Chapter Four: FACILITY REQUIREMENTS

La Grande / Union County Airport

Airport Master Plan Update

FINAL – March 2018

Introduction

In this chapter, existing airport facilities at the La Grande / Union County Airport (Airport) are evaluated to identify their functionality, condition, compliance with design standards, and capacity to accommodate demand projected in Chapter Three, *Aeronautical Activity Forecasts*.

The objective of this effort is to identify, in general terms, what facilities are needed and the adequacy of the existing facilities in meeting those needs. Where differences between existing and needed facilities are noted, this chapter identifies when those additional facilities may be needed. Once the facility requirements have been established, alternatives for providing these facilities will be created with input from the Planning Advisory Committee (PAC), Oregon Department of Aviation (ODA), and Federal Aviation Administration (FAA). The alternatives will be discussed in Chapter Five.

Actual development will be demand driven as projected demand may accelerate beyond or lag behind the forecasts at various times during the 20-year planning term. All requirements identified in this chapter will comply with existing FAA standards and recommendations. Additionally, existing deviations from the requirements will be documented and analyzed.

For comprehensive planning purposes, the needs discussed in this chapter will not be limited to those facilities and services that might be funded or provided by the County, State, or FAA but also anticipate facilities and services that private entities may provide.

Airport Planning and Development Criteria

The development and use of planning criteria ensures that recommended improvements and proposed development align with the goals and objectives of the national, state, regional, and local air transportation systems, appropriate aviation industry segments, and the airport sponsor's vision. Sources for airport planning criteria include:

- FAA – Design guidelines found in Advisory Circular (AC) 150/5300-13A, *Airport Design*, provide the planning criteria with respect to current and future critical or design aircraft for the runways, taxiways, and apron areas.
- Oregon Aviation Plan (OAP) – Provides a distribution of airports by classification, as well as recommendations and direction on how to meet the state's long-term commercial and general aviation (GA) needs. The OAP also provides a set of performance objectives based on the airport's classification.
- Transportation Security Administration (TSA) – Although TSA does not regulate GA airports, such as the La Grande / Union County Airport, it does provide guidance for security at GA airports. The guidelines provided by the TSA are tailored to an airport's size and risk level.
- Business Aviation Industry – The National Business Aviation Association (NBAA) represents the industry and provides recommendations airport facilities and services to accommodate business aviation needs.

- Union County, Airport Users, Planning Advisory Committee (PAC) – Stakeholders, via surveys and meeting participation, provided input specific to the Airport. Users of the Airport are the most accurate source to understand safety and operations concerns that affect the flying public. The local airport community is an important source since its operational issues, community relationships, and future vision for the airport help shape the list of future facility needs.

Federal, State, and Industry Criteria

Federal and State planning criteria are further detailed below, along with industry criteria.

The FAA specifies design standards by Airport Reference Code (ARC), Runway Design Code (RDC), and instrument approach visibility minimums. The ARC is a coding system used to relate airport design criteria to the operational (Aircraft Approach Category – AAC) and the physical characteristics (Airplane Design Group – ADG) of the airplanes intended to operate at an airport. Individual runways are designated by RDC, using the same coding system described for the ARC, to allow for greater planning flexibility for airports with more than one runway. The ARC is the most demanding RDC at a given airport.

In the previous chapter it was determined that the Runway 16-34 RDC is B-II, while the RDC for Runway 12-30 should be C-IV – although the FAA only supports C-III at this time. It was determined that the ARC at the Airport is C-IV, which is exemplified by the Hercules C-130.

ODA created general guidelines in the OAP for airport planning and development based on the roles, or categories, of airports within the statewide system. The OAP identified five airport categories, each with its own set of performance criteria. The categories are based on factors such as the Airport's function, the type and level of activity at the Airport, and the facilities and services available. The categories are:

- Category I – Commercial Service Airports
- Category II – Urban General Aviation Airports
- **Category III – Regional General Aviation Airports**
- Category IV – Local General Aviation Airports
- Category V – RAES (Remote Access/Emergency Service) Airports

The La Grande / Union County Airport is classified as Category III – Regional General Aviation Airport. The function of this category is to support primarily single and multi-engine aircraft and may also accommodate business jets. The OAP identified a few deficiencies at the Airport for meeting Category III minimum and desired criteria. The OAP recommends the Airport should install Runway 16-34 and taxiway lighting to meet the minimum criteria. For the Airport to meet the desired criteria, it should have an area on the apron designated for cargo loading/unloading, and precision approach.

New technology allows instrument approaches using the Global Positioning System (GPS) to be implemented at a minimal cost, in terms of navigational aids and cockpit equipment. For many small GA airports, however, the cost of upgrading facilities (*e.g.*, larger safety area, installing lights) to the minimum requirements for the different approach visibility categories is a significant constraint to establishing an instrument approach. This chapter presents the requirements of all the different instrument approach visibility minimums, to aid in assessing the feasibility of an instrument approach, considering existing constraints.

The Airport currently has two nonprecision instrument approaches (NDB and RNAV (GPS)). For determining airport design criteria, instrument approach visibility minimums are divided into three categories:

- Visual and not lower than one-mile (currently at the Airport)
- Not lower than ¾-mile
- Lower than ¾-mile

A precision instrument approach is just one of the features more important to business aviation than to operators of smaller piston aircraft for personal use. Some Airport users and members of the PAC have highlighted the need for such enhancements, to attract and maintain high performance business aircraft. They realize that having a business jet-capable airport can boost regional and community economic development and increase airport revenue. The NBBA provides optimum and minimum airport requirements for corporate jets. In comparing the minimum requirements for light jet and turboprop aircraft the Airport lacks a precision approach, but meets all other minimum recommendations.

The FAA cannot use economic development as a criterion for funding airport improvements and, with few exceptions, cannot fund revenue-generating projects. However, Union County, the State of Oregon and the private investors in airport improvements can rank economic development and revenue generation high among their investment priorities.

