CRATER LAKE
KLAMATH
REGIONAL AIRPORT

Master Plan

February 2021

Mead&Hunt

Chapter 3

Facility Requirements

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INTRODUCTION

This chapter documents the recommended airport facility improvements to satisfy the 20-year aviation forecast demand for the Crater Lake–Klamath Regional Airport (LMT). The facility improvements are identified to accommodate user demand, conform to airport design standards, and address strategic developments envisioned by the City of Klamath Falls. The facility requirements bridge the gap between what LMT has and what it needs.

This Facility Requirements Chapter includes:

- Airport Classifications and Federal Aviation Administration (FAA) Standards
- Airfield System Requirements
  - Airport Capacity
  - Runway System
  - Taxiway System
  - Navigational, Weather, and Lighting Aids
- Landside Facility Requirements
  - Airline Terminal
  - Air Cargo
  - General Aviation
  - Aviation Tenants
  - Support Facilities
- Airport Land Use and Property Interests

AIRPORT CLASSIFICATION AND FAA STANDARDS

Figure 3-1 illustrates the facility requirement process. Airport facilities, which include infrastructure, buildings, equipment, and property, are recommended consistent with the LMT role, user demand, and FAA design classification. Facility requirements are not an absolute design mandate, but rather, are recommendations for meeting FAA minimum design standards for safe and efficient facilities.

Figure 3-1 : Facility Requirements Planning Process

Source: Mead & Hunt, Inc., February 2019.

AIRPORT DESIGN STANDARDS

LMT is a unique airport in terms of facility requirements. LMT is a FAA Part 139 commercial service facility supporting civil and military operations having demanding aircraft performance requirements, including heavy transports, large-cabin business jets, and fighters. These operational factors are central to appropriately planning facility improvements at LMT. The airfield facilities, including the runway and taxiway systems, are shared with the Oregon Air National Guard (Oregon ANG).

The airfield facility requirements and application of planning standards are identified to accommodate civilian use in accordance with FAA design standards. The facility requirements for shared-use areas to accommodate military use or design standards are documented separately. The military areas that are leased or used exclusively by the Oregon ANG are excluded as part of the facility requirement recommendations.

The tables in this chapter use the following color coding system to identify facility requirement conditions and recommendations, for civilian and military purposes.

- Black Text = Existing Condition
- **Blue Text = Recommended 20-Year Facility Change**
- **Bold Text = Facility Exceeds FAA Standards**
- **Gray Text = Military (Guard) Facility Standard**

Civilian Airport Facility Planning

Airport facility planning must conform to FAA minimum design standards, preferably without deviation or modification. The application of FAA design standards for airfield planning is determined by the existing and forecast critical aircraft. FAA Advisory Circular 150/5300-13A (FAA AC-13A), *Airport Design,* uses a classification system to plan airport facilities that is established from the following Airport Reference Code (ARC) and Runway Design Code (RDC) components:

Airport Reference Code (ARC): FAA planning and design designation based on the most demanding Runway Design Code (RDC).

Runway Design Code (RDC): FAA planning and design designation which signifies the FAA design standards to which the runway is to be built.

- **Aircraft Approach Category (AAC):** alphabetic letter designating approach speed, in knots.
- **Airplane Design Group (ADG):** roman numeral designating wingspan and tail height, in feet.
- **Taxiway Design Group (TDG):** number designating aircraft wheel gear configuration.
- **Runway Visibility Range (RVR):** instrument approach visibility minimums, in feet.

Military Airport Facility Planning

FAA funding guidance requires military facilities be documented separately from FAA facility planning and design requirements. In accordance with FAA AC-13A, Section A1-2(b), “During airport facility design, consider routine military operations such as medical evacuation, strategic deployment and dispersal, and Reserve and National Guard training missions.”

Therefore, military operations for the leased Oregon ANG areas are considered as part of developing LMT facility requirement recommendations for existing and planned conditions. The LMT military facility and land use project requirements are documented directly from the Oregon ANG Installation Development Plan (2015 IDP), the Joint Land Use Study (2016 JLUS Phase 1 and 2019 JLUS Phase 2), and the Installation Complex Encroachment Management Action Plan (2018 ICEMAP).

Military facility requirements and airfield design standards reflect the US Department of Defense (DOD) Unified Facilities Criteria (UFC) 3-260-01, *Airfield and Heliport Planning and Design*, dated February 2019 and the Air National Guard Handbook 32-1084, *Facility Space Standards*, dated January 2015. Aviation facilities serving military purposes at LMT must be planned, programmed, and constructed in accordance with the DOD procedures and the Area Development Plan process.

