 percent growth rate for Centralia and a 0.66 percent growth rate for Chehalis. Centralia grew from 10,054 in 1970 to13,600 in 2000. Chehalis grew from 5,727 in 1970 to 7,020 in 2000.

TABLE 1D
Historical Socioeconomic Data

Area	1970	1980	1990	1995	2000	Annual Growth Rate (1970-00)
Lewis County						
Population	45,610	56,220	59,550	65,830	69,550	1.37%
Employment	18,770	25,760	29,920	33,310	38,670	2.36%
PCPI*	$12,759	$15,487	$16,364	$16,638	$18,846	1.27%
Thurston County						
Population	77,490	125,360	163,030	195,190	209,290	3.26%
Employment	34,780	55,360	84,580	99,810	119,420	4.06%
PCPI	$14,579	$17,137	$19,828	$20,335	$23,059	1.49%
City Populations						
Centralia	10,054	11,555	12,101	12,730	13,600	0.98%
Chehalis	5,727	6,100	6,527	6,910	7,020	0.66%
Olympia	23,296	27,447	33,729	37,170	40,310	1.78%
State of Washington	3,413,250	4,132,353	4,866,663	5,433,150	5,856,740	1.76%

Sources: Woods and Poole CEDDS 2000; State of Washington Office of Management, 2000
* Per capita personal income.

ECONOMIC PROFILE

The cities of Centralia and Chehalis are steeped in local history. Tourism and shopping attract large numbers of visitors to the area. Centralia offers antique shopping in one of eleven antique malls and factory outlet shopping just off the highway. The cities are also jumping off places for hiking, camping and other recreation in and around Mt. Rainier, Mount St. Helens, Mt. Adams, the Gifford Pinchot National Forest, and the Pacific Ocean. This high quality of life fosters a low rate of employment turnover, according to the local Chamber of Commerce.

Chehalis is the Lewis County seat. The city has historically been an industrial city beginning with saw mills, logging and farming as the major industries. Today industry is still important to Chehalis which houses a thriving industrial park and a growing commercial center adjacent to the airport.

As of 1997, Lewis County had a total of 5,228 registered businesses, ranking 14th of the 39 counties in the state. In 1997 new businesses accounted for 12.3 percent of total businesses in the county, topping the state average of 10.8 percent.

Table 1E, **Largest Employers** depicts Lewis County's largest employers, as of 1995. The government sector, represented by Lewis County and the Centralia and Chehalis School Districts employ a combined total of 1,436 people. Providence Centralia Hospital is the largest private employer, employing over 700 people. The hospital provides comprehensive medical and surgical services. Centralia College has over 400 employees. The college is a well respected institution of learning, offering academic and vocational training.

TABLE 1E
Largest Employers
Lewis County, Centralia, and Chehalis

Company Name	Employees
Providence Centralia Hospital	736
PacifiCorp	660
Lewis County	643
National Frozen Foods Corp.	500
Centralia School District	425
Centralia College	400
Chehalis School District	368
Centralia Outlet Center	280
Fred Meyer	270
Wal Mart	260
Lewis County Mall	238
Safeway Stores	200

Source: The Chamber, serving Centralia, Chehalis, and Greater Lewis County.

EMPLOYMENT

Analysis of a community's employment base can provide valuable insight to the overall well-being of the community. In most cases, the community make-up and health is significantly impacted by the availability of jobs, variety of employment opportunities, and types of wages provided by local employers.

Employment statistics for Lewis County can be found in **Table 1F, Employment by Sector** below. According to information presented in **The Complete Economic and Demographic Data Source** (**CEDDS 2000**) by Woods and Poole Economics, Inc., Lewis County increased in total employment over the thirty year reporting period by an average 2.36 percent annually. The figures show that in 1970 18,770 people were employed in the county. By 2000 that figure more than doubled to 38,670. The rate of employment increased at a higher rate than the population over the same time period, so that it could be deduced that employment opportunities were drawing people to the area. Also the rate of employment increased by almost a whole percent from 2.17 percent from the period 1990 to 1995 to 3.00 percent from 1995 to 2000.

TABLE 1F
Employment by Sector
LEWIS COUNTY

Employment Section	1970	1980	1990	1995	2000	% Annual Increase
TOTAL EMPLOYMENT	18,770	25,760	29,920	33,310	38,670	2.36%
FARM EMPLOYMENT	1,310	2,180	1,590	1,530	1,490	0.41%
AGRICULTURAL SERVICES, OTHER	270	510	920	1,070	1,210	4.90%
MINING	100	680	840	700	730	6.61%
CONSTRUCTION	1,830	890	1,200	1,760	2,300	0.75%
MANUFACTURING	4,190	5,060	4,950	4,950	5,640	0.96%
TRANSPORT, COMM. & PUBLIC UTIL	730	1,180	1,600	1,560	1,730	2.84%
WHOLESALE TRADE	460	1,080	1,090	1,150	1,150	3.03%
RETAIL TRADE	3,090	4,390	5,660	7,030	8,680	3.39%
FINANCE, INS. & REAL ESTATE	1,060	1,340	1,190	1,490	1,590	1.31%
SERVICES	2,740	4,510	6,320	7,030	8,390	3.67%
FEDERAL CIVILIAN GOVT	280	380	420	310	370	0.94%
FEDERAL MILITARY GOVT	260	230	320	280	250	-0.12%
STATE AND LOCAL GOVT	2,460	3,350	3,840	4,450	5,160	2.42%

Source: Woods and Poole: *CEDDS, 2000*

The greatest sectors of growth have been in the agriculture, trade, and services industries, all achieving greater than three percent annual growth. The other dominant sectors of employment growth are in state and local government and the transportation, communications and public utilities sector, at 2.42 and 2.84 percent respectively. Although the construction industry was sluggish over the recorded thirty year period, as shown in **Table 1F,** the rate of growth over the past five years indicated a solid 2.74 percent annual increase.

The number of employed in each sector indicates the diversity in the local economy. Employment in the retail trade and services industries accounts for 17,070 jobs, almost half of the total employment in Lewis County. The manufacturing and state and local governments sectors account for an additional 10,800 jobs. Although employment in the manufacturing sector has been growing at a slow pace, it still added 700 jobs to the local economy from 1995 to 2000, or approximately 140 jobs each year. All sectors combined added approximately 5,360 new jobs to Lewis County between 1995 and 2000.

PER CAPITA PERSONAL INCOME

Table 1G, Per Capita Personal Income (PCPI), compares the per capita personal income (adjusted to 1992 dollars) for the Lewis County, Thurston County (Olympia MSA), the state of Washington, and the United States between 1970 and 2000.

As illustrated by the table, the two Washington counties have mirrored, but slightly trailed the PCPI for the United States. The State of Washington's PCPI was slightly higher than that of the United States and continued to lead by a widening margin into 2000. The two Washington counties were outperformed by the state overall, with Lewis County increasing in Per Capita Income at a lower rate than Thurston County.

TABLE 1G
Adjusted Per Capita Personal Income

Jurisdiction	1970	1980	1990	2000	Average Annual Increase
Lewis County	$12,759	$15,487	$16,364	$18,846	1.27%
Thurston County	$14,579	$17,137	$19,828	$23,059	1.49%
Washington	$14,203	$18,441	$21,101	$25,298	1.88%
US	$13,812	$17,203	$20,652	$23,119	1.68%

Source: Woods and Poole: *CEDDS, 2000 - (*Adjusted to 1992 Dollars)

SUMMARY

The information discussed on the previous pages provides a framework for the remaining elements of the Airport Master Planning process. Information on current airport facilities, their utilization, and conditions 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

A variety of different documents were referenced in the inventory process. The following listing reflects a partial compilation of these sources. An on-site inventory and interviews with city administrators were also used to review the conditions of facilities for the master planning effort.

Airport Facility Directory, Northwest U.S., U.S. Department of Commerce, National Oceanic and Atmospheric Administration, October 5, 2000 Edition.

The Complete Economic and Demographic Data Source (CEDDS) Woods and Poole Economics, 2000.

Chehalis-Centralia Airport Master Plan Update, 1992; Chehalis-Centralia Airport Board.

National Plan of Integrated Airport System (NPIAS), U.S. Department of Transportation, Federal Aviation Administration, 1998-2002.

Seattle Sectional Aeronautical Chart, U.S. Department of Commerce, National Oceanic and Atmospheric Administration, June, 2000.

State of Washington Airport System Plan, Washington Department of Transportation, Aviation Division, 1999.

The following Web pages were also visited for information during the preparation of the inventory:

FAA 5010 Data, Area Airports
- http://www.airnav.com/
- http://www.nasao.org/
- http://www.gcr1.com/
- http://www.faa.com/

Lewis County
- http://www.chamberway.com/
- http://www.centralia.com/

State of Washington Office of Financial Management
- http://www.ofm.wa.gov/

Aviation Demand Forecasts

Facility planning begins with a definition of the demand that may occur over a specified period. For projection of demands at Chehalis-Centralia Airport (CLS) forecasts of aviation activity indicators are utilized. These forecasts provide the foundation from which aviation demand is translated into specific facility improvements needed by Chehalis, Centralia, and the Lewis County area over the next 20 years.

Because of the cyclical nature of the economy, it is virtually impossible to predict with certainty year-to-year fluctuations in activity when looking as far as 20 years into the future. However, a trend can be established which delineates long-term growth potential.

While a single line on a graph is often used to express the anticipated growth, it is important to remember that actual growth may fluctuate above and below this line. Forecasts serve as guidelines. Planning must remain flexible to respond to unforeseen facility needs. These facility needs may differ in response to a variety of external influences, including the changing types of aircraft and the nature of available facilities.

The following forecast analysis examines recent national and regional aviation trends and historical and current socioeconomic and demographic information to develop an updated set of aviation demand projections for Chehalis-Centralia Airport. Analysis of these factors will ensure a comprehensive outlook for future aviation demand.

NATIONAL TRENDS

Each year the Federal Aviation Administration (FAA) publishes its national aviation forecast. Included in this publication are forecasts for air carriers, air taxi/commuters, general aviation and military activities. The FAA forecasts are prepared to meet budget 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 by the general public. The Terminal Area Forecast (TAF), referenced in this report, uses the economic performance of the United States as a baseline indicator of future aviation industry growth.

GENERAL AVIATION

General aviation is defined as the portion of civil aviation which encompasses all facets of aviation except commercial and military operations. By most statistical measures, general aviation recorded its fifth consecutive year of growth (1994-1999). Following more than a decade of decline, the general aviation industry was invigorated by the passage of the General Aviation Revitalization Act in 1994 (federal legislation which limits the liability on general aviation aircraft to 18 years from the date of manufacture). This legislation sparked both an interest to renew the manufacturing of general aviation aircraft and a renewed optimism for the industry. The high cost of product liability insurance was a major factor in the decisions by many American aircraft manufacturers to slow or discontinue the production of general aviation aircraft.

According to the General Aviation Manufacturers Association (GAMA), aircraft shipments and billings grew for the fifth consecutive year in 1999, following fourteen years of annual declines. In the first three quarters of 1999, general aviation aircraft manufacturers shipped a total of 1,692 aircraft, a 13.4 percent increase over the same period in1998. Shipments of piston aircraft and jets were up 10.8 and 26.2 percent, respectively. Turboprop shipments increased 14.8 percent in 1998 and 8.6 percent through the first three quarters of 1999.

Both the number of active pilots and student pilot starts were up in 1998. Total active pilot numbers increased by 3.5 percent in 1999 over 1998, eclipsing the 0.3 percent gain the previous year. For 1999, student pilot starts increased for the third consecutive year, increasing by 4.4 percent over 1998. These student pilots are the future of general aviation and are a key factor impacting the general aviation industry.

Since most pilot training activities are conducted using general aviation aircraft, the increases in new pilot starts, along with increases in advanced training, are primary reasons for the resurgence in general aviation over the past years. These increases, combined with the increases in piston-powered aircraft shipments and aircraft production, are tangible evidence of the renewed vitality of the industry.

General aviation activity at towered airports increased for the third consecutive year in 1999, up 5.2 percent over 1998. For the three year period, operations at towered airports were up 13.4 percent. The largest gain was in local (training) operations, up 6.5 percent in 1999. Itinerant operations were up 4.3 percent. Since 1996, local operations are up 17.4 percent and itinerant operations up 10.7 percent. The gain in local operations coincides with the gains in student pilot starts.

Furthermore, general aviation growth is not limited to general aviation airports. Three of the top 10 airports showing the fastest growth in general aviation operations are large hub commercial service airports (Dallas/Fort Worth, Minneapolis/St. Paul and Covington/Cincinnati). This signifies the expansion of the general aviation fleet to include larger, more sophisticated turboprop and turbojet aircraft which require air traffic control services and airport facilities similar to commercial air carriers.

Instrument operations at towered airports and general aviation aircraft handled at en route traffic control centers increased 4.8 percent and 1.9 percent, respectively, in 1999. Instrument operations have increased five of the past six years, with activity gains totaling 17.4 percent over the period. The number of general aviation aircraft handled at en route traffic control centers increased for the eighth consecutive year in 1999. These increases are consistent with the expanding fleet of sophisticated turboprop and turbojet aircraft in the general aviation fleet and the greater use of these aircraft for business/corporate uses.

The most notable trend in general aviation is the continued strong use of general aviation aircraft for business and corporate uses. For 1998 (the most current year of data), business and corporate use of general aviation aircraft represented 23.9 percent of general aviation activity. These uses accounted for 21.2 percent of general aviation activity in 1997.

An equally striking industry trend is the continued growth in fractional ownership programs. Fractional ownership programs allow businesses and individuals to purchase an interest in an aircraft and pay for only the time that they use the aircraft. This has allowed many businesses and individuals, who might not otherwise, to own and use general aviation aircraft for business and corporate uses. Between 1993 and 1998, these companies expanded their fleet and shareholders by 65.2 percent and 66.1 percent, respectively. In 1999, the fractional jet fleet totaled 329 and shareholders totaled 1,567. Since 1993, Executive Jet, currently the fractional leader, has ordered 368 new aircraft and is purportedly the single largest nonmilitary purchaser of aircraft.

While the fractional jet ownership industry is rapidly expanding, new attention has been given the regulatory oversight of the industry. Presently, fractional jet providers operate under Federal Aviation Regulation (FAR) Part 91 which governs general aviation aircraft. Industry pressure is for fractional ownership providers to operate under FAR Part 135 which governs commercial operations for air carriers, air taxi and air charter companies. Part 135 operators believe the fractional ownership providers benefit from the less restrictive FAR Part 91 standards. The FAA commissioned a formal rulemaking committee to analyze regulatory requirements for the industry. Their report, released in Spring 2000, recommended that fractional ownership providers operate under a new subpart of FAR 91. The FAA is now reviewing this recommendation. A formal rulemaking proposal could be made within a year.

Exhibit 2A, U.S. Active General Aviation Forecasts depicts the FAA forecast for active general aviation aircraft in the United States. The FAA forecast predicts general aviation aircraft to increase at an average annual rate of 0.9 percent over the 13 year planning period for general aviation aircraft. General aviation aircraft are projected to increase from 204,710 in 1998 to 230,995 in 2011.

Although the general aviation active fleet is projected to increase at less than one percent annually, general aviation hours flown are forecast to increase by 1.7 percent annually over the twelve year planning period. The total pilot population is projected to grow at 2.1 percent annually through the planning period.

GENERAL AVIATION SERVICE AREA

The initial step in determining the general aviation demand for an airport is to define its generalized service area for the various segments of aviation the airport can accommodate. The airport service area is determined primarily by evaluating the location of competing airports, their capabilities and services, and their relative attraction and convenience. With this information, a determination can be made as to how much aviation demand would likely be accommodated by a specific airport. It should be recognized that aviation demand does not necessarily conform to political or geographical boundaries.

The airport service area is an area where there is a potential market for airport services. Access to general aviation airports, commercial air service, and transportation networks enter into the equation that determines the size of a service area, as well the quality of aviation facilities, distance, and other subjective criteria.

As previously mentioned, Chehalis-Centralia Airport is designated as a general aviation airport by the FAA in the NPIAS. The designation indicates that the airport provides general aviation services as an active general aviation base.

Defining the service area, or aviation demand pool for Chehalis, is somewhat subjective. Chehalis-Centralia Airport suffered several devastating setbacks in airfield use when the floods of 1990 and 1996 halted service and damaged aircraft. In the case of the 1996 flood, many aircraft sustained overwhelming damage, reducing the aircraft base at Chehalis. The quick rebound of based aircraft and service demand has been gratifying in underscoring the importance of the airfield to local and

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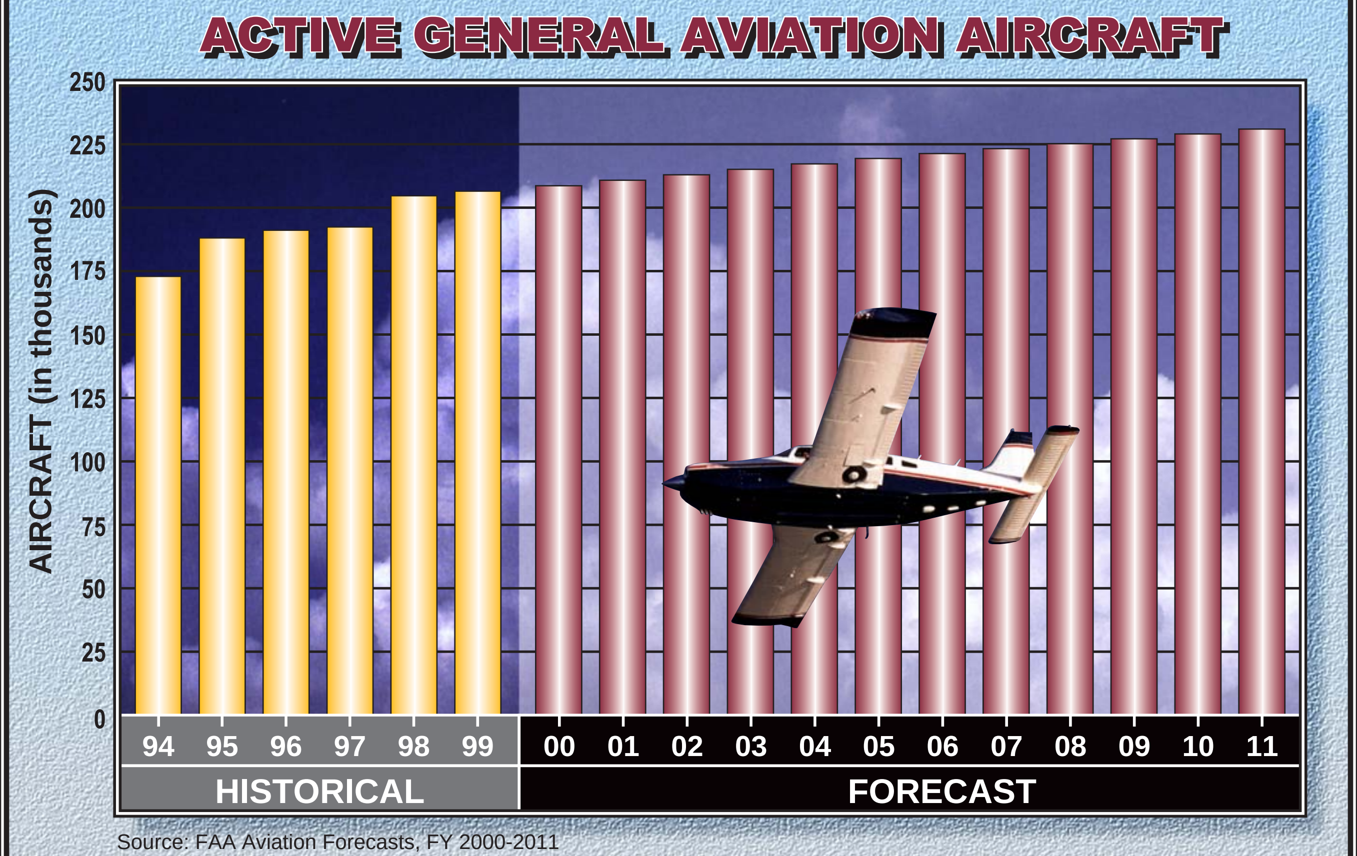


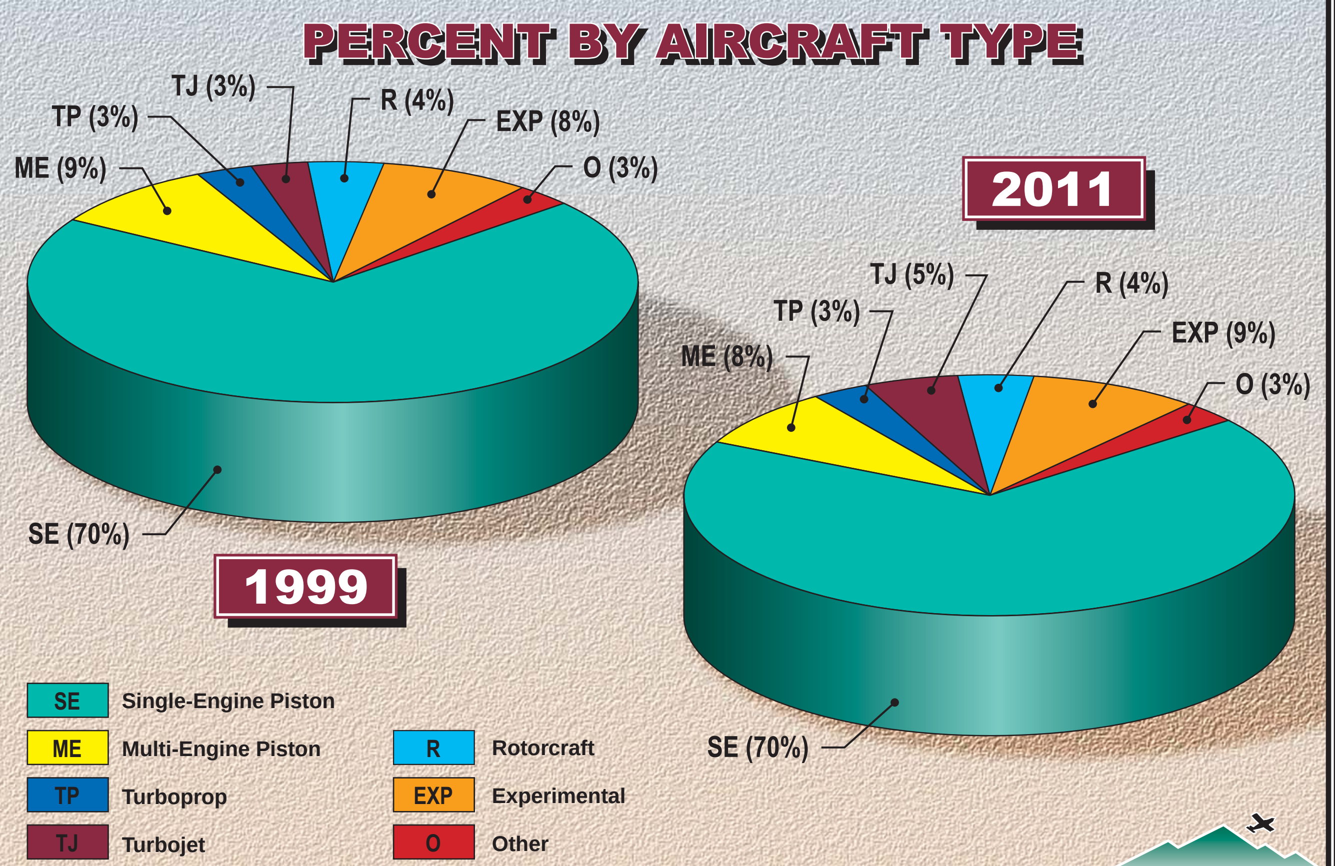


Exhibit 2A
U.S. ACTIVE GENERAL AVIATION
AIRCRAFT FORECASTS

regional air traffic. Demand is such that a waiting list for aircraft hangar storage has been established. Flood warning measures are now in place that help to alert the airport prior to a potential flood event.

Not only has there been steady growth, but this is also accompanied by use of the airfield by a wider diversity of aircraft, including a based jet and turboprop.

The other general aviation airports in the region include Olympia Airport and Toledo-Winlock Airport. Olympia is located 18 nautical miles north of Chehalis, has a primary and a crosswind runway, and is tower-controlled. Although currently unavailable, passenger air service has been provided on a scheduled basis as recently as 1995. Aircraft are able to navigate directly to Olympia via the VOR, as the VORTAC is located on the field. Additionally, Olympia has four published instrument approaches, including a precision ILS, extending the usability of the airfield.

Toledo-Winlock is located 14 nautical miles south of Chehalis in Lewis County and is very similar in available services to Chehalis-Centralia Airport. Toledo has a single runway that is 5,000 feet in length. The number of based aircraft was reported as 72 for 1999. Toledo has no published instrument approach, although there is a NDB located on field. Services offered are similar to those of Chehalis: fuel, aircraft repairs, and flight instruction.

The service area of the Chehalis-Centralia Airport would seem to overlap that of Olympia or southern Thurston County. Probably there are some airport users who depend upon instrument approach capability to best use their aircraft. Leakage of potential based aircraft at Chehalis to Olympia may be a result. The availability of hangar storage space may also contribute to this leakage, as a waiting period now exists for space at Chehalis. The primary service area for Chehalis-Centralia Airport can be expected to be defined primarily by the aviation demand of Chehalis, Centralia, and the surrounding communities of Lewis County and southern Thurston County.

LOCAL SOCIOECONOMIC FEATURES

The local socioeconomic conditions provide an important baseline consideration for preparing aviation demand forecasts. While in many cases local socioeconomic variables such as population, employment and personal income cannot be relied upon to indicate the growth of aviation demand, these factors can provide an important indicator for understanding the dynamics of the general aviation service area and the specific trends in economic growth.

For this study, socioeconomic variables for Lewis and Thurston (Olympia MSA) Counties have been considered. County and state information was gathered from Woods and Poole Economics, Inc.: **The Complete Economic and Demographic Data Source (CEDDS 2000)**.

POPULATION

Table 2A summarizes historical and forecast population estimates for Lewis, and Thurston (Olympia MSA) Counties, as well as the state of Washington. As shown in the table, each segment has experienced population growth over each decade. Lewis County has experienced an average annual growth of 1.02 percent, increasing from 56,220 people in 1980 to 69,550 estimated in 2000. In comparison, Thurston County (Olympia MSA) has grown at a more rapid pace from 125,350 people in 1980 to 209,290 in 2000, a 2.47% annual rate of growth. Lewis County, at 1.02 percent, is below the state average annual growth of 1.67 percent.

Future projections of population for Lewis County indicate continued growth at a rate consistent with recent trends. Population is expected to reach 83,258 by 2020 (a 1.65 percent annual gain for Lewis County) compared to higher growth rates in Thurston County and the State of Washington.

EMPLOYMENT

Historical and forecast employment data for Lewis and Thurston Counties is also presented in **Table 2A**. The table shows gains in employment for each of the two counties and the state of Washington over the next twenty years. All forecast employment is projected at an annual average increase that exceeds the previous twenty years with exception to the state figures. These are projected to continue to grow over the forecast period, but by slightly less than the previous twenty year period. All sectors of the economy have contributed to the overall rise in employment. No sector had a great dominance over the others. The services sector lead other sectors, having had the greatest gains over the historical twenty year period, averaging 4.45 percent annually. Other contributors with over three percent gains averaged annually were the retail trade and agricultural sectors.

Total employment at both county and state levels has increased at a greater average annual rate than population over the twenty year period shown in **Table 2A**, with some slowing in the last ten years. Employment forecasts for Lewis County indicates a slower and more moderate growth trend. Growth in employment for Thurston County will continue, but at a more moderate pace than the preceding twenty year period, from 3.73 percent to 2.65 percent.

PER CAPITA PERSONAL INCOME (PCPI)

Table 2A also compares per capita personal income (adjusted to 1992 dollars) for Lewis and Thurston Counties and the state of Washington. Lewis County has an adjusted PCPI of $18,846 estimated for 2000. Thurston County has an adjusted PCPI which was somewhat higher at $23,059. The average annual rate of growth in personal income for the state of Washington over the twenty year period shows that the state had a higher PCPI at 1.52 percent, than either Thurston or Lewis Counties.