Cargo is another component of GA activity that must be considered at the Airport, as Ameriflight and FedEx are both regular users. As the OAP acknowledges, an appropriate place to park a cargo aircraft is the primary need, since often the cargo is transferred directly between the airplane and a vehicle on the apron. Security is a concern for air cargo, particularly for aircraft over 12,500 pounds and for vehicular access to the apron. Having a better instrument approach would enhance airport use for cargo operators, since it would reduce the time that the airport is unavailable for their use.

Locally, and regionally, the Airport plays a significant role in wildland fire suppression being home to the US Forest Service's (USFS's) Regional Tanker Base. Large Air Tankers, Single Engine Air Tankers, and helicopters use the Airport heavily during the summer/fall fire season. The USFS, as well as other agencies such as Oregon Department of Forestry and US Bureau of Land Management that contract fire suppression aircraft, rely on the Airport to manage the vast wilderness of Northeastern Oregon.

Airfield Requirements

As discussed in Chapter 2, airfield facilities are those that are related to the arrival, departure, and ground movement of aircraft. Airfield facility requirements are addressed for the following areas:

- Airfield Capacity
- Airfield Design Standards
- Runway Orientation, Length, Width, and Pavement Strength
- Taxiways
- Airport Visual Aids
- Airport Lighting

- Radio Navigational Aids & Instrument Approach Procedures
- Other Airfield Recommendations

Airfield Capacity

A demand/capacity analysis measures the capacity of the airfield configuration by determining its Annual Service Volume (ASV). This measure is an estimate of an Airport's maximum annual capacity based on factors such as aircraft mix and weather conditions, among others. FAA Advisory Circular (AC) 150/5060-5, *Airport Capacity and Delay*, provides guidance on determining an airport's ASV. The annual capacity of two intersecting runways with parallel taxiways, such as at the Airport, is approximately 230,000 operations (takeoffs, landings, and training operations). The forecast projects annual operations of 20,585 by 2034 is well below the maximum capacity of the existing airfield system.

In addition to ASV, *Airport Capacity and Delay* also provides guidance on determining peak hour capacity. For the Airport, the peak hourly capacity during VFR conditions is 98 operations, which is well above the anticipated peak hour activity of 20 by 2034. Therefore, the Airport is expected to have sufficient hourly capacity throughout the 20-year planning period.

Airfield Design Standards

FAA AC 150/5300-13A (Change 1), *Airport Design,* sets forth the FAA's recommended standards for airport design, which are primarily safety-driven. Design standards are specific to airports, based on the Airport's design aircraft. The design aircraft is the most demanding aircraft that operates or is forecast to operate at the Airport on a regular basis. The design aircraft may be a specific aircraft or a composite of aircraft characteristics. Individual runways can be designated different design aircraft. At the La Grande / Union County Airport, the Runway 16-34 design aircraft is the Fairchild Metroliner and the forecast Runway 12-30 design aircraft is the C-130 Hercules. Table 3P, in Chapter 3, highlights the Aircraft Approach Category (AAC) and Airplane Design Group (ADG) characteristics of these design aircraft.

In addition to the Airport Reference Code (ARC) mentioned in Chapter 3, the FAA's Design AC introduced the Runway Design Code (RDC), which is based on planned development and signifies the design standards to which the runway is to be built. The RDC is composed of three components, the AAC, ADG, and Visibility Minimums. The first component, AAC, is depicted by a letter (A through E) and relates to the approach speed of the design aircraft. The second component, ADG, is depicted by a roman numeral (I through VI) and relates to either aircraft wingspan or tail height; whichever is most restrictive. The third component relates to runway visibility minimums as expressed in Runway Visual Range (RVR) equipment measurements. RVR-derived values represent feet of forward visibility that have statute mile equivalents (*i.e.*, 2400 RVR = ½-mile). Table 4A provides a summary of the RDC classifications.

Table 4A. Runway Design Code Classifications

Aircraft Approach Category (AAC)		
AAC	**Approach Speed (knots)**	
A	less than 91	
B	91 to 120	
C	121 to 140	
D	140 to 165	
E	greater than 166	
Airplane Design Group (ADG)		
Group #	**Tail Height (ft)**	**Wingspan (ft)**
I	<20	<49
II	20 - <30	49 - <79
III	30 - <45	79 - <118
IV	45 - <60	118 - <171
V	60 - <66	171 - <214
VI	66 - <80	214 - <262
Approach Visibility Minimums		
RVR (ft)	**Flight Visibility Category (statute mile)**	
4000	lower than 1 mile but not lower than ¾ mile	
2400	lower than ¾ mile but not lower than ½ mile	
1600	lower than ½ mile but not lower than ¼ mile	
1200	lower than ¼ mile	

Source: FAA AC 150/5300-13A (Change 1)

As discussed in Chapter 3, *Forecasts*, the current and future design aircraft for Runway 16-34 fits within the AAC and ADG of B-II. The FAA has not concurred with the design aircraft for Runway 12-30. The FAA supports an AAC and ADG of C-III, whereas Union County supports and AAC and ADG of C-IV. The visibility minimums for the two nonprecision approaches at the Airport gives the runways a RDC of "visual" as they are both greater than 1 mile.

The FAA design standards represent the primary consideration for all planning efforts. These standards aim at optimizing the safety of operations. A few of the more critical design standards are those for runways and the areas surrounding runways, including:

Runway Safety Area (RSA): The RSA is a defined surface surrounding the runway that is prepared or suitable for reducing the risk of damage to airplanes in the event of an airplane undershoot, overshoot, or an excursion from the runway.

Object Free Area (OFA): The OFA is an area on the ground centered on the runway or taxiway centerline that is provided to enhance the safety of aircraft operations. No above ground objects are allowed except for those that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes.

Obstacle Free Zone (OFZ): The OFZ is a volume of airspace below 150 feet of the established airport elevation that is required to be clear of objects, except for frangible items required for the navigation of aircraft. It is centered along the runway and extended runway centerline and protects the transition of aircraft to and from the runway.

