

OKANOGAN-LEGION AIRPORT

AIRPORT LAYOUT PLAN AND NARRATIVE REPORT

FINAL DRAFT

**AIRSIDE
P.O. Box 287
GREENBANK, WA 98253
(360) 678-9249**

Chapter 1: Introduction

This airport layout plan and narrative report (ALP) for Okanogan-Legion Airport is sponsored by the city of Okanogan. It examines existing conditions at Okanogan-Legion Airport, forecasts future aviation activity over a 20-year time period, recommends improvements to ensure that the airport can serve projected demand and identifies sources of funds to pay for those improvements.

This report focuses on:

- The size and layout as well as the existing and planned uses of Okanogan-Legion Airport.
- The extent to which the airport conforms to Federal Aviation Administration (FAA) design recommendations and, where such recommendations are not met, whether they can be met considering site constraints.
- Projected facility development and whether that development can be accomplished in conformance with FAA design recommendations.
- Enhancements at Okanogan-Legion Airport that will increase the airport's value to the community as a primary transportation portal.

Photo 1: Okanogan-Legion Municipal Airport



Photo courtesy of Roy Skelton

In preparing this ALP, Airside has reviewed the following:

- Airport development plan prepared by Airside in 2000.
- Airport facility drawing prepared by W&H Pacific in 1994.
- Pavement condition report sponsored by WSDOT/AD in 2000.
- Recent work accomplished on paved surfaces.
- Information contained in the Washington State Aviation System Plan.

Primary funding for this report has been provided by the Washington State Department of Transportation’s Aviation Division (WSDOT/AD). It has been prepared by Airside with assistance from a volunteer steering committee seated by the city of Okanogan. Review of the interim report, as well as ongoing technical assistance, has been provided by WSDOT/AD.

This ALP has been prepared according to WSDOT/AD guidelines contained in Appendix E of the aviation division’s Grant Procedures Manual.

In writing this report we have followed the guidelines of the *Chicago Manual of Style* and the *AP Stylebook*, the two most widely used stylebooks in American publishing. These stylebooks call for different practices than are sometimes used in these kinds of plans, particularly with respect to capitalization of cities, as well as government agencies and offices.

Table 1: City of Okanogan ALP Steering Committee

MEMBER	REPRESENTING
Leslie Abraham	Chamber of Commerce
Mary Beth Clark	Colville Confederated Tribes
Ray Clements	Okanogan maintenance supervisor
John Combs	Okanogan City Council
Jon Culp	Okanogan City Council
Gordon Hennings	Okanogan Fire District No. 14.
Chris Johnson	Okanogan city planner
Steve Kunkel	Local citizen
Ralph Malone	Okanogan city clerk
David Nee	Mt. Tolman Fire Center
Frank Rogers	Okanogan County Sheriff
Bix Rosenkranz	Airport manager
Vickie Scholla	Civil Air Patrol
Roy Skelton	OLAIA*
John Townsley	OLAIA
Harlan Warner	OLAIA
Greg Wilder	Okanogan County Planning Department

*Okanogan-Legion Airport Improvement Association.

Chapter 2: Inventory

2.1 GENERAL

City of Okanogan

The city of Okanogan is situated adjacent to the Okanogan River in north-central Washington state, approximately 50 miles south of the Canadian border, 140 miles east of Seattle and 100 miles northwest of Spokane. Okanogan is centrally located in the Okanogan River Valley in Okanogan County. The city serves as the county's administrative center. The city lies along U.S. Highway 97, a major transportation corridor between the interior of British Columbia and Washington, and Washington State Highway 20, a scenic route of statewide importance.

Okanogan County

Okanogan County consists of 5,281 square miles of land. It is the third-largest county in the continental United States. Only 30 percent of the land is privately owned. The remaining land is owned by the Colville Confederated Tribes, the U.S. government and Washington State. The county is bordered on the north by British Columbia, Canada, on the south by Chelan County and the Columbia River, on the west by the Cascade Mountains and on the east by Ferry County.

Okanogan-Legion Airport

Okanogan-Legion Airport is located on a plateau, one mile southeast of the city of Okanogan. Airport property consists of approximately 111 acres. Topography in the region surrounding the airport varies from rolling hills in the immediate area to mountains with peaks of over 6,500 feet to the east and west. The airport lies within the boundaries of the

2,100-square-mile Colville Indian Reservation. The reservation's 1.4 million acres of land were established by presidential order in 1872 and are administered by the government of the Colville Confederated Tribes. The Colville Confederated Tribes is a sovereign nation whose population is comprised of over 9,000 descendants of 12 aboriginal tribes of Indians. As of April 2004, 4,034 tribal members lived on the reservation.

About four percent of the property within the reservation is owned by non-Indian individuals and municipalities. Okanogan-Legion Airport is owned in fee-simple status by the city of Okanogan.

Climate

The nearest location where climate data is recorded by the National Oceanic and Atmospheric Administration's National Climatic Data Center (NOAA/NCDC) is Omak. Okanogan is close enough to Omak to have the same range of temperatures. The NCDC's database shows Omak's mean maximum temperature, which generally occurs in July, to be 83.1 degrees F. NCDC information also indicates that temperatures may reach 109 degrees Fahrenheit during July and August.

2.2 SOCIOECONOMIC DATA

Population

Okanogan County's population has grown steadily, rising from 33,350 in 1990 to 43,904 today. The population is relatively widely dispersed. Omak is the county's largest city with a population of 4,705. The second-largest city is Okanogan, with a population of 2,450. Other cities with populations above 1,000 are Brews-

ter (2,200), Oroville (1,675) and Tonasket (1,005). Across the entire county, population density is approximately seven persons per square mile.

Economy

Agriculture and forestry are the anchors of Okanogan County's economy, employing 3,234 people. The only sectors employing larger num-

Okanogan County is experiencing an increase in tourism. Among the primary tourist sites are the Grand Coulee Dam, one of the largest concrete structures in the world, which is located in the southeastern part of the county, and the Methow Valley which is located in the western part of the county. The Methow Valley offers cross-country ski trails and snowmobile parks in the winter and mountain biking, fishing, camping and hiking during the rest of the year.

Table 2: Industry sectors

Industry sector	Establishments	Employees
Agriculture, forestry, fishing and hunting	404	3,324
Mining	8	51
Utilities	n/a	n/a
Construction	157	430
Manufacturing	33	171
Wholesale trade	30	263
Retail trade	178	1,547
Transportation and warehousing	26	135
Information	17	108
Finance and insurance	28	215
Real estate, rental and leasing	42	117
Services	797	3,115
Federal government	13	440*
State government	20	298
Local government	63	4,523
Not elsewhere classified	11	60

*Includes employees of the Colville Indian Precision Pine Mill.
Source: Washington State Employment Security Department.

Annual events such as the Omak Stampede, the Okanogan County Fair, Okanogan Days and Tonasket's Founders' Days are important to the local economy. Ranches catering to tourists, so-called dude ranches, are increasing in numbers. Communities in the central Okanogan Valley are participating in the U. S. Highway 97 Corridor Plan which is intended to increase tourism. Substantial numbers of tourists travel the U. S. Highway 97 corridor. Light aircraft commonly fly to and from Canada along this route as well. The city of Oroville north of Okanogan is a U.S. Customs port of entry.

bers of people are government (4,523), services (3,115) and retail trade (1,547). Omak, is growing steadily based on its role as a regional center for services and trade. At 9.9 percent, unemployment is significantly higher in the county than the national average, though that figure is an improvement over the 11.1 percent unemployment which existed in 2000.

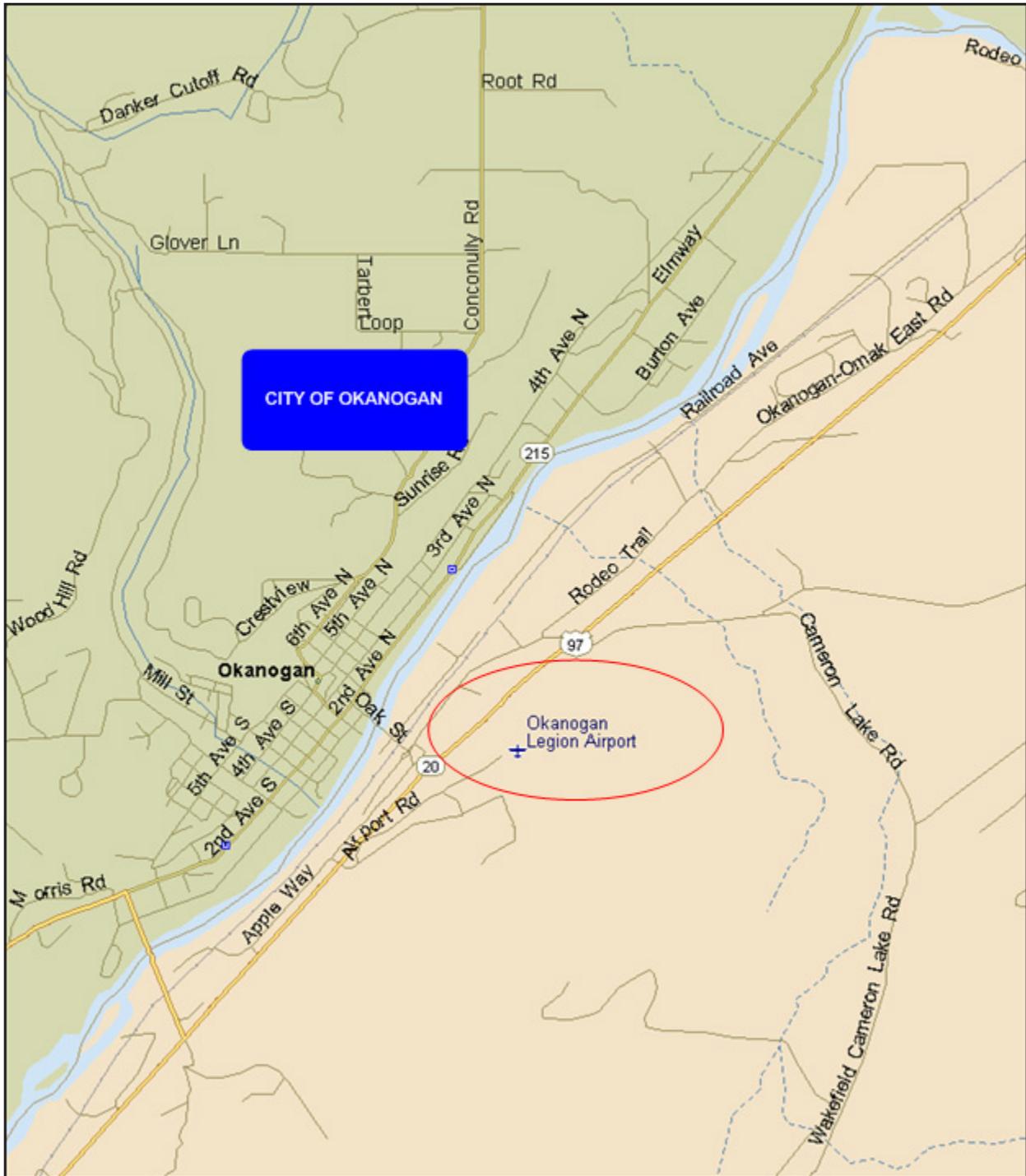
2.3 LAND-USE AND PLANNING

Land-use and zoning issues at Okanogan-Legion Airport exist in an interesting jurisdictional environment. As stated, the airport is within the boundary of the Colville Indian Reservation. The Colville Confederated Tribes owns all of the property surrounding the airport. The reservation extends west of the airport to the middle of the Okanogan River.

Map 1: Okanogon-Legion Airport regional location



Map 2: Okanogan-Legion Airport site



The city of Okanogan began purchasing portions of the property on which the airport is located in 1928. Several property transactions have occurred since then. Deeds related to these purchases have been approved and recorded with the Department of Interior and Office of Indian Affairs. The city annexed the airport in 1976.

Okanogan County is responsible for unincorporated lands outside of the city of Okanogan and external to the property owned by Colville Confederated Tribes. The city of Okanogan is responsible for planning, land-use controls, development regulations and zoning for all city property including the airport. The airport is a municipal island, i.e. though it is a part of the city, it is not contiguous with the main elements of city property.

At this time the city of Okanogan, Okanogan County and the Colville Confederated Tribes are each working on comprehensive plans. They are communicating with each other to ensure that their plans, once developed, are coordinated, consistent and mutually supportive.

Existing land-use and zoning

The zoning and land use process in the area surrounding Okanogan-Legion Airport is, as explained, in a state of development. There are however a number of documents related to zoning and land use that are currently in effect. Following is a brief description of each. Complete texts of each of the zoning documents may be found in the appendix to this narrative report. (See appendix, Land-Use and Zoning Documents.)

Colville Confederated Tribes

Tribal land use regulation 4-3-51 identifies Okanogan-Legion Airport as being within what is called a Special Requirement District (SRD). The SRD includes property that has experienced, and is expected to continue to experience, atypical development pressure. These areas, which are mostly adjacent to the Okanogan River, also contain a

wide range of uses. The purpose of this district is to require a conditional use permit for alterations to any existing uses or structures and for any new uses or structures. The limitations imposed by the district will remain in place until further studies by Colville Confederated Tribes result in comprehensive land use and development regulations. Conditional use applications are subject to the requirements of tribal land use regulations 4-3-118 and 4-3-122.

Okanogan County

Okanogan County has two ordinances that relate to Okanogan-Legion Airport. These are Chapter 17.12 of the county code, titled "Airport Development District (AP)" and Chapter 17.32, titled "Airport Safety Overlay District."