FAA Airport Design Classification

The following outlines the existing and future FAA ARC/RDC critical aircraft design classification for Runway 14/32 and Runway 7/25. The ARC/RDC designation is used to appropriately plan airspace, airfield, and landside facilities, including the geometric standards which govern safety area dimensions, separations, setbacks, height limitations, and buffer areas.

Runway 14/32 (Existing Condition)

- FAA ARC/RDC Category: D-III (Large Aircraft Less than 150,000 Pounds)
- FAA Taxiway Design Category: TDG 3 to 5
- Critical Aircraft Design Group
  - AAC D: Fighter (F-15 C/D)
  - ADG III: Large Narrowbody Transport (Avro RJ-85/MD-87)
- FAA RVR: 2,400 Feet (Not Lower than ½-Mile)

Runway 14/32 (Future Condition)

- FAA ARC/RDC Category: D-IV (Large/Heavy Aircraft Greater than 150,000 Pounds)
- FAA Taxiway Design Category: TDG 5
- Aircraft Type Design Group
  - AAC D: Fighter (F-15 C/D)
  - ADG IV: Heavy Transport (DC-10-30 Series)
- FAA RVR: 2,400 Feet (Not Lower than ½-Mile)

Runway 7/25 (Existing/Future Condition)

- FAA ARC/RDC Category: B-II (Large Aircraft: Greater than 12,500 Pounds)
  - Existing runway designed to RDC B-III
- FAA Taxiway Design Category: TDG 2
- Critical Aircraft Design Group
  - AAC B: Twin Turboprop
  - ADG II: Twin Turboprop
- Aircraft Type: Beechcraft King Air 350/1900
- FAA RVR: Visual

AIRFIELD SYSTEM REQUIREMENTS

This section documents airfield facility requirements and makes recommendations for changes to facilities based on forecast traffic levels, user/tenant demand, FAA ARC/RDC critical aircraft standards, and strategic facility developments envisioned by the City of Klamath Falls.

AIRPORT CAPACITY

Airfield capacity analysis is used to identify the type and timing of airfield enhancements to optimize operational efficiency and increase level of service. Annual Service Volume (ASV) is the FAA method to quantify airfield operational capacity. ASV, as defined in FAA Advisory Circular 150/5060-5, *Airport Capacity and Delay,* is the number of annual aircraft takeoff and landing operations accommodated by the runway and taxiway system.

The ASV is calculated using these inputs:

- Airfield (runway and taxiway) geometric configuration
- Annual, monthly, and hourly peak-period operations
- Traffic patterns, aircraft type mix, and runway end arrival/departure utilization
- Runway instrumentation/meteorological conditions (visual and instrument).

Annual Service Volume (ASV): An airport's annual aircraft operational takeoff and landing capacity.

Demand: The number of aircraft operations accommodated in a specified period.

Capacity: The maximum number of aircraft operations accommodated during a specified period or operating condition.

Delay: The time period an aircraft experiences a capacity constraint, usually expressed in minutes.

Airfield ASV Capacity Analysis

The airfield configuration provides an ASV of 200,000 annual aircraft operations. Runway 14/32 accommodates 85 to 95 percent of total airport traffic and Runway 7/25 accommodated 5 to 15 percent of the ARC/RDC Category A and B traffic. 2018 annual operations at LMT totaled 48,500 and are forecast to reach 54,900 operations by 2038. The following is the percent ASV demand-to-capacity ratio based on 2018 and 2038 activity levels.

Airport ASV Capacity (Runway 14/32 and Runway 7/25)

- 2018 ASV Demand/Capacity Ratio = 24 Percent (48,500 Operations ÷ 200,000 ASV)
- 2038 ASV Demand/Capacity Ratio = 27 Percent (54,900 Operations ÷ 200,000 ASV)

The FAA recommends planning for airfield capacity improvements when the ASV demand/capacity ratio reaches 60 percent. Although the airfield provides adequate annualized ASV capacity for normal operating periods during visual and instrument conditions, the following factors have been considered in planning to accommodate unique and peak-period activity occurrences at LMT:

