

Twisp Municipal Airport

Airport Layout Plan and Narrative Report

MAY 2007

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Chapter 1:

Introduction

This airport layout plan and narrative report (ALP) for Twisp Municipal Airport is sponsored by the town of Twisp. It examines existing conditions at Twisp Municipal 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 Twisp Municipal 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 Twisp Municipal Airport that will increase the airport's value to the community and the surrounding area.

In preparing this ALP, Airside has reviewed the following:

- Washington State Department of Transportation/Aviation Division airport database.
- Federal Aviation Administration (FAA) Form 5010.

- Applied Pavement Technology, Inc. pavement report dated February 2006.

During preparation of this report, several meetings were held with a steering committee that was seated by the town of Twisp. A briefing was also conducted for the Twisp Town Council. Preliminary, draft and final narratives and diagrams were posted on a Web site — www.Airside.net — so that any interested party could review and comment on this plan as it was being developed.

Primary funding for this report has been provided by the Washington State Department of Transportation's Aviation Division (WSDOT/AD). 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.

Table 1: Twisp ALP Steering Committee

MEMBER	Affiliation
Clint Estes	Twisp council member
Bob Lloyd	Citizen
Vern Nations	Mayor, Twisp
Don Owens	Citizen
Mike Port	Citizen
Morgan Smith	Chair, Twisp Airport Board
Colleen Storms	Clerk-treasurer, Twisp

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.

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Chapter 2: Inventory and current activity

2.1 GENERAL

Okanogan County

Okanogan County, the largest county in Washington, covers 5,281 square miles in the north-central part of the state. It is bordered on the north by Canada, on the south by the Columbia River and on the west by the Cascade Mountains. Okanogan County is unusual in part because only 30 percent of the land in the county is privately owned. Much of the remainder is owned by Washington State and the federal government. Seven hundred thousand acres of Okanogan County comprise the Colville Indian Reservation.

Twisp

The town of Twisp is located at the confluence of the Twisp and Methow rivers. Straddling Highway 20, Twisp is the largest town in the scenic and historic Methow Valley.

Climate

Okanogan County has a continental climate, with mean annual temperatures between 46 and 48 degrees Fahrenheit. Average annual precipitation is about 15 to 20 inches. High temperatures range from about 30 degrees Fahrenheit in the winter to 88 degrees Fahrenheit in the summer.

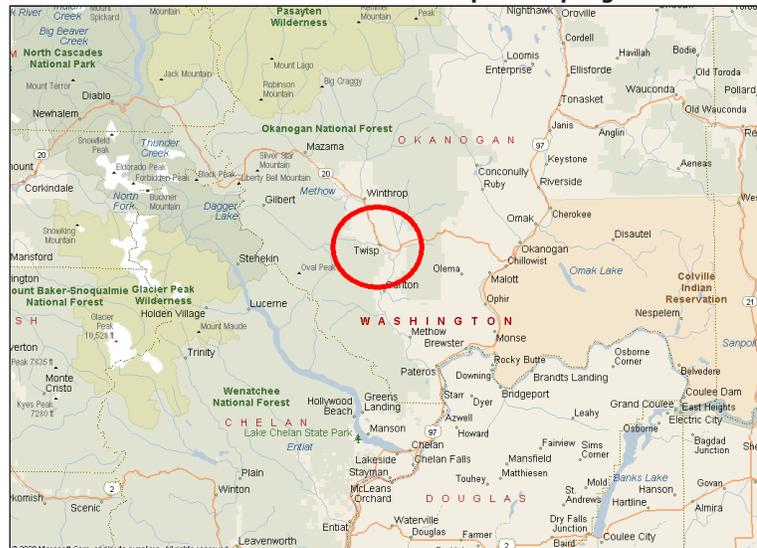
The weather in Okanogan County in the summer and fall is generally hot and sunny with infrequent thundershowers and very little rain. In the winter, the county receives significant snowfall and has many cold, clear days.

2.2 SOCIOECONOMIC DATA

Population

Between 1990 and 2000, the population of Okanogan County grew from 33,350 to 39,564. The current population of the county, according to the Washington State Office of Financial Management, is 39,800. Omak, the largest city in the county has a population of 4,495. Twisp has

Map 1: Twisp regional location



a population of 995. With a population density of 7.75 people per square mile, Okanogan County has one of the lowest density rates in the state. State officials expect the population of Okanogan County to rise to 49,410 by 2025.

Economy

Okanogan County's economy is based primarily on agriculture and forestry. Those sectors, along with recreational hunting and fishing, employ 8,257 people.

The county — and particularly the Methow Valley, located in the western portion of the

county — is becoming a recreational attraction, with hundreds of square miles of cross-country ski trails, snowmobile parks, mountain biking, fishing, camping and hiking.

Other industries are also beginning to play larger roles in the local economy. With the introduction of high-speed Internet in the region, for example, technology companies have strategically located in the Methow Valley and throughout the county.

The county’s unemployment rate of 5.2 percent puts it very close to the 5.6 percent rate for the state as a whole.

2.3 LAND-USE AND PLANNING

Purpose

This section describes existing land use, comprehensive plans, and zoning on and in the vicinity of Twisp’s airport. Recommendations related to these elements are contained in Chapter 4. Additional information is contained in the existing conditions diagram, further in this chapter, and in drawings C1.6 and C1.7 of the airport layout plan drawing set.

Map 2: Twisp Municipal Airport

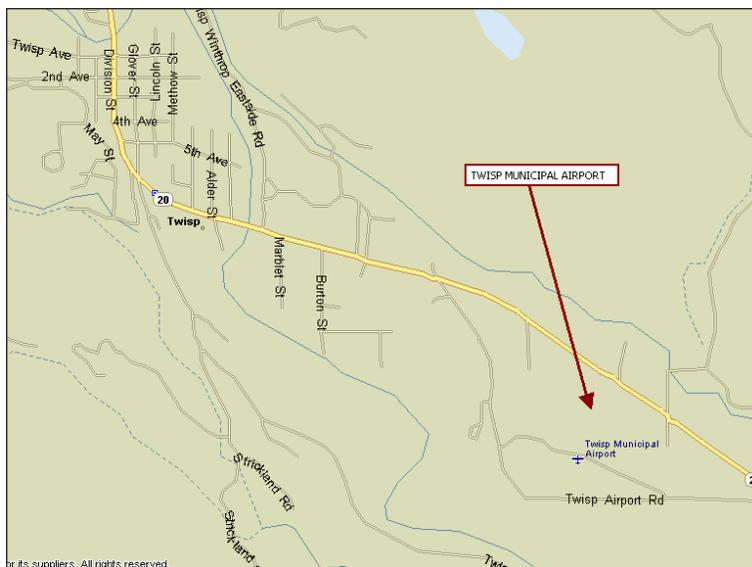


Table 2: Industry sectors

North American Industry Classification System (NAICS) Sector	Estab.	Employees
Agriculture, forestry, fishing and hunting	393	8,257
Mining	7	57
Utilities	9	34
Construction	177	607
Manufacturing	33	234
Wholesale trade	31	327
Retail trade	180	1,724
Transportation and warehousing	30	160
Information	21	129
Finance and insurance	28	210
Real estate, rental and leasing service	44	117
Federal government	12	565
State government	20	330
Local government	63	4,415
Not elsewhere classified	14	69

Source: Covered Employment & Wage Data, First Quarter 2004 Washington State Employment Security Department.

Note: The North American Industry Classification System (NAICS) was developed jointly by the United States, Canada and Mexico. It is a comprehensive classification system that groups establishments into industries based on their primary activities, both goods-producing and service-producing.

Area Description

Twisp Municipal Airport and adjacent properties are within the town of Twisp’s urban growth area (UGA). The airport is one and one-half miles southeast of the town’s urbanized center. It expands over several tax parcels that total 71.1 acres. Except for a recreational track and baseball field to its south, properties surrounding the airport are mostly used for low density residential and agricultural purposes.

Okanogan County is responsible for unincorporated property outside

of the town of Twisp. The town has jurisdiction over land use controls, development regulations, and zoning for all town property, including the airport, which is a non-contiguous municipal island.

Comprehensive planning and zoning

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. Twenty-nine counties and the cities in those counties currently plan under the GMA. The primary goals of GMA are best described by what the GMA calls its basic steps. These are:

- Identification and protection of critical areas and resource lands.
- Designation of county-wide planning policies and urban growth areas.
- Preparation and adoption of comprehensive plans
- Adoption of development regulations to carry out comprehensive plans.
- Evaluation and updating of comprehensive plans and development regulations.

Okanogan County

County comprehensive plan

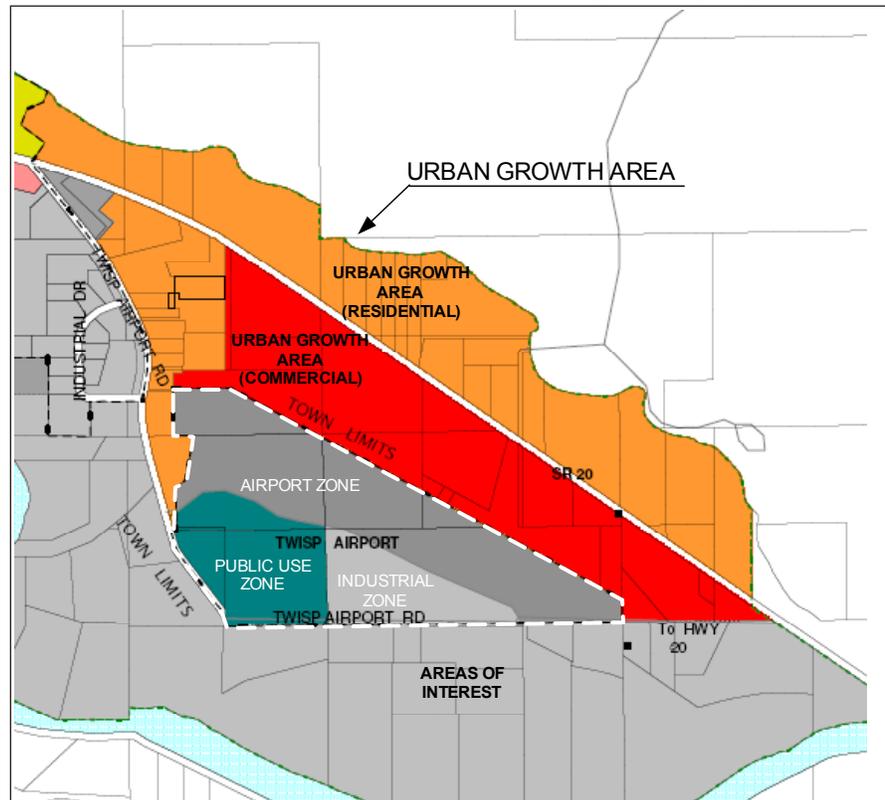
Okanogan County is not required to plan according to GMA but is preparing a

comprehensive plan according to GMA principles. The county's current draft plan, dated June 2005, identifies airports in the county but does not contain any policies with respect to them.

County zoning

With the exception of one property zoned for industrial use among the properties surrounding the airport, all unincorporated land is currently

Map 3: Twisp Airport in UGA



zoned under Okanogan County's Zoning Ordinance as the Methow Review District (MRD). The ordinance states:

"The purpose of this district is to protect the sensitive environmental, aesthetic and economic qualities of the Methow Valley through review and the imposition of more stringent development and subdivision standards."

Permitted uses are primarily agricultural and residential in nature and allow supporting uses such as small retail and medical operations. The ordinance also sets specific lot area, density, and height requirements in this district. Lots may not be smaller than one acre and the minimum density is one dwelling unit per acre. In this district, the permitted height of structures ranges from 35 feet to 200 feet depending on the type of structure. For example, most structures may not exceed 35 feet, however, structures such as communication towers may reach up to 200 feet.

Chapter 17.32 of the county code contains an airport safety overlay district (ASOD). It has several important functions. Its stated main purpose is to protect lives and property on lands which lie within the [FAR Part 77] transition and approach zones surrounding an airport or landing field.

Also, the district is intended to prevent the establishment of airspace obstructions through height restrictions and other land use controls for the safety of "persons airborne." This section is applied to lands where airports are classified by the Federal Aviation Administration as visual (paved), utility, non-precision and precision runways. This description applies to Twisp Municipal Airport. It is stated in this code section that use requirements and standards of underlying zones shall apply unless in conflict with provisions of this section (17.32).

Section 17.32 is shown below.

17.32.010 - The dimensions of the transition and approach zones shall be determined by the current Federal Aviation Administration use classification and standards.

17.32.020 - Uses such as schools, churches, auditoriums, etc. where large groups of people assemble shall not be allowed within the Airport Safety Overlay District.

17.32.030 - No use shall be permitted within

this district in such a manner as to create electrical interference with navigational signals or radio communications between the airport and aircraft.