Chapter 17.12's purpose is to provide for future airport expansion and to protect airport facilities by establishing development standards. This chapter addresses such issues as permitted, conditional, accessory and prohibited uses, lot sizes, development density, setbacks, heights of structures, lot coverage, and parking. A special provisions section includes restrictions and/or guidelines intended to assure that activities are compatible with airport operations. Among the issues covered are glare, smoke emissions, flammable substances and equipment or activities that may create electrical interference to flight operations.

Protection of the airport's airspace from development that would erode safety is provided in Chapter 17.32. This chapter codifies Federal Air Regulation Part 77 "Objects Affecting Navigable Airspace."

City of Okanogan

The city of Okanogan's code section 18.50 addresses airspace protection as well as permitted and prohibited uses on and adjacent to airport property.

Changes to existing land-use and zoning requirements

Individuals or businesses seeking changes to, or exemptions from, current land-use and zoning restrictions must receive approval from one or more of the three governmental entities. Specific procedures are dependent on the location of the property involved.

Development application process

Applications for development on the Colville Reservation may be filed with either the Tribal Planning Office in Nespelem or the Okanogan County Planning Office in Okanogan. All applications are reviewed weekly by staff members from each agency to determine which agency will be the “processing agency,” and which will be the “commenting agency.”

The processing agency is responsible for processing applications, accepting fees, and notifying applicants. The commenting agency may make written comments or recommendations on all applications. Next, applications are processed in compliance with an agreement between Okanogan County and the Colville Confederated Tribes.

Intergovernmental land-use planning agreement

An intergovernmental land-use planning agreement between the Colville Confederated Tribes, Okanogan County, and the cities of Omak, Okanogan, Nespelem, Elmer City and Coulee Dam has been established to provide for discussion, consultation and cooperation regarding intergovernmental planning matters. The primary purpose of this agreement is to reach consensus on land use and regulatory matters for all lands of the Colville Reservation.

Occasionally, governments that are party to the agreement meet and decide upon amendments

to the agreement that are deemed necessary for it to fulfill its purpose.

As part of the intergovernmental land-use planning agreement, Okanogan County, the cities and the Colville Confederated Tribes have established an interim process and protocol for all applications proposing any type of development activity on lands within reservation boundaries. Furthermore, the tribes are a consulted agency under SEPA (even though the tribes enforce NEPA) for any development activity on lands adjoining the reservation.

Washington Growth Management Act

Chapter 36.70A of the Revised Code of Washington (RCW) titled “Growth Management – Planning by Selected Counties and Cities” (GMA) imposes planning requirements on counties and cities based on their population or rates of population growth. Neither Okanogan County nor the city of Okanogan has populations or rates of growth that require them to plan under GMA.

The law, where applicable, requires every county, city and town to adopt comprehensive plan policies and development regulations that will discourage the siting of incompatible uses adjacent to general aviation airports that are operated for the benefit of the general public, whether publicly owned or privately owned public use airports. Depending on airport characteristics, location and amount of usable open space adjacent to a general aviation airport, incompatible land uses may include public assembly/large concentrations of people, residential density, intensity of nonresidential development, structure height, hazardous/explosive material, wildlife hazards, light/glare, air quality and electronic signals.

Code sections implemented by both the city of Okanogan and Okanogan County are in general conformance with the growth management act.

2.4 AIRPORT SITE – GENERAL

Okanogan-Legion Airport is located on a promontory one mile east of the city. All airport structures are located on the west side of the runway both north and south of the aircraft parking apron.

2.5 RECENT AIRPORT REVITALIZATION

The Okanogan-Legion Airport Improvement Association (OLAIA), a local volunteer group, and the city of Okanogan entered into a cooperative agreement to begin revitalization and development of airport facilities in 2001. The purpose of the agreement and subsequent work is to maintain and improve airport facilities, to support aviation uses and to attract new business activity to the city of Okanogan. Recent efforts have resulted in improvements to airport facilities such as the extension of the existing municipal water main to a portion of the airport and installation of water hydrants. Availability of water is viewed as one of the most important actions the city of Okanogan can take to promote business development.

Other work recently completed includes resurfacing of the main runway and paving of the aircraft parking apron. OLAIA acquired a vehicle that was donated to the city and is now used as a visitor courtesy car. OLAIA is also constructing a security fence and has accomplished planning to serve as the basis for renovation of the city-owned wood hangar.

A continuing cooperative effort between the city of Okanogan and the volunteers working on behalf of the association is important to the future of Okanogan-Legion Airport.

2.6 AIRPORT CLASSIFICATION – THE ARC SYSTEM

Okanogan-Legion Airport serves general aviation aircraft weighing less than 12,500 pounds. It accommodates business, governmental and

recreational activity. Both the Federal Aviation Administration (FAA) and WSDOT/AD use what is termed the airport reference code, or ARC system, to categorize airports. The ARC system provides a method for applying dimensional safety and protection standards to airports according to the aircraft those airports generally serve. Dimensional standards include such items as runway-to-taxiway separation distances, sizes of runway safety areas (RSAs) and sizes of runway object free areas (ROFAs). The ARC system uses the concept of a critical aircraft, described as an aircraft that controls one or more airport design features based on the aircraft's approach speed and wingspan. Five hundred annual operations are required for an aircraft to be considered the critical aircraft for an airport.

Letter designations, from A to E, represent five aircraft approach speed categories ranging from less than 91 nautical miles per hour (knots) to 166 knots or more. Roman numeral designations from I to VI represent aircraft wingspans of from less than 49 feet to 261 feet. There is a special designation, used mostly in ARC categories A and B, for airports that serve aircraft weighing less than 12,500 pounds. This designation attaches the term "small" to the ARC letter/numeral combination. Some dimensional and safety standards are specific to the "small" category.

An airport facilities inventory drawing (AFID) completed in February 1994 for Okanogan-Legion Airport identifies the airport as having an ARC classification of A-I (small). This means that the airport's critical aircraft has an approach speed of 91 knots per hour or less. Okanogan-Legion Airport is, however, currently classified as a B-I small airport in the Washington State Continuous Airport System Plan (WSCASP). The B-I (small) rating designates facilities that are determined to be appropriate for aircraft with approach speeds between 91 and 121 knots, with wingspans of

fewer than 49 feet and which weigh less than 12,500 pounds.

With a length of 2,539 feet and a width of 36 feet it is questionable whether the B-I classification is appropriate. There is a substantial difference between A-I aircraft and B-I aircraft. Though the A-I category includes some high-performance aircraft, such as the Mitsubishi Solitaire (MU-2P), which has an approach speed of 87 knots, typical A-I aircraft are the Beechcraft Bonanza and the Cessna 182. Typical B-I aircraft include the Cessna Citation I, Beechcraft Baron 58P and the Piper Aerostar. These high-performance B-I aircraft seem ill-suited to the length and width of Okanogan-Legion's runway, especially during summer months when high temperatures reduce aircraft performance.

Photo 2: Cessna 172 Skyhawk



The Cessna 172 is the most prevalent aircraft and is designated as the design aircraft. The Cessna 172 has a wingspan of 35 feet, 10 inches, a maximum certified takeoff weight of 2,550 pounds and an approach speed of less than 91 knots.

NPIAS

Okanogan-Legion Airport is not listed on the National Plan of Integrated Airport Systems (NPIAS) and is therefore ineligible to apply for federal grant funds through the Federal Aviation Admin-

istration. The Washington State Department of Transportation's Aviation Division is Okanogan-Legion Airport's primary source of grant funds.

Table 3: The ARC system

AIRCRAFT APPROACH CATEGORY APPROACH SPEED IN KNOTS			AIRPLANE DESIGN GROUP WINGSPAN IN FEET		
Category	More than	Less than	Wing-span	More than	Less than
A		91	I		49
B	91	121	II	49	79
C	121	141	III	79	118
D	141	166	IV	118	171
E	166		V	171	214
			VI	214	262

Source: FAA Advisory Circular 150/5300-13

Wind coverage

Information regarding prevailing wind is not available from the National Oceanic and Atmospheric Administration (NOAA) for Okanogan-Legion Airport. The nearest station with consistent wind reporting is Omak. Due to the absence of wind data, a wind rose was not constructed for this airport.

2.7 EXISTING AIRSIDE FACILITIES

Paved surfaces

Runway

Okanogan-Legion Airport has a single runway oriented on magnetic headings 040 and 220 degrees (Runway 4/22). It is 2,539 feet long and 36 feet wide. The runway is constructed of asphalt and has a gross weight-bearing capacity of 6,000 pounds for aircraft with single-wheel main landing gear according to a report published by Pavement Consultants Inc. in 2000. Paved aircraft run-up areas approximately 2,600 square feet in size are located on the east sides of each end of the runway.

Aircraft apron and taxiway

An aircraft parking apron approximately 420 ft. by 180 ft. in size is located on the west side of the runway. It is connected to the runway by a single perpendicular taxiway. There are five aircraft parking spaces on this paved apron. There are five additional aircraft parking spaces in an unpaved area north of the apron.

Painted graphics

Painted graphics include runway numerals, a white dashed centerline, runway fog lines, hold lines on the perpendicular taxiway and T-shaped graphics defining each paved aircraft parking area.

Recent paved surface maintenance

Each year since 2000 the runway, and after 2002, the newly paved aircraft apron, have been crack sealed. In 2002 the runway was fog sealed. In 2004 the runway and apron were resurfaced using a slurry mixture. New graphics were applied at that time.

The condition of all paved surfaces is good at this time with the exception of a few locations where cracks have developed. These cracks are scheduled to be filled during the summer of 2005.

Photo 3: Aircraft parking area



Airport lighting and navigation aids

Runway lights

The runway is equipped with 26 medium-intensity runway edge lights (MIRLs) and eight split

Table 4: Recent pavement work

RECENT PAVEMENT REHABILITATION AND MAINTENANCE		
Year	Project	Cost
2000	Runway crack sealed	Volunteer labor
2001	Runway seal – apron/taxiway resurface	\$79,042
2001	Runway crack sealed	Volunteer labor
2002	Runway and apron crack sealed	Volunteer labor + \$5,000
2003	Runway and apron crack sealed	Volunteer labor
2004	Runway and apron crack sealed	Volunteer labor
2004	Runway, apron and taxiway slurry surface	\$22,761
Total		\$106,803

Source: City of Okanogan

red/green threshold lights. Two threshold lights are located on each side of each end of the runway. Two blue taxiway lights are located where the perpendicular taxiway intersects the runway. All lights are mounted on stakes rather than on in-ground base cans. All runway threshold and taxiway lights as well as the rotating beacon have been deactivated due to numerous wiring faults. Existing light cable is not within conduit and is approximately 25 years old.

Wind indication

Okanogan-Legion Airport has two wind indicators. A lighted indicator is located on top of the city-owned wooden hangar. A second, unlighted indicator is centered within a segmented circle on the east side of the airport at approximately mid-

field. The segmented circle is in poor condition. Local pilots consider the wind indicator to be generally inaccurate due to masking of the wind by an adjacent hill.

Airport rotating beacon

A rotating beacon is located north of the city-owned wooden hangar. It appears to be mounted on a support that is not level. Its westerly “sweep” is masked by a shield.

Electrical power supply

Electrical power connects to the airport south of the city-owned wooden hangar along the east edge of the airport access drive.

Table 5: Airport data

Name	Okanogan Legion Airport
Location number	S 35
FAA Designation	26324.A
Owner	City of Okanogan
Acreage	111
Service level (on the NPIAS system)	General aviation (GA)
Reference code existing	B-1 (Small)
Design aircraft	Cessna 172
Elevation	1,034 feet
Reference point (location) NAD83 NAVD88	Latitude 48-21-42.905N Longitude 119-34-03.216W
Mean maximum temperature	83.1 degrees
Approach category	Visual
Navigation aids	Wind indicator/segmented circle/rotating beacon
Wind coverage	n/a
Annual local operations	2,600
Annual itinerant operations	1,000
Based aircraft	15

Signage

There are no taxiway, hold-line, informational, direction or runway remaining signs installed at Okanogan-Legion Airport except for those located adjacent to and related to the fueling system.

Visual approach aids

There are no visual approach aids, such as precision approach path indicators (PAPIs), installed.

2.8 EXISTING LANDSIDE FACILITIES

Structures

Ten structures exist at Okanogan-Legion Airport. Seven are privately owned hangars. The city of Okanogan owns two structures. One of the city-owned structures is a wooden hangar with two aircraft storage bays, a restroom, showers and a small office. Adjacent to this hangar is a public-use area with picnic tables. The other city owned structure is used to store airport maintenance equipment and aircraft. One of the two aircraft storage bays in the wooden hangar is not usable at this time due to roof structure failure. A private residence, intended to increase airport security, is located on leased airport property. Table 6 lists existing airport structures.

Aircraft fuel

The city owns and operates two fuel tanks with dispensing systems. One is a 4,000-gallon tank that contains 80-octane aviation gasoline (AVGAS). The other is an 8,000-gallon tank that contains 100-octane AVGAS. Both tanks are located above ground. Both are within a fuel-containment system and are surrounded by a security fence. The 80-octane tank is currently inoperative. Transient pilots call the city for fuel. Local pilots own the fuel cooperatively and use a key lock system for fuel access. The city receives a flowage fee and collects fuel taxes.

Access road and vehicle Parking

Access to the airport is provided by Okanogan Airport Road which extends from U.S. Highway 97, immediately south of the city, to a gravel vehicle parking area on the airport's west side. Okanogan Airport Road's west side is exposed to a steep hillside. There are no vehicle safety barriers or lighting. The road is unpaved.