TABLE 2A Historical and Forecast Socioeconomic Factors								
	HISTORICAL					*FORECAST*		
	1980	1990	1995	2000	(%) Avg Annual Increase	2010	2020	(%) Avg Annual Increase
Lewis County								
Population	56,220	59,550	65,830	69,550	1.02%	76,196	83,258	1.65%
Employment	25,760	29,920	33,310	38,670	1.95%	44,362	48,700	2.12%
PCPI	$15,487	$16,364	$16,638	$18,846	0.94%	$21,496	$23,739	2.12%
Thurston County								
Population	125,360	163,030	195,190	209,290	2.47%	243,350	278,920	2.65%
Employment	55,360	84,580	99,810	119,420	3.73%	141,170	159,300	2.65%
PCPI	$17,137	$19,828	$20,335	$23,059	1.42%	$25,633	$27,815	1.72%
State of Washington								
Population	4,132,353	4,866,663	5,433,150	5,856,740	1.67%	6,665,240	7,514,810	2.29%
Employment	2,109,470	2,861,800	3,157,960	3,735,920	2.76%	4,349,480	4,876,760	2.45%
PCPI	$18,441	$21,101	$22,012	$25,298	1.52%	$28,469	$31,208	1.93%
Source: County and State Data from Woods & Poole, *CEDDS 2000*								

The 20-year forecast predicts that the PCPI for Lewis County will grow at an average annual rate of 2.12 percent. The PCPIs for Thurston County (1.72 percent) and for state of Washington (1.93 percent) are forecast to continue to grow, but at a slower rate than the preceding twenty year period and also slower than the rate forecast for Lewis County.

FORECASTING APPROACH

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

The most reliable approach to estimating aviation demand is through the utilization of more than one analytical technique. Methodologies frequently considered include trend line projections, correlation/regression analysis, and market share analysis.

It is important to note that one should not assume a high level of confidence in forecasts that extend beyond five years. Facility and financial planning usually require at least a ten-year preview, since it often takes more than five years to complete a major facility development program. However, it is important to use forecasts which do not overestimate revenue-generating capabilities 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 air service provided in both the local and national market. Technological advances in aviation have historically altered, and will continue to change, the growth rates in aviation demand over time. The most obvious example is the impact of jet aircraft on the aviation industry, which resulted in a growth rate that far exceeded expectations. Such changes are difficult, if not impossible to predict, and there is simply no mathematical way to estimate their impacts. Using a broad spectrum of local, regional and national socioeconomic and aviation information, and analyzing the most current aviation trends, forecasts are presented in the following sections.

The following forecast analysis examines general aviation demand expected at Chehalis-Centralia Airport over the next twenty years.

AVIATION ACTIVITY FORECASTS

To determine the types and sizes of facilities that should be planned to accommodate general aviation activity, certain elements of this activity must be forecast. These indicators of general aviation demand include:

- Based Aircraft
- Based Aircraft Fleet Mix
- Local and Itinerant Operations
- Annual Instrument Approaches
- Aviation Peaking Activity

BASED AIRCRAFT FORECASTS

The number of based aircraft is the most elementary indicator of general aviation demand. By first developing a forecast of based aircraft, the growth of the other aviation demand indicators can be projected. The rationale for forecasting general aviation activity is presented below.

Historical Based Aircraft

A cursory review of historically based aircraft at Chehalis-Centralia Airport reveals an erratic pattern in numbers of based aircraft. However, prior to the inundating floods of the 1990s and beginning with 1980, Chehalis-Centralia Airport had 68 based aircraft. This compares to the current year's total based aircraft count of 68.

Through the early 1980s this number held steady at 68 based aircraft. However, as was typical of general aviation throughout the country, general aviation based aircraft numbers declined through the mid 1980s due to litigation issues and subsequent loss of small aircraft manufacturing. The decline at Chehalis was relatively minor with based aircraft numbers declining to 62 by 1984, then rising again to 64 by 1989.

In 1990, as the first of the devastating floods swept over the airport with significant aircraft damage and losses, the based aircraft numbers declined to 56. The flood of 1996 again affected the local aviation community. Since that time the number of based aircraft has returned, growing slowly, but steadily. By late 1996, 60 aircraft were based at Chehalis-Centralia Airport. The number rose to 68 by late 2000.

Therefore, when viewed within the context of external influences, there is good evidence of the potential for future expansion of based aircraft for Chehalis-Centralia Airport.

Forecasting Rationale For Based Aircraft

A summary of historical and forecast based aircraft is illustrated on **Exhibit 2B, Based Aircraft Forecast**. The projections depicted on the exhibit illustrate an envelope of potential based aircraft at Chehalis-Centralia Airport over the next 20 years.

The first method for forecasting based aircraft for Chehalis-Centralia Airport uses a trend line projection. The trend line is developed utilizing regression analysis, which attempts to average the high and low points. The acceptability of time series or regression analysis is based upon the correlation coefficient (Pearson's "r") which measures the association between changes in the dependent and independent variables. If the r-squared value (coefficient of determination) is greater than 0.95, it indicates good predictive reliability. A value below 0.95 may be used with the understanding that the predictive reliability is lower.

Considering based aircraft at Chehalis-Centralia Airport between 1996 and 2000, the time series analysis for trend line projections provides a r^2 value of 0.93. The trend line projection has indicated an increase in aircraft for all projected years and yields 72 aircraft for 2005, 77 aircraft for 2010, and 88 aircraft for 2020, as depicted in **Exhibit 2B**.

Several other regression analyses have also been conducted comparing based aircraft with the socioeconomic elements presented earlier. The first uses population statistics and forecasts for Lewis County. The second uses Per Capita Personal Income (PCPI) values for Lewis County.

The relationship between population and based aircraft over the same recording period (1996 to 2000), yields a r^2 output of 0.87. This correlation factor is strong, yet must be assumed to not be as highly reliable as the previous factor. The forecasts for based aircraft for the years 2005, 2010, and 2020 are 69, 72, and 80 respectively. This is depicted graphically in **Exhibit 2B.**

Testing the relationship of PCPI for Lewis County versus based aircraft yields the r^2 value of 0.88. Again, this correlation factor is not as reliable an indicator as the above 0.9 value. The regression yields based aircraft forecasts for 2005, 2010, and 2020 of 72, 75, and 82.

In **Table 2B**, **Based Aircraft** versus Population Projections, a market analysis approach was used. In this type of analysis comparisons are made involving based aircraft numbers for the Chehalis-Centralia Airport and the population statistics for Lewis County. The projections used for forecasting the based aircraft for the years 2005, 2010, and 2020 are indicated using both a constant share projection (or rate of growth of population that stays the same as the historical pattern), and an increasing share projection (where the same forecast population increases its share of the aircraft market). An increasing market share approach would be consistent with the projection that Chehalis will draw more aircraft from the existing service area or from a wider service area.

TABLE 2B
Based Aircraft vs. Population Projections

Year	Chehalis Based	Lewis County Population	Aircraft per 1,000
1980	68	56,216	1.21
1990	56	59,551	0.94
1996	60	66,754	0.90
1997	63	67,590	0.93
1998	65	68,154	0.95
1999	65	68,890	0.94
2000	68	69,550	0.98
Constant Share Projection			
2005	70	72,827	0.96
2010	73	76,196	0.96
2020	80	83,258	0.96
Increasing Share Projection			
2005	73	72,827	1
2010	91	76,196	1.2
2020	117	83,258	1.4

Based on a current market share of 68 aircraft per 69,550 population, or 0.98 aircraft per 1,000, the constant share projections predict 70 based aircraft for 2005, 73 aircraft for 2010, and the projection of 80 for the year 2020. The increasing share analysis proposes a factor of 1.0 aircraft per 1,000 population is to be used to forecast based aircraft for 2005, 1.2 aircraft per

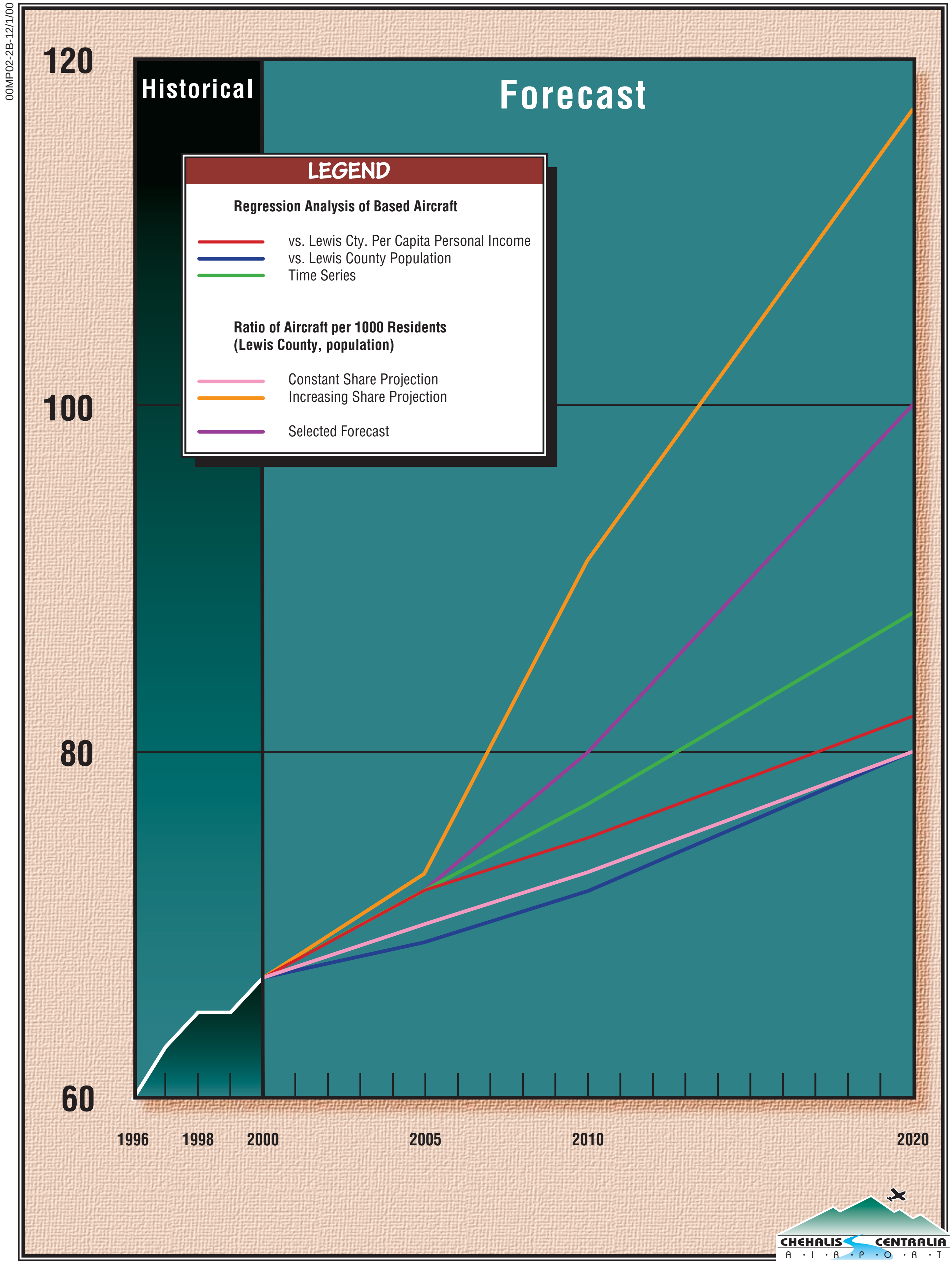


Exhibit 2B
BASED AIRCRAFT FORECASTS

1,000 for 2010, and increasing to 1.4 per 1,000 to be used for 2020. This yields a forecast of 73 based aircraft for the year 2005, 91 aircraft for 2010, and the projection of 117 for the year 2020.

A composite of projections appears to be the most reasonable for the purposes of this Master Plan. These projections are somewhat optimistic beyond the short term, but they allow for consideration of increasing capture of general aviation as awaited hangar and navigational aids become available. In order to formulate a plan which will allow the Governing Board to develop facilities based upon demand, the following planning horizon activity milestones have been established for based aircraft:

- Short Term - 72
- Intermediate Term - 80
- Long Term - 100

BASED AIRCRAFT FLEET MIX PROJECTION

Knowing the aircraft fleet mix expected to utilize the airport is necessary to properly plan facilities that will best serve the level and the type of activities occurring at the airport. The existing based aircraft fleet mix is comprised of single and multi-engine piston-powered aircraft, a turboprop, and a jet.

As discussed previously, the national trend is toward a larger percentage of sophisticated turboprop, jet aircraft, and helicopters in the national fleet. Growth within each based aircraft category at the airport has been determined by comparison with national projections (which reflect current aircraft production) and consideration of local economic conditions.

The projected trend of based aircraft at Chehalis-Centralia Airport includes a growing number of single and multi-engine aircraft. However, growth in business turbojet aircraft is projected for the airport through the planning period, consistent with national trends. The based aircraft fleet mix projection for Chehalis-Centralia Airport is summarized in **Table 2C**.

Currently, single engine aircraft compose the largest segment of aircraft at Chehalis-Centralia Airport. Future based aircraft mix will continue to be dominated by single engine aircraft, but with an increasing percentage of turbine aircraft. The improvement of the airport, combined with a positive economic outlook, will promote increases in operations by higher powered general aviation aircraft. For this reason, all aircraft types, including both turboprop and turbojet aircraft, have been forecast to increase. Although increasing consistently in numbers over the forecast period, single engine based aircraft percentages are forecast to represent less of the total mix in the future.

ANNUAL OPERATIONS

There are two types of operations at an airport: local and 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. Typically, itinerant operations increase with business and commercial use since business aircraft are used primarily to carry people from one location to another.

TABLE 2C
Fleet Mix Forecast

	EXISTING		FORECAST					
Type	2000	%	Short Term	%	Intermediate Term	%	Long Term	%
Single Engine	61	91.0%	64	89.0%	68	86.0%	77	77.0%
Multi-Engine	5	7.5%	5	7.5%	7	8.5%	12	12.0%
Turboprop	1	0.0%	1	1.0%	2	2.0%	6	6.0%
Jet	1	1.5%	1	1.5%	2	2.0%	3	3.0%
Helicopter	0	0.0%	1	1.0%	1	1.5%	2	2.0%
Totals	68	100.0%	72	100.0%	80	100.0%	100	100.0%

Due to the absence of an airport traffic control tower, actual operational counts are not available for Chehalis-Centralia Airport. Instead, only general estimates of aircraft operations are made based on periodic observations. Current annual operations estimates at Chehalis-Centralia Airport have been made by the airport management. For a record of the estimated historical aircraft operations, the FAA 5010-1, Airport Master Record Form, has been consulted.

Projections of annual operations have been developed by examining the number of historical operations per based aircraft for Chehalis-Centralia Airport. Airports with higher training operations (local operations) will have a higher operation per based aircraft ratio, whereas airports with a higher percentage of transient aircraft operations will have a lower ratio. Chehalis has an average number of flight training operations. These are indicated by the figures in **Table 2D**, **General Aviation Operations Forecast**.

Likewise, the FAA projects an increase in aircraft utilization and the number of general aviation hours flown. This projected trend supports future growth in annual operations at Chehalis-Centralia Airport . **Table 2D** presents operational forecasts for each associated planning horizon. For planning purposes, annual operations per based aircraft will be forecast at 650 operations per based aircraft for each associated planning horizon. The operations split is projected to be 45 percent itinerant and 55 percent local operations through the short term, gradually shifting to a 50-50 split in the intermediate term, and 55 percent itinerant to a 45 percent local operations split for the long term projection.

As shown in **Table 2D** general aviation operations have been estimated for the year 2000, in addition to being projected for the short term, intermediate term, and long term.

TABLE 2D
General Aviation Operations Forecast

Year	Itinerant	Local	Total	Based AC	Ops per Based
1980	25,050	26,050	51,100	68	751
1985	16,300	20,000	36,300	43	844
1990	15,600	20,000	35,600	56	636
1995	16,330	21,000	37,330	56	667
2000	18,000	22,000	40,000	68	588
GENERAL AVIATION OPERATIONS FORECAST					
Short Term	21,060	25,740	46,800	72	650
Intermediate Term	26,000	26,000	52,000	80	650
Long Term	35,750	29,250	65,000	100	650

AIR TAXI

The total annual air taxi operations by aircraft operating under Federal Aviation Regulation Part 135, *Operating Requirements: Commuter and On-Demand Operations*, have also been estimated for Chehalis-Centralia Airport.

Air taxi consists of aircraft involved in on demand passenger or small parcel transport. Typical services that qualify as air taxi operations are charter, air ambulance, and small package services.

Although not strictly "public" air taxi operations, private business aircraft operations serve to provide the same function as air taxi aircraft. For the purpose of estimating air taxi operations and the annual instrument approaches upon which these are based, private business aircraft have been included in these calculations.

The Pacific Cataract and Laser Institute is headquartered in Chehalis and bases its four aircraft at Chehalis-Centralia Airport. Additional air taxi operations are performed for the Providence Centralia Hospital and air charter.

These operations make up the growing Part 135 air taxi operations. A conservative estimate of air taxi defined operations would be approximately 25 percent of total itinerant operations for the airfield. The calculations for this segment of the itinerant traffic is summarized in **Exhibit 2C**, **Forecast Summary**.

MILITARY ACTIVITY

Projecting future military use of an airport is complicated by the fact that local missions may change with little notice. However, existing operations and aircraft mix may be confirmed for their impact on facility planning. As indicated by the FAA TAF document, military operations have accounted for limited (210 in 2000) itinerant operations annually. Military operations consist of a range of helicopters. For planning purposes, these operations have been forecast at 300 annual operations through the planning period.

PEAKING CHARACTERISTICS

Many airport facility needs are related to the levels of activity during peak periods. The periods used in developing facility requirements for this study are as follows:

- **Peak Month** - The calendar month when peak aircraft operations occur.
- **Design Day** - The average day in the peak month. This indicator is easily derived by dividing the peak month operations by the number of days in the month.
- **Busy Day** - The busy day of a typical week in the peak month.
- **Design Hour** - The peak hour within the design day.

Without an airport traffic control tower, adequate operational information is not available to directly determine peak general aviation operational activity at the airport. Typically, the peak month for activity at general aviation airports approximates 10 to 15 percent of the airport's annual operations. For planning purposes, peak month operations have been estimated as 13 percent of annual operations. Based on peaking characteristics from similar airports, the typical busy day was determined by multiplying the design day by twenty percent of weekly operations during the peak month, or 1.4. Design hour operations were determined using 20 percent of the design day operations. The general aviation peaking characteristics are summarized in **Table 2E, Peak Operations Forecast**.

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." Annual instrument approaches are included in forecasting for purposes of defining certain navigational aid requirements. Records are not kept at Chehalis-Centralia Airport; therefore an estimate has been developed for existing AIAs from which forecasts have been developed for the future.

TABLE 2E
Peak Operations Forecasts
Chehalis-Centralia Airport

	2000	Short Term	Intermediate	Long Term
Annual Operations	40,000	46,800	52,000	65,000
Peak Month	5,200	6,084	6,760	8,450
Busy Day	243	284	315	394
Design Day	173	203	225	282
Design Hour	35	41	45	56

All Part 135 operators file an IFR flight plan, even though cancellation of IFR flight plans is common upon reaching an initial approach fix. In the case of Chehalis-Centralia Airport flight plans are filed to the closest airport with an instrument approach, then continued under VFR flight rules.

With weather conditions conducive to low visibilities, it has been assumed that a total of 30% of the annual Part 135 approaches would be performed as instrument approaches (AIAs). The AIAs have been summarized in **Exhibit 2C, Forecast Summary**.

SUMMARY

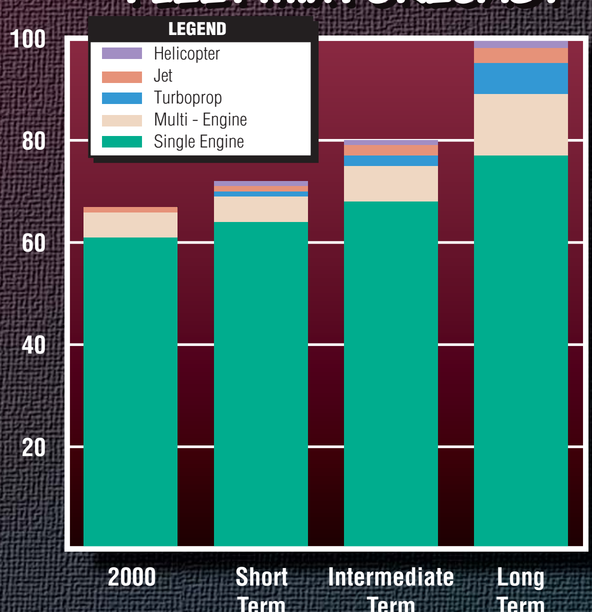
This chapter has outlined the various aviation demand levels anticipated for approximately the next 20 years at Chehalis-Centralia Airport. Long term growth at the airport will be influenced by many factors, including: the local economy, the need for a viable aviation facility in the immediate area, and trends in general aviation at the national level.

The next step in the master planning process will be to assess the capacity of existing facilities, their ability to meet forecast demand, and to identify changes to the airfield and/or landside facilities which will create a more functional aviation facility. The aviation demand forecasts for Chehalis-Centralia Airport through the long term planning horizon are summarized on **Exhibit 2C**.

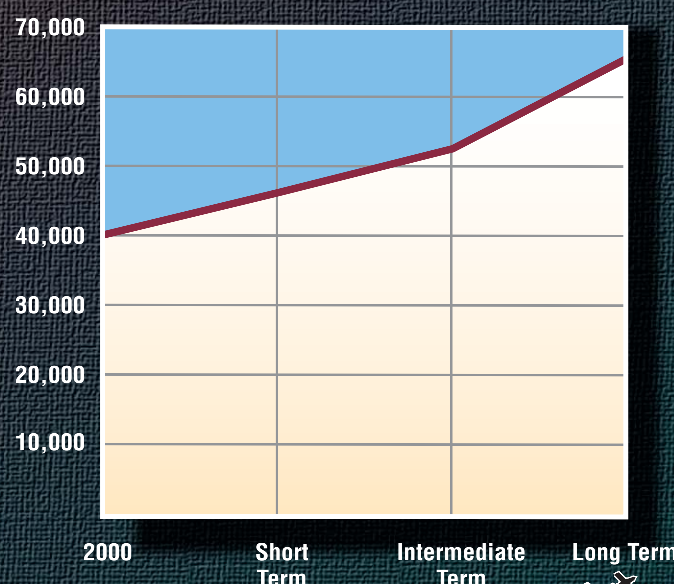
FORECAST SUMMARY

	Historical	Forecasts		
CATEGORY	2000	Short Term	Intermediate Term	Long Term
Annual Operations				
Itinerant				
AirTaxi	4,500	5,265	6,500	8,940
General Aviation	13,290	15,495	19,200	26,510
Military	210	300	300	300
Total Itinerant	*18,000*	*21,060*	*26,000*	*35,750*
Local	22,000	25,740	26,000	29,250
Total Operations	***40,000***	***46,800***	***52,000***	***65,000***
AIAs	**N/A**	**1,600**	**2,000**	**2,700**
Based Aircraft				
Single Engine	61	64	68	77
Multi-engine	5	5	7	12
Turboprop	0	1	2	6
Jet	1	1	2	3
Helicopter	0	1	1	2
Total Based Aircraft	***67***	***72***	***80***	***100***

FLEET MIX FORECAST



OPERATIONS FORECAST



CHEHALIS CENTRALIA AIRPORT

Exhibit 2C
FORECAST SUMMARY

Facility Requirements

To properly plan for the future of Chehalis-Centralia Airport, it is necessary to translate forecast aviation demand into the specific types and quantities of facilities that will serve this identified demand. This chapter uses the results of the forecasts conducted 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, general aviation terminal building, aircraft parking apron, fueling, automobile parking and access) facility requirements.

Chapter Three will 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** to determine the most cost-effective and efficient means for implementation.

AIRFIELD REQUIREMENTS

Airfield requirements include those facilities related to the arrival and departure of aircraft. These facilities are comprised of the following items:

- Runways
- Taxiways
- Airfield Marking and Lighting
- Navigational Aids

The selection of the appropriate FAA design standards for the development of the airfield facilities is based primarily upon the characteristics of the aircraft which are expected to use the airport. The definitive characteristics are the **approach speed** and the wing-span of the **critical design aircraft**. The

critical design aircraft is defined as the most demanding category of aircraft which conducts 500 or more operations per year.

CRITICAL AIRCRAFT

The Federal Aviation Administration has established criteria for use in the sizing and design of airfield facilities. These standards include criteria which relate to aircraft size and performance. According to *Federal Aviation Administration Advisory Circular (AC) 150/5300-13, Change 6, 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 five approach categories used in airport planning are as follows:

Category A: Speeds of less than 91 knots.

Category B: Speeds of 91 knots or more, but less than 121 knots.

Category C: Speeds of 121 knots or more, but less than 141 knots.

Category D: Speeds of 141 knots or more, but less than 166 knots.

Category E: Speeds of 166 knots or greater.

The second basic design criteria relates to aircraft size. The Airplane Design Group **(ADG)** is based upon wingspan. The six 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.

Together, approach category and ADG correspond to a coding system whereby airport design criteria are related to the operational and physical characteristics of the aircraft intended to operate at the airport. This code, the 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 and taxilanes. **Exhibit 3A** provides a listing of typical aircraft and their associated ARC. **Table 3A** indicates a listing by their Airport Reference Code (ARC) of typical aircraft of the type that might be expected to use an airport similar to Chehalis-Centralia Airport. Information is also given on approach speed and wingspan - the characteristics that determine ARC.

00MP02-3A-12/18/00

A-I

Beech Baron 55
Beech Bonanza
Cessna 150
Cessna 172
Piper Archer
Piper Seneca

C-I, D-I

Lear 25, 35, **55**
Israeli Westwind
HS 125

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

Gulfstream II, **III**, IV
Canadair 600
Canadair Regional Jet
Lockheed JetStar
Super King Air 350

B-II
less than 12,500 lbs.

Super King Air 200
Cessna 441
DHC Twin Otter

C-III, D-III

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, II
over 12,500 lbs.

Super King Air 300
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
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.

CHEHALIS CENTRALIA AIRPORT

Exhibit 3A
AIRPORT REFERENCE CODES

TABLE 3A
Representative General Aviation Aircraft by ARC

Airport Reference Code	Typical Aircraft	Approach Speed	Wingspan (feet)	Maximum Takeoff Weight (lbs)
	Single Engine Piston			
A-I	Cessna 150	55	32.7	1,600
A-I	Cessna 172	64	35.8	2,300
A-I	Beechcraft Bonanza	75	37.8	3,850
	Turboprop			
A-II	Cessna Caravan	70	52.1	8,000
	Multi Engine Piston			
B-1	Beechcraft Baron	96	37.8	5,500
B-1	Piper Navajo	100	40.7	6,200
B-1	Cessna 421	96	41.7	7,450
	Turboprop			
B-1	Mitsubishi MU-2	119	39.2	10,800
B-1	Piper Cheyenne	119	47.7	12,050
B-1	Beechcraft King-Air B-100	111	45.8	11,800
	Business Jets			
B-1	Cessna Citation I	108	47.1	11,850
B-1	Falcon 10	104	42.9	18,740
	Turboprop			
B-II	Beechcraft Super King Air	103	54.5	12,500
B-II	Cessna 441	100	49.3	9,925
	Business Jets			
B-II	Cessna Citation II	108	51.7	13,330
B-II	Cessna Citation III	114	53.5	22,000
B-II	Cessna Citation Bravo	114	52.2	15,000
B-II	Cessna Citation Excel	114	55.7	19,400
B-II	Cessna Citation Ultra	109	52.2	16,500
B-II	Falcon 20	107	53.5	28,660
B-II	Falcon 900	100	63.4	45,500
	Business Jets			
C-1	Lear 55	128	43.7	21,500
C-1	Rockwell 980	137	44.5	23,300
C-1	Lear 25	137	35.6	15,000
	Turboprop			
C-II	Rockwell 980	121	52.1	10,325
	Business Jets			
C-II	Canadair Challenger	125	61.8	41,250
C-II	Gulfstream III	136	77.8	68,700
	Business Jets			
D-I	Lear 35	143	39.5	18,300
D-II	Gulfstream II	141	68.8	65,300
D-II	Gulfstream IV	145	78.8	71,780

The FAA advises designing all elements to meet the requirements of the airport's most demanding, or critical aircraft. As discussed above, **this is the aircraft, or family of aircraft, that performs greater than 500 itinerant operations per year**. Once the ARC of the critical aircraft is determined, application of the appropriate design criteria can begin.