17.32.040 - No use shall be permitted within this district which would foster an increased bird population and thereby increase the likelihood of a bird strike problem.

17.32.050 - No structure shall be allowed in the designated "clear zones."

17.32.060 - Storage of flammable substances such as fuel or petroleum products shall be in accordance with all current standards and regulations.

17.32.070 - There shall be no emission of smoke, fly ash, dust, vapor, gases, or other forms of air pollution that may conflict with any present or planned operations of the airport.

17.32.080 - Roadways shall be located in such a manner that vehicle lights will not make it difficult for pilots to distinguish between airport runway landing lights or result in glare or in any other way impair visibility in the vicinity of the landing or take-off approach.

17.32.090 - Unless necessary for safe and convenient air travel, sign lighting and exterior lighting shall not project into the runway, taxiway, or approach zone.

17.32.100 - Building materials shall not produce glare which may conflict with any present or planned operation of the airport.

17.32.110 - No obstructions (structural or natural) shall extend into the transitional or approach surface of the runway.

Section 12 of the ASOD provides for an Airport Development District (ADD) that specifies approved land uses and activities in airport

approach zones and airport sites in the county. This section further protects Twisp Airport's airspace by stating the following:

"No obstruction (structural or natural) shall extend into the transitional, approach, horizontal or conical surfaces of the runway, unless the structure is absolutely essential to the operation of the airport.

"No use shall be permitted within this district which creates electrical interference with navigational signals or radio communications between the airport and aircraft.

"There shall be no emission of smoke, fly ash, dust, vapor, gases or other forms of air pollution that may conflict with any present or planned operations of the airport.

"Building materials shall not produce glare which may conflict with any present or planned operation of the airport."

Town of Twisp

Comprehensive Plan

The town of Twisp is currently updating their comprehensive plan. The draft plan indicates an urban growth boundary in which there are designated future land uses. As indicated in drawing C1.6, both commercial and residential uses are designated as acceptable in the vicinity of the airport. To the south of the airport, the plan designates an "area of interest" that is to be studied further and its future land use designations are to be coordinated with Okanogan County. Twisp's comprehensive plan also identifies nearly 15 acres of land southwest of the airport as "public use." As noted, this area is currently used for a baseball field and track. The plan recommends that other land adjacent to the airport be designated for industrial uses that should be buffered to avoid adverse effects on other types of land use.

The plan discusses improving Twisp Airport in order to attract more users and create economic development opportunities. It also recognizes the airport among other transportation modes as being important to the community. To date however, there are no adopted policies discouraging the development of incompatible land uses adjacent to the airport or prohibiting penetration of Part 77 imaginary surfaces.

The element of the capital facilities portion of the plan that will include the airport has yet to be drafted.

Town zoning

Section 18.35.030 of the town zoning code, titled "Airport Development District (ADD)," establishes a specialized public-use area designed to allow for the location and development of a wide range of uses that are compatible with the primary use of the site as an airport.

The district is intended to provide uses that compliment the airport, in a location which insulates the major residential areas from the noise, traffic or aesthetic impacts of such uses. Allowed uses within the airport development district are intended to be limited to those uses which can be operated without threatening the integrity of airport operations. Conditional uses are allowed if they can be shown to not threaten the utility of the airport.

This zoning section indicates that lot sizes, setbacks and additional height requirements are to be as recommended by the Twisp Airport Board.

South of the airport, other properties within the town limits are zoned as public use and industrial-commercial. Permitted uses in the public use district range from parks and sports facilities to public utility service and storage yards while manufacturing and research and development uses are permitted in the industrial district.

Easements and License Agreements

In 1998, the town was granted a 75-foot wide road and utility easement to the north side of the airport from an adjacent property owner. The easement runs north to south and connects the airport to Washington State Route 20. The easement remains in effect regardless of changes in property ownership. The agreement allows the town the right to maintain, repair, construct, and improve the easement at all times.

An access (license) agreement exists between the town and owner of the property on which the utility easement is located. This agreement allows the owner to access the airport's taxiways and runway. The license agreement requires an annual fee from the owner and is valid through 2008. The license agreement may be extended by the owner for a 10-year period. Privileges stated in the agreement may not be assigned to another user without prior consent from the town.

The easement and license agreement described herein are contained in the appendix to this report.

2.4 AIRPORT SITE – GENERAL

Twisp Municipal Airport is located on 71.1 acres of property owned by the town of Twisp. The airport, which is one and one-half miles southeast of the center of Twisp, was first used as a landing area in 1924. All structures on the airport are privately owned.

2.5 RECENT AIRPORT REVITALIZATION

The most recent infrastructure projects

that have occurred at Twisp Municipal Airport are slurry surfacing of the runway, south taxiway and the south taxiway-to-runway connector. Paving of the perpendicular runway connector between the runway and hangars located north of the runway as well as aprons in front of the north hangars occurred in 2002 and 2003.

Table 3: Recent capital projects

Year	Project	Town portion	WSDOT/Aviation Division portion	Total cost
2002	Slurry runway and south taxiway	\$4,126	\$39,486	\$43,612
2003	Paving adjacent to hangars	Privately funded		
2004	Fence	\$19,855	\$5,000	\$24,855
2005	Signs – runway markings	\$250	\$2,500	\$2,750
2006	No projects			
Five-year period		\$24,231	\$46,986	\$71,217

2.6 AIRPORT CLASSIFICATION – THE ARC SYSTEM

Both the 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.

Table 4: The ARC system

AIRCRAFT APPROACH CATEGORY APPROACH SPEED IN KNOTS			AIRPLANE DESIGN GROUP WINGSPAN IN FEET		
CATEGORY	AT OR MORE THAN	LESS THAN	WINGSPAN	AT OR 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

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” or “design” 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 itinerant operations are required for an

Table 5: Airport data

Name	Twisp Municipal Airport
Location number	250
FAA Designation	26440.*A
Owner	Town of Twisp
Acreage	71.1 acres
Service level (on the NPIAS system)	General aviation (GA)
Reference code existing	B-I (Small)
Design aircraft	Cessna 182
Elevation	1,602 feet
Reference point (location) NAD83 NAVD88	Latitude: 48 deg. 21' 02.107" N Longitude: 120 deg. 05' 38.223" W
Mean maximum temperature	86.2 degrees (July)
Approach category	Visual
Navigation aids	Wind indicator/rotating beacon
Approach guidance	PAPI – Runway 28
Wind coverage	n/a

aircraft to be considered the critical aircraft for an airport. An operation is either a take-off or a landing.

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 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.

The Washington State Continuous Airport System Plan (WSCASP) database shows Twisp Airport as having an ARC classification of B-I (small). This category includes aircraft with approach speeds of at least 91 nautical miles (knots) per hour and less than 121 knots per hour, wingspans of less than 49 feet and weights under 12,500 pounds.

A review of Twisp Municipal Airport’s operations conducted for this plan indicates that it does, in fact, generally serve aircraft in the A-1 (small) and B-I (small) ARC categories.

NPIAS

Twisp Municipal Airport is not listed on the 2005–2009 National Plan of Integrated Airport Systems (NPIAS) and is, therefore, not eligible to apply for federal grant funds from the Federal Aviation Administration. The Washington State Department of Transportation’s Aviation Division is the airport’s primary source of capital improvement and maintenance grant funds.

Wind Coverage

Information regarding prevailing wind is not available from the National Oceanic and Atmospheric Administration (NOAA) for Twisp Municipal Airport. Due to the absence of wind data, a windrose was not constructed for the airport. Local observers note that prevailing winds are from the west/northwest and that, as in many areas of Washington State, strong south winds are sometimes experienced. Since the runway is oriented almost directly east/west and prevailing winds are from the west/northwest, pilots using Runway 28 experience varying degrees of right-side quartering cross winds.

2.7 EXISTING AIRSIDE FACILITIES

Paved surfaces

Runway and taxiways

Twisp Municipal Airport has a single runway oriented on magnetic headings 100 and 280 degrees (Runway 10/28). It is 2,701 feet long

and 36 feet wide. The runway is constructed of asphalt. The west end of the runway (Runway 10) has a displaced threshold that is 130 feet from the pavement end. Its controlling obstruction is a group of trees that are 285 feet from the end of the runway and 19 feet southwest of the runway's

Photo 1: Runway 28 end looking west



extended centerline. The east end of the runway (Runway 28) has a displaced threshold that is 200 feet from the pavement end. Its controlling obstruction is Airport Road, which crosses under the Runway 28 approach path.

A 2,687-foot-long taxiway (Taxiway A) is located south of the runway. The taxiway's width varies from 20 feet at both ends to 50 feet in the center. The proximity of Taxiway A to hangars along its southern edge is such that aircraft moving along the taxiway do not have appropriate wingtip clearance as further detailed in Section 2.9 of this chapter.

Near the center of the airport, a taxiway extends perpendicular to the runway from Taxiway A to hangars north of the runway. This taxiway is approximately 380 feet in length.

Aircraft apron

A 7,000-square-foot apron is located south of the runway and north of Taxiway A near mid-field.

Paved surface condition

Table 6 indicates the condition of paved surfaces at Twisp Municipal Airport as reported by Applied Pavement Technology Inc. (APT) in a pavement management report published in February 2006.

The table shows both the designations given to pavement sections by APT and pavement designations that have been determined for this plan. A diagram of the paved surface conditions is included in the appendix to this plan. Pavement condition index (PCI) numbers indicate overall condition of each section of pavement using a numerical system of 0 (failed) to 100 (excellent).

Pavement markings

Pavement markings include numerals at both ends of the runway and a white dashed centerline, as well as displaced threshold arrows, chevrons and threshold bars at both ends of the runway. Taxiway A and the perpendicular taxiway have yellow centerlines. Hold lines are painted at all four locations where aircraft can access the runway.

Photo 2: South-side taxiway very close to hangars



Table 6: Pavement summary

Airport layout plan designation	Applied Pavement Technology, Inc. designation	Total square feet	Surface material	Pavement condition PCI 2005
Runway	R10TW-01	108,440	AC	41
Taxiway A west and central	T01TW-01	29,461	AC	33
Taxiway A east	T01TW-02	16,218	AC	41
Apron southwest	A02TW-01	21,335	AC	88
Apron southeast	A02TW-02	6,205	AC	94
Apron south	A01TW-01	2,800	AC	100
Taxiway connector south	T02TW-01	3,720	AC	27
Taxiway connector north	T03TW-01	4,288	AC	100
North hangar apron west	A03TW-01	2,800	AC	100
North hangar apron central	A03TW-02	4,800	AC	100
North hangar apron east	A03TW-03	3,040	AC	100

Notes: PCC = Portland cement concrete, AC = Asphalt cement concrete, ACC = Asphalt overlay on asphalt cement

Source: Applied Pavement Technology Inc.

Airport lighting and navigation aids

Runway lights

The runway is equipped with 22 medium-intensity runway edge lights (MIRLs) and 12 split red/green threshold lights. All lights are mounted on in-ground base cans.

Taxiway reflectors

No taxiway reflectors are installed at Twisp Municipal Airport.

Precision approach path indicator (PAPI)

A precision approach path indicator (PAPI) system that provides visual glide slope guidance for pilots during landing approaches to runway 28 is located 420 feet from the east end of the runway and 60 feet south of the runway’s centerline.

Wind indication

Twisp Municipal Airport has one lighted wind indicator. It is located 190 feet north of the runway at approximately mid-field. An unlighted wind indicator is located on top of a hangar on the north side of the airport.

Airport rotating beacon

A rotating beacon is located on top of a hangar at approximately mid-field south of Taxiway A.

Light activation

The airport is equipped with a radio controller. It is located on a privately owned hangar on the south side of the airport. This radio controller makes it possible for pilots to activate airport lights with their in-aircraft radios. Radio control light systems allow airport lights to be on only when requested by a pilot. Such systems improve views of the night sky and save energy.

Signage

The following signs are installed at Twisp Municipal Airport:

- An entry sign south of the airport where Airport Road connects with the airport’s access road.
- A hold-line sign displaying “10” and “28” at a location where the perpendicular taxiway

connects with the runway from the north. Hold-line signs indicating “10” and “28” at the respective ends of Taxiway A.

- Distance-to-go signs indicating “2” and “1” on the north side of the runway. These are visible to pilots landing on Runway 28. These signs indicate the approximate amount of runway remaining, in thousands of feet, at the location of the signs.

2.8 EXISTING LANDSIDE FACILITIES

Structures

There are 21 existing structures located within the boundary of Twisp Municipal Airport. All are privately owned aircraft hangars on property leased from the town of Twisp. Sixteen of the structures are on the south side of the runway. Five structures are on the north side of the runway.

Photo 3: North-side hangars



Seven additional hangar locations are under lease from the town of Twisp. The town anticipates that structures will be placed on these locations within five years.

