

# **MOSES LAKE MUNICIPAL AIRPORT**

## **AIRPORT LAYOUT PLAN AND NARRATIVE REPORT**

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# Chapter 1: Introduction

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This airport layout plan and narrative report (ALP) for Moses Lake Municipal Airport is sponsored by the city of Moses Lake. It examines existing conditions at the airport, forecasts future aviation activity over a 20-year time span, recommends improvements 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 Moses Lake Municipal Airport.
- The extent to which the airport conforms to Federal Aviation Administration (FAA) design recommendations and, where such recommendations are not met, whether they can be met considering site constraints.
- Projected facility development and whether that development can be accomplished in conformance with FAA design recommendations.
- Enhancements at Moses Lake Municipal Airport that will increase the airport’s value to the community and the surrounding area.

In preparing this ALP, Airside has reviewed the following:

- Washington State Department of Transportation/Aviation Division airport database.
- Washington State Long-Term Air Transportation Study (LATS).
- FAA Form 5010.

- Applied Pavement Technology Inc. pavement report dated February 2006.
- Numerous documents and drawings provided by the city of Moses Lake.

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. 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: ALP Steering Committee**

Member	Affiliation
Anne Henning	Senior planner, City of Moses Lake
Delone Krueger	Airport commission member
Fred Miese	Owner – Moses Lake/Warden Air Service
Jerry Richardson	Airport commission member
Jon Lane	City council member
Richard Pearce	Deputy mayor, city council member
Tom Dent	Airport commission member
Darel Fuller	Airport commission member

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.

# Chapter 2: Inventory and current activity

## 2.1 GENERAL

### Grant County

Grant County is in central Washington. The county consists of 2,675 square miles of land. It is the fourth-largest county in Washington. The county is bordered on the west by Douglas and Kittitas counties, on the southwest by Yakima County, on the south by Benton and Franklin counties, on the east by Adams and Lincoln counties and on the north by Okanogan County. Grant County is generally rural. Approximately 65 percent of the county is productive farmland. County topography ranges in elevation from 380 feet above sea level along the Columbia River to 2,882 feet above sea level at the crest of a hill near Quincy in the west part of the county.

### Moses Lake

The city of Moses Lake, Grant County's largest city, is adjacent to Interstate Highway 90 in east central Grant County. It is 20 miles southeast of Ephrata, the county seat.

### Climate

The climate in the Moses Lake area is the same as in most of Grant County. It is in Washington's Central Basin climatological region, which is semi-arid. Winters are cold. Summers are hot. The average annual temperature is 52 degrees Fahrenheit. The mean maximum temperature is 90 degrees Fahrenheit. Average annual rainfall in Grant County is 8.42 inches.

## 2.2 SOCIOECONOMIC DATA

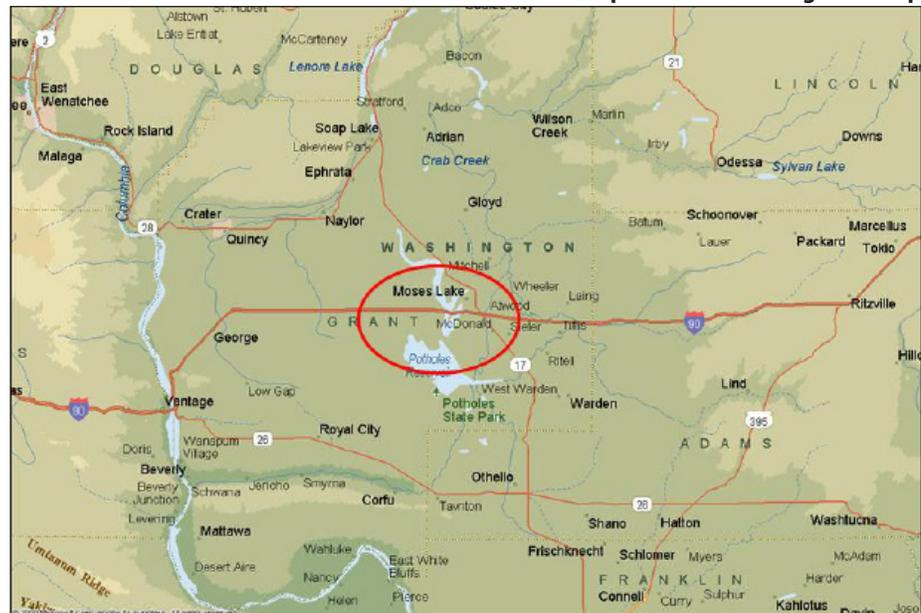
### Population

In 1910, one year after becoming a county, Grant County's population was 8,698. Over the next 20 years the population was at times as low as 5,666. From 1930 to 1962 the county experienced rapid growth to over 54,000. During the 1960s, Washington State followed a nationwide rural-to-urban migration pattern. Population growth in Grant County slowed during this period. Population growth was erratic during the 1970s and 1980s. During the 1990s, county population increased considerably. Population in 2000 was 74,698. In 2009 it grew to an estimated 86,100.

### Economy

Between 1990 and 2009, total employment in Grant County grew by 45 percent. Agriculture, including production, distribution and processing, is and has been for many years the anchor of Grant County's economy, employing

Map 1: Moses Lake regional map



about 6,000 people. The only sector employing a larger number of people is government (7,462).

## 2.3 LAND USE AND ZONING

### Purpose

This section describes existing comprehensive plans, land-use characteristics and zoning designations relevant to Moses Lake Municipal Airport. Table 2 provides an overview of city and county documents that contain policies that are relevant to airport protection and airport/community compatibility. Relevant policies include: 1) identification of the airport as an essential public facility; 2) showing it as part of a multi-modal transportation system; 3) indicating that incompatible development should be discouraged; and 4) protection of FAR Part 77 airspace surfaces. Findings related to these elements are identified in this section. Recommendations related to land use and zoning are contained in Chapter 4. Drawings C1.6 and C1.7 of the airport layout plan drawing set provide graphic depictions of existing conditions and recommendations.

### Comprehensive planning

#### *Washington Growth Management Act*

Chapter 36.70A of the Revised Code of Washington, titled "Growth Management – Planning by Selected Counties and Cities" (GMA),

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

- Identification and protection of critical areas and resource lands.

**Table 2: City and county documents**

<b>Policies considered relevant to airport protection</b>	<b>Grant County Comprehensive Plan</b>	<b>City of Moses Lake Comprehensive Plan</b>	<b>City of Moses Lake Zoning Ordinance</b>
Identification of airport as an essential public facility	Yes	No	No
Identification of airport as part of a multi-modal transportation system	Yes	Yes	No
Language that discourages incompatible development	Yes	No	Yes
Language that prohibits penetration of FAR Part 77 surfaces	No	No	Yes

- Designation of countywide planning policies and urban growth areas.
- Preparation and adoption of comprehensive plans.
- Adoption of development regulations to carry out comprehensive plans.

- Evaluation and updating of comprehensive plans and development regulations.

### **Grant County comprehensive plan**

While Moses Lake Municipal Airport is not under Grant County’s jurisdiction, major transportation improvements and other development projects within the county, especially those nearby the airport, often require intergovernmental coordination due to their impacts on local transportation systems. Grant County’s comprehensive plan, adopted in 1999, includes a chapter devoted to essential public facilities, including airports. In the plan’s transportation element, Moses Lake Municipal Airport is identified in the county’s airport facilities inventory. The following airport-related transportation policies are found in the policy element of the comprehensive plan.

Policy T-2.3: The county shall establish regulations that ensure the compatibility between land use activities and transportation facilities and services.

Policy T-6.4: Grant County supports the expansion and maintenance of air, rail and surface freight handling facilities as required to attract and accommodate economic growth. The county supports a countywide transportation network, which integrates all modes of transportation into an efficient system.

### **City of Moses Lake comprehensive plan**

Moses Lake adopted its comprehensive plan in 2001. The city adopted many of Grant County’s countywide planning policies in addition to their own sets of goals and policies to ensure consistent planning within city limits and unincorporated urban growth areas. The plan contains an essential public facilities element that outlines a process for siting such facilities.

**Table 3: Industry sectors**

<b>NAICS Sector</b>	<b>Estab.</b>	<b>Employees</b>
Agriculture, forestry, fishing and hunting	593	6,460
Mining	3	82
Construction	256	1,213
Manufacturing	78	3,814
Wholesale trade	94	1,188
Retail trade	237	2,963
Transportation and warehousing	98	958
Information	19	210
Finance and insurance	63	467
Real estate and rental and leasing	83	266
Services	1,346	6,098
Total government	107	7,462

*\* Data suppressed for confidentiality according to the Washington State office responsible for this information. Source: Covered Employment & Wage Data, First Quarter 2009, Washington State Employment Security Department.*

Moses Lake Municipal Airport is described within the plan’s land-use and transportation elements. None of the plan’s policies address the airport and surrounding land-use compatibility.

### **Existing land-use characteristics**

Moses Lake Municipal Airport consists of several parcels totalling 54.56 acres. A single parcel of almost 30 acres contains the runway and taxiway system. Eighteen parcels totalling 10.4 acres are on the east side of the airport along Municipal Airport Road NE. Twenty-two parcels are on the west side along Municipal Hangar Road. These parcels, owned by the city, have structures owned by private and public entities that provide for uses that are accessory to airport operations. The airport also shares its eastern and northern boundaries with Moses Lake’s corporate limits. East of the airport, unincorporated land is used for agricultural purposes. To the north is a residential subdivision. The city’s operations

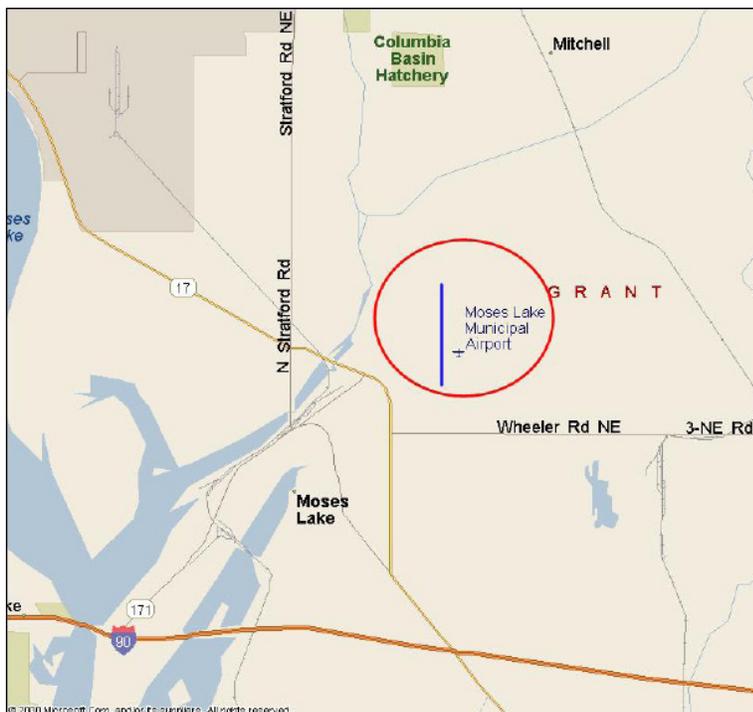
complex sits on a 95-acre parcel directly west of the airport. The remainder of the parcel is designated for open space and public use. It is used for agriculture. The Moses Lake Industrial Park is located south of the airport.

## Zoning characteristics

### Grant County

Unincorporated land north of the airport is zoned by Grant County as rural residential 3. Unincorporated land to the east is zoned agricultural. Below are brief descriptions of each zoning district.