As indicated in **Chapter Two**, Chehalis-Centralia Airport is presently utilized by aircraft ranging from small single-engine aircraft to more sophisticated turboprop and jet aircraft. The most critical aircraft currently based at the airport with 500 or more annual operations is the Citation Jet (525), which is privately owned by Pacific Cataract and Laser Institute (PCLI). PCLI also owns two Cessna 340 aircraft and a Piper Cheyenne 400LS. Its approach speed and design group utilizes a minimum B-I facility.

The future mix of aircraft can be expected to include a larger percentage of corporate aircraft from Category B and C, Group II and III. Increased corporate aircraft utilization is typical at general aviation airports serving growing population and employment centers. The fueling records for 1999 indicate that the highest approach speed category aircraft to use Chehalis was a Lear 35 (ARC D-1). Once utilized only by larger corporations, corporate aircraft (especially jets) have been increasingly utilized by a wider variety of companies. According to FAA statistics, active general aviation turbine aircraft are expected to increase on an average annual basis of 2.2 percent over the next decade.

As companies shift away from downtown locations to suburban areas and smaller communities, utilization of corporate aircraft has become a cost-effective manner in which to transport executives and other personnel. The cost benefit can be attributed to the newer, fuel efficient jet aircraft which can close the expense gap between the seat on the corporate jet versus the seat on the commercial carrier.

The growth generated industrial/ commercial trade has and will likely continue to contribute to an increase in corporate aircraft activity at the Chehalis-Centralia Airport over the planning period. Thus, future facility planning must include the potential for the airport to be utilized by a wide range of business jets.

The previous chapter indicated that as many as three business jets are forecast to be based at the airport within the planning period. Thus, the combination of operations by based business jet aircraft combined with itinerant corporate jet operations will determine the critical aircraft for the airport.

According to FAA general aviation business jet aircraft data, the Cessna and Lear series jet aircraft comprise the largest portion of active business jet aircraft. Therefore, the most demanding of these aircraft should be considered. The Lear 35 and 55 are classified as ARC D-I and C-I, respectively. The series of Cessna Citation aircraft fall within ARC B-I and B-II. Because it can be expected that a mix of these aircraft will utilize the airport more than 500 times annually, airport design standards should, at a minimum, conform to FAA criteria for Approach Category B and Design Group II and be evaluated regarding design to ARC C-II standards.

The airfield facility requirements outlined in this chapter correspond to the design standards described in the *FAA's Advisory Circular 150/5300-13, Airport Design*. The following airfield facilities are outlined to describe the scope of facilities that would be necessary to accommodate the airport's role throughout the planning period.

RUNWAYS

The adequacy of the existing runway system at Chehalis-Centralia Airport has been analyzed from a number of perspectives, including runway orientation, airfield capacity, runway length, and pavement strength. Using this information, requirements for runway improvements have been determined for the airport.

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. The capacity of the airport's one runway system is approximately 210,000 annual operations.

FAA Order 5090.3B Field Formulation of the National Plan of Integrated Airport Systems (NPIAS) indicates that improvements should be considered when operations reach 60 percent of the airfield's annual service volume (ASV). Even if the projected long range planning horizon level of operations comes to fruition prior to projections, the airfield's ASV will not exceed the 60 percent level by the long range planning horizon. Therefore, no additional airfield improvements aimed at increasing airfield capacity will be required for the planning period.

Runway Orientation

The current airfield configuration includes the single Runway 15-33, which is oriented in a northwest/southeast manner. Ideally the primary runway at an airport should be oriented as close as practical in the direction of the predominant winds to maximize the runway's usage. This minimizes the percent of time that a crosswind could make the preferred runway inoperable.

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

Wind data for Chehalis-Centralia Airport is being currently updated. The 1992 Airport Master Plan indicates that the single Runway 15-33 is adequate to meet 96 percent coverage for 12 mph crosswinds and 99 percent at 15 mph.

The analysis indicates that Runway 15-33 provides adequate crosswind coverage for ARC A-I, B-I, and B-II aircraft. The updated wind analysis will be depicted on **Exhibit 3B, Wind Roses**.

Runway Length

The determination of runway length requirements for the airport are based on five primary factors:

- Critical aircraft type expected to use the airport.
- Stage length of the longest nonstop trip destinations.
- Mean maximum daily temperature of the hottest month.
- Runway gradient.
- Airport elevation.

As stated, an analysis of the existing and future fleet mix indicates that business jets will be the most demanding aircraft at Chehalis-Centralia Airport. The typical existing business aircraft range from the Cessna Citation I and the Citation Jet, with minimal runway length requirements, to the Citation III and the Lear Jet models 25 and 35, requiring longer runway lengths. Typical business jets were identified in **Table 3A**.

Aircraft operating characteristics are affected by three of the five primary factors above. They are the mean maximum daily temperature of the hottest month, the airport's elevation, and the gradient of the runway. For the purposes of weather computations, the closest weather recording station, Olympia, Washington, has been used. The mean maximum daily temperature of the hottest month of the year for Olympia is 77.1 degrees Fahrenheit. The airport elevation at Chehalis is 174 feet MSL. The effective gradient for Runway 15-33 is 0.12 percent.

The runway lengths for Chehalis-Centralia Airport have been determined by incorporating the variables stated above into the FAA airport design computer program, *Airport Design, Version 4.2D* based upon *Advisory Circular (AC) 150/5300-13, Airport Design*. **Table 3B** outlines the runway length requirements for various classifications of aircraft as calculated by this program.

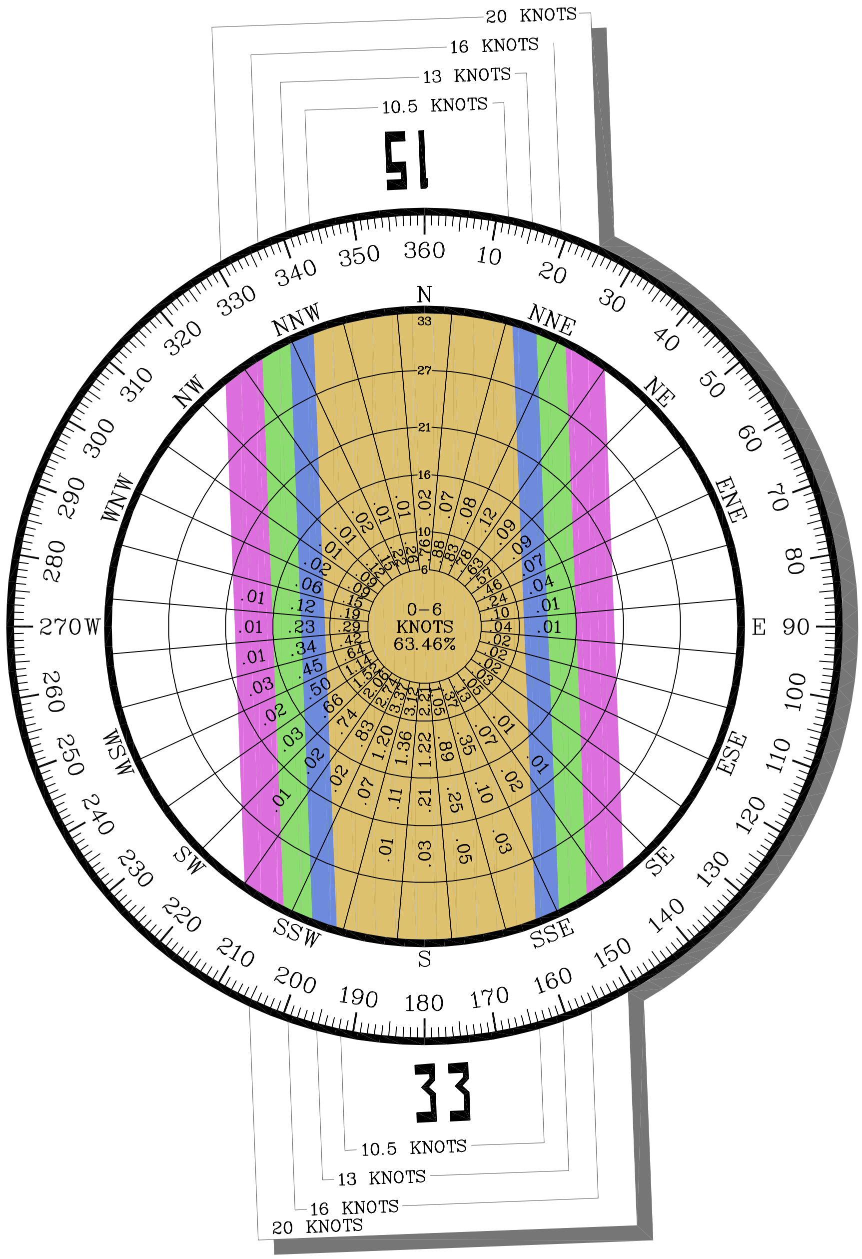
Upon analysis of the current and forecasted aircraft fleet mix projected through the long range planning period, it has been determined that Chehalis-Centralia Airport should be designed to accommodate B-II category aircraft. The B-II designation enables the primary runway, under given variables of temperature, elevation, gradient and 500 mile trip length, to accommodate all "small aircraft with 10 or more passenger seats". As calculated for Chehalis-Centralia Airport the recommended ARC B-II runway length is 4,070 feet. The current length of Runway 15-33 is 5,000 feet, meeting this design group standard.

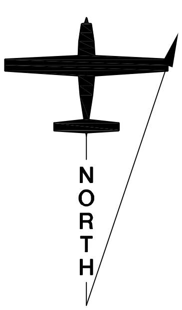
Given the current ARC for the airport (B-I) and the projected ultimate ARC (B-II), large aircraft are not envisioned as making up a high percentage of the fleet. Even so, many of the C-II business jet aircraft will be able to use Chehalis-

00MP02-3B-03/09/01

ALL WEATHER WIND COVERAGE

Runways	10.5 Knots	13 Knots	16 Knots	20 Knots
Runway 15–33	*97.56%*	*98.90%*	*99.86%*	*99.98%*





Magnetic Variance
18° 39' East (March 2001)
Annual Rate of Change
4.94' West (March 2001)

SOURCE:
NOAA National Climatic Center
Asheville, North Carolina
Olympia Airport
Olympia, Washington

OBSERVATIONS:
78,319 All Weather Observations
1991–2000

CHEHALIS CENTRALIA AIRPORT

Exhibit 3B
WINDROSE

Centralia's facilities. The required runway length for category C-II aircraft should be able to accommodate "75 percent of aircraft at 60 percent useful load". Based on the mean high temperature, airport elevation, and gradient the runway length requirement is 5,280 feet. As the runway length requirement is proportional to the temperature, 5,000 feet of runway will be of sufficient length to handle C-II aircraft for much of the year.

TABLE 3B
Runway Length Requirements
Chehalis-Centralia Airport

AIRPORT AND RUNWAY DATA	
Airport elevation	174 feet
Mean daily maximum temperature of the hottest month	77.10 F
Maximum difference in runway centerline elevation	5 feet
Length of haul for airplanes of more than 60,000 pounds	500 miles
Wet and slippery runways	
RUNWAY LENGTHS RECOMMENDED FOR AIRPORT DESIGN	
Small airplanes with less than 10 passenger seats	
75 percent of these small airplanes	2,430 feet
95 percent of these small airplanes	2,970 feet
100 percent of these small airplanes	3,530 feet
Small airplanes with 10 or more passengers seats	4,070 feet
Large airplanes of 60,000 pounds or less	
75 percent of business jets at 60 percent useful load	5,280 feet
75 percent of these large airplanes at 90 percent useful load	6,770 feet
100 percent of these large airplanes at 60 percent useful load	5,500 feet
100 percent of these large airplanes at 90 percent useful load	7,370 feet
Airplanes of 60,000 pounds or more	5,070 feet

REFERENCE: FAA's airport design computer software utilizing Chapter Two of *AC 150/ 5325-4A, Runway Length Requirements for Airport Design*

Runway Safety Areas

Consideration of runway length requirements is but one factor among other design criteria established by the FAA. FAA design criteria regarding runway object free area (OFA), runway safety area (RSA), and height clearances must also be examined.

The runway OFA is defined in FAA Advisory Circular 150/5300-13 and is concurrent with Change 6 (the latest update to the circular), as an area centered on the runway extending out in accordance to the critical aircraft design category utilizing the runway. The OFA must provide clearance of all ground based objects protruding above the runway safety area (RSA) edge elevation, unless the object is fixed by function serving air or ground navigation. **Table 3C** presents airfield planning design standards for Runway 15-33. The following chapter will examine compliance with these standards.

For ARC B-II OFA design standards at Chehalis-Centralia Airport, FAA criteria call for a cleared and graded area 500 feet wide (centered on the runway) extending 300 feet beyond the runway. By comparison the next highest ARC category, C-II, would require 800 feet in width and 1,000 feet in length for the cleared area. The airport currently meets only the lesser of these design standards.

The RSA is also centered on the runway extending out a specific distance depending on 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 supporting aircraft, capable of accommodating fire and rescue vehicles, and free of obstacles not fixed by navigational purpose.

In order to meet design criteria for ARC B-II aircraft at Chehalis, the cleared and graded RSA will need to be 150 feet wide (centered on the runway) and extend 300 feet beyond each runway end. Likewise, RSA standards for ARC C-II, would require a cleared area 800 feet on each side of the runway center-line, extending 1,000 feet beyond each runway end.

Runway 15-33 currently provides adequate area for the required ARC B-II OFA and RSA standards. Clearly C-II standards would be difficult to attain. (While it may be difficult for the airport to attain this standard, it does not preclude operations by aircraft in this category.) In **Chapter Four, Alternatives** the applied standards will be depicted graphically.

Runway Width

Runway 15-33 is currently 150 feet wide. FAA design criteria calls for a runway width of 75 feet to serve aircraft in approach category B-II and 100 feet for C-II/D-II.

Runway Strength

As previously mentioned, the pavement for Runway 15-33 is strength rated at 30,000 pounds single and double wheel gear loading (SWL/DWL) and 85,000 pounds for dual tandem wheel loading (DTWL).

Facility planning must consider the possibility of a greater number of higher performance business jets basing or utilizing the airport in the future. In acknowledging that Chehalis will likely remain a B-II facility, Runway 15-33 meets current and future runway strength needs. It is the responsibility of airport management to ensure that pavement capacities are not exceeded by itinerant aircraft which may fall outside of this design standard.

TABLE 3C
Airfield Planning Design Standards (Ultimate ARC B-II)
Chehalis-Centralia Airport

	Runway 15-33			
DESIGN STANDARDS				
Runways				
Length (ft.)	4,070			
Width (ft.)	75			
Pavement Strength (lbs.)				
Single Wheel (SWL)	30,000			
Dual Wheel (DWL)	30,000			
Dual Tandem (DTL)	85,000			
Shoulder Width (ft.)	10			
Runway Safety Area				
Width (feet)	150			
Length Beyond Runway End (ft.)	300			
Object Free Area				
Width (ft.)	500			
Length Beyond Runway End (ft.)	300			
Obstacle Free Zone				
Width (ft.)	400			
Length Beyond Runway End (ft.)	200			
Taxiways				
Width (ft.)	40			
OFA Width (ft.)	131			
Distance to Fixed or Movable Object (ft.)	58			
Runway Centerline to:				
Parallel Taxiway Centerline (ft.)	240			
Aircraft Parking Area (ft.)	250			
Building Restriction Line (ft.)				
20 ft. Height Clearance	390			
33 ft. Height Clearance	481			
Runway Protection Zones	**15**		**33**	
	Not lower than 1 mile	Not lower than 3/4 mile	Not lower than 1 mile	Not lower than 3/4 mile
Inner Width (ft.)	500	1,000	500	1,000
Outer Width (ft.)	700	1,510	700	1,510
Length (ft.)	1,000	1,700	1,000	1,700
Approach Slope	20:1	20:1	20:1	20:1

TAXIWAYS

Taxiways are constructed primarily to facilitate aircraft movements to and from the runway system. Some taxiways are necessary simply to provide access between the aprons and runways, whereas other taxiways become necessary to facilitate safe and efficient separation of air traffic on the airfield.

The Washington State Department of Transportation, Aviation Division updates the *Airport Pavement Management Program* periodically. In August, 2000 this program completed an assessment for the Chehalis-Centralia Airport. The results are compiled in the Final Report prepared by Pavement Consultants, Inc. and detail the pavement needs, including taxiways. This critical analysis should be used when preparing an annual and/or five year Capital Improvements Plan for the airport.

As detailed in **Chapter One**, Runway 15-33 is served by a partial parallel taxiway system, and four entrance/exit taxiways. Serving to route traffic in a predominantly parallel fashion, Taxiway A varies in centerline offset from the runway. The centerline of the parallel taxiway is situated west of the runway centerline, varying from approximately 225 feet to 500 feet, as the taxiway angles southwest to the hangar/tie down areas. The B-II distance separation standard between taxiway and runway centerlines is 240 feet. An upgrade to C-II separation standards would not change the 240 foot separation requirement, even with 3/4-mile visibility minimums. The airfield also maintains a series of older taxiways that serve to interconnect main taxiways and apron areas.

As referenced in **Chapter One**, **Exhibit 1B, Airside Facilities**, the width of the partial parallel taxiway A is 50 feet. Taxiway A2, the midfield connector, is 30 feet in width. Taxiway A3 is 40 feet wide. Taxiway A4 is 140 feet wide, as the remainder of the old crosswind runway. Taxiway A5, section 1 is 45 feet wide, while section 2 is 50 feet wide. Taxiway CL is 45 feet wide. The older taxiways 01, 02, 03, and 05, sections 1,2 and 3 vary in width from 15 to 18 to 20 feet. Older taxiway 04, sections 1 and 2 have been improved in 1997 to 35 feet in width. Older taxiway 06 is 30 feet wide. In order to accommodate Design Group II aircraft, FAA criteria calls for a taxiway width of 35 feet. These surfaces are also depicted in **Appendix C**.

In order to accommodate all aircraft currently based and expected at Chehalis-Centralia Airport in the future, all taxiways serving Runway 15-33 should be a minimum of 35 feet wide. The following chapter will examine the adequacy of the existing taxiway system.

NAVIGATIONAL AIDS, LIGHTING, AND MARKING

Airport and runway navigational aids are based on FAA recommendations as depicted in *DOT/FAA Handbook 7031.2B, Airway Planning Standard Number One* and *FAA Advisory Circular 150/5300-2D, Airport Design Standards, Site Requirements for Terminal Navigation Facilities.*

Navigational aids provide two primary services to airport operations, precision guidance to a specific runway and/or non-precision guidance to a runway or the airport itself. The basic difference between a precision and non-precision navigational aid is that the former provides electronic descent, alignment (course), and position guidance, while the non-precision navigational aid provides only alignment and position location information. The necessity of such equipment is usually determined by design standards predicated on safety considerations and operational needs. The type, purpose and volume of aviation activity expected at the airport are factors in the determination of the airport's eligibility for navigational aids.

Global Positioning System

The advancement of technology has been one of the most important factors in the growth of the aviation industry in the twentieth century. Much of the civil aviation and aerospace technology has been derived and enhanced from the initial development of technological improvements for military purposes. The use of orbiting satellites to confirm an aircraft's location is the latest military development to be made available to the civil aviation community.

Global positioning systems (GPS) use two or more satellites to derive an aircraft's location by a triangulation method. The accuracy of these systems has been remarkable, with initial degrees of error of only a few meters. As the technology improves, it is anticipated that GPS may be able to provide accurate enough position information to allow Category II and III precision instrument approaches, independent of any existing ground-based navigational facilities. In addition to the navigational benefits, it has been estimated that GPS equipment will be much less costly than existing precision instrument landing systems.

The FAA is proceeding with efforts to establish procedures that include vertical guidance and have minimums of approximately 350 feet (height above touchdown) and one-mile visibility. Procedures using GPS for traditional precision minimums (200 feet/one-mile) will be delayed.

Currently, Chehalis-Centralia Airport has no instrument approach. However, a GPS Runway 15 approach is under review by the FAA. This would allow use of the primary runway during instrument weather conditions.

Recent correspondence from FAA to Chehalis-Centralia Airport, in January 2001, regarding the potential construction of a Home Depot franchise adjacent to Runway 15-33, provided some insight in the capability of the airport to improve its landing approach. An area navigation (RNAV) instrument procedure with vertical guidance (IPV) is possible if certain conditions are met:

- Increase in decision altitude (by 30-50 feet) due to possible penetration of the obstacle clearance surface during a missed approach;
- Home Depot building would need obstruction lights; and

- Chehalis-Centralia Airport would be required to get a local altimeter setting source to use precision RNAV procedures. Only non-precision approaches would be available due to the lack of a local altimeter setting.

Local altimeter settings would be available to pilots if the airport were to install an automated weather observing system (AWOS). These systems cost approximately $100,000 (installed), depending upon availability of power to the site. The systems are eligible for 90% federal reimbursement under the Airport Improvement Program (AIP).

Airport Visual Approach Aids

Visual glide slope indicators are a system of lights located at the side of the runway which provide visual descent guidance information during an approach to the runway. Currently, Runway 15 is equipped with a four-box precision approach path indicator (PAPI-4). Runway 33 is equipped with a two-box visual approach slope indicator (VASI-2). The four-box systems are preferred for use by business jet aircraft. For the highest efficiency during instrument weather conditions the PAPI-4 is preferred.

Airfield Lighting And Marking

Runway identification lighting provides the pilot with a rapid and positive identification of the runway end. The most basic system involves runway end identifier lights (REILs).

Based on the forecast need to plan for instrument approach capability, it will be necessary to plan for the installation of an approach lighting system and the possible upgrade to the runway edge lighting to high intensity (refer to Table A16-1B in Appendix B).

The taxiway intersections at Chehalis-Centralia Airport are lighted by medium intensity taxiway lighting (MITL). The remaining taxiway system uses reflectors. The current basic markings on Runway 15-33 should be ultimately upgraded to nonprecision marking to accommodate the planned approaches.

The airport has a lighted wind cone and a segmented circle which provide pilots with information about wind conditions and traffic pattern circulation. In addition, an airport beacon assists in identifying the airport from the air at night. Each of the facilities should be maintained in the future.

LANDSIDE REQUIREMENTS

Landside facilities are those necessary for handling of aircraft, passengers, and cargo while on the ground. These facilities provide the essential interface between the air and ground transportation modes. These areas will be subdivided into two parts: general aviation and air cargo facilities and support facilities. The capacities of the various components of each area were examined in relation to projected demand to identify future landside facility needs.

GENERAL AVIATION FACILITIES

The purpose of this section is to determine the space requirements during the planning period for the following types of facilities normally associated with general aviation terminal areas:

- Hangars
- Aircraft Parking Apron
- General Aviation Terminal
- Vehicle Access
- Vehicle Parking
- Fuel

Hangars

The space required for hangar facilities is dependent upon the number and type of aircraft expected to be based at the airport. Other variables may also influence hangar use. Weather conditions at Chehalis-Centralia Airport are likely to encourage most based aircraft owners to prefer hangar space to outside tie-downs.

The following tables depicting forecast need are calculated based upon an analysis of existing general aviation facilities and the current and future demand at Chehalis-Centralia Airport. An initial overview of existing aircraft storage verifies the preference for individual hangars. This is consistent with an overall trend in aviation toward ownership of higher performance aircraft and, many times, of multiple aircraft ownership. Because of this preference, it is necessary to determine what percentages of these aircraft would utilize conventional-type and executive hangars in addition to individual T-Hangars.

T-Hangars are relatively inexpensive to construct and provide the aircraft owner more privacy and greater ease in obtaining access to the aircraft. The principal uses of conventional hangars at general aviation airports are for large and/or multiple aircraft storage, storage during maintenance, and for housing fixed base operator activities. Executive hangars provide a storage area typically larger than T-Hangars allowing for storage of larger aircraft or multiple small aircraft.

The analysis of hangar storage at Chehalis-Centralia Airport concludes that all but 13 based aircraft are stored in the five sets of T-hangars (including one shade and one open face set of T-hangars), one conventional hangar, and seven executive hangars. The combined total accounts for approximately 63,000 square feet of hangar storage space.

A planning standard of 1,200 square feet per based aircraft stored in T-hangars has been used to determine future T-hangar requirements. A standard of 1200 square feet has also been applied to each position that would be available within a conventional hangar. Executive hangar requirements were calculated based on a 2,500 square feet standard per aircraft position. Additional hangar storage square footage has been calculated for maintenance areas based on 15 percent of the total storage space needs. These figures were then applied to the aircraft to be hangared as determined by the based aircraft forecasts. These figures are presented in **Table 3D.**

TABLE 3D Aircraft Storage Hangar Requirements			Future Requirements		
	Available	Current Need	Short Term	Intermediate Term	Long Term
Aircraft to be Hangared		68	72	80	100
T-Hangar Positions	39	43	45	48	54
Executive Hangar Positions	13	12	14	18	28
Conventional Hangar Positions	2	13	14	15	18
Hangar Area Requirements					
T-Hangar Area (s.f.)	29,250	51,200	53,800	57,100	64,700
Executive Hangar Storage Area	18,900	23,100	25,700	35,200	61,000
Conventional Hangar Storage Area	7,200	16,400	17,400	19,300	24,300
Total Maintenance Area	7,500	11,400	12,200	14,300	19,000
Total Hangar Area (s.f.)	62,850	102,100	109,100	125,900	169,700

From the analysis in **Table 3D**, it is apparent that the existing hangar positions do not meet current demands. Therefore, short through long term facility planning may be determined to include all three hangar types. It should be noted that the trend toward use of executive hangars in lieu of conventional style hangars may allow for a shift of the allotted square footages accordingly. Likewise, executive positions that appear in the table as available currently and for the short term, may be reserved solely for the use of the private lessees and unavailable for general use.

Aircraft Parking Apron

A parking apron should be provided, at a minimum, for based aircraft not stored in hangars and maintenance operations, as well as transient aircraft. At the present time, there are 69 tiedowns indicated on the current Airport Layout Plan for a total of 22,000 square yards of apron space.

Total apron area requirements were determined by applying a planning criterion of 600 square yards for itinerant single and multi engine piston aircraft, 1200 square yards for itinerant and/or local jet aircraft, and 360 square yards for local piston aircraft. The results of this analysis are presented in **Table 3E, Aircraft Parking Apron Requirements.**

Table 3E Aircraft Parking Apron Requirements	Available	Short Term	Intermediate Term	Long Term
Single, Multi-engine Transient Aircraft Positions		18	24	33
Apron Area (s.y.)		10,800	14,400	19,800
Jet Transient		2	2	3
Apron Area (s.y.)		2,400	2,400	3,600
Locally-Based Aircraft Positions		12	14	17
Apron Area (s.y.)		4,320	5,040	6,120
Total Positions		32	40	53
Total Apron Area (s.y.)	22,000	17,520	21,840	29,520

Based on the available 22,000 square yards of apron space, additional aircraft apron area will be needed only in the long term. An examination of the fuel reports for Chehalis indicate moderate itinerant helicopter activity. Parking needs for several itinerant helicopters should also be accommodated.

General Aviation Terminal Facilities

General aviation terminal facilities have a variety of functions and, therefore, space needs. Building space is required for passenger waiting, the pilot's lounge and flight planning area, concessions, management, storage and various other needs. At Chehalis-Centralia Airport the FBO and airport management functions out of two separate facilities. The offices use an existing 1,250 square foot hangar space at the end of hangar building D. The FBO is combined with the maintenance facility south of the fuel area. The space dedicated to FBO functions within this building is approximately 800 square feet.

The selected methodology used to estimate general aviation terminal facility needs was based upon recommendations from *FAA Advisory Circular 150/5300-13* and uses the design hour number of passengers to estimate expected facility need. **Table 3F, General Aviation Terminal Area Facilities** indicates that a planning average of 18 itinerant passengers per design hour in the short term, increasing to 31 passengers by the long term, was multiplied by 90 square feet to determine an approximate amount of square feet of terminal building space that will be needed.

TABLE 3F General Aviation Terminal Area Facilities Chehalis-Centralia Airport	Available	Short Term	Intermediate Term	Long Term
General Aviation Design Hour Itinerant Passengers	16	18	23	31
General Aviation Building Space (s.f.)	2,050	1,600	2,100	2,800

AIR CARGO

Air cargo is a small but growing sector of the airport mix of commercial aircraft. For this reason air cargo operations considered for the Chehalis-Centralia Airport for the short, intermediate, and long terms should respond to the demand for facilities to accommodate a feeder status of smaller type aircraft that fall within ARC B-II, such as Cessna Caravans, the Beechcraft 1900 and Beechcraft King Air. The feeders would likely shuttle cargo from Chehalis and Centralia to Seattle, Yakima, Spokane, and Portland.