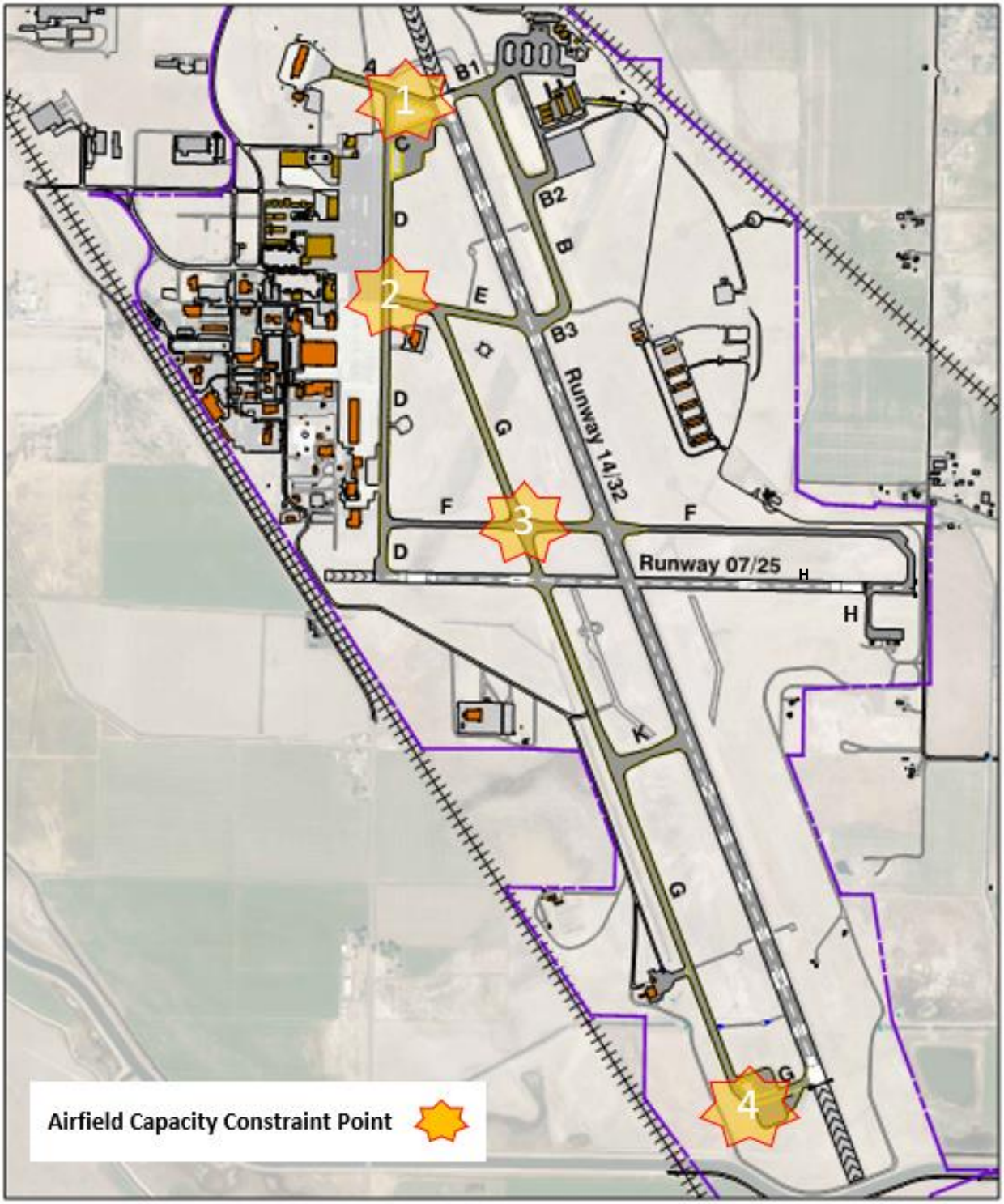
- Aircraft mix, size, approach speeds, and runway performance requirements
- Air Traffic Control (ATC) assignment of local traffic pattern(s) and runway utilization
- Civilian flight training periods
- Military flight training (8 to 12 aircraft departures/arrivals per training bank session)
- Military aircraft arming and de-arming practices
- Adversary Air tactical training (4 to 6 aircraft departures/arrivals per training bank session)
- US Forest Service fire-fighting activity.

Figure 3-2 depicts the points where airfield capacity is constrained; these are locations where congestion and delay occur during peak-period demand as the result of airfield configuration and operating procedures. The locations were obtained from LMT staff, LMT Airport Traffic Control Tower (ATCT) tower chief, and Oregon ANG Master Plan representatives). Congestion most often occurs during morning and afternoon Oregon ANG training activities, when multiple military aircraft (8 to 12 F-15s) are awaiting departure clearance and occupying the Explosive Ordinance Recovery (EOR) arming/de-arming positions.

- **Congestion/Delay Point 1:** North Runway 14 End (Intersection of Taxiways D and C)
- **Congestion/Delay Point 2:** Main Apron (Intersection of Taxiways D and E)
- **Congestion/Delay Point 3:** Parallel Taxiways (Intersection of Taxiways G and F)
- **Congestion/Delay Point 4:** South Runway 32 End (Taxiway G Entrance)

ASV Capacity Recommendation: The airfield provides sufficient capacity throughout the 20-year planning period for operations occurring during normal operating periods. Peak-activity periods will inform future airfield infrastructure or procedural changes for specified congestion/delay locations to minimize runway and taxiway occupancy.

