Sand Canyon Airport

Airport layout plan and narrative report

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Chapter 1: Introduction

This airport layout plan and narrative report (ALP) for Chewelah's Sand Canyon Airport is sponsored by the city of Chewelah. It examines existing conditions at Sand Canyon 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 Sand Canyon 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 Sand Canyon 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

Primary funding for this report has been provided by the Washington State Department of Transportation's Aviation Division (WSDOT/AD). It has been prepared by Airside with assistance from a volunteer steering committee seated by the city of Chewelah. 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: Sand Canyon Airport ALP Steering Committee

Member	Affiliation
Lee Dorrance	President, Sand Canyon Airport Committee
Steve Crisp	Vice-president, Sand Canyon Airport Committee
Mack Johnston	Sand Canyon Airport Committee
Roy McLaughlin	Sand Canyon Airport Committee
Carra Nupp	Councilmember
Curt Kelling	City administrator

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

Stevens County

Stevens County is in the northeast corner of Washington State. The county's 2,481 square miles of territory are bordered on the north by Canada and on the west by the Columbia River. To the east is Pend Oreille County and then the Idaho border. Southeast and southwest are Spokane and Lincoln counties respectively. Stevens County is predominantly rural. More than 90 percent of the county's 41, 200 inhabitants live in unincorporated areas. The county has six incorporated cities, Colville, the largest with 4,980 inhabitants, Chewelah, Kettle Falls, Marcus, Northport and Springdale. Spokane Tribal lands make up almost 238 square miles of the county. The topography of the county is primarily uplands, with the great majority of the land ranging in elevation from 1,600 feet to 3,000 feet.

City of Chewelah

Chewelah is located in the south central part of Stevens County. The city straddles U.S. Highway 395 approximately 45 miles north of Spokane. The town is situated in the Colville River Valley about one mile east of the Colville River. Chewelah, which has an elevation of 1,671 feet, is surrounded by farmland and forests. With a population of 2,315, Chewelah is the second-largest city in the county.

Climate

Stevens County has a continental climate, with a mean annual temperature between 46 and 48 degrees Fahrenheit. Average annual precipitation is about 15 to 20 inches.

2.2 SOCIOECONOMIC DATA

Population

Between 1990 and 2000, the population of Stevens County grew from 30,948 to 40,006, an increase of 29.46 percent which was the eighth highest county growth rate in the state. Between 2000 and 2005 the rate of growth slowed

Map 1: Chewelah regional location

considerably, with the population increasing to 41,200, an increase of 2.83 percent. The county currently ranks 22nd among the 39 counties in the state, and its population density of 17 people per square mile is decidedly at the low end compared to other counties, with only 12 of the state's counties having lower densities. State officials expect the total county population to reach 64,000 by 2025.

Economy

The economy of Stevens County is grounded primarily upon agriculture (including timber) and manufacturing. While there are signs that the county may be starting to take advantage of recreation and tourism to stimulate its economy, the county has struggled in recent years to maintain economic growth.

Between 1969 and 2005, the number of people employed in Stevens County increased from 6,475 to 15,985, with most of the job growth coming between 1985 and 1995. Since 2000, employment figures have generally held steady though the county experienced a modest 1.97 percent increase in 2004. Nevertheless, Stevens County's job growth rate in the current decade falls significantly short of state and national averages.

The county's 9.9 percent unemployment rate is nearly double the rate for the state.

2.3 LAND-USE AND PLANNING

Purpose

This section describes existing land use, comprehensive plans, and zoning on and in the vicinity of Sand Canyon 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.

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

Table 2: Industry sectors

North American Industry Classification System (NAICS) Sector	Establishments	Employees
Agriculture, Forestry, Fishing and Hunting	84	400
Mining	5	73
Utilities	*	*
Construction	133	485
Manufacturing	42	1,434
Wholesale Trade	19	165
Retail Trade	105	1,161
Transportation and Warehousing	47	247
Information	12	92
Finance and Insurance	23	164
Real Estate and Rental and Leasing	32	103
Services	37	113
Federal Government	9	414
State Government	16	402
Local Government	37	2,176
Not Elsewhere Classified	3	86

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 which groups establishments into industries based on their primary activity, both goods-producing and service-producing.

based on their population or rates of population growth. Twenty-nine counties and the cities in those counties currently plan under the GMA. These primary goals of GMA are best described by what the GMA calls its basic steps. These are:

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

Stevens County comprehensive plan and development regulations

Stevens County is required to plan according to GMA. The county's comprehensive plan was adopted on July 11, 2006. Draft development regulations were published for public comment in May of 2007. The development regulation comment period will end on June 25, 2007.

Comprehensive plan
Stevens County's comprehensive plan addresses airports or subjects that could be applied to airports in a general way in four policies of the transportation element. These policies are shown below.

- Policy TR-1
  Encourage the strengthening and growth of the local economy by facilitating the flow of people, products, goods and services through Stevens County.

- Policy TR-3
  Give high priority to preservation and maintenance of existing facilities to avoid costly replacements of those facilities.

- Policy TR-9
  Commercial and industrial businesses adjacent to airports (within Urban Growth Areas) that do not conflict with airport operations should be encouraged. Discourage structures that could intrude into protected airspace.

- Policy TR-10
  Discourage high density residential development within airport safety areas where significant noise impacts and safety hazards exist or are likely to exist in the future.

Map 2: Sand Canyon Airport

Development regulations
Section 3:06:030 of the draft county development regulations addresses siting criteria, permitted uses and setbacks at new airports developed within the county. These regulations do not apply to Sand Canyon Airport since it is an existing facility and is within the Chewelah Urban Growth Area.

City of Chewelah

Comprehensive plan
The city of Chewelah has held several meetings over the past six months as it begins its process of developing a comprehensive plan. The city has

not produced a draft comprehensive plan as of the date of this report.

Zoning
Two sections of the city of Chewelah Municipal Code address Sand Canyon Airport. These are section 18.08.135 titled Airport-golf course (APGC1), (APGC2), (APGC3) zones and section 18.08.170 titled airport overlay (AO) zone. A brief explanation of each zone section is provided below. Full texts of these sections are included in the appendix to this plan.

Airport-Golf Course Zone 1 (APGC1)

Purpose and Intent

> *The purpose of the APGC1 zone is to ensure compatibility between the land use and activities generated by Sand Canyon Airport and the existing single-family residential area adjacent to the airport. This zone will be governed by an additional set of regulations to be found in the airport overlay zone that specifically addresses airport safety considerations as they apply to adjacent land use. The APGC1 zone will accommodate single-family residences, hangars and other aviation oriented uses at the Sand Canyon Airport.*

Essentially, APGC1 lists lot size and setback requirements that are intended to provide compatibility between airport operations and adjacent residences.

Section 18.08.170 Airport overlay (AO) zone

Section 18.08.170 establishes an airport overlay (AO) zone. Most of its provisions are general in nature such as the prohibition of any land use that interferes with the safety of airport operations.

None of the provisions of the zoning requirements of the municipal code are retroactive however the regulations do require an owner of any existing nonconforming structure to take any steps deemed necessary by the Sand Canyon Airport manager to mark hazards as he or she deems necessary.

The regulations also provide for a perpetual navigational easement "providing for the right-of-way for the free and unobstructed passage and flight of aircraft prior to approval of any future plats, development permits, variances, and at such time property is purchased" within the zone.

There are no county or city documents that define Sand Canyon Airport as an essential public facility or as an important multi-modal facility.

2.4 AIRPORT SITE – GENERAL

Sand Canyon Airport is on a portion of a 428 acre site that is leased from the Washington State Department of Natural Resources. Airport property occupies 90 acres of that leased land. The lease was initiated in August 1980 and continues until August of 2035. A copy of the airport lease is in the appendix to this document.

The airport is 2.6 miles northwest of the center of the city of Chewelah. The airport is managed by the city of Chewelah with assistance of a volunteer airport board whose members are appointed by the city.

2.5 RECENT AIRPORT REVITALIZATION

In 2006, the city of Chewelah applied a sealing mixture, commonly called a sealcoat, to the runway at a cost of $1,600. This is the only major maintenance or capital project conducted within the previous three years.