Runway Protection Zone (RPZ): The RPZ is defined as an area off each runway end whose purpose is to enhance the protection of people and property on the ground. The RPZ is trapezoidal in shape and centered about the extended runway centerline. The dimensions of an RPZ are a function of the RDC. The FAA recommends that RPZs be clear of all residences and places of public assembly (churches, schools, hospitals, etc.) and that airports own the land within the RPZs.

Surface Gradient. The maximum allowable longitudinal grade on existing runways varies, depending on its AAC. For AAC B runways the maximum grade is 2.0%, whereas for AAC C runways the maximum grade is 1.5% with the first and last quarter of the runway length being no more than 0.8%.

Building Restriction Lines (BRL). A BRL is the line indicating where airport building must not be located, limiting building proximity to aircraft movement areas. The BRL should be set beyond the RPZs, OFZs, OFAs, runway visibility zone, NAVAID critical areas, and area required for terminal instrument procedures (TERPS). The location of the BRL is dependent upon the selected allowable structure height. The closer development is allowed to the Aircraft Operations Area (AOA), the more impact it will have on future expansion capabilities of the airport.

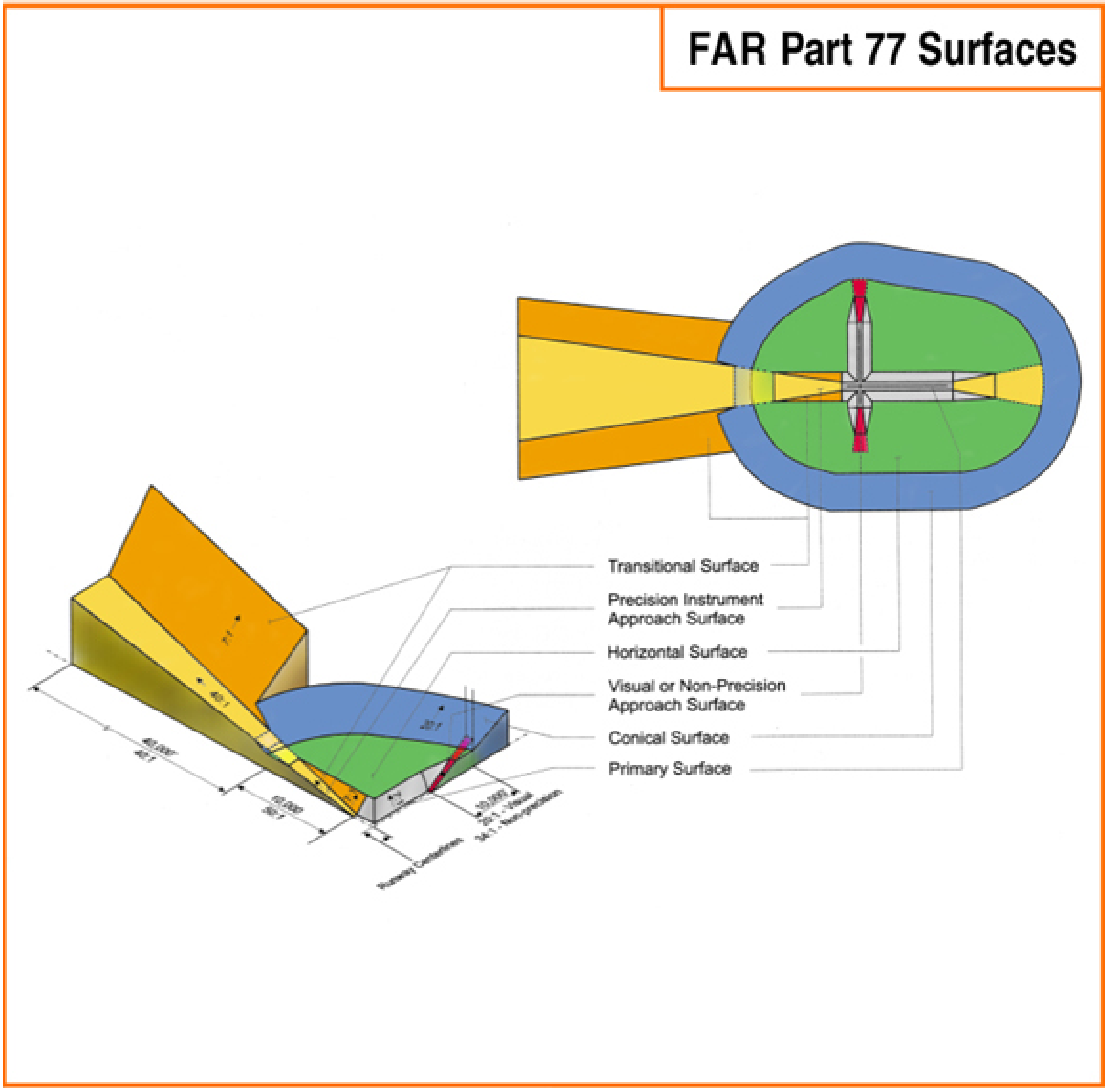
Runway Visibility Zone. This zone is an area formed by imaginary lines connecting the two runways' visibility points. Terrain needs to be graded and permanent objects need to be designed or sited so that there is an unobstructed line of sight from any point five feet above on runway centerline to any point five feet above an intersecting centerline, within the runway visibility zone.

Federal Aviation Regulation (FAR) Part 77, Objects Affecting Navigable Airspace. Title 14, Code of Federal Regulation (CFR) Part 77, *Safe, Efficient Use, and Preservation of the Navigable Airspace*, defines and established the standard for determining obstructions that affect airspace in the vicinity of an airport. Prior to any development Union County must request the FAA conduct an airspace evaluation to determine the impact to the national airspace system and air safety, regardless of project scale. Part of the airspace evaluation involves the determination of the impact of proposed development on an airport's imaginary surfaces. Imaginary surfaces are geometric shapes that are in relation to an airport an each runway, as defined in 14 CFR Part 77. The size and dimensions of these imaginary surfaces are based on the category of each runway for existing and planning airport operations.