**Map 2: Moses Lake Municipal Airport location**



- **Rural residential 3:** This zoning district intends to preserve the residential character and rural aspects of rural residential areas. Areas include small-scale farms, dispersed single-family homes on large parcels with some single- and multi-family homes on smaller parcels. The height restriction in this district is 35 feet for structures.

- **Agricultural:** Grant County's agricultural zoning district provides land for farming activities. It is intended to conserve agricultural land and supporting activities and operations. No height limitation exists for structures built in this district, unless located within a specified overlay zone. No overlay zones are in place at this time.

### Moses Lake

Moses Lake Municipal Airport is zoned "airport" under the city's zoning ordinance, Title 18 of the Municipal Code. Land west of the airport is zoned "public." Land south of the airport is zoned "Moses Lake Industrial Park." Following are descriptions of each district:

- **Municipal airport zone:** Moses Lake established this district to ensure that all uses on the property are compatible with airport operations. The district allows uses directly related to and required for airport operations. It also prohibits permanent residential uses and contains development standards related to noise, lighting and parking. The district also specifies height restrictions consistent with FAR Part 77 and the Federal Aviation Administration's Advisory Circular 150/5300-13, "Airport Design."

- **Public zone:** This district allows for a variety of public uses, including parks, offices, community

facilities and schools. The district has no minimum lot size but limits the height of structures to 40 feet.

- **Moses Lake Industrial Park zone:** This district specifically regulates the business park located south of the airport. It allows small-scale, light-industrial facilities and uses such as contractor shops, vehicle

repair, storage and distribution. Performance standards are in place to control air quality, odors, heat and humidity, glare, vibrations, hazardous materials, industrial waste, electromagnetic interference and noise. The maximum building height is 50 feet. The planning commission may allow structures taller than 50 feet if it can be shown in a public hearing that safety is not compromised.

### **Future land-use designations**

To accommodate and prepare for future growth and the extension of urban services, the city's comprehensive plan and its future land-use map identify urban growth areas (UGAs) and define future land-use designations for those areas. Land directly north and east of the airport are not in an urban growth area and, according to Grant County's comprehensive plan, they are planned to continue their existing uses into the planning horizon. Southeast of the airport, Moses Lake's future land-use map designates most of the incorporated land and land within an urban growth area for industrial uses.

### **Land-use and planning-related findings**

Existing land-use conditions around the airport do not appear to pose conflicts to airport operations. Broad policies and regulations related to airport operations are in place at both the county level and the city level. The city's zoning ordinance addresses development standards and compatible uses on airport property. Following are primary findings of this section:

- Grant County's comprehensive plan acknowledges airports as essential public facilities. It contains policies intended to protect airport operations by, in part, preventing land-use conflicts near airports.

- Moses Lake's comprehensive plan does not contain policies that address land-use compatibility around the airport and the airport's role in the overall transportation system.
- Land north of the airport is unincorporated and is zoned for residential use at a maximum density of one dwelling unit per two acres. Unincorporated land east of the airport is zoned for agricultural use. County and city comprehensive plans intend this area to remain in agricultural use during the planning horizon.
- Properties around the airport are not included in overlay zones that address use and/or height restrictions in addition to those in the primary districts.
- Development standards specified in Moses Lake's zoning ordinance for the Moses Lake Industrial Park will help prevent conflicts with airport operations.
- Moses Lake's zoning ordinance specifies permitted uses and development standards for property within the airport's boundary.
- The lot west of the airport is owned by Moses Lake. A portion of this property contains a city operations facility. The remainder of the lot is intended for public use.

## **2.4 AIRPORT SITE – GENERAL**

Moses Lake Municipal Airport is located two miles northeast of the center of the city on 54.5 acres of property owned by the city of Moses Lake. The date of first use as an airport is unknown. It is known that the property was deeded to the city in 1947 by the Northern Pacific Railroad.

## 2.5 RECENT AIRPORT REVITALIZATION

Over the past several years, the city of Moses Lake has carried out a number of maintenance, improvement and safety-related projects. These projects are listed in Table 4.

## 2.6 AIRPORT MANAGEMENT

In March 1994 the city created the Moses Lake Airport Commission, empowering it with management responsibility for the airport. Since then, the commission has held monthly meetings during which commission members and guests discuss airport safety, operations and development. The commission publishes minutes of each meeting, which are then distributed

**Table 4: Recent capital projects**

Year	Project	City portion	WSDOT/AD portion	Total cost
2006	Runway edge repair	\$528	\$4,754	\$5,282
2007	Pavement crack sealing	\$2,174	\$19,571	\$21,745
2009	Slurry surface all pavements/ repainting of all markings	\$28,000	\$72,000	\$100,000
Four-year period		\$30,702	\$96,325	\$127,027

to the city and interested parties. Included in the minutes are records of airport safety inspections and other volunteer efforts carried out by commission members. The commission also recommends airport capital improvements. Airport commissioners are appointed by the mayor and serve six-year terms.

The relationship between the city of Moses Lake, as owner of the airport, and the Moses Lake

Airport Commission, as a volunteer management and advisory entity, is well-balanced. The city recognizes the value of the day-to-day efforts of the commission to manage the airport efficiently while the commission is cognizant of the city's ultimate decision-making authority.

## 2.7 AIRPORT CLASSIFICATION – THE ARC SYSTEM

Both the Federal Aviation Administration (FAA) and the Washington State Department of Transportation/Aviation Division (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.

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 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 database shows Moses Lake Airport as having an ARC classification of B-I (small). This category includes aircraft with approach speeds of more than 91 knots but less than 121 knots, with wingspans of less than 49 feet and weights under 12,500 pounds.

A review of Moses Lake Municipal Airport’s operations conducted for this plan indicates that while some B-I (small) aircraft are operated at the airport, most of the aircraft served are in the A-I (small) category. Consequently, the Cessna 182 is designated as the design aircraft for Moses Lake Municipal Airport.

**Table 5: 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

**NPIAS**

Moses Lake Municipal Airport is not listed on the 2005–2009 National Plan of Integrated Airport Systems (NPIAS) and is therefore not eligible to apply for federal grant funds from the FAA. The WSDOT/AD is Moses Lake Municipal Airport’s primary source of grant funds.

**Table 6: Airport data**

Name	Moses Lake Municipal Airport
Airport identification	W20
FAA site number	26305.A
Owner	City of Moses Lake
Acreage	54.5 acres
Service level (on the NPIAS system)	General aviation (GA)
Reference code existing	A-I (Small)
Design aircraft	Cessna 182
Elevation	1,203 feet
Reference point (location) NAD83 NAVD88	Latitude: 47° 08' 31,2150"N Longitude: 119° 14' 16.51098"W
Mean maximum temperature	82.2 degrees (August)
Approach category	Visual
Navigation aids	None
Approach guidance	PAPI system both ends
Wind coverage	n/a

**Wind coverage**

Information regarding prevailing wind is not available from the National Oceanic and Atmospheric Administration for Moses Lake Municipal Airport. Due to the absence of wind data, a windrose was not constructed for the airport. Local observers note that prevailing winds are from the west-northwest and that, as in many areas of Washington State, strong south winds are sometimes experienced. Since the runway is oriented north-south and prevailing winds are from the west-northwest, pilots using Runway 34 experience varying degrees of left-side quartering cross winds.

## 2.8 EXISTING AIRSIDE FACILITIES

### Paved surfaces

#### *Runway and taxiways*

Moses Lake Municipal Airport has a single runway oriented on magnetic headings 160 and 340 degrees (Runway 16/34). It is 2,513 feet long and 50 feet wide. The runway is constructed of asphalt.

The airport has two full-length, nearly parallel taxiways. The taxiway east of the runway is designated Taxiway A. The taxiway west of the runway is designated Taxiway B. Taxiway A has five paved connections to the runway. Taxiway B has four paved connections to the runway.

**Photo 1: Runway looking south**



#### *Aircraft apron*

Moses Lake Municipal Airport has a number of paved apron areas that serve individual and business requirements. The primary apron that is intended for based aircraft that are not contained in hangars and transient aircraft is on the east side of the airport immediately south of mid-field. This area is approximately 25,600 square feet in size.

#### *Paved surface condition*

Table 7 indicates the condition of paved surfaces at Moses Lake Municipal Airport as reported by

**Photo 2: Runway looking north**



Applied Pavement Technology Inc. (APT) in a pavement management report published in the airport's most recent pavement management report in February 2006. The table shows both the designations given to pavement sections by APT and pavement designations that have been determined for this plan. Pavement condition index (PCI) numbers indicate overall condition of each section of pavement using a numerical system of 0 (failed) to 100 (excellent).

Following Table 7 are two drawings of the airport's paved surfaces that were created by APT. The first drawing, called a "network definition map," shows the method used by APT to divide the airport's paved surfaces into section categories. This map also identifies the PCI status of general segments of the airport's paving as

**Photo 3: Based and transient aircraft tie-downs**



recorded in 2005. The second APT drawing, the pavement condition index map, provides a useful, color depiction of the condition of the paved surfaces, again as they were determined to be in 2005.

Paving projects undertaken at Moses lake Municipal Airport will be recorded in a pavement assessment update scheduled for 2010.

**Table 7: Pavement summary**

Airport layout plan designation	Applied Pavement Technology, Inc. designation	Total square feet	Surface material	Pavement condition PCI 2005
Run-up southeast	AHLD1ML-01	2,626	AC	74
Run-up southeast	AHLD1ML-02	5,350	AC	100
Run-up northeast	AHLD2ML-01	2,609	AC	80
Run-up northeast	AHLD2ML-02	5,249	AC	53
Aircraft tie-down	AO1M0-01	7,000	AC	62
Aircraft tie-down	AO1M0-02	18,600	AC	100
Runway	R16ML-01	8,225	AAC	74
Runway	R16ML-02	3,337	AC	74
Runway	R16ML-03	84,600	AC	72
Runway	R16ML-04	21,808	AAC	83
Taxiway B	T01ML-01	43,334	AAC	83
Taxiway B	T01ML-02	6,770	AC	97
Taxiway B	T01ML-03	11,818	AC	87
Taxiway A	T02ML-01	5,573	AAC	80
Taxiway A	T02ML-02	37,250	AAC	80
Taxiway A	T02ML-03	10,895	AAC	81
Taxiway A	T03ML-01	2,391	AAC	74
Taxiway A	T04ML-01	3,773	AAC	78
Taxiway A	T05ML-01	2,303	AAC	80

Notes: PCC = Portland cement concrete, AC = Asphalt cement concrete, ACC = Asphalt overlay on asphalt cement. Source: Applied Pavement Technology Inc.

### **Pavement markings**

Pavement markings include runway-end numerals, a dashed centerline, displaced threshold arrows and chevrons and displaced threshold bars. Displaced thresholds are marked at 251 feet and 465 feet from the 34 and 16 runway ends, respectively. Both taxiways have centerlines. Runway hold lines are painted at all taxiway-to-runway connectors. The runway and

taxiways have fog lines. Recommendations for painted markings were provided to the city of Moses Lake during preparation of this plan.

### **Airport lighting and navigation aids**

#### **Runway lights**

There are 16 runway edge lights along the runway. These are located in between the

displaced thresholds. Four red/green threshold lights are located on each side of the runway, adjacent to each threshold.

#### **Precision approach path indicator**

Precision approach path indicators (PAPI) serve both runway ends.

#### **Wind indication**

Moses Lake Municipal Airport has one lighted wind indicator. It is a device commonly called a "wind T." It is located within a segmented circle that is centrally located west of the runway.

#### **Airport rotating beacon**

A rotating beacon is located on the east side of the airport, east of the airport access drive about midway

between the runway ends.