Table 3: Recent capital projects

Year	Project	City portion	WSDOT/ AD portion	Total cost
2004				
2005				
2006	Runway sealcoat	$1,600	$0	$1,600

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. 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 aircraft to be considered the critical aircraft for an airport.

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

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 Sand Canyon Airport as having an ARC classification of A-I (small). This category includes aircraft with approach speeds of less than 91 nautical miles (knots) per hour, wingspans of less than 49 feet and weights under 12,500 pounds.

Though there are occasions when a twin-engine Beechcraft King Air and a Cessna Citation use the airport, a review of Sand Canyon Airport's operations conducted for this plan supports the A-I (small) categorization. Sand Canyon Airport primarily accommodates recreational flying. Activity levels at the airport are relatively low.

None of the models of based aircraft or itinerant aircraft uses the airport often enough to meet the FAA's requirement (500 annual operations) for an aircraft to be considered a critical or design aircraft.

An aircraft that clearly represents the A-1 (small) ARC category is the Cessna 182. The Cessna 182 has been in production for a number of years and has gone through several attribute changes. Its latest version has a wingspan of 36 feet, a maximum certified takeoff weight of 3,100 pounds and an approach speed of less than 91

knots. The Cessna 182 is designated in this plan as Sand Canyon Airport's critical aircraft.

Table 5: Airport data

Name	Sand Canyon Airport
Location number	1S9
FAA Designation	26150.*A
Owner	City of Chewelah
Acreage	90 (approximate)
Service level (on the NPIAS system)	General aviation (GA)
Reference code existing	A-I (Small)
Design aircraft	Cessna 182
Elevation	2,075 feet
Reference point (location) NAD83 NAVD88	Latitude: 48 deg. 18' 49.80" N Longitude: 117 deg. 44' 36.60" W
Mean maximum temperature	86 degrees (August)
Approach category	Visual
Navigation aids	Wind indicator/ rotating beacon
Approach guidance	PAPI – Runways 35 and 17
Wind coverage	n/a

National Plan of Integrated Airport Systems

Sand Canyon Airport is not listed on the Federal Aviation Administration's (FAA) 2005 – 2009 National Plan of Integrated Airport Systems (NPIAS) and is therefore ineligible to apply for federal grant funds from the FAA. The Washington State Department of Transportation's Aviation Division is Sand Canyon Airport's primary source of grant funds for projects involving aircraft operating areas.

Wind Coverage

Information regarding prevailing wind is not available from the National Oceanic and Atmospheric Administration (NOAA) for Sand Canyon 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 southwest. Strong north winds are experienced during storms. Since the runway is oriented almost directly north/south and prevailing winds are from the southwest, pilots using Runway 17 experience varying degrees of left side quartering cross winds.

2.7 EXISTING AIRSIDE FACILITIES

Paved surfaces

Runway and taxiway

Sand Canyon Airport has a single runway oriented on magnetic headings 170 and 350 degrees (Runway 17/35). It is 3,446 feet long and 48 feet wide. The runway is constructed of asphalt. Runway 17's threshold is displaced 230 feet. Its controlling obstruction is Sand Canyon Road which is located at an angle north of the runway end. Runway 35's threshold is displaced 101 feet. It has no controlling obstruction. There is no written record that provides insight about the reason the Runway 35 threshold is marked as displaced. It is assumed that the displacement has occurred to provide efficient access from the taxiway, which does not enter the runway at the runway end. A 30-foot-wide full-length taxiway, designated as Taxiway A in this plan, is located east of the runway. The distance between the centerline of the runway and the centerline of Taxiway A is 85 feet.

Aircraft apron

An aircraft parking apron approximately 100 feet by 600 feet in size is located east of the taxiway slightly north of mid-field.

Additional paved surfaces

On the west side of the runway an angled taxilane extends from the runway in a northwesterly direction immediately north of mid-field. A paved pull-out, often called a turn-around, is on the

runway's north end at the west side. Three paved taxiways, one north of the apron area and two south of the apron area connect the taxiway to the runway.

Several taxilanes extend from private residences to the runway on both sides of the airport. These taxilanes are privately-owned and maintained and, for purposes of this plan, are not considered part of the airport.

Pavement condition

In 2005 Washington State Aviation contracted with Applied Pavement Technology, Inc. (APT) to evaluate the condition of paved surfaces at most Washington airports including Sand Canyon. The APT report for Sand Canyon Airport was published in February of 2006.

Table 6 indicates the condition of paved surfaces at Sand Canyon Airport as reported by APT. 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 condition of paved surfaces is 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).

Table 6: Applied Pavement Technology Inc. pavement summary

Airport layout plan designation	Applied Pavement Technology Inc. designation	Total square feet	Surface material	Pavement condition PCI 2005
Runway (south section)	R17CH-01	6,075	AAC	95
Runway (center section)	R17CH-02	145,350	AAC	95
Runway (north section)	R17CH-03	11,610	AAC	92
Taxiway A	T01CH-01	109,380	AAC	60
Taxiway connector (south)	T05CH-01	1,710	AC	100
Taxiway connector (center)	T02CH-01	1,710	AAC	89
Taxiway connector (north)	T03CH-01	1,890	AAC	91
Taxiway angle	T04CH-01	2,878	AC	95
Apron (primary)	A01CH-01	60,000	AAC	71
Apron – pull-out (north)	A02CH-01	4,000	AC	33

Notes: APT divided the runway into three sections to distinguish portions of runway ends beyond displaced thresholds.
AC = Asphalt cement concrete
AAC = Asphalt overlay on AC
Source: Applied Pavement Technology Inc.

Pavement markings

Runway pavement markings include numerals at both ends of the runway, a white dashed centerline, fog lines, displaced threshold arrows and chevrons as well as threshold bars at both ends. Taxiway A is marked with a yellow centerline. Hold lines are located at the five locations where Taxiway A connects with the runway and on the angled taxiway as it approaches the runway on its west side.

Airport lighting and navigation aids

Runway lights

The runway is equipped with 30 medium-intensity runway edge lights (MIRLs) and 12 split red/green threshold lights. All runway edge and threshold lights are mounted on in-ground stakes.

Taxiway reflectors

There are no taxiway reflectors installed at Sand Canyon Airport

Precision Approach Path Indicator (PAPI)

Precision Approach Path Indicators (PAPIs) provide visual glide slope guidance for pilots approaching both ends of the runway. The Runway 17 PAPI system is located west of the runway and approximately 640 feet from the runway end. The Runway 35 PAPI system is also located west of the runway and approximately 580 feet from the runway end.

Photo 1: Runway 17 PAPI system

Wind indication

Sand Canyon Airport has one lighted wind indicator. It is centered in a segmented circle 96 feet west of the runway and 360 feet north of mid-field.

Airport rotating beacon

A rotating beacon is located 145 feet east of the south end of the runway.

Light activation

Runway edge and threshold lights are activated by a pilot-controlled system which is located at structure A.

Signage

Sand Canyon Airport has retroreflective hold-line signs at each end of the taxiway where it connects with the runway. There are no hold-line signs at any of the other locations where one can access the runway. There are no runway distance-remaining signs at Sand Canyon Airport.

2.8 EXISTING LANDSIDE FACILITIES

Structures

There are 9 existing structures located within the boundary of Sand Canyon Airport. All of the structures are on the east side of the runway. Table 7 lists the structures' size, use and ownership. A drawing that depicts existing features of the airport including locations of these structures is at the end of this chapter.

Aircraft fuel

Sand Canyon Airport does not have a fuel system.

Access road and vehicle parking

Sand Canyon Road provides primary access to Sand Canyon Airport from U. S. Highway 395 and the city of Chewelah. The east

Photo 2: Wind and pattern information

side of the airport is accessed from Sand Canyon Road by Holford Road. The west side is accessed from Sand Canyon Road by Richmond Lane. The airport's access roads are not controlled by gates.

Utilities

Power

Electrical power connects to the airport on the east side of the city-owned structure (Structure A).

Telephone

No land-line telephone service is provided at Sand Canyon Airport.