The short and intermediate term facility requirement projections would already be inclusive of the short and intermediate term needs for air cargo apron space. Careful evaluation of the rate of the growth and demand for air cargo will determine the long term airport facility needs. Long term needs may include a sorting and dock facility, hangars, and increased apron area.

VEHICLE ACCESS

Direct access to Chehalis-Centralia Airport is available from Interstate 5, located immediately east of the airport. The airport is easily accessible from the interstate exit and the frontage road, Louisiana Avenue. Commercial uses are constructed at the exit, on both privately owned property and on leased airport property.

To access the airport entrance, vehicles must drive around the south end of the airport on Mount St. Helens Drive, to the west side onto Airport Road, then over the levee at the entrance. A new access road at the south end of the airport has been in the planning for several years, enabling closer access to hangars and parked aircraft.

A new airport access road should be completed ultimately, creating access to each area of the airport. At some point Mount St. Helens Drive and Airport Road will need realignment and typical road improvements.

VEHICLE PARKING

Vehicle parking demands have been determined for Chehalis-Centralia Airport. Space determinations were based on an evaluation of the existing airport use as well as the industry standards.

Automobile parking spaces required to meet general aviation demand were calculated by adding the hangar and terminal areas of existing, short term, intermediate term, and long term. The standard of one vehicle space per 1,000 square feet of space was applied. Parking requirements are summarized in **Table 3G**. Based on the availability of approximately 30 parking spaces, the table indicates a need currently and throughout the planning period.

TABLE 3G
Vehicle Parking Requirements

	Available Need	Short Term	Intermediate Term	Long Term
Hangar Area	62,850	109,100	125,900	169,700
Terminal Area	2,600	1,600	2,100	2,800
Total Area	65,450	110,700	128,000	172,500
Parking Spaces (1 space/1000 sq. ft.)	65	111	128	173
Total Area (400 sq. ft./space)	26,000	44,400	51,200	69,200

FUEL STORAGE

Fuel storage at Chehalis-Centralia Airport includes two below ground fuel storage tanks. These store 6,000 gallons each of Jet A and 100 Low Lead (LL) fuel. The self serve pumps allow 24 hour self service.

The future fuel storage requirements analysis takes into consideration both 1999 fuel sales and the percent increase in aviation activity as forecast for Chehalis-Centralia Airport. **Table 3H** presents peak month fuel sales at the airport during 1999 and projects peak future usage in the short, intermediate, and long term. From the figures shown 100LL fuel sales exceed bi-weekly storage capability during the peak period by 2,300 gallons. To be able to meet peak demand, the airport would need to be able to store 8,300 gallons, especially during the peak summer months. The airport should consider adding an additional fuel tank for 100 LL during the planning period.

Jet fuel storage needs are currently being met and are projected to be met through the long term by the available storage capability. The forecast fleet mix projects a doubling of locally based jets. Should this increase in based jet aircraft translate to a doubling of JetA fuel sales the available storage capacity is still sufficient through the long term. The rate of JetA fuel sales should be reviewed periodically, as increased itinerant jet traffic also will create greater demand. A tripling of the jet fuel sales would necessitate greater capacity by the long term (3,300 gallons).

SUMMARY

The intent of this chapter has been to outline the facilities required to meet potential aviation demands projected for Chehalis-Centralia Airport for the planning horizon. A summary of the airfield and general aviation facility requirements is presented on **Exhibits 3C** and **3D**.

The following step will be to use this analysis of facility requirements to formulate a direction for development which best meets these projected needs. The remainder of the master plan will be devoted to outlining this direction, its schedule, and its costs.

TABLE 3H
Fuel Storage Requirements

	Available	Current Need	Short Term	Intermediate Term	Long Term
Peak Month Fuel Sales (gal.)					
100LLGas		16,600[1]	19,400	21,600	27,000
Jet		661[2]	820	910	1,140
Bi-weekly Storage Requirements					
100LLGas	6,000	8,300	9,700	10,800	13,500
Jet	6,000	350	410	455	570

1 July, 1999 fuel sales
2 April, 1999 fuel sales

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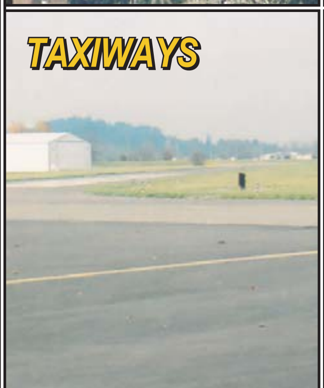
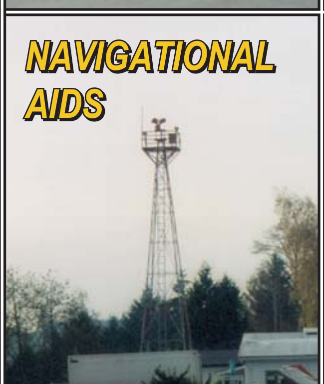
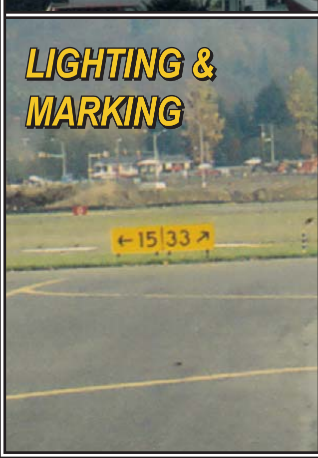
	AVAILABLE	SHORT-TERM	ULTIMATE
RUNWAYS 	**Runway 15-33** 5,000' x 150' 30,000# SWL/DWL 85,000# DTWL	**Runway 15-33** Same	**Runway 15-33** Same
TAXIWAYS 	**Runway 15-33** Partial Parallel Taxiway Four Exits	**Runway 15-33** Same	**Runway 15-33** Same
NAVIGATIONAL AIDS 	**Runway 15-33** VASI - 2L - 33 PAPI - 4L - 15	**Runway 15-33** GPS - 15 GPS - 33 PAPI - 4L - 33	**Runway 15-33** Same
LIGHTING & MARKING 	Segmented Circle Rotating Beacon MITL Lighted Windcones **Runway 15-33** MIRL, Basic Marking, REIL (33)	Segmented Circle Rotating Beacon MITL Lighted Windcones **Runway 15-33** MIRL, Non-Precision Marking, REIL (15) Same	Segmented Circle Rotating Beacon MITL Lighted Windcones **Runway 15-33** Same

CHEHALIS CENTRALIA AIRPORT

Exhibit 3C
AIRFIELD FACILITY REQUIREMENTS

00MP02-3D-12/18/00

AIRCRAFT STORAGE HANGARS

	AVAILABLE	SHORT TERM NEED	INTERMEDIATE NEED	LONG TERM NEED
T-hangar Positions	39	45	48	54
Executive Hangar Positions	13	14	18	28
Conventional Hangar Positions	2	14	15	18
T-hangar Area (s.f.)	29,250	53,800	57,100	64,700
Executive Hangar Area (s.f.)	13,900	21,800	35,200	61,000
Conventional Hangar Area (s.f.)	20,300	17,400	19,300	24,300
Maintenance Area (s.f.)	7,500	11,600	14,300	19,000
Total Hangar Area (s.f.)	75,950	104,600	125,900	169,700

APRON AREA

	AVAILABLE	SHORT TERM NEED	INTERMEDIATE NEED	LONG TERM NEED
Transient Positions		20	26	36
Locally-Based Aircraft Postions		12	14	17
Total Positions		32	40	53
Total Apron Area (s.y.)	22,000	17,700	21,900	29,500

TERMINAL SERVICES AND VEHICLE PARKING

	AVAILABLE	SHORT TERM NEED	INTERMEDIATE NEED	LONG TERM NEED
Terminal Building Space (s.f.)	2,050	1,600	2,100	2,800
Total Parking Spaces	30	79	111	173
Total Parking Area (s.f.)	20,000	44,400	51,200	69,200

CHEHALIS CENTRALIA AIRPORT

Exhibit 3D
LANDSIDE REQUIREMENTS

Chapter Four

Airport Development Alternatives

In the previous chapter, airside and landside facility needs that would satisfy projected demand over the planning period were identified. The next step in the master planning process is to evaluate the various ways these facilities can be provided. In this chapter, these facility needs will be applied to a series of airport development alternatives. The possible combinations of alternatives can be endless, so some intuitive judgement must be applied to identify those alternatives which have the greatest potential for implementation. The alternative's analysis is an important step in the planning process since it provides the underlying rationale for the final master plan recommendations.

While any evaluation of alternatives can also include a "no action" alternative, this would effectively reduce the quality of services being provided to the general public, and potentially affect the area's ability to accrue additional economic growth. This action would not be consistent with the recent Washington State Transportation Commission's statement on aviation policy to aid in preservation of general aviation airports and advocate the economic importance of the state's airports.

The airport's aviation forecast and the analysis of facility requirements indicate both a current and future need for the development of aircraft storage facilities and improved navigational aids and lighting. Without these facilities, regular users of the airport will be constrained from taking maximum advantage of the airport's air transportation capabilities.

Although this study will not consider the relocation of services to another

airport, it is always a potential alternative. While there are several public-use airports located within a 30 nautical mile radius of the airport, they are not as convenient and will not enhance community development in the Chehalis-Centralia region. Furthermore, the continuing growth expected by the major employers in the area that use the Chehalis-Centralia Airport's facilities demonstrate the important role that this airport must play, a role that is not easily replaced by another (more distant) airport without tremendous expense. Therefore, the master planning process must attempt to deal with the facility needs for Chehalis-Centralia Airport which have been identified in the previous chapter, at the levels forecast throughout the twenty-year planning period.

INITIAL DEVELOPMENT CONSIDERATIONS

Exhibit 4A summarizes the major development considerations for the airport which will be used in the alternatives analysis to follow. These were derived from the facility needs analysis (Chapter Three) and include Planning Advisory Committee (PAC) input. The items have been grouped by categories typically used in alternative evaluations. While many of these development considerations reflect projects or topics which are demand driven (the need for additional T-hangars), several are functional in nature (airfield navigational and lighting aids), but are important considerations in the overall development of the airport and the master planning effort.

AIRPORT DEVELOPMENT ALTERNATIVES

The previous chapter identified both the airside and landside facilities necessary to satisfy forecast demands through the planning period. The overall objective is to produce a balanced airside and landside complex to serve forecast aviation demands. The development alternatives for the airport can be categorized into two functional areas: the airside (e.g. runways and taxiways) and landside (e.g. terminal building, aircraft storage facilities, and aircraft parking apron). Within each of these functional areas, specific facilities are required or desired. Although each functional area is treated separately, each area interrelates to each other and affect the development potential of the other. Therefore, these areas must be examined both individually and collectively to ensure a final plan that is functional, efficient, cost effective, and minimizes environmental impacts. Through this process, a basic airport concept is developed into a realistic development plan.

AIRFIELD ALTERNATIVES

Airfield facilities are, by their very nature, the focal point of the airport complex. Because of their primary role and the fact that they physically dominate airport land use, airfield facility needs are often the most critical factor in the determination of viable airport development alternatives. In particular, the runway/taxiway system requires the greatest commitment of land area and often imparts the greatest influence on the identification

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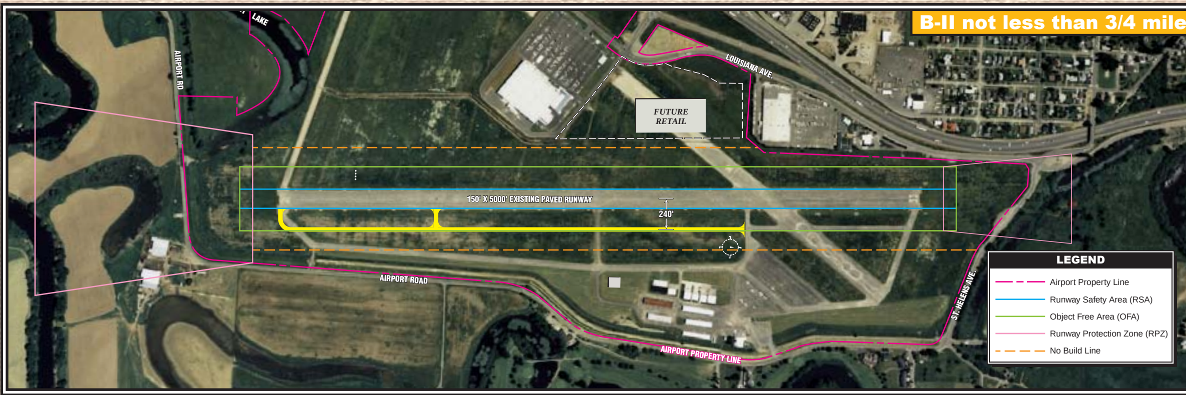
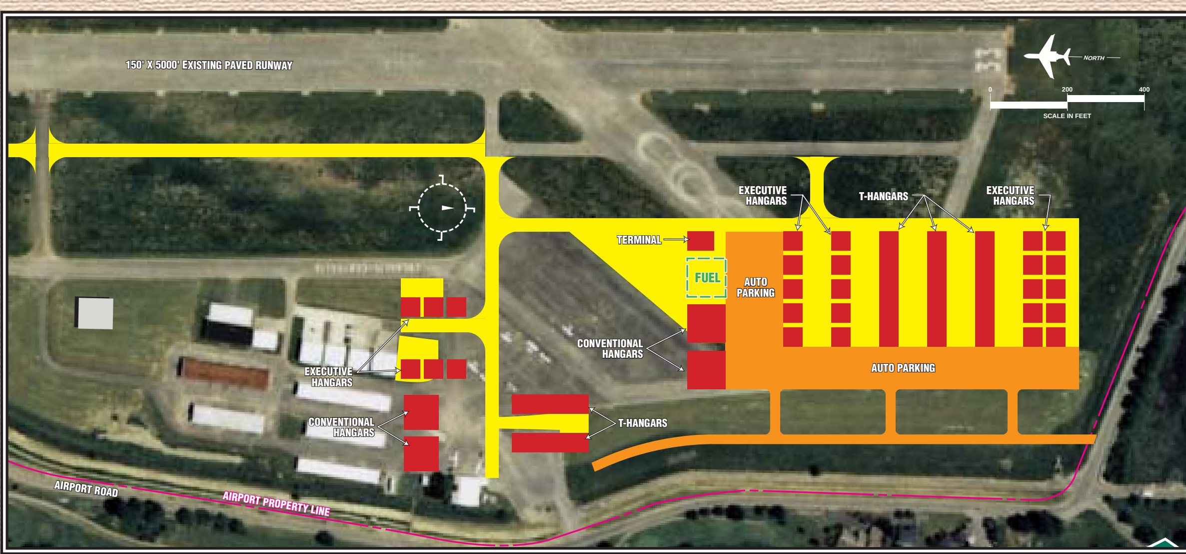
AIRFIELD CONSIDERATIONS

- Investigate the potential to upgrade runway/taxiway design standards (B-I to B-II or C-II).
- Evaluate the approach needs to obtain the most appropriate instrument approaches.
- Evaluate navigational, lighting, and weather reporting aids to serve instrument approach functions.



LANDSIDE CONSIDERATIONS

- Locate future terminal area.
- Specify areas needed for aviation purposes.
- Locate additional hangars (T-hangars, conventional, and executive types).
- Determine new alignment for entrance road.
- Evaluate fuel storage locations.



CHEHALIS CENTRALIA AIRPORT

Exhibit 4A
INITIAL DEVELOPMENT CONSIDERATIONS

and development of other airport facilities. Furthermore, due to the nature of aircraft operations, there are a number of FAA design criteria that must be considered when looking at airfield improvements. These criteria can often have a significant impact on the viability of various alternatives designed to meet airfield needs.

As discussed previously in Chapter Three, airfield design standards are a function of the physical characteristics of aircraft which are using, or are expected to use, the airfield. The Federal Aviation Administration (FAA) has established a coding system to relate the physical characteristics of aircraft using the airfield to runway design standards. Referred to as the Airport Reference Code (ARC), the FAA coding system is a function of the aircraft's approach speed and wingspan.

The forthcoming discussions will evaluate the opportunities and disadvantages associated with applying ARC B-II and C-II criteria to Runway 15-33 at Chehalis-Centralia Airport. Additionally, the following issues will be evaluated:

- Whether further commercial development can occur without limiting airfield development;
- Constraints of the physical environment; and
- What is the logical extent of approach criteria that can be met through the planning periods.

Runway Features

Presently, most features of Runway 15-33 conform with ARC B-II design standards. Analysis in the previous chapter indicated that the runway system provides adequate length for all small airplanes and many of the corporate fleet aircraft within the C-II ARC category. There are physical limitations affecting an upgrade of the runway, that include: the proximity of county roads at each end; Interstate Highway 5; the Chehalis River; and on-airport wetlands. Another limiting factor is the lack of a critical aircraft that defines a need for more runway. Therefore, it has been assumed in this plan that the length of Runway 15-33 is sufficient for the planning periods.

Runway 15-33 currently meets most ARC B-II design standards, accommodating all "small aircraft with 10 or more passenger seats".The 5,000-foot runway exceeds the recommended runway length of 4,070 feet. Likewise, the required width of the runway (75 feet) is met (and exceeded) by the 150-foot wide pavement. The pavement is strength rated at 30,000 pounds SWL/DWL and 85,000 DTWL and meets ARC B-II standards.

Based upon the wind analysis, Runway 15-33 meets the FAA standard for wind coverage with 97.5 percent coverage at 12 mph crosswinds and 98.9 percent coverage for crosswind components at 15 mph. Therefore, a crosswind runway is not necessary.

Navigational Aids

Chehalis-Centralia Airport has received FAA approval for a nonprecision GPS/RNAV approach. This has the potential to be upgraded to a precision RNAV approach with vertical guidance, upon fulfillment of several requirements stated by the Seattle Airports District Office of the FAA. These include:

- An increase of the Decision Altitude (DA) by 30-50 feet due to penetration of the obstacle clearance surface (within the missed approach segment of the approach) by a proposed building structure;
- Lighting of the penetrating structure per Flight Procedures Office minimums; and
- Installation of an approved local altimeter setting source (such as that provided by an AWOS).

With the transition from the current ground-based navigational systems to satellite-based navigational systems over the next decade, airports will have the potential to achieve lower visibility approaches, without the need to install costly instrument landing systems (which are now required to achieve one-half mile visibility and 200-foot cloud ceiling minimum approaches). With the completion of the Wide Area Augmentation System (WAAS) early in this decade, it is expected that this approach capability will be available to nearly every airport across the country meeting specific runway protection zone, design standard, approach lighting, edge lighting, and obstacle clearance requirements. (These standards are covered under Appendix 16 of AC 150/5300-13, Airport Design, which was included as an appendix in the Phase One report.)

Due to the complexities of establishing a new GPS navigational system and the development delays already being experienced, the Washington Department of Transportation Aviation Division, in conjunction with the FAA, has issued a statement of clarification with regard to GPS:

"The Washington State Department of Transportation Aviation Division supports the development and implementation of this new [GPS] technology. It is important to us that airport sponsors have a clear understanding about the implementation realities of the WAAS program: timing of satellite coverage, facility requirements and land use requirements. The satellite precision instrument approach is not off-the-shelf technology and the program is experiencing development delays. However, the FAA is committed to implementing the WAAS program throughout the United States during the first decade of the 21st Century."

Runway 15 is the primary runway at the airport. With approval by the FAA for a nonprecision RNAV approach using GPS technology (and potential upgrade to a precision RNAV approach with vertical guidance), a precision approach with not lower than 3/4-mile visibility minimum should be planned for the runway end in the short term period.

Additional lighting aids and markings will be required for a less than 3/4-mile visibility minimum GPS approach to Runway 15. A Medium Intensity Approach Lighting System with Runway End Identifier Lights (MALSR) is the recommended approach lighting system. Precision runway and taxiway markings will also be required.

Together, the ARC and approach visibility minimums define all airfield design standards. **Table 4A** summarizes airfield design standards by ARC and approach visibility minimums.

The following exhibits compare the difference in safety areas when alternate ARC design and approach criteria are applied to Chehalis-Centralia Airport. It should be noted that a line restricting building construction has been set according to the Object Free Zone (OFZ) standards and various FAA clearance criteria. The distance is set at 400 feet as measured to either side of the runway centerline and does not change throughout the series of alternatives.

Exhibit 4B, Airfield Alternative A compares airfield safety standards based upon an ARC of B-II (top view) and an ARC of C-II (bottom view) for Runway 15-33 with not less than 1 mile approach capabilities. As is evident from the exhibit and data provided in **Table 4A**, the existing airfield components, for the most part, meet the ARC B-II design standard.

Exhibit 4B further depicts the safety areas that would be in effect with nonprecision approach capability, as would be the case until weather reporting (specifically barometric pressure reading) equipment is in place. Approach minimums in effect would be those illustrated at not less than one mile visibility.

To achieve ARC B-II with not less than one mile visibility minimums for Runway 15-33 the following criteria must be met. A runway/taxiway separation distance of 240 feet is required. The Runway Safety Area (RSA) for ARC B-II includes the area 150 feet in width (centered on the runway) and extending out 300 feet beyond each runway end. The RSA is to be free of obstructions and able to be used for aircraft overshoots or excursions from the runway. As reflected on the exhibit, all objects that fall within the Object Free Area (OFA) are fixed by function per FAA regulations; that is, within 500 feet of width by 300 feet in length beyond each runway end. The Runway Protection Zone (RPZ) measures a two-dimensional area 500 feet in width at 200 feet from the runway end and 700 feet in width at 1200 feet from the runway end. FAA design standards limit the types of development within the RPZ to that which is compatible with aircraft operations.

As can be seen on the lower half of the exhibit for ARC C-II, the RSAs measure 400 by 1,000 feet from each runway end. The OFA widens to 800 feet by 1,000 feet in length beyond each runway end, encompassing Airport Road, the levees, the dairy barn, and Interstate-5. The RPZ measures an area 500 feet in width at 200 feet from the runway end and 1010 feet in width at 1900 feet from the runway end.

TABLE 4A **Airfield Design Standards by ARC**				
Airport Reference Code **Approach Visibility Minimums**	B-II 3/4 Mile	B-II ½ Mile (Cat I)	C-II 3/4 Mile	C-II ½ Mile (Cat I)
Runway				
Width	75	100	100	100
Runway Safety Area (RSA)				
Width	150	300	400	400
Length Beyond Runway End	300	600	1,000	1,000
Object Free Area (OFA)				
Width	500	800	800	800
Length Beyond Runway End	300	600	1,000	1,000
Runway Centerline to:				
Parallel Taxiway Centerline	240	300	300	400
Edge of Aircraft Parking Apron	250	400	400	500
Runway Protection Zones (RPZ)				
Inner Width	1,000	1,000	1,000	1,000
Outer Width	1,510	1,750	1,510	1,750
Length	1,700	2,500	1,700	2,500
Obstacle Clearance	20:1	34:1	20:1	34:1
No Build Line [2]				
Distance from Runway Centerline	400	400	400	400
Taxiways				
Width	35			
Safety Area Width	79			
Object Free Area Width	131			
Taxiway Centerline to:				
Parallel Taxiway/Taxilane	105			
Fixed or Moveable Object	65.5			
Taxilanes				
Taxilane Centerline to:				
Parallel Taxilane Centerline	105			
Fixed or Moveable Object	65.5			
Taxilane Object Free Area	131			

Source: FAA Airport Design Software Version 4.2D, F.A.R. Part 77, TERPS
[1] Small aircraft less than 12,500 pounds
[2] A measured distance, determined by using various FAA clearance criteria.

Exhibit 4C, Airfield Alternative B compares airfield safety standards based upon an ARC of B-II (top view) and an ARC of C-II (bottom view) for Runway 15-33 with not less than 3/4 mile approach capabilities. The top view of **Exhibit 4C** depicts the runway safety areas at ARC B-II, with not less than 3/4 mile visibility. The parallel taxiway is shown at the required 240-foot offset. The RSA and OFA are the same areas as those depicted in the previous exhibit for ARC B-II. The RPZ at the north end of the runway includes two dairy barns and at least one residence adjacent to Airport Road.

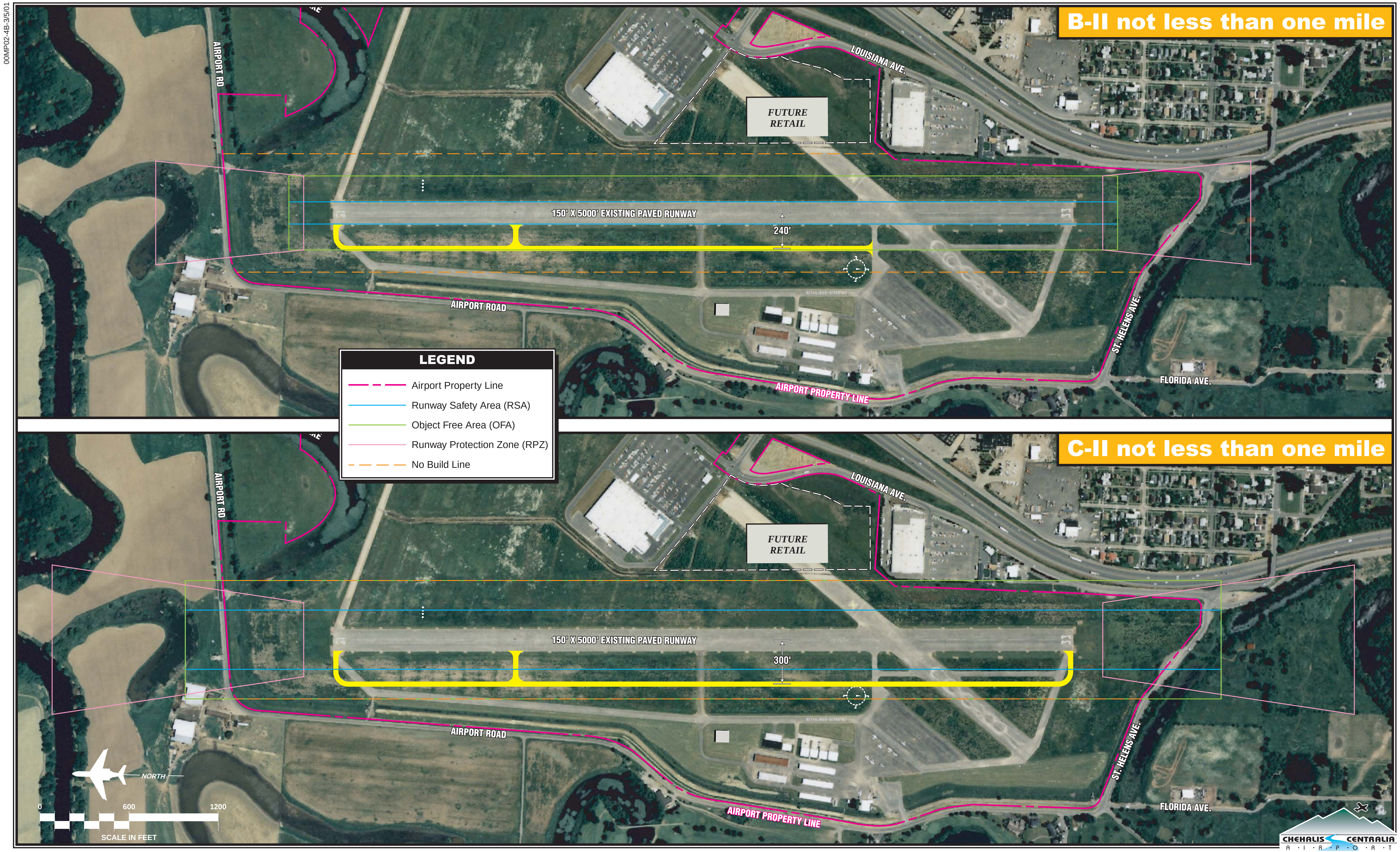


Exhibit 4B
AIRFIELD ALTERNATIVE A

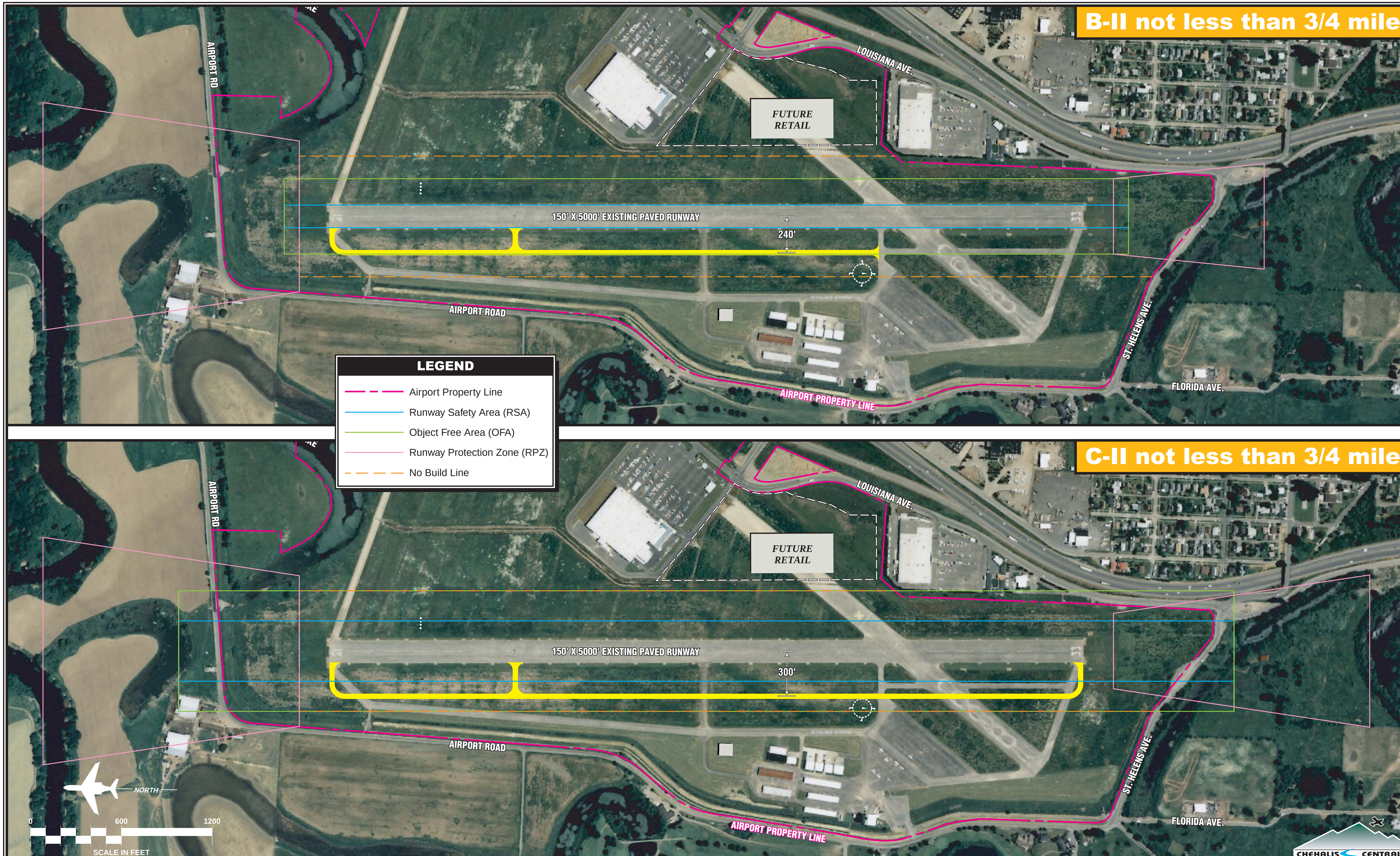


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Exhibit 4C
AIRFIELD ALTERNATIVE B

Comparatively, as depicted in the bottom view, the safety areas do not meet the requirements for ARC C-II at not less than 3/4-mile visibility. The required taxiway/runway separation distance is 300 feet. The RSA includes the area 200 feet either side of the runway centerline and extending out 1,000 feet beyond each runway end. Areas that would be encompassed and that would not meet standards are Airport Road, St. Helens Avenue, and drainage areas at either runway end. The objects that fall within the OFA, and that are not fixed by function to the airport, include Airport Road, the levee, the dairy barn, and Interstate-5.The RPZ overlays the same area as the previous example.