#### **Light activation**

Though the airport has a system that allows pilots to activate runway lights by using their in-aircraft radios, this system is not being used at this time. Runway lights are activated and deactivated by a photo cell. Lights are automatically activated at dusk and turned off at sunrise.

Reserved for Figure 1

Reserved for Figure 2

The pilot-activated light system is not used because it is not considered by the airport commission to be as reliable as the system that uses the photo cell.

### Video monitoring

The airport has four video cameras. Each is used to monitor a specific area. Camera views are recorded in a system that is located in the airport operations building.

### Signage

The following signs are installed at Moses Lake Municipal Airport:

- Runway hold-line signs at each of seven locations where taxiways connect with the runway.
- Informational signs warn the public to use caution due to operating aircraft.

**Photo 4: Runway hold-line sign**



## 2.9 EXISTING LANDSIDE FACILITIES

### Structures

There are numerous structures within the boundary of Moses Lake Municipal Airport. Generally, the east side of the airport and the north half of the west side of the airport are used for businesses and storage of aircraft that are

**Photo 5: Operations building**



accessories to those businesses. The west side of the airport from approximately midfield to the south boundary is generally used for private hangars.

An airport operations building is located on the east side of the airport. It is available for aviation-related meetings and for use by those visiting Moses Lake and the vicinity by air. Access to the building is gained by using a numerical code that is obvious to pilots because it is comprised of the frequency numbers used during local VHF radio communications.

The airport is divided into property segments. They are identified as one through 18 on the east side and 19 through 40 on the west side. In some cases, structures span two or more properties. In other cases, two or more structures are within a single property. The city of Moses Lake has adopted a system that identifies structures sequentially based on the numbered property they are within. The city's structure-numbering system is used in this plan (see drawings C1.1A and C1.1B).

### Aircraft fuel

For several years the airport has used a fuel truck to dispense fuel. This system has not been completely reliable due to mechanical problems with the truck and its equipment. As of the publication of this plan (January 2010) the fuel truck is operational and has a capacity of 2,000

gallons of aviation gasoline (AVGAS). Fuel is available when requested by pilots.

**Access roads**

The airport is accessed by Road 4, which extends east-west along the north side of the airport. Municipal Airport Road NE provides access to facilities on the airport’s east side. Municipal Hangar Road serves the airport’s west side.

**Utilities**

**Power**

Electrical power connects to the airport on the east side at about midfield in the area where the rotating beacon is located.

**Telephone/Internet**

Both a telephone and Internet-capable computer are available to the public within the airport operations building.

**Water/Sewage**

The airport is connected to city water. A city sewage service line extends along the south right-of-way of Road 4. A commercial business located at the airport’s northwest corner is the only structure on the airport that is connected to the city sewage line.

**Airport maintenance equipment**

No equipment is dedicated entirely to airport use.

**2.10 COMPARISON OF EXISTING CONDITIONS TO FAA STANDARDS**

This section contains a comparison of FAA-recommended airport design standards to existing conditions at Moses Lake Municipal Airport. Airport design standards published by the FAA are intended to provide an acceptable level of airport safety. Information about FAA standards has been obtained from FAA Advisory Circular (AC) 150/5300-13.

**Table 8: Airport facility data**

Airport feature	Information
Runway	
Dimensions	2,513' X 50'
Gradient	0.001 percent (3' over 2,513')
Surface	Asphalt concrete
Pavement strength	Unknown
Marking	Displaced thresholds, runway numerals, dashed centerline
Lighting	Medium intensity runway (MIRL)
Taxiway A	
Dimensions	2,513 X 20'
Surface	Asphalt concrete
Marking	Centerline and runway hold lines
Lighting/reflectors	Reflectors
Taxiway B	
Dimensions	2,513 X 20'
Surface	Asphalt concrete
Marking	Centerline and runway hold lines
Lighting/reflectors	Reflectors
Primary aircraft apron	
Dimensions	Rectangular shape approximately 25,600 SF
Surface	Asphalt concrete
Marking	None
Lighting/reflectors	None
Tie-downs	20
Fuel system	
Available fuel	Truck
Tank size	2,000 gallons
Dispensing mechanism	Manual

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.

Reserved for Figure 3

*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:

- Cleared and graded and have no potentially hazardous ruts, humps, depressions or other surface variations.
- Drained by grading or storm sewers to prevent water accumulation.
- Capable, under dry conditions, of supporting snow-removal equipment, aircraft-rescue and firefighting equipment, and aircraft without causing structural damage to the aircraft.
- Free of objects, except for objects that need to be located in the RSA because of their function.

Objects that must be within the RSA 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 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 be out of 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, and enhanced drainage.

*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 a 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 or exiting 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 property interest in the RPZ.

## **2.11 ASSESSMENT OF EXISTING CONDITIONS RELATIVE TO FAA DESIGN STANDARDS**

### **Runway length**

Moses Lake Municipal Airport's runway is 2,513 feet long. Considering its elevation above mean sea level (1,203 feet) and the average mean/maximum temperature (86.2 degrees), the airport's runway would need to be 4,000 feet long to accommodate all aircraft in the A-1 (small) ARC category and 3,400 feet long to accommodate 95 percent of those aircraft. These distances have 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 50 feet, the width of the airport's runway is 10 feet less than the FAA standard.

### **Runway safety area**

At Moses Lake Municipal Airport, the FAA-recommended runway safety area (RSA) extends 60 feet on both sides of the runway centerline and 240 feet beyond each end of the runway's pavement. The total recommended RSA length is therefore 2,993 feet.

Moses Lake's RSA conforms to the FAA standard along the sides of the runway for its entire length. The airport is not in conformance with the FAA standard in those areas where the RSA standard extends beyond the ends of the runway. This is due to the existence of Cherokee Road East, which is perpendicular to the north end of the runway, and a canal, which is perpendicular to the south end of the runway. At the north end of the airport the actual RSA available is 36 feet, or 204 feet less than the standard. At the south end of the airport the available RSA is 95 feet, or 145 feet less than the standard. The actual RSA length available therefore is 2,644 feet. This is 349 feet less than the FAA standard.

### **Runway object-free area**

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

The ROFA at Moses Lake Municipal Airport is also consistent with FAA recommendations along the length of the runway but not beyond the runway ends. The actual ROFA available is 2,644 feet, compared to the standard of 2,993 feet.

### **Runway obstacle-free zone (ROFZ)**

The FAA-recommended ROFZ extends 200 feet beyond each end of the runway. Its width for a runway serving this airport is 250 feet (125 feet on both sides of centerline). The ROFZ at Moses Lake Airport is consistent with the FAA standard along the sides of the runway but, as with the

RSA and the ROFA, is not consistent beyond the runway ends due to the same factors that affect the RSA and ROFA. The ROFZ standard is 2,913. Actual ROFZ available is 2,644 feet.

### **Runway shoulder**

Runway shoulder areas should be graded and compacted to 10 feet from runway edges. Runway shoulders at Moses Lake Municipal Airport are well graded and are consistent with this standard.

### **Taxiway width**

The FAA taxiway width standard for airports of this ARC is 25 feet. Both taxiways at Moses Lake Municipal Airport are 20 feet wide which is 5 feet narrower than the standard.

### **Taxiway safety area**

Taxiway safety areas (TSAs) are 49 feet wide and are centered on taxiway centerlines. The taxiways at Moses Lake Municipal conform to this standard.

### **Taxiway object-free area**

Taxiway object-free areas are 89 feet wide and are centered on taxiway centerlines. Taxiways at the airport are also in conformance with this standard. Active commercial operations, especially along the east side of the airport, create the possibility that aircraft or vehicles could inadvertently be parked within the TOFA.

### **Taxiway shoulder**

Taxiway shoulders are well-graded and in conformance with the taxiway shoulder standard.

### **Runway centerline to taxiway separation**

At airports within this ARC the runway centerline-to-taxiway centerline standard is 150 feet. At Moses Lake Municipal the distances between the runway centerline and taxiways A and B are 156 feet and 252 feet, respectively. The distance from

the runway centerline to the centerline of Taxiway A at the south end of the airport is slightly more than that distance along most of the runway and taxiway. The predominant distance is noted in this plan. This FAA standard is exceeded.

### **Runway centerline to holding-position marking**

This FAA standard is 125 feet. Existing runway hold-line markings are between 94 feet and 98 feet from the runway's centerline. These markings are therefore about 30 feet closer to the centerline than recommended by the FAA.

### **Runway centerline to aircraft parking**

The FAA standard is 125 feet. Aircraft tie-down positions are on the east side of the airport adjacent to the operations building. The parking positions that are closest to the runway are approximately 200 feet from the runway centerline. Aircraft parking locations at Moses Lake Municipal are consistent with the FAA standard.

### **Runway protection zone (RPZ)**

The Runway 16 and Runway 34 RPZs are not under the control of the city of Moses Lake. The Runway 16 RPZ extends over Cherokee Road East and onto private property. The Runway 34 RPZ extends over a canal and onto private property. Land uses within the RPZs are not likely to draw large groups of people. The RPZs are, therefore, not inconsistent with FAA guidelines even though they are not under the direct control of the airport.

**Table 9: Comparison of existing conditions to FAA standards**

FAA design standard	FAA design standard relative to Moses Lake Municipal Airport	Explanation of existing conditions as they relate to FAA design standards
Runway length	4,000 feet - 100 percent of A-1 (small) fleet – 3,400 feet - 95 percent of the fleet	2,513' 1,487' less than standard for 100 percent. 887 feet less than standard for 95 percent.
Runway width	60'	50' - 10' less than standard.
Runway safety area length (based on existing runway length)	2,993'	2,644' - 349 feet less than the FAA standard.
Runway safety area width	120'	The RSA meets the FAA standard within the area where it meets the length standard.
Runway object-free area length	2,993'	2,644' 349 feet less than the FAA standard.
Runway object-free area width	250'	250' The ROFA meets the FAA standard within the area where it meets the length standard.
Runway obstacle-free zone	2,913'	2,644' or 269 feet less than standard The ROFZ meets the FAA standard within the area where it meets the length standard. The ROFZ does not meet the standard beyond the runway ends.
Runway shoulder	10'	10' - Meets the FAA standard.
Taxiway width	20'	20' - 5 feet less than the FAA standard.
Taxiway safety area	49'	49' - Meets the FAA standard.
Taxiway object-free area	89'	89' - Meets the FAA standard.
Taxiway shoulder	5'	5' - Meets the FAA standard.
Runway-to-taxiway separation	150'	156' Taxiway A 252' Taxiway B The FAA standard is met for both taxiways.
Runway centerline to runway hold-position marking	125'	94' – 98' Between 27 feet and 31 feet less than the FAA standard.
Runway centerline to aircraft parking area	125'	200' - Meets the FAA standard.
Runway protection zone	250' X 1,000' X 450'	Runway 16 and 34 RPZs are compliant in terms of usage. Airport does not have control over RPZ properties.

Note: Runway length standard computed using average mean/max. temperature of hottest month (86.2 degrees) and 1,200 feet mean sea level elevation.

Reserved for Figure 4

## 2.12 INFORMATION SOURCES

Sources of information provided in this chapter include:

- WSDOT/AD airport database.
- FAA Form 5010.
- Applied Pavement Technology Inc. pavement report dated February 2006.
- The ALP steering committee.
- Site visits.

# Chapter 3:

## Forecasts

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### 3.1 INTRODUCTION

This chapter forecasts the numbers of based aircraft and annual aircraft operations at Moses Lake Municipal Airport in five-year intervals over a 20-year planning period (2010 – 2029). A future airport reference code (ARC) based on forecast data is identified.