This plan uses the town’s method of identifying hangar locations. Hangar locations are noted by letters and numbers. The letter/number combinations indicate each hangar’s relationship to the runway and the centrally located,

Table 7: Hangars at Twisp Municipal Airport

Designation	Use	Approx. size (in sq. ft.)	Structure ownership
SE1	Aircraft hangar	1,750	Private
SE2	Aircraft hangar	1,280	Private
SE3	Aircraft hangar	1,280	Private
SE4	Aircraft hangar	1,280 *	Private
SW5	Aircraft hangar	1,280 *	Private
SW6	Aircraft hangar	900	Private
SW7	Aircraft hangar	1,800	Private
SW8	Aircraft hangar	2,500	Private
SW9	Aircraft hangar	2,500	Private
SW10	Planned hangar	No structure	Private
SW11	Aircraft hangar	1,920	Private
SW12	Aircraft hangar	1,920	Private
SW13	Planned hangar	No structure	Private
SW14	Planned hangar	No structure	Private
SW15	Aircraft hangar	1,750	Private
SW16	Aircraft hangar	2,300	Private
SW17	Aircraft hangar	1,620	Private
SW18	Aircraft hangar	2,000	Private
SW19	Aircraft hangar	1,610	Private
SW20	Aircraft hangar	4,290	Private
SW 21	Planned hangar	No structure	Private
SW 22	Planned hangar	No structure	Private
NE1	Aircraft hangar	1,800	Private
NE2	Planned hangar	No structure	Private
NW1	Aircraft hangar	2,750	Private
NW2	Aircraft hangar	2,750	Private
NW3	Aircraft hangar	2,750	Private
NW4	Aircraft hangar	2,750	Private
NW5	Planned hangar	No structure	Private

* Hangar occupies one-half of structure

perpendicular taxiway. For instance, hangar location SW 20 is on the south side of the airport and west of the perpendicular taxiway. Table 7 indicates these structures. The seven leased areas that will contain hangars in the future are noted herein as “planned hangars.” Hangars designated as SE4 and SW5 are within a single structure.

Aircraft fuel

Twisp Municipal Airport does not have a fuel system that is available to the public.

Access road and gates

Two roads provide vehicle access to Twisp Municipal Airport. On the airport’s south side, Airport Road connects with the airport access road and enters the airport just west of mid-field.

On the north side, Aviation Lane provides access from Washington State Route 20.

Utilities

Power

Electrical power connects to the airport at two locations. One is on the south side of the runway at hangar SW5. The other is at the north side of the runway north of hangar NW3.

Telephone

No public telephone service is available at Twisp Municipal Airport.

Water/Sewage

A well that is tapped with a freeze-proof outlet is located between hangars SE3 and SE4. There is no town water, town sewer or septic system at the airport.

Airport maintenance equipment

A snow blower is the only item of major equipment dedicated entirely to airport use.

Fencing

Twisp Municipal Airport is partially fenced. Existing fence locations are indicated on the existing conditions diagram near the end of this chapter.

Airport maintenance

Twisp Municipal Airport is primarily maintained by the town of Twisp with assistance from local volunteers.

2.9 COMPARISON OF EXISTING CONDITIONS TO FAA STANDARDS

An important aspect of this planning program is comparison of FAA-recommended standards to existing

Table 8: Airport facility data

Airport feature		Information
Runway		
Dimensions		2,701' X 36'
Gradient		0.002 percent (6' over 2,701')
Surface		Asphalt concrete
Pavement strength		6,000 pounds
Marking		End numerals/center dashed lines/ displaced threshold Runways 10 and 28
Lighting		Edge (22)/threshold (6 per end) (MIRL) *
Taxiway		
Dimensions		2,687' X 16' (Taxiway A) 454' X 17' (taxiway connector)
Surface		Asphalt
Marking		Centerline and hold lines
Lighting/reflectors		None
Aircraft apron (south side)		
Dimensions		40' X 70'
Surface		Asphalt concrete
Marking		None
Lighting/reflectors		None
Tie-downs		None
Fuel system		
Available fuel		No
Tank size		N/A
Dispensing mechanism		N/A

MIRL = Medium intensity runway lights

conditions at Twisp Municipal 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. Information related to FAA standards has been obtained from FAA Advisory Circular (AC) 150/5300-13.

Airport information is from the WSDOT/AD database and from on-site measurements.

Standards definitions

Runway length – A distance that is adequate to accommodate all aircraft within a specific ARC group.

Runway width – A 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 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) of the lowest practical height with the frangible point no higher than 3 inches above grade.

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.

Runway obstacle-free zone (OFZ) – A defined volume of airspace centered above a runway centerline. The runway OFZ is the airspace above a surface whose elevation at any point is the same as the elevation of the nearest point on the runway centerline.

Note: It is important to understand the differences between the RSA and the ROFA/ROFZ standards. RSAs are to be prepared to accommodate aircraft at runway elevation. ROFAs and ROFZs are to be clear of objects relative to runway elevations. Therefore, a steep dropoff within an RSA area will cause the runway to not be in compliance with the RSA standard whereas a dropoff within an ROFA or ROFZ dimension will not cause the runway to be out of compliance.

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 width – A width considered adequate to accommodate aircraft in an airport's design group.

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

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

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.

Building restriction line - A line which identifies suitable building area locations on airports.

2.10 ASSESSMENT OF EXISTING CONDITIONS RELATIVE TO FAA DESIGN STANDARDS

Runway length

Twisp Municipal Airport's runway is 2,701 feet long. Considering its elevation above mean sea level (1,602 feet) and the average mean/maximum temperature (86.2 degrees), the airport's runway would need to be 4,550 feet

long to accommodate all aircraft in the B-1 (small) category. This distance has been determined by using information provided in FAA Advisory Circular 150/5325-4B, Figure 2, a copy of which is in the appendix to this narrative.

Runway width

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

Runway safety area

At Twisp Municipal Airport, the FAA recommended runway safety area (RSA) extends 60 feet on both sides of the runway centerline and extends 240 beyond each end of the runway pavement. The total recommended RSA length is therefore 3,181 feet.

Twisp's RSA is not in conformance with the FAA standard at the Runway 10 end due to reductions in terrain elevation at a location 85 feet from the runway end. Consequently, the compliant portion of the RSA is 155 feet less than standard as measured from the runway end.

At the Runway 28 end, reductions in terrain south of the runway and Airport Road result in an actual runway safety area that is 250 feet less than the FAA RSA standard. Sixty feet of flat terrain from the centerline of the runway to the south is available beginning at a location 10 feet from the end of pavement.

Considering the above, the available RSA is 405 feet less than the FAA standard of 3,181 feet. The actual RSA length therefore is 2,776 feet.

Runway object-free area

The FAA-recommended runway object-free area (ROFA) standard extends 125 feet from centerline on both sides of the runway and, as with the RSA, 240 feet beyond the runway pavement ends.

An object-free area that is consistent with the FAA standard is available at the Runway 10 end.

At the Runway 28 end, Airport Road is estimated by Airside to be 3 feet higher in elevation than the runway at the end of pavement and 16 feet lower than the runway at a location 100 feet from the end of pavement. Since Airport Road is considered an object by the FAA its relationship to the runway should be taken into consideration. Airside estimates that a full object-free area is available at a location also approximately 10 feet from the end of pavement.

Consequently, the actual available object-free area at Twisp Municipal Airport is 2,931 feet or 250 feet less than the FAA standard.

Runway obstacle free zone

The FAA-recommended runway OFZ extends 200 feet beyond each end of the runway. Its width for a runway serving this airport is 250 feet (125 feet on both sides of centerline). The ROFZ standard at length at Twisp is 3,101 feet. The ROFZ standard is complied with at the Runway 10 end. The ROFZ at the Runway 28 end is 210 feet less than the standard due to Airport Road. Consequently, the actual ROFZ length is 2,891 feet.

Runway shoulder

The runway shoulder area of 10 feet from the runway edge is well-graded and in conformance with the relevant standard.

Taxiway width

The width of Taxiway A in some portions is 17 feet. The perpendicular mid-field taxiway connector is 16 feet wide. The taxiways are, therefore, 8 to 9 feet narrower than the FAA taxiway width standard of 25 feet.

Taxiway safety area

The taxiway safety area is 49 feet wide, centered on the taxiway. The perpendicular taxiway and the east portion of Taxiway A are in compliance with this standard. The west portion of Taxiway A is not in compliance with the standard due to

the proximity of hangar structures south of the taxiway.

Taxiway object-free area

The taxiway object-free area is 89 feet wide, centered on the taxiway. As with the taxiway RSA, Taxiway A is not in compliance with this standard due to hangars south of the taxiway.

Taxiway shoulder

The FAA recommends that an area 10 feet on both sides of taxiways and taxilanes be compacted and graded. Twisp Municipal Airport's taxiway system is in compliance with this standard except for those portions of Taxiway A that are adjacent to hangars.

Runway centerline-to-taxiway separation

The FAA standard for A-1 and B-I (small) airports is 150 feet from runway centerline to taxiway centerline. The distance between the runway and Taxiway A is 150 feet for most of the taxiway's length. Terrain and the angle at which Taxiway A and the runway converge cause the taxiway to approach the runway at both ends of the airport at acute angles rather than at right angles. Consequently, the ends of Taxiway A are not in compliance with the separation standard.

Runway centerline to holding position marking

The FAA standard from runway centerline to hold line is 125 feet. Twisp Municipal Airport has marked hold lines at all four locations where aircraft may access the runway. All of these hold lines are at locations that are consistent with this standard.

Runway centerline to aircraft parking

The FAA recommends 125 feet separation from a runway centerline to an aircraft parking area. Aircraft are occasionally parked at and adjacent to the apron that is south of the runway and immediately west of the perpendicular taxiway.

The closest edge of this paved area to the runway centerline is 138 feet. The distance from the runway centerline to an area commonly used for aircraft parking is therefore consistent with the FAA standard.

Runway protection zone (RPZ)

The Runway 10 and Runway 28 RPZs are not under the control of the town of Twisp. The RPZ

area west of the Runway 10 end is occupied by homes and some commercial entities. The property east of the Runway 28 end is occupied by homes, an orchard and Airport Road. The uses to which these RPZs are put are not likely to draw large groups of people. Both RPZs are therefore in conformance with the FAA’s recommendations regarding RPZ activity.

Table 9: Comparison of existing conditions to FAA standards

Comparison of FAA design standards for airport to existing conditions		
FAA design standard	Design standard dimension relative to Twisp Municipal Airport	Existing condition at Twisp Municipal Airport
Runway length	4,550 feet to accommodate 100 percent of B-1 (small) fleet	2,701’ (1,849’ less than standard)
Runway width	60’	36’ (24’ less than standard)
Runway safety area length	3,181’	2,776’ (405’ less than standard)
Runway safety area width	120’	120’ (Meets standard within the area where it meets the length standard)
Runway object free area length	3,181’	2,931’ (250’ less than standard)
Runway object free area width	250’	250’ (Meets standard within the area where it meets the length standard)
Runway obstacle free zone	3,101’	2,891’ (210’ less than standard)
Runway shoulder	10’	10’ (Meets standard)
Taxiway width	25’	16’ – 17” (8’ to 9’ less than standard along some portions)
Taxiway safety area	49’	46’ (3’ less than standard at west half, south of the taxiway)
Taxiway object-free area	89’	65’ (24’ less than standard at the west half, south of the taxiway)
Taxiway shoulder	10’	10’ (Meets standard except along the west half of Taxiway A)
Runway-to-taxiway separation	150’	150’ (Meets standard for most of runway length. Non-compliant at runway ends)
Runway centerline-to-hold position marking	125’	125’ (Standard complied with at all four locations)
Runway centerline-to-aircraft parking area	125’	138’ (Standard is exceeded)
Runway protection zone	250’ X 1,000’ X 450’	Runway 10 and 28 RPZ are compliant in terms of usage. Airport does not have control over RPZ properties.

Note: Runway length standard computed using average mean/max. temperature of hottest month (82 degrees) and 1,602 mean sea level elevation.

Page reserved for existing conditions diagram

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.
- Applied Pavement Technology, Inc. pavement report dated February 2006.

Chapter 3:

Forecasts

3.1 INTRODUCTION

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

The forecasting process is an important one for a number of reasons. Primarily, forecasts will help the town of Twisp plan the airport's future. Understanding future demand will help the town make better decisions about airport capital improvements.

Forecasts are also vital to the funding of those improvements. As stated, Washington State Aviation is Twisp Municipal Airport's primary source of grant funds for the airport's operational areas. Though the Aviation Division has made considerable progress over the past few years with respect to the grant process and to the amount of funds available, the division continues 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, as well as 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 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 Economic Development (CTED) and the U.S. Department of Commerce's Economic Development Administration offer 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 that improve incomes.

It is a primary recommendation of this plan that, after it is published, the town of Twisp 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 Twisp Municipal Airport maintain its appropriate place on 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, in the end, 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:

Aircraft operation: A takeoff or a landing.