Under FAR Part 77, an aeronautical study can be undertaken by FAA to determine whether the structure in question would be a hazard to air navigation. However, there is no specific authorization in any statute that permits the FAA to limit structure heights or determine which structures should be lighted or marked. In fact, in every aeronautical study determination, the FAA acknowledges that state or local authorities have control over the appropriate use of property beneath an airport's airspace.

The five imaginary surfaces are the Primary, Approach, Horizontal, Conical, and Transitional. Any object that penetrates these surfaces is considered an obstruction and may affect navigable airspace. Unless these obstructions undergo additional aeronautical study to conclude they are not a hazard, obstructions are presumed to be a hazard. Hazards to air navigation may include terrain, trees, permanent or temporary construction equipment, or permanent or temporary manmade structures. **Exhibit 4A** highlights these fives surfaces, with text following with detailed definitions.

Exhibit 4A. FAR Part 77 Imaginary Surfaces



Source: Virginia Department of Aviation.

Primary Surface. The primary surface is longitudinally centered on a runway. When the runway has a hard surface, the primary surface extends 200 feet beyond each end of the runway. The width of a primary surface ranges, depending on the existing or planned approach and runway type.

Horizontal Surface. The horizontal surface is a horizontal plan located 150 feet above the established airport elevation, covering an area from the transitional surface to the conical surface. The perimeter is constructed by swinging arcs from the center of end of the primary surface and connecting the adjacent arcs by lines tangent to those areas. For all approaches to runways supporting large aircraft, the radius of each arc used to construct the horizontal surface is 10,000 feet.

Conical Surface. The conical surface extends upward and outward from the periphery of the horizontal surface at a slope of one foot for every 20 feet (20:1) for a horizontal distance of 4,000 feet.

Transitional Surface. Transitional surfaces extend outward and upward at right angles to the runway centerline, with the runway centerline extended at a slope of seven feet horizontally for each foot vertically (7:1) from the sides of the primary and approach surfaces. The transitional surfaces extend to where they intercept the horizontal surface at a height of 150 feet above the runway elevation.

Approach Surface. Longitudinally centered on the extended runway centerline, the approach surface extends outward and upward from the end of the primary surface. An approach surface is applied to each end of each runway based on the type of approach. FAA surfaces are 20:1 for visual approaches, 34:1 for nonprecision approaches, and 50:1[1] for precision approaches.

The critical FAR Part 77 surfaces will be identified in the Airport Layout Plan drawings. Existing Part 77 surfaces will be evaluated during the development of the ALP and any penetrations will be noted and addressed for removal or marking.

In addition to these design standards, the FAA provides recommended dimensions for runway width, taxiway width, taxiway safety areas, and others. It is important to note that while these are FAA recommendations, ODA generally follows the same criteria. The following tables compare the Airport's existing dimensions to the recommended design standards for each runway.

Table 4B presents Runway 16-34 for Airplane Design Groups (ADG) II, based on an RDC of B-II, along with various approach minimums. Areas where Runway 16-34 are deficient for visual and not lower than 1 mile visibility minimums are noted with an asterisk, which are runway width and approach RPZ, per Table 4B. Additional visibility minimums for not lower than ¾ mile and lower than ¾ mile are included for comparison and future discussion of alternatives.

[1] Precision instrument approach slope in 50:1 for the inner 10,000 feet and 40:1 for an additional 40,000 feet.

Table 4B. Runway 16-34 FAA Airfield Design Standards (RDC B-II)

Design Standard	Existing Dimension	Visibility Minimums	
		Visual and Not lower than 1 mile[2]	Lower than ¾ mile
Runway Width	60' *	75'	100'
Runway Centerline to Parallel Taxiway Centerline	350'	240'	300'
RSA **Width**	150'	150'	300'
Length beyond runway end	300'	300'	600'
OFA **Width**	500'	500'	800'
Length beyond runway end	300'	300'	600'
Precision OFZ **Width**	N/A	N/A	800'
Length	N/A	N/A	200'
RPZ **Inner Width x** **Outer Width x** **Length**	250' x 450' x 1,000' *	500' x 700' x 1,000'	1,000' x 1,750' x 2,500'
Runway Blast Pads **Width**	95'	95'	120'
Length	150'	150'	150'
Runway Shoulder Width	10'	10'	10'
Runway Centerline to Aircraft Parking	425'	250'	400'
Runway Holdline	200'	200'	250'
Taxiway Safety Area Width	79'	79'	79'
Taxiway Object Free Area Width	131'	131'	131'

**Does not meet current standard.*

Source: FAA AC 150/5300-13A (Change 1), Table 3-5, Runway Design Standards Matrix

Table 4C shows design standards for Runway 12-30. In addition to showing existing dimensions, both RDC of C-III and C-IV are included, per recommendation from Chapter 3, *Forecasts*. Options for various visibility minimums are included for comparison and future discussion for development of alternatives. Note there are no differences between C-III and C-IV for the design standards listed. The only difference is in relation to the RPZ for the visibility minimums. Runway 12-30 currently meets all criteria for both C-III and C-IV, with two exceptions. The first one is runway shoulder width, which will be addressed in an upcoming project. The second is runway width. Runway 12-30 was permitted an FAA Modification to Standard during the last Master Plan that stated, "the current critical aircraft is the C-130, the C-130 has a narrow undercarriage width (14'3") which, according to the manufacturer, allows it to operate on runways as

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[2] For visibility minimums of Not Lower than ¾ mile, design standards for Visual and Not Lower than 1 mile apply. The only difference is for RPZ, which would be 1,000' x 1,510' x 1,700'.

narrow as 60 feet wide. It is recommended that as long as the C-130 is the critical aircraft, the 100 foot runway width will be allowed to remain."