Figure 3-2 : LMT Annual Service Volume (ASV) Congestion/Delay Locations



Source: Mead & Hunt, Inc., February 2019.

RUNWAY SYSTEM

This section documents the runway facility requirements for the primary Runway 14/32 and crosswind Runway 7/25, including supporting runway infrastructure, facilities, and equipment to meet user demands and the forecast critical aircraft design standards.

Primary Runway 14/32 Facilities

Runway 14/32 is 10,302 feet long and 150 feet wide, and includes paved shoulders, blast pads, and overruns beyond each end, as well as runway lighting, signs, and markings to support precision instrument capabilities. Runway 14/32 includes an arresting gear installed for the Runway 14 and 32 ends used exclusively for military fighter emergency landing situations.

Runway 14/32 Length

Runway 14/32 is 10,302 feet, constructed to this length in 1956. The Runway 14/32 takeoff, landing, and accelerate-stop length requirements were assessed based on the forecast critical aircraft in accordance with FAA Advisory Circular 150/5325-4B, *Runway Length Requirements for Airport Design* (AC 5325-4B). Runway length analysis was determined for specific critical aircraft, using airplane performance manuals, from the greater of the takeoff or landing performance characteristics in consideration of the following LMT conditions.

- Existing critical aircraft type/model (F-15 C/D)
- Future critical aircraft type/model (DC-10-30 Series)
- Future critical aircraft maximum takeoff weight (DC-10-30 Series at 555,000 pounds)
- Airfield elevation (4,095 feet above mean sea level [MSL])
- Runway end elevation gradient (4-foot differential at 0.04 percent slope)
- Ambient temperatures and density altitude:
  - LMT mean maximum temperature during hottest month is 83° F (July).
  - LMT standard temperature density altitude is 6,600 feet MSL.
- Pavement surface conditions (dry versus wet/slippery)
- No-wind condition (winds not applied for runway length calculations)
- FAA regulatory and aircraft certification takeoff and landing safety margins

Runway Length Analysis - Safety Margins

The runway length must satisfy aircraft takeoff and landing performance distances, plus computations for safety factor margins. Safety factors involve weather and emergency conditions, such as an aborted takeoff, loss of braking, and wet/slippery runway surface conditions. FAA regulations can require 15 to 20 percent of the runway length to satisfy takeoff safety margins, and 30 to 40 percent of the runway length for landing safety margins. The FAA safety margins account for wet/slippery conditions or greater than 0.05 inches of rainfall for more than 75 days a year. In addition, runway length requirements increase to adjust for non-standard ambient temperature, airfield elevation, and pressure (density altitude).

Runway Length Analysis – FAA Design Standards (Aircraft Less than 60,000 Pounds)

For general planning purposes, FAA Advisory Circular 5325-4B was referenced for runway takeoff performance curves based on aircraft less than 60,000 pounds for "100 percent of the business jet fleet at 90 percent useful load" (useful load includes passengers, cargo payload, and fuel). The recommended FAA runway length, adjusted for LMT airfield elevation (4,095 feet MSL) and mean maximum temperature (83°F), comes to 9,400 feet. In accordance with FAA guidance, this length is not used for LMT planning purposes because the critical aircraft weighs more than 60,000 pounds; therefore, the airplane design manual is used to determine runway length requirements for the LMT DC-10-30 Series critical aircraft.

Runway Length Analysis – Critical Aircraft Requirements (Aircraft over 60,000 Pounds)

The F-15 C/D is the existing critical aircraft operated by the Oregon ANG. The military runway length standard for this aircraft is 8,000 feet. The Oregon ANG allows 7,000 feet as the minimum landing runway length with an arresting cable. The DC-10-30 Series is the future critical aircraft, operated by the US Forest Service (DC-10-30 Very Large Air Tanker Transport) and the military to support the Oregon ANG mission (KC-10 Troop Transport and Aerial Refueling Tanker). The runway length requirement for the DC-10-30 at LMT is 10,300 feet, based on performance curves taken from the DC-10-30 aircraft manufacturer operating manual. The KC-10 runway length requirement for military standards is 10,000 feet (Class B aircraft category per ANGH/UFC criteria standards). LMT is also an emergency landing facility for other military aircraft with similar runway length requirements.