Exhibit 4D, Airfield Alternative C depicts airfield alternatives based upon ARC B-II and ARC C-II, assuming a lowering of approach minimums to Cat I minimums (typically ½ mile) for Runway 15. As shown on the exhibit, the transition to lower visibility minimums requires a greater runway/ taxiway separation distance and larger runway protection zones.

To achieve Cat I visibility minimums for Runway 15-33 requires a runway/taxiway separation distance of 300 feet for ARC B-II and 400 feet for ARC C-II. As can be seen at a 400-foot offset, the taxiway comes very close to the drainage area inside the levee to the north. This alternative also removes a large amount of area from future airport development. The RSAs measure 300 by 600 feet beyond each runway end for B-II and 400 by 1,000 feet from each runway end for C-II. The RPZ is the same for both the ARC B-II and the ARC C-II for Runway 15. It measures an area 1,000 feet in width at 200 feet from the runway end and 1,750 feet in width at 2,500 feet from the runway end.

Airside Summary

As the requirements imposed on each alternative become clear, so do the answers to the questions posed at the beginning of the chapter also emerge.

By understanding that a no build line is permanently set for the airport, east side commercial construction beyond that line can occur within the limitations set by the FAA. West side aviation development, adhering to the same restrictions, can accommodate all landside planning period needs.

The airfield exhibits have shown that, while precision approach capability is a reality, there are limitations. The controlling factors are determined by the ARC, the accompanying approach minimums, and the amount of money that can be reasonably expended. For all ARC C-II airfield alternatives the safety areas are expanded from the equivalent B-II approach minimums. In the C-II alternative with less than 1 mile minimum approach, the RSA and OFA enclose the roads to the north and south, Interstate 5, the dairy barn to the north, and the slough further to the north near the Chehalis River. All of these would be required to be moved or, in the case of the slough, filled. To move the structures may require acquisition of the property. As each alternative is depicted at more precise minimums, the safety areas become even more inclusive, requiring greater mitigation at higher costs.

The most reasonable conclusion with regard to the establishment of the airport ARC and approach minimums is that, until an AWOS is installed, the airport can achieve a B-II with a not less than 1 mile non precision approach. The airport currently meets the RSA and OFA safety area minimums. However, land acquisition or avigation easement control is required within areas depicted on Alternative A to control or eliminate any incompatible objects or activities. With respect to the farm property at the northwest corner of the airport boundary, the dairy barn to the east would need to be removed from within the safety area boundary. To remove the dairy barn may involve the acquisition of the entire farm parcel. To further achieve ARC B-II with a not less than 3/4 mile precision approach requires that the RPZ encompass a wider area, including both dairy barns and two residences to the north, the Interstate-5 outer road, and roads at either end of the airport. To remove the dairy barns and residences would most likely involve the acquisition of the entire farm parcel.

LANDSIDE AND ACCESS ALTERNATIVES

The primary landside facilities to be accommodated on the airport include a terminal building and parking facilities, the main access road, aircraft storage hangars, fuel storage area(s), and aircraft parking aprons. The interrelationship of these functions is important to defining a long range landside layout for the airport. To a certain extent landside uses need to be grouped with similar uses or uses that are compatible. Other functions should be separated, or at least have well defined boundaries for reasons of safety, security, and efficient operation.

Each landside use must be planned in conjunction with the airfield, as well as ground access that is suitable to the function. Runway frontage should be reserved for those uses with a high level of airfield interface. Other uses with lower levels of aircraft movements, or little need for runway exposure can be planned in more isolated locations.

The landside alternatives presented in this chapter attempt to resolve the following issues:

- Designation of a new entrance;
- Location of a roadway circulation system that allows safe access to the terminal area and hangars and provides separation from most aircraft movement areas;
- Provision for a relocated, above ground fuel storage, thereby allowing better utilization of space for hangars;
- Location of the fuel operations area close to the terminal/ FBO area that would allow for attended fueling operations;
- Provision for vehicle parking areas that can be jointly used for aircraft storage in a high water event;

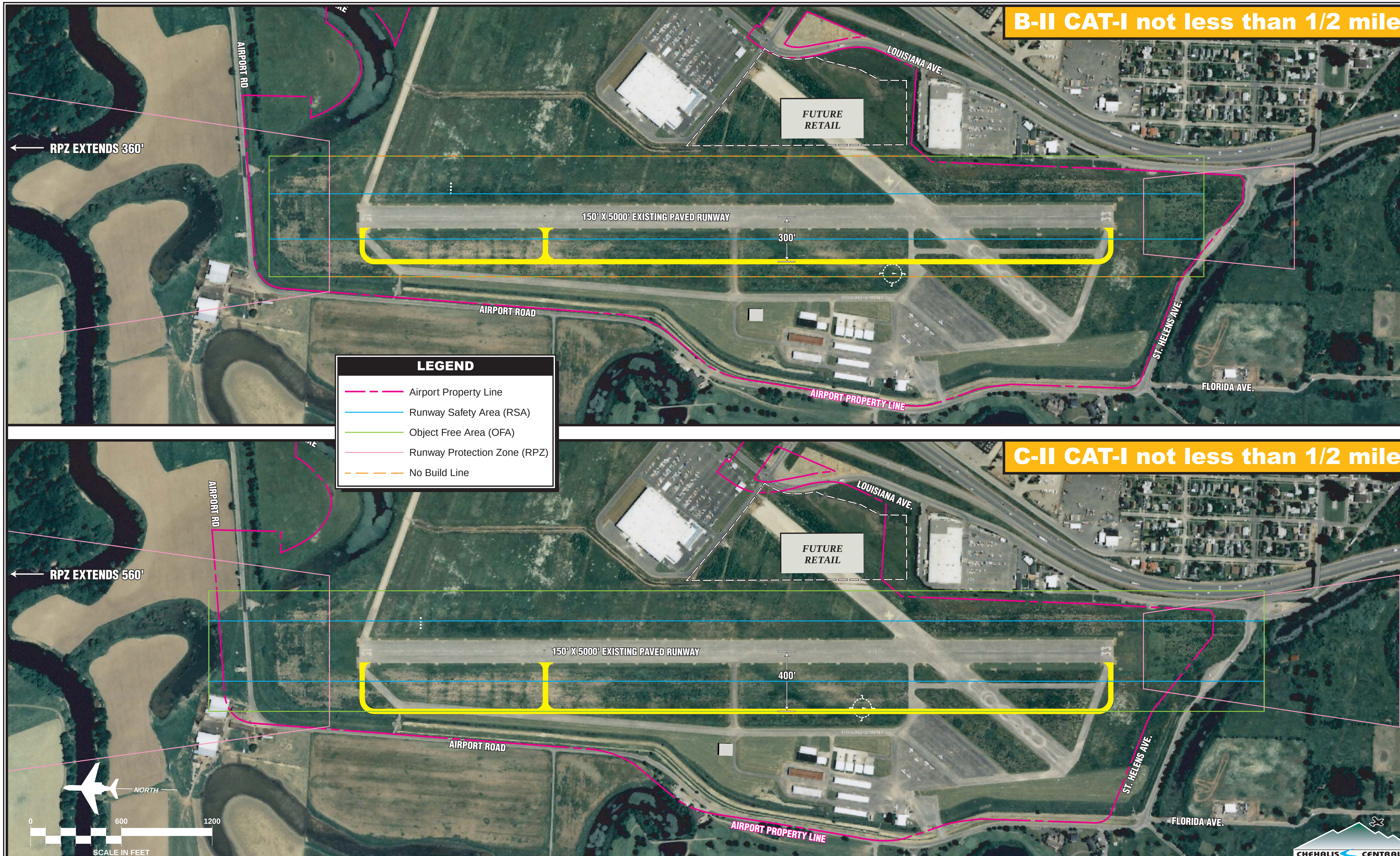

Exhibit 4D
AIRFIELD ALTERNATIVE C

- Provision for paving of gravel areas to protect aircraft and encourage use by more corporate aircraft; and

- Location of the AWOS III structure.

The following briefly describes landside facility requirements.

Fixed Based Operator (FBO): This essentially relates to providing areas for the development of facilities associated with aviation businesses that require airfield access. This includes businesses involved with (but not limited to) aircraft rental and flight training, aircraft charters, aircraft maintenance and line service. Businesses such as these are characterized by high levels of activity with a need for apron space for the storage and circulation of aircraft. In addition, the facilities commonly associated with businesses such as these include large, conventional type hangars which hold several aircraft plus attached office and business space. Utility services are needed for these types of facilities as well as automobile parking areas.

General Aviation Terminal Building: A new terminal building and associated parking area is proposed for the airport. The terminal should be designed with a minimum of 2,500 square feet of space to meet intermediate to long term needs. Based upon projected requirements, the parking area will require 170+ vehicle parking spaces for the long term. Adequate apron area for the circulation of aircraft and fueling operations must also be considered. At present fuel is self-serve, unattended, and handled by the Airport Governing Board. However, the fuel operations area and fuel tank storage area will need to be centrally located on the airfield to allow for direct fueling by truck to aircraft.

Enclosed T-Hangars: The facility requirements analysis indicated that an additional 54 T-hangar units would be needed to accommodate projected long term demand.

Hangar Lease Parcels: This involves providing parcels of land for businesses or individuals who wish to construct their own aircraft storage hangar. The best location for these facilities is off the immediate flight line, but readily accessible by taxiway. Parking and utilities such as water and sewer should be considered for these areas. The facility requirements analysis anticipates the need for storage of 28 aircraft.

Conventional Hangars: By the long term planning period the airport needs are for 43,300 square feet of conventional type hangar space. This includes 19,000 square feet for maintenance purposes and 18 aircraft positions.

All three alternatives presented are variations of a predominant theme regarding future facility placement. The majority of new development is proposed to the south of the current tiedown apron and terminal area. This is the highest ground on the airport. It relocates the entrance on the south side, accessing from St. Helens Avenue. Fuel operations are located near the new terminal area. The new orientation allows definition and redevelopment of the central landside area, which is now part of a combined expanse of open apron, fueling operations, and taxi area. All facilities are located beyond the 400-foot no build line.

These layouts allow for the existing hangars to remain, but limit new development north of the south line of storage hangars.

Landside Alternative A, depicted on **Exhibit 4E**, examines a landside development layout that faces the terminal/FBO to the east, with itinerant aircraft on the east apron. Local tiedowns would use the area on the north. Additional executive spaces and conventional hangars enclose the tiedown area. This alternative allows for 76 T-Hangars, 28 executive hangars, and 3 conventional hangars. The fuel storage area is separated from daily operations, fulfilling a need for on demand fueling.

Landside Alternative B, depicted on **Exhibit 4F**, examines a similar pattern of development to Alternative A. In this layout two conventional hangars share the front service line with the terminal, reducing the number of T-Hangars. This alternative allows for 72 T-Hangars, 26 executive hangars, and 4 conventional hangars.

Alternative C, depicted on **Exhibit 4G**, shows a third layout that orients the terminal, FBO and fuel operations to the north. Both the fuel operations and storage area are sited together. Terminal parking is able to be shared among the terminal visitors, FBO clients, and executive hangar owners.

The AWOS III proposed for the airport should be located to the north of the developed area on the west side of the airport, where power can be made readily available, and away from development and other structures that might interfere with wind and pressure measurements. Upon selection of a final development concept, the siting will be more clearly defined.

Landside/Access Summary

The landside alternatives have offered solutions regarding the issues of a new road entrance, internal circulation, future terminal and hangar needs (and their associated support facilities), and the location of fuel operations and an AWOS structure. The alternatives have been based upon the following broader conclusions.

New facilities are favored to the south of the existing terminal area, where drainage from the site is better, and where proposed new structures do not require prior removal of existing facilities. The east side of the airport, as defined by existing commercial development, will remain unavailable for aviation-related use through the lease periods. At the same time these new facilities should best utilize available facilities (i.e. apron and tie down area).

In the interests of safety and function and to allow the greatest economic viability, the fuel operations should be relocated close to the terminal and FBO.

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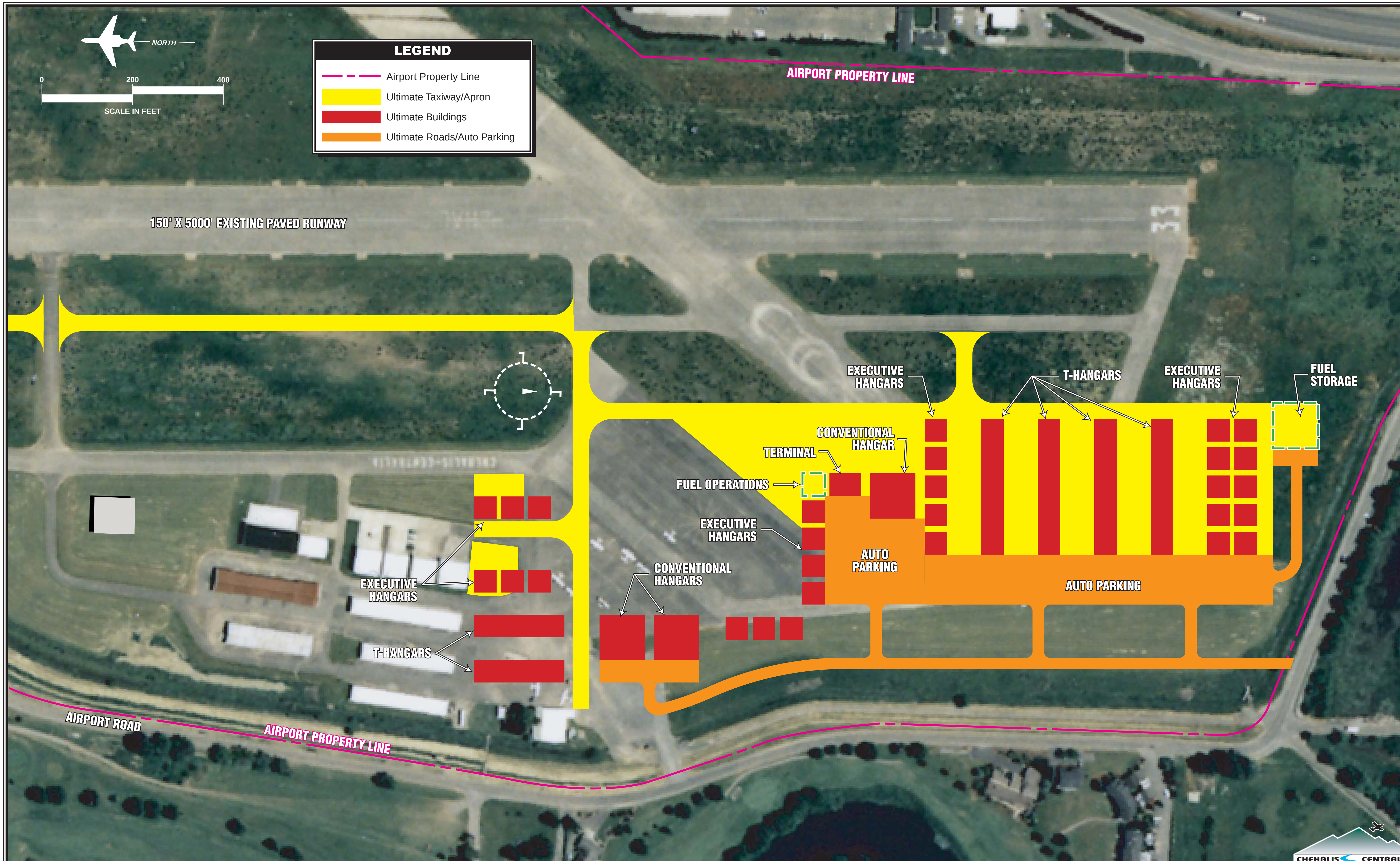

Exhibit 4E
LANDSIDE ALTERNATIVE A

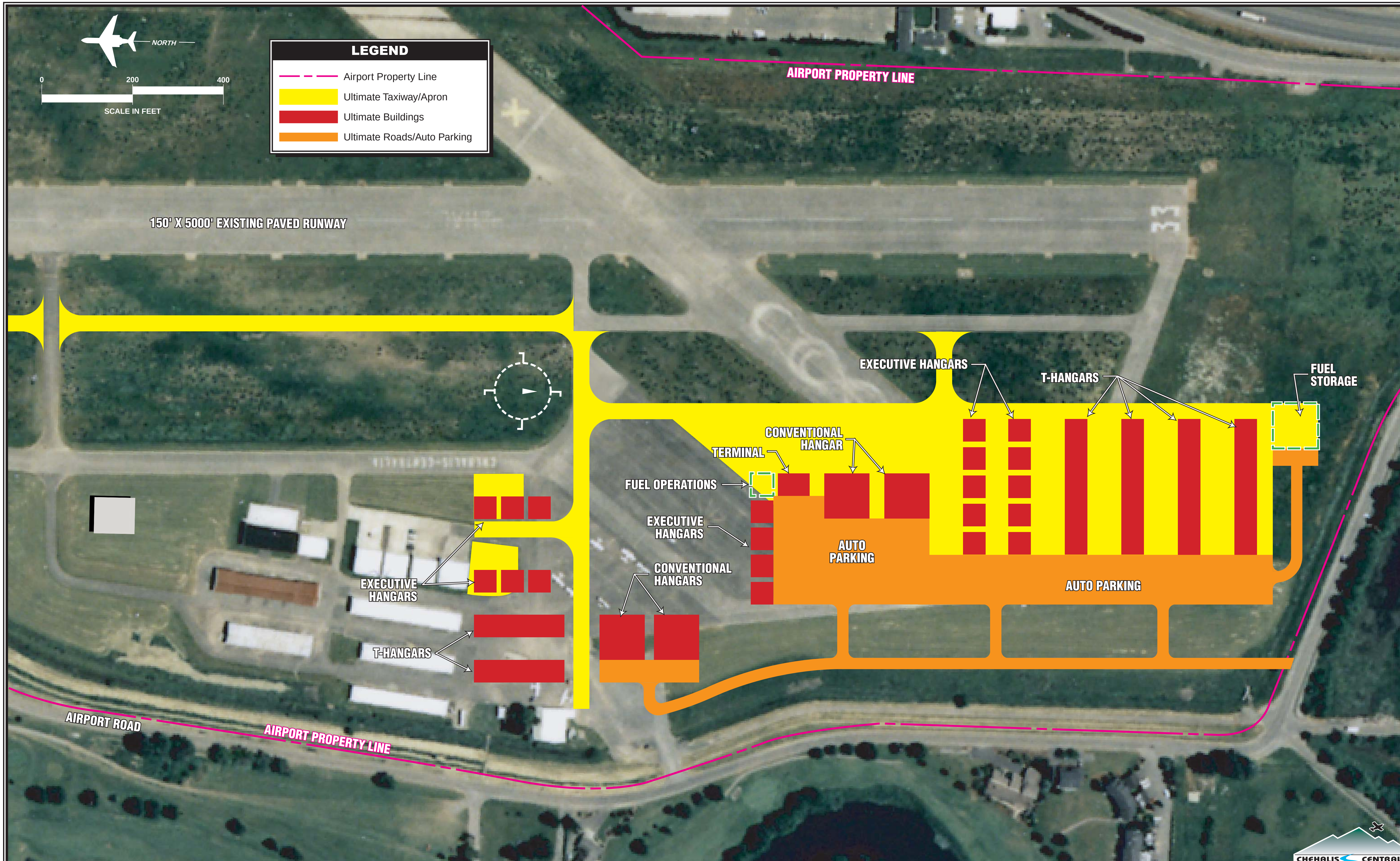

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Exhibit 4F
LANDSIDE ALTERNATIVE B

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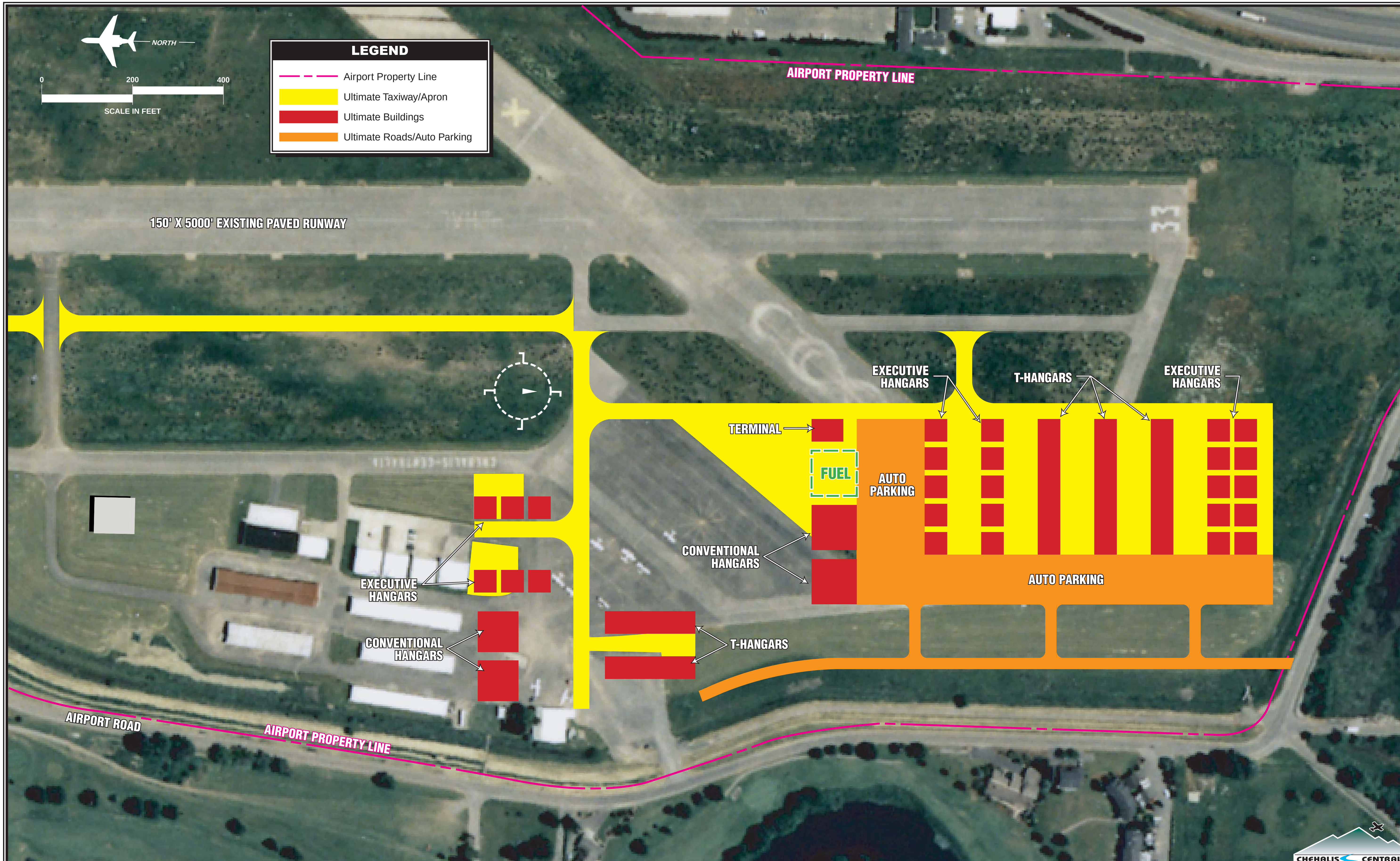


Exhibit 4G
LANDSIDE ALTERNATIVE C

A safe entrance is a priority for the airport. Likewise, any proposal for the development of the west side must be respectful of the fact that high ground be retained and usable for aircraft maneuvering in a high water event.

SUMMARY

Once the preliminary master plan concept has been identified, cost estimates will be prepared for the individual projects, a development schedule will be prepared, and potential funding sources for recommended projects will be identified. The remaining chapters of the master plan will be used to refine a final concept through the development of detailed layouts and a phased development program.

AIRPORT PLANS/ ENVIRONMENTAL EVALUATION

The airport master planning process evolved through several analytical efforts in the previous chapters intended to analyze future aviation demand, establish airside and landside facility needs, and evaluate options for the future development of the airside and landside facilities. The development alternatives were refined into a single recommended master plan concept. The planning process has included the development of phased reports, distributed to a planning advisory committee, and discussed at several coordination meetings held during the study process. This chapter describes in narrative and graphic form, the recommended direction for the future use and development of Chehalis - Centralia Airport. Included are comments regarding specific environmental considerations that result from the recommended airport development plan.

RECOMMENDED MASTER PLAN CONCEPT

The recommended master plan concept provides for anticipated facility needs over the next twenty years as well as the airport's ability to accommodate aviation demand for the Chehalis - Centralia and Lewis County region well beyond the planning period. **Exhibit 5A** depicts the selected Master Plan concept for Chehalis-Centralia Airport. The following sections summarize airside and landside recommendations.

AIRSIDE RECOMMENDATIONS

Airside recommendations include improvements for the runways, taxiways, instrument approaches, and airfield lighting. Airside recommendations are as follows:

- Develop global positioning system (GPS) approach procedures to each end of Runway 15-33, to be upgraded to a precision RNAV approach for Runway 15 with vertical guidance at not lower than 3/4 mile visibility. The upgrade to precision approach status is dependent upon lighting of any penetrating structure within the obstacle clearance surface (commercial buildings on east side of airport property), an increase of the Decision Altitude by 30-50 feet, and AWOS III installation.