Table 4C. Runway 12-30 FAA Airfield Design Standards (RDCs C-III and C-IV[3])

Design Standard	Existing Dimension	RDC C-III Visibility Minimums		RDC C-IV Visibility Minimums	
		Visual and Not lower than 1 mile	Lower than ¾ mile	Visual and Not lower than 1 mile	Lower than ¾ mile
Runway Width	100' *	150'	150'	150'	150'
Runway Centerline to Parallel Taxiway Centerline	400'	400'	400'	400'	400'
RSA Width	500'	500'	500'	500'	500'
Length beyond runway end	1,000'	1,000'	1,000'	1,000'	1,000'
OFA Width	800'	800'	800'	800'	800'
Length beyond runway end	1,000'	1,000'	1,000'	1,000'	1,000'
Precision OFZ Width	N/A	N/A	800'	N/A	800'
Length	N/A	N/A	200'	N/A	200'
RPZ Inner Width x Outer Width x Length	500' x 1,010' x 1,700'	500' x 1,010' x 1,700'	1,000' x 1,750' x 2,500'	500' x 1,010' x 1,700'	1,000' x 1,750' x 2,500'
Runway Blast Pads Width	200'	200'	200'	200'	200'
Length	200'	200'	200'	200'	200'
Runway Shoulder Width	-[4]	25'	25'	25'	25'
Runway Centerline to Aircraft Parking	500'	500'	500'	500'	500'
Runway Holdline	250'	250'	250'	250'	250'
Taxiway Safety Area Width	118'	118'	118'	118'	118'
Taxiway Object Free Area Width	186'	186'	186'	186'	186'

**Does not meet current standard, but modification to standard is in place for C-130.*
Source: FAA AC 150/5300-13A (Change 1), Table 3-5, Runway Design Standards Matrix

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[3] For both RDC C-III and C-IV: visibility minimums of Not Lower than ¾ mile, design standards for Visual and Not Lower than 1 mile apply. The only difference is for RPZ, which would be 1,000' x 1,510' x 1,700'.

[4] Runway 12-30 shoulder width is non-standard. The upcoming Phase II of the 2013 Rehabilitation project will correct this deficiency.

Number and Orientation of Runways

The number of runways needed for an airport depends upon the level of aviation demand and wind coverage. The previous airfield capacity analysis concluded that the existing runway system is adequate for the 2034 unconstrained forecast of aircraft operations, as explained below.

For the operational safety and efficiency of an airport, it is desirable for the primary runway to be oriented as close as possible to the direction of the prevailing wind. This reduces the impact of crosswind components during landing or takeoff. Wind coverage is the percent of the time crosswind components are below an acceptable velocity. The desirable minimum wind coverage for an airport is 95%, based on maximum crosswind speeds that are defined for different sizes of aircraft (lower for smaller aircraft). Ten years of wind data at the Airport were gathered through the National Climatic Data Center and the results of this analysis are shown in **Table 4D**. Combined, both runways exceed the desired wind coverage for the smallest airplanes, which supports the need for two runways.

Table 4D. All Weather Wind Analysis

Crosswind Component	Runway 12-30	Runway 16-34	Both Runways
10.5 knots	90.84%	93.05%	99.56%
13 knots	94.98%	96.75%	99.84%
16 knots	98.13%	98.97%	99.59%

Source: NCDC AGIS Windrose Generator, date range 2007-2016.

Runway Length

The runway length required for an aircraft is different for landing and for takeoff, and it depends on several factors such as airport elevation, temperature, runway gradient, airplane operating weights, runway surface condition (*i.e.*, wet or dry), and others. FAA Advisory Circular 150/5325-4B, *Runway Length Requirements for Airport Design*, and the FAA's Airport Design Computer Program were consulted for guidance on recommended runway length at the Airport.

Both the Advisory Circular and the FAA's computer program classify aircraft based on weight. For "small" airplanes (those with maximum takeoff weights of 12,500 pounds or less), the classifications are further divided into two additional categories – small airplanes with fewer than 10 passenger seats and small airplanes with 10 or more passenger seats. Additionally, the program displays recommended runway lengths for airplanes between 12,500 and 60,000 pounds maximum takeoff weight. The computer program, using site-specific data, reflects runway length recommendation by grouping general aviation aircraft into several categories, reflecting percentage of fleet within each category. **Table 4E** summarizes the FAA's generalized runway length recommendations for the Airport.

Table 4E. Runway Length Requirements

Airport and Runway Data		
Airport elevation	2717 feet	
Mean daily maximum temperature of the hottest month	86° F	
Maximum difference in runway centerline elevation	5 feet	10 feet
Wet and slippery runways		
Runway Length Recommended for Airport Design		
	Runway 16-34	Runway 12-30
Small airplanes with less than 10 passenger seats		
To accommodate 75% of these small airplanes	-	-
To accommodate 95% of these small airplanes	4,150	4,150
To accommodate 100% of these small airplanes	4,650	4,650
Small airplanes with 10 or more passenger seats	4,600	4,600
Large airplanes of 60,000 pounds or less		
75% of these large airplanes at 60% useful load	5,300	5,350
75% of these large airplanes at 90% useful load	7,200	7,250
100% of these large airplanes at 60% useful load	6,350	6,400
100% of these large airplanes at 90% useful load	8,800	8,850

Source: FAA's Airport Design Computer Program, Version 4.2D, AC 150/5325-4B

Additional runway length requirements will be reviewed in Chapter 5, *Alternatives*.

Runway Width

The current runway width for both runways is deficient for the applicable standard. The standard width for Runway 16-34 is 75 feet, it is currently 60 feet. The standard width for Runway 12-30 (for both C-III and C-IV standards) is 150 feet. As stated previously, the current runway width of 100 feet was approved via Modification to Standard. Another Modification to Standard for the Runway 12-30 width will be pursued.