Table 7: Airport structures

Designation	Use	Size (in square feet)	Ownership
East side of runway			
A	Operations building	1,200	City of Chewelah
B	Private home	2,800	Private
C	Garage	400	Private
D	Aircraft Hangar	2,000	Private
E	Aircraft Hangar	3,000	Private
F	Aircraft Hangar	300	Private
G	Aircraft Hangar	300	Private
H	Aircraft Hangar	1,600	Private
I	Aircraft Hangar	900	Private

Water/Sewage

Structure A has a toilet and sink and an adjacent septic system. Water to serve two airport fire hydrants comes from a well on the golf course west of the airport. The fire hydrants are both located east of Taxiway A. There is not a well on Sand Canyon Airport.

Airport maintenance equipment

No major vehicles or large items of equipment are dedicated for use at the airport.

Airport maintenance

Sand Canyon Airport is primarily maintained by the city of Chewelah with assistance from local volunteers.

Fencing

There is no fencing at Sand Canyon Airport.

2.9 COMPARISON OF EXISTING CONDITIONS TO FAA STANDARDS

An important aspect of this planning program is comparison of FAA-recommended standards to existing conditions at Sand Canyon 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 the airport's existing conditions. Information about FAA standards was obtained from FAA Advisory Circular (AC) 150/5300-13.

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

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.

Table 8: Airport facility data

Airport feature		Information
Runway		
	Dimensions	3,446′ X 48′
	Gradient	.003 percent (9′ over 3,446′)
	Surface	Asphalt concrete
	Pavement strength	Unknown
	Markings	End numerals/center dashed lines/fog lines, displaced thresholds
	Lighting	Edge (30)/threshold (6 per end)
Taxiway		
	Dimensions	3,520 X 30′ (Taxiway A)
	Surface	Asphalt concrete
	Marking	Yellow centerline
	Lighting/reflectors	None
Aircraft parking apron		
	Dimensions	600′ X 100′ (primary apron, east side)
	Surface	Asphalt concrete
	Marking	None
	Lighting/reflectors	None
	Tie-downs	None
Fuel system		
	None	

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.

2.10 ASSESSMENT OF EXISTING CONDITIONS RELATIVE TO FAA DESIGN STANDARDS

Runway length

Sand Canyon Airport's runway is 3,446 feet long. Considering its elevation above mean sea level (2,075 feet) and the average mean/maximum temperature (86 degrees) the airport's runway would need to be 4,300 feet long to accommodate all aircraft in the A-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 48 feet, the width of the airport's runway is 12 feet less than the FAA standard.

Runway safety area

The FAA recommended runway safety area for A-1 (small) airports extends 60 feet on both sides of the runway centerline and 240 feet beyond each end of the runway. Sand Canyon's RSA is not in conformance with the FAA standard due to steep reductions in terrain elevation within a few feet of the Runway 35 end and due to the location of Sand Canyon Road which is close to the end of the Runway 17 end. The RSA standard length is 3,926 feet. The actual RSA length is 3,456 feet which is 470 feet less than standard.

The portion of the RSA that is to the sides of the runway conforms with the RSA standard within the area that is compliant longitudinally with the runway.

Runway object-free area

The recommended runway object free area (ROFA) standard is 125 feet from centerline on both sides of the runway. The ROFA also extends 240 feet beyond the runway ends. The object free area at Sand Canyon Airport is not consistent with FAA recommendations at the north (Runway 17 end) due to the existence of Sand Canyon Road. The recommended ROFA length is 3,926 feet. The actual ROFA length is 3,561 feet, 365 feet less than standard. ROFA non-conformance is exacerbated by the angle of Sand Canyon Road as it extends north of the airport. The ROFA width standard is not complied with due to the existence of

vegetation and trees on the west side of the runway south of the wind indicator. The actual ROFA width is approximately 215 feet, or 35 feet less than the standard.

Runway obstacle free zone

The FAA-recommended runway OFZ extends 200 beyond each end of the runway. Its width for a runway serving this airport is 250 feet. The FAA-recommended ROFZ is 3,846 feet; actual is 3,521 feet, 325 feet less than standard.

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

Taxiway A at 30 feet of width is five feet wider than the FAA taxiway width standard.

Taxiway safety area

The taxiway safety area is 49 feet wide, centered on the taxiway. Sufficient space exists around all taxiways to for them to be in compliance with this standard. However, two fire hydrants are located east of the taxiway within the TSA. Grading and compaction of the taxiway safety areas and relocation of these hydrants are necessary for compliance with the taxiway safety area standard.

Taxiway object-free area

The taxiway object-free area is 89 feet wide, centered on the taxiway. Taxiway A complies with this standard except for the aforementioned fire hydrants.

Taxiway shoulder

The FAA recommends that an area 10 feet on both sides of taxiways and taxilanes be compacted and graded. Sand Canyon Airport's taxiway system is in compliance with this standard.

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 85 feet. This is 65 feet less than the FAA standard.

Runway centerline to runway hold position marking

The FAA standard from runway centerline to runway hold lines is 125 feet. There are five hold-line locations on Taxiway A and one on the angled taxiway west of the runway. All runway hold lines are 60 feet from the runway centerline. All are therefore 65 feet less than the standard. The location of runway holding position markings cannot be altered unless changes occur to the conformation of paved surfaces that provides additional space between the runway and taxiways.

Runway centerline to aircraft parking

The FAA recommends at least 125 feet of separation between a runway centerline and an aircraft parking area. Aircraft parked within 60 feet of the east edge of the parking apron will be compliant with this standard. Aircraft parked west of that location will not be compliant with the standard.

Runway protection zone (RPZ)

The Runway 35 RPZ extends over a steep dropoff at the south end of the runway. It is compliant with the intent of the RPZ. The Runway 17 RPZ extends over Sand Canyon Road and over private property. While the city does not have control over the Runway 17 RPZ there are no activities within that RPZ that are inconsistent with the intent of the RPZ standard except for activities on Sand Canyon Road.

Table 9: Comparison of FAA design standards to existing conditions

FAA design standard	Design standard dimension relative to Sand Canyon Airport	Existing condition at Sand Canyon Airport
Runway length	4,350 feet to accommodate 100 percent of A-1 (small) fleet	3,446 904′ less than standard
Runway width	60′	48′ 12′ less than standard
Runway safety area length	3,926′	3,456′ 470′ 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	3,926′	3,561′ 368′ less than standard
Runway object free area width	250′	215′ Approximately 35′ less than standard West side, vegetation and trees south of wind indicator; road and vegetation north of wind indicator
Runway obstacle free zone	3,846′	3,521′ 325 feet less than standard
Runway shoulder	10′	10′ Meets standard
Taxiway width	30′	5′ Above standard
Taxiway safety area	49′	49′ Meets standard except for fire hydrants
Taxiway object-free area	89′	89′ Meets standard except for fire hydrants
Taxiway shoulder	10′	10′ Meets standard
Runway-to-taxiway separation	150′	Taxiway A – 85′ 65′ less than standard
Runway centerline-to-hold position marking	125′	60′ 65′ less than standard
Runway centerline-to-aircraft parking area	125′	Standard is met depending on area of apron being used. The easternmost 60 feet of the parking area meets the standard.
Runway protection zone	250′ X 1,000′ X 450′	Runway 17 RPZ extends over road and on to private property. Runway 35 RPZ extends over downward sloped hill

Note: Runway length standard computed using average mean/max. temperature of hottest month (86 degrees) and 2,075 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.
- Sand Canyon Airport Land Use Compatibility Study dated July 2005.
- Federal Aviation Administration (FAA) Form 5010.
- Applied Pavement Technology Inc. pavement report dated February 2005.

Chapter 3: Forecasts

3.1 INTRODUCTION

This chapter forecasts the numbers of based aircraft and annual aircraft operations at Sand Canyon 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 city of Chewelah plan the airport's future. Understanding future demand will help the city make better decisions about airport conformation and capital improvements.

Forecasts are also vital to the funding of those improvements. As stated, Washington State Aviation is Sand Canyon 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 businesses 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 city of Chewelah 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 Sand Canyon Airport maintain its appropriate place in the Aviation Division's priority list. Also, this information will be useful during the next update to this airport layout plan. Forecasting by professionals has become a highly refined art but it is still, 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 practice areas.