Local aircraft operation: Aircraft operating in an airport's traffic pattern or aircraft known to be departing to or arriving from local areas used for flying practice.

Itinerant aircraft operation: All other operations.

3.3 FORECASTING METHODS

To determine the most accurate forecast of future airport operations, this section begins by quantifying existing conditions, including the numbers and types of based aircraft, estimating local and itinerant flight operations, and determining county and local population and other pertinent data. Next, factors that are likely to influence future demand are identified. These factors include population projections for Okanogan County over the planning period as well as projections made by federal and state agencies about economic development in the region served by Twisp Municipal Airport. Forecast information produced by WSDOT/AD and the FAA is also considered.

Other issues that may impact changes in airport activity are then evaluated. These include: 1) changes to pilot rules recently promulgated by the FAA; and 2) the impacts of airport development.

For purposes of this narrative report, the term “based aircraft” refers to aircraft that are tied down on the airport’s existing apron or stored in privately owned hangars within the airport’s boundaries.

Table 10: FAA Form 5010

Fleet Mix Based aircraft 2005		Estimated Operations 2005	
Single-engine	12	GA local	940
Multi-engine	1	GA itinerant	650
Turboprop	0	Air carrier	0
Glider	0	Air taxi	100
Ultralight	0	Commuter	0
Rotorcraft	0	Military	0
Total	13	Total	1,690

Source: FAA Form 5010.

3.4 EXISTING DATA

Existing data about based aircraft and annual flight operations are available from three sources: the FAA’s Airport Master Record, also called Form 5010, last updated in December 2005; the WSDOT/Aviation Division database, last updated in 2006; and data provided by the airport layout plan steering committee. Information from these sources is shown in tables 10, 11 and 12.

Table 11: WSDOT/AD database

Fleet Mix Based aircraft 2006		Estimated Operations 2006	
Single-engine	30	GA local	700
Multi-engine	0	GA itinerant	700
Turboprop	0	Air carrier	0
Glider	0	Air taxi	0
Ultralight	0	Commuter	0
Rotorcraft	0	Military	0
Total	30	Total	1,400

Source: WSDOT/AD database.

Determination of based aircraft baseline

FAA and WSDOT/AD based aircraft estimates for 2006 are 13 and 30 respectively. Information provided by the ALP steering committee is provided in Table 12. As of the date of this publication there are 19 single-engine and two multi-engine operational aircraft based at Twisp Municipal Airport. The steering committee’s data are current and provide a clear understanding of makes and models of aircraft. This data will be used as the based aircraft baseline for this report.

Flight operations activity baseline

FAA and WSDOT/AD databases estimate 1,690 and 1,400 annual aircraft operations respectively during 2006. Both databases indicate a significant number of itinerant operations.

Flight operations activity levels at small, general aviation airports are difficult to determine without direct inquiry of local pilots. For this report, a member of the Twisp Municipal Airport’s

steering committee queried owners of based aircraft. According to those who own and operate aircraft at Twisp Municipal Airport there are approximately 1,800 flight operations conducted on an annual basis. Of these, approximately 250 operations are flown by a local air taxi service.

Table 12: Currently based operational aircraft

Aircraft	ARC category	General use
<i>Single engine</i>		
Cessna 175	A-I (small)	Personal
Cessna 210	A-I (small)	Personal
Cessna 172	A-I (small)	Personal
Taylorcraft	A-I (small)	Personal
Cessna 170	A-I (small)	Personal
Cessna 180	A-I (small)	Personal
Piper Cherokee	A-I (small)	Personal
Cessna 182	A-I (small)	Personal
Cessna 172	A-I (small)	Personal
Cessna 172	A-I (small)	Personal
Cessna 182	A-I (small)	Personal
Cessna 182	A-I (small)	Personal
Piper Cherokee Six	A-I (small)	Commercial charter
PA-12	A-I (small)	Personal
Beechcraft F-33	A-I (small)	Personal
BE-36	A-I (small)	Personal
Aeronca	A-I (small)	Personal
Beechcraft Debonair	A-I (small)	Personal
Piper Cub	A-I (small)	Personal
<i>Multi-engine</i>		
Beechcraft B-55	B-I (small)	Personal
Piper Seneca	A-I (small)	Personal

Source: Twisp Municipal Airport Steering Committee

Existing data conclusion

This report uses data provided by the steering committee to determine baseline information for based aircraft and annual flight operations. Based aircraft consist of 19 single-engine and two

multi-engine aircraft. All except the Beechcraft B-55 are in the A-1 (small) category. Annual flight operations by based aircraft have been estimated by this report’s steering committee as 1,550 per year. Itinerant flight operations are estimated for this report at 700. This is the estimate of WSDOT/AD and it is close to the 650 flight operations estimated by the FAA. Approximately 250 annual flight operations are flown in air taxi service.

Table 13: Aircraft and operations baseline

Fleet Mix Based aircraft 2007		Estimated Operations 2007	
Single-engine	19	GA local	1,550
Multi-engine	2	GA itinerant	700
Turboprop	0	Air carrier	0
Glider	0	Air taxi	250
Ultralight	0	Commuter	0
Rotorcraft	0	Military	0
Total	21	Total	2,500

Sources: Twisp Municipal Airport Steering Committee and local FAR Part 135 operator

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 estimates that 254 aircraft were based in the county in the year 2000 and that based aircraft would increase to 258, a net increase of just four aircraft during the planning period. Eighteen aircraft were identified in this document as being based at Twisp Municipal Airport in 2000, the first year addressed in the study. No additional aircraft were projected to be based at Twisp Municipal Airport through the year 2020.

Federal Aviation Administration

As stated, the FAA does not project future numbers of based aircraft or flight activity levels at Twisp Municipal Airport. The FAA does, however, publish other useful forecasting 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 per year through the year 2025. Most of this growth is attributed to business-type aircraft. Single-engine piston aircraft, those most applicable to Twisp Municipal Airport, are expected to increase in numbers at a rate of 0.2 percent per year. 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 Twisp Municipal Airport, parallel estimates by WSDOT/AD.

Conclusions based on WSDOT/AD, FAA and actual data

Projections by WSDOT/AD and the FAA indicate only slight growth in Okanogan County's based aircraft and flight operations over the planning period. No growth is expected by WSDOT/AD at Twisp over the planning period.

Population and income projections

Okanogan County has experienced slow and at times erratic growth in population over the past decade. During some periods, population actually declined from year to year. Washington State analysts project that the county's population will continue to grow slowly from its 2006 level of 39,800 to about 49,410 in 2025. This is a projected growth rate of 24.1 percent, which is slightly lower than the growth rate of 27.9 percent that is projected statewide.

Okanogan County has experienced relatively steady growth in total personal income over

the past several years. According to the U.S. Department of Commerce's Bureau of Economic Analysis (BEA), personal income is the best available local indicator of general purchasing power and is, therefore, important to tracking and comparing economic growth. Personal income is defined by BEA as the income received by all persons from working. Personal income is the sum of net earnings by place of residence, rental incomes of persons, personal dividend payments, personal interest income and transfer payments.

Table 14: Okanogan County population

	2006	2010	2015	2020	2025
Okanogan County	39,800	44,061	46,315	47,920	49,410

Source: Washington State Office of Financial Management, 2006.

Examples of transfer payments are social security payments, Medicare payments, unemployment insurance payments and veterans' pensions. Personal income is measured before the deduction of personal income taxes and other personal taxes.

Per capita personal income

In 2004 Okanogan had a per capita personal income (PCPI) of \$25,459. This PCPI ranked 19th in the state and was 73 percent of the state average, \$35,041, and 77 percent of the national average, \$33,050. The 2004 PCPI reflected an increase of 6.6 percent from 2003. The 2003-2004 state increase was 6.6 percent and the national increase was 5.0 percent. In 1994 the PCPI of Okanogan was \$17,984 and ranked 20th in the state. The 1994-2004 average annual growth rate of PCPI was 3.5 percent. The average annual growth rate for the state was 4.3 percent and for the nation was 4.1 percent.

Total personal income

In 2004 Okanogan had a total personal income (TPI) of \$1,004,922. This TPI ranked 22nd in the state and accounted for 0.5 percent of the state total. In 1994 the TPI of Okanogan was \$656,961

and ranked 22nd in the state. The 2004 TPI reflected an increase of 7.7 percent from 2003. The 2003-2004 state change was 7.9 percent and the national change was 6.0 percent. The 1994-2004 average annual growth rate of TPI was 4.3 percent. The average annual growth rate for the state was 5.8 percent and for the nation was 5.2 percent.

Conclusions about population and income

According to Washington State economists and planners, Okanogan County's population will increase between now and 2025 by just over 24 percent. Washington State data indicates that the state's population as a whole will increase by almost 28 percent. There is no data that indicates that Okanogan County will experience other than slow, steady growth that will be somewhat less than that expected statewide.

Data from the BEA indicate that personal income will also continue to rise in Okanogan County. Expected increases, however, are consistent with increases that are projected for Washington State and the rest of the United States.

No data related to population or personal income indicates that the numbers of based aircraft or level of flight operations will increase to other than a slight degree in Okanogan County over the planning period.

Additional factors

Airport forecasts should take into account specific local conditions and factors other than official population and income projections as long as 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:

- Unique factors in the Methow Valley.
- Alterations to FAA rules regarding pilots.
- Airport improvements.

Methow Valley

The Methow Valley, which incorporates, in part, the communities of Twisp, Winthrop and Mazama, is a unique region in Okanogan County. Its topography, accommodations and history make it one of the most popular locations for residents, both full-time and seasonal, and for visitors. It is logical to assume that Twisp Municipal Airport will be an increasingly important portal to this sub-county region especially to seasonal residents and those on vacation. Twisp Municipal Airport may experience some unpredicted demand due to the access it provides to the sub-county region but this demand may be tempered somewhat by the airport's proximity to Methow Valley State Airport, which has a 5,000-foot-long runway and is less than five miles north.

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 Twisp that have low activity levels, are non-towered and that have an abundance of adjacent, uncontrolled airspace.

Airport Improvements

Though typical planning procedures call for airport improvements, especially those that increase airport capacity, to be justified by demand it is also logical to assume that such improvements might in turn have some impact on actually generating demand. Capital improvements that cause Twisp Municipal Airport to be increasingly attractive, efficient and functional will likely create additional demand. During an interview with a member of this plan's steering committee it was noted that there have been several recent inquiries from individuals about potential plans to develop the airport

and, specifically, to construct hangars. These inquiries are assumed to be evidence of potential growth. As mentioned earlier in this report, five unimproved hangar sites are currently under lease from the town.

It is a conclusion of this narrative that alterations to the airport’s layout, operating features and operational capability are likely to have a supportive impact on the aircraft census as well as on based and itinerant activity levels.

Conclusions about additional factors

All three of the factors described in this section are likely to increase usage at Twisp Municipal Airport. The airport provides access to a beautiful and popular sub-county region – a region that is time consuming to reach by vehicle. There is no doubt that new FAA rules related to sport aircraft will increase personal, recreational flight activity and that much of this activity will occur at non-towered, rural airports such as Twisp. Finally, the “build it and they will come” theory that is common to many aspects of our lives will probably play a role at Twisp as it would at other, generally undeveloped, airports. Improved airport facilities, especially those intended to accommodate visitors are likely to generate increased use.

Forecast of based aircraft and operations

After taking into consideration state and FAA aircraft census projections, state and federal population and income projections, Twisp’s

location in the increasingly popular Methow Valley, the proximity of Methow Valley State Airport to Twisp Municipal, likely airport facility improvements and FAA sport pilot rules Airside makes the following projections about based aircraft and flight operations activity over the planning period.

Based aircraft

Based aircraft will increase by 10 (50 percent) between 2007 and the end of the period. Most of the additional aircraft will be single-engine. Some of the additional aircraft, possibly as many as half, will be in the sport pilot category.

Flight operations

Aircraft based at Twisp Municipal Airport currently operate an average of approximately 100 times per year. This is less than the national average, a factor possibly of the weather. Itinerant operations, currently at about 700 per year, are also fairly low. This also may be related to weather. Airside estimates that the additional aircraft that are predicted to be based at Twisp Municipal Airport will operate at generally the same level of activity as currently based aircraft with the exception that sport aircraft are likely to operate more frequently than conventional aircraft.

Tables 15, 16 and 17 indicate growth in based aircraft and flight operations over the planning period.