- Lower visibility minimums increase the size of the Runway 15-33 RPZs. Portions of existing and ultimate RPZs for each runway end extend beyond the existing airport property line. The FAA recommends the fee simple acquisition of the RPZ to protect the area within it from incompatible uses. To achieve the ultimate visibility minimums (at 3/4 mile) for Runway 15 requires the eventual relocation/removal of the existing dairy barn facilities along Airport Road and possible acquisition of the property.

- Upgrade visual approach lights for Runway 33 by installing PAPI-4 lights and install an omni-directional approach lighting system (ODALS) to Runway 15.

- Airfield lighting recommendations include: installing pavement edge lighting along all taxiways; installing runway end identifier lights (REIL) for Runway 15, and upgrading runway markings from basic to precision markings.

- Construct a full length parallel taxiway system (at 300-foot separation from runway centerline).

LANDSIDE RECOMMENDATIONS

The recommended master plan concept provides for terminal and aircraft - storage hangar development and expansion. Landside recommendations are as follows:

- Construct additional aircraft storage hangars to accommodate current and future based aircraft levels.

- Construct a new general aviation terminal and automobile parking facilities.

- Relocate fuel farm and fueling facilities.

- Construct a new entry and access road, keeping the existing high ground available for use for aircraft storage during a possible high water event.

00MP02-5A-7/2/01

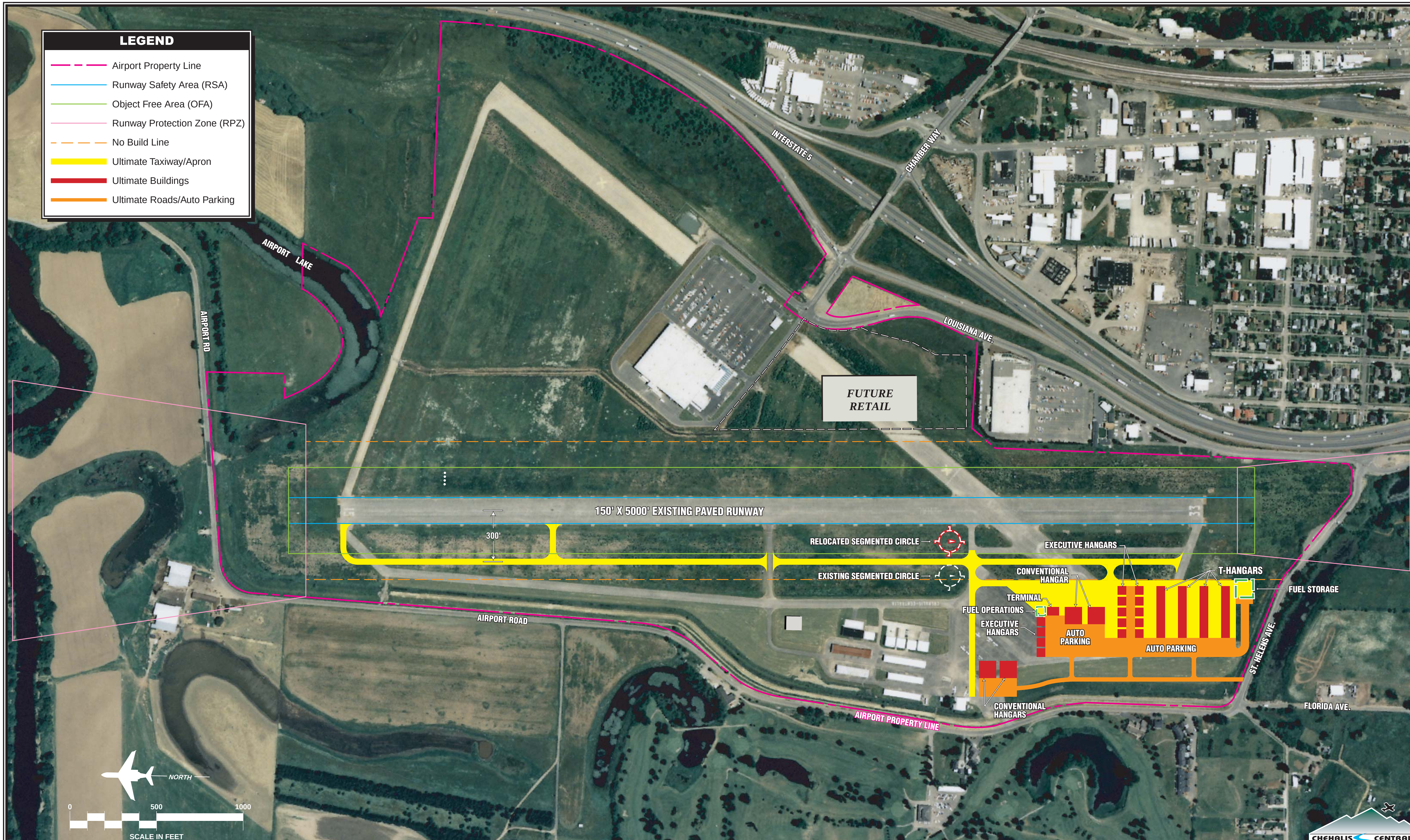


Exhibit 5A
MASTER PLAN CONCEPT

ENVIRONMENTAL EVALUATION

This section considers possible effects on the environs on and around the Chehalis-Centralia Airport should the recommended airport development plan be implemented.

NOISE COMPATIBILITY

Aircraft noise emissions are often the most noticeable environmental effect an airport will produce on the surrounding community. If the sound is sufficiently loud or frequent in occurrence, it may interfere with various activities or otherwise be considered objectionable.

The 2001 contours, which represent the baseline condition, have been generated using the estimated number and type of aircraft operations that occurred over twelve months, as provided in the *Airport Master Plan*. The operations have been estimated, based on periodic observations, since the airport is not equipped with an airport traffic control tower, and visual traffic counts over a one-year period were not practical. These estimates were used for the development of total annual operations for existing and forecast (2020) conditions.

The basic methodology, employed to define aircraft noise levels, involves the extensive use of a mathematical model for aircraft noise prediction. The *Yearly Day-Night Average Sound Level* (DNL) is used in this study to assess aircraft noise. DNL is the metric currently preferred by the Federal Aviation Administration (FAA), Environmental Protection Agency (EPA), and Department of Housing and Urban Development (HUD) as an appropriate measure of cumulative noise exposure. All federally-funded airport noise studies use DNL as the primary metric for evaluating noise.

The same federal agencies identify the 65 DNL contour as the threshold of incompatibility with noise sensitive land uses. Under this determination, all uses located outside of the 65 DNL contour are considered compatible with the airport. Noise sensitive land uses located within the 65 DNL are subject to further consideration and evaluation in order to determine their compatibility.

The Existing (2001) and Future (2020) noise contours, generated for Chehalis-Centralia Airport, are displayed on **Exhibit 5B**. The variation between the two views, both for the existing operations level and for the forecast operations level, indicates that there is not a considerable difference in the location of the 65 DNL noise contour as the airport shifts to a future mix, adding a slightly higher mix of high performance aircraft to both based aircraft and annual itinerant operations. The only portion of the 65 DNL contour that escapes airport property is the corner adjacent to Interstate 5 on the southeast. Because this is not a land use that is incompatible with airport use, there is no significant impact.

SOCIAL AND ECONOMIC EFFECTS

Implementing actions recommended in the report will enhance the airport for commercial based aircraft and will enhance the safety of land access to the facility. Airside improvements will attract on-airport economic growth including aircraft maintenance, fuel sales, and businesses dependent on air access, all of which will create job growth. These issues are addressed in the Economic Benefit Study (attached as an appendix to this report).

RELOCATIONS

All facilities development or improvement will take place on the airport, with the possible exception of pipe utilities. No projects will require the relocation of existing activities off airport, and certain existing activities may move to upgraded facilities on the airport.

RECREATION

No proposed actions would adversely affect existing recreational activities around the airport.

HISTORIC AND ARCHAEOLOGICAL SITES

Some evidence of human habitation of sites near the airport over the past 8,000 years has been documented in the Washington State Inventory of Archaeological Places. Coordination with the State Historic Preservation Office (SHPO) regarding a Section 106 Review per the National Historic Preservation Act may be required. This may also include coordination with either or both the Cowlitz and Chehalis Indian Tribes. An archaeologist may be retained by the Airport Board or future private developers to survey proposed development sites prior to construction.

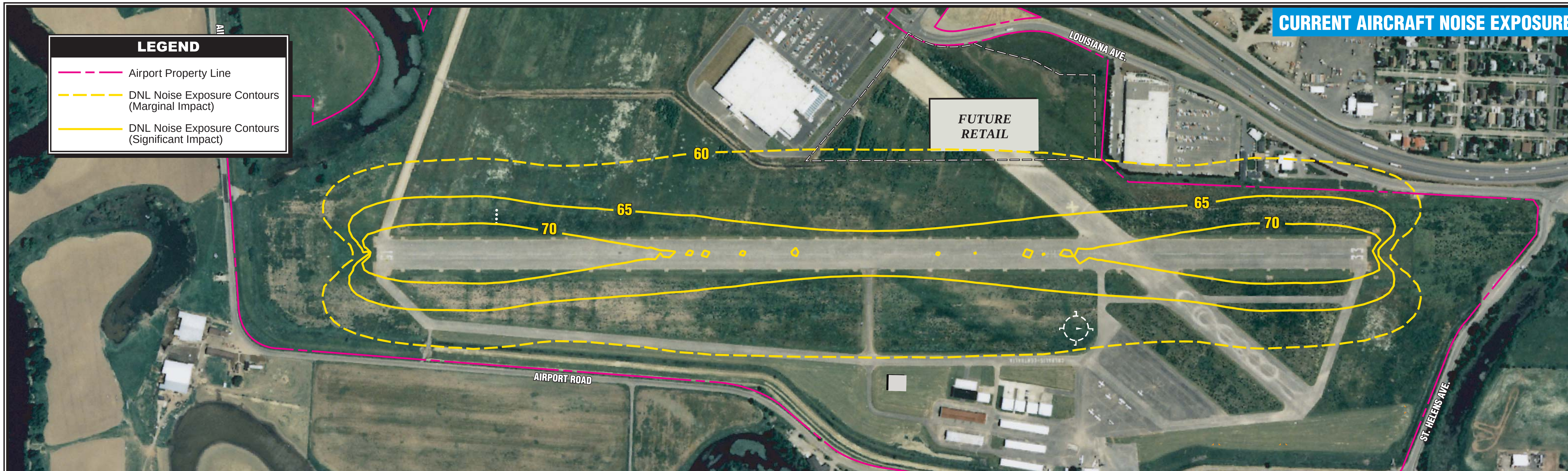
AIR QUALITY

Construction activities could cause short-term air quality impacts due to dust or other pollutants arising from clearing, excavation, paving, use of temporary haul roads, etc. Combustion in aircraft or vehicular engines also contributes to air pollution. Increased air and ground traffic at the airport is not likely to have a significant adverse air quality impact at the airport or surrounding area. Lewis County is not cited as a "non-attainment" area by the Environmental Protection Agency.

WATER QUALITY

Construction can have a temporary adverse effect on water quality. Contractors would be expected to follow regulations for control of pollution during activities such as construction of the parallel taxiway aprons and new entry road.

Sanitary sewers are expected to be extended as appropriate to all new facilities recommended in the Master Plan to avoid pollution. New fuel storage and dispensing facilities should be constructed to current standards and regularly inspected to avoid fuel



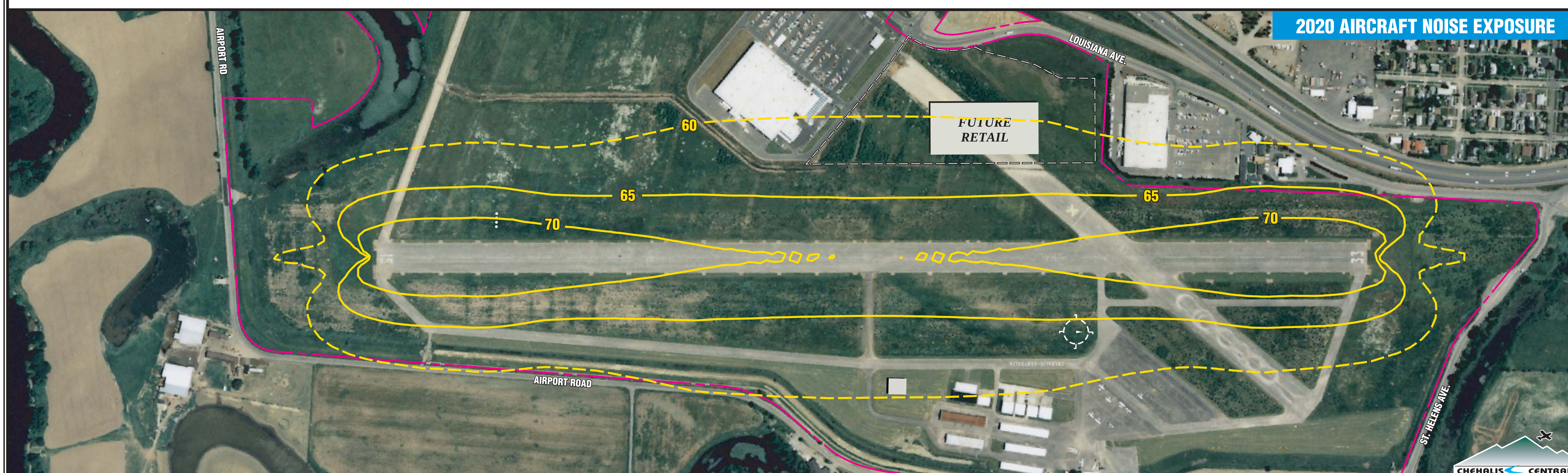


Exhibit 5B
AIRCRAFT NOISE EXPOSURE CONTOURS

contamination. Oil-water separators may be installed at aprons as appropriate.

AREAS OF UNIQUE INTEREST OR AESTHETICS

No areas of unique interest or aesthetic beauty exist on the airport.

PLANT AND WILDLIFE HABITAT

The airport site and surrounding urbanized areas have limited the variety and amount of plant and animal life. According to the Washington State Department of Fish and Wildlife and the City of Chehalis, no rare or endangered species exist at the airport. However, the potential exists for an analysis of impacts to the Chinook Salmon and/or Bull Trout habitat in the Chehalis River per the Endangered Species Act.

WETLANDS

Some wetlands occur on the eastern portion of the airport property. Existing and proposed private developments have or will conduct wetland delineation studies for each parcel and appropriate actions will be taken to secure permits required by the U.S. Army Corps of Engineers. The site drainage system needs to be maintained and/or upgraded to avoid the creation of new wetlands.

FLOODPLAINS

All Chehalis-Centralia Airport property lies within the floodplain of the Chehalis River. An extensive regional study by the Corps looked at various options to protect facilities from flood problems. Improvements at the airport include raising the height of the existing levy and expanding the levy system south along St. Helens Avenue. Funding for such improvements has not yet been obtained. It is unlikely that the airport may act unilaterally to raise or extend levies to protect the airport, as the entire regional flood control system is interrelated and interdependent. The airport has constructed an emergency aircraft parking pad near the proposed new entrance for use in flooding emergencies.

UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS

Proposed airport improvements or developments, as discussed above, should have no significant adverse effect on areas of unique or scenic beauty, water pollution, or air pollution. Increased runoff due to the creation of impermeable surfaces may require improved storm sewers, detention, and possible water quality treatment. One recommendation is to acquire private lands surrounding Airport Lake to ensure that overall airport drainage systems can be maintained and protected.

SHORT-TERM EFFECTS

Construction effects of the recommended capital improvement program can be mitigated by adherence to agency requirements or generally accepted practices, minimizing land exposure by use of temporary mulch or hydro-seeding, dust control of sites and construction roads, controlling site drainage with check dams and similar techniques, and treating water from construction activities to reduce sediments entering the Chehalis River.

LONG-TERM EFFECTS

Social, economic, and environmental effects of the proposed improvements or actions described in the Master Plan will be primarily positive, including increased airside and ground access safety and capacity, improved air system availability in Lewis County, and increased aviation-related economic activity with increased tax revenue and community jobs.

IRREVERSIBLE OR IRRETRIEVABLE COMMITMENTS OF RESOURCES

None of the proposed projects require resources that are irreversible or irretrievable except for funding, capital, and labor expended in the actual construction.

SUMMARY OF EFFECTS AND BENEFITS

Any short-term increase in noise or pollution due to construction, or in long-term air and noise pollution due to increased operations, occur in relatively tolerable ways, and should be more than offset by improved safety, air and ground access, and economic benefits, including increased employment and tax revenue. Improved air access may contribute to the decision of other industries to locate in the community.

However, it is understood that any future project would undergo a State Environmental Protection Agency review (SEPA). Should federal funding be involved a National Environmental Protection Agency (NEPA) review would be required.

AIRPORT LAYOUT PLANS

The remainder of this chapter provides a brief description of the official layout drawings for the airport that will be submitted to the FAA for review and approval. These plans, referred to as the Airport Layout Plans, have been prepared to graphically depict the ultimate airfield layout, facility development, and imaginary surfaces which protect the airport from hazards.

The documents summarized in this chapter are:

- Airport Layout Plan
- F.A.R. Part 77 Airspace Drawing

- Runway Approach/Plan and Profile - Runway 15 and 33
- On-Airport Land Use Map
- Property Map

AIRPORT LAYOUT PLAN

The Airport Layout Plan (ALP) for the Chehalis-Centralia Airport was prepared according to the criteria in the *FAA Advisory Circular 150/5300-13 (through Change 6)* and reflects the types of aircraft anticipated to use the airport throughout the forecast period and the proposed new 34:1 approach to Runway 15. Companion documents to the ALP set are the Airspace Drawing (Part 77) and the Runway Approach Plan and Profile - Runway 15 and 33 drawing.

F.A.R. PART 77 AIRSPACE DRAWING

This drawing was prepared in accordance with *FAA Federal Aviation Regulations, Part 77: Objects Affecting Navigable Airspace*. This regulation is intended to safeguard the operation into, out of, and around the airport. Subpart C of Part 77 sets standards for identifying obstructions to navigation by means of imaginary surfaces that establish vertical height limits for manmade and natural objects in the airspace above designated areas of the airport.

RUNWAY APPROACH/PLAN AND PROFILE - RUNWAY 15 AND 33

This drawing shows the plan and profile of the runway approach surfaces, with obstructions to navigation and their heights and locations relative to the approach surfaces shown for the active runway.

ON-AIRPORT LAND USE MAP

The On-Airport Land Use Map presents a plan for land use within the boundaries of the airport, with areas for general aviation activities, airfield operations, and existing and proposed commercial lease area development and the area that may be needed for drainage control and improvement.

AIRPORT PROPERTY MAP

The Airport Property Map depicts the original tracts of land acquired to form the airport and the methods of acquisition (Federal or local funds, surplus, etc.) as well as avigation easements. The existing Runway 15 avigation easement does not include the area proposed for the enlarged RPZ as needed to meet the precision approach minimums. A new easement or the acquisition of appropriate land will be required.

OFF-AIRPORT ZONING

The City of Chehalis and Lewis County have jurisdiction over lands adjacent to the airport. Present City zoning protection allows certain conditional uses that could adversely affect airport operation; new zoning is in the process of adoption, with adoption expected in September 2001. The new zoning will better protect the airport from the development of incompatible uses adjacent to airport property, based on noise. The airport property within the City currently falls under the ASD (Airport Services District) zoning, which is proposed to be changed to ASD EPF(A) zoning.

Like the County ordinances, the City zoning map protects against the construction of structures, including mobile, or the growth of trees that may penetrate the various imaginary surfaces in the approaches or sidelines. The County does not employ any zoning maps, but utilizes airport protection language based on the Part 77 Airspace Drawing of this Master Plan, and the Runway Approach Drawing, which addresses flight safety issues relating to obstructions.

The Airport Obstruction Zoning was adopted as Chapter 17.90 of the Lewis County Code. Other non-compatible uses, such as those affected by noise, are not addressed. As a practical matter, floodplain areas to the north of Runway 15 and treatment plant facilities to the south preclude the development of residential neighborhoods that would be affected by noise. The City should consider eliminating the possibility that incompatible conditional uses could be approved.

EXISTING RUNWAY END COORDINATES			
RUNWAY	LATTITUDE	LONGITUDE	ELEVATION
RUNWAY 15	46°40'12.6"	122°58'56.5"	167.7'
RUNWAY 33	46°41'02.0"	122°58'59.3"	173.0'

PROPOSED MODIFICATION OF STANDARDS

ITEM	AIRPLANE DESIGN GROUP EXIST.	AIRPLANE DESIGN GROUP FUT.	STANDARD EXIST.	STANDARD FUT.	NON-STANDARD CONDITION EXIST.	NON-STANDARD CONDITION FUT.	REMARKS	APPROVAL DATE
TAXIWAY T-04	B-II	B-II	240	300	225		CONSTRUCT NEW TAXIWAY	

RUNWAY DATA

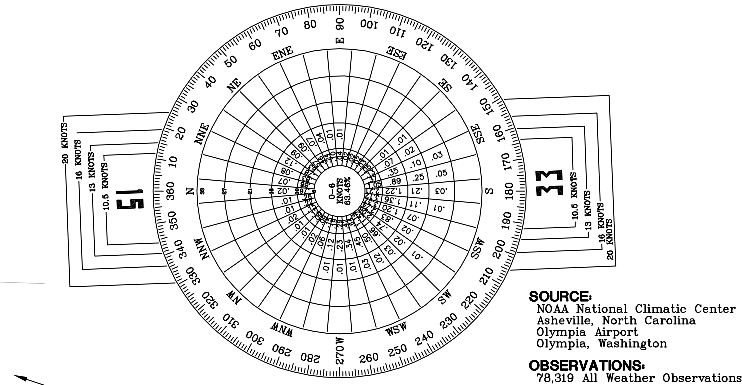
ITEM	RUNWAY 15-33 EXIST.	FUTURE
RUNWAY WIDTH AND LENGTH	150'x5000'	SAME
FAR PART 77 CATEGORY	VISUAL/ VISUAL	NP/V
RUNWAY LIGHTING	MEDIUM INTENSITY	SAME
RUNWAY SAFETY AREA	150'x5600'	SAME
RUNWAY OBJECT FREE AREA	500'x5600'	SAME
RUNWAY OBSTACLE FREE ZONE	400'x5400'	SAME
THRESHOLD SITING CRITERIA		
APPROACH VISIBILITY MINIMUMS	VISUAL/ VISUAL	3/4 MILE/V
INSTRUMENT RUNWAY	YES	YES
NAVIGATIONAL AIDS	NONE	GPS (RNAV)
LANDING AIDS	PAPI/VASI	SAME
APPROACH SURFACES	20:1/20:1	34:1/20:1
PAVEMENT STRENGTH	30,000 SINGLE 85,000 DUEL	SAME
PAVEMENT TYPE	PCC	SAME
EFFECTIVE RUNWAY GRADIENT%	0.12%	SAME
MAX R/W GRADIENT	0.15%	SAME
% WIND COVERAGE (13/10.5 KNOTS)	99.4	SAME
AIRPORT REFERENCE CODE	B-II	B-II
RUNWAY LINE-OF-SIGHT	CRITERIA MET	CRITERIA MET
CRITICAL AIRCRAFT	CITATION JET	CITATION JET
RUNWAY MARKING	BASIC	INSTRUMENT

AIRPORT DATA

ITEM	EXISTING	FUTURE
AIRPORT ELEVATION	173.0	SAME
AIRPORT REFERENCE POINT (ARP)	LAT: 46°40'36" LONG: 122°58'41"	SAME
MEAN MAX. TEMP OF HOTTEST MONTH	77.1° F	
AIRPORT PROPERTY (ACRES)	319.2	APPROX. 420
UNICOM (MHZ)	128.8	128.8
NPIAS CATEGORY	GENERAL AVIATION	SAME
CONTROL TOWER	NONE	SAME
AIRPORT MAGNETIC VARIATION	21°30'00"	SAME
TAXIWAY LIGHTING	INTERSECTIONS ONLY	ALL TAXIWAYS
WEATHER REPORTING EQUIP.	NONE	AWOS

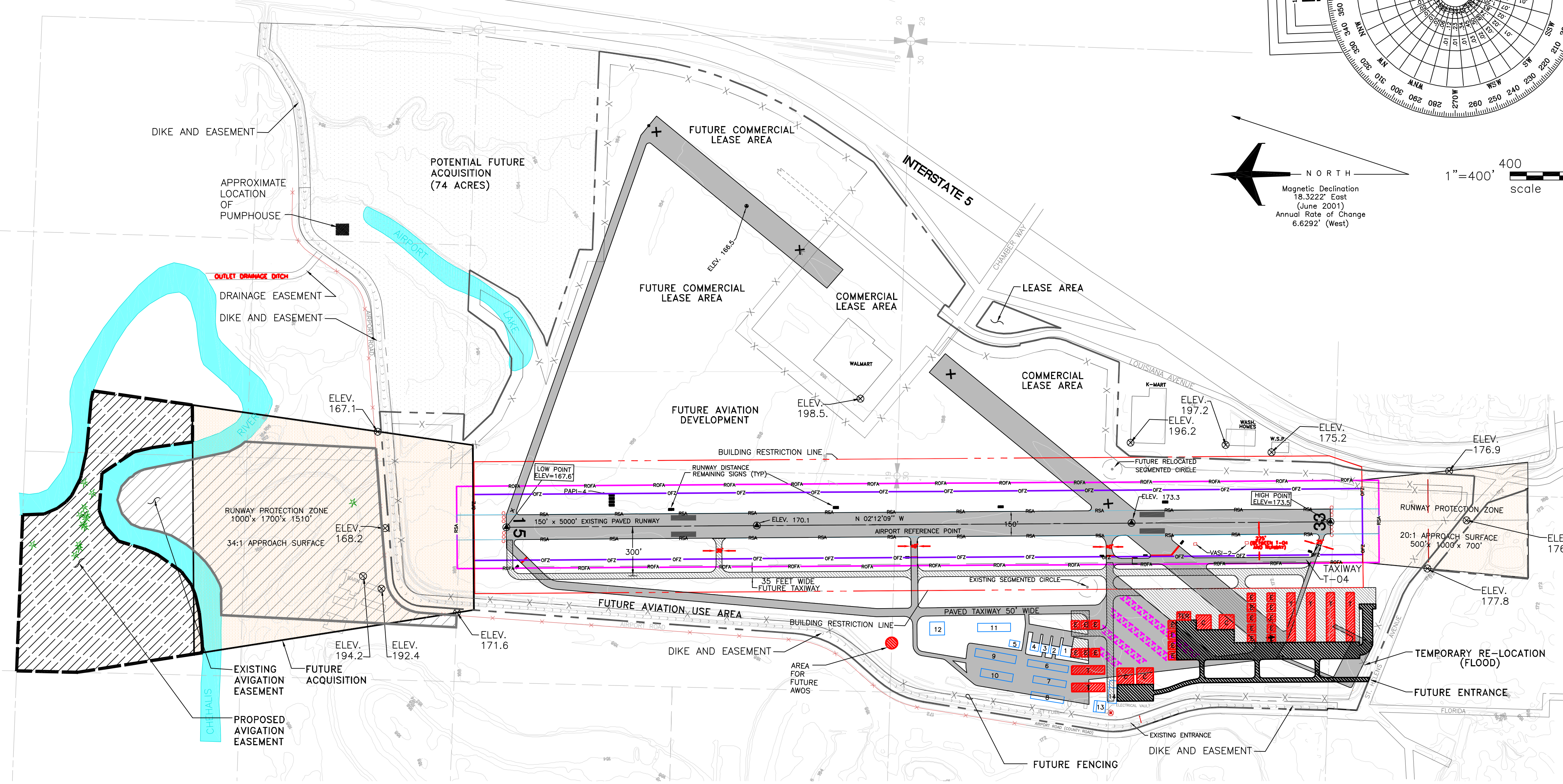
ALL WEATHER WIND COVERAGE

Runways	10.5 Knots	13 Knots	16 Knots	20 Knots
Runway 15-33	97.56%	98.90%	99.86%	99.98%



SOURCE:
NOAA National Climatic Center
Asheville, North Carolina
Olympia Airport
Olympia, Washington

OBSERVATIONS:
78,319 All Weather Observations
1991-2000



PROJECT MANAGER:
D.K. FORSSEN, P.E.