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 Stevens County over the planning period as well as projections made by federal and state agencies about economic development in the region served by Sand Canyon Airport. Forecast information produced by WSDOT/AD 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, stored in privately owned hangars within the airport's boundaries or stored on private property adjacent to the airport and that have direct access to the airport's taxiway.

3.4 EXISTING DATA

Existing data about based aircraft and annual flight operations are available from four sources:

- The FAA's *Airport Master Record*, also called FAA *Form 5010*, last updated in April 2003.
- The WSDOT/Aviation Division airport database, last updated in 2002.
- The draft of the *Airport Facilities & Services Summary* portion of the *2006 Long-Term Air Transportation Study* (LATS) sponsored by WSDOT/AD.
- Data provided by the airport layout plan steering committee.

Information from these sources is shown in tables 10, 11 and 12.

Table 10: FAA Form 5010

Fleet Mix Based aircraft 2003		Estimated Operations 2003	
Single-engine	16	GA local	6,500
Multi-engine	0	GA itinerant	4,500
Turboprop	0	Air carrier	0
Glider	0	Air taxi	0
Ultralight	0	Commuter	0
Rotorcraft	0	Military	0
Total	16	Total	11,000

Source: FAA Form 5010

Table 11: WSDOT/AD 2002 database

Fleet Mix			Estimated Annual Operations		
Based A/C	Existing 2002	Projected 2005		Existing 2002	Projected 2005
Single-engine	16	19	GA local	6,500	6,250
Multi-engine	0	1	GA itinerant	4,500	3,125
Turboprop	0	0	Air carrier	0	0
Glider	0	0	Air taxi	0	0
Ultralight	0	0	Commuter	0	0
Rotorcraft	0	0	Military	0	0
Total	16	20	Total	11,000	9,375

Source: WSDOT/AD

Determination of based aircraft baseline

Information from the FAA and WSDOT/AD about the numbers of based aircraft are nearly consistent with data supplied by this plan's steering committee. As of May 2007, the committee reports 18 operational aircraft are based at Sand Canyon Airport or are based on property adjacent to the airport and have direct access to the airport's runway. All but one of the aircraft are single engine. All but one are in the A-I (small) ARC category. A twin-engine Piper Navajo is a B-I (small) aircraft.

Table 12: WSDOT/AD LATS

Fleet Mix		Estimated Annual Operations	
Based A/C	**Base year 2005**	**Operations**	**Existing 2005**
Single-engine	16	GA local	3,516
Multi-engine	1	GA itinerant	2,434
Turboprop	0	Air carrier	0
Glider	0	Air taxi	0
Ultralight	0	Commuter	0
Rotorcraft	0	Military	0
Total	17	Total	5,950

Source: WSDOT/AD (LATS)

Determination of flight operations activity baseline

The WSDOT/LATS database estimates that there were a total of 5,950 annual operations in 2005. Of those operations, 3,516 were estimated to have been flown by locally based aircraft. The database projects 9,100 annual operations in 2030. Of those, 5,377 are identified as local operations.

The FAA does not provide estimates of flight activity levels at Sand Canyon Airport. However, the FAA publishes general guidelines that are intended to be used in airport planning. One of these guidelines is that one should assume 250 operations per year per based aircraft at rural airports. This multiplier, if applied to the 18 currently active aircraft at Sand Canyon Airport, would result in annual flight operations of 4,250. This number of operations is generally consistent with the 3,516 operations estimated by LATS.

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 Sand Canyon Airport's advisory committee queried owners of based aircraft. Local pilots estimate their annual operations to be 2,100.

Table 13: Based operational aircraft

Aircraft	ARC category	General use
Piper twin-Seneca	A-I (small)	Personal
Cessna 172	A-I (small)	Personal
Piper Pacer	A-I (small)	Personal
Cessna 180	A-I (small)	Personal
Champion	A-I (small)	Personal
Fairchild	A-I (small)	Personal
Aeronca Chief	A-I (small)	Personal
Heath biplane	A-I (small)	Personal
Navion	A-I (small)	Personal
Citabria	A-I (small)	Personal
RV 8	A-I (small)	Personal
Eagle	A-I (small)	Personal
Cessna 180	A-I (small)	Personal
Cessna Cardinal	A-I (small)	Personal
Piper Cherokee	A-I (small)	Personal
Hiperbipe	A-I (small)	Personal
Cessna 150	A-I (small)	Personal
Piper Navajo	B-I (small)	Personal
Total	**18**	

Source: Sand Canyon Airport ALP Steering Committee.

3.5 FORECASTS

WSDOT/AD

The Long Term Air Transportation Study forecasts based aircraft and flight operations levels through the year 2030. The LATS program will be developed over the next several years. Preliminary LATS forecasts have, however, been published. Forecasts for Sand Canyon Airport indicate that the number of based aircraft will grow from 17 to 23 and that the existing estimated 5,950 annual flight operations will increase by over 3,100 to 9,100. This amounts to a growth in both based aircraft and flight operations of just under ten percent over the LATS planning period (2005 – 2030) and almost eight percent over the period covered in this plan (2006 – 2025).

Table 14: WSDOT/AD LATS forecast

Fleet Mix			Estimated Annual Operations		
Based A/C	**Base year 2005**	**Projected 2030**	**Operations**	**Existing 2005**	**Projected 2030**
Single-engine	16	23	GA local	3,516	5,377
Multi-engine	1	3	GA itinerant	2,434	3,723
Turboprop	0	0	Air carrier	0	0
Glider	0	0	Air taxi	0	0
Ultralight	0	0	Commuter	0	0
Rotorcraft	0	0	Military	0	0
Total	17	26	Total	5,950	9,100

Source: WSDOT/AD (LATS)

Conclusions based on WSDOT/AD data

Projections by WSDOT/AD in both the published database and LATS indicate light to moderate growth in Sand Canyon Airport's based aircraft and flight operations through the year 2025.

Population and income projections

Population

Over the sixteen-year period from 1990 to 2006 Stevens County's population grew by almost 36 percent. During the 10-year period from 1990 to 2000 Stevens County was the eighth-fastest growing county in Washington.

Washington State analysts project that Stevens County's population will increase from its current estimated level of 42,100 to slightly over 58,000 in 2020 and to more than 64,000 in 2025. Over the planning period addressed in this document Stevens County is expected to add another 22,000 residents. Many of those are expected to live in or adjacent to the city of Chewelah.

Washington State divides population change into two general categories: 1) natural increases (the difference between births and deaths); and 2) net migration (the difference between those moving to and from the county). Net migration accounted for over 80 percent of the population change over the 16-year period.

Total personal income

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

In 2004 Washington State had a TPI of $217.503 billion, which ranked 15th in the United States. In 1994 Washington's TPI was $123.293 billion, which also ranked 15th in the United States. In Washington State the 1994-2004 average annual growth rate of TPI was 5.8 percent, while the average annual growth rate for the nation was 5.2 percent.

In 2004 Stevens County had a TPI of $880.410 million. This TPI ranked 25th in the state and accounted for 0.4 percent of the state total. In 1994 the TPI of Stevens County was $568.218 million and ranked 24th in the state. The 1994-2004 average annual growth rate of TPI was 4.5 percent, while the average annual growth rate for the state was 5.8

Per capita personal income

In 2005 Stevens County had a per capita personal income (PCPI) of $21,900. This PCPI ranked 35th in the state and was 62 percent of the state average, $35,479, and 64 percent of the national average, $34,471. The 2005 PCPI reflected an increase of 2.3 percent from 2004. The 2004-2005 state change was 1.5 percent and the national change was 4.2 percent. In 1995 the PCPI of Stevens was $15,604 and ranked 37th in the state. The 1995-2005 average annual growth rate of PCPI was 3.4 percent. The average annual growth rate for the state was 4.1 percent and for the nation was 4.1 percent.

Conclusions about population and income

Stevens County's population is expected to grow by almost 50 percent between 2005 and 2025. This is considerably higher than the 26.1 percent growth expected statewide. Income in Stevens County has traditionally been lower than the state average. It is logical to assume that as the county continues to develop it will close this gap and attain both per capita personal income and total personal income levels that are consistent with the state as a whole.

Table 15: Stevens County population

Year	Population
1990	30,948
2000	40,066
2005	42,105
2015	49,839 (projected)
2020	58,154 (projected)
2025	64,057 (projected)

Source: Washington State Office of Financial Management.