Utilities

Water

Water is a valued commodity in Okanogan County. Often water or a lack of it determines development. The city of Okanogan is in an advantageous

Photo 4: Fuel system



position, having not only stable sources of water but also a 500,000-gallon water storage tank. The tank is located east of the runway within the airport's boundary. Currently the city is installing fire hydrants at the airport. According to Gordon Hennings of Okanogan Fire District 14 components of the existing water system may not be adequate to provide appropriate fire flow pressures to some areas of the airport. A ground water monitoring well, located east and north of building A-30-N, as depicted in the drawing on Page 2:16, is capped but must remain accessible.

Electricity

According to the public utilities district, adequate electrical power is available to support development of both private and commercial uses at the airport.

Sewage

There are two septic systems located on the west side of the airport. One serves the bathroom in the wooden hangar – number A-10 – and one serves the residence at 265 Okanogan Airport Road. Drain fields for these systems are west of building A-20N and north of the residence, respectively.

Table 6: Airport structures

Airport structures by building number		
Number	Size/use	Ownership
A60-S	60'x40' Hangar	Private
A50-S	40'x30' Hangar	Private
A40-S	60'x40' Hangar	Private
A30-S	60'x40' Hangar	Private
A20-S	40'x40' Hangar	Private
A10	Hanger/rest-room/pilots' public-use area	City
A20-N	Work and storage	City
A30-N	40'x40' Hangar	Private
A70-N	Hangar	Private
265 Okanogan Airport Rd.	Residence	Private

Airport maintenance equipment

A weed sprayer with wand and boom capability is available for airport service. No major vehicles or large equipment are dedicated for use at the airport.

Fencing

Chain link fencing is currently being installed throughout the central portion of the west side of

the airport. This fence has, or will have, personnel and vehicle gates at strategic locations.

Airport maintenance

Okanogan-Legion Airport is maintained by the city of Okanogan and, as stated, by volunteer efforts of the Okanogan-Legion Airport Improvement Association.

2.9 COMPARISON OF EXISTING CONDITIONS TO FAA STANDARDS

An important aspect of this planning program is a comparison of FAA-recommended standards to existing conditions of Okanogan-Legion Airport. Dimensional standards published by the FAA are intended to provide an acceptable level of airport safety. This section defines specific FAA standards and relates them to existing conditions in Table 8.

Information and definitions related to FAA standards was obtained from FAA Advisory Circular (AC) 150/5300-13. Airport information is from the WSDOT/AD database and from on-site measurements and observations.

Standards definitions

Runway width – A runway width considered adequate to provide for safe aircraft operations.

Runway Safety Area (RSA) – A defined rectangular surface centered on a runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot or excursion from the runway.

Runway safety areas shall be: (1) cleared and graded and have no potentially hazardous ruts, humps, depressions or other surface variations; (2) drained by grading or storm sewers to prevent water accumulation; (3) capable, under dry conditions, of supporting snow removal equipment, aircraft rescue and firefighting equipment, and the occasional passage of aircraft without

causing structural damage to the aircraft; and (4) free of objects, except for objects that need to be located in the RSA because of their function. Objects higher than 3 inches above grade should be constructed, to the extent practicable, on low-impact resistant supports (frangible mounted structures). Other objects, such as manholes, should be constructed at grade. In no case should their height exceed 3 inches above grade.

Runway safety areas, including their conditions and their protection, are one of the highest priorities of both the FAA and WSDOT/AD.

Runway Object Free Area (ROFA) – An area on the ground centered on a runway provided to enhance the safety of aircraft operations by being free of objects, except for objects that need to be located within the ROFA for air navigation or aircraft ground maneuvering purposes.

Shoulder – An area adjacent to the edge of runways, taxiways or aprons providing a transition between pavement and the adjacent surface, support of aircraft running off the pavement, enhanced drainage and blast protection.

Taxiway Safety Area (TSA) - A defined rectangular surface centered on a taxiway prepared or suitable for reducing the risk of damage to airplanes unintentionally departing from the taxiway.

Taxiway Object Free Area (TOFA) - An area on the ground centered on a taxiway provided to enhance the safety of aircraft operations by being free of objects, except for objects that need to be located within the TOFA for air navigation or aircraft ground maneuvering purposes.

Runway-to-taxiway separation – A distance between a runway centerline and an adjacent taxiway centerline considered adequate to protect operating aircraft.

Runway centerline-to-holding position marking – A distance considered adequate to provide protec-

tion between aircraft using an active runway and aircraft waiting for takeoff from that runway.

Runway Protection Zone (RPZ) – RPZs enhance the protection of people and property on the ground. This is achieved through airport owner control over RPZs. Such control includes clearing of RPZ areas of incompatible objects and activities. Control is preferably exercised through the acquisition of sufficient property interest in the RPZ.

Runway centerline-to-aircraft parking area – A distance considered sufficient to protect operating aircraft, parked aircraft and activities occurring around parked aircraft.

Table 7: Airport facility data

Airport feature		Information
Runway		
Dimensions		2,539'x36'
Gradient		.6%
Surface		Asphalt
Pavement strength		6,000 lbs per wheel
Marking		End numerals/fog lines/center dashed lines
Lighting		Edge (26)/threshold (4 per end) (Inoperative)
Taxiway		
Dimensions		83'x32'
Surface		Asphalt
Marking		Hold line
Lighting/reflectors		None
Aircraft parking apron		
Dimensions		420'x180'
Surface		Asphalt
Marking		Tie-downs painted
Fuel system		
Tank 1 size/use		4,000/80 octane (inoperative)
Tank 2 size/use		8,000/100 LL
Tank 1 operation		manual
Tank 2 operation		manual

2.10 ASSESSMENT OF EXISTING CONDITIONS RELATIVE TO FAA DESIGN STANDARDS

Runway length

Okanogan-Legion’s runway, according to FAA data, is able to accommodate less than 75 percent of the aircraft fleet having maximum certified takeoff weights of less than 12,500 pounds.

Runway width

At 36 feet, the width of the airport’s runway is 24 feet less than the FAA standard.

Runway safety area

The area encompassing the runway safety area lateral to the runway and for the length of the runway is in general conformance with the runway safety area standard. The 240 feet of runway safety area off the Runway 22 end is not to standard due to a rise in terrain. The runway safety area off the Runway 4 end is in general conformance with the standard for about 110 feet from the end of the runway. After that location terrain drops off steeply. Additionally, the county landfill road bisects the runway safety area at the runway 4 end.

Runway object-free area

The area encompassing the runway object-free area is in general conformance with the FAA standard with the exception of the county landfill road at the Runway 4 end.

Runway shoulder

The runway shoulder area of 10 feet is in general conformance with the relevant standard.

Taxiway and hold-line standards

There is one perpendicular taxiway leading from the runway to the aircraft apron. The taxiway conforms with the FAA’s clearance standard relative to taxiways. The existing hold line is 38 feet from the centerline of the runway. The FAA standard from runway centerline to hold lines is 125 feet.

Table 8: Comparison of FAA standards

Comparison of FAA standards for A-1 (Small) airport to existing conditions		
FAA standard	Dimension relative to Okanogan-Legion Airport	Existing condition at Okanogan-Legion Airport
Runway length*	2,800' (75%)/3,300' (95%)/3,900' (100%)	2,539'
Runway width	60'	36'
Runway safety area	120'x3,019'	Width to standard. RSA not to standard at both ends.
Runway object-free area	250'x3,019'	250'x3,019'
Shoulder	10'	10'
Taxiway width	25'	32'
Taxiway safety area	49'	49'
Taxiway object-free area	89'	89'
Runway centerline-to holding position marking	125'	38'
Runway protection zone	250'x1,000'x450'	250'x1,000x450'
Runway centerline-to-aircraft parking area	125'	160'

* Length of runway to accommodate 75 percent, 95 percent and 100 percent of a group of aircraft weighing fewer than 12,500 pounds. Source, AC 150/5325-4A.

Runway Protection Zone (RPZ)

Portions of both runway protection zones are off airport property and not under the control of the city of Okanogan.

Runway centerline-to-aircraft parking

The FAA standard of 125 feet from runway centerline to aircraft parking area is complied with.

2.11 INFORMATION SOURCES

Sources of information provided in this chapter include:

- Washington State Department of Transportation/Aviation Division airport database.
- Federal Aviation Administration (FAA) Form 5010.
- 2001 airport development plan by Airside.
- 1994 airport facility drawing by W & H Pacific, Inc.
- Pavement Consultants, Inc. pavement report dated June 2000
- Grant and project recap provided by the city of Okanogan
- Exhibit from the Okanogan-Legion Airport Security and Emergency Response Plan dated October 2003

Chapter 3:

Forecasts

3.1 GENERAL

This chapter forecasts based aircraft and annual aircraft operations at Okanogan-Legion Airport in five-year intervals over a 20-year planning period. A future airport reference code (ARC) based on forecast data is also identified.

The forecasting process is an important one for a number of reasons. Forecasts will help the city of Okanogan, Okanogan County and the Colville Confederated Tribal Government plan the airport's future. Understanding future demand that may result from factors both within and outside of local influences will help these three entities make better decisions about capital improvements.

Forecasts are also vital to the funding of those improvements. As stated, Washington State Aviation is Okanogan-Legion Airport's primary source of grant funds for the airport's operational areas. Though the aviation division has made considerable progress over the last few years with respect to the grant process and with increasing the amount of grant funds available, they continue to have less money than is needed to meet project demands. Consequently, the division must carefully prioritize grants. Forecasts assist WSDOT/AD with these funding decisions.

Capital projects that are necessary to correct conditions that negatively impact safety and projects that maintain investment in infrastructure, especially paved surfaces, should be funded as money is available regardless of forecasts. However, major development that enhances airport operational capability, for example a runway extension, will be made only after careful evaluation of necessity based on logically quantified future need.

Forecasts are also important to organizations interested in financing features of airports that are not generally funded by WSDOT/AD. Both the Washington State Department of Community Trade and Development (CTED) and the U.S. Department of Commerce's Economic Development Administration (EDA) are financial resources for projects, such as utility infrastructure and road construction, that are necessary to support development of airport-related and airport-compatible business on and adjacent to airport property. These entities are interested in funding projects that create jobs and improve incomes.

It is a primary recommendation of this plan, that after it is published, the city of Okanogan update and communicate its activity-level forecast as conditions indicate it is appropriate to do so. For instance, if a new manufacturing business that operates one or more aircraft moves to the area, the resulting increase in based aircraft and annual operations should be added to the forecast and communicated to WSDOT/AD. This will help the city of Okanogan maintain its appropriate place in the aviation division's priority list. Also, this information will be useful during the next update to this airport layout plan. Forecasting by professionals has become a highly refined art but it is still, at best, educated guessing. Tracking and noting actual conditions that alter forecasts help refine this process.

3.2 TERMINOLOGY

Terms used in this section that require definition are:

Local aircraft operation: Operations remaining in an airport's local traffic pattern and operations to or from an airport and a practice area within a 20-mile radius.

Itinerant aircraft operation: All other operations.

3.3 FORECASTING METHODS

To determine the most accurate forecast of future airport operations, we begin with quantifying existing conditions, including the numbers and types of based aircraft, estimated local and itinerant flight operations, county and city population and other pertinent data. Next, factors that are likely to influence future demand are identified. These factors include population projections over the planning period as well as projections made by state agencies about economic development in the region served by Okanogan-Legion Airport. Forecast information produced by WSDOT/AD and the FAA is also taken into account.

We then consider other issues that may impact changes in airport activity. These include planned development of a Civil Air Patrol base, intentions by the Colville Confederated Tribes for economic development adjacent to and on airport property as well as advancing aircraft technology and changes in pilot rules recently promulgated by the FAA that may result in increased aviation activity.

3.4 EXISTING DATA

Existing data about based aircraft and annual flight operations are available from three sources: FAA's Airport Master Record, also called Form 5010, last updated in April 2003; the WSDOT/Aviation Division database, last updated in 2002; and data provided by the airport layout plan steering committee.

Information from these sources is shown in tables 9 and 10.

Determination of based aircraft baseline

Information contained in the WSDOT/AD and FAA databases is similar to actual conditions as noted in early May 2005. The reasoning behind WSDOT/AD's assumption that the aircraft census would decline from 17 to 12 aircraft between 2002 and 2005 is not stated. The actual based

Table 9: FAA Form 5010

Fleet Mix		Estimated Annual Operations	
Based A/C	2003	2003	
Single-engine	15	GA local	2,600
Multi-engine	0	GA itinerant	1,000
Turboprop	0	Air carrier	0
Glider	0	Air taxi	100
Ultralight	3	Commuter	0
Rotorcraft	0	Military	0
Total	18	Total	3,700

Source: FAA Form 5010

aircraft census provided by OLAIA will be used as the baseline for this forecast. Two of the 15 currently based aircraft are inoperative. Their owners intend to return them to the active fleet. For purposes of this forecast these two aircraft are considered "based."

Determination of flight operations activity baseline

Flight operations activity levels at small, general-aviation airports are difficult to determine. The WSDOT/AD database estimated a total of 3,500 annual operations in 2002. Of those operations, 2,400 were estimated to have been local operations. The database projected nearly 5,000 total annual operations in 2005 even though the numbers of based aircraft were projected to decline.

The FAA recommends that one should generally assume 250 operations per year per based aircraft at rural airports. This multiplier applied to currently active aircraft at Okanogan-Legion Airport results in annual flight operations of 3,750 for based aircraft. WSDOT/AD estimates just over 2,300 annual operations by itinerant aircraft in 2005 while the FAA estimates 1,100 annual itinerant flight operations in 2003.