This forecasting effort is important for a number of reasons. Primarily, forecasts will help the city of Moses Lake plan the airport's future. Understanding future demand will help the city make informed decisions about airport capital improvements.

Forecasts are also vital to the funding of those improvements. As stated, the Washington State Department of Transportation/Aviation Division (WSDOT/AD) is Moses Lake Municipal Airport's primary source of grant funds for the airport's operational areas. Though WSDOT/AD has made considerable progress over the past few years with respect to the grant process and as well as with 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 grant requests. 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 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 local and regional economies.

It is a primary recommendation of this plan that the Moses Lake Airport Commission update its activity-level forecast in the WSDOT/AD Airport Information System (AIS) 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 shown in the AIS. This will help the 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.

This chapter estimates current activity and forecasts demand. It does not address whether Moses Lake's airport, as it exists today, is able to accommodate demand that is projected. This issue will be addressed in the following chapter.

### 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.

*Based aircraft:* Aircraft that are routinely stored on outside tie-down areas or in hangars inside the airport boundary.

### 3.3 FORECASTING METHODS

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

Other issues that may impact airport activity are then evaluated. These include efforts by the community of Moses Lake to increase tourism, changes in pilot rules recently promulgated by the Federal Aviation Administration (FAA) and the potential for airport development to affect demand.

The process used in this plan for identifying the number of based aircraft is different from the process used to estimate annual flight operations activity. Both FAA and WSDOT/AD databases contain information about the numbers of aircraft based at Moses Lake Municipal. This plan includes FAA and aviation division data but uses current data secured from the plan’s steering committee.

It is not as easy to determine annual flight operations activity at airports such as Moses Lake’s that do not have control towers and, therefore, have no records of operating activity. For this we have relied heavily on WSDOT/AD and FAA data as well as on local input.

### 3.4 EXISTING DATA

The specific sources that have been used to help determine based aircraft and annual flight operations levels at Moses Lake Municipal Airport are:

- The FAA’s Airport Master Record, also called FAA Form 5010, last updated in August 2006.
- The Airport Facilities & Services Report portion of the 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 10-12.

**Table 10: FAA Form 5010**

Fleet mix of based aircraft 2005		Estimated operations, 2005	
Single-engine	40	GA local	5,000
Multi-engine	1	GA itinerant	16,500
Turboprop	0	Air carrier	0
Glider	0	Air taxi	0
Ultralight	15	Commuter	0
Rotorcraft	0	Military	0
<b>Total</b>	<b>56</b>	<b>Total</b>	<b>21,500</b>

Source: FAA Form 5010.

**Table 11: WSDOT/AD LATS**

Fleet mix		Estimated annual operations	
Based A/C	Existing 2008		Existing 2008
Single-engine	45	GA local	5,756
Multi-engine	2	GA itinerant	18,994
Jet engine	0		
Helicopter	0		
Ultralight	8		
Total	55		24,750

Source: WSDOT/AD. Note: As of September 2008, seven aircraft shown in the ultralight category are actually light-sport aircraft.

**Table 12: Based operational aircraft**

Aircraft	ARC category
Thrush Commander (2)	A-I (small)
Air Tractor	A-II
Piper Brave	A-I (small)
Cessna 150 (3)	A-I (small)
Cessna 152 (2)	A-I (small)
Cessna 170	A-I (small)
Cessna 172 (4)	A-I (small)
Cessna 177	A-I (small)
Cessna 180	A-I (small)
Cessna 182 (3)	A-I (small)
Cessna 190	A-I (small)
Cessna 210 (2)	A-I (small)
Mooney	A-I (small)
Piper Twin Comanche	A-I (small)
Piper Tomahawk	A-I (small)
Piper J-3 Cub (2)	A-I (small)
Piper Pacer	A-I (small)
Beechcraft A-36	A-I (small)
Champion Citabria (2)	A-I (small)
Aeronca 7AC	A-I (small)
Cirrus SR-22	A-I (small)
Maule	A-I (small)
Avid (2)	A-I (small)
Kitfox (2)	A-I (small)
Challenger (light sport) (10)	A-I (small)
Bell 206 helicopter	Not categorized
<b>Total</b>	<b>49</b>

Source: Moses Lake Municipal Airport Steering Committee.

### Based aircraft baseline

Steering committee data will be used as the based aircraft baseline in this plan. Forty-nine operational aircraft are based at Moses Lake Municipal Airport at the time of publication. All based, fixed-wing aircraft are in the A-I (small) airport reference code (ARC) category except for the Air Tractor agricultural aircraft, which is in the A-II ARC.

### Flight operations activity baseline

This plan recaps airport-specific information from the FAA and WSDOT/AD and considers general estimating guidelines provided by the FAA to determine a flight operations activity baseline.

As stated, flight operations activity levels at small general-aviation airports are difficult to determine. Efforts are being made to develop automated processes to gather operational information at unattended airports but, as of the date of this plan, a reliable, cost-effective process is not known to be available.

Information provided in Tables 10 and 11 indicate that there are between 21,500 and 24,750 flight operations that occur annually at Moses Lake's airport. Of these, between 5,000 and 5,800 are estimated to be local operations. Agricultural aircraft, which are very active at Moses Lake, are categorized as itinerant operations, as dictated by FAA and WSDOT/AD planning definitions.

Another element to consider as we attempt to estimate annual flight operations activity is the FAA's position that it is reasonable to assume 250 operations per year per based aircraft at small, general aviation airports. This multiplier, if applied at Moses Lake, would result in 12,250 annual flight operations by only based aircraft. This activity level would amount to roughly half of the flight operations estimated by both the FAA and WSDOT/AD.

Proximity also plays a role in activity levels at small airports and in the mix of operations by based and visiting aircraft. Many small airports in Washington are a considerable distance from their related communities. It can be assumed that in those cases there are limited numbers of flights by visiting aircraft made for the purposes of accessing the communities or their government offices. Moses Lake Municipal Airport is conveniently located to the central core of the city, to the area's growing business districts and to the Interstate 90 corridor. It is logical to conclude that several flights a month are conducted by visiting aircraft that are related to this active, developing community.

This plan concludes that actual annual flight operations are likely to be more consistent with the WSDOT/AD LATS program estimates than the FAA estimates. The aviation division's estimates are more recent and they are the result of a more involved research process. The LATS program estimates local flight operations at slightly fewer than 6,000 per year and itinerant flight operations at almost 19,000. While many of the itinerant operations are conducted by agricultural aircraft, Moses Lake Municipal Airport probably experiences consistent visits by non-based recreational flyers, by aircraft operated from other airports for flight training and by aircraft flown for business purposes. Total annual flight operations are estimated by this plan to be 25,000.

## 3.5 FORECASTS

### WSDOT/AD

The LATS program estimates that based aircraft will increase from 55 to 72 between the base year of 2005 and the year 2030. LATS begins with a baseline number of 55, which is slightly more than the 49 operational aircraft indicated by this plan's steering committee. Over this same period, flight operations are projected to increase from an estimated 2005 level of 24,750 to over 32,000.

### Federal Aviation Administration

As stated, the FAA does not project future numbers of based aircraft or flight activity levels at Moses Lake Municipal Airport. The FAA does, however, publish other useful forecasting information.

According to the FAA, the number of U.S.-based active general-aviation aircraft is expected to increase at an average annual growth rate of 0.5 percent per year through the year 2025. Most of this growth is attributed to business-type aircraft. Single-engine piston aircraft, those most applicable to Moses Lake Municipal Airport, are expected to increase in numbers at a rate of 0.2 percent per year. Flight hours are expected to increase at a faster rate than the aircraft fleet – 1.5 percent annually through 2014 and then 1.2 percent annually through 2025. These modest numbers, when applied to Grant County and to Moses Lake Municipal Airport, parallel estimates by WSDOT/AD.

### Conclusions based on WSDOT/AD, FAA and actual data

Projections by WSDOT/AD and the FAA indicate moderate growth in Moses Lake Municipal Airport's based aircraft and flight operations over the planning period.

### Population and income projections

Grant County has experienced moderate and at times erratic growth in population over the

past decade. Washington State analysts project that the county's population will continue to grow and do so more steadily in the foreseeable future. The Washington State Office of Financial Management estimates the current Grant County population to be 80,600. This is 149 percent more than the 32,440 people the county had in 1990. State analysts, in their intermediate projections, estimate that the county will gain another 18,335 people by the year 2025.

Grant County has also experienced steady growth in household income. In current dollars, median household income has risen from \$24,216 in 1990 to \$37,173 in 2008. (Washington State Office of Financial Management, "Median Household Income Estimates by County: 1989 to 2008 and Projection for 2009.") Per capita personal income in the county has risen from \$19,408 in 1999 to \$21,756 in 2003, according to the U.S. Department of Commerce's Bureau of Economic Analysis (BEA). ([Http://www.bea.doc.gov/bea/regional/reis/drill.cfm](http://www.bea.doc.gov/bea/regional/reis/drill.cfm).) The average annual growth rate in personal income has been 7.7 percent since 1990, this rate has slowed in recent years. It was only 3.4 percent in 2002-2003.

Though Grant County's personal income growth rate has recently slowed, it is important to note that during the period from 1990 to 2003 it grew, in current dollars, from \$14,621 to \$21,756. Average income is less in Grant County than it is in more populated areas of Washington State but there is evidence of consistent improvement.

If, as expected, Grant County's population and personal incomes continue to grow they will almost certainly create greater demand for airport services.

### Conclusions about population and income

According to Washington State economists and planners, Grant County's population will increase between now and 2025 by just over 22 percent. Washington State data indicates that the state's population as a whole will increase by almost

28 percent. There is no data that indicates that Grant County will experience other than slow-to-moderate, steady growth.

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

**Table 13: Grant County population**

Year	Population
1990	54,798
2000	74,698
2003	77,100
2006	80,600 (estimated)
2009	86,100 (estimated)
2010	88,331 (projected)
2015	92,806 (projected)
2020	95,715 (projected)
2025	98,395 (projected)

Source: Office of Financial Management, 2006.

### 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 regulations.
- Airport improvements.
- Local branding and marketing.

### Alterations to FAA regulations

Rules recently promulgated by the FAA allow owners of several categories of ultralight aircraft to register those aircraft in a new category called

“light sport.” Light-sport aircraft are expected to substantially add to the numbers of based aircraft and flight operations at U.S. airports. It is logical to assume that pilots in this category will, in general, prefer to operate from airports such as Moses Lake Municipal that, again, have low or moderate activity levels, are non-towered and that have an abundance of adjacent, uncontrolled airspace. This category of aircraft is already very active at this facility.

### **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. Moses Lake Municipal Airport is not a large facility but it is well-organized, well-managed and has room to grow. Two full-length taxiways provide easy access to the runway from both sides of the airport. Care has been taken, to the extent possible, to conform to FAA design recommendations. Future improvements, as detailed in the following chapter, will include projects that enhance the airport as a portal to the city. These projects will increase demand and contribute to growth in based aircraft and activity levels.

### **Local branding and marketing**

The city of Moses Lake is working on a plan to increase tourism. This plan, a draft of which is currently on the city’s Web site, contains recommendations for branding and marketing that will help define the community and provide it with a coordinated process to attract visitors. If Moses Lake Municipal Airport is appropriately represented in this plan, and if the airport facilities, especially on and off-airport signage, are part of the branding effort, airport activity levels and the value of the airport to the community will increase.

### **Forecast of based aircraft and operations**

After taking into consideration state and federal population and income projections, specific development efforts in Grant County and the Moses Lake area, FAA sport pilot rules, the likely impact of ongoing airport improvements and preliminary forecasts by WSDOT/AD’s LATS, This plan makes the following projections about based aircraft and flight operations activity over the planning period:

#### *Airport reference code (ARC)*

The ARC for Moses Lake Municipal Airport is forecast to remain A-I (small). This conclusion is not based on demand, which may exceed the A-I (small) category, but rather on an assumption that the kinds of aircraft the airport will be able to accommodate will be generally within the A-I (small) categories.