Table 15: Additions to based aircraft, increases in flight operations over planning period

A/C	2007-2011			2012-2016			2017-2021			2022-2026		
	Aircraft	Local Ops Per/Yr	Itinerant Ops Per/Yr	Aircraft	Local Ops Per/Yr	Itinerant Ops Per/Yr	Aircraft	Local Ops Per/Yr	Itinerant Ops Per/Yr	Aircraft	Local Ops Per/Yr	Itinerant Ops Per/Yr
SE	1	100	50	2	200	50	2	200	50	1	100	50
SESP	1	125	0	1	125	0	1	125	0	1	125	0
ME	0	0	0	0	0	0	0	0	0	0	0	0
Heli	0	0	0	0	0	0	0	0	0	0	0	0
Total	2	225	50	3	325	50	3	325	50	2	225	50

Note: Additions to based aircraft in the 2007 – 2012 period are not projected to occur until one-half way into the period.

A/C = Aircraft; SE = Conventional single-engine aircraft; SESP = Single-engine sport category aircraft; ME = Multi-engine aircraft

Heli = Helicopter.

Table 16: Forecast based aircraft 2007 - 2026

Based A/C by type	2007	2012	2017	2022	2026
SE	19	20	22	24	25
SESP	0	1	2	3	4
ME	2	2	2	2	2
Heli	0	0	0	0	0
Total	21	23	26	29	31

A/C = Aircraft; SE = Conventional single-engine aircraft; SESP = Single-engine sport category aircraft; ME = Multi-engine aircraft

Heli = Helicopter.

Table 17: Forecast annual flight operations 2007 - 2026

Operations	2007 (1)	2012	2017	2022	2026
SE	2,400	2,500	2,700	2,900	3,000
SESP	0	125	250	325	450
ME	200	200	200	200	200
Heli	0	0	0	0	0
Total operations	2,600	2,825	3,150	3,425	3,650
Average annual increase in total operations		1.8 percent	2.4 percent	1.8 percent	1.4 percent

(1) Estimated current.

A/C = Aircraft; SE = Conventional single-engine aircraft; SESP = Single-engine sport category aircraft; ME = Multi-engine aircraft

Chapter 4:

Facility requirements and development alternatives

4.1 INTRODUCTION

This chapter discusses development alternatives at Twisp Municipal Airport. It then describes a preferred alternative and identifies projects related to that alternative.

Information contained in this chapter is derived from this report's Chapters 2 and 3, data gathered during site visits and suggestions from the ALP steering committee. Recommended improvements at Twisp Municipal Airport extend over the 20-year planning period. Projects listed are intended to increase safety, accommodate forecast demand and provide a transportation facility that is efficient and attractive. Information about the timing of projects is at the end of this chapter. Estimated expenses associated with recommendations are contained in Chapter 5.

As stated in Chapter 3, the Cessna 182 and the A-1 (small) group of aircraft it represents is identified as the design aircraft throughout the planning period. Additional kinds of aircraft that may use Twisp Municipal Airport are light sport aircraft and variations of aircraft based on advancing aircraft technologies.

FAA recommendations related to design standards that are contained in Advisory Circular 150/5300-13 "Airport Design" have been applied in this chapter.

4.2 AIRPORT FEATURES

Chapter 2 identifies several features of Twisp Municipal Airport that either fail to meet FAA design standards or that would, if altered, improve airport safety and efficiency. These features include runway length and width, the runway safety area, the runway object-free

area, the runway obstacle-free zone, Taxiway A width and Taxiway A safety and object-free areas. Before addressing these features in development alternatives it is necessary to make a determination about runway length as it is a fundamental feature that will impact all alternatives.

Runway length

The existing runway at Twisp Municipal Airport is 2,701 feet long and 36 feet wide.

Figure 2-1 in FAA Advisory Circular 150/5325-4B provides a method for determining runway lengths that are adequate to accommodate both 95 percent and 100 percent of what the FAA terms "small airplanes." According to the FAA, small airplanes are those that have certificated gross weights of less than 12,500 pounds and that have fewer than 10 passenger seats.

The graph in Figure 2-1 provides a method for using temperature and airport elevation to compute runway length calculations since both of these factors affect aircraft performance. According to this graph, which is included in the appendix to this report, runway lengths of 3,600 feet and 4,200 feet are required to accommodate 95 percent and 100 percent, respectively, of the small airplane fleet at Twisp Municipal Airport considering the mean temperature of the area's hottest month (86.2 degrees in July) and the mean sea level elevation of 1,600 feet. This means that the airport's runway is 900 feet less than that needed for 95 percent of the fleet and 1,500 feet less than that needed for 100 percent of the fleet.

Before concluding that Twisp's runway is inadequate it is important to put the runway length requirements contained in the FAA's

advisory circular in perspective. Specifically, some of the aircraft in the small airplane category are high-performance, multi-engine turboprops that are larger and faster than those that generally use Twisp Municipal Airport.

4.3 DEVELOPMENT ALTERNATIVES

During preparation of this report, a number of development alternatives related to the general conformation of Twisp Municipal Airport were considered. These alternatives are described in this section.

Alternative 1: Do nothing

Except for hangar development north of the runway, Twisp Municipal Airport has existed in its current conformation for many years. It is logical to assume that it could continue to serve its purpose for several years to come. The “do nothing” alternative is therefore worth consideration.

At least two factors bear heavily on this decision:

1) Are there existing features of the airport that reduce safety and unnecessarily increase the town of Twisp’s liability; and 2) would failing to address these features reduce the ability of the town of Twisp to receive airport aid grants for capital projects from WSDOT/AD?

Though the airport has apparently operated without any major incident related to its layout, factors such as the proximity of Taxiway A to hangars on the south side of the airport, non-compliance with the FAA’s runway safety area and runway object-free area design standards and absence of a 20:1 approach to Runway 28 due to the runway’s proximity to Airport Road, do increase the chance of aircraft mishap and increase the town’s liability. The degree to which these issues reduce safety and increase liability is impossible to determine.

It is important to note that FAA airport design standards described in this report are not regulations and cannot be legally imposed on

the town of Twisp since the town has not taken FAA funds for capital improvements or land purchase. As stated, not being included in the FAA’s National Plan of Integrated Airport Systems (the NPIAS) makes it impossible for the town to apply for FAA funds that would then obligate it to attempt to meet FAA standards. Nevertheless the town’s primary source of airport aid grant funds, WSDOT/AD, has required that this report review the airport with respect to its ability to conform to at least the most basic of those standards.

Exercising the “do nothing” alternative, considering WSDOT/AD’s position about meeting FAA design standards to the extent possible, might cause the airport to be placed in a “maintenance only” grant posture. That is to say, that if the town were to decide to not address the primary design shortcomings described herein, WSDOT/AD may decide to not fund major development at the airport but would instead provide only funds for projects such as runway and taxiway crack sealing and seal coating that would be necessary to maintain the airport’s functionality. This, in fact, is the position that the FAA takes with respect to those airports that are on the NPIAS that are unable or unwilling to meet federal standards due to site constraints and that have taken federal funds for improvements or land purchase.

Answers to questions about the airport’s layout and FAA design standards as they relate to safety, liability and future grants from WSDOT/AD are, admittedly, guesses at best. Safety and liability issues are difficult to quantify and WSDOT/AD, as of the publication of this document, has not announced a “maintenance only” posture at airports that do not attempt to comply with FAA design standards.

Nevertheless, it is Airside’s recommendation that it is sound policy to do all that is feasible to correct any safety deficiencies, whether or not they relate to federal or state design standards.

The “do nothing” alternative would also fail to address issues that have nothing to do with FAA design standards. These include development of a taxiway on the north side of the runway to serve hangar development that continues to occur there, construction of features that will better serve the flying public as well as setting aside and planning areas for commercial and light industrial development.

Alternative 2: Extend the runway over Airport Road

The convergence of Airport Road with the east end of the runway limits the length of the runway and creates a number of design standard deficiencies. Closing Airport Road and purchasing property to its east would allow a runway extension of 1,000 to 1,200 feet. The extended runway would be able to comply with runway safety area, runway object-free area and approach surface standards.

Undoubtedly, lengthening of the runway across Airport Road would be beneficial, as the ultimate runway would be long enough to accommodate most of the A-1 (small) and B-1 (small) aircraft fleet.

Alternative 3: Reconfigure Airport Road and lengthen the runway

If Airport Road were to be reconfigured so that it departed Highway 20 at a right angle to the south and then were to progress southerly until passing south of the extended centerline of the runway it would be possible to extend the runway without closing the road. This action would allow a sizable runway extension but it would not be as long as would be possible with Alternative 2. Airport Road would, however, continue to be useable. As with Alternative 2, considerable property acquisition would be necessary.

Alternative 4: Maintain the runway as it is and meet design standards as possible

This alternative would leave Airport Road as it is. Runway pavement would remain at its

existing length but markings and lighting on the runway would indicate relocated rather than displaced thresholds. As stated, when thresholds are relocated, runway safety areas and runway object-free areas begin at those thresholds rather than at pavement ends, as is the case with displaced thresholds. Technically, the runway would be shortened. However, the runway would be in compliance with these most basic FAA standards.

Alternative 1 has not been diagrammed because it can be seen in the Existing Conditions Diagram in Chapter 2. Diagrams indicating Alternatives 2, 3 and 4 follow as drawings 2, 3 and 4.

Alternative 2 drawing

Alternative 3 drawing

Alternative 4 drawing

4.4 PREFERRED DEVELOPMENT ALTERNATIVE

This plan identifies Alternative 4 as the preferred alternative.

Alternative 1, doing nothing, is not considered feasible for safety, liability and future-grant-funding reasons.

Alternatives 2 and 3 — which would involve closing or rerouting Airport Road — would provide for a greatly improved airport due to the lengthened runway. However, the cost, time and environmental actions that would be required to accomplish either of these alternatives are not considered by Airside to be justified at this time given the airport's forecast level of activity, the models of aircraft the airport generally serves and the availability of Methow Valley State Airport and its longer runway just a few miles north. Airside does, however, recommend that the town of Twisp consider a review of both of these alternatives during the next update to this plan.

Alternative 4 involves maintaining the runway's pavement in its current conformation and taking steps to meet FAA design standards. Additional development actions based on the runway's configuration are also recommended. Major actions included in this alternative are listed below:

- Relocate thresholds to conform to FAA recommendations related to runway safety areas, runway object-free areas, runway obstacle-free zones and approach surfaces.
- Widen the runway to 60 feet to conform to FAA recommendations.
- Reroute and reconstruct Taxiway A to provide conforming taxiway safety and taxiway object-free areas.
- Construct a new taxiway (Taxiway B) to serve development on the north side of the airport.

- Develop the area north of future Taxiway B to accommodate: 1) additional hangars; 2) commercial activities; 3) a fuel system; 4) a small terminal referred to herein as a welcome center; and 5) an access road and vehicle parking area.

A number of actions — such as installations of lights and reflectors, painting, installing signs and landscaping, as well as planning and installation of utilities — will be necessary to support the primary development indicated above.

Alternative 4, Action 1: Create conforming RSA, ROFA, ROFZ and approach surface

Relevant Standards

As explained in Chapter 2, Twisp Municipal Airport does not have conforming runway safety areas (RSAs) at either end of the runway nor does it have a conforming runway object-free area (ROFA) or runway obstacle-free zone (ROFZ) at the east end of the runway.

Both ends of the runway are currently marked with displaced thresholds. According to the FAA's airport design circular (150/5300-13), when a displaced threshold is marked on a runway both the RSA and ROFA begin at the end of that runway's pavement. For airports with the airport reference code category of Twisp Municipal, RSAs extend 60 feet on either side of the runway's centerline. ROFAs and ROFZs extend 125 feet on either side of the runway's centerline. Both the RSA and ROFA extend 240 feet beyond the pavement ends. The ROFZ extends 200 feet beyond the runway ends.

Runway Safety Area (RSA)

At the Runway 10 end, property that is consistent with, or could be made to be consistent with, the RSA standard extends 85 feet west of the pavement. After that, terrain drops off in such a way that earthwork could not provide a conforming RSA. Since the RSA standard extends

240 feet beyond the pavement end this means that 155 feet of non-conforming area exists beyond the Runway 10 end.

At the Runway 28 end a conforming RSA does not exist beyond the end of pavement. This is because of the proximity of Airport Road to the runway and the angle at which Airport Road converges with the runway. Therefore, the full 240 feet of area where a conforming RSA should be is non-existent.

RSA conclusion: Given the runway length of 2,701 feet, the FAA standard RSA length is 3,181 feet. The RSA is 155 shorter than it should be at the Runway 10 end and 240 feet less than it should be at the Runway 28 end. The total of 395 feet means that the actual RSA length, based on existing runway markings, is 2,786 feet.

Runway Object Free Area (ROFA)

The ROFA at the Runway 10 end conforms with the FAA's standard. The ROFA standard does not require a surface that is able to accommodate straying aircraft, as does the RSA standard. Instead, the ROFA standard only requires that terrain, items of equipment, structures, roads, etc., do not rise above the runway's elevation.

Due to the angle at which Airport Road converges with the east end of the runway and the proximity of the runway to the road, the actual ROFA available is 366 feet less than the FAA standard.