If one averages the 2003 itinerant estimate by the FAA (1,100) and the 2005 estimate by WSDOT/AD (2,300) the result is 1,700 annual itinerant opera-

tions. This amounts to about 140 itinerant operations per month. The total of based aircraft annual operations (3,750) and itinerant annual operations is estimated in this plan to be 5,450.

3.5 FORECASTS

WSDOT/AD

In 2002 WSDOT/AD published a document that extensively analyzed and forecast Washington aviation activity through the year 2020. This document is part of the Washington State Continuous Airport System Plan, or WSCASP. The plan concluded that numbers of based aircraft and flight operations activity for all airports in Okanogan County would change very little through the year 2020. The study assumes that 254 aircraft were based in the county in the year 2000 and that

bers of based aircraft or flight activity levels.

The FAA does, however, publish other useful information. According to the FAA, the number of U.S.-based active general-aviation aircraft is expected to increase at an average annual growth rate of 0.5 percent through the year 2025. Most of this growth is attributed to business-type aircraft. Single-engine piston aircraft — the type of aircraft already most prevalent at Okanogan-Legion Airport — are expected to increase in numbers at a rate of 0.2 percent. Flight hours are expected to increase at a faster rate than the aircraft fleet, 1.5 percent annually through 2014 and then 1.2 percent annually through 2025. These modest numbers, when applied to Okanogan County and to Okanogan-Legion Airport, seem to parallel estimates by WSDOT/AD.

Table 10: WSDOT/AD database

Fleet Mix			Estimated Annual Operations		
Based A/C	Existing 2002	Projected 2005		Existing 2002	Projected 2005
Single-engine	16	12	GA local	2,400	2,618
Multi-engine	1	0	GA itinerant	1,000	2,182
Turboprop	0	0	Air carrier	0	0
Glider	0	0	Air taxi	100	60
Ultralight	0	0	Commuter	0	0
Rotorcraft	0	0	Military	0	60
Total	17	12	Total	3,500	4,920

Conclusions based on WSDOT/AD, FAA and actual data

Projections by WSDOT/AD and the FAA indicate very limited growth in based aircraft and flight operations.

Population and income projections

Okanogan County has

based aircraft would increase at an even pace to 258, a net increase of just four aircraft throughout the planning period. Based aircraft at Okanogan-Legion airport were, as shown in Table 10, projected to be 12.

Federal Aviation Administration

Since Okanogan-Legion Airport is not listed in the National Plan of Integrated Airport Systems (NPIAS), the FAA does not project its future num-

bers of based aircraft or flight activity levels. Washington state analysts project that the county's population will continue to grow at a similar pace into the foreseeable future. With a current population of 43,904 the county has 10,554 (25 percent) more people than it did in 1990. State analysts project that the county will gain another 1,725 people by the year 2020.

While Washington state's population growth has been significantly affected by migration, Okanogan County's growth in population has not been so affected, at least to date. In fact, during the

Growth in personal incomes in the county has averaged seven percent annually since 1969, according to the U.S. Department of Commerce's Bureau of Economic Analysis.³ The growth rate has slowed considerably in recent years, however,

reaching only 0.9 percent in 2001-2002, and 3.8 percent in 2002-2003.

If, as expected, Okanogan County's population and income continue to grow they will almost certainly result in greater demands for airport services. And if, as some analysts have projected, growth rates exceed government projections and they are compounded by increased tourism, those demands on Okanogan-Legion Airport could increase further.

Table 11: Currently based operational aircraft

Aircraft	ARC category	Operational	General use
Cessna 180	A-1	Yes	Personal/com-muting
Cessna 172	A-1	Yes	Personal/business
Cessna 172	A-1	Yes	Personal
Cessna 172	A-1	Yes	Personal
Cessna 172	A-1	Yes	Personal
Cessna 182	A-1	Yes	Personal
Cessna 182 RG	A-1	Yes	Part 135/ag support
Cessna 177	A-1	Yes	Ferry parts
Piper PA 32	A-1	Yes	Personal
Funk	A-1	Yes	Personal
Kitfox	A-1	Yes	Personal
Grumman Tiger	A-1	Yes	Personal
Champion Lancer	A-1	Yes	Personal
Cessna 377	A-1	No	Being rebuilt
Maule	A-1	Yes	Personal
Total	15		

Source: OLAIA.

3.6 ADDITIONAL FACTORS

Forecasts should take into account specific local conditions and other factors to the extent that the information used is logical, reasonable and credible. The factors included in this section are considered to meet this test. These local conditions and factors relate to:

- The Civil Air Patrol
- The Colville Confederated Tribes
- Advances in aircraft technology
- Alterations to FAA rules regarding pilots
- Airport improvements

period from 2000 to 2004 Okanogan County experienced a net loss through migration of 349.¹

Okanogan County has also been experiencing a slow but steady growth in household income. In current dollars, median household income has grown from \$20,580 in 1990 to \$32,873 in 2004.²

1 Office of Financial Management, <http://www.ofm.wa.gov/pop/april1/cocmpch2004.pdf>.

2 Washington State Office of Financial Management, *2004 Population Trends*.

3 <http://www.bea.doc.gov/bea/regional/reis/drill.cfm>.

Civil Air Patrol

Recently the Civil Air Patrol (CAP) officially recognized the Okanogan-based Northern Desert Composite Squadron as a new element of its nationwide organization. This squadron plans to construct a hangar at Okanogan-Legion Airport and is expected by its commander to be receiving either a Cessna 172 or 182 to use in its training, familiarization, utility, emergency-response and search-and-rescue missions. The CAP hangar will be a staging area for all CAP search-and-rescue activity in Okanogan County. During active missions, it is anticipated that the CAP headquarters hangar will be a center of activity for aircraft from around the region.

Anticipated impact on forecast

CAP activity will increase the aircraft census by at least one single-engine airplane per year beginning in 2007. In addition, it will increase based and itinerant flight operations 400 per year. An additional two based aircraft are expected in the 2010 to 2015 time frame. During that period 450 annual operations are expected to be attributable to CAP activity.

Colville Confederated Tribes

The tribes' planning department indicated in a memorandum dated May 4, 2005 that they may be "interested in [economic] development of the area" [on and adjacent to Okanogan-Legion Airport] "if the airport is upgraded and can offer expanded services." This memorandum is indicative of the tribes' recognition of the airport's potential to further tribal interests. Specific steps the tribe would take near and possibly on the airport that would impact the aircraft census and flight operations are unknown at this time. Possible scenarios include: (1) expansion of or movement of their industrial site which currently exists in Omak, (2) tourism development which would utilize the airport as one of the portals to tribe attractions and (3) fire control activities.

Anticipated impact on forecast

In the 2005-2010 time period one additional single-engine fixed-wing aircraft and one helicopter are attributed to tribe activities or influences. The helicopter would be used for fire support. The single-engine aircraft is estimated generate 150 operations per year. The helicopter is forecast to generate 100 operations per year. Throughout the remainder of the planning period a modest increase of 100 flight operations per five-year period, mostly by the fixed-wing aircraft is expected. These operations will likely result from tourism and business activity.

Advances in aircraft technology

Technological advances are providing pilots with more flight options than they have ever had. New kinds of engines, more advanced and less expensive avionics and lighter, stronger airframes are being developed. Much of this effort is directed by manufacturers to individual pilots on limited budgets.

The civil tiltrotor and other technologies that allow aircraft to take off over very short distances and to cruise at airplane speeds continue to be in development even if their proliferation as assumed several years ago has not happened. This class of aircraft is particularly adaptable to airports with short runways such as Okanogan-Legion.

To a limited degree research, development and manufacturing efforts that are focused on changing the way people fly are factored into FAA forecasts. Airside, however, believes that the FAA has taken a conservative approach with respect to new technologies.

Anticipated impact on forecast

An additional ten based aircraft are expected through the period 2005 to 2025. Flight operations are expected to increase by 200 annual operations per based aircraft.

Alterations to FAA rules regarding pilots

Rules recently promulgated by the FAA allow owners of several categories of ultralight aircraft to register those aircraft in a new category called "light sport." Light-sport aircraft are expected to substantially add to the numbers of based aircraft and flight operations at U.S. airports. It is logical to assume that pilots in this category will, in general, prefer to operate from airports such as Okanogan-Legion that have low-activity levels, are non-towered and that have an abundance of adjacent, uncontrolled airspace.

Anticipated impact on forecast

The sport pilot category is expected to increase the based aircraft census by eight aircraft between 2005 and 2025. Annual operations are expected to average 150 per based aircraft.

Airport Improvements

Though typical planning procedures call for airport improvements, especially those that increase airport capacity, to be justified by demand, it is logical to assume that improvements might have some impact on actually generating demand. One example of this is the statement by Colville Confederated Tribes that they would be more interested in using the airport and in participating in airport-related development if the airport were upgraded and offered expanded services. The tribes' phrase "expanded services" is understood to generally mean improved accommodations for visitors and for based aircraft.

With the exception of those related to the tribes, no specific increases in the aircraft census and forecast operations are assumed in this forecast to result from airport improvements. It is a conclusion of this narrative, however, that alterations to the airport's layout, operating features and operational capability are likely to have a general, supportive impact on the aircraft census as well as based and itinerant activity levels.

Basic layout improvements would include a full-length taxiway, a widened and/or lengthened runway, and additional tie-downs and hangars. Operating features would include an updated lighting system, including precision approach path indicators (PAPI). Operational improvements would include an instrument approach procedure. These improvements are more fully explained in the following Facility Requirements Chapter.

It is possible that Okanogan-Legion Airport would increase its share of all aircraft based in Okanogan County if it were to improve the airport as described in this section. Market share is not considered a major factor, however because drive distances between Okanogan-Legion Airport and other county airports where growth seems to be occurring, such as Tonasket, Twisp and Methow Valley State, are too extensive to assume that improvements will draw aircraft based based from those facilities.

3.7 PROJECTING POPULATION AND INCOME

As indicated, Okanogan County's population in 1990 was 33,350. In 2005 it is 43,904. It is expected to grow to 54,629 by the year 2020. This amounts to an average of approximately 710 additional citizens per year over the 30-year period. If this rate were projected to the year 2025, the last year of the planning period addressed in this plan, the county will have a population of 58,174. Over 14,000 residents, a 33 percent increase, would be added to the county between 2005 and 2025.

This raises a question about where this increased population will reside. Omak is the largest city in the county. Other populated areas are widely dispersed. Okanogan's proximity to Omak, combined with Okanogan's position as the county seat, may result in the city experiencing growth rates that exceed those of the county as a whole.

Two new subdivisions have recently begun offering upscale view lots within the city of Okanogan. Home construction in Okanogan has continued at a modest but steady pace for several years.

While Okanogan County's medium household income growth rate has recently slowed it is important to note that during the period from 1990 to 2004 it grew, in current dollars from \$20,580 to \$32,873. Average income is less in Okanogan County than it is in more populated areas of Washington state but there is evidence of relatively consistent improvement.

3.8 FORECAST OF BASED AIRCRAFT AND OPERATIONS

Based aircraft

Fifteen aircraft are currently based at Okanogan-Legion Airport. Forecasts by WSDOT/AD and the FAA expect no growth in this number. Airside, however, believes that those forecasts did not consider factors indicated in this chapter that will result in some growth in based aircraft. The impacts of each of these factors on based aircraft over the planning period are shown in Table 13.

Annual operations

As explained earlier in this section, current annual flight operations resulting from both based and itinerant activity are assumed to be 5,450. Table 13 indicates the impacts of each of the factors

Table 12: Okanogan County population

Year	Population
1990	33,350
2000	39,564
2003	39,600
2005	43,904
2010	47,850 (projected)
2015	51,549 (projected)
2020	54,629 (projected)
2025	58,174 (projected)

identified in this section. Table 14 applies this information to based aircraft over the planning period. Table 15 applies this information to forecast flight operations over the planning period.

Tables 13, 14 and 15 indicate moderate growth of based aircraft and flight operations over the planning period. These forecasts are based on expected continuing population increases, expected continued advances in medium household income, development of the CAP base, activities by the Colville Confederated Tribes, technological advances and changes in FAA rules regarding the light-sport category of aircraft. Air taxi operations are expected to increase due to Okanogan's county-seat status in a growth area. Local operations are expected to grow in a manner slightly disproportionate to the total due to the addition of non-traditional, generally short-range aircraft.

Table 13: Additions to based aircraft and flight operations per period over the planning cycle

Factor	2005-2010			2010-2015			2015-2020			2020-2025		
	Based aircraft	Local Ops	Itinerant Ops	Based aircraft	Local ops	Itinerant ops	Based aircraft	Local ops	Itinerant ops	Based aircraft	Local ops	Itinerant ops
CAP	1	250	150	2	25	25	0	0	0	0	0	0
CCT	2	250	0	0	100	0	0	100	0	0	100	0
A/C Tech	3	600	100	3	600	100	2	400	75	2	400	75
Sport pilot	2	300	100	2	300	100	2	300	100	2	300	100
Totals	8	1,400	350	7	1,025	225	4	800	175	4	800	175

Airport fleet mix

The fleet mix at Okanogan-Legion Airport is forecast to continue to be dominated by single-engine reciprocating aircraft due to runway length. Additions to the fleet mix will be light sport aircraft, a rotary-wing aircraft and as yet unknown aircraft variations resulting from new aircraft technologies.

Airport reference code

Forecast aircraft continue to support an ARC category of A-1 (small). Technological advances and sport pilot rules are not likely to change this designation.