#### *Based aircraft*

Based aircraft will increase by 26 to a total of 75 by the end of the planning period. Most of the additional aircraft will be single-engine. Some, possibly a significant number, will be in the light-sport category. This is moderately more than the LATS program estimate of 72 by the end of the planning period. The rate of growth in the Moses Lake area will increase due to the area’s quality of life, central location in the state, proximity to Interstate 90 and local marketing and economic development efforts.

#### *Flight operations*

Local annual flight operations, estimated by Airside to be 6,000, will increase to about 9,000 over the planning period.

Annual itinerant operations, currently estimated by Airside to be 19,000, are expected to moderately increase. Two factors that will affect the degree to which itinerant operations will increase are: 1) demand for agricultural aircraft

activity; and 2) the ability of the airport to accommodate demand.

Airside forecasts that itinerant operations will reach 22,000 by the end of the planning period.

Airside’s estimates of combined local and itinerant operations at the end of the planning period – the year 2029 - is therefore 31,000. This is in line with the LATS estimate of 32,400 by the year 2030.

**Table 14: Forecast based aircraft 2010-2029**

Based A/C by type	2010	2015	2020	2025	2029
SE	37	41	45	49	55
SESP	10	12	14	16	17
ME	1	2	2	2	2
Heli	1	1	1	1	1
Total	49	56	62	68	75

*A/C = Aircraft; SE = Conventional single-engine aircraft; SESP = Single-engine sport category aircraft; ME – Multi-engine aircraft; Heli = Helicopter.*

**Table 15: Forecast annual flight operations 2010-2029**

Operations	2010 (1)	2015	2020	2025	2029
SE	23,850	25,000	27,000	28,000	29,150
SESP	1,000	1,200	1,400	1,600	1,700
ME	100	100	100	100	100
Heli	50	50	50	50	50
Total operations	25,000	26,350	28,550	29,750	31,000
Increase of total operations over the planning period		1,350 5.4 percent	2,200 8.4 percent	1,200 4.2 percent	1,250 4.2 percent
Average annual increase in total operations		270 1.08 percent	440 1.67 percent	240 .84 percent	250 .84 percent

(1) Estimated current.

# Chapter 4: Requirements

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## 4.1 INTRODUCTION

This chapter discusses projects that will improve Moses Lake Municipal 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 Moses Lake Municipal Airport extend over a 20-year planning period. Projects listed are intended to increase safety, accommodate forecast demand, and enhance the airport's role as a portal to Moses Lake and its environs. Information about the timing of projects is at the end of this chapter. Estimated expenses associated with capital improvements are contained in Chapter 5.

As stated in Chapter 2, the Cessna 182 is identified as the design aircraft throughout the planning period. Additional kinds of aircraft that may use Moses Lake Municipal Airport are light-sport aircraft and variations of aircraft based on advancing technologies.

Federal Aviation Administration (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 PRIMARY FEATURES

Chapter 2 compares several aspects of Moses Lake Municipal Airport to many of the primary FAA airport design standards. The airport is not currently in conformance with five of those design standards. These are: 1) runway length; 2) runway width; 3) runway safety area; 4) runway object-free area; and 5) runway obstacle-free zone. It bears repeating that items 3, 4 and 5 are

consistent with FAA recommendations along the entire runway length. It is in the areas beyond the runway ends that these design standards are not met. This condition is found often at community airports in Washington.

### 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, runway lengths of 3,400 feet and 4,000 feet are required to accommodate 95 percent and 100 percent, respectively, of the small airplane fleet at Moses Lake Municipal Airport, considering the mean temperature of the area's hottest month (86.2 degrees in August) and the mean sea level elevation of 1,200 feet. This means that the airport's runway, which is 2,513 feet long, is 887 feet shorter than required for 95 percent of the fleet and 1,487 feet shorter than required for 100 percent of the fleet.

While it is possible to extend the runway to the north and/or south it is unlikely that funding would be forthcoming for such an effort given the proximity to Grant County International Airport and its major runway system.

One must also consider the aircraft Moses Lake's airport is likely to accommodate in the future. Light, single- and multi-engine aircraft in the Cessna 182 and Piper Cherokee category along with light-sport aircraft will continue to use the airport. While additional runway length is always desirable, lengthening of the runway is not justified considering predominant use by these kinds of aircraft.

Lastly, it is important to consider the sources of funds necessary to expand the runway and taxiway. As noted, Moses Lake Municipal Airport is not included in the FAA's National Plan of Integrated Airport Systems (NPIAS) and is not likely to be placed on the NPIAS due to the airport's proximity to Grant County International Airport, which is on the NPIAS. Therefore, capital funds from the FAA would not be forthcoming. At this time, WSDOT/AD is making a strong effort to maintain the Washington airport system as it is currently configured. Grant funds for runway lengthening would only be made available in cases where the need is clear and vital. Further, the Aviation Division is currently limited to \$250,000 per grant. This is far short of the funds needed to purchase additional property, and to construct a lengthened runway and taxiway system.

In case this narrative has left some readers with the impression that Moses Lake's runway is inadequate with respect to runway length it is important to note that many general aviation airports do not have runways that are long enough to accommodate all of the small airplane fleet. The B-I (small) ARC category includes some aircraft that would be considered very large were they seen at Moses Lake's airport. Examples are the Marquise and Solitaire turboprop aircraft made by Mitsubishi Heavy Industries, the venerable DHC-2 Beaver and the Piaggio Portofino.

Airside does not recommend major capital projects unless there are logical sources of funds

to pay for them and the projects are reasonable to undertake given specific conditions. It is a conclusion of this plan that increasing the length of the runway/taxiway system at Moses Lake Municipal Airport is not feasible. It is not justified by forecast levels of activity and it is not logical to assume that sources of funds for such an endeavor would be forthcoming.

### **Runway/taxiway width**

The FAA standard for runway width is 60 feet. Moses Lake's runway is 50 feet wide. While a wider runway would be nice to have, future available funds might be better spent on care and conservation of the airport's extensive existing paved surfaces and on other projects that will improve the aesthetics and functionality of the airport. The 50-foot-wide runway is not exactly in conformance with FAA recommendations but it is much better than many runways in Washington that are 36 feet to 40 feet wide.

The pavement study accomplished by Applied Pavement Technology Inc. indicates that the primary section of the runway has a PCI value of 72. Small sections of runway at the south end have PCI values of 74 and a section at the north end has a PCI value of 83. These PCI values are within a range on the PCI scale where preventative maintenance rather than reconstruction is advised. A slurry surface and repainting project was accomplished on the runway and taxiway system during the summer of 2009. It is not known whether or, if so, to what extent a slurry surface improves PCI values.

This is the case with the taxiway system as well. Though the taxiways are not as wide as the FAA-recommended 25 feet, they appear to adequately handle aircraft that use them. Most of the taxiway system is also rated by APT Inc. as requiring preventative maintenance to continue its viability.

This plan does not recommend reconstruction of either the runway or the taxiway system. However, if reconstruction becomes necessary it is recommended that FAA standard widths for the runway and taxiway system be applied.

### **Runway safety areas and object-free areas**

As explained in Chapter 2 of this plan, runway safety areas (RSAs) are rectangular areas that surround runways. RSA sizes vary with the category of runway to which they are applied. At Moses Lake Municipal, the FAA standard RSA extends 240 feet from each end of the runway and 60 feet on both sides of the runway's centerline. RSAs are to be generally level with the runway surface, free of objects that could damage aircraft, graded, compacted and capable of supporting airplanes and vehicles. The main purpose of an RSA is to limit damage to airplanes and injury to occupants if aircraft were to stray from the runway, to land short of a runway or to overrun a runway.

The runway object-free area (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, etc., do not rise above the runway's elevation or – if they must to support airport functions, such as with runway lights – that they have frangible (breakable) supports.

At the airport's north end, Cherokee Road East and property north of the road are within much of the RSA and ROFA. At the airport's south end, an irrigation canal and private property are also within both the RSA and ROFA.

Given conditions at both ends of Moses Lake's runway, the only way to conform to the FAA's RSA and ROFA standards is to relocate the runway's thresholds. It is important to make sure that a clear distinction is made between displaced and relocated runway threshold markings.

Displaced thresholds, such as those currently marked at Moses Lake, are intended to provide approach slope clearance over objects along approach paths for arriving aircraft. When runway thresholds are relocated, runway pavement generally stays in place but new runway ends are marked on runway surfaces. Runway lights are also adjusted to indicate adjusted runway ends. The resulting shortened lengths of runways are changed in government and private publications that are available to pilots. Technically, once a runway threshold is relocated, runway pavement behind a threshold cannot be used for takeoff or landing roll-out from the opposite direction. It is important to note that when thresholds are displaced RSA and ROFA areas, which are 240 feet long, begin at the end of pavement. When thresholds are relocated they begin at the point of relocation. This is why airports sometimes relocate thresholds. It allows the airports to bring RSA and ROFA areas onto airport property, where they are more likely to meet the FAA's standards.

At Moses Lake, relocation of the runway's thresholds to comply with the RSA standard would result in shortening the runway from its current length of 2,513 feet to 2,164 feet.

If Moses Lake's thresholds were relocated, based on pilots who understand local conditions would probably use the entire runway length for takeoff, regardless of markings. This would be more likely to occur during hot days with heavily loaded aircraft. The major concern about runway shortening, therefore, is the impact it might have on visiting pilots who are required to consider published runway length at destination airports as they plan their flights. These include those operating for government entities, FAA-regulated for-hire charter services, and some businesses. It is probable that some of these entities would decide against using Moses Lake Municipal Airport even though pavement beyond the relocations would still be in place.

Questions about the ramifications of not conforming to the FAA's RSA and ROFA standards naturally arise. To refrain from relocating Moses Lake's thresholds would mean that the city decides against conforming to two of the most basic FAA design recommendations. Conversely, relocating the thresholds would result in sizeable reductions in posted, if not actual, runway length.

It is logical to obtain as much information about this subject as possible before committing to a course of action. Of primary importance is the position of WSDOT/AD with respect to how a decision might impact future grants-in-aid to the city of Moses Lake for its airport.

### ***WSDOT/AD's position***

The Aviation Division stated several years ago in public forums that it expected airports to "move toward" compliance with FAA design standards. Indeed, the scope of work for this project, as mentioned earlier, requires that Moses Lake's airport and other airports involved in similar planning projects, use FAA design standards in their evaluations of airport features and in the depiction of future capital projects.

The Aviation Division's current stance is logical for a number of reasons. First, if the division did not subscribe to FAA airport design philosophy then what standards would it use? The state has no published design standards. Efforts some time ago to create standards for non-NPIAS, non-(FAA) obligated, community airports in Washington were unsuccessful. Also, there is concern that if the division did not require facilities that it helps fund to promote safety by adhering to reasonable standards, the state may assume unwanted legal liability. Further, no one can argue that making every effort to conform to FAA standards at Moses Lake and similar community airports will create safer facilities and will lower community liability.

The Aviation Division is aware of the need to develop a clear policy about this subject. As of

the publication of this plan, a comprehensive policy has not been announced.