ROFA conclusion: The FAA standard ROFA length is 3,181 feet. The actual ROFA available, based on existing runway markings, is 2,815 feet, or 366 feet less than standard.

Runway Obstacle-Free Zone (ROFZ)

The FAA ROFZ standard length is 80 feet less than the ROFA length, or 3,101 feet. The ROFZ width is the same as the ROFA width. As with the ROFA, the ROFZ standard is met at the Runway 10 end but not at the Runway 28 end.

ROFZ conclusion: The ROFZ standard length is 3,101 feet. This actual ROFZ available, based on existing markings, is 2,775 feet.

Runway Approach Surface

FAA's advisory circular 150/5300-13 in Appendix 2, Table A2-1, the "Approach/Departure Requirements Table," identifies dimensional standards and approach slopes for various runways. Row 2 of that table lists standards for approach ends of runways intended to serve small airplanes with approach speeds of 50 knots (nautical miles per hour) or more in day or night visual conditions. This table also indicates that the approach slopes for airports such as Twisp Municipal may begin at the landing threshold. The shape of these approach surfaces are indicated on this report's airport layout plan.

Title 14 of the Code of Federal Regulations, Part 77, having to do with objects that affect airspace, states that roads of the type and use of Airport Road are to be treated as 15-foot obstructions.

Runway 10 end

The WSDOT/AD database indicates that trees located 285 feet from the runway end and 19 feet to the right of centerline penetrate the Runway 10 approach surface. Since the survey that provided information for the database was accomplished, the airport's landing threshold has been displaced 130 feet. With this action a conforming 20:1 approach surface was created. The tops of the trees are 19 feet higher than the elevation of the displaced threshold. The displaced threshold provides an approach surface with a base of 20 feet at the trees' location.

Runway 28 end

The convergence of Airport Road with the runway as both extend east creates a situation where consideration must be given to the location of the Runway 28 threshold. The goal, given the approach surface standard is to ensure that as the approach surface rises at a 20:1 slope to the east

from the landing threshold it is at least 15 feet over the road. The critical area, considering the convergence of the road and the runway, is along the approach surface's southern edge.

Elevation information for the runway and the road that is available for this report comes from a survey accomplished by WSDOT/AD. Elevation data is available for the center of the runway (the airport reference point), the centers of both ends of the runway and the center of Airport Road at a distance of approximately 150 east of the extended runway centerline. The elevation of the Runway 10 end is 1,596 feet. The elevation of the aforementioned Airport Road location is 1,604 feet. Observations by Airside indicate that Airport Road lowers in elevation as it progresses west. Survey data indicates that the runway rises in elevation as it progresses west.

WSDOT's database indicates that the existing visual approach surface at the Runway 28 end is 0:1 due to Airport Road.

Runway approach surface conclusion: The Runway 10 approach surface exceeds the 20:1 standard. No action is necessary at the Runway 10 end with respect to approach surface clearance. The Runway 28 end threshold would have to be located 346 feet from the end of pavement to provide 15 feet of clearance over the road along the most critical part of the surface, which is the southerly, east/west line of the surface. This location assumes that Airport Road is 4 feet less in elevation than the runway at the convergence of the approach surface and Airport Road.

Recommendations regarding threshold locations

After considering all factors that affect runway threshold locations and, in particular, reviewing, the most critical design standard and/or Part 77 approach surface for each end of the runway, this report determines that the Runway 10 threshold should be relocated to a distance that is 155 feet from the west end of the paved surface. This

relocation will provide an opportunity to create a conforming runway safety area, which is the most critical design factor. Since a conforming approach slope is currently provided at the threshold location of 130 feet from the end of pavement this new location will continue to provide a conforming approach slope.

The most critical design factor at the Runway 28 end is the runway object-free area. Relocating the threshold a distance of 366 feet from the end of pavement will create a conforming ROFA. It will also bring the entire runway safety area onto airport property.

Key to these recommendations is the concept that the existing displaced thresholds will be eliminated and will be replaced by relocated thresholds. Relocating thresholds does not eliminate runway pavement but it does reduce the length of runways since the pavement toward each runway end from the relocated thresholds is turned into a taxiway and is, therefore, not available for takeoff or rollout after landing in the opposite direction.

There are, in short, tradeoffs to relocating the thresholds. Relocating thresholds at the airport will shorten the runway, an action that is never desirable, but it will also provide an opportunity to have a conforming RSA and ROFA as well as an approach slope at the Runway 28 end which conforms to design standards.

It is important to note that actions recommended in this report provide opportunities to have a conforming runway safety area. In order to be fully compliant, the area serving as the RSA should be graded and compacted so that it meets the definition of this standard. Along with repainting of the runway to indicate the relocated thresholds, the paved areas toward the ends of pavement from the thresholds should be marked as taxiways and the existing threshold lights should be relocated to coincide with the new thresholds.

ALTERNATIVE 4, ACTION 2: WIDEN RUNWAY TO 60 FEET

Standard

The FAA design width standard for ARC A-1 and B-1 runways is 60 feet. The existing width of the runway is 36 feet.

Recommendation

Widen the runway to 60 feet using the existing runway as a base for the center 36-foot section.

ALTERNATIVE 4, ACTION 3: TAXIWAY A

Standard

Taxiway A is too close to its adjacent hangars to provide conforming taxiway safety and taxiway object-free areas.

Recommendation

Reconstruct Taxiway A to a width and at a location that is consistent with the FAA's relevant design standard. The new taxiway's centerline should be 150 feet from the centerline of the runway. A potential design for paving that will provide for access to the new Taxiway A from existing hangars is shown on the airport layout plan and building area plan. Final configuration of this paved access area should take snow removal and storage into consideration.

ALTERNATIVE 4, ACTION 4: CONSTRUCT TAXIWAY B

Consideration

A number of hangars have been constructed on the north side of the runway. A new access road (Aviation Lane) now connects this side of the airport with Highway 20. Electricity has been provided to the north side hangars according to the terms of a utility easement. Future hangars as well as other development will occur on this side.

Recommendation

Construct a full-length taxiway on the north side of the runway. This will cause access to and from

the runway for development on the north side to be more efficient. Aircraft transitions to and from the runway will also be safer since it will be unnecessary for aircraft to either cross the runway at mid-field or to back-taxi along the runway. The width and location of this taxiway (Taxiway B) should also be consistent with the FAA's design standard.

ALTERNATIVE 4, ACTION 5: DEVELOP NORTH SIDE OF AIRPORT

Consideration

Adequate space is available from east to west along the north side of the airport to develop a welcome center (small terminal), a fuel system, a future airport-compatible and/or airport-related commercial area, outside aircraft parking and additional hangars.

Recommendation

Develop the area north of the runway as depicted in the airport layout plan and building area plan.

ALTERNATIVE 4, ACTION 6: PHASING

Current state regulations do not allow WSDOT/AD to provide grants in excess of \$250,000. Design, engineering and construction of a reconfigured Taxiway A and new Taxiway B will exceed that amount. Unless state regulations regarding maximum grant amounts are changed before implementation of this option, taxiway and apron paving identified in Alternative 4 should be accomplished in two grants as indicated below.

Phasing plan

1. Design, engineering, specifications and contract documents for Taxiways A and B including grading, drainage, lighting, signage and other features.
2. Construction of Taxiways A and B, including painting and installation of hold-line signs and other taxiway features.

4.5 DETAIL AND TIMING OF IMPROVEMENTS

This section lists recommended improvements and the timing of those improvements. It includes actions necessary to implement Alternative 4 as well as actions that are not directly related to Alternative 4.

Development, rather than being shown on an annual basis, is divided into four time periods of five years each. Experience has shown that indicating specific years during which projects will be accomplished is counterproductive. Oftentimes airport sponsors are not able to maintain specific time schedules and/or availability of grants from WSDOT/AD that are necessary to fund projects are not available at the times indicated. Establishing five-year cycles and then prioritizing projects within these periods provides flexibility to both the town of Twisp and WSDOT/AD. It also helps maintain the validity of this report.

Improvements described in this section are depicted on the airport layout plan (drawing C1.1), the Building Area Plan (drawing C1.2) or both.

PROJECTS 2007 - 2011

Following is a list of prioritized projects recommended for completion between 2007 and 2011.

A1. Runway safety area (RSA), runway object-free area (ROFA) and FAR Part 77 Approach Surface enhancements

- Repaint the threshold at the Runway 10 end, placing the threshold at a distance of 155 feet from the end of pavement. Repaint the Runway 28 threshold at 366 feet from the end of pavement. Repaint white centerlines.

- Paint the runway west of the Runway 10 threshold and east of the Runway 28 threshold as a taxiway.
- All painted markings should conform to recommendations contained in FAA Advisory Circular 150/5340-1J.
- Adjust lighting at both ends of the runway to indicate relocated thresholds. Lighting should conform to recommendations contained in FAA advisory circular 150/5340-30B.
- Grade and compact the runway safety area to conform to the RSA standard. This area is 120 feet wide, centered on the runway and extends 240 feet from each threshold toward each end of the runway.
- Update FAA Form 5010 to indicate the adjustment to the runway's length.

A2. Runway incursion-reducing enhancements

Repaint hold lines at the existing four runway access locations at 125 feet from the runway's centerline. Hold-line markings should be consistent with those indicated in FAA advisory circular 150/5340-1J.

Install standard, 2-foot-by-4-foot, retroreflective hold-line signs at all four locations. Signs should be on frangible mountings and should be located adjacent to their respective hold lines. Ensure that the non-frangible portions of all hold-line signs extend no more than 2 inches above grade.

A3. Re-locate PAPI system

The precision approach path indicator system (PAPI) that serves Runway 28 should be relocated to be consistent with the new threshold. The distance from the runway edge to the new PAPI location should be determined using the planned future width of the runway. (See item B1) Ensure that PAPI installations are accomplished so that concrete bases are no more than 2 inches above grade.

A4: Install taxiway reflectors

Install taxiway reflectors along both sides of the perpendicular taxiway and, to the extent possible, along Taxiway A. This will take approximately 36 reflectors.

A5. Reposition distance-remaining signs

When the runway thresholds are relocated, locations of the two distance-remaining signs should be changed to ensure that they accurately reflect distances between themselves and between each of them and the ends of the runway.

A6. Fence airport

Finish fencing the airport. It is approximately 80 percent complete at this time. Use Elk Fence as specified by the Washington Department of Fish and Wildlife. Install personnel and vehicle access gates at the Aviation Lane and Airport Access Road entrances. This is important due to the number of deer in the Methow Valley.

A7. Plan, specify and develop bid and contract documents intended to implement paved surface plan

This plan calls for relocation of Taxiway A (the south taxiway), construction of Taxiway B (the north taxiway) and widening of the runway to conform to FAA design recommendations. During this period, accomplish engineering plans, cost estimates and other documents necessary to accomplish these projects.

A8. Plan north side development

This plan calls for development of a welcome center (small terminal), fuel system, vehicle access drive and parking area, landscaping, utilities and future hangars. This period should be used to accomplish detailed planning of these improvements.

A9. Construct Taxiway B

Add a full-length taxiway on the north side of the runway. The centerline of the new taxiway should

be 150 feet from the centerline of the runway. Paint the taxiway centerline and all hold lines. Add hold-line signs at each end of the taxiway. Install taxiway reflectors along the entire length. Grade and compact the taxiway safety area as necessary.

A10. Install fuel system

A 100-gal lead fuel tank and dispensing system is shown on the building area plan (drawing C1.2a) as part of a larger development which includes a welcome center and aircraft parking area that is scheduled for the 2012 – 2016 time period. It will be beneficial to the airport to install the fuel system during the 2007 - 2011 time period. Planning the location, electrical power supply and connections and supportive infrastructure of the tank so that it may be easily incorporated into future development is important.

PROJECTS 2012 - 2016

Following is a list of prioritized projects recommended for completion between 2012 and 2016.

B1. Widen runway

Widen the runway, centered on the existing base, to 60 feet to conform to FAA design standards. Repaint all markings. Reposition all runway lights. Provide new wiring for all lights. Grade and compact the runway safety area as necessary.

B2. Relocate / reinstall lighting system with new wiring

Reposition all runway lights. Provide new wiring.

B3. Relocate Taxiway A

Construct Taxiway A on the south side of the runway. As with Taxiway B, the centerline of the new taxiway should be 150 feet from the centerline of the runway. Paint the taxiway centerline and all hold lines. Add hold-line signs at each end of the taxiway. Install taxiway

reflectors along the entire length. Pave access from the existing south hangars to the new taxiway. Planning should take snow removal and storage requirements into consideration. Grade and compact the taxiway safety area as necessary.

B4. Develop terminal area

Install paving, a terminal structure, a fuel system (if not accomplished earlier), vehicle access, vehicle parking, lighting, signage, transient and based aircraft parking, landscaping and supportive utilities necessary to complete the development that is planned for the central area of the north side of the airport.