PROJECT ENGINEER:
NICOLE CAUBLE

TECHNICIAN:
GLENN RIMANDO

SCALE:
1" = 400'

DATE:
SEPTEMBER 13,2001

CHECKED BY:
GEORGE BULEY

LEGEND

AIRPORT PROPERTY	
BUILDINGS	1
BUILDING RESTRICTION LINE (BRL)	
CENTERLINE	
OBSTACLE FREE ZONE	OFZ
RUNWAY OBJECT FREE AREA	ROFA
RUNWAY SAFETY AREA	RSA
RUNWAY PROTECTION ZONE	
LAND FILLED LEVEE	
SURVEY MONUMENT (W/ ELEVATIONS)	ELEV
FENCE	
RUNWAY SAFETY AREA BOUNDARY	
TAXIWAY IDENTIFIER	
RUNWAY END INDENTIFIER LIGHTS (REIL)	
AIRCRAFT TIE DOWN POSITION	
PAVED SURFACE	
SIGN	
ELEVATIONS	
TREES	

EXISTING BUILDINGS*

1 EXECUTIVE HANGAR
2 EXECUTIVE HANGAR
3 EXECUTIVE HANGAR
4 EXECUTIVE HANGAR
5 EXECUTIVE HANGAR
6 T-HANGAR
7 T-HANGAR
8 T-HANGAR
9 T-HANGAR
10 T-HANGAR
11 EXECUTIVE HANGAR
12 CONVENT. HANGAR
13 FBO/MAINTENANCE
14 EXECUTIVE HANGAR

*NO BUILDINGS EXCEEDING 25'.

ULTIMATE BUILDINGS*

ULTIMATE ROADS/AUTO PARKING
ULTIMATE TAXIWAY/APRON
ULTIMATE BUILDINGS

E = EXECUTIVE HANGARS
T = T-HANGARS
C = CONVENTIONAL HANGARS
TER = TERMINAL

*NO BUILDINGS EXCEEDING 25'.

MISC.

FUTURE APPROACH AQUISITION
EXISTING AVIGATION EASEMENT

REVISIONS

NO.	DATE	BY	APPR.	REVISIONS

CHEHALIS-CENTRALIA AIRPORT BOARD

APPROVED BY:

DATE:

FEDERAL AVIATION ADMINISTRATION

APPROVED BY:

DATE:

CHEHALIS CENTRALIA AIRPORT

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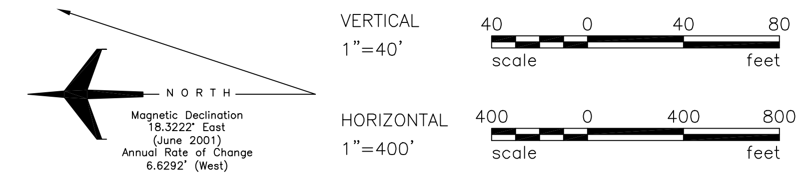
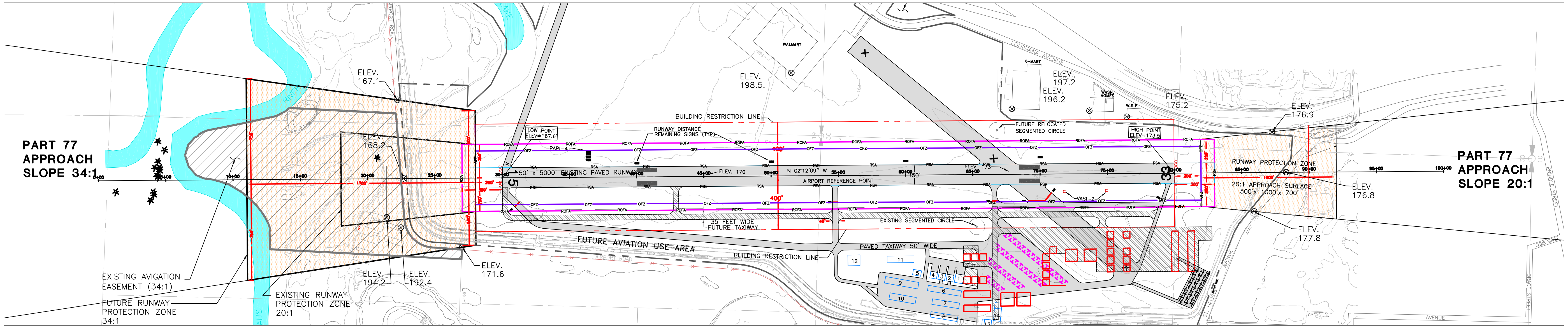
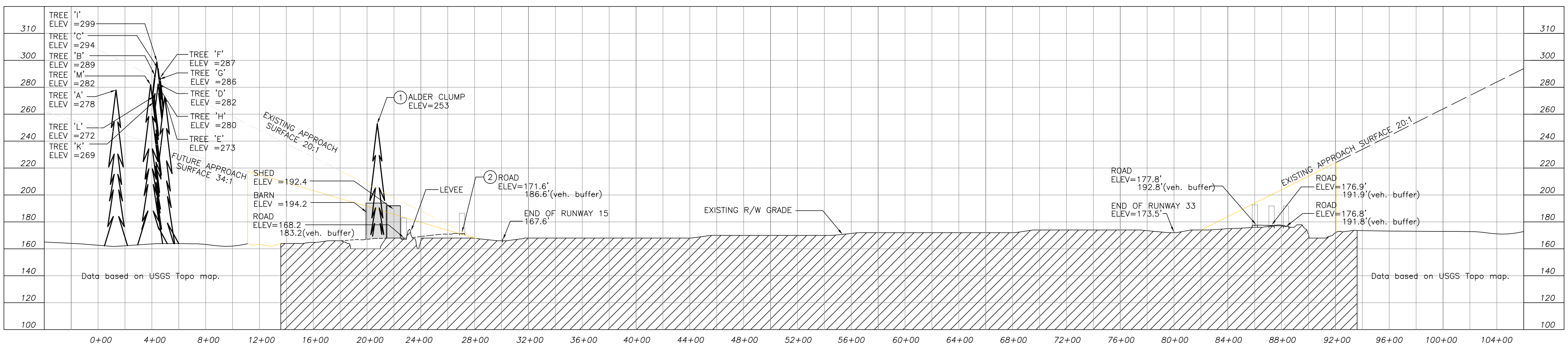
AIRPORT LAYOUT PLAN

Sheet 1







PROJECT MANAGER:
D.K. FORSSEN, P.E.

PROJECT ENGINEER:
NICOLE CAUBLE

TECHNICIAN:
GLENN RIMANDO

SCALE:
VERTICAL 1" = 40'
HORIZONTAL 1" = 400'

DATE:
AUGUST 28,2001

CHECKED BY:
GEORGE BULEY

OBSTRUCTIONS RUNWAY 15

NOTE: THERE ARE NO OBSTRUCTIONS TO RUNWAY 33 APPROACH

OBSTRUCTION	DESCRIPTION	ELEVATION	PENETRATION	PROPOSED ACTION	OBSTRUCTION	DESCRIPTION	ELEVATION	PENETRATION	PROPOSED ACTION
1	'ALDER CLUMP'	253'	43.8'	REMOVE	TREE 'G'	'TREE'	286'	49'	REMOVE
2	ROAD (SE Elevation)	171.6' 186.6'(veh. buffer)	4.0' 19.0'(veh. buffer)	ANALYSIS	TREE 'H'	'TREE'	280'	37'	REMOVE
TREE 'A'	'TREE'	278'	31'	REMOVE	TREE 'I'	'TREE'	299'	62'	REMOVE
TREE 'B'	'TREE'	289'	51'	REMOVE	TREE 'K'	'TREE'	269'	31'	REMOVE
TREE 'C'	'TREE'	294'	57'	REMOVE	SHED	SHED	192	77'	REMOVE
TREE 'D'	'TREE'	282'	45'	REMOVE	BARN	BARN	194	68'	REMOVE
TREE 'E'	'TREE'	273'	37'	REMOVE					
TREE 'F'	'TREE'	287'	50'	REMOVE					

CHEHALIS CENTRALIA
A · I · R · P · O · R · T

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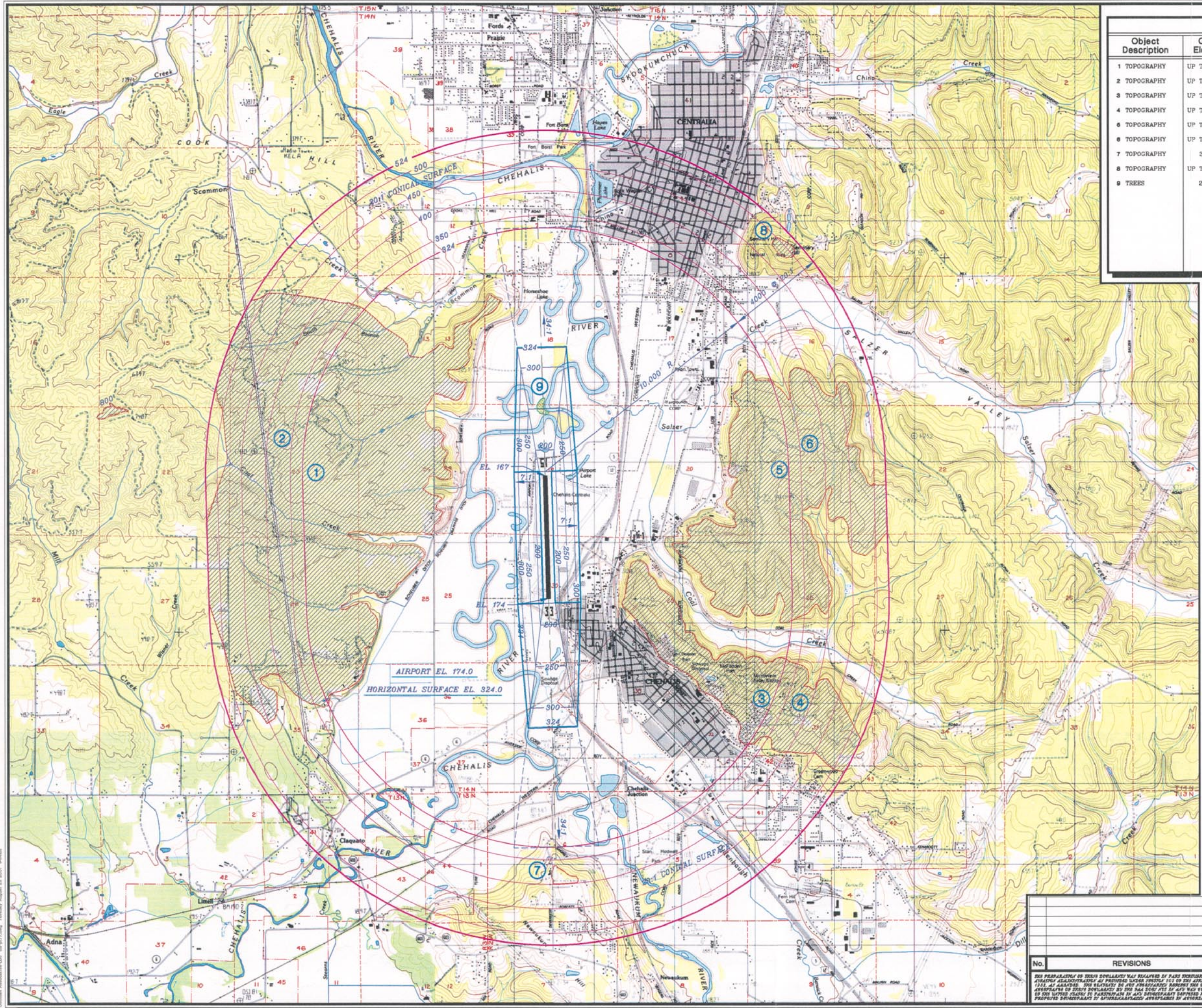
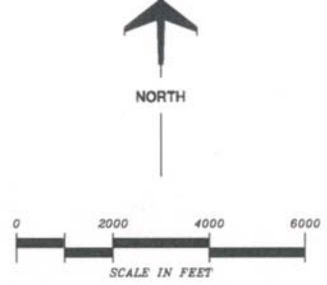
RUNWAY APPROACH
PLAN AND PROFILE-RUNWAY 15 AND 33

Sheet 2



OBSTRUCTION TABLE

Object Description	Object Elevation	Obstructed Part 77 Surface	Surface Elevation	Object Penetration	Proposed Object Disposition
1 TOPOGRAPHY	UP TO 560 MSL	HORIZONTAL SURFACE	324 MSL	236'	REQUEST AERONAUTICAL STUDY
2 TOPOGRAPHY	UP TO 640 MSL	20:1 CONICAL SURFACE	350 MSL	290'	REQUEST AERONAUTICAL STUDY
3 TOPOGRAPHY	UP TO 660 MSL	HORIZONTAL SURFACE	324 MSL	336'	REQUEST AERONAUTICAL STUDY
4 TOPOGRAPHY	UP TO 692 MSL	20:1 CONICAL SURFACE	330 MSL	362'	REQUEST AERONAUTICAL STUDY
5 TOPOGRAPHY	UP TO 624 MSL	HORIZONTAL SURFACE	324 MSL	300'	REQUEST AERONAUTICAL STUDY
6 TOPOGRAPHY	UP TO 624 MSL	20:1 CONICAL SURFACE	330 MSL	294'	REQUEST AERONAUTICAL STUDY
7 TOPOGRAPHY	391 MSL	20:1 CONICAL SURFACE	389 MSL	2'	REQUEST AERONAUTICAL STUDY
8 TOPOGRAPHY	UP TO 540 MSL	20:1 CONICAL SURFACE	500 MSL	40'	REQUEST AERONAUTICAL STUDY
9 TREES	299 MSL	34:1 APPROACH SURFACE	250 MSL	49'	REQUEST AERONAUTICAL STUDY



OBSTRUCTION LEGEND

- OBSTRUCTION
- TOPOGRAPHY
- MULTIPLE OBSTRUCTIONS (TREES)

GENERAL NOTES:

1. Obstructions, clearances, and locations are calculated from ultimate runway and elevations and ultimate approach surfaces, unless otherwise noted.
2. Existing and future height and hazard ordinances are to be amended and/or referenced upon approval of updated F.A.R. PART 77 AIRSPACE DRAWING.

No.	REVISIONS	DATE	BY	APP'D.

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.

CHEHALIS-CENTRALIA AIRPORT
F.A.R. PART 77 AIRSPACE DRAWING
Chehalis, Washington

PLANNED BY: Stephen C. Wagner
DETAILED BY: Larry D. Johnson
APPROVED BY: Stephen C. Wagner

September 13, 2001

Sheet 3

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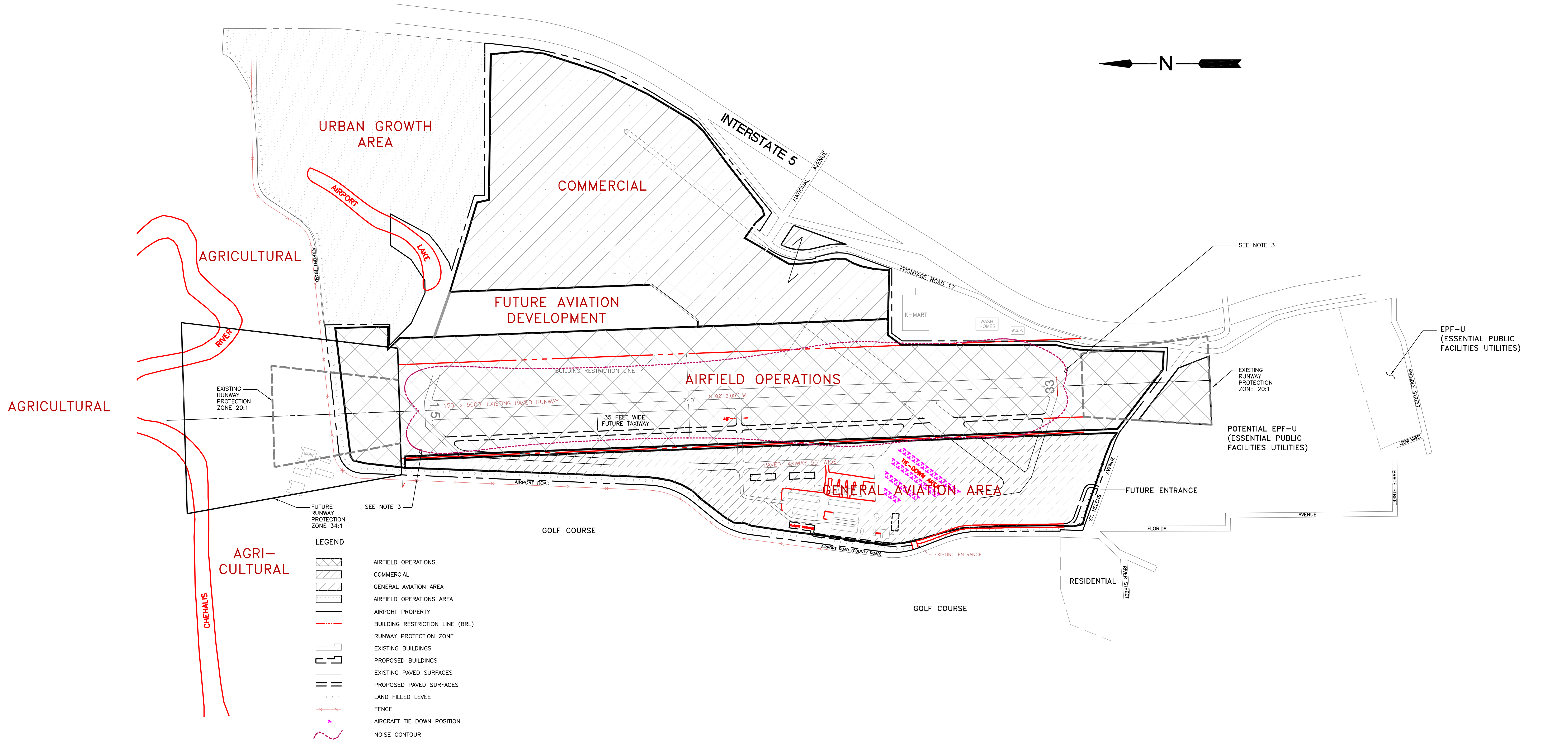

PROJECT MANAGER:
D.K. FORSSEN, P.E.

PROJECT ENGINEER:
NICOLE CAUBLE

TECHNICIAN:
GLENN RIMANDO

SCALE:
1" = 400'

DATE:
SEPTEMBER 13, 2001

CHECKED BY:
GEORGE BULEY

NOTE:
1. CHEHALIS–CENTRALIA AIRPORT OBSTRUCTION ZONING ADOPTED BY LEWIS COUNTY AS CHAPTER 17.90 LCC MAY 2000.

2. THE AIRPORT IS LOCATED IN A FLOODPLAIN.

3. AIRCRAFT NOISE EXPOSURE CONTOUR (65 DNL). FORECAST FOR 2020.

CHEHALIS CENTRALIA AIRPORT

LAND USE MAP

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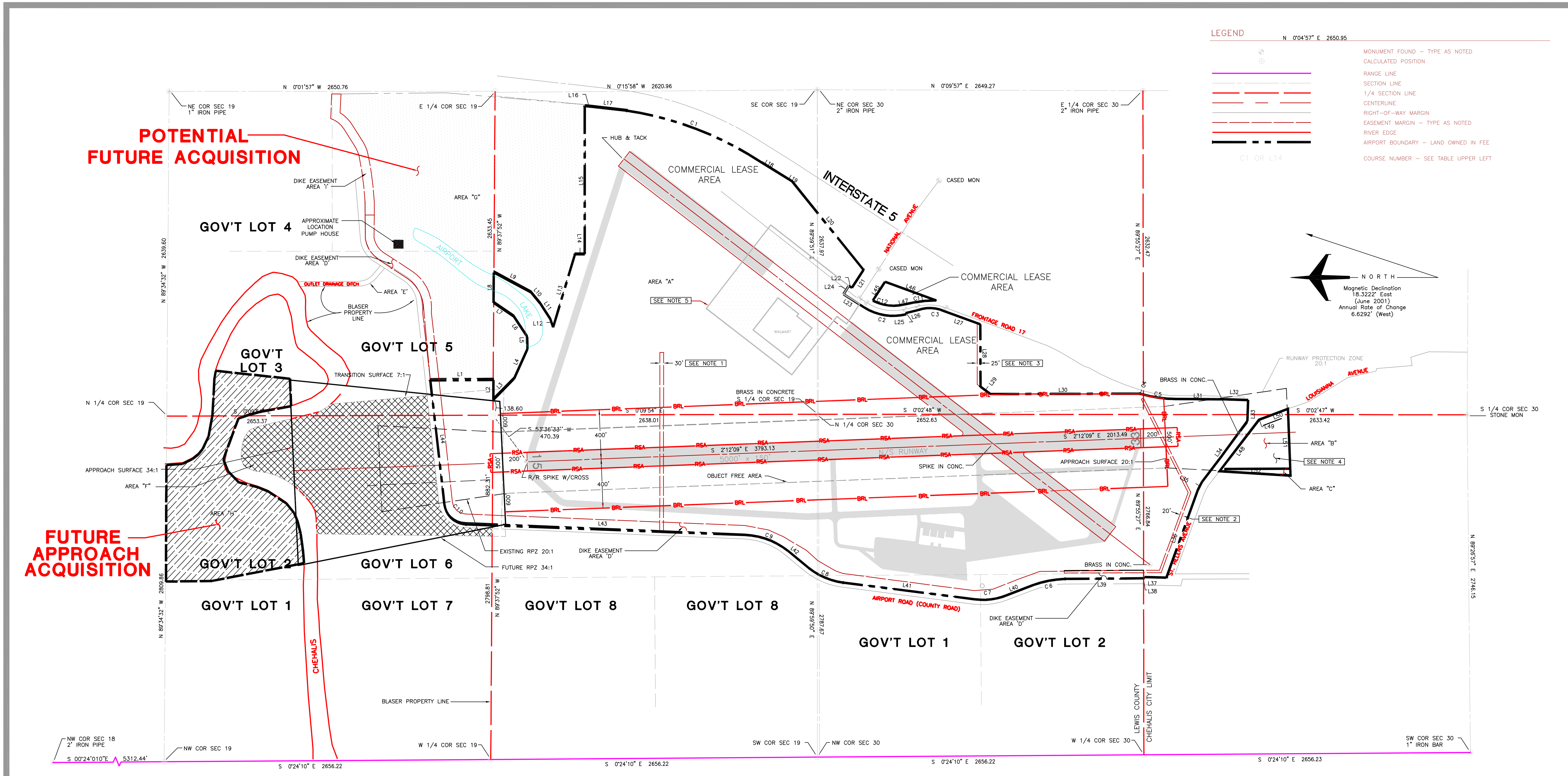
Coffman Associates Airport Consultants

Sheet 4



LINE	BEARING	DISTANCE
L1	S 0°09'54" E	513.37
L2	N 89°37'52" W	161.41
L3	S 45°18'28" E	241.16
L4	S 65°37'52" E	264.00
L5	N 89°22'08" E	99.00
L6	N 56°37'08" E	198.00
L7	N 34°22'08" E	198.00
L8	S 89°37'52" E	247.08
L9	S 28°10'57" W	343.10
L10	S 50°41'04" W	120.00
L11	S 57°13'04" W	150.00
L12	S 71°39'04" W	70.00
L13	S 73°10'56" E	619.40
L14	S 0°12'56" E	79.73
L15	S 89°49'02" E	1204.54
L16	S 5°32'32" W	51.58
L17	S 6°31'43" W	292.11
L18	S 31°59'20" W	292.11
L19	S 32°58'32" W	169.50
L20	S 51°15'17" W	924.61
L21	N 57°01'59" W	173.99
L22	N 32°51'03" E	30.08
L23	N 57°08'57" W	80.00
L24	S 32°51'03" W	198.58
L25	N 76°25'28" E	10.00
L26	S 13°34'32" E	106.32

LINE	BEARING	DISTANCE
L27	S 19°54'51" W	308.86
L28	S 89°57'39" W	508.30
L29	S 36°36'39" W	100.72
L30	S 0°02'48" W	1216.05
L31	S 0°28'53" W	398.29
L32	S 1°47'19" W	189.58
L33	N 87°55'41" W	182.42
L34	N 52°28'41" W	607.76
L35	N 62°29'26" W	77.68
L36	N 70°07'18" W	754.00
L37	N 1°32'53" E	178.49
L38	S 89°55'27" W	10.01
L39	N 0°11'57" W	645.80
L40	N 20°54'36" W	233.17
L41	N 7°24'17" E	1073.42
L42	N 39°38'30" E	206.21
L43	N 2°21'24" E	2272.05
L44	N 83°41'27" E	1014.39
L45	S 57°01'59" E	182.17
L46	S 19°52'49" W	444.09
L47	N 13°34'32" W	106.32
L48	S 52°28'41" E	527.13
L49	S 02°04'19" W	8.27
L50	S 21°25'28" E	244.70
L51	S 87°47'51" E	542.99
L52	N 03°30'29" E	579.06

CURVE	ARC	DELTA	RADIUS	TAN LENGTH
C1	1015.62	21°25'59"	2715.00	513.82
C2	355.86	46°25'35"	439.17	188.35
C3	215.57	33°29'23"	368.80	110.96
C4	7.70	0°12'52"	2057.82	3.85
C5	287.69	15°58'26"	1031.88	144.78
C6	262.41	20°42'40"	725.95	132.65
C7	271.45	28°18'53"	549.28	138.55
C8	312.52	32°14'13"	555.46	160.52
C9	385.87	37°17'06"	592.97	200.05
C10	261.10	81°20'03"	261.09	158.02
C11	162.62	21°14'03"	438.80	161.70
C12	259.47	41°23'30"	359.17	253.88

NOTES:

1. EASEMENT FOR ROADWAY, INGRESS AND EGRESS, TITLE REPORT DOES NOT LIST SECTION, TOWNSHIP AND RANGE. TELEPHONE CONVERSATION WITH TITLE COMPANY PLACES EASEMENT IN SECTION 19, TOWNSHIP 14 NORTH, RANGE 2 WEST, W.M., TO CITY OF CHEHALIS (?).
2. EASEMENT FOR WATER MAIN AND TRANSMISSION LINE TO CITY OF CHEHALIS, A.F.N.'S 883401 AND 880099.
3. LEASE AFFECTING PROPERTY. LESSOR IS CITY OF CHEHALIS. LESSEES ARE RAINIER FUND, A.F.N. 861250, AND S. JAMES TUFFREE, TRUST NUMBER ONE, A.F.N.'S 876775 AND 874939.
4. EASEMENT FOR UNDERGROUND UTILITY CONTRUCTION, MAINTENANCE AND OPERATION, A.F.N 907467.
5. WALMART PROPERTY–FAA APPROVED RELEASE OF LAND.

PROPERTY DATA TABLE

AREA	INTEREST	AREA (AC)	BOOK & PAGE/ RECEPTION NO.	LEWIS CO. AUDITOR	DATE ACQUIRED
AREA 'A'	FEE	320.434	–	–	1945
AREA 'B'	FEE	4	257–674	83756	1983
AREA 'C'	FEE	.3	256–383	83499	1982
AREA 'D' (DIKE)	EASEMENT	–	258–127	364572	1942
AREA 'E'	EASEMENT			364569	1942

AREA	INTEREST	AREA (AC)	BOOK & PAGE/ RECEPTION NO.	LEWIS CO. AUDITOR	DATE ACQUIRED
AREA 'F'	EASEMENT	31.5	53–583	83–200185–2	1982
AREA 'G'	FEE	74	N/A		FUTURE
AREA 'H'	FEE OR EASEMENT	19	N/A		FUTURE
AREA 'I'	EASEMENT	–	258–133,134	–	–
–	–	–	–	–	–

PROJECT MANAGER: D.K. FORSSEN, P.E.

PROJECT ENGINEER: NICOLE CAUBLE

TECHNICIAN: GLENN RIMANDO

SCALE: 1" = 400'

DATE: SEPTEMBER 11, 2001

CHECKED BY: GEORGE BULEY

CHEHALIS CENTRALIA AIRPORT

AIRPORT PROPERTY MAP 'EXHIBIT A'

ENTRANCO www.entranco.com

Coffman Associates Airport Consultants

Sheet 5

FINANCIAL PLAN

The successful implementation of the Chehalis-Centralia Airport Master Plan will require sound judgement on the part of the Chehalis-Centralia Airport Board. Among the more important factors influencing decisions to carry out a recommendation are timing and airport activity. Both of these factors should be used as references in plan implementation.