Table 14: Forecast based aircraft 2005-2025

Based aircraft by type	2005 (1)	2010	2015	2020	2025
Single-engine	14	21	28	32	36
Multi-engine	1	1	1	1	1
Helicopter	0	1	1	1	1
Total based aircraft	15	23	30	34	38
Average annual percentage increase		10.6	6.0	2.6	2.4

Table 15: Forecast flight operations 2005-2025

Operations	2005 (1)	2010	2015	2020	2025
Single-engine	5,450	7,100	8,250	9,125	10,000
Multi-engine	0	0	0	0	0
Helicopter	0	100	200	300	400
Total operations	5,450	7,200	8,450	9,425	10,400
Average annual percentage increase in total operations		6.4	3.5	2.3	2.1
Local operations	3,750	5,150	6,175	6,975	7,775
Average annual percentage increase in local operations		7.5	4.0	2.6	2.3
Itinerant operations	1,700	2,050	2,275	2,450	2,625
Average annual percentage increase in itinerant operations		4.1	2.2	1.5	1.4

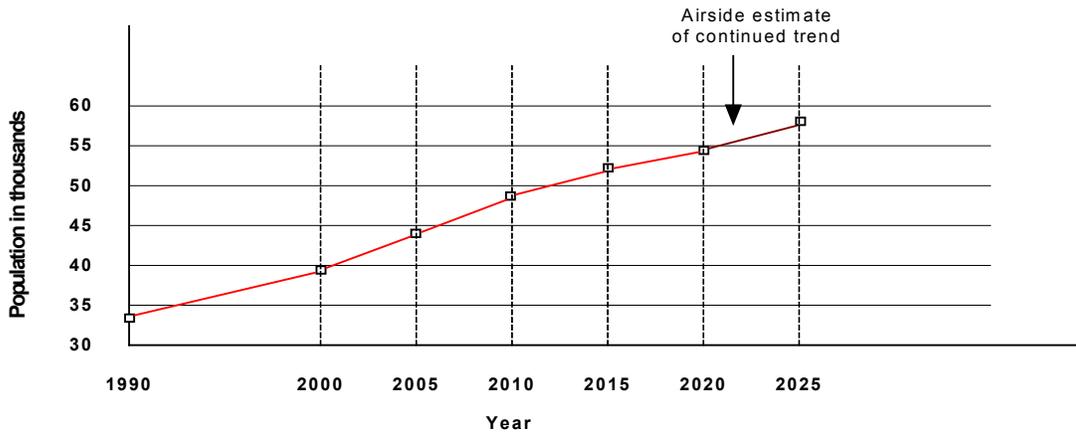


Figure 2: Okanogan County Population Growth Estimated by the Washington State Office of Financial Management in 2003

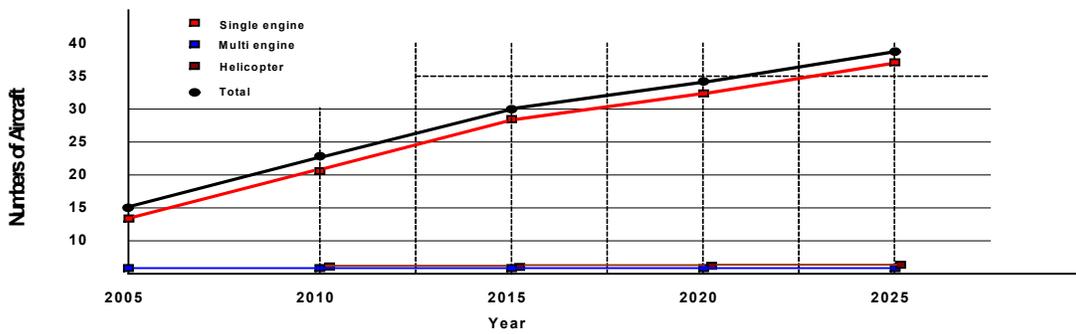


Figure 3: Forecast of Based Aircraft at Okanogan-Legion Airport

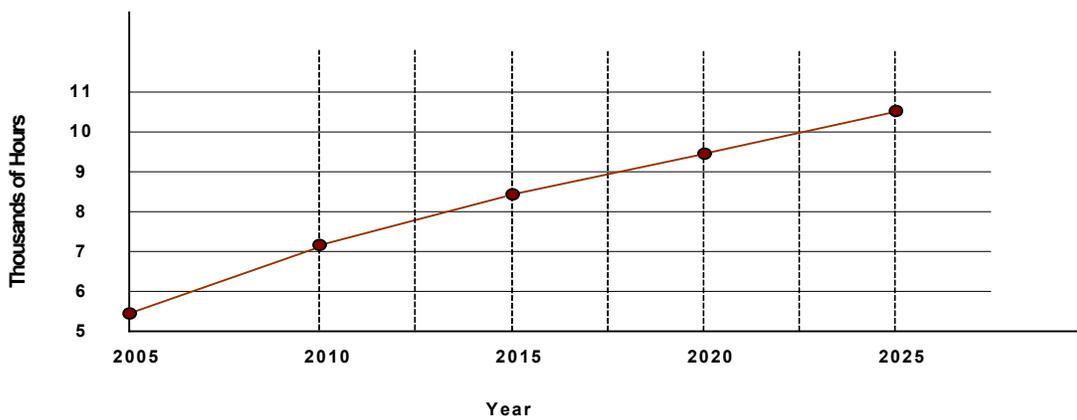


Figure 4: Forecast of Annual Flight Operations at Okanogan-Legion Airport

Chapter 4:

Facility requirements and development alternatives

4.1 INTRODUCTION

This chapter uses information from Chapters 2 and 3, data gathered during site visits, and suggestions from the ALP steering committee to develop a list of recommended improvements at Okanogan-Legion Airport over the planning period. Projects listed are intended to increase safety, accommodate forecast demand and provide a transportation facility that is aesthetically pleasing and accommodating to local citizens and visitors. Information about the timing of projects is at the end of the chapter. Estimated expenses associated with recommendations are contained in the next chapter.

As stated in the Forecast Chapter, the Cessna 172 and the A-1 (small) group of aircraft it represents is forecast as the design aircraft throughout the planning period. Additional kinds of aircraft that may use Okanogan-Legion Airport are light sport aircraft and variations of aircraft based on advancing technologies.

FAA design standards contained in Advisory Circular 150/5300-13 have been used where applicable.

Recommendations in this chapter are organized in the following sections.

- Airport layout
- Alternative development
- Improvements 2005
- Improvements over remaining planning period

4.2 AIRPORT LAYOUT

Runway length

The existing runway at Okanogan-Legion Airport is 2,539 feet long and 36 feet wide. For small, single-engine aircraft this runway length is generally adequate. According to the FAA's computer model, the airport is able to accommodate less than 75 percent of the general aviation fleet weighing less than 12,500 pounds. During the summer, when temperatures exceed 90 degrees, pilots of fully loaded aircraft probably consider the runway's length marginal. Runway width - at 36 feet - is 24 feet less than the FAA's runway width design standard of 60 feet.

Though the FAA's A-1 (small) category is used in this plan as a guideline for adequate runway length it is worth noting that the A-1 small aircraft category includes some relatively large aircraft when taken in context with current airport activity. Though it is an unusual inclusion, aircraft such as the Mitsubishi MU-2P, high-performance multi-engine turboprop are considered A-1 small aircraft. Most of the aircraft using the airport now weigh considerably less than the maximum weight of the A-1 (small) category and do not generally require runway lengths identified by the FAA as being capable of accommodating 100 percent of the category. Nevertheless, growth is forecast and the A-1 (small) category of aircraft should be accommodated to the extent possible. Further, forecast growth in the area and Okanogan's status as the county seat indicate occasional use by larger A-1 and B-1 category aircraft.

Parallel taxiway

Absence of a parallel taxiway makes it necessary for pilots to "back-taxi," that is, to use the run-

way as a taxiway either before or after takeoff or landing operations. Back-taxi operations reduce safety because they increase the risk of accident through use of an active runway for activities other than those directly related to landing and taking off. The degree of risk associated with back-taxi operations is dependent on a number of factors such as whether aircraft using the airport have radios and, if they do have them, whether they use them to communicate with other aircraft in the area. Other factors include visibility, signage, as well as pilot skill levels and pilot awareness. Yet another exacerbating factor is the fact that traffic to Runway 4 uses a left pattern while traffic to Runway 22 uses a right pattern. During calm wind or crosswind conditions pilots may choose either pattern for landing or takeoff operations. Another key factor is an airport's activity level. The busier an airport is the more risk is associated with back-taxi operations. Night operations and day operations conducted in reduced visibility conditions increase back-taxi risks and liability exposure.

Some of the light sport aircraft and variations of aircraft based on new technologies that are expected to use Okanogan-Legion Airport will not have radios with which to listen to other air traffic and to announce their intentions. The degree to which communications issues relating to light sport aircraft will reduce safety in a non-taxiway environment is not known but it is reasonable to assume some negative impact.

Back-taxi operations are arguably the ultimate runway encroachment since they require operations on active runways that do not relate to landing and taking off.

4.3 ALTERNATIVES DEVELOPMENT

The overall conformation of the airport has been reviewed by Airside. Discussions with the ALP steering committee regarding the existing and future airport layout resulted in consideration of a number of development alternatives. Doing nothing, commonly called the "no change alternative,"

though obviously the least costly, has not been given serious consideration because it would require continuing back-taxi activities.

Five alternatives are detailed in this section.

ALTERNATIVE 1 - CONSTRUCTION OF A FULL-LENGTH TAXIWAY CONSISTENT WITH FAA STANDARDS (Refer to Figure A1.1)

This alternative would maintain the runway in its current location and at its existing length and width. A full-length taxiway would be constructed. The FAA A-1 (small) design standard of 150 feet centerline-to-centerline separation would be complied with.

Assessment of this alternative

Advantages

- A full-length taxiway would eliminate the need for back-taxi operations.
- Pre-takeoff run-up operations would be conducted farther away from the runway. This would improve safety. Pre-takeoff operations are now conducted either on the runway or on run-up pads located adjacent to the runway and within the runway object-free area.
- The portion of the taxiway north of the existing apron would be fully functional and in compliance with FAA design standards. No issues would exist regarding structures relative to the TOFA north of the apron.

Disadvantages

- The FAA design standard of 150 feet centerline-to-centerline and the standard related to the taxiway object-free area (TOFA) would cause the TOFA to be within 4 feet of the east walls

of four of the five hangars that are south of the apron. Those four hangars would also be within 48 feet of the centerline of the taxiway. The fifth hangar, hangar A-20S, which is 10 feet closer to the runway, would have to be moved west to line up with hangars A-30S through A-60S.

- While proximity of the hangars to a taxiway located south of the apron would be functional, a difficult operating environment would be created for the owners of the hangars. Either hangar owners would not park or stage their aircraft in front of their hangars or they would be transgressing into the TOFA when their aircraft were in front of their hangars.
- Safety for taxiing aircraft, especially at night would be compromised on the portion of the taxiway south of the apron.
- Runway length would continue to limit the ability to accommodate over 25 percent of the general aviation A-1 (small) fleet.

ALTERNATIVE 2 - CONSTRUCTION OF A FULL-LENGTH TAXIWAY WITH REDUCED SEPARATION STANDARD (Refer to Figure A1.2)

This alternative would reduce the runway/taxiway centerline-to-centerline separation to less than the FAA standard.

Assessment of this alternative

Advantages

- The operating environment for the owners of hangars south of the apron would improve commensurate with the degree to which there is variance from the FAA separation standard. The

closer the taxiway would be constructed to the runway the more room there would be in front of the hangars for staging owners' aircraft.

- Pre-takeoff run-up operations would be conducted farther away from the runway, as opposed to on run-up pads as explained in Alternative 1.

Disadvantages

- Reduced safety and increased liability would result from failure to comply with the FAA centerline-to-centerline design standard. To what degree safety would be reduced is difficult to measure. It is illogical to assume that a taxiway/runway system with, for instance, a 125-foot centerline-to-centerline separation is simply dangerous. This FAA standard has, however, been established on data gathered over a number of years. It is credible and, from a legal standpoint, a matter of record. Were this a matter of a few feet being necessary to create a functional taxiway it would probably be a viable alternative. However, to create adequate room in front of the hangars for staging at least 25 to 35 feet would be necessary. This would mean a sizeable reduction in centerline-to-centerline distance.
- Runway length would continue to limit the ability to accommodate over 25 percent of the general aviation A-1 (small) fleet.

ALTERNATIVE 3 - CONSTRUCTION OF A PARTIAL TAXIWAY/NORTH END (Refer to Figure A1.3)

This alternative would provide a taxiway from the north end of the airport's aircraft parking apron to the north end of the existing runway. The

runway would be left in its current location. Width and length of the runway would be unchanged.

Assessment of this alternative

Advantages

- It is relatively inexpensive.

This alternative improves safety over existing conditions, especially since a north taxiway would parallel approximately 70 percent of the runway's length.

- FAA taxiway safety area (TSA) and taxiway object-free area (TOFA) design standards would be complied with.
- The FAA's runway-centerline-to-taxiway-centerline separation standard would be met.
- Pre-takeoff run-up operations for aircraft departing on Runway 22 would be conducted at a safe distance from the runway, clear of the runway object-free area.

Disadvantages

- This alternative would not totally eliminate back-taxi operations. They would, however, be on a relatively short section of the runway because the existing midfield taxiway is only 900 feet from the end of Runway 4.
- Runway length would continue to limit the ability to accommodate over 25 percent of the general aviation small fleet.
- Pre-takeoff run-up operations for aircraft departing on Runway 4 would continue to be conducted on the pad

on the east side of the runway, well within the runway object-free area.