The welcome center (terminal) should be centered on or adjacent to Aviation Lane. This building will be used as a visitor center where those flying to the Twisp area can be accommodated in clean, comfortable and functional surroundings. This building will provide increased opportunities for the town of Twisp and local business interests to display information about their individual and mutual economic development and tourism efforts. Those flying to Twisp will have a place to await ground transportation. Pilots will use this building for flight planning. This new structure will serve as the focal point for the airport.

B5. Improve Aviation Lane and the airport access road

Pave and provide entry signage on Aviation Lane from Highway 20 to the terminal area. Accomplish the same with the access road from Airport Road.

B6. Install weather reporting station

Install an automatic weather observing system (AWOS) or similar system to provide weather information to pilots. High-performance aircraft have limited abilities to identify and interpret wind information from wind indicators when planning their landing approaches. Safety is also increased if aircraft are able to determine wind

and basic weather information before entering the airport area. AWOS systems are also helpful to departing pilots.

B7. Allow construction of hangars according to plan

Construct additional hangars east of the terminal area and north of Taxiway B as demand warrants.

B8. Add PAPI system to Runway 10

PROJECTS 2017 - 2021

Following is a list of prioritized projects recommended for completion between 2017 and 2021.

C1. Conduct paved surface maintenance

Seal cracks, apply high-quality seal coat and repaint all paved surfaces.

C2. Sponsor commercial and/or light industrial development

Encourage and support commercial development west of the terminal, north of Taxiway B.

C3. Improve vehicle access east and west of the terminal as demand warrants.

Improvements include asphalt paving, lighting and signage.

PROJECTS 2022 - 2026

Following is a list of prioritized projects recommended for completion between 2022 and 2026.

D1. Conduct paved surface maintenance

Seal cracks, apply high-quality seal coat and repaint all paved surfaces.

D2. Continue to develop the north side of airport.

D3. Continue overall landscaping, lighting, signage and other functional and aesthetic improvements.

4.6 HANGAR AND TIE-DOWN DEVELOPMENT

This section relates existing and expected numbers of based and itinerant aircraft to development of aircraft tie-downs and construction of aircraft hangars over the planning period.

Chapter 3 indicates that 20 aircraft are currently based at Twisp Municipal Airport. All of these aircraft are stored in private hangars on airport property.

Chapter 3 forecasts that 30 aircraft will be based at the airport at the end of the planning period—the year 2026. Given winter weather conditions in the Methow Valley, it is assumed that all aircraft that are based at the airport on a year around basis will be stored in hangars. It is also logical to assume that both occasional visitors and seasonal residents in the Twisp area will require outside storage for their aircraft.

This plan indicates locations for five hangars within the currently planned hangar areas. The five existing lots that are available for development are NE2, NW5, SW10, SW13 and SW14. These are indicated on the existing conditions diagram as well as on Drawings C1.1, the airport layout plan and C1.2, the building area plan. An area for future hangar development is identified on the north side of the airport east of the hangar NE2 location. This expansion area is able to accommodate at least twice as many aircraft hangars than are projected during the planning period.

West of hangar NW5 and west of the location where Aviation Lane enters airport property is a planned area to be used for tie-downs for seasonal residents and visitors. In its first phase this tie-down area will be able to accommodate five aircraft. West of this area is another area that has been set aside for tie-downs. Its capacity is also five aircraft.

4.7 BUILDING RESTRICTION LINES (BRLS)

Building restriction lines (BRLs) are lines parallel to runways that are established to identify permissible locations for structures. Generally, BRLs are located so that FAR Part 77 transitional surfaces will not be penetrated by planned structures. Maximum structure heights are typically considered to be 15 feet for planning purposes.

Transitional surfaces rise at a ratio of 7:1 (horizontal to vertical) perpendicular to an airport's runway. Outward and upward slopes begin at another FAR Part 77 surface called the "primary surface," which at Twisp Municipal Airport is 125 feet from centerline on both side of the runway. 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.

It should be noted that FAR Part 77 is not a legal restriction of structure heights. Instead, it is a federal regulation that identifies a method for determining existing and proposed penetrations of airspace and their dispensation. Penetrations are considered by the FAA to be obstructions to navigable airspace unless a study by the FAA determines otherwise. FAA studies may result in one of three conclusions: 1) no objection to the penetration; 2) objection unless mitigation, such as lighting, is accomplished; and 3) objection. FAA airspace determinations are not binding on local jurisdictions since the FAA does not have authority over local zoning. Nevertheless, it is a good idea, and WSDOT/AD policy, to avoid FAR Part 77 penetrations, thus the logic behind showing BRLs on airport plans. FAR Part 77 requires the filing of documents related to proposed construction on and near airports, depending on the height and location of the proposed construction.

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

4.8 ZONING AND LAND USE

Forecasting usage and scheduling improvements at Twisp Municipal Airport will ultimately prove to be fruitless exercises unless meaningful efforts continue to be used to protect this facility.

Airports in the United States close routinely – not because of a lack of funds to keep them open but because municipalities and counties did not anticipate and address the negative impacts of encroachment and the insidious advance of incompatible land uses. It is easy to overlook the need for airport-protective zoning and land use planning at rural airports that do not have existing adjacent development. At the same time, it is easier to implement protective zoning before incompatible land-use encroachments make themselves evident. It is at such a time, when the need is not obvious, to address this subject – before protective actions must be used to try to reverse active development.

Incompatible pressures on airports come in two forms: (1) those that restrict airspace necessary to maintain operational viability and (2) those that place incompatible development so close to airports that it becomes a risk to the facility and its neighbors.

Because the airport is within the town's corporate limits and surrounding properties are within Twisp's urban growth area, this section recommends actions to be taken by the town of Twisp that will help protect Twisp Municipal Airport and that will help maintain the airport as a good neighbor. We strongly suggest that they be carefully reviewed and implemented.

Zoning

This plan concludes that existing zoning policies as promulgated by the town of Twisp and Okanogan County are adequate to protect

the airport from incompatible land use as long as appropriate oversight is applied to future development. As noted in Section 2.3 of this plan, properties surrounding the airport are regulated by Okanogan County and are classified under the Methow Review District (MRD) in the county's zoning ordinance. Further, the town's airport property is zoned as Airport Development District (ADD) in their zoning ordinance. The town's ADD includes provisions for airport safety and the development of compatible uses adjacent to the airport and follows the regulations set forth in the county's Airport Development District (ADD) to ensure safety and prevent development that would be detrimental to the airport's airspace. Additionally, the county's Airport Safety Overlay District safeguards against locating obstructions in the airport's FAR Part 77 approach and transitional zones.

Future efforts to protect Twisp Municipal Airport from incompatible land uses, to prevent obstructions to FAR Part 77 airspace and to promote airport/community compatibility will require consideration of what is specifically meant by the term 'incompatible land uses.' As decisions are made in this regard careful attention should be paid to achieving a goal of continuing successful co-existence. For instance, allowing high-density residential development in close proximity to the airport is likely, over time, to result in complaints about airport noise. Conversely, allowing development that is supportive of the airport and that would not be unduly disturbed by airport operations such as restaurants, commercial and light-industrial uses would probably not result in future conflicts.

Because the Part 77 imaginary surfaces extend beyond Twisp's corporate limits, the town should enter into an agreement with Okanogan County to jointly enforce the county's Airport Safety Overlay district, or adopt its own overlay district to ensure that development on adjacent properties within corporate limits do not penetrate those surfaces or conflict with the airport.

Land Use

The town of Twisp is currently updating their comprehensive plan. Map II of the draft comprehensive plan identifies recommended land uses for future growth and development that could occur in the town's urban growth area surrounding the airport. Recommended land uses shown on Map II are in accordance with RCW 35.63.250 and RCW 36.70.547. However, some aspects of the map should be altered prior to the comprehensive plan's adoption. These actions, noted below, may also require that subsequent amendments to the town's zoning ordinance be considered.

Boundary review

Review and amend the location of the boundary between the airport and public-use designations. The town may wish to consider boundary line adjustments as the area identified as being for public use encroaches upon areas used for aircraft hangars on the airport. It is recommended that the south boundary of the airport access road in the vicinity of hangars SW 10 through SW 17 be used as an east/west line that separates the airport from the public-use area.

Public-use area regulations

Adopt regulations regarding the operations of recreational uses authorized in the public-use area to prevent disturbances to airport operations. It is recommended that further development of the ball field and/or other recreational sites not include overhead lighting.

Comprehensive plan policies

Ensure that supporting comprehensive plan policies discourage incompatible development in the vicinity of the airport. Map II of the comprehensive plan proposes commercial uses north of the airport, residential uses north of Highway 20, and what is noted as an "area of interest" to the south for future development of the area. Development in these areas may

positively impact the airport. As recommended in this plan, there is an opportunity to develop a welcome center and commercial uses on the north side of the airport. Other commercial uses in the area can benefit from the airport and as well as complement the services provided by the airport for both travel and recreation. However, as the town annexes properties in these areas and approves development consistent with designated land uses, it should also consider adding regulations to ensure that new developments adjacent to the airport are compatible with airport operations and that airport operations are not likely to have a negative impact on that development. Regulations should address building in the FAR Part 77 surfaces; lighting, glare, and signage as well as operations that produce emission of smoke, fly ash, dust, vapor, gases, or other forms of air pollution that may conflict with any present or planned operations of the airport.

Example policies under land use related goals could include:

- Encourage growth and development surrounding the airport that will be compatible with current airport operations and potential airport expansion.
- Encourage industrial uses that locate adjacent to the airport to be airport dependent, airport related, or airport compatible.
- Reserve areas that are adjacent to the airport's taxiway system for uses that are airport-dependent – that require taxiway access. Avoid using areas adjacent to taxiways for uses that do not require such access since these areas are limited.
- Continue to be aware of the need to maintain clearance of FAR Part 77 surfaces in all appropriate future zoning and land use documents.

Example policies under transportation related goals could include:

- Clearly identify Twisp Municipal Airport as an essential public facility.
- Recognize Twisp Municipal Airport as an integral part of a larger multi-modal transportation system.

Notification to property buyers

Initiate a process that informs purchasers of property within the urban growth area that their property is located adjacent to or within close proximity to Twisp Municipal Airport and that their property may be impacted by a variety of aviation activities. Note that such activities may include but are not limited to noise, vibration, chemical, odors, hours of operation, low overhead flights and other associated activities and that the Federal Aviation Administration (FAA) establishes standards and notification requirements for potential height hazards that may be caused by structures, building, trees and other objects affecting navigable air space through 14 CFR Federal Aviation Regulations (FAR) Parts 157 and 77. Any questions relating to structures, height hazards or obstructions should be directed to the Okanogan County Planning Department or the FAA. (See the WSDOT/AD disclosure notice and information related to Title 14 Code of Federal Regulations Parts 157 and 77 in the appendix to this plan.)

Required notice of construction

Federal Air Regulation Part 77.13 requires that notice be given to the FAA of any construction, including roads, that is (1) 200-feet or more above ground level or (2) that is within 10,000 feet of the nearest part of a runway that is 3,200 feet long or less and that breaks a slope of 50:1. Notice may be given by filling out a paper form or can be submitted online at <https://www.oaiaa.faa.gov/oaiaa/external/portal.jsp>. It is recommended that staff who address construction be made aware of this regulation and that it be followed.

Through-the-fence operations

Adopt a policy regarding what are commonly termed “through-the-fence operations.” Through-the-fence is defined as access to a public airport’s aircraft operating areas from private property adjacent to an airport. The Federal Aviation Administration and Washington State Aviation have general policies against such operations. However, neither the FAA nor WSDOT/AD can actually prevent them. There are several reasons for governmental concerns about through-the-fence activities. These include increased airport-sponsor liability, the possibility for unfair competition with airport-based businesses and absence of control of airport perimeters.

Some airports such as Desert Aire, near Mattawa in Grant County, and Goldendale Municipal in Klickitat County have successfully addressed through-the-fence operations by placing financial, insurance and contract requirements on those gaining access. Desert Aire, in fact, has levied reasonable fees to those who have access to the airport from private property to the extent that the airport is one of the more financially solvent community airports in Washington.

Some interest has been shown by members of the Twisp community in considering through-the-fence operations from property north of the airport and west of Aviation Lane. Airside recommends that if any person is allowed to conduct through-the-fence operations at Twisp Airport that the following issues be addressed:

- Appropriate compensation for the right of use.
- Control by the town of the access point for security and safety purposes.
- Assurance that there is no discrimination against based aircraft owners or on-airport businesses.
- Ensure that appropriate insurance and hold harmless agreements are provided.
- Ensure that the activities benefit the airport.

Chapter 5:

Financial

Chapter 4 contained information about airport improvements that are intended to meet forecast demand and increase safety, utility and efficiency at Twisp Municipal 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 airport income and expenses.