Experience indicates that the standard format of many planning documents does not allow the flexibility needed to adapt to new issues that develop from unforeseen changes. The demand-based format used in the development of this master plan allows flexibility in this respect.

While it is necessary for scheduling and budgeting purposes to consider the timing of airport development, the actual need for facilities is established by airport activity. Proper master planning implementation suggests the use of airport activity levels rather than time as guidance for development. Tracking

airport activity levels and then comparing these to forecast activity levels and facility requirements provides decision-makers with the ability to anticipate and plan for real-time facility need.

This chapter of the Master Plan is intended to become a primary reference for decision-makers responsible for implementing master plan recommendations. Consequently, the narrative and graphic presentations provide an understanding of each recommended development item. This understanding will be critical in maintaining a realistic and cost-effective program that provides maximum benefit to the Chehalis-Centralia Airport Board, the FAA, and airport users.

The presentation of the financial plan has been organized into two sections. First, the airport development schedule is presented in narrative and graphic form. Secondly, airport improvement funding sources on the federal, state, and local levels are identified and discussed.

AIRPORT DEVELOPMENT SCHEDULE AND COST SUMMARIES

The airport development schedule presented in this chapter estimates the costs for each recommended project and approximates when development should take place. The program outlined on the following pages has been evaluated from a variety of perspectives and represents the culmination of a comparative analysis of basic budget factors, demand, and priority assignments.

Since forecast demand and operational changes can fluctuate (frequently with little notice), the airport development schedule has been divided into planning horizons, reflecting short term (0-5 years), intermediate (6-10 years), and long term (10-20 years) goals and needs. Planning horizons are intended to reflect the fact that many future improvements for the airport are demand-based, rather than time-based, and that the actual need to improve facilities will be linked to specific and verifiable activity. The airport development schedule should be viewed as a fluid document which can be modified to reflect actual growth in airport activity. The short-term planning period covers items of highest priority.

Table 6A summarizes the airport development schedule for Chehalis - Centralia Airport. In addition to the listing of actual improvement projects, an estimate has been made of the timing for implementation and federal and state funding eligibility for each airport improvement project as well as the local share costs for completing the recommended improvements. Due to the conceptual nature of a master plan, implementation of capital improvement projects should occur only after further refinement of their design and costs through engineering and/or architectural analyses. Capital costs in this chapter should be viewed only as estimates subject to further refinement during design. Nevertheless, these estimates are considered sufficient for performing the feasibility analyses in this chapter.

SHORT TERM PLANNING HORIZON IMPROVEMENTS

As indicated above, the short term program is presented within a five-year time frame, in order of importance, to assist in capital improvement programming. Development projects for the short term have been planned according to priority needs. Consolidating and grouping projects into one planning period, in lieu of year-by-year project planning, will allow the Airport Board to address immediate needs at the airport. Also, as funding for these projects is requested, the potential exists for several of these projects to be funded in one year's grant cycle.

TABLE 6A Capital Improvement Program (CIP) Chehalis-Centralia Airport				
	Project	**Total Cost**	**FAA Share**	**Local Share**
SHORT TERM PROGRAM				
1.	Land Acquisition/Tree Removal	$80,000*	$72,000	$8,000
2.	RPZ Land Acquisition (Dairy Farm area)	340,000	306,000	34,000
3.	Land Acquisition for Airport Drainage	400,000*	40,000	360,000
4.	Design and Construct New Access Road	423,200*	380,880	42,320
5.	Install AWOS III/PAPIs/REILs/ODALS	375,000	337,500	37,500
6.	Security Fencing	72,000*	64,800	7,200
7.	Rehabilitate Beacon Tower	10,000*	9,000	1,000
8.	Taxilane/Apron Rehab and Reconstruction	146,000*	131,400	14,600
9.	Utilities Improvements	250,000	0	250,000
10.	Construct New Terminal/Apron/Parking Lots	535,200	481,680	53,520
11.	Construct Fuel Facilities	150,000	0	150,000
12.	Construct T-Hangars/Conventional Hangar	780,000	0	780,000
SHORT TERM TOTAL		$3,561,400	$1,823,260	$1,738,140
INTERMEDIATE TERM PROGRAM				
13.	New N/S Taxiway	$290,000	$261,000	$29,000
14.	Construct Apron/Parking Lots	1,574,000	1,416,600	157,400
15.	Construct T-Hangars/Conventional Hangar	780,000	0	780,000
16.	Pavement Rehabilitation - 5 Year Program	500,000	450,000	50,000
17.	Drainage Improvements: Taxiways, Airport Lake, and Restore Old System	1,250,000*	1,125,000	125,000
INTERMEDIATE TERM TOTAL		$4,394,000	$3,252,600	$1,141,400
LONG TERM PROGRAM				
18.	Construct Apron/Parking Lots	$940,000	$846,000	$94,000
19.	Hangars	1,560,000	0	1,560,000
20.	Construct Parallel Taxiway	920,000	828,000	92,000
21.	Pavement Rehabilitation - 10 Year Program	1,000,000	900,000	100,000
LONG TERM TOTAL		$4,420,000	$2,574,000	$1,846,000
TOTAL PROGRAM COSTS		$12,375,400	$7,649,860	$4,725,540
Cost estimates (*) prepared by Entranco, Inc. All others prepared by Coffman Associates.				

The short term planning horizon outlines the anticipated capital needs of the airport over the next five years. **Short term planning horizon**

improvements are estimated to cost approximately $3.6 million.

Proposed Improvements

Based upon previous facility information, improvements are needed to better accommodate both user and to meet FAA requirements. Likewise, in order to best operate the airport at ARC B-II standards, with not less than 3/4 mile visibility (Runway 15) and not less than 1 mile visibility (Runway 33), the following short term CIP projects are proposed:

1. **Land Acquisition/Tree Removal**. Negotiation has begun for fee simple acquisition of approximately 21 acres of land at the northwest end of the airport to meet RPZ safety area dimensions. Of the $80,000 proposed for funding, $10,000 is for removal of trees that breach the approach surface.

2. **RPZ Land Acquisition (Dairy Farm area)**. This project proposes to acquire all or part of the dairy farm located at the northwest corner of the plan and within the RPZ. Control of the portion of land that lies within the RPZ is required by the FAA to secure the approach surfaces. This project would allow fee simple acquisition of all or part of the land and existing structures and removal of those conflicting structures.

3. **Land Acquisition for Airport Drainage**. Acquisition of 74 acres on the north side of the airport would allow the Airport Board to control the property, improve drainage, and prohibit incompatible development. A portion of this land would be eligible for FAA funding as it lies adjacent to the RPZ. This has been indicated in **Table 6A** as a 10 percent FAA match, with the balance coming from local funding.

4. **Design and Construct New Access Road**. A 2,000 linear foot drive and new entranceway for public access is proposed to be located on the south side of the airport off St. Helen's Road. This is a high priority, not only as an access facility to the new terminal and hangar areas, but also as a safety feature as numerous near miss accidents have occurred over the years by the existing entrance that is very difficult to negotiate.

5. **Install AWOS III/PAPIs/REILs/ODALs**. As one of the conditions for a precision approach, the AWOS III will provide for barometric pressure sensing for a real time altimeter reading at Chehalis-Centralia Airport. The estimate includes visual approach lighting (PAPIs) for Runway 33, ODALs for Runway 15, and REILs for Runway 15.

6. **Security Fencing**. The airport perimeter is currently uncontrolled. The airport experiences intrusions, theft, and trespassing on a constant basis. This project will enclose the airport perimeter with security fencing with controlled access.

7. **Rehabilitate Beacon Tower**. This structure is severely weathered, with illegible markings and needs rehabilitation to meet FAA standards.

8. **Taxilane/Apron Rehab and Reconstruction**. This project proposes to rehabilitate specific taxiways that are so deteriorated that they provide a hazard to transiting aircraft. These areas have been identified by the pavement study to be in poor condition.

9. **Utilities Improvements**. This project proposes to upgrade existing airport utilities, including sanitary sewer, water, and underground electrical lines.

10. **Construct New Terminal/ Apron/Parking Lots/E/W Taxilane**. The facility needs analysis identified a need for terminal, hangar, and parking lot space. As the new terminal is built a new apron will also be constructed to provide for additional itinerant parking, especially for turboprop and business jet aircraft adjacent to the new fuel facility. The new terminal building is dimensioned at 2,800 square feet. Grading and paving costs are estimated for both apron area and taxiway, running east and west in alignment with the existing connector Taxiway 3. The apron area is estimated at 1,700 square yards, while the taxiway includes 3,778 square yards. The two auto parking lots, located at the new terminal site and in conjunction with the existing public parking lot, include 5,000 square yards of paving. The cost estimate also includes $77,800 for lighting and signage.

11. **Construct Fuel Facilities**. This estimate includes the cost of installation of two 12,000 gallon above ground fuel tanks, self-service island relocation for 100 LL, and purchase of a fuel truck for jet fuel service, meeting the needs determined by the facility requirements analysis, and to promote fuel sales for a latent jet fuel market. Should a paved pad site and fencing for the fuel storage area be desired these may be estimated at additional cost. Also included in this estimate is the cost for a 800 linear foot drive to connect the fuel storage area with the entrance drive and to also access the new T-hangars.

12. **Construct T-Hangars/ Conventional Hangar**. This cost estimate includes the estimate for a 14 unit T-hangar and one conventional hangar (10,000 square feet). Temporary parking facilities for the T-hangar are planned until permanent paving is installed during the intermediate term of the CIP development.

Exhibit 6A provides a graphical depiction of short term planning horizon improvements.

INTERMEDIATE PLANNING HORIZON

Intermediate planning horizon improvements continue pavement preservation and rehabilitation and T-hangar and conventional hangar development. Executive hangars are planned to be built on demand by the lessee. Associated projects include: apron area and parking lot construction and utility improvements. **Total intermediate planning horizon improvements are estimated to cost approximately $4.4 million.**

13. **New N/S Taxiway**. A new north-south taxiway is included in this estimate that connects all new facilities with Taxiway 3 and the end connector to Runway 33, estimated at 1,150 linear feet of 40-foot wide surface, requiring 5,100 square yards of paving. This project should run concurrently with the above facilities.

14. **Construct Apron/Parking Lots**. The estimate for this project includes the apron area for the second set of T-hangars (2,500 square yards), the second conventional hangar (10,000 square yards), and the executive hangars (2,500 square yards). Although the executive hangars are not proposed to be developed by the Airport Board, the service facilities should be provided to encourage development. Parking lots for each hangar area are also included in the cost estimate (6,300 square yards), in addition to completing the paving for the internal drive. This project should run concurrent with the following hangar project.

15. **Construct T-Hangars/Conventional Hangar**. This cost estimate includes the costs for both one set of 14 unit T-hangars and one conventional hangar (10,000 square feet).

16. **Pavement Rehabilitation** - 5 Year Program. This cost covers five years of pavement maintenance, at $100,000 per annum.

17. **Drainage Improvements: Taxiways, Airport Lake, and Restore Old System**. Drainage improvements to these areas would allow safe and efficient airport drainage.

Exhibit 6A provides a graphical depiction of intermediate planning horizon improvements.

LONG TERM PLANNING HORIZON

By the end of the long term planning horizon, the airport is expected to have 100 based aircraft and have an annual traffic volume of nearly 62,000 operations. Improvements over the long term planning horizon are designed to keep the airport apace with projected based aircraft and operational needs.

As the airport exceeds intermediate planning horizon operational milestones, it will be necessary to construct additional hangars and their associated facilities (parking areas and apron areas). **Total long term**

00MP02-6B-7/5/01

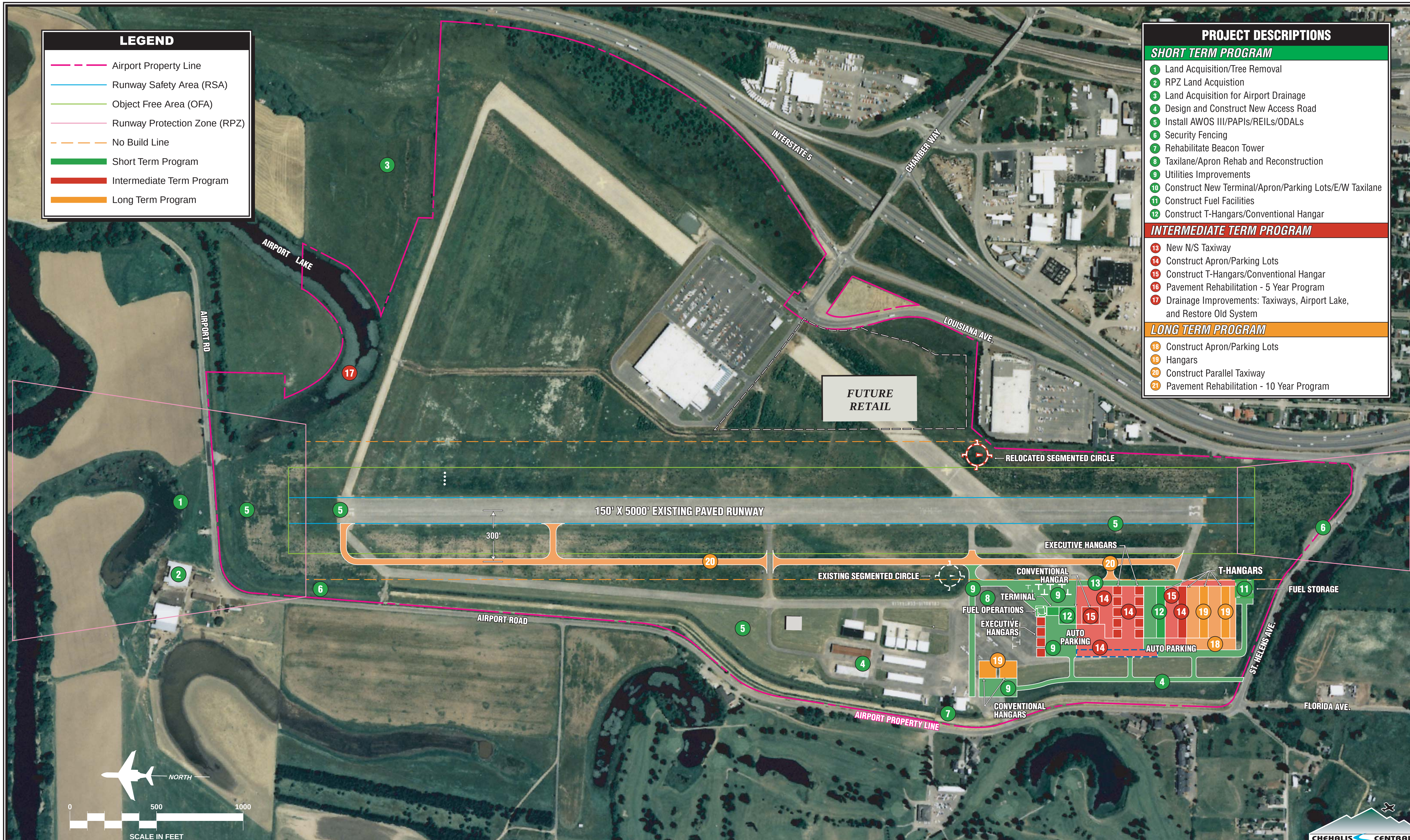


Exhibit 6A
DEVELOPMENT STAGING

planning horizon improvements are estimated to cost approximately $4.4 million.

18. **Construct Apron/Parking Lots**. The estimate for this project includes the construction costs for the apron area for the double set of T-hangars (5,000 square yards) and the parking areas (250 square yards).

19. **Hangars**. This cost estimate includes the costs for two sets of 14 unit T-hangars and two conventional hangars at 10,000 square feet each.

20. **Construct Parallel Taxiway**. A new parallel taxiway is estimated, and includes the small connector taxiway for the new hangar area. The parallel taxiway is 5,000 linear feet and estimates include costs for 22,200 square yards of material.

21. **Pavement Rehabilitation - 10 Year Program**. This cost covers 10 years of pavement maintenance, at $100,000 per annum.

Exhibit 6A provides a graphical depiction of long term planning horizon improvements.

AIRPORT DEVELOPMENT AND FUNDING SOURCES

Financing capital improvements at the airport will not rely exclusively upon the financial resources of the joint jurisdictions that operate the airport. Capital improvements funding is available through various grant-in-aid programs on the state and federal levels. The following discussion outlines the key sources for capital improvement funding.

FEDERAL AID TO AIRPORTS

The United States Congress has long recognized the need to develop and maintain a system of aviation facilities across the nation for national defense and promotion of interstate commerce. Various grants-in-aid programs to public airports have been established over the years for this purpose. The most recent legislation was enacted in early 2000, and is entitled the *Wendell H. Ford Aviation Investment and Reform Act for the 21st Century* or AIR-21.

This four-year bill covers fiscal years 2000-2003. This was breakthrough legislation because it authorized funding levels significantly higher than ever before. Airport improvement program funding was authorized at $2.475 billion in 2000, $3.2 billion in 2001, $3.3 billion in 2002, and $3.4 billion in 2003.

The source for AIR-21 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 Trust Fund also finances the operation of the FAA. It is funded by user fees, taxes on airline tickets, aviation fuel, and various aircraft parts.

Through AIR-21 each general aviation airport is entitled to receive up to $150,000 annually in entitlement funds based upon airport activity. The remaining AIP funds are discretionary and distributed by the FAA based on priority of the requested project.

Qualified airports receive 90 percent federal funding through AIR-21. Eligible projects include property acquisition, airfield improvements, aprons, and access road improvements. General aviation terminal buildings and associated automobile parking are generally eligible for federal funds. Funds are distributed each year by the FAA from Congressional appropriations.

FAA FACILITIES AND EQUIPMENT 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 available for enroute navigational aids, on-airport navigational aids, and approach lighting systems.

Recommended improvements in this master plan which may be eligible for funding through the F&E program include the PAPIs for Runway 33, and REILs and ODALs to Runway 15. Should the Airway Facilities Division of the FAA install these navigational aids at the airport, they would be operated and maintained by the FAA at no expense to the airport.

STATE FUNDS

AIP Matching Grants

The AIP grant is distributed for the purpose of aiding an airport with the local match of a federally funded improvement project. In order to be eligible for an AIP Matching Grant, the project must have been included in the state CIP and the sponsor must have accepted a federal AIP Grant for the project. Only state eligible projects can be awarded an AIP Matching Grant (projects involved with air carrier improvements are not eligible).

Washington Local Airport Aid Program

The Washington Local Airport Aid Program provides funding for airports within the state of Washington which are owned by an eligible public agency and open to the public without exception and, typically, that are not eligible for AIP funding. The state of Washington provides funding in the amount of half of the local share. In general, approximately 90 percent of the projects selected for funding are pavement improvement projects.

LOCAL FUNDING

The balance of project costs, after consideration has been given to the various grants available, must be funded through airport resources. The combined governments of Chehalis, Centralia, and Lewis County, through the Chehalis-Centralia Airport Board, own, operate and manage the Chehalis-Centralia Airport. This includes planning and financial oversight of airport projects. The Airport Board maintains funds in a voucher account with Lewis County, through which revenues and expenditures are routed.

There are three primary sources for operating revenues at the airport: Fuel Sales, Aviation related leases (such as tie-down fees and hangar rental revenue), and lease of land for commercial retail uses. In addition, grant money received by the airport is shown as revenue on the annual budget for accounting purposes. All revenues generated from the airport property is to be used for the development, maintenance and operation of the airport, according to FAA policy.

For the years 1996 through 2000 gross revenues ranged from $274,000 to $353,000 per year. While fuel sales is the highest gross revenue source, commercial retail ground lease rents are the highest net income followed by tie-down and hangar lease sources. In the year 2001 the Airport Board completed two additional commercial retail leases that will achieve additional gross revenue when these leases reach full rent status.

The approach of the Airport Board has been to maintain the airport facility to the extent financially possible, while developing sources of long term revenue for the airport to support future development and high cost maintenance items, such as runway maintenance. The Airport Board has maintained this direction for the last decade and its persistence in this plan is now beginning to generate revenues to support development of an instrument approach, new hangar construction and other capital improvements identified in this Master Plan Update.

Expenditures vary year by year as shown in reports reviewed for years 1996 through 2000. While airport payroll expenditures remain essentially constant, costs for fuel have varied due to changing market prices and due to changing sales volume. The Airport Board also had expenditures during the period for preparing sites for ground leasing, grant participation and for recovery from the 1996 flood. Expenditures for the period 1996 through 2000 ranged from $313,383 to $639,148.

SUMMARY

The best means of beginning the implementation of recommendations of this master plan is to first recognize that planning is a continuous process that does not end with completion of the master plan. Rather, the ability to continuously monitor the existing and forecast status of airport activity must be provided. The central issues upon which this master plan is based will remain valid for several years. As such, the primary goal is for the airport to evolve into a facility that will best serve the air transportation needs of the region and, ultimately, to evolve into a self-supporting economic generator.

Toward meeting this goal, successful implementation of airport improvement projects will require sound judgement by the Chehalis-Centralia Airport Board. Among the more important factors influencing the decision to carry out a specific improvement are timing and airport activity. Both factors should be used as references in the implementation of the master plan. In this master plan, focusing on the timing of airport improvements was necessary. However, the actual need for facilities is more appropriately established by airport activity levels rather than a specified date.

For example, projections have been made as to when additional T-hangar facilities would be needed to accommodate based aircraft growth. However, in reality, the time frame in which additional facilities are needed may be substantially different. Actual demand may be slow in reaching forecast activity levels. On the other hand, increased based aircraft totals may establish the need for new facilities much sooner. Although every effort has been made in this master planning process to conservatively estimate when facility development may be needed, actual aviation demand will dictate the timing of facility improvements.

The real value of a usable master plan is that it keeps the issues and objectives in the mind of the user so that he or she is better able to recognize change and its effect. As adjustments are made in the Master Plan to adapt to demand, the period for which the plan is valid will, similarly, be impacted. The format used in this plan is intended to reduce the need for costly updates. Updating can be done by the user, improving the plan's effectiveness.

In summary, the planning process requires the Chehalis-Centralia Airport Board to consistently monitor the progress of the airport in terms of total aircraft operations, total based aircraft, and overall aviation activity. Analysis of aircraft demand is critical to the exact 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.

Appendix A
GLOSSARY

Included in the following pages are a number of terms with appropriate definitions to assist the reader in understanding the technical language included in this document.

Air carrier: an operator which: (1) performs at least five round trips per week between two or more points and publish flight schedules which specify the times, days of the week and places between which such flights are performed; or (2) transport 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.

Air taxi: An air carrier certificated in accordance with 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 tower (ATCT): a central operations facility in the terminal air traffic control system, consisting of a tower, including an associated 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 (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 enroute phase of flight.

Approach light system (ALS): an airport lighting facility which provides visual guidance to landing aircraft by radiating light beams in a directional pattern by which the pilot aligns the aircraft with the extended centerline of the runway on his final approach for landing.

Azimuth: horizontal direction or bearing; usually measured from the reference point of 0 degrees clockwise through 360 degrees.

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.

Compass locator (LOM): a low power, low or medium frequency radio beacon installed in conjunction with the instrument landing system. When LOM is used, the locator is at the Outer Marker; when LMM is used, the locator is at the Middle Marker.

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: day-night noise level. The daily average noise metric in which that noise occurring between 10:00 p.m. and 7:00 a.m. is penalized by 10 times.

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.

Duration: length of time, in seconds, a noise event such as an aircraft flyover is experienced. (May refer to the length of time a noise event exceeds a specified threshold level.)

Enplaned passengers: the total number of revenue passengers boarding aircraft, including originating, stop-over, and transfer passengers, in scheduled and non-scheduled services.

Fixed base operator (FBO): a provider of service to users of an airport. Such services include, but are not limited to, fueling, hangaring, flight training, repair and maintenance.

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.

Glide slope equipment: electrical equipment that emits signals which provide vertical guidance by reference to airborne instruments during instrument approaches (such as an ILS) or visual ground aids (such as VASI) which provide vertical guidance for a VFR approach, or for the visual portion of an instrument approach and landing.

Global positioning system (GPS): a navigational technology based on a constellation of satellites orbiting approximately 11,000 miles above the surface of the earth.

Ground effect: the excess attenuation attributed to absorption or reflection of noise by man-made or natural features on the ground surface.

Instrument approach procedure (IAP): 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. It is prescribed and approved for a specific airport by competent authority.

Instrument flight rules (IFR): rules governing the procedures for conducting instrument flight. Also a term used by pilots and controllers to indicate type of flight plan.

Instrument landing system (ILS): a precision instrument approach system which normally consists of the following electronic components and visual aids: localizer, glide slope, outer marker, middle marker, and approach lights.

Localizer (LOC): the component of an ILS which provides horizontal guidance to the runway centerline for aircraft during approach and landing by radiating a directional pattern of radio waves modulated by two signals which, when received with equal intensity, are displayed by compatible airborne equipment as an "on-course" indication, and when received in unequal intensity are displayed as an "off-course" indication.

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.

Microwave landing system (MLS): a precision instrument approach system that provides precision guidance in azimuth, elevation, and distance measurement.

Missed approach: a maneuver conducted by a pilot when an instrument approach can not be completed to a landing. This may be due to visual contact not established at authorized minimums or instructions from air traffic control, or other reasons.

Non-directional beacon (NDB): a radio beacon transmitting non-directional signals that a pilot of an aircraft equipped with direction finding equipment can determine his/her bearing to or from the radio beacon and "home" on or track to or from the station. When the radio beacon is installed in conjunction with the instrument landing system marker, it is normally called a compass locator.

Nonprecision approach procedure: a standard instrument approach procedure in which no electronic glide slope is provided, such as VOR, GPS, RNAV, ASR, LDA, SDF, TACAN, NDB, or LOC.

Operation: a take-off or a landing.

Outer marker (OM): an ILS navigation facility in the terminal area navigation system located four to seven miles from the runway threshold on the extended centerline of the runway, indicating to the pilot, that he/she is passing over the facility and can begin final approach.

Precision approach path indicator (PAPI): an airport lighting facility in the terminal area navigation system used primarily under VFR conditions. The PAPI provides visual decent guidance to aircraft on approach to landing through a single row of two to four lights, radiating a high intensity red or white beam to indicate whether the pilot is above or below the required approach path to the runway. The PAPI has an effective visual range of 5 miles during the day and 20 miles at night.

Precision approach procedure: a standard instrument approach procedure in which an electronic glide slope is provided, such as ILS or MLS.

Precision instrument runway: a runway having a existing instrument landing system (ILS).

Reliever airport: an airport to serve general aviation aircraft which might otherwise use a congested air-carrier served airport.

Runway end identification lights (REIL): an airport lighting facility in the terminal area navigational system consisting of one flashing white high intensity light installed at each approach end corner of a runway and directed toward the approach zone, which enables the pilot to identify the threshold of a usable runway.

Vector: a heading issued to an aircraft to provide navigational guidance by radar.

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 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 in the terminal area navigation system used primarily under VFR conditions. It provides vertical visual guidance to aircraft during approach and landing, by radiating a pattern of high intensity red and white focused light beams which indicate to the pilot that he/she is above, on, or below the glide path.

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.

VOR/Very high frequency omnidirectional range station: 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.

VORTAC/VHF Omnidirectional range/tactical air navigation: a navigation aid providing VOR azimuth, TACAN azimuth, and TACAN distance-measuring equipment (DME) at one site.

ABBREVIATIONS

AGL: above ground level

ALSF: approach lighting system (with sequenced flashing lights)

ARTCC: air route traffic control center

ATCT: air traffic control tower

DME: distance measuring equipment

DNL: day-night noise level

DW: runway weight bearing capacity for aircraft with dual-wheel type landing gear

DTW: runway weight bearing capacity for aircraft with dual-tandem type landing gear

FAA: Federal Aviation Administration

FAR: Federal Aviation Regulation

FBO: fixed base operator

GPS: global positioning system

GS: glide slope

IFR: instrument flight rules (FAR Part 91)

ILS: instrument landing system

LAAS: local area augmentation system

LMM: compass locator at middle marker

LOC: ILS localizer

LOM: compass locator at outer marker

MALSR: medium intensity approach lights with runway alignment indicator lights

MLS: microwave landing system

MM: middle marker

MSL: mean sea level

NAVAID: navigational aid

NDB: non-directional beacon

OM: outer marker

PAPI: precision approach path indicator

REIL: runway end identification lights

SEL: sound exposure level

SW: runway weight bearing capacity for aircraft with single-wheel type landing gear

TACAN: tactical air navigation

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 omnidirectional range

VORTAC: (see VOR and TACAN)

WAAS: wide area augmentation system