### ***RSA and ROFA recommendations***

After due consideration, Airside recommends that the city of Moses Lake continue to do all it can to prepare those portions of the runway safety area and keep clear those portions of the runway object-free area over which the city has reasonable control. Airside does not recommend shortening the airport's runway in order to fully comply with these standards. Airside's recommendations are based on the following factors:

- Relocation of the runway thresholds would reduce published runway length to a degree that will have a measurable effect on decisions by government, for-hire (charter) and corporate operators to use the airport.
- Relocation of the thresholds would not alter the operating conditions that exist at the airport. There is a finite amount of runway pavement. Regardless of how the runway is marked, Cherokee Road East and the irrigation canal will continue to exist. Aircraft landing short of the runway or overrunning the runway will do so regardless of alterations to markings and lighting.
- Relocation of the thresholds would create conforming runway safety and runway object-free areas at the expense of runway length, a step that would have its own, possibly more serious, safety implications.

### **Runway safety**

Among the most important safety actions that can be taken at any airport are those that attempt to prevent untimely runway incursions. A runway incursion is defined as movement by an aircraft, vehicle or person onto an active runway at a location and a time that risks collision with

aircraft using the runway. Risks of such incursions vary with facilities. Concern about incursions is especially high at an active airport where there are numerous taxiway-to-runway connectors. Pilots who routinely use this airport are mindful of its conditions and are most likely extra vigilant. Visiting pilots have varying knowledge of the airport. All that can be done to avoid mishaps between aircraft and between aircraft and vehicles should be done.

It is recommended that the runway hold-line system, consisting of both the painted hold lines and runway hold-line signs be well-maintained.

### 4.3 DEVELOPMENT ALTERNATIVES

In light of its overall length, the width of the airport's property is extensive. This provides not only for a two taxiway system but also for areas that can be used for commercial enterprises and aircraft storage on both sides of the airport. Additionally, the primary features of the airport are well organized and well cared for. Major alterations to the layout of the airport are not necessary and not recommended in this plan.

This plan does, however, recommend a number of actions and projects that will: 1) maintain the public's investment; 2) increase utility; 3) improve aesthetics; and 4) cause the airport to be a more convenient and active portal to the surrounding community. Recommended actions are listed below and further explained in the following section.

#### Airport capital improvements

- Continuance of a scheduled plan of preventive maintenance for all paved surfaces.
- Installation of coordinated caution, direction and feature identification signs on and off the airport.
- Addition of the airport as a community portal in the city's marketing and branding plan.

- Refinement of structure development standards that are in the city code that will provide for lighting and landscaping consistency for future private development.
- Installation of a perimeter fence.
- Straightening of Municipal Airport Road NE to provide additional development space in the area to its west. Addition of a paved vehicle turnaround at the south end of the road.
- Development of a new small terminal – a welcome center – to be used to greet and serve the needs of visitors. Designation of vehicle parking.
- Installation of an aviation gasoline (AVGAS) system with card-lock dispensing mechanism.
- Further development of tie-downs for based and transient aircraft.
- Initiation of a multi-year landscaping and lighting program to include a system to water grass areas. Site work in the area south of the runway.
- Development of a global positioning system (GPS) instrument landing procedure.
- Construction of standard or nested T-hangars, tie-downs and other amenities for based aircraft on property on the southwest side of the airport. Development of vehicle parking areas and improvement to the access road.
- Installation of an automated weather observing system (AWOS).
- Installation of lighted runway hold-line signs.
- Installation of lights for Taxiways A and B.
- Construction of a restroom and aircraft-wash facility on the airport's west side.

## 4.4 DEVELOPMENT DETAILS

### ***ACTION 1: DIRECTION AND FEATURE SIGNS***

Signs that provide information, especially to visitors, are important. If properly designed and coordinated, signage can also display pride in a facility and be representative of good management. Additionally, signs play a role in reducing theft and vandalism. General signage should be worded carefully so as to recognize the airport's role as a portal to the city of Moses Lake and its environs. Signs should also be installed at key areas in Moses Lake to provide those visiting by vehicle with directions to the airport. Recommended signage includes:

*Airport direction:* located along roadways in the community to provide direction to motorists.

*Graphic runway hold-line markings:* These exist and should be maintained and replaced as necessary.

*Transient aircraft parking:* As mentioned earlier, these signs provide clear guidance to visitors and let visitors know that they are expected and welcome.

*Welcome center (terminal) signage:* It is recommended that signage in this area welcome visitors and provide clear instructions about: 1) aircraft parking locations and fees; 2) vehicle parking; 3) emergency contacts; 4) reporting of unsafe or suspect conditions; and 5) airport traffic-pattern and noise-abatement procedures.

All new signs should be professionally designed and manufactured and should be visually consistent to provide a coordinated appearance.

### ***ACTION 2: INCLUSION IN THE BRANDING AND MARKETING PLAN***

The draft of the Community Branding, Development & Marketing Plan that is currently

on the city's Web site makes limited reference to Moses Lake Municipal Airport. This is an oversight, given the proximity of the airport to the city core. The plan should not only include the airport but signage and other improvements should be designed so as to coordinate with the branding program.

### ***ACTION 3: DEVELOPMENT STANDARDS***

There is little doubt that over the next several years the property that comprises Moses Lake Municipal Airport will be used to its full potential. Development standards that dictate building setbacks, structure quality, landscaping, lighting and signage and that require outside areas of structures to be free of stored items will help ensure that an appropriate image is projected. Section 18:35 of the municipal code, titled "Municipal Airport Zone," contains a number of sections that seek to ensure that new structures are compatible with airport operations. It is recommended that this code section be reviewed in terms of content related to structure and structure-area aesthetics.

### ***ACTION 4: PERIMETER FENCE***

Airport activity levels and proximity to a populous area justify a perimeter fence that would secure airport operations. It is recommended that such a fence be installed around the entire perimeter of the airport. This would include approximately 8,000 lineal feet of chain link fence plus vehicle and pedestrian gates.

### ***ACTION 5: STRAIGHTEN MUNICIPAL AIRPORT ROAD NE***

As the terminal area is being planned consideration should be given to straightening this road in order to provide additional room for development to its west. Some power poles and utilities would have to be relocated during this action.

#### ***ACTION 6: DEVELOP A SMALL TERMINAL***

A small terminal could be used as a location to welcome and accommodate visitors. It also would provide a place for local residents to meet and provide transportation for visitors. Past efforts to provide such a place are evident in the operations building that is currently on the east side of the airport. An improved facility, coordinated with more well-defined transient aircraft parking and an aviation gasoline fuel system will further enhance the image of the city of Moses Lake. Accommodations should be made for displays created by the city, Grant County and local businesses to highlight area attractions and inform visitors about business opportunities.

#### ***ACTION 7: INSTALL AVGAS FUEL SYSTEM***

Moses Lake Municipal Airport is active and is expected to be more active in the future. The airport's centralized location in the state makes it a logical fuel stop for transiting aircraft. A card-lock controlled fuel system should be installed in coordination with terminal facility development.

#### ***ACTION 8: BASED AND TRANSIENT AIRCRAFT TIE-DOWNS***

The airport commission has worked to develop an efficient and attractive aircraft tie-down area on the east side of the airport west and north of the operations building. Parts of this area are in turf. Efforts to increase grassed areas and a watering system to irrigate them continue. Alterations to this tie-down area should be considered along with development of the terminal and fuel system so that the area is well-coordinated. Consideration should be given to a clear separation and signage of those areas used for based aircraft and areas set aside for visitors. Visitor aircraft parking areas should be adjacent to the fuel system and terminal facilities. An alternative to the above that could be put in place over time is to set aside an area on the west side of the airport for based aircraft tie-downs and to use the area adjacent to the terminal primarily for visiting aircraft. This would allow for

additional space near the welcome center that could be used for commercial enterprises.

#### ***ACTION 9: LANDSCAPING AND LIGHTING***

A landscaping and lighting program should be adopted to improve aesthetics at the airport. Much has already been done with the partial installation of a grass watering system. This system should be expanded. The program should be spread over several years. Property lessees should be encouraged to participate. Developers of new structures should be required to participate.

#### ***ACTION 10: GPS-BASED INSTRUMENT APPROACH***

Instrument procedures intended to serve airports of the size and type of Moses Lake Municipal Airport are being implemented throughout the United States. Pilots using Moses Lake Municipal Airport will benefit from such a system. It is recommended that the city send letters to the FAA's Airports District Office (ADO) and Flight Procedures Office (FPO) indicating an interest in development of such a system.

#### ***ACTION 11: WEST SIDE T-HANGARS***

The airport has a number of individual hangars. Given the expected increase in based aircraft the city should consider sponsoring development of standard T or nested T hangars on the west side of the airport on portions of properties 34 through 40. T hangars will increase aircraft storage capacity as compared to individual hangars. The city may wish to construct and own these hangars and lease them to tenants. If the city does not wish to fill this role it is possible that the property could be leased to a developer or developers with the understanding that public T-hangars would be constructed. Municipal Hangar Road should be improved from its current south end to the end of the airport's property adjacent to property parcel 40 as this area is improved to accommodate demand. Utilities should also be extended as necessary.

#### ***ACTION 12: INSTALL AWOS***

This plan recommends installation of an automated weather observation system. These systems have become quite sophisticated. AWOS are able to determine and communicate a number of weather factors to pilots. AWOS are available in a number of configurations, from those that provide very basic weather information, such as temperature, wind direction, wind velocity and barometric pressure, to those that are also capable of communicating cloud ceiling, horizontal visibility and a number of other weather factors.

#### ***ACTION 13: ENHANCED RUNWAY HOLD LINES***

This plan notes three items that give rise to concern about runway encroachment. These are increased aviation activity in general, increased use by visitors and the unusually high number of areas where aircraft may access the runway from the taxiway system. Consideration should be given to replacing retroreflective runway hold-line signs with lighted runway hold-line signs. This is an unusual concept for airports the size of Moses Lake Municipal but it is justified by the airport's layout and expected usage.

#### ***ACTION 14: LIGHT TAXIWAYS A AND B***

Lighted taxiways are also unusual at airports such as Moses Lake Municipal. Given expected activity, lighting the taxiways will materially enhance safety. Priority should be given to Taxiway A as it will be the taxiway most often used by visitors.

#### ***ACTION 15: PUBLIC RESTROOM/AIRCRAFT-WASH FACILITY***

The west side of the airport is planned to increasingly accommodate based, non-commercial aircraft. A public restroom and aircraft wash facility will increase services to based aircraft owners and will also improve environmental conditions.

#### **PROJECT PHASING**

Current state regulations do not allow WSDOT/AD to provide grants in excess of \$250,000. Should the city decide to accomplish major construction projects that might exceed \$250,000 in capital expenditure it should consider phasing the work in two or more segments and dividing the work over two or several grants. Taxiway lighting and signage improvements as an example would be divided into design and engineering (Phase 1) and construction (Phase 2).

### **4.5 DETAIL AND TIMING OF IMPROVEMENTS**

#### **PROJECTS 2010-2014**

Action items 1 through 4 are important to the safety and efficiency of Moses Lake Municipal Airport. They will also encourage and enhance use by visitors to Moses Lake and the surrounding area. It is recommended that these actions be accomplished in the 2010 through 2014 time period or that they at least be programmed during that period for accomplishment thereafter.

Action items 5 through 16 are programmed for the 2015 through 2019 time period. The airport commission and city should prioritize these projects prior to the beginning of that phase.

Paved surface maintenance – an action that is important to the protection of public investment in the airport – should be accomplished routinely throughout the 20-year period addressed in this plan. Reconstruction of paved surfaces is not programmed over the 20-year planning period.

### **4.6 APPROACH SURFACE CONSIDERATIONS**

This section addresses airspace that serves both ends of Moses Lake Municipal Airport's runway. It identifies locations on the runway that are marked as displaced thresholds and determines whether those locations are appropriate considering current conditions.