Runway Pavement Strength

The most important feature of airfield pavement is its ability to withstand repeated use by the most weight-demanding aircraft that operates at an airport. The current pavement strength for Runway 12-30 is rated at 99,000 pounds for Single Wheel Gear (SWG) aircraft and 129,000 pounds for Dual Wheel Gear (DWG). The pavement rating for Runway 16-34 is 45,000 pounds SWG and 60,000 pounds DWG. The pavement strength for both runways is adequate to accommodate the forecasted aircraft fleet mix.

Taxiways

Taxiways are constructed primarily to facilitate aircraft movements to and from the runway system. While some taxiways are necessary to provide access between the aprons and the runways, others are necessary to provide safe and efficient use of the airfield as activity increases at an airport. Advisory Circular AC 150/5300-13A (change 1) no longer bases taxiway design on Airplane Design Group (ADG). Taxiway design is, however, based on a newly established Taxiway Design Group (TDG), which is based on the overall Main Gear Width (MGW) and the Cockpit to Main Gear (CMG) distance.

The current, as well as the forecast, critical aircraft at the Airport fall within TDG 2 and smaller. The required width for taxiways serving TDG 2 aircraft is 35 feet. All taxiways at the Airport meet the required taxiway width of 35 feet.

Runway 12-30 is served by parallel Taxiway C, with a taxiway centerline to runway centerline separation of 400 feet. The 400 feet separation is recommended for taxiways serving C-III and C-IV aircraft.

Runway 16-34 is served by parallel Taxiway A. The taxiway centerline to runway centerline separation of 350 feet exceeds the RDC B-II standard of 240 feet. While it is acceptable to exceed this standard, it is recommended when the taxiway is rebuilt or additional ramp space is needed, consideration should be given to relocating the taxiway to meet the standard. By moving Taxiway A closer to the runway, to meet the standard separation, there will be a reduced potential for aircraft conflicts (parked vs. taxiing) and increased area for aircraft parking.

Two other taxiways, B and D provide access to and from the runway system. The 2014 Pavement Condition Index (PCI) rating for Taxiways A and C were listed as good, Taxiway B was listed as fair, and Taxiway D received a rating of poor. The taxilane system accessing Taxiway A from the hangar area was given a rating of fair, poor, and failed. Maintenance of these pavements should be considered in the capital improvement plan. Taxiway D is slated for rehabilitation as part of an upcoming project, which will be reflected in the capital improvement plan.

Airport Visual Aids

Airports commonly include a variety of visual aids, such as pavement marking and signage to assist pilots using the airport.

Pavement Markings. Runway markings are designed according to the type of instrument approach available on the runway. FAA Advisory Circular 150/5340-1J, *Standards for Airport Markings*, provides the guidance for airport markings. Nonprecision markings are currently in place on both runways and are in good condition. If a precision approach were to be implemented, the runway markings would need to be upgraded accordingly.

There are hold marking on all taxiways adjoining the runways. The purpose of hold markings is to ensure that aircraft waiting for arriving or departing aircraft to clear the runway are not in the RSA. In addition to hold markings, all taxiways are clearly marked with centerlines. Existing hold and taxiway marking at the Airport are adequate.

Airfield Signage. The Airport currently has hold signs on all taxiways adjoining the runways. There are no guidance or location signs on the taxiway system leading to the runways, however. It is recommended that guidance and location signs be installed, as appropriate.

Airport Lighting

Beacon. The Airport's rotating beacon is located near the southwest corner of the Airport property and is adequate for the planning period.

Visual Approach Aids. Both ends of Runway 12-30 have a two-light Precision Approach Path Indicator (PAPI); Runway 16 has a four-light PAPI system. This system should be maintained.

Runway and Taxiway Lighting. Runway 12-30 has Medium Intensity Runway Lighting (MIRL). All other movement areas on the Airport, including Runway 16-34, only have edge reflectors to provide effective ground movement of aircraft at night. Future improvements should include the installation of runway, taxiway, and taxilane edge lights, which would aid pilots at night and during low visibility.

The Airport is equipped with pilot-controlled lighting (PCL). PCL allows pilots to turn runway lighting on and control its intensity using the radio transmitter in their aircraft. The PCL system is energy-efficient and should be maintained.

Runway identification lighting provides pilots with a rapid and positive identification of the runway end. The most basic system involves runway end identifier lights (REILs). Runway 30 has REILs. It is recommended that all runway ends have REILs.

If an instrument approach with visibility minimums lower than 1 mile are implemented, an instrument approach lighting system would be required, to include omnidirectional approach lights (ODALs).

Radio Navigational Aids and Instrument Approach Procedures

Electronic and visual approach aids provide guidance to arriving aircraft and enhance the safety and capacity of the airfield. Such facilities are vital to the success of the airport and provide additional safety to passengers using the air transportation system. Instrument approaches are categorized as either precision or nonprecision. Precision instrument approach aids provide an exact alignment and decent path for an aircraft on final approach to a runway while nonprecision instrument approach aids provide only runway alignment information. Most existing precision instrument approaches in the United States are instrument landing systems (ILS) utilizing glide slope and localizer electric equipment installed adjacent to the runway.

With the advent of GPS, standalone instrument-assisted approaches will eventually be established that provide vertical guidance down to visibility minimums currently associated with precision instrument runways. As a result, airport design standards that formerly were associated with a type of instrument procedure (precision/nonprecision) are now revised to relate instead to the designated or planned approach visibility minimums. The FAA is continuing to expand development and use of GPS for use in aircraft navigation and instrument approach procedures via Area Navigation (RNAV) and the Wide Area Augmentation System (WAAS). WAAS utilizes a network of ground-based antennas to send correcting signals to the GPS satellite constellation, allowing for ILS-like accuracy. Instrument procedures published for the airport include a localizer performance with vertical guidance (LPV) approach as an RNAV (GPS) approach to Runway 16, and a nonprecision NDB-B approach to all runway ends. The minimum descent altitude (MDA) for the RNAV approach is 1,400 feet above ground level (AGL), which is restricted due to terrain with missed approach procedure corridor.