- Owners of hangars south of the apron would have to taxi north to the apron in order to gain access to the runway via the existing taxiway.

ALTERNATIVE 4 - CONSTRUCTION OF A FULL-LENGTH TAXIWAY WITH RELOCATED RUNWAY (See Figure A1.4)

This layout would move the runway to the east by 25 feet and widen it to 60 feet. A full-length taxiway would be constructed to provide access to the north and south ends of the runway. The Runway 4 end would be moved 150 feet north thus allowing the runway safety area to be within an area that can be graded, compacted and brought into compliance with the relevant FAA standard. The north end of the runway would not be lengthened. The runway's length would be therefore reduced by the 150-foot adjustment at the south end to 2,389 feet.

Assessment of this alternative

Advantages

- This layout would cause Okanogan-Legion Airport to be in full compliance with the runway/taxiway separation, runway width, runway safety and object-free area as well as the taxiway safety and object-free area FAA design standards.
- It would totally eliminate the need to back-taxi.
- Owners of four of the five hangars south of the aircraft parking apron would have adequate room – about 29 feet – to stage and maneuver their aircraft. Hangar A-20S would have about

19 feet for staging. The staging area in front of A-20S would be adequate but not ideal. Hangar A-20S could be moved to line up with the four hangars to its south to provide it the same staging room.

- The existing structures south of the parking apron would either not penetrate the FAR Part 77 Transitional Surface or would do so only minimally.
- A building restriction line (BRL) based on a 15-foot structure would be moved west, thereby increasing the room available for structures along the entire length of the runway and notably south of hangar A-60S.
- Pre-takeoff run-up operations would be conducted off of the runway and at a safe distance from the runway at both its ends.

Disadvantages

- The Runway – at 2,389 feet – would be 150 feet shorter than it is currently.

Detailed planning of Alternative 4 would have to be accomplished to determine the exact distance the runway would be offset from its current location because the farther east the runway is located, the more the hill to the east will penetrate the FAR Part 77 Transitional Surface. This process will require an effort to achieve balance between transitional surface penetration and maneuvering room outside of the TOFA adjacent to the hangars.

Grading of the hill to the east and use of graded material would serve a dual purpose. It would provide material to level the elevation of the runway at a location roughly one-third of the

distance from the Runway 22 end where there is an existing drop in runway elevation. It would also reduce the degree to which the hill to the east would penetrate the FAR 77 Transitional Surface.

ALTERNATIVE 5 - CONSTRUCTION AS OUTLINED IN ALTERNATIVE 4 WITH EXTENSION OF THE RUNWAY. (See Figure A1.5)

In addition to the four development alternatives identified in this plan, a fifth is offered for consideration by the city of Okanogan and Colville Confederated Tribes. This development alternative cannot be offered for current, consideration as have the other alternatives because appropriate discussions have not occurred between the parties involved and will not be able to be held before this plan is due to be completed.

It is important to identify this alternative in this plan, however, since it would provide for increased runway length resulting in a substantial improvement to safety and operational utility of the airport. This fifth alternative would also be more likely to create a favorable environment for economic development and business growth at the airport and within the surrounding communities and tribal lands.

This layout would move the runway to the east by 25 feet, widen it to 60 feet and make all other beneficial alterations as explained in Alternative 4. In addition, the north end of the runway would be extended by 208 feet so that the runway would be 2,597 feet long. This amounts to a net increase of 58 feet. This distance was chosen because it would place the northwest corner of the runway's pavement inside city property but within a reasonable setback of 10 feet from the property boundary.

Due to the location and angle of the property boundary on the north side of the airport, this layout would require either an angled taxiway at

the Runway 22 end or a taxiway that adjoins the runway perpendicularly but short of the runway's end.

With this layout, portions of the runway safety area and runway object-free area as well as an increased amount of the runway protection zone would extend over the boundary between city and tribal land. Consequently, this layout would require a long-term easement agreement between the Colville Confederated Tribes and the city of Okanogan that provided for (1) grading, compacting and protecting the portion of the runway safety area (RSA) that is on tribal property, (2) ensuring that the portion of the runway object-free area (ROFA), that is also on tribal property is maintained according to FAA design recommendations, (3) adhering to FAA-recommended restrictions relative to the Runway 22 protection zone (RPZ) and (4) protection of FAR Part 77 airspace serving the relocated runway.

None of these four conditions would require structures, equipment or routine access to any properties outside of the existing airport property boundary. They would, however, require an agreement between the parties that the RSA, ROFA, RPZ and FAR Part 77 approach and transitional surfaces are vital, protected elements of the relocated runway. Agreements between the parties would have to be unambiguous and irrevocable in order to acquire WSDOT/AD funding.

Assessment of this alternative

Advantages

- This layout would cause Okanogan-Legion Airport to be in full compliance with applicable FAA standards as indicated in Alternative 4.
- It would also totally eliminate the need to back-taxi.
- Owners of four of the five hangars south of the aircraft parking apron

would have adequate room, as indicated in Alternative 4, to stage and maneuver their aircraft. Issues relative to hangar A-20S would be the same as in Alternative 4. The owner of A-20S would still have about 19 feet for staging. The hangar could be moved to line up with the four hangars to its south to provide it the same staging room.

- The existing structures south of the parking apron would either not penetrate the FAR Part 77 Transitional Surface or would do so only minimally.
- A building restriction line (BRL) based on a 15-foot structure would be moved east thereby increasing the room available for structures along the entire length of the runway.
- Pre-takeoff run-up operations would be conducted off of the runway and at a safe distance from the runway at both its ends.
- Runway length would be increased.

Disadvantages

- The Runway – at 2,597 feet – would still not be able to accommodate 100 percent of the A-1 (small) aircraft fleet.

As with Alternative 4, detailed planning of Alternative 5 would also have to be accomplished to determine the exact distance the runway would be offset from its current location due to the FAR Part 77 issues described. Graded material from the hill to the east would continue to provide the benefit of reducing FAR Part 77 Transitional Surface penetration while adding base material for the runway.

Additional consideration

Discussions between the city of Okanogan and the tribes may result in an agreement that extends paved surfaces for the runway or the runway/taxiway system onto tribal property as demand occurs and as it is in their mutual best interests. Achieving a runway length of approximately 3,200 feet would make the airport more attractive to business aircraft operators.

Summary assessment

Alternatives 1 and 2 are not desirable. Alternative 1 would create an untenable and unsafe condition along the area from the south edge of the

apron to the south end of the taxiway. Alternative 2, though functional, reduces safety for taxiing aircraft as well as for landing aircraft and increases liability. Alternative 3 is moderately expensive but could be done in compliance with FAA standards and would result in safer operations.

Alternative 4 provides numerous benefits. The only disadvantage of this alternative is the reduction of runway length by 150 feet. Runway length plays a major role in safety but so do runway width and clear, conforming safety areas. This tradeoff of runway length for other safety advantages is, in Airside's opinion, a net benefit.

Table 16: Comparison of alternatives with FAA standards

FAA standard	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Runway length* 2,800' approx.	2,539'	2,539'	2,539'	2,389'	2,597'
Runway width Standard 60'	36'	36'	36'	60'	60'
Taxiway width Standard 25'	25'	25'	25'	25'	25'
Runway Safety Area (RSA) 120' wide centered on the runway. Extends 240' beyond each runway end.	Not in compliance at Runway 4 end, not totally under owner control at Runway 22 end.	Not in compliance at Runway 4 end, not totally under owner control at Runway 22 end.	Not in compliance at Runway 4 end, not totally under owner control at Runway 22 end.	In total compliance.	In total compliance.
Runway Object-Free Area (ROFA) 250' wide centered on the runway. Extends 240' beyond each runway end.	In compliance but not totally under owner control at either end.	In compliance but not totally under owner control at either end.	In compliance but not totally under owner control at either end.		
Taxiway safety area (TSA) 49' wide centered on the taxiway.	Yes	Yes	Yes	Yes	Yes
Taxiway Object-Free Area (TOFA) 89' wide centered on the taxiway.	Yes	Yes	Yes	Yes	Yes
Runway/taxiway separation 150'	Yes	No	Yes	Yes	Yes
Runway centerline-to-holding-line marking 125'	No -- at apron area taxiway connector.	No -- at all taxiway connectors.	No -- at apron area taxiway connector.	Yes	Yes
Runway protection zone under control Length 1,000' Width inner 250' Width outer 450'	No	No	No	No	Possibly
FAR Part 77 Transitional Surface 7:1 slope beginning at the edge of FAR 77 Primary surface	No -- west side.	No -- west side.	No -- west side.	Yes	Yes

*None of the alternatives is able to provide the runway length recommended for 75 percent of the small aircraft fleet.

Alternative 4 also makes it possible to implement Alternative 5, which increases runway length, should there be a future opportunity to do so, and without major reconstruction of the taxiway since the taxiway would have been placed in its optimum location.

Alternative 5 incorporates all of the advantages of Alternative 4 and adds the benefit of increased runway length. An additional advantage of this alternative is that it can be implemented as an addition to Alternative 4.

Recommendation

1. The taxiway/runway configuration identified in Alternative 4 is recommended for implementation. This configuration will maintain all paved surfaces within the existing property boundary and will be consistent with the planning agreement that is in place between the Colville Confederated Tribes and the city of Okanogan. It will also provide for increased compliance with FAA standards and result in a more efficient airport layout. Alternative 4 would also provide a basis for implementation of Alternative 5 if runway lengthening can be accomplished at a future date.

2. The taxiway/runway configuration identified in Alternative 5 should be discussed with the tribes. Depending on how discussions with the tribes progress, extension of the runway to the north beyond the current property boundary should be considered if and when demand justifies it and if it is deemed to be in the mutual best interest of the parties.

Phasing

Current state regulations do not allow WSDOT/AD to provide grants in excess of \$250,000. Design, engineering and construction of a new taxiway/runway system as described in Alternative 4 would exceed that amount. Unless state regulations regarding maximum grant amounts are changed before implementation of this option, Alternative 4 could be phased in three grants as follows:

1. Design, engineering, specifications and contract documents for the runway/taxiway system including grading, drainage, lighting, signage and other features as detailed further in this chapter.

2. Construction of the relocated runway and extension of existing taxiway. This phase would include installation of all runway equipment.

3. Construction of full-length taxiway and installation of all taxiway features.

Alternative 1 drawing

Alternative 2 drawing

Alternative 3 drawing

Alternative 4 drawing

Alternative 5 drawing

4.4 IMPROVEMENTS 2005

Following is a list of prioritized improvements recommended for completion in 2005.

A1. Design and install temporary runway lights; activate rotating beacon and install new lighted wind indicator.

Install runway edge and threshold light wiring in above ground conduit. Increase the numbers of threshold lights that are located on each end of the runway to six. Use new light fixtures that will ultimately be placed underground when the runway is relocated. The location for a new lighted wind indicator is shown on the airport layout plan.

A2. Hold line/safety area enhancement.

Eradicate existing hold lines. Paint new hold lines at the location where the aircraft parking apron adjoins the existing taxiway. This will increase the distance from the runway to the hold lines. Install a retroreflective hold-line sign on frangible mountings adjacent to the hold lines. Hold-line graphics should be yellow and in 1-foot widths rather than the existing 6-inch widths.

A3. Grade and compact the runway safety area and FAR Part 77 Primary Surface.

Efforts to improve the RSA and Part 77 Primary Surface should be accomplished to the degree terrain will permit. These areas should be graded and compacted to conform to the relevant FAA standards. The RSA is 120 feet wide, centered on the runway and extends 240 beyond each end. The FAR Part 77 Primary Surface extends 200 feet beyond the runway and is 250 wide centered on the runway. Some areas south of Runway 4 will not be able to be improved due to a reduction in terrain elevation. Particular attention should be given to the area north of the end of Runway 22 where there is a rise in terrain.

A4. Purge/connect fuel tanks.

Purge the 80-octane tank and connect it with the 100-LL fuel tank. Replace the key lock system with a card lock system to allow for self-fueling of transient aircraft.

A5. Seal runway cracks.

A6. Dismantle segmented circle and remove its wind indicator.

A7. Finish fence south of the apron.

Complete installation of fence and gates.

A8. Finish rehabilitation of wood hangar.

Over the short term, repairs to the roof of structure A-10 – the wooden hangar - are recommended. The building should be cleaned, painted and generally improved. Set aside an area where the city, the county and the Colville Confederated Tribes can display information about the area and about their cooperative and individual plans for economic and tourism development. This area should be designed to be a seamless display and constructed in a high-quality manner.

A9. Off-airport signs.

Information/direction signs should be installed at the entrance to the access road at the U.S. Highway 97 intersection as well as WSDOT and/or USDOT specified distances north and south on U.S. Highway 97.

Additional signs indicating directions to the airport should be installed at the intersection of Second Avenue and Oak Street within the city.

Signs welcoming and providing directions to visitors should be installed adjacent to the wooden hangar on both the apron and vehicle parking sides.

4.5 IMPROVEMENTS DURING REMAINING PLANNING PERIOD

Improvements 2006-2010

Following is a list of improvements recommended for the 2006-2010 time period.

B1. Construct a relocated runway and full-length taxiway as indicated in Alternative 4.

This project may have to be phased as indicated earlier in this chapter. Paint all paved surfaces according to FAA design specifications.

B2. Install the medium-intensity (MIRL) runway edge and threshold lights formerly purchased.

Use the conduit, wiring, lights and frangible supports purchased for the temporary light system. Install these in in-ground base cans.

B3. Install reflectors throughout the taxiway system.

Reflector locations should be consistent with taxiway light locations specified by the FAA. An option to reflectors is to install blue-lens taxiway lights.