Displaced thresholds are marked on runways at locations that ensure clear approach surfaces for arriving aircraft. Approach surface slopes vary from 20:1 (5 percent), for airports such as Moses Lake Municipal to much shallower 50:1 (2 percent), at large commercial airports. These upward slopes should be clear of objects to provide for safe aircraft operations.

Displaced thresholds are marked at both ends of this airport. The threshold for Runway 16 is displaced 435 feet from the north end of pavement. Runway 34's threshold is displaced 251 feet from the south end of pavement.

### **History**

The city of Moses Lake recognized some time ago that it was important to protect airspace used for approaches to Moses Lake Municipal Airport. From April 1963 to July 1965 the city obtained easements that restricted heights of objects on property north and south of the airport. Three easements were necessary. Two of the easements were obtained from private parties who owned adjacent properties. A third easement was obtained from the United States Department of the Interior and was related to the canal south of the airport which is part of the Columbia Basin Project. The runway was shorter during that time period so the geometry used to calculate visual (20:1) approach slopes does not equate exactly to today's conditions.

### ***Runway 16 easement details***

When the Runway 16 easement was obtained, the north end of the runway was 630 feet from the center of Cherokee Road East. The easement's 20:1 slope began at a location that was 200 feet north of the end of pavement. Upon reaching the north right-of-way of the road which is also the south edge of the subject property, the easement slope was at a height of approximately 1,223 feet above mean sea level or 23 feet above the elevation of the runway's end. The easement covered a distance of 1,000 feet south-to-north and terminated at a distance of 570 feet from the

center of the road at a height of 1,250 feet above mean sea level.

### ***Runway 34 easement details***

When the Runway 34 easement was obtained, the south end of the runway was 260 feet from the north edge of the right-of-way of the canal owned by the Bureau of Reclamation. The easement's 20:1 slope began at a location that was 200 feet south of the end of pavement. Upon reaching the north right-of-way of the canal, the easement was at a height of approximately 1,205 feet above mean sea level or 3 feet above the elevation of the runway. The easement covered a distance of 1,000 feet north-to-south and terminated at a distance of 860 feet from the south edge of the canal right-of-way.

### ***Municipal code action***

An additional action to protect airspace serving the airport was taken by the city when it created a municipal airport code in 1996. Chapter 18.35 of the code, titled "Municipal Airport Zone," contains Section G, "Height Restrictions." This section limits heights of structures within the Municipal Airport Zone. It does not apply to adjacent zones.

### ***Displaced thresholds***

Displaced thresholds are marked on runways at locations necessary to provide approach slope clearances that are appropriate to a runway's use. Approaches to this airport are accomplished in visual flight conditions. In these cases, 20:1 slopes are standard. These slopes are, at airports such as this one, 250 feet wide at their beginning. Some objects that may impact approach slopes are obvious. Examples of these are structures, trees and light poles. Often easements and/or ordinances prevent the existence of or provide for the removal of these physical penetrations. Other items that are considered objects by the relevant regulation – Title 14 of the Code of Federal Regulations, Part 77 "Objects Affecting Navigable Airspace" (FAR Part 77) – are not so obvious. Examples of these are roads such as

Road 4, which is considered to be a 15-foot-high obstruction.

Waterways are obstructions if they are navigable. The height of waterway obstructions is equal to the height of the tallest vessel or other object that may traverse the waterway. The canal south of the airport is not navigable and therefore not an obstruction as defined in the FAR Part 77 regulation.

To establish the location of a displaced threshold it is important to identify what is called a controlling obstruction, if one exists. A controlling obstruction is an item that is of a height and at a location which make it the primary item to be considered when applying a 20:1 slope to a runway.

The Runway 16 (north end) controlling obstruction is an approximately 50-foot high tree that is located north of Road 4; west of the extended centerline of the runway. This tree penetrates the south portion of the Runway 16 approach slope by about 18 feet.

If this tree were to continue to exist at its current height, the Runway 16 displaced threshold would have to be moved to a location 360 feet south of its existing location (height of penetration times slope -  $18' \times 20 = 360'$ ). This would reduce landing distance available for arriving aircraft to an unacceptable degree.

The existing Runway 16 displaced threshold marking considers Road 4 the controlling obstruction. Again, roads of this category are considered 15-foot-high obstructions by FAR Part 77. The existing displaced threshold is marked at a location approximately 500 feet from the south edge of the right-of-way of the road. The approach surface begins at a location that is 200 feet north of the marked threshold. From this location it takes 300 feet of lateral distance for the approach slope to rise to a 15-foot height. The displaced threshold for Runway 16 is therefore marked in the appropriate location if the road,

not the tree, is to be considered the ultimate controlling obstruction.

It is important to note that the tree also penetrates, by approximately 25 feet, the ordinance that is currently in place.

This plan therefore considers the road the Runway 16 ultimate controlling obstruction as it is assumed that the tree will either be lowered to the extent that it does not penetrate the approach slope or removed altogether.

The approach for Runway 34 does not have an obstruction that penetrates the 20:1 slope. The nearest structure or object is 773 feet south of the existing displaced threshold marking. Instead the displaced threshold location is dictated by the easement that controls heights of objects on property south of the canal. The displaced threshold coincides with the end of the runway that existed when the easement was put in place.

The easement allows structure heights beginning at approximately 7 feet at the north edge of the property. Structure height limitations rise at a 20:1 or 5 percent slope as the easement progresses southward. The existing displaced threshold is considered to be in an appropriate location.

### ***Recommendations***

Maintain the displaced threshold markings for both runway ends at their current locations. Reduce the height of the tree that extends into the Runway 16 approach slope to a degree that will allow for a clear 20:1 approach.

Refer to drawings C1.2A, C1.2B, and C1.3 - C1.5 of the drawing set and the easements that are contained in the appendix to this plan.

## **4.7 HANGAR AND TIE-DOWN DEVELOPMENT**

This section discusses whether Moses Lake Municipal Airport has sufficient property to

accommodate forecast based and itinerant aircraft.

Chapter 3 indicates that 49 aircraft are currently based at Moses Lake Municipal Airport and that an additional 26 aircraft are expected to be based at the airport at the end of the planning period.

Based aircraft are currently accommodated on both the east and west sides of the airport. The east side of the airport and the north portion of the west side are generally used for commercial aircraft hangars. The east side also has a tie-down area for outside storage of both based and transient aircraft. The central and south portions of the west side of the airport are used for hangar storage of based aircraft.

This plan recommends that tie-down space for transient aircraft be expanded and improved on the east side of the airport near the operations building and that over time, as demand by transient aircraft dictates, based aircraft tie-downs be moved to the west side, south of property 33.

Properties 34 through 40 on the west side of the airport contain sufficient space for forecast based aircraft if the available space is used judiciously. A tie-down area should be developed for individuals who have aircraft but who do not have hangars. Tie-down areas should be limited in scale, as most owners of based aircraft will wish to store their aircraft in hangars due to winter weather conditions. Future hangars on properties 34 through 40 should include T-hangars that will make better use of available space.

If the Moses Lake Municipal Airport Commission decides that development of T-hangars as opposed to individual hangars, on remaining west-side property is, in fact, the best way to maximize remaining property the commission should work with the city to develop regulations that mandate them.

Paving and other improvements of Municipal Hangar Road, and installation of utilities on the west side of the airport beyond the city's operations complex should occur as this area is developed to accommodate aircraft.

## **4.8 FAR PART 77 TRANSITIONAL SURFACE LINES**

On the airport layout plan (Drawing C1.2A and B) are two lines that are parallel to the runway that are noted as "FAR Part 77 Transitional Surface at 15 feet." These lines are established to help plan locations for structures. Generally, these lines, sometimes called "building restriction lines," or BRLs, are located so that FAR Part 77 transitional surfaces will not be penetrated by planned structures. Structure heights are typically considered to be 15 feet for planning purposes.

Transitional surfaces are perpendicular to an airport's runway. Outward and upward slopes begin at another FAR PART 77 surface called the "primary surface," which at Moses Lake Municipal Airport is 125 feet from centerline on both sides of the runway. Primary surfaces increase 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 specifies 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. 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.

Heights and locations of all structures, power poles, flag poles and trees on and adjacent to Moses Lake Municipal Airport have been reviewed in terms of their relationships to FAR Part 77 Transitional Surfaces. It has been determined that one structure, two poles and two trees that are located on the east side of the airport penetrate the FAR Part 77 Transitional Surface to a minor degree. These penetrations may be seen on drawing C1.5. No action is recommended with respect to these minor penetrations.

## 4.9 ZONING AND LAND USE

Forecasting usage and scheduling improvements at Moses Lake Municipal Airport will ultimately prove to be fruitless exercises unless meaningful efforts continue to be used to protect this facility. Airports in the United States close routinely, not because of a lack of funds to keep them open but because municipalities and counties did not anticipate and address the negative impacts of encroachment and the insidious advance of incompatible land uses.

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

Development exists and will continue in areas adjacent to the airport. Given development pressures, the city and Grant County have made reasonable efforts to protect the airport from incompatible land uses. Land immediately west of Moses Lake Municipal Airport has recently

been used for construction of a city operations complex. This use is compatible with airport operations. It also serves as a buffer between the airport and properties to the west.

Tools that can help prevent development that is incompatible with airport operations from occurring are the city and county comprehensive plans and the city's zoning ordinance. Recommended actions in this section involve changes in Moses Lake's comprehensive plan and zoning ordinance. Some would require coordination with Grant County. These actions are also depicted in drawings C 1.6, titled "Zoning and Land Use," and C 1.7, titled "Exhibit A."

### **Recommendation 1: Amend the city's comprehensive plan to include policies supportive of airport operations**

Moses Lake's comprehensive plan, adopted in 2001, plans for future growth and development within city limits and urban growth areas. The plan's essential public facilities, land use, and transportation elements do not contain any specific policies regarding Moses Lake Municipal Airport. Within the essential public facilities element, the plan states that the city will adopt a list of essential public facilities. If not already identified, the city should add Moses Lake Municipal Airport to this list.

Specific recommendations:

#### ***Essential public facilities element***

Goal 1:

- Recognize Moses Lake Municipal Airport as an essential public facility and discourage land uses that may promote incompatible development adjacent to the airport.

#### ***Land-use element***

Goal 2:

- Coordinate the protection of Moses Lake

Municipal Airport with Grant County by developing consistent development regulations that utilize WSDOT Aviation Airport and Land Use Compatibility guidelines and other best management practices for encouraging compatible land uses adjacent to the airport.

A goal addressing airport land use should be added to the land use element. Under this goal, sample policies related to airport/community land-use compatibility should:

- Protect the viability of the airport as a significant economic resource to the community by encouraging compatible land uses, densities, and reducing hazards that may endanger the lives and property of the public and aviation users.
- Evaluate all proposed amendments to the comprehensive plan, capital facilities plan and/or urban growth area (UGA) that might increase incompatible land uses or have the potential of incompatible development adjacent to the airport through inappropriate land use or zoning designations and/or inadvertent land use policies.

### ***Transportation element***

Goal 3:

- Recognize Moses Lake Municipal Airport as an integral part of a larger multi-modal transportation system.

Goal 4:

- Identify, preserve, and enhance the airport, through interjurisdictional planning, goals, policies and development regulations that promote significant regional transportation linkages and multimodal connections to and from the airport.
- Encourage economic development opportunities and aviation related uses adjacent to the airport.

Grant County's comprehensive plan includes a section related to airports and includes a transportation related policy that Moses Lake should also add to its transportation policies. Under the objective to provide for adequate transportation connections to the airport, a policy in Grant County's plan states, "Support expanded intermodal connections to airport facilities where practical to ensure sufficient transportation connections to these facilities."