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:

- Alterations to FAA rules regarding pilots
- Airport improvements

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 and near airports such as Sand Canyon that have low activity levels, do not have control towers and that have an abundance of adjacent airspace that is not under direct FAA control.

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 generating demand. Capital improvements that cause Sand Canyon Airport to be increasingly attractive, efficient and functional may create additional interest in the facility. An example of an improvement that may create additional demand and as depicted further in this plan is the development of accommodations for aircraft adjacent to a new taxiway east of the runway.

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

Both of the factors described in this section are likely to increase usage at Sand Canyon Airport. There is no doubt that recently promulgated 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 Sand Canyon. Finally, the "build it and they will come" theory that is common to many aspects of our lives may play a role at Sand Canyon 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 aircraft census projections, state and federal population and income projections, Sand Canyon's location, potential 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

Airside estimates that based aircraft will increase by 12 between 2007 and the end of the planning period. All of the additional aircraft will be single-engine. Some of the additional aircraft will be in the light sport pilot category. This estimate of 12 additional aircraft is slightly more than the 9 additional aircraft forecast by the LATS program over the planning period.

Flight operations

Additional aircraft based at Sand Canyon Airport will operate an average of approximately 150 times per year. This is less than the national average, Itinerant operations, currently estimated at 2,434 per year are expected to increase to 3,600 per year by the end of the planning period. This is consistent with LATS estimates.

Tables 16 and 17 indicate growth in based aircraft and flight operations projected by this plan over the planning period.

Table 16: Forecast based aircraft 2007-2026

Based A/C by type	2007	2012	2017	2022	2026
SE	17	19	21	22	23
SESP	0	2	4	5	6
ME	1	1	1	1	1
Heli	0	0	0	0	0
Total	18	22	26	28	30

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
Itinerant	2,500	2,700	3,200	3,400	3,600
Based aircraft					
SE	3,400	3,700	3,900	4,050	4,200
SESP	0	300	600	750	900
ME	150	150	150	150	150
Heli	0	0	0	0	0
Total operations	6,050	6,850	7,850	8,350	8,850
Average annual increase in total operations		2.6 percent	2.9 percent	1.3 percent	1.2 percent

(1) Estimated current; SE=conventional single-engine aircraft; SESP=single-engine sport category aircraft; ME=multi-engine aircraft; Heli=helicopter.

Chapter 4:
Development alternatives and recommended projects

4.1 INTRODUCTION

This chapter discusses projects that will improve Sand Canyon Airport. Information contained herein 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 Sand Canyon 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-I (small) ARC group is identified as the design aircraft throughout the planning period. Additional kinds of aircraft that may use Sand Canyon Airport are light sport aircraft and variations of aircraft based on advancing aircraft technologies. Occasionally high-performance, multi-engine turboprop aircraft and a light jet aircraft use the airport. Visits by high-performance aircraft are, however, not routine.

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 Sand Canyon 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, runway and taxiway safety and object-free areas and runway-to-taxiway separation distance. 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

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 of the advisory circular 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, a runway length of 4,350 feet is required to accommodate 100 percent of the small airplane fleet at Sand Canyon Airport considering the mean temperature of the area's hottest month (86 degrees in August) and the mean sea level elevation of 2,075 feet. This means that the airport's runway is 900 feet shorter than is required accommodate 100 percent of the fleet and 350 shorter than is required to accommodate 95 percent of the fleet.

A steep cliff at the south end of the runway and major road at the north end of the runway are features that cannot be altered. It is a conclusion of this plan that increasing runway length to accommodate an increased percentage of the fleet is not possible.

Before concluding that Sand Canyon'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 Chewelah's Airport.

4.3 DEVELOPMENT ALTERNATIVES

Often airport layout plans similar to this one review a variety of development alternatives and then identify a preferred alternative that serves as the basis for a capital improvement program.

The size and layout of Sand Canyon Airport and constraints that exist on three sides of the property make identification of several development alternatives in this plan impossible. Sand Canyon Road crosses from southeast to northwest near the north end of the runway. Private properties extend from north to south along the west side of the airport and terrain drops off steeply at the south end of the airport. Land that the city leases from the Washington State Department of Natural Resources, east of the airport's parallel taxiway, is therefore the only property available for airport development.

Consequently, rather than reviewing a number of development alternatives, this section first considers the ramifications of a "do nothing" alternative and then recommends to the city of Chewelah logical steps that will improve the airport's compliance with FAA design standard recommendations, that will facilitate development intended to meet forecast demand and that will increase the value of the airport to the community of Chewelah and its environs.

ALTERNATIVE 1: Do nothing

Sand Canyon 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, worthy of 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 city of Chewelah's liability; and 2) would failing to address these features reduce the ability of the city to receive financial grants for capital projects from WSDOT/AD?

Though the airport has apparently operated without major incidents related to its layout, features such as the proximity of the taxiway to the runway and non-compliance with the FAA's recommended runway safety area and runway object-free area design standards increase the chance of aircraft mishap and increase the city's liability. The degree to which these factors 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 city of Chewelah since the city 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 city 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 plan 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, if the city were to decide not to address the primary design shortcomings described herein, WSDOT/AD may decide not to 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 capital improvements or land purchases.

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 though WSDOT/AD is working on a design standard policy, the division has not, as of the publication of this document, declared itself in this regard.

All this report can do, then, is to provide the author's best possible guidance about these issues based on currently available information. The guidance offered in this plan is that it is sound policy to do *all that is feasible* to comply with FAA design standards recommendations.

The "do nothing" alternative would also fail to address certain relevant issues that have nothing to do with FAA design standards. These include development of property east of the runway to serve aircraft that may be based at the airport in the future, planning areas for commercial and light industrial development and constructing facilities that would enhance Sand Canyon Airport's role as a portal to the community.

The "do nothing" alternative is, for the above reasons, not recommended.

ALTERNATIVE 2

This section details primary elements of a development program for Sand Canyon Airport that will both address FAA design standards and improve the airport's functionality and usefulness. Projects are given letter/number codes that generally indicate their relative priority. Again, flexibility is provided by organization of these projects into four, five-year time periods.

YEARS 2007 – 2011

ACTION A1: MAINTAIN PAVED SURFACES

Both the airport layout plan steering committee and airside agree that preserving Sand Canyon Airport's paved surfaces should be the city's highest airport-related priority. The runway has PCI (pavement condition index) values of 92 and 95 which indicate, according to Applied Pavement Technology Inc., that preventive maintenance such as crack sealing and seal coating is satisfactory to maintain its integrity.

The taxiway and its connectors as well as the aircraft parking apron have PCI values between 60 and 91. Reconstruction of some of these areas is justified but since this plan identifies relocation of Taxiway A and reconstruction of the aircraft parking apron during the second five-year planning period, crack sealing and seal coating are deemed adequate at this time.

It is important to apply a substantial seal coat to all surfaces during the summer or fall of 2007.

ACTION A2: CONSTRUCT TAXILANE TO HANGARS UNDER CONSTRUCTION

New hangars are being constructed on the northeast side of Sand Canyon Airport at locations east of hangars E and I as indicated on the existing conditions diagram in Chapter 2 and on drawings C1.1 and C1.2 of the drawing set.

A 325-foot long by 20-foot wide taxilane is necessary to serve both existing hangars and hangars under construction.

ACTION A3: CONFORM TO RSA AND ROFA DESIGN STANDARDS

Relevant standards

As explained in Chapter 2, Sand Canyon 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) at the north 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 Sand Canyon, RSAs extend 60 feet on either side of a runway's centerline. ROFAs extend 125 feet on either side of the runway's centerline. Both the RSA and ROFA extend 240 feet beyond the pavement ends.

Existing runway safety area (RSA)

At the Runway 35 end property that is consistent with, or could be made to be consistent with, the RSA standard extends approximately 40 feet south of the pavement. After that, terrain drops off in such a way that earthwork would be unable to provide a conforming RSA. Since the RSA standard extends 240 feet beyond the pavement end this means about 200 feet of non-conforming area exists beyond the Runway 35 end.