Alternatives should address the potential for additional and/or improved instrument approaches. However, terrain surrounding the Airport will likely limit the ability to realize lower approach minimums.

Helicopter Facilities

The Airport does not have a public helipad. Considering the number of current and forecasted helicopter operations, a helipad location should be designated. Discussions with airport management have indicated the helipads should be designed to accommodate a CH-47 Chinook or Sikorsky S-64 Skycrane, which are frequently used during fire suppression activities. The location should be away from the fixed wing tiedown area, so as to reduce damage from rotorwash.

Other Airfield Recommendations

Traffic Pattern. The current traffic pattern is standard left-hand traffic. The existing traffic pattern is adequate.

Wind Indicators / Segmented Circle. A segmented circle and lighted windsock are located mid-field. This system should be maintained, with supplemental wind indicators placed near the runway ends.

Weather Reporting. Real-time weather reporting at the Airport is supplied via Automated Weather Observing System (AWOS). The AWOS meets the Airport's weather reporting needs and should be maintained. An updated AWOS-III or an Automated Surface Observing System (ASOS) would be preferred, as they include a precipitation discriminator device.

Landside Requirements

Landside facilities support airside operations, such as the facilities necessary for handling aircraft and passengers while on the ground. The landside facilities consist of hangars, apron, aircraft tiedown space, access roads, GA terminal facility, and other support facilities. The capabilities and capacities of the various landside components are examined in relation to the projected demand to help identify future landside facility needs.

Hangars

The utilization of hangars varies as a function of local climate, security, and owner preferences. The trend in GA aircraft is toward higher performance, higher value aircraft. Therefore, many aircraft owners prefer enclosed hangar space to outside tie-downs. In planning for hangar development, the number and type of aircraft to be based at the Airport is analyzed. Hangar development should be based upon actual demand trends and financial investment conditions, not solely on forecasts.

At the Airport, 75 of the 76 based aircraft are currently stored in hangars. It is assumed that 98% of based aircraft will be hangared in the future. Hangar facilities at an airport typically consist of some combination of T-hangars and conventional hangars. T-hangars typically store one aircraft in one unit, while conventional hangars can store more than one aircraft in one large enclosed structure. In order to determine the number of T-hangars versus conventional hangars, the following assumptions were made:

- All multi-engine aircraft, turbojets, and helicopters will be stored in conventional hangars.
- 5% of all single engine aircraft stored in hangars will be stored in conventional hangars, while the remaining single engine aircraft will be stored in T-hangars.
- A ratio of 1,200 square feet per aircraft is used for T-hangar development.
- A ratio of 3,000 square feet will be used for conventional hangar development.
- 15% of total hangar space needs was added for aircraft maintenance and servicing.

Applying these assumptions, one additional T-hangar with a capacity for four airplanes (approximately 4,800 square feet) will be needed and nine additional conventional hangars (27,000 square feet) will be needed by 2034. **Table 4F** summarizes the hangar development needs for each milestone year.

For long-term planning purposes, possible hangar development area needs beyond the 20-year planning window, per Table 4F, should be considered in the development alternatives.

Table 4F. Landside Facility Needs

	2019	2024	2034	Planning Period Total
Additional Aircraft to be Hangared				
Single Engine	0	2	3	5
Multi-engine	0	0	2	2
Turbojet	1	0	0	1
Helicopters	2	1	2	5
Total				*13*
Hangar Positions				
T-hangar	0	2	2	4
Conventional	3	1	5	9
Total				*13*
Hangar Area Requirements (square ft)				
T-hangar Area	0	2,400	2,400	4,800
Conventional Hangar Area	9,000	3,000	15,000	27,000
Maintenance Area	1,350	810	2,610	4,770
Total Additional Area Needed	10,350	6,210	20,010	36,570
Tiedown Positions				
Based Aircraft Tiedowns	8	8	8	-
Transient Aircraft Tiedowns	17	18	20	-
Total Square Yards	11,380	11,880	12,880	-
Cargo Apron (square yards)	8,320	8,320	8,320	-

Source: WHPacific, 2015
Note: Square footages for hangars are building area only and do not include areas needed for taxilanes between hangars.

Aprons and Aircraft Parking

Currently, there are 25 tiedown positions at the Airport. One based aircraft is presently stored in tiedowns. Due to the desire for aircraft owners to store their aircraft in hangars, it has been assumed that future based aircraft will be hangared. For planning purposes, it is assumed that 10% of locally based aircraft will require space on the parking apron due to some aircraft requiring both hangar storage and parking apron space.

The FAA has developed an approach for determining the number of tiedowns needed for itinerant aircraft operating at an airport. The following general methodology was taken from *Airport Design*, Appendix 5, Change 10, and is based on peak operations calculations:

- Peak Day Operations (from Chapter Two), multiplied by ratio of itinerant operations
- Divide by 2 (50% of operations are departures)
- Multiply by 50% (assumes 50% of the transient airplanes will be on the apron during the peak day)

Using this methodology, the Airport will need to have transient tiedown space for 20 aircraft by 2034, as shown is Table 4F. Combining based and transient tiedown needs, a total of 28 tiedown positions will be needed throughout the planning period. The FAA recommends using a ratio of 360 square yards per based aircraft tiedown, and 500 square yards per transient aircraft tiedown. By 2034, the total area needed for both based aircraft and transient aircraft tiedowns is 12,880 square yards. The current apron will be not be adequate over the planning period.

The OAP recommends Category III airports have designated cargo aprons. FedEx loads and unloads on a leased apron, separate from the GA parking apron. Ameriflight, however, loads and unloads cargo on the GA parking apron and parks there during most days. Having a cargo apron, separate from the GA apron, would enhance safety and operational efficiency. It is recommended the cargo apron be approximately 8,320 square yards. This would allow for an ARC B-II aircraft taxi, turn and maneuver on the ramp, as well as an area for the delivery truck/van to park.