Runway 14/32 Length Recommendation: A length of 10,300 feet is required for Runway 14/32 to meet the future critical aircraft (DC-10-30 Series) for civilian and military use based on LMT temperature and field elevation. No extension is recommended for Runway 14/32. The following summarizes the recommendation for existing runway length condition, critical aircraft planning standard, and the future facility:

- Existing Condition: **10,302 Feet**
- Existing Requirement: (F-15 C/D): **±8,000 Feet**
- Future Requirement (DC-10-30 Critical Aircraft Manual): **±10,300 Feet**
- Facility Recommendation (DC-10-30 Critical Aircraft Manual): **10,302 Feet**

Note: The 10,302-foot Runway 14/32 length is sufficient to accommodate the return of scheduled airline service and regional jet (CRJ-200 or similar aircraft) performance requirements operating at maximum takeoff weight.

Runway 14/32 Width

Runway 14/32 is 150 feet wide and accommodates heavy and large aircraft transports. The following aircraft operate at LMT and require a 150-foot runway width in order to meet minimum operating standards, as determined from design criteria and aircraft manufacturing manuals.

These aircraft, including the nearly 16,000 annual military F-15 C/D and civilian Adversary Air F-159 Alca fighter operations, would not be able to operate at LMT on a runway less than 150 feet wide:

- DC-10-30: US Forest Service Air Tanker (Boeing DC-10-30) = **150 Feet**
- DC-10-30/KC-135/C-17: Military Transport/Refueling (Class B UFC/ANGH) = **150 Feet**

- F-15 C/D: Military Fighter (Class B UFC/ANGH) = **150 Feet**
- C-17 Globemaster: Oregon Resiliency Plan (FAA and Military Standards) = **150 Feet**

The runway width requirement is determined from the critical aircraft as related to the aircraft size (ADG), aircraft operating weight (maximum takeoff weight-MTOW), and approach visibility minimums. The FAA runway width design standard and FAA Airport Improvement Plan (AIP) eligibility is 100 feet for ARC/RDC C/D-III existing critical aircraft with MTOWs less than 150,000 pounds, and 150 feet wide for the ARC/RDC D-IV future critical aircraft. The 150-foot width is required to accommodate the Oregon ANG fighter and transport aircraft operating requirements. Other unique factors that support a runway width of 150 feet are summarized below:

- Turbine traffic unable to operate on the crosswind Runway 7/25 due to length, width, pavement strength or approach and departure capabilities
- Turbine traffic operated for emergency-medical flights or critical military missions reliably needing to use Runway 14/32 during high crosswind events
- Large and heavy transport aircraft operating requirement
- Military fighter operating requirement
- Runway 32 precision instrument capabilities for minimums as low as 2400 RVR
- Tier 1 response facility for Oregon Resiliency Plan (designated transport aircraft)
- Scheduled regional jet airline service outlook during wet and wintertime runway conditions.

FAA runway standards for ARC/RDC C/D-III aircraft are determined by the aircraft maximum takeoff weight threshold of 150,000 pounds; and no longer is the 3/4-mile visibility minimum threshold applicable to runway width standards. For aircraft with a MTOW at or less than 150,000 pounds, the FAA standard runway width is 100 feet, the shoulder width is 20 feet, and the runway blast pad width is 140 feet. For aircraft with a MTOW greater than 150,000 pounds, the FAA standard runway width is 150 feet, the shoulder width is 25 feet, and the runway blast pad width is 200 feet.

Runway 14/32 Width Recommendation: The 150-foot width is required to meet the large and heavy transport critical aircraft requirements, including the DC-10-30 future critical aircraft, as determined from FAA and military design standards. Narrowing the runway to 100 feet (FAA AIP-eligible width) to meet the ARC/RDC existing critical aircraft design standards is not recommended.

These points below outline the existing runway width, critical aircraft planning standard, and the future facility recommendation.

- Existing Condition: **150 Feet**
- Existing FAA D-III Standard (Aircraft Less than 150,000 Pounds): **100 Feet (FAA AIP-eligible)**
- Planned FAA D-IV Standard (Aircraft Greater than 150,000 Pounds): **150 Feet**
- Facility Recommendation (D-IV Aircraft Greater than 150,000 Pounds): **150 Feet**

Note: The 150-foot Runway 14/32 width is sufficient to accommodate the return of scheduled airline service and regional jet (CRJ-200) performance requirements.

Runway 14/32 Pavement Strength

Pavement strength requirements are determined from the most demanding aircraft maximum takeoff weight (MTOW) and maximum landing weight (MLW) in considering flight frequency and aircraft wheel gear configuration: single wheel gear (SWG), dual wheel gear (DWG), and dual tandem-wheel gear (DTWG). The pavement strength and design characteristics are expressed by the Pavement Classification Number (PCN) value in accordance with FAA AC 150/5335-5C. For planning purposes, airport pavement strength is designed to support the most demanding aircraft loads over a 20-year structural life.