At the Runway 17 end, a conforming RSA does not exist beyond the end of pavement. In fact, the non-conforming portion of the RSA is about 12 feet before the pavement end. This is because of the proximity of Sand Canyon Road to the runway and the angle at which the 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 3,446 feet, the FAA standard RSA length is 3,926 feet (3,446 feet plus 240 feet at each end). The RSA is approximately 200 feet shorter than it should be at the Runway 35 end and 252 feet less than it should be at the Runway 17 end. The total of 452 feet means that the actual RSA length, based on existing runway markings, is 3,474 feet.

Existing runway object-free area (ROFA)

The ROFA at the Runway 35 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.

Because of the proximity of the runway to and Canyon Road and the angle at which the road converges with the north end of the runway, the actual ROFA available is 368 feet less than the FAA standard.

ROFA conclusion: The FAA standard ROFA length is 3,926 feet. The actual ROFA available, based on existing runway markings, is 3,558 feet, or 368 feet less than standard.

Discussion

Considering site conditions, the only way to fully comply with the FAA's runway safety area and runway object-free area design standards is to relocate the airport's thresholds. As was mentioned, when thresholds are displaced, as they are currently, the RSA and ROFA standards begin at pavement ends. When runway thresholds are *relocated* however the pavement behind (toward the short end) of runways is no longer considered part of the runway. Consequently, the RSA and ROFA standard dimensions begin at the relocated thresholds.

It is important to note that when runway thresholds are relocated, published runway lengths are altered accordingly. Runway pavement may remain as it is but reductions – in this case a sizable one – in runway length could materially impact decisions by pilots of higher-performance aircraft to use an airport. Technically, once thresholds are relocated they are no longer usable for landing or takeoff. Again, pavement may remain as it is but relocated threshold markings and reduced runway lengths in official

publications may make a difference to the utility of the airport.

At Sand Canyon, fully complying with the RSA and ROFA standards would result in a new published runway length of 2,902 feet. This 554-foot reduction has been discussed at length with the airport committee. Concerns have been expressed that some of the aircraft that are currently using the airport may, in fact, no longer do so. Further, taking such an action in the name of safety needs to be balanced with a subsequent reduction in runway length, which has its own safety implications.

Recommendation

After considerable review, this plan recommends full compliance with the RSA and ROFA standards. This decision was influenced by an interest in providing a clear 20:1 approach to the Runway 17 end. This distance necessary to provide an approach that is consistent with FAR Part 77 is almost the same as the distance necessary to conform to the ROFA standard.

1. *Relocate the Runway 35 threshold 176 feet from the end of pavement*. With minimal earthwork, this would bring the south end of the runway into compliance with the RSA standard. It is currently in compliance with the ROFA standard.

2. *Relocate the Runway 17 threshold 368 feet south of the end of the pavement*.

The resulting runway length would be 2,902 feet or 544 feet less than the current length. Such a length would still compare favorably with other airports in Washington that are considered viable.

3. Paint all areas of the runway and taxiway system to conform to recommendations contained in FAA Advisory Circular 150/5340-1J or its successor. Painted markings should include the relocated thresholds, runway numerals, fog lines, runway and taxiway centerlines, and hold lines.

4. Relocate the runway 35 and Runway 17 PAPI systems. The exact location of the relocated PAPI should be determined after consulting the PAPI manufacturer's siting criteria.

5. Relocate threshold lights.

6. Install runway hold-line signs at all locations where aircraft can enter the runway from the taxiway system. Signs need not be FAA-certified but their design and installation should be consistent with relevant FAA advisory circulars.

7. Update Federal Aviation Administration Form 5010 to reflect threshold alterations.

With these steps, the city of Chewelah will be able to show that it has made a strong effort to conform to design standards recommendations while carefully considering the negative ramifications of overly shortening Sand Canyon Airport's runway. Hopefully, these actions will contribute to continued favorable consideration by Washington State Aviation of future capital projects at Sand Canyon Airport.

ACTION A4: TAXIWAY REFLECTORS

Install approximately 60 taxiway reflectors throughout all taxiway and taxilane areas as well as around the aircraft parking apron.

ACTION A5: RUNWAY LIGHTS

Runway edge lights are currently installed on metal stakes. Wiring that serves runway lights mounted on stakes is exposed and tends to deteriorate over time. This can create electrical faults. Runway light in-ground base cans protect wiring and, if properly installed with their tops at grade, will reduce the chance of damage to aircraft if they are struck or taxied over. The lighting array should conform to recommendations contained in FAA advisory circular 150/5340-30B or its successor. This plan calls for the ultimate widening of the runway from 48 feet to 60 feet to comply with FAA

Alternative 2 drawing

recommendations. The new lighting system should be located to coincide with this future widening.

ACTION A6: SIGNS

Additional signage both on and off the airport can be used to welcome and assist visitors. On the airport it is recommended that the reverse sides of hold-line signs, which are usually left blank, have messages such as "Welcome to Chewelah" or "Welcome to Sand Canyon Airport" or some variation thereof. Signs directing visiting aircraft to the parking apron and to the visitor's lounge at would also be helpful.

ACTION A7: PLANNING AND ENGINEERING

Accomplish detailed planning and engineering for relocation of Taxiway A and widening of the runway to conform to FAA recommendations. Also plan the welcome center, access road, fuel system, vehicle parking area, aircraft aprons, utilities, landscaping and other east side features. This project will include all environmental documentation necessary to accomplish these projects in the 2012–2016 time period.

YEARS 2012–2016

ACTION B1: RELOCATE TAXIWAY A

The distance between the centerline of Taxiway A and the centerline of the runway is 85 feet. This is 65 feet less than the FAA design standard. Relocate and reconstruct Taxiway A to conform to the centerline-distance standard and the taxiway width standard of 25 feet.

During this reconstruction it will be necessary to relocate two fire hydrants that are located east of the existing taxiway. This plan does not specify the hydrants' future locations.

ACTION B2: WIDEN RUNWAY AND IMPROVE TURN-AROUND

Widen the runway to comply with the FAA design width standard of 60 feet. Re-mark the runway surfaces. Increase the size of the turn-around on the west side of the north end of the runway.

ACTION B3/B4 and B5: DEVELOP EAST SIDE TERMINAL AREA

Adequate space is available north to south on the east side of the relocated taxiway to develop a welcome center (small terminal), a fuel system, a future airport-compatible and/or airport-related commercial area, outside aircraft parking, additional hangars and an access road. It is recommended that this area be the subject of detailed engineering and planning.

The welcome center would be used as a visitor center where those flying to the Chewelah area can be accommodated in clean, comfortable and functional surroundings. This building would provide increased opportunities for the city of Chewelah and local business interests to display information about their individual and mutual economic development and tourism efforts. Those flying to Sand Canyon Airport would have a place to await ground transportation. Pilots would use this building for flight planning. This new structure would serve as the focal point for the airport.

It is recommended that the city generate development standards to ensure that future hangars have a consistent appearance and that the areas around hangars are lighted and landscaped.

Consideration of existing structures and activities will be necessary. Either the expanded east side of the airport is designed around existing uses or those existing uses are moved.

YEARS 2017 – 2026

Projects recommended for the 10-year period of 2017 through 2026 involve continued development of the east side of the airport and maintenance of paved surfaces.

Project phasing

Current state regulations do not allow WSDOT/AD to provide grants in excess of $250,000. It is not anticipated that any project recommended in this plan will exceed that amount. Should the city, however, decide to accomplish major construction projects that may exceed $250,000 in capital expenditure it should consider phasing the work in two segments and dividing the work over at least two grants.

4.4 DETAIL AND TIMING OF IMPROVEMENTS

This section lists the timing of recommended improvements.

PROJECTS 2007 - 2011

Action items A1 through A7 are important to the safety and efficiency of Sand Canyon Airport and are generally related to each other. It is recommended that these actions be accomplished in the 2007–2011 time period.

These actions include: 1) maintenance of paved surfaces; 2) construction of a taxilane to serve hangars currently being constructed; 3) increasing conformance with RSA and ROFA standards; 4) installation of reflectors; and 5) signs and engineering for future development.

Items B1 through B5, relocation of taxiway A, runway widening and east-side improvements as well as routine maintenance activities are scheduled for the 2012–2016 time period. Detailed engineering and planning for the east side of the airport including the relocation of Taxiway A should be accomplished between 2009 and 2011.