Airport Access and Parking

Airport access is adequate at this time. However, any development alternatives should consider impacts to surface transportation.

Vehicle parking is located near the fixed base operator (FBO). During PAC meetings the need for additional parking has been identified – particularly for helicopter support crews and wildland firefighter crews – as well as possible temporary camping locations. Any future helipad location should consider these needs.

Aviation Businesses and Services

Airport services are currently offered by the County's FBO and an on-site aircraft airframe and powerplant mechanic. User surveys and PAC members have indicated the need for additional services, such as an avionics shop. Chapter 5, *Alternatives*, should identify locations appropriate for service-related development.

General Aviation Terminal Facility

The County-owned and operated FBO is located within the GA Terminal. The terminal offers pilot amenities, meeting areas, and weather monitoring. The terminal is in good condition and will meet the Airport's needs over the planning period.

Support Facility Requirements

Facilities that are not classified as airfield or landside are known as Support Facilities, and include emergency services, airport maintenance, airport fencing, utilities, storm drainage, and aviation fueling facilities.

Emergency Services and Security

There are no aircraft rescue and firefighting (ARFF) facilities located at the Airport. ARFF services are the responsibility of the La Grande Fire and Rescue District. Based on FAA regulations, the Airport is not required to provide ARFF since the Airport does not have commercial passenger service.

The Airport is a base for wildland firefighting and suppression, being home to the USFS Tanker Base used by the USFS, US Bureau of Land Management, Oregon Department of Forestry, and their private contractors. The presence of these firefighting activities at the Airport is essential for the sustainability of the region's natural resources and economic base.

Airport Security. With the exception of three general aviation airports located within the Flight Restriction Zone around Washington DC, the Transportation Security Administration (TSA) does not regulate GA airports.

The Airport Characteristics Measurement Tool (ACMT), published in the TSA Information Publication (IP) A-001, is considered the standard security assessment tool available for GA airports. TSA states that the document aims to provide effective and reasonable security enhancements at GA facilities across the Nation to the extent the procedures and recommendations are consistent with the Airport's circumstances. The ACMT uses points to assess security risks for different airport characteristics. **Table 4G** summarizes the results of the assessment.

The ACMT separates GA airports into four categories: 0 to 14 points, 15 to 24 points, 25 to 44 points, and greater than 45 points. Based on the assessment presented in Table 4G, the Airport currently falls into the 0 to 14 points category and will move to the 15 to 24 points category once a Part 135 operator begins conducting charter operations and the turbojet bases at the Airport (5 to 10 years).

Table 4G. GA Airport Security Assessment – La Grande / Union County Airport

Security Characteristics	Existing Conditions	Future Conditions[5]
26 – 100 based aircraft	2	2
Based aircraft over 12,500 pounds	-	3
Runway 5,000 feet or greater	5	5
Part 135 operations	-	3
Flight training	3	3
Rental aircraft	4	4
Total	14	20

Source: Security Guidelines for General Aviation Airports ((IP) A-001), May 2004

[5] Based on user/tenant statements.

The TSA recommendations for airports in the 0 to 14 points category include:

- Signs
- Documented Security Procedures
- Positive Passenger ID
- Fencing
- Community Watch
- Contact List

In addition to the recommendations associated with the 0 to 14 points category, the TSA recommendations for the 15 to 24 category also include:

- Law Enforcement Officer Support
- Security Committee
- Transient Pilot Sign In/Out Procedures

The Airport has some of these security enhancements in place today, but should consider integrating and enforcing the rest of these recommendations

Airport Maintenance

Airport maintenance equipment is currently stored in various locations on-Airport. Airport management has expressed a need for consolidating maintenance equipment in a single location. Development alternatives should identify potential locations for this purpose.

Airport Fencing

The Airport does not have full perimeter fencing. It is recommended that full perimeter fencing be installed for safety, security, and wildlife abatement.

Utilities

Any new development must include the associated extension of utility lines to serve the said development. As development alternatives are prepared in the next chapter, utility infrastructure needs and existing adequacies will be examined.

Storm Drainage

The need for additional facilities have been identified, which will increase the Airport's existing impervious surfaces. These additional surfaces must be evaluated to ensure that the requirements of the 1200-Z[6] stormwater discharge permit are met. Because a specific layout for future development has not been defined yet, the exact amount of increased impervious surface is to be determined. The alternatives

[6] The federal Clean Water Act mandates jurisdictional control of the quality of stormwater runoff. This mandated program is found in the Code of Federal Regulation part 122.26. The Airport may fall under the scope of these regulations and may need to apply for a National Pollution Discharge Elimination Permit (NPDES) for the discharge of rain water to the surface water system. In Oregon, this is typically referred to as a 1200-Z General Permit.

analysis will provide additional details regarding stormwater impacts of each alternative. The analysis will also include Department of Environmental Quality (DEQ) requirements, water treatment, and detention.

Aviation Fueling Facilities

AvGas and Jet A fuel is available for sale at the Airport. The current location and size of the tanks is suitable for the duration of the planning period.

Land Use Planning and Zoning Recommendations

In general, the Airport meets most State and County land use requirements. There are a couple items the County should work towards with regard to land use and zoning around the Airport. Recommendations are provided below.

Zoning Code

Current zoning of the Airport is in compliance with Oregon Revised Statutes (ORS) 836.600 through 836.630, *Local Government Airport Regulation*. No changes are recommended.

Comprehensive Plan

Adopt the final Master Plan Update, by reference, into Union County's Comprehensive Plan.

Adopt a title notice or similar requirement to inform purchasers of property within one mile of the Airport that their property is located adjacent to or in close proximity to the Airport and their property may be impacted by a variety of aviation activities. Note that such activities may include but are not limited to noise, vibration, chemical odors, hours of operations, low overhead flights, and other associated activities.