Dual-Wheel Gear (DWG): Each landing gear axle consists of a single axle with two tires per axle that equally share the weight of the aircraft and provide for greater weight distribution.

Dual Tandem-Wheel Gear (DTWG): Two wheels side by side followed by two additional side-by-side wheels.

Runway 14/32, with a grooved runway surface, has a published pavement strength of 315,000 pounds DTWG to accommodate large and heavy transport aircraft, including the DC-10-30 future critical aircraft. Waivers are issued to regulate aircraft use by weight; with aircraft more than 475,000 pounds not permitted, aircraft between 475,000 and 400,000 pounds must receive prior waiver approval, and aircraft under 400,000 are allowed without a waiver.

Transport aircraft with a MTOW exceeding 315,000 pounds conduct 80 to 100 operations annually, including the DC-10-30, KC-10, C-17, and KC-135. The DC-10-30 and C-17, which have a MTOW approaching 600,000 pounds, are the heaviest aircraft operating at LMT. Aircraft with a MTOW exceeding the FAA 150,000-pound threshold (C-130, DC-10-30, KC-10, C-17, KC-46A, and KC-135) conduct about 180 to 200 operations annually, with most aircraft over 150,000 pounds having DTWG. The large and heavy transport aircraft activity is forecast to increase from 100 to 150 annual operations between 2018 and 2019.

Pavement Strength Recommendation: The Runway 14/32 pavement strength is recommended to be maintained at 315,000 pounds DTWG to accommodate large and heavy transport aircraft, including a grooved surface. Typically, the supporting taxiway system is constructed to a similar pavement design and strength as the associated runway.

- Existing Condition: **175,000 pounds DWG; 315,000 pounds DTWG (PCN 41 F/A/X/T)**
- Facility Recommendation: **315,000 pounds DTWG**

Runway 14/32 Navigation and Lighting Equipment

Runway 14/32 is planned to remain precision instrument, with either a traditional Instrument Landing System (ILS) and/or a satellite Global Positioning System (GPS) procedure providing positive vertical guidance, with the possibility for a curved GPS approach in the future.

A future Runway 14 ILS is planned by the Oregon ANG to provide precision instrument approach capabilities from the north. The ILS installation is a military project being coordinated with the FAA. The Runway 14 ILS project received FAA technical approval based on the LMT FAA ILS Feasibility Study dated January 2020. From this Study and Oregon ANG communications, it is anticipated the Runway 14 ILS will provide both military and civilian approach procedures with minimums not less than ¾-mile (Guard pilot

minimums are 1-nautical mile as the lowest category). The Study also indicates that the intermediate approach light system (MALSF: lights extend 1,400 feet beyond runway end) would be replaced by a full approach light system (MALSR; light extending 2,400 feet beyond the runway end -- MALSR allows as low as ½-mile approach minimums). These facility and land use factors are associated with establishing a traditional ILS:

- ILS Antenna and Shelter Equipment Siting (Glideslope and Localizer)
- ILS Aircraft Critical Hold Short Positions
- Airspace Clearance and Obstruction (Approach and Obstruction Surfaces)
- Airport Overlay Ordinance (Zone Compatibility)

Unless a runway end has a displaced threshold, the runway threshold lights should be located such that the outer light units are in line with the runway edge lights and the remaining light units are located inside the runway width (referred to as inboard). Both the Runway 14 and 32 outer threshold light units are in line with the runway edge lights, but the remaining light units are located outside the runway width (referred to as outboard). It is recommended that in-pavement threshold lights be installed within the width of the runway.

Summary of Planned Runway 14/32 Facility Design Standard Improvements

Table 3-1, R*unway 14/32 Facility Recommendations,* summarizes the Runway 14/32 facility recommendations for runway dimensions and equipment. **Table 3-2,** *Runway 14/32 Facility Standard Recommendations,* summarizes the existing and planned Runway 14/32 facility conditions based on FAA safety area and setback design standards. The tables are color-coded to show facility requirement changes based on existing conditions and compliance with FAA critical aircraft design standards. The recommended airfield improvements for Runway 14/32 are listed below.