4.5 APPROACH SURFACE CONSIDERATIONS

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 indicates that the approach slopes for airports such as Sand Canyon may begin at landing thresholds rather than 200 feet from the thresholds.

Title 14 of the Code of Federal Regulations, Part 77, having to do with objects that affect airspace, indicates that roads of the type and use of Sand Canyon Road that exists north of Runway 17 are to be considered 15-foot obstructions. To maximize available runway length at Sand Canyon Airport this plan employs standards contained in Appendix 2, Table A2-1, Item 2, of the FAA's advisory circular. Applying this standard allows Sand Canyon's runway approach slopes to begin at the relocated thresholds. The resulting approach slope for Runway 35 is calculated to be 20:1 or more. The approach slope at centerline of Runway 17 is more than 20:1. The easternmost part of the approach slope to Runway 17, as it crosses Sand Canyon Road is calculated to be 15:1.

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 2 indicates that 18 aircraft are currently based at Sand Canyon Airport and that 30 aircraft are expected to be based at the airport at the end of the planning period. Given winter weather conditions in Stevens County it is assumed that all aircraft that are based at the airport on a full-time basis will be stored in hangars.

There is capacity at the airport currently to store all based aircraft. Hangar capacity for an

additional 12 aircraft is forecast to be necessary over the planning period. This storage capacity, two sets of six-bay nested T- hangars are, indicated on the airport layout plan (Drawing C1.1) and the building area plan (Drawing C1.2). These hangars or variations of them are planned for the east side of the relocated taxiway.

Drawings C1.1 and C1.2 also indicate a new aircraft parking apron that will be north of the planned hangars and adjacent to the new welcome center. Space for an additional 12 based and visiting aircraft will be available at this site.

Temporary aircraft parking will also be available on an apron adjacent to the planned fuel system west of the new welcome center.

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. For planning purposes, maximum structure heights are typically considered to be 15 feet.

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 Sand Canyon 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 considered.

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 Sand Canyon Airport are depicted on the airport layout plan and should be adhered to as new construction is accomplished.

A number of existing structures outside of the airport's boundary as well as the existing visitor's lounge penetrate the FAR Part 77 transitional surface. The degree to which structures penetrate the transitional surface is not known.

4.8 ZONING AND LAND USE

Forecasting usage and scheduling improvements at Sand Canyon Airport will ultimately prove to be fruitless exercises unless meaningful efforts are made 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. It is at such a time, when the need is not obvious, that it is most effective to address this subject.

Pressures resulting from incompatible uses at or near airports come in two forms: 1) those that restrict airspace necessary to maintain operational viability; and 2) those that place incompatible development too close to airports. Both types of incompatible uses can present risks to both the facility and its neighbors.

Stevens County is in the process of adopting development regulations for unincorporated land and will be drafting and seeking adoption of a county zoning ordinance in the future. Because there are no existing regulations in the county, there is an obvious opportunity to develop regulations that will protect the airport and ensure compatibility with its neighbors in the future. Additionally, the city of Chewelah is updating its comprehensive plan and will be able to create policies that proactively address land-use compatibility around the airport before urban growth and development pressures occur.

This section, therefore, recommends actions to be taken by the city of Chewelah that will help protect Sand Canyon Airport and that will help maintain the airport as a good neighbor. Recommendations are also made to Stevens County for land surrounding the airport that falls under its jurisdiction. Recommendations are grouped into the following three categories: 1) comprehensive planning; 2) future land use; and 3) zoning.

Recommended actions in this section as depicted in drawings C 1.6, titled "Zoning and Land Use," and C 1.7, titled "Exhibit A," are consistent with existing zoning and are meant to contribute to development of the city's in-process comprehensive plan.

Comprehensive Planning

Stevens County's comprehensive plan contains general policies regarding the existence of airports as essential public facilities in the county and the importance of land-use compatibility around airports. Of the two transportation policies that relate to airport safety, policy TR-10 should further define "airport safety areas," "significant noise impacts," and "safety hazards" to provide clear direction for implementation in future codes and regulations. This plan advises review of the definitions of airport-level geometric surfaces such as runway safety areas (RSA's) and runway object-free areas (ROFA's) that are contained in Chapter 2 as well as FAR Part 77 approach and transitional surfaces as depicted on the FAR Part 77 surface drawing and model zoning ordinance that are included in the appendix.

It is important that Sand Canyon Airport be recognized in Chewelah's comprehensive plan as an essential public facility for the community and a component of the city's overall transportation system. The plan should also contain land-use policies that ensure that the airport will remain open and operable in the future and that prevent encroachment by incompatible land uses.

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.
- Reserve areas that are adjacent to the airport's taxiway system for uses that are airport-dependent. 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 Sand Canyon Airport as an essential public facility.
- Recognize Sand Canyon Airport as an integral part of a larger multi-modal transportation system.

Future Land Use

Besides being a municipal island, other characteristics of Sand Canyon Airport include low-density residential development and a golf course. Unincorporated land around the airport is designated by Stevens County's comprehensive plan as rural and there are currently no city plans for future development around the airport and its adjacent neighborhood. There is some protection from incompatible uses to the west of the airport since several properties there have been designated by the county as forest land. Landowners whose property is so designated must meet certain open-space requirements.

Should the city annex property around the airport and approve 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 avoid placing structures in FAR Part 77 surfaces. They should also address lighting, glare and signage issues, as well as operations that produce emission of smoke, fly ash, dust, vapor, gases or other forms of air pollution.

Zoning

As mentioned, Stevens County will soon be seeking adoption of development regulations and will be initiating a process to draft a zoning ordinance. As both documents are created and adopted, the following recommendations should be considered:

Permitted uses: Upon assigning zoning to properties surrounding the airport, allow uses that are compatible with airport operations. Assigned zoning should also be consistent with the comprehensive plan's rural classification. Specify height restrictions and building densities that conform with FAR Part 77 surfaces.

Airport Safety Overlay District: Because FAR Part 77 imaginary surfaces extend beyond Chewelah's corporate limits, the county should jointly enforce the city's airport overlay zone or adopt its own overlay district to ensure that development on properties adjacent to corporate limits does not penetrate those surfaces or conflict with the airport. An overlay district will also provide additional protection to regulate permitted uses in the underlying district.

Notification requirements: Initiate a process for the county to inform purchasers of property around the airport that their property is located adjacent to or within close proximity to Sand Canyon Airport and that their property may be impacted by a variety of aviation activities.

This process can be codified in the zoning ordinance. Note that such activities may include but are not limited to noise, vibration, chemicals, 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 Stevens 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 it can be submitted online at https://www.oeaaa.faa.gov/oeaaa/external/portal.jsp. It is recommended that staff members who address construction advise applicants of their responsibilities.

Existing zoning regulations as promulgated by the city of Chewelah appear to be adequate to protect the airport from incompatible land use as long as appropriate oversight is applied to future development. Like the county, the city should adhere to notice requirements for new construction to property owners and the FAA.

Future efforts to protect Sand Canyon Airport from incompatible land uses, to prevent obstructions to FAR Part 77 surfaces 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 would be likely, over time, to result in complaints about airport noise. Conversely, allowing development that is supportive of the airport and existing residential and recreational uses, 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.

Due to the residential component of the airport, the city should adopt a code or policy regarding what is 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 FAA 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 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.

Airside recommends that the following issues regarding through-the-fence operations be addressed:

- Appropriate compensation for the right of use.
- Control by the city 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.

Lastly, as future development occurs around the airport, additional access will be required. As developments are reviewed, the placement of roads in proximity to the airport should be carefully considered. Topography at Sand Canyon Airport is such that future roads will probably only be on the east side of the airport. This area underlies the FAR Part 77 Transitional Surface which rises at a 7:1 slope, perpendicular to the

runway and begins at a location 125 feet from the runway centerline.

Both Airside and the Washington State Department of Transportation's Aviation Division staffs are very willing to assist the city of Chewelah as it promulgates its comprehensive plan and Stevens County as its development regulations are finalized. Airside may be reached at (360) 222-3646. The Aviation Division may be reached at (360) 651-6300 and has placed helpful information on its Web site at www.wsdot.wa.gov/aviation/planning.