### **Recommendation 2: Coordinate with Grant County to adopt an airport overlay zone**

Considering existing and anticipated development north, south and west of the airport, it is advisable to establish an airport overlay zone to help prevent negative impacts to airport operations. An overlay zone would address height limits of structures that would otherwise be permitted to obstruct air space. Grant County already has an airport overlay zone that is applied elsewhere in the county. We recommend that the city coordinate with the county to develop a consistent code and also see that the overlay zone is applied to unincorporated properties that are directly influenced by the airport.

Of particular importance are the protection of FAR Part 77 Transitional and Approach Surfaces. This regulation would be a replacement for the existing airspace easements.

### **Recommendation 3: Correct terminology in the zoning ordinance's municipal airport zone**

Several corrections are needed under Section G of the municipal airport zone's development standards (Chapter 18.35.050 of Moses Lake municipal code). The object-free area boundary defined under item 1 should be changed from 300 feet to 240 feet. In the same section, under item 2, the term "Object-Free Area" should be changed to FAR Part 77 Primary Surface. Under item 3, remove "as defined in the Airport Development Plan" from the end of the sentence.

These recommended changes should be made by the Airport Commission to the Planning Commission.

### **Additional zoning and land-use considerations**

#### ***Required notice of construction***

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

#### ***Property Owner Notification Requirements***

Due to the proximity of existing and future residential neighborhoods near the airport, a process should be formalized requiring the county and city to inform purchasers of property around the airport that their property is located adjacent to, or within close proximity to, Moses Lake Municipal 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 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 Moses Lake Community Development 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.)

### **Resources**

Both Airside and the WSDOT/AD are willing to assist the city of Moses Lake and Grant County as they continue to work with zoning and comprehensive plan issues. Airside may be reached at (360) 222-3646. The Aviation Division may be reached at (360) 651-6300.

# Chapter 5:

## Financial

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Chapter 4 contained information about airport improvements that are intended to meet forecast demand and increase safety, utility and efficiency at Moses Lake Municipal Airport. This chapter identifies the cost of those improvements and establishes a plan to pay for them.

### 5.1 GENERAL FINANCIAL INFORMATION

#### Cost estimates

Project cost estimates are in 2009 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 Moses Lake will need to adjust the 2008-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.

#### Hangars

Chapter 4 and the airport layout plan drawing indicate future multi-position hangars west of Taxiway B near the airport's south end. Hangar layouts include eight-place and six-place nested T-hangars and four- and five-place standard

T-hangars. One of the primary aircraft hangar manufacturing firms indicated that hangar costs are, as of this program's publish date, approximately \$50 per square foot. Assumptions include concrete floors, electrical components and bi-fold doors but not fire-extinguishing systems.

#### 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 Moses Lake 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 Moses Lake Municipal Airport.

#### 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 Economic 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 or limited cost to the city of Moses Lake because of assumed third-party financing.

### **Rates and charges**

It is very important at Moses Lake Municipal Airport, as with all airport facilities, that careful attention be paid to determinations of rates and charges. Small airports have limited abilities to collect revenue. It is often the case that fees that sponsors of small airports charge for based aircraft tie-downs, land leases, overnight tie-downs, fuel and other services are lower than what might be considered market value. In some cases, fees — with the exception of those associated with fuel — are not charged at all.

Clearly, sponsors of most small airports do not have the ability to collect revenue that is sufficient to pay for major capital improvements. It is important that airport sponsors do their best to maximize revenue while being cognizant of the ability of those engaged in general aviation to pay. In this way, airport sponsors can show that they are doing their best to contribute to the needs of their airports.

When establishing rates and charges, airport sponsors should consider the positive effects of volunteerism. Clearly, this airport has benefited from the efforts of the members of the commission that manages it and the relationship between the commission and the city. 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 Moses Lake to carefully consider the value of Moses Lake Municipal Airport property as it looks forward to growth and major capital improvements. A periodic review of airport-related property lease fees and access fees is recommended. Fees should be adjusted to reflect real market conditions. This plan does not recommend a change in fees but does recommend a procedure be established to routinely evaluate and alter fees as the commission deems appropriate.

### **Financing of this development program**

As stated, the Washington State Department of Transportation's Aviation Division (WSDOT/AD) is Moses Lake Municipal Airport's primary source of grant funds for airside improvements. Airside improvements are those that relate to the runway/taxiway system, the aircraft parking apron and navigational aids, including signage. Planning and engineering for projects that are eligible for WSDOT/AD construction grants are also eligible for grant funds. For additional information about eligibility of projects for WSDOT/AD grants, as well as the division's project priority system and application process, see their website: <http://www.wsdot.wa.gov/aviation/grants/default.htm>. Under the Grant Program tab see the Grant Procedures Manual.

The grant cycle following publication of this plan has not been announced by WSDOT/AD but is assumed by Airside to occur during the spring of 2010. This plan should be used to prepare a grant request that will be submitted to WSDOT/AD in a timely manner once that cycle is announced.

### **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. Actions that help prevent runway incursions are particularly important at airports such as Moses Lake Municipal that are active and that have numerous locations where aircraft can enter the runway. This is an excellent program that targets a high-priority safety issue.

### **Department of Commerce and Economic Development Administration**

Sources of grant funds for landside-related projects such as structures, roads and utilities are the Washington State Department of Commerce (DOC) and the United States Department of Commerce/Economic Development Administration (DOC/EDA).

WSDOC's contact information is:

Washington State Department of Commerce  
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 CURRENT EFFORTS**

In July 2009 a slurry surface was applied to the runway and taxiway system at Moses Lake Municipal. Repainting of all runway and taxiway markings has been completed. Routine

maintenance of paved surfaces is included in the capital improvement program during each of the five-year periods.

## **5.3 RECOMMENDED PROJECTS**

This section estimates costs of projects over the 20-year planning period that are listed and explained in Chapter 4. Table 16 provides details about how project costs have been calculated. Table 17 indicates planned sources of funds for the projects. Table 18 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 16: 20-year capital improvement program details**

<b>Item</b>	<b>2010 – 2014 projects</b>	<b>Detail cost</b>
A1	On and off airport signs	\$10,000
A2	Inclusion of airport in city marketing and branding plan	\$2,000
A3	Adjustment of development standards	\$0
A4	Perimeter fence	\$200,000
	<b>Total 2010 – 2014 projects</b>	<b>\$212,000</b>
	<b>2015 – 2019 projects</b>	
B1	Straighten Municipal Airport Road	\$120,000
B2	Plan and construct terminal area Welcome center Paving Landscaping Utilities Total	\$150,000 \$100,000 \$20,000 \$20,000 <b>\$290,000</b>
B3	Install aviation gasoline (AVGAS) system	\$80,000
B4	Tie-down additions	\$10,000
B5	Landscaping and lighting program	\$50,000
B6	GPS instrument procedure	\$10,000
B7	Development of southwest side of airport T-hangars (32,256 SF covered) Paving of taxilanes (21,570 SF) Extension of Municipal Hangar Road and utilities Total	\$1,612,800 \$75,000 \$570,000 <b>\$2,257,800</b>
B8	Install Automated Weather Observing System (AWOS)	\$100,000
B9	Runway hold-line safety improvements Lighted runway hold-line signs Total	\$50,000 <b>\$50,000</b>
B10	Lights for taxiways A and B	\$180,000
B11	Restroom/ aircraft wash facility – west side	\$160,000
B12	Pavement maintenance and re-stripping	\$60,000
	<b>Total 2015 – 2019 projects</b>	<b>\$3,257,800</b>
	<b>2020 – 2024 projects</b>	
C1	Continued landscaping	\$10,000
C2	Pavement maintenance and re-stripping	\$60,000
	<b>Total 2020 – 2024 projects</b>	<b>\$70,000</b>
	<b>2025 – 2029 projects</b>	
D1	Pavement maintenance and re-stripping	\$60,000
	<b>Total 2025 – 2029 projects</b>	<b>\$60,000</b>
	<b>Total CIP 2010 - 2029</b>	<b>\$3,599,800</b>

**Table 17: 20-year capital improvement program recommended cost distribution**

Item	Project	Total cost	WSDOT/AD	City of Moses Lake	Private or other grant agency	Volunteer labor, materials and equipment
<b>2010-2014</b>						
A1	Pavement maintenance	\$10,000	\$9,500	\$500	0	0
A2	Video system	\$5,000	\$4,750	\$250	0	0
A3	Signs	\$10,000	0	\$10,000	0	0
A4	Marketing	\$2,000	0	\$2,000	0	0
A5	Development standards	0	0	0	0	0
A6	Fence	\$200,000	\$190,000	\$10,000	0	0
	<b>Total 2010 - 2014</b>	<b>\$212,000</b>	<b>\$201,400</b>	<b>\$10,600</b>	<b>0</b>	<b>0</b>
<b>2015 - 2019</b>						
B1	Airport Road	\$120,000	0	\$60,000	\$60,000	0
B2	Terminal area	\$290,000	\$95,000	\$95,000	\$100,000	0
B3	AVGAS	\$70,000	\$35,000	\$35,000	0	0
B4	Tie-downs	\$10,000	\$5,000	\$4,000	0	\$1,000
B5	Landscaping/lighting	\$50,000	0	\$45,000	0	\$5,000
B6	GPS	\$10,000	\$5,000	\$5,000	0	0
B7	Southwest development	\$2,257,800	\$71,000	\$200,000	\$1,986,800	0
B8	AWOS	\$100,000	\$80,000	\$20,000	0	0
B9	Hold lines	\$50,000	\$47,000	\$3,000	0	0
B10	Taxiway lights	\$180,000	\$170,000	\$10,000	0	0
B11	West side restroom and wash facility	\$60,000	0	\$60,000	0	0
B12	Pavement maintenance	\$60,000	\$50,000	\$10,000	0	0
	<b>Total 2015 - 2019</b>	<b>\$3,257,800</b>	<b>\$558,000</b>	<b>\$547,000</b>	<b>\$2,146,800</b>	<b>\$6,000</b>
<b>2020 - 2024</b>						
C1	Landscaping	\$10,000	0	\$10,000	0	0
C2	Pavement maintenance	\$60,000	\$50,000	\$10,000	0	0
	<b>Total 2020 - 2024</b>	<b>\$70,000</b>	<b>\$50,000</b>	<b>\$20,000</b>	<b>0</b>	<b>0</b>
<b>2025 - 2029</b>						
D1	Pavement maintenance	\$60,000	\$50,000	\$10,000	0	0
	<b>Total 2025 - 2029</b>	<b>\$60,000</b>	<b>\$50,000</b>	<b>\$10,000</b>	<b>0</b>	<b>0</b>
	<b>Total CIP</b>	<b>\$3,599,800</b>	<b>\$859,400</b>	<b>\$587,600</b>	<b>\$2,146,800</b>	<b>\$6,000</b>

**Table 18: Capital improvement program expenditure by phase**

<b>Phase</b>	<b>CIP total cost</b>	<b>WSDOT/AD</b>	<b>City of Moses Lake</b>	<b>Private or other grant agency</b>	<b>Volunteer labor, materials and equipment</b>
2010 – 2014	\$212,000	\$204,400	\$10,600	0	0
2015 – 2019	\$3,257,800	\$558,500	\$547,000	\$2,146,800	\$6,000
2020 – 2024	\$70,000	\$50,000	\$20,000	0	0
2025 - 2029	\$60,000	\$50,000	\$10,000	0	0
<b>Total</b>	<b>\$3,599,800</b>	<b>\$859,400</b>	<b>\$587,600</b>	<b>\$2,146,800</b>	<b>\$6,000</b>