- Runway 14 Object Free Area Length: **1,000 Feet (Existing limited to approximately 715 feet by location of the airfield perimeter roadway, perimeter fence, and Brett Way)**
- Runway Shoulders: **25 Feet Paved Per Side**
- Runway Blast Pads: **200 Feet Long x 200 Feet Wide**
- Runway Edge Lights: **High Intensity LED (Based on FAA Funding and Avionics Integrity)**
- Runway 14 Instrument Approach: **Precision (ILS, MALSR, not less than 3/4 mile visibility minimums)**
- Runway 32 Light Aids: **PAPI-4L**

Table 3-1 : Runway 14/32 Facility Recommendations

PRIMARY RUNWAY SYSTEM				
Facility Component	**Existing Condition (2017)**		**Future Condition (2037)**	
	Runway 14/32		**Runway 14/32**	
	Runway End 14	**Runway End 32**	**Runway End 14**	**Runway End 32**
Runway Type	Primary		Primary	
FAA Runway Design Code (RDC)	D - III (Less Than 150,000 Pounds)		**D - IV**	
FAA Taxiway Design Group (TDG)	TDG 3		TDG 5	
Military UFC Classification	Class B Aircraft		Class B Aircraft	
Runway Facility Systems				
Runway Length x Width	10,302' x 150'		10,302' x 150'	
Runway Shoulder Width (Type)	20' Per Side - Paved		**25' Per Side - Paved**	
Paved Blast Pad (W x L)	150' x 200'	150' x 200'	150' x 200'	150' x 200'
Paved Stopway/Overrun (W x L)	150' x 1,002'	150' x 1,000'	150' x 1,002'	150' x 1,000'
Runway Displaced Threshold	None		None	
Arresting Gear (Military Use Only)	Yes	Yes	Yes	Yes
Land and Hold Short (LASHO)	None		None	
In-Line Taxiway	None		None	
Runway-to-Runway Separation	N/A		N/A	
Pavement and Markings				
Pavement Strength - Pounds (Aircraft Main GearType)	175,000 (Dual-DWG) 315,000 (Dual Tandem-DTWG) PCN 41 F / A / X / T		315,000 (Dual Tandem-DTWG) PCN (To Be Determined)	
Pavement Surface Course	Asphalt-Concrete: Grooved		Asphalt-Concrete: Grooved	
Pavement Markings	Precision		Precision	
Runway Lighting Systems				
Edge Lights	High Intensity - HIRL		High Intensity - HIRL **(LED)**	
Threshold Lights	Outboard	Outboard	**Inboard**	**Inboard**
Lighting Aids	PAPI-4L	VASI-4L	PAPI-4L	**PAPI-4L**
Approach Lighting System	MALSF	MALSR	**MALSR**	MALSR
Centerline Lighting Systems	None	None	None	None
Runway Visibility Range (RVR)	Yes	Yes	Yes	Yes
Runway Instrument Approaches	RNAV, VOR/DME	ILS, RNAV, VOR/DME	**ILS**, RNAV, VOR/DME	ILS, RNAV, VOR/DME
Instrument Minimums (Lowest) Aircraft Categories	3/4-Mile | 550'	1/2-Mile | 200'	3/4-Mile | **±200'**	1/2-Mile | 200'
	(A, B, C, D)	(A, B, C, D, E)	(A, B, C, D)	(A, B, C, D, E)

Note: **Blue** indicates future condition | **Gray** indicates military facility.
Source: Mead & Hunt, Inc., February 2019.

Table 3-2 : Runway 14/32 Design Standard Recommendations

RUNWAY 14/32 FACILITY REQUIREMENTS						
Runway Design Component	Existing FAA RDC Standard and Existing LMT Condition			Future FAA RDC Standard and Planned LMT Condition		
	FAA Standard	RWY 14/32 (2017)		FAA Standard	RWY 14/32 (2037)	
		RWY 14	RWY 32		RWY 14	RWY 32
FAA Runway Design Code (RDC)	D - III (Less than 150,000 Pounds)			D - IV		
Runway Width	100' (Note)	**150'**		150'	150'	
Paved Shoulder Width (Per Side)	20' (Note)	20'		25'	**25'**	
Blast Pad Width	140' (Note)	**150'**	**150'**	200'	**200'**	**200'**
Blast Pad Length	200'	200'	200'	200'	200'	200'
Runway Stopway Width	150'	N/A	N/A	150'	N/A	N/A
Runway Stopway Length	N/A	N/A	N/A	N/A	N/A	N/A
Runway Overrun Width (Military)	150'	150'	150'	150'	150'	150'
Runway Overrun Length (Military)	300' (UFC) 1,000' (ANGH)	1,002'	1,000'	300' (UFC) 1,000' (ANGH)	1,002'	1,000'
Runway Safety Areas (RSA)						
RSA Length Beyond Departure End	1,000'	1,000'	1,000'	1,000'	1,000'	1,000'
RSA Length Prior to Threshold	600'	600'	600'	600'	600'	600'
RSA Width	500'	500'		500'	500'	
Runway Object Free Area (ROFA)						
ROFA Length Beyond Runway End	1,000'	1,000'	715'	1,000'	1,000'	1,000'
ROFA Length Prior to Threshold	600'	600'	600'	600'	600'	600'
ROFA Width	800'	800'		800'	800'	
Precision Obstacle Free Zone (POFZ)						
POFZ Length Beyond Runway End	200'	N/A	200	200'	N/A	200
POFZ Width	800'	N/A	800	800'	N/A	800
Runway Protection Zone (RPZ)	Precision / Non-Precision	Non-Precision	Precision	Precision	Non-Precision	Precision
Approach RPZ Length	2,500' / 1,700'	1,700'	2,500'	2,500'	1,700'	2,500'
Approach RPZ Inner Width	1,000' / 1,000'	1,000'	1,000'	1,000'	1,000'	1,000'
Approach RPZ Outer Width	1,750' / 1,510'	1,510'	1,750'	1,750'	1,510'	1,750'
Runway Centerline To:						
Holding Position (Elevation Adjusted)	250' (291')	291'		250' (291')	291'	
Parallel Taxiway / Taxilane	400'	**790'**		400'	**790'**	
Aircraft Parking Area	500'	**750'**		500'	**750'**	