Recommendations related to east-side development

Drawing C1.1, the airport layout plan, and C1.2 the building area plan, indicate examples of how both nested T-hangars and individual hangars might be arranged east of a future, relocated taxiway. These depictions are for general information and are not to be considered specific recommendations by Airside. The depictions make efficient use of property but may not represent the most aesthetically pleasing layout. It is recommended that the city develop a hangar-area plan that provides for retaining many of the trees in this area and possibly incorporates hangars within the trees. Also, a tree buffer between new hangars and the future taxiway would help maintain the beauty of this special 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 Sand Canyon Airport. This chapter identifies the cost of those improvements and establishes a plan for paying for them.

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 city of Chewelah 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 city of Chewelah with planning and funding flexibility. It will also allow for periods when grant funds requested by the city 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 Sand Canyon.

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 city of Chewelah because of assumed third-party financing.

Rates and charges

It is very important at Sand Canyon 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 Sand Canyon 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 city of Chewelah to carefully consider the value of Sand Canyon 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 Sand Canyon 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 RECOMMENDED PROJECTS

This section estimates costs of projects over the 20-year planning period that are included in Chapter 4. Table 18 provides details about how project costs have been calculated. Table 19 indicates planned sources of funds for the projects. Table 20 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 18: 20-year capital improvement program details

Item	2007 – 2011 projects	Detail cost
	2007-2011 projects	
A1	Pavement maintenance (39,000 SY)	
	Crack seal and apply substantial sealcoat with wearing course to all paved surfaces	$39,000
	Sales tax	$2,964
	Subtotal	$41,964
A2	Construct taxilane for access to existing and in-process hangars (725 SY)	
	Mobilization	$2,000
	Site grading	$4,000
	Drainage culverts	$0
	Electrical conduit for future use	$0
	Crushed surfacing base and top course (2" each)	$5,000
	Hot mix asphalt concrete paving (2")	$7,000
	Pavement markings	$500
	Incidental construction items and contingency	$2,000
	Subtotal	$20,500
	Sales tax at 7.6 percent	$1,558
	Total construction estimate	$22,058
	Design engineering	$4,000
	Construction engineering, inspection, materials testing	$3,000
	Environmental documentation	$0
	Total	$29,058
A3	RSA, ROFA, FAR Part 77 enhancements	
	Repaint Runway 17 and Runway 35 thresholds and numerals, paint areas behind thresholds, paint taxiways and hold lines.	$10,000
	Adjust threshold lighting. Relocate PAPI systems.	$3,000
	Install hold line signs	$3,750
	Grade and compact RSA	$1,000
	Update FAA 5010 record	$0
	Sales tax	$1,350
	Subtotal	$19,100

Table 18: 20-year capital improvement program details (continued)

Item	2007-2026 projects	Detail cost
A4	Taxiway reflectors 60 reflectors (@ $50 each) along existing Taxiway A Labor Sales tax Subtotal	 $3,500 $1,000 $342 $4,842
A5	Signs	$3,000
A6	Planning and engineering Relocation of Taxiway A, widening of runway, welcome center, access road, fuel system, vehicle parking area, aircraft aprons, utilities, landscaping and other east side features. Includes environmental documentation	 $80,000
	Total 2007 - 2011	**$177,964**
	2012 – 2016 projects	
B1	Relocate Taxiway A (11,000 SY) Mobilization Site grading Drainage culverts Electrical conduit for future use Crushed surfacing base and top course (2" each) Hot mix asphalt concrete paving (2") Pavement markings Incidental construction items and contingency Subtotal Sales tax at 7.6 percent Total construction estimate Design engineering Construction engineering, inspection, materials testing Environmental documentation Relocate Runway 17 PAPI system to east side of runway Total	 $8,000 $40,000 $8,000 $1,000 $42,000 $77,000 $1,000 $15,000 $192,000 $14,592 $206,592 See A5 $30,000 $5,000 $3,000 $244,592
B2	Widen runway from 48 feet to 60 feet, overlay with 2" asphalt and improve turn-around (24,000 SY) Mobilization Site grading Drainage culverts Electrical conduit Crushed surfacing base and top course (2" each) Hot mix asphalt concrete paving (2") Pavement markings Incidental construction items and contingency Subtotal Sales tax at 7.6 percent Total construction estimate Design engineering Construction engineering, inspection, materials testing Environmental documentation Total	 $8,000 $5,000 $8,000 $1,000 $16,800 $168,000 $7,500 $15,000 $229,300 $17,426 $246,726 See A5 $15,000 See A5 $261,726
B3	Develop east side terminal area Welcome center Paving Utilities Sales tax Subtotal	 $150,000 $100,000 $50,000 $23,100 $323,100
B4	Install fuel system	$70,000

Table 18: 20-year capital improvement program details (continued)

Item	2007-2026 projects	Detail cost
B5	Improve access roads, create round-about	$150,000
	Total 2012 – 2016 projects	$1,049,418
	2017 – 2021 projects	
C1	Continue development of east side of airport (est.)	$200,000
C2	Pavement maintenance	$40,000
	Total 2017 – 2021 projects	$240,000
	2022 – 2026 projects	
D1	Pavement maintenance	$40,000
D2	Continue east side development	$50,000
	Total 2011 - 2026	**$90,000**
	Total CIP 2007 - 2026	**$1,557,382**

Table 19: 20-year capital improvement program recommended cost distribution

Item	Project	Total cost	WSDOT/AD	City of Chewelah	Private or other grant agency	Volunteer labor, materials and equipment
	2007-2011					
A1	Pavement maintenance	$41,964	$39,865	$2,099	$0	$0
A2	Taxilane	$29,058	$27,605	$1,453	$0	$0
A3	RSA, ROFA enhancements	$19,100	$18,145	$955	$0	$0
A4	Taxiway reflectors	$4,842	$4,610	$0	$0	$232
A5	Way-finding signs	$3,000	$0	$2,500	$0	$500
A6	Planning and engineering	$80,000	$76,000	$4,000	$0	$0
	Subtotal	$177,964	$166,225	$11,007	$0	$732
	2012 – 2016					
B1	Relocate Taxiway A	$244,592	$232,490	$12,102	$0	$0
B2	Widen runway	$261,726	$248,639	$13,087	$0	$0
B3	East side terminal area	323,100	$160,000	$40,000	$123,100	$0
B4	Fuel system	$70,000	$66,500	$3,500	$0	$0

Table 19: 20-year capital improvement program recommended cost distribution (continued)

Item	Project	Total cost	WSDOT/AD	City of Chewela	Private or other grant agency	Volunteer labor, materials and equipment
B5	Access roads	$150,000	$0	$50,000	$100,000	
	Subtotal	$1,049,418	$707,629	$118,689	$223,100	$0
	2017-2021					
C1	East side development	$200,000	$80,000	$40,000	$80,000	$0
C2	Pavement maintenance	$40,000	$38,000	$2,000	$0	$0
	Subtotal	$240,000	$118,000	$42,000	$80,000	$0
	2022-2026					
D1	Pavement maintenance	$40,000	$38,000	$2,000	$0	$0
D2	Continue east side development	$50,000	$25,000	$10,000	$15,000	$0
	Subtotal	$90,000	$63,000	$12,000	$15,000	$
	Totals	**$1,557,382**	**$1,054,854**	**$183,696**	**$318,100**	**$732**

Note: Items that relate to paving, signage and lighting projects assume 95-percent participation from WSDOT/AD. 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. Amounts having to do with east side development, assume that some of these projects will be related to aircraft tie-downs and aircraft taxilanes that will be appropriate for WSDOT/AD participation.

Table 20: Capital improvement program expenditure by phase

Phase	CIP total cost	WSDOT/AD	City of Chewelah	Private or other grant agency	Volunteer labor, materials and equipment
2007 – 2011	$177,964	$166,225	$11,007	$0	$732
2012 – 2016	$1,049,418	$707,629	$118,689	$223,100	$0
2017 – 2021	$240,000	$118,000	$42,000	$80,000	$0
2022 - 2026	$90,000	$63,000	$12,000	$15,000	$0
Total	**$1,557,382**	**$1,054,854**	**$183,696**	**$318,100**	**$732**