5.1 GENERAL FINANCIAL INFORMATION

Cost estimates

Project cost estimates are in 2007 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 town of Twisp will need to adjust the 2007-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. The following formulas were applied to estimates for other paved surfaces.

Base course and top course rock

Area to be paved times the depth of compacted rock @ .167 for 2-inch depth and .25 for 3-inch depth.

Class A/B asphalt (ACP)

A yield of 8.25 square yards per ton of asphalt is estimated for a 2-inch mat depth.

Organization

This capital improvement program (CIP) has been organized by scheduling specific projects in four, five-year time periods. Using this five-year system will provide the town of Twisp with planning and

funding flexibility. It will also allow for periods when grant funds requested by the town may not be available from WSDOT/AD. It is important to review and adjust this CIP on at least an annual basis.

Funding sources

This capital improvement program makes assumptions that some funding will be available from sources other than WSDOT/AD. 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 Twisp.

Planning ahead

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 when they are given plenty of advance notice about intentions to apply for funds. This helps granting agencies to do their own advance planning. Informing grant sources of plans three to four years in advance, and each year thereafter until funds are requested, is an effective strategy.

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 town of Twisp because of assumed third-party financing.

Rates and charges

It is very important at Twisp Municipal 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. It is often the case that 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 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 that airport sponsors 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. When establishing rates and charges, airport sponsors should consider the potential of volunteerism. Efforts by individuals who volunteer their time — local pilots for example — are very important to airports such as Twisp Municipal Airport. It is important, though, to strike a fiscally sound balance between recognizing — applying a value to — volunteer efforts and charging rates that help airports remain financially viable. It is particularly important for the town of Twisp to carefully consider the value of Twisp Airport 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

As stated, the Washington State Department of Transportation's Aviation Division (WSDOT/AD) is Twisp Municipal Airport's primary source

of grant funds for airside 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.

Grant applications for the next grant cycle following publication of this report will be accepted by WSDOT/AD until June 15 2007. Grants will be announced shortly after July 1, the beginning of Washington State's next biennium.

This report should be used to formulate a grant request for this upcoming grant period.

The runway safety grant program

WSDOT/AD has a grant program specifically designed to address runway safety 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 specified in Chapter 4 — would qualify for funding under this specific program. This is an excellent program that targets a high-priority safety issue.

CTED and EDA

Sources of grant funds for landside-related projects such as structures, roads and utilities are the Washington State Department of Community Trade and Development (CTED) and the United States 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) 725-4100

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

5.2 EXISTING REVENUE AND EXPENSES

Twisp Municipal Airport's primary source of revenue is leased land used for private aircraft hangars. Funds received during the years 2004–2006 are indicated in Table 18. Expenses are indicated in Table 19. Grants from WSDOT/AD are

Table 18: Revenue

Revenue source	2004	2005	2006	Three-year total	Three-year average
Ground leases	\$4,290	\$4,373	\$4,455	\$13,118	\$4,373
Miscellaneous receipts	\$3 (1)	\$100 (2)	\$0	\$103	\$34
Airport club contributions	\$0	\$0	\$1,955	\$1,955	\$652
Total	\$4,298	\$4,473	\$6,410	\$15,176	\$5,059

Source: Town of Twisp

(1) Unknown, (2) Vendor paid to pick flowers on airport.

not included in Table 18.

Revenue/expense summary

During the period 2004–2006, expenses exceeded revenue by an average of just over \$2,500 per year.

Table 19: Expenses

Expense category	2004	2005	2006	Three-year total	Three-year average
Administration and planning	\$1,811	\$1,987	\$1,944	\$5,742	\$1,914
Electricity	\$323	\$259	\$455	\$1,037	\$346
Insurance	\$3,230	\$3,230	\$3,393	\$9,853	\$3,284
Maintenance	\$277	\$526	\$399	\$1,202	\$401
Snow removal	\$1,530	\$1,610	\$1,895	\$5,035	\$1,678
Total	\$7,171	\$7,612	\$8,086	\$22,869	\$7,623

Source: Town of Twisp

5.3 RECOMMENDED PROJECTS

This section estimates costs of projects over the 20-year planning period that are included in Chapter 4. Table 20 provides details about how project costs have been calculated. Table 21 indicates planned sources of funds for the projects. Table 22 recaps expected capital expenditures by five-year phase.

Capital project cost information has been detailed where possible. Costs associated with some items, such as a future welcome center, have been generally estimated because such costs can only be determined once design work has been accomplished. Minor maintenance expenses are not specifically identified.

Table 20: 20-year capital improvement program details

Item	2007 – 2011 projects	Detail cost
A1	RSA, ROFA, FAR 77 enhancements Repaint Runway 10 and Runway 28 thresholds, paint runway ends as taxiways Adjust runway and threshold lighting Grade and compact RSA Update FAA 5010 record Sales tax Subtotal	\$3,000 \$2,500 \$3,000 \$0 \$655 \$9,155
A2	Runway incursion-reducing enhancements Repaint hold lines Install standard 2' x 4' signs (4) Sales tax Subtotal	\$1,000 \$2,800 \$290 \$4,090
A3	Runway 28 PAPI Relocate Runway 28 PAPI to coincide with new runway threshold	\$3,000
A4	Taxiway reflectors Install 36 reflectors (@ \$40 each) along existing Taxiway A Sales tax Subtotal	\$1,440 \$110 \$1,550
A5	Distance-remaining signs Reposition to coordinate with new runway length	\$500
A6	Airport fence Provide vehicle and personnel access gates at Aviation Lane entrance 1,000 feet of Elk fence to finish airport enclosure Sales tax Subtotal	\$5,000 \$20,000 \$1,925 \$26,925
A7	Paved surface planning and documents Accomplish engineering and survey work for relocation of Taxiway A, construction of Taxiway B and widening of runway (estimated at 12 percent of construction)	\$55,000
A8	North side development planning Plan welcome center, fuel system, vehicle access, vehicle parking, near-term and mid-term aircraft tie-downs, landscaping and utilities	\$42,000
A9	Construct Taxiway B (using existing mid-field connector) 9,300 SY Materials testing and management (estimated at 13 percent of construction) Cut and waste (1,000 cubic yards @ \$4.50) Base course rock (1,200 tons @ \$16.00) Top course rock (900 tons @ \$16.00) Asphalt, Class A/B (1,100 tons @ \$60.00) Sales tax on materials Subtotal	\$14,000 \$4,500 \$19,200 \$14,400 \$66,000 \$8,000 \$126,500
A10	Install fuel system	\$70,000
	Total 2007 - 2011	\$338,720
	2012 – 2016 projects	Detail cost
B1	Widen runway from 36 feet to 60 feet (overlay entire surface) 18,000 SY Materials testing and management (estimated at 13 percent of construction) Cut and waste (800 cubic yards @ \$4.50) Base course rock (1,100 tons @ \$16.00) Top course rock (800 tons @ \$16.00) Asphalt, Class A/B (2,100 tons @ \$60.00) Sales tax on materials Subtotal	\$22,000 \$3,600 \$17,600 \$12,800 \$126,000 \$12,320 \$194,320
B2	Relocate/reinstall lighting system with new wiring Sales tax on materials Subtotal	\$110,000 \$8,470 \$118,470

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

2012 – 2016 projects		Detail cost
B3	Relocate Taxiway A (using existing mid-field connector) 9,300 SY Materials testing and management (estimated at 13 percent of construction) Cut and waste (1,000 cubic yards @ \$4.50) Base course rock (1,200 tons @ \$16.00) Top course rock (900 tons @ \$16.00) Asphalt, Class A/B (1,100 tons @ \$60.00) Sales tax on materials Subtotal	\$14,000 \$4,500 \$19,200 \$14,400 \$66,000 \$8,000 \$126,500
B4	Develop terminal area Welcome center Paving Utilities Sales tax Subtotal	\$150,000 \$100,000 \$50,000 \$23,100 \$323,100
B5	Improve access roads Aviation Lane and Airport Access Road	\$150,000
B6	Install weather station (AWOS 1)	\$65,000
B7	Allow hangar construction	\$0
B8	Add Runway 10 PAPI	\$6,000
	Total 2012 - 2016	\$983,390
2017 – 2021 projects		Detail cost
C1	Paved surface maintenance (crack seal and seal coat)	\$20,000
C2	Sponsor commercial development – planning and coordination	\$20,000
C3	Improve north side vehicle access (east/west drive)	\$150,000
	Total 2017 - 2021	\$190,000
2022 – 2026 projects		Detail cost
D1	Conduct paved surface maintenance (crack seal and seal coat)	\$20,000
D2	Continue north side development	\$50,000
D3	All facility aesthetic improvements	\$50,000
	Total 2011 - 2026	120,000
	Total CIP 2007 - 2026	\$1,632,110

Table 21: 20-year capital improvement program recommended cost distribution

Item	Project	Total cost	WSDOT/AD	Town of Twisp	Private or other grant agency	Volunteer labor, materials and equipment
2007-2011						
A1	RSA, ROFA, FAR 77 enhancements	\$9,155	\$8,698	\$457	\$0	\$0
A2	Runway incursion-reducing enhancements	\$4,090	\$3,885	\$205	\$0	\$0
A3	Relocate PAPI	\$3,000	\$2,850	\$150	\$0	\$0
A4	Install taxiway reflectors	\$1,550	\$1,200	\$100	\$0	\$250
A5	Reposition distance-remaining signs	\$500	\$0	\$0	\$0	\$500
A6	Fence airport (Elk style) and install security gate(s)	\$26,925	\$25,578	\$1,347	\$0	\$0
A7	Documents for paved surfaces	\$55,000	\$52,250	\$2,750	\$0	\$0
A8	Plan north side development	\$42,000	\$21,000	\$21,000	\$0	\$0
A9	Construct Taxiway B	\$126,500	\$120,175	\$6,325	\$0	\$0
A10	Install fuel system	\$70,000	\$66,500	\$3,500	\$0	\$0
	Subtotal	\$338,720	\$302,136	\$35,834	\$0	\$750
2012-2016						
B1	Widen runway	\$194,320	\$184,604	\$9,716	\$0	\$0
B2	Relocate/reinstall lighting	\$118,470	\$112,546	\$5,924	\$0	\$0
B3	Relocate Taxiway A	\$126,500	\$120,175	\$6,325	\$0	\$0
B4	Develop terminal area	\$323,100	\$120,000	\$53,100	\$150,000	\$0
B5	Improve access roads	\$150,000	\$0	\$20,000	\$130,000	\$0
B6	Install weather station	\$65,000	\$61,750	\$3,250	\$0	\$0
B7	Allow hangar construction	\$0	\$0	\$0	\$0	\$0
B8	Add Runway 10 PAPI	\$6,000	\$5,700	\$300	\$0	\$0
	Subtotal	\$983,390	\$604,775	\$98,615	\$280,000	\$0

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

2017-2021						
C1	Paved surface maintenance	\$20,000	\$19,000	\$1,000	\$0	\$0
C2	Sponsor commercial development	\$20,000	\$0	\$5,000	\$15,000	\$0
C3	Improve north side vehicle access	\$150,000	\$0	\$20,000	\$130,000	\$0
	Subtotal	\$190,000	\$19,000	\$26,000	\$145,000	\$0
2022-2026						
D1	Conduct paved surface maintenance	\$20,000	\$19,000	\$1,000	\$0	\$0
D2	Continue north side development	\$50,000	\$10,000	\$10,000	\$30,000	\$0
D3	All facility aesthetic improvements	\$50,000	\$0	\$10,000	\$40,000	\$0
	Subtotal	\$120,000	\$29,000	\$21,000	\$70,000	\$0
	Totals	\$1,632,110	\$954,911	\$181,449	\$495,000	\$750

Notes to Table 21: Items that relate to paving, signage and lighting projects assume 95-percent participation from WSDOT/AD. Examples of these projects are A1 – A7, A9 and B1 – B3. Items that relate to access roads, on-airport roads, vehicle parking areas, general landscaping and utilities assume minimal or no participation from WSDOT/AD but do assume participation from CTED and other grant sources. Examples of these projects are A8 and B4. Item D2, north side development, assumes that some of these projects will be related to aircraft tie-downs and aircraft taxilanes that will be appropriate for WSDOT/AD participation.

Table 22: Capital improvement program expenditure by phase

Phase	CIP total cost	WSDOT/AD	Town of Twisp	Private or other grant agency	Volunteer labor, materials and equipment
2007 – 2011	\$338,720	\$302,136	\$35,834	\$0	\$750
2012 – 2016	\$983,390	\$604,775	\$98,615	\$280,000	\$0
2017 – 2021	\$190,000	\$19,000	\$26,000	\$145,000	\$0
2022 - 2026	\$120,000	\$29,000	\$21,000	\$70,000	\$0
Total	\$1,632,110	\$954,911	\$181,449	\$495,000	\$750