B4. Install precision approach path indicators (PAPIs) at both ends of the runway.

These will be located approximately 450 feet from each runway end and on the left side of the runway as seen during landing. Take extra precautions to assure that they are installed with full frangibility and on concrete platforms that are even with grade.

B5. Install runway hold line signs where the new taxiway connects with the ends of the runway.

As with the initial sign these signs should be retroreflective, be on frangible supports and be on the left side of the taxiway as seen when facing

the runway. The signs should be even with the painted hold lines. They should be either FAA-certified or constructed to FAA specifications.

B6. Install a supplemental wind indicator as shown on the airport layout plan.

This wind indicator need not be lighted. It should be on a short (8 foot or shorter) post.

B7. Install a new radio controller.

This should be a multi-position controller which has two circuits for runway lights and one circuit each for all other equipment.

B8. Add an additional tie-down area north of the existing apron.

Currently, there are five aircraft tie-downs on the paved apron and five on an unpaved area north of hangar number A-30N. There is no identification on the aircraft apron as to which tie-downs are for based aircraft and which are for visiting aircraft. The existing paved apron is irregular in shape.

The FAA standard distance from a runway centerline to an aircraft parking area for A-1 (small) category aircraft is 125 feet. When the full-length taxiway is constructed, a portion of the east side of the existing apron will be unusable for aircraft parking due to the need to protect the taxiway's object-free area.

Existing paved apron space that is consistent with the FAA standard amounts to approximately 6,250 square yards. About 750 square yards of this space should be set aside for aircraft fueling and those waiting to fuel. Apron space available for parking aircraft is further reduced by the need to provide space in front of hangars A-10 and A-70N for ingress and egress. Additionally, the paved apron areas south of structures A-10 and A-20N must be kept clear for vehicle and emergency access and a taxilane must be available to provide a connection with the runway. These considerations and the irregular shape of the paved apron result in its having a capacity for parked aircraft of

about 2,000 square yards – enough for about five aircraft.

Space for additional tie-downs for both based and visiting aircraft exists north of hangar A-20N. This area is shown in the building area drawing of the ALP drawing set. The numbers of tie-down spaces were determined by assigning 300 square yards per based aircraft and 360 square yards per transient aircraft. Transient aircraft parking requirements were determined by using the FAA formula contained in FAA Advisory Circular 150/5300-13, Appendix 5, Change 8.

B9. Identify areas for aircraft storage.

Aircraft storage means storage inside hangars. Hangars may be individual buildings housing one aircraft each, buildings intended to contain several aircraft in separate bays or structures intended to accommodate several aircraft in large, open spaces.

There are currently nine functional hangars at Okanogan-Legion Airport. All of these hangars are individual structures. There is room for additional hangars north of the parking apron and south of hangar A-60S if Alternative 4 is implemented. At optimal spacing of 20 feet between structures, four additional hangars the size of hangar A-60S can be built south of hangar number A-60S.

The Civil Air Patrol (CAP) has indicated its interest in establishing a facility at the airport. The Colville Confederated Tribes has stated its general interest in development as well.

Set aside specific areas south of hangar A-60S to accommodate new individual hangar development. Set aside areas north of the existing apron for future T-hangar, CAP hangar and a hangar for Colville Confederated Tribes as required.

B10. Perimeter fencing, gates and surveillance equipment.

Security fence installation should continue south of the existing apron. Surveillance cameras

should be installed in the area around the wood hangar and the area encompassing the fuel terminal. Cameras should be linked to the Okanogan County sheriff's dispatch center.

B11. EMS operations area.

Emergency medical service (EMS) helicopter operations are important to small communities as they provide timely access to critical medical care at major hospitals that would otherwise be unobtainable. When these services are used every minute is important. One way to save time is to assure that EMS helicopter crews and ground based medical aid crews know exactly where transfers at airports are to take place and that those locations are prepared and always available for their exclusive use.

A dedicated location for helicopter EMS service activities, including ground aid unit staging, is identified in this plan.

B12. Access roads and vehicle parking.

Okanogan Airport Road is narrow and unpaved. Also, certain areas are close to steeply sloping terrain where there are no guardrails. Portions of the road are eroding. It is recommended that the west side of the access road be stabilized, that the road be paved and that guardrails be installed along areas where they are necessary.

The area adjacent to the terminal should be paved, lighted and landscaped. Vehicle parking graphics should be applied. Handicapped parking areas should be identified.

The area north of the existing apron will accommodate much of the airport's growth in the future. This will require access. It is recommended that a new access road be constructed from the vehicle parking area to the north to serve development. This road should be west of features such as the CAP, EMS and tribes operating areas but east of future development that would not need direct access to the taxiway. The road right-

of-way will be used to route utilities. This road should be lighted and landscaped.

Improvements 2011 - 2015

C1. Identify and prepare specific areas for commercial structures.

Property is available north of the existing apron for structures used for aircraft maintenance, aircraft assembly and other activities that require access to the taxiway/runway system. This area may also be used for commercial activities that do not require direct access to the runway.

C2. Add additional hangars.

Construct or lease space for construction of T-hangars, individual hangars and small-scale hangars for light sport aircraft as required. Construct taxiways to serve hangars.

C3. Additional based and transient tie-downs.

Add apron space immediately north of the existing apron as required to accommodate demand. Assure clear definition between spaces used for based aircraft and spaces available for transient aircraft. Transient aircraft tie-down spaces should be closest to the fuel area. Continue to adhere to FAA recommendations regarding the distance from the runway centerline to aircraft parking areas. Also, assure that the taxiway object free area remains clear.

C4. Construct a new multi-purpose terminal.

Raze the wooden hangar. In its place construct a new, multi-purpose building. This building could be used as a visitor center where those flying to the Okanogan area can be accommodated in clean, comfortable and functional surroundings. This building will provide increased opportunities for the city, the county and the Colville Confederated Tribes to display information about their individual and mutual economic and tourism efforts. This new structure would serve as the focal point for the airport.

C5. Extend runway.

If discussions with the Colville Confederated Tribes are productive extend the runway either as indicated in Alternative 5 or longer based on demand at that time. Extend runway lighting and taxiway reflectors or lights as appropriate.

C6. Install infrastructure.

Install an on-site sewage system of sufficient size to accommodate commercial development north of the existing apron. Install power, cable, water, water hydrants and other utilities as required.

C7. Paved surface maintenance.

Apply high-quality seal coat to all paved surfaces. Repaint.

C8. Instrument approach.

It is recommended that the city of Okanogan request a GPS-based instrument approach procedure.

The benefits of GPS-based instrument navigation have been available to general aviation pilots for several years. Recent enhancements to both the satellite- and ground-based elements of the GPS system have made it possible to provide GPS instrument approaches to small, general aviation airports.

While the FAA's Flight Standards Office has published prerequisites for GPS approaches such as runway length and full-length taxiways that would appear to eliminate the possibility of an approach it is apparent that the implementation of the GPS system is evolving and so are its airport-related requirements.

FAA Flight Standards personnel should be asked to provide their assessment about the probably of installing an instrument procedure.

C9. Weather reporting.

The FAA requires that local weather reporting be available in order to use an instrument approach.

If a GPS approach is implemented a weather-reporting system, such as an Automated Weather Observation System (AWOS), should be installed.

C10. Add additional fuel tank and dispensing system.

Turbine aircraft in development today will be able to use runways of about 3,000 feet long. If Okanogan-Legion Airport extends its runway careful attention should be paid to advancing turbine aircraft technologies. A fuel system that is able to dispense Jet A fuel or new types of fuel that these aircraft will use should be installed as demand is identified.

Improvements 2016 – 2020

D1. Hangar development.

Add hangars as required. Develop or lease property for new generations of aircraft that may not need hangars of the size currently used.

D2. Vertical lift terminal

In this time period it is likely that the civil tiltrotor or other aircraft with vertical-lift, horizontal-cruise capabilities will be operational. One of the major justifications for such aircraft is their ability to provide transportation links from rural communities to (1) centers of major cities, (2) major airports and (3) multi-purpose transportation facilities in which are incorporated jet airliner terminals, rail terminals and vehicle freeway nodes. An area has been identified on the accompanying airport layout plan for the Okanogan vertical aircraft passenger transportation terminal.

D3. Vertical flight GPS-based approach.

GPS technology currently makes it possible to conduct simultaneous instrument approaches at airports. By this time period this technology will

be even more highly refined. A GPS approach which specifically serves aircraft using the vertical lift terminal will improve air service.

D4. Paved surface maintenance.

Apply high-quality seal coat to all paved surfaces. Repaint.

Table 17: Apron and hangar requirements

Item	2005	2010	2015	2020	2025
Demand					
Based aircraft	15	23	30	34	38
Itinerant peak *	1	1	2	2	3
Existing facilities					
Aircraft tie-downs	10	x	x	x	x
Existing hangar spaces	7	x	x	x	x
Total apron area (SY)	2,000 (est.)	x	x	x	x
Projected Needs					
Itinerant aircraft tie-downs	1	1	2	2	3
Aircraft tie-downs	x	9	13	15	17
Total apron needs	x	2,700	3,900	4,500	5,100
Additional hangar spaces	x	14	17	19	21

**Assumes 5 percent itinerant aircraft operations.*

Improvements 2021-2025

E1. Reconstruct all paved surfaces with new technology paving material.

E2. Incorporate new technology lighting and new navigation aids.

E2. Develop the northeast portion of the airport.

Hangar development

This chapter recommends development of hangars during various time periods. Table 17 relates forecast based aircraft to hangar demand.

Building Restriction Lines (BRLs)

Building restriction lines (BRLs) are lines parallel to runways that are established to identify structure locations. BRLs should be established so that structures do not penetrate FAR Part 77 Transitional Surfaces. At Okanogan-Legion Airport these surfaces are identified by slopes with ratios of 7 to 1. They begin at the edges of the airport's FAR Part 77 Primary Surface, which is a 250-foot-wide surface centered on the runway centerline. The transitional surface, in other words, begins 125 feet from the centerline of the runway and

then rises 1 foot for each 7 feet it extends laterally from the runway. In this case, the BRL is established to provide for a 15-foot-high structure that does not penetrate this surface. Primary surfaces rise and decrease in elevation with the nearest point of the runway so differences in runway elevations relative to adjacent proposed building sites must be taken into consideration.

BRLs related to both existing and ultimate runway conditions are depicted on the airport layout plan.

Table 18: Projects and timing

Projects and timing	
2005	
A1. Design and install temporary runway lights and activate rotating beacon and new wind indicator.	B11. Construct EMS operations area.
A2. Enhance safety area.	B12. Develop access roads and vehicle parking.
A3. Grade and compact the runway safety area and FAR Part 77 Primary Surface.	B13. Construct RV parking spaces for up to six RVs
A4. Purge/connect fuel tanks.; install card system.	B14. Construct picnic area west of airport access road
A5. Seal runway cracks.	
A6. Dismantle segmented circle; remove existing unlighted wind indicator.	2011-2015
A7. Finish fence south of apron.	C1. Identify and prepare specific areas for commercial structures.
A8. Finish rehabilitation of wooden hangar.	C2. Add additional hangars.
A9. Install off-airport signs.	C3. Construct additional based and transient tie-downs.
	C4. Extend runway.
2006-2010	C5. Install infrastructure.
B1. Construct a relocated runway and full-length taxiway as indicated in Alternative 4.	C6. Conduct paved surface maintenance.
B2. Install the medium-intensity (MIRL) runway edge and threshold lights formerly purchased.	C7. Implement instrument approach procedure.
B3. Install reflectors throughout the taxiway system.	C8. Install weather reporting equipment.
B4. Install precision approach path indicators (PAPIs) at both ends of the runway.	C9. Add additional fuel tank and dispensing system.
B5. Install runway hold line signs where the new taxiway connects with the ends of the runway.	
B6. Install a supplemental wind indicator as shown on the airport layout plan.	2016-2020
B7. Install a new radio controller.	D1. Development hangars.
B8. Add an additional tie-down area north fo the existing apron.	D2. Construct veritical lift terminal.
B9. Identify areas for aircraft storage.	D3. Implement vertical flight GPS-based approach.
B10. Install perimeter fencing, gates and surveillance equipment.	D4. Conduct paved surface maintenance.

Table 18: Project and timing (continued)

Projects and timing	
2011-2015	2016-2020
C1. Identify and prepare specific areas for commercial structures.	D1. Development hangars.
C2. Add additional hangars.	D2. Construct vertical lift terminal.
C3. Construct additional based and transient tie-downs.	D3. Implement vertical flight GPS-based approach.
C5. Extend runway.	D4. Conduct paved surface maintenance.
C6. Install infrastructure.	
C7. Conduct paved surface maintenance.	2021-2025
C8. Implement instrument approach procedure.	E1. Reconstruct all paved surfaces with new technology paving material.
C9. Install weather reporting equipment.	E2. Incorporate new technology lighting and new navigation aids.
C10. Add additional fuel tank and dispensing system.	E3. Develop the northeast portion of the airport.
	E4. Construct a new multi-purpose terminal.

Chapter 5:

Financial

Chapter 4 contained information about airport improvements that are intended to meet forecast demand and increase safety, utility and efficiency at Okanogan-Legion Airport. This chapter identifies the cost of those improvements and establishes a plan for paying for them. Also included in this chapter is data related to current and projected airport income and expenses.

5.1 GENERAL FINANCIAL INFORMATION

Cost estimates

Project cost estimates are in 2005 dollars. A 30 percent contingency has been incorporated into projects where applicable to cover engineering, administration and unforeseen circumstances. As this portion of this plan is updated, the city of Okanogan will need to adjust the 2005-based dollar amounts as they are affected by inflation. These estimates are for planning purposes only and should not be used as construction cost estimates.

Organization

This capital improvement program (CIP) has been organized by identifying specific projects that should be completed during 2005. They include the installation of temporary runway lights that are critical to safety. The CIP phases projects after 2005 in five-year increments through the year 2025. The recommended 2005 projects and projects listed in multi-year phases have been listed in order of priority. A diagram is provided to supplement the information provided in the CIP table.

This CIP is intended to provide scheduling of projects as they are envisioned at this time. Obviously projects recommended for the 2005 through

2010 time period are easier to plan than projects identified for implementation 15 or 20 years from now. It is important to review and adjust this CIP at least annually.

Funding sources

This capital improvement program makes assumptions that some funding sources other than the city and WSDOT/AD will be available, especially for structure and infrastructure projects. Actual availability of funds as identified herein will depend on a number of factors including the level of funds available to WSDOT/AD and to other agencies to distribute and the needs of other airports as compared to the needs of Okanogan-Legion.

Planning ahead

The city of Okanogan has considerable experience working with granting agencies so this statement may be unnecessary but in the interest of thoroughness we will do so. A factor that plays a material role in the successful receipt of grant funds from WSDOT/AD and other sources such as the Washington State Department of Community Trade and Development is communication. Granting agencies are more likely to respond positively to grant requests if they are given plenty of advance notice about intentions to apply for funds. This helps granting agencies to do their own advance planning.

Third-party financing

Airports often use third-party financing for development of facilities that are to be used primarily by private businesses or organizations. Projects of this kind include hangars, and industrial structures. Some portions of this CIP identify no cost to the city of Okanogan because of assumed third-party financing.

Rates and charges

It is very important at Okanogan-Legion Airport, as with all airport facilities, that careful attention be paid to determinations of rates and charges. Small airports have limited abilities to collect revenue. Often fees that sponsors of small airports charge for based aircraft tie-downs, land leases, overnight tie-downs, fuel and other services are lower than what might be considered actual market value. In some cases fees, with the exception of those associated with fuel, are not charged at all. Clearly, sponsors of most small airports do not have the ability to collect revenue that is sufficient to pay for major capital improvements. It is important, however, that airport owners do their best to maximize revenue while being cognizant of the ability of those engaged in general aviation to pay. In this way airport sponsors can show that they are doing their best to contribute to the needs of their airports.

The city of Okanogan, in the process of establishing rates and charges, should consider the value of volunteer efforts. Efforts by OLAIA, as an example, are very important to Okanogan-Legion Airport and the city of Okanogan. It is important, though, to strike a fiscally sound balance between recognizing volunteer efforts and charging rates that help airports remain financially viable.

It is particularly important for airports such as Okanogan-Legion to carefully consider the value of its property as it looks forward to growth and major capital improvements. A periodic review of airport-related property lease fees is recommended. Fees should be adjusted to reflect real market conditions.

Financing of this development program

WSDOT/AD

The Washington State Department of Transportation's Aviation Division is Okanogan-Legion Airport's primary source of grant funds for airside-related improvements. Airside improvements are those that relate to the runway/taxiway system,

the aircraft parking apron and navigational aids, including signage. Planning and engineering for projects that are eligible for WSDOT/AD construction grants are also eligible for grant funds.

For additional information about eligibility of projects for WSDOT/AD grants as well as the division's project priority system and application process see their website, <http://www.wsdot.wa.gov/aviation/grants/default.htm>. Under the "grant program" tab see the Grant Procedures Manual.

CTED and EDA

Sources of grant funds for landside-related projects such as roads, utilities, the multi-use building and possibly structures that might be used as business incubators at the airport are the Washington State Department of Community Trade and Development (CTED) and the U.S. Department of Commerce/Economic Development Administration (DOC/EDA).

CTED's contact information is:
Washington State Department of Community Trade and Economic Development
RAAD Building
MS: 42525
128 – 10th Avenue
PO box 42525
Olympia, WA 98504
Business and Project Development Office
(360) 72504100

EDA's contact information is:
United States Department of Commerce
Economic Development Administration
Jackson Federal Building, Room 1856
915 Second Avenue
Seattle, WA 98174
(206) 220-7682

WSDOT/AD grants for routine maintenance

Expenses associated with non-project-specific routine maintenance such as light bulb replace-

ment, pavement crack sealing, and pavement surfacing, should be applied for on an annual basis even if the projects have not been specifically identified. If grant funds are accessed to help pay for these kinds of expenses it is a good idea to send letters to WSDOT/AD at least annually stating how the money was used.

The safety area grant program

WSDOT/AD has a grant program specifically designed to address runway safety area improvements, especially those improvements that reduce the likelihood of inadvertent runway incursions. Information about this program is included in the appendix to this plan. Projects such as hold-line repainting and hold-line sign installation (as noted in Chapter 4) would qualify for funding under this specific program. This is an excellent program that targets a specific, high-priority safety issue.

5.2 EXISTING REVENUES AND EXPENSES

Existing revenue sources at Okanogan-Legion Airport are fuel sales, land leases from hangar leases/tie-downs, and rental of land for the residence located at the airport. A potential source of revenue would be from recreational vehicle spaces, should they be developed. Income from these sources is shown in table 19. Table 20 shows general airport expenses. Neither table includes funds received from granting organizations or matching funds provided by the city relative to grants.

Revenue/expense summary

Over the period 2002 through 2004 expenses exceeded revenues by an average of \$4,441 per year.

Annual subsidy

Annually, the city of Okanogan transfers funds from its current expense budget to subsidize airport operations and to build reserves to be used as matching funds for grants.

Table 19: Revenue 2002-2004

Revenue source	Three-year total	Three-year average
Fuel	\$34,870	\$11,623
Hangar lease/tie-down	\$10,688	\$3,563
RV space rental	\$3,923	\$1,308

Source: City of Okanogan

Table 20: Expenses 2002-2004 and net financial

Expense category	Three-year total	Three-year average
Salaries/wages	\$1,515	\$505
Personnel benefits	\$561	\$187
Fuel purchases	\$31,054	\$10,351
Airport supplies	\$1,217	\$406
Professional services	\$2,093	\$698
Telephone	\$1,323	\$441
Insurance	\$8,500	\$2,833
Public utility services	\$3,755	\$1,252
Repairs and maintenance	\$175	\$58
Miscellaneous	\$300	\$100
Contract operation manager	\$10,719	\$3,573
State sales/B&O taxes	\$1,594	\$531
Total	\$62,806	\$20,935
Total revenue	\$49,481	\$16,494
Net income	(\$13,325)	(\$4,441)

Source: City of Okanogan

5.3 RECOMMENDED PROJECTS

This section estimates costs of projects included in Table 18, Chapter 4.

The 2005 through 2010 phase of the CIP is shown in more detail than are projects scheduled for the 2010 through 2025 time period. Minor maintenance expenses are not specifically identified. Planned sources of funds related to each item in the 2005 through 2010 time period are identified.

Table 21: 20-year capital improvement program

Item	Project	Detail cost	Total cost	WSDOT/AD	Other grand agencies	Volunteer labor, materials and equipment	City share
2005							
A1	Design and install temporary runway lights and activate rotating beacon and new wind indicator						
	Design	\$23,000					
	Lights, junction boxes, conduit and cable (38 units)	\$10,000					
	Lighted wind indicator	\$1,700					
	Installation	\$10,000	\$44,700	\$44,465	\$0	\$1,000	\$1,235
A2	Enhance safety area – repaint hold lines, add sign		\$750	\$700	\$0	\$50	\$0
A3	Grade, compact the RSA and FAR Part 77 Primary Surface		\$2,000	\$19,950	\$0	\$0	\$1,050
A4	Purge/connect fuel tanks; install cardlock system		\$18,000	\$17,100	\$0	\$0	\$900
A5	Seal runway cracks runway and apron		\$4,000	\$2,000	\$0	\$1,500	\$500
A6	Dismantle segmented circle; remove existing wind indicator		\$500	\$0	\$0	\$500	\$0
A7	Finish fence south of apron		\$8,000	\$4,000	\$0	\$3,000	\$1,000
A8	Finish rehabilitation of wood hangar roof		\$10,000	\$0	\$0	\$5,000	\$5,000
A9	Install off-airport signs		\$2,000	\$0	\$0	\$0	\$2,000
	Subtotals		\$108,950	\$86,215	\$0	\$11,050	\$11,685
2006 - 2010							
B1	Design and Construct a relocated runway and full-length taxiway as indicated in Alternative 4 (27,000 SY)						
	Planning, engineering, contract documents and management	\$25,000					
	Pulverize existing pavement (10,200 SY)	\$11,000					
	Grade all areas	\$40,000					
	Crushed base course, 4" (6,000 tons)	\$90,000					
	Crushed top course, 2" (3,100 tons)	\$56,000					
	Class A/B asphalt (3,400 tons)	\$136,000					
	Graphics	\$4,000	\$362,000	\$343,900	\$0	\$0	\$18,100
B2	Install (MIRL) runway edge and threshold lights formerly purchased		\$8,000	\$7,600	\$0	\$400	\$0
B3	Install reflectors throughout the taxiway system (40 units)		\$3,000	\$2,850	\$0	\$0	\$150
B4	Install PAPIs at both ends of the runway		\$12,000	\$11,400	\$0	\$0	\$600
B5	Install runway hold line signs at new taxiway connections		\$1,200	\$1,140	\$0	\$60	\$0
B6	Install a supplemental wind indicator		\$1,200	\$1,140	\$0	\$60	\$0

Table 21: 20-year capital improvement program (continued)

Item	Project	Detail cost	Total cost	WSDOT/AD	Other grand agencies	Volunteer labor, materials and equipment	City share
B7	Install a new radio controller		\$1,800	\$1,710	\$0	\$0	\$90
B8	Add an additional tie-down area north of the existing apron		\$108,000	\$102,600	\$0	\$0	\$5,400
B9	Identify areas for aircraft storage		\$0	\$0	\$0	\$0	\$0
B10	Install perimeter fencing, gates and surveillance equipment		\$20,000	\$10,000	\$0	\$5,000	\$5,000
B11	Construct EMS operations area		\$35,000	\$33,250	\$0	\$0	\$1,750
B12	Develop access roads and vehicle parking		\$500,000	\$0	\$480,000	\$0	\$20,000
B13	Construct RV parking spaces for up to six RVs.		\$7,500	\$0	\$0	\$2,000	\$5,500
B14	Construct picnic area west of airport access road		\$3,000	\$0	\$0	\$1,500	\$1,500
	Subtotals		\$1,062,700	\$515,590	\$480,000	\$9,020	\$58,090
	2011 - 2015						
C1	Identify and prepare specific areas for commercial structures		\$1,000	\$0	\$0	\$0	\$1,000
C2	Add additional hangars		\$0				
C3	Construct additional based and transient tie-downs		\$50,000	\$47,500	\$0	\$0	\$2,500
C4	Extend runway		TBD				
C5	Install infrastructure		TBD				
C6	Conduct paved surface maintenance		\$10,000	\$9,500	\$0	\$500	\$0
C7	Implement instrument approach procedure		\$5,000	\$2,500	\$0	\$0	\$2,500
C8	Install weather reporting equipment		\$40,000	\$38,000	\$0	\$0	\$2,000
C9	Add additional fuel tank and dispensing system		\$75,000	\$71,250	\$0	\$0	\$3,750
	Subtotals		\$181,000	\$168,750	\$0	\$500	\$11,750
	2016 – 2020						
D1	Develop hangars		\$0				
D2	Construct vertical lift terminal		\$300,000	\$50,000	\$225,000	\$0	\$25,000
D3	Implement vertical flight GPS-based approach procedure		\$5,000	\$2,500	\$0	\$0	\$2,500
D4	Conduct paved surface maintenance		\$10,000	\$9,500	\$0	\$500	\$0
	Subtotals		\$315,000	\$62,000	\$225,000	\$500	\$27,500
	2021 - 2025						
E1	Reconstruct all paved surfaces with new technology paving material		TBD				
E2	Incorporate new technology lighting and new navigation aids		TBD				
E3	Develop the northeast portion of the airport		TBD				

Volunteer labor is credited at \$15.00 per hour where applicable.

Table 21: 20-year capital improvement program (continued)

Item	Project	Detail cost	Total cost	WSDOT/AD	Other grand agencies	Volunteer labor, materials and equipment	City share
E4	Construct a new multi-purpose terminal – welcome center		\$200,000	\$0	\$150,000	\$0	\$50,000
	Subtotals		\$200,000	\$0	\$150,000	\$0	\$50,000
2005	\$83,950	\$10,435	\$62,465	\$11,050			
2006 – 2010	\$1,062,700	\$58,090	\$515,590	\$489,020			
2011 – 2015	\$181,000	\$11,750	\$168,750	\$500			
2016 – 2020	\$315,000	\$27,500	\$62,000	\$225,500			
2021 – 2025	\$200,000	\$50,000	\$0	\$150,000			
Totals	\$1,842,650	\$157,775	\$808,805	\$876,070			

Table 22: Capital expenditure by phase

Phase	CIP total cost	Local funding	WSDOT/AD funding	Other funding/volunteer labor
2005	\$108,950	\$11,685	\$86,215	\$11,050
2006-2010	\$1,062,700	\$58,090	\$515,590	\$489,020
2011-2015	\$181,000	\$11,750	\$168,750	\$500
2016-2020	\$315,000	\$27,500	\$62,000	\$225,500
2021-2025	\$200,000	\$50,000	\$0	\$150,000
Totals	\$1,842,650	\$157,775	\$808,805	\$876,070