Note: **Blue** indicates future condition | **Bold** indicates exceeds FAA standard | **Gray** indicates military facility. **Red** indicates FAA standard not met.
Note: For airplanes with maximum certificated takeoff weight of 150,000 pounds or less, the standard runway width is 100 feet, the shoulder width is 20 feet, and the runway blast pad width is 140 feet. Hold positions adjusted for LMT elevation. Unified Facility Criteria (UFC) and Air National Guard Handbook (ANGH).
Source: FAA Advisory Circular 150/5300-13A.

Crosswind Runway 7/25 Facilities

This section recommends crosswind Runway 7/25 facilities to meet user demands and the forecast ARC/RDC B-II critical aircraft design standards. Runway 7/25 is 5,258 feet long by 100 feet wide, with displaced thresholds and a Runway 7 paved overrun-stopway area (overrun is a military facility standard and stopway is a FAA facility standard). Runway 7/25 is required to meet FAA crosswind conditions based on the primary Runway 14/32 coverage at less than 95 percent.

Runway 7/25 Length Analysis

The Runway 7/25 takeoff and landing length was assessed using FAA recommended runway length curves for the composite grouping of critical aircraft with similar characteristics within the ARC/RDC B-II classification, as substantiated from LMT user aircraft performance requirements.

FAA Length Analysis (AC 5325-4B)

FAA AC 5325-4B guidance (Steps #1 to #5) was followed for assessing the future Runway 7/25 takeoff length requirement. The applicable FAA takeoff performance curve for 100 percent of the general aviation propeller fleet at MTOW (includes passengers, cargo payload, and fuel) was used for Runway 7/25. This FAA performance curve was adjusted to compensate for the LMT airfield elevation (4,095 feet MSL) and LMT mean maximum temperature of the hottest month (83°F July). Adjustments were also made to consider the mean seasonal high temperature when peak winds are out of the west and the crosswind runway is at its busiest (February to May). The annual mean and seasonal (February to May) high temperature (62°F) was computed to identify the minimum FAA runway length and the mean maximum temperature (83°F) was computed for the maximum FAA runway length. These are the FAA runway lengths calculations for Runway 7/25:

- FAA Minimum Curve (100 percent General Aviation Propeller Fleet at 62°F mean seasonal high): **5,000 feet**
- FAA Maximum Curve (100 percent General Aviation Propeller Fleet at 83°F mean max): **5,500 feet**

Runway 7/25 Critical Aircraft (King Air Series)

The Beechcraft King Air 300/1900 Series is the Runway 7/25 critical aircraft, operated at LMT for scheduled air cargo, medical flights, and by general aviation users. Beechcraft manufacturer takeoff performance curves for the King Air 300/1900 Series require an accelerate-stop takeoff distance of 4,800 to 5,200 feet based on the LMT field elevation and mean-high ambient temperatures.

- King Air Series Critical Aircraft (Aircraft Manual): **5,000± feet** (4,000-foot field elevation at 77°F)

US Forest Service

The US Forest Service operates on Runway 7/25, principally with single (P2V T-05, Air Tractor 802, and Fire Boss FB-208) and twin propeller aircraft (Aero Commander, Grumman S2-T). The crosswind Runway 7/25 is important for expediting US Forest Service traffic flows during peak fire-tanker operations. As documented from the US Forest Service correspondence (dated September 3, 2019), a crosswind runway length less than 5,000 feet would limit US Forest Service takeoff and landing capabilities at LMT. The

minimum runway length for the US Forest transport aircraft is 7,000 feet; therefore, the large turboprop and jet category aircraft are not planned to use Runway 7/25.

LMT FBO/Users

Runway 7/25 is used for business jets, including based jets operated by the Fixed-Base Operator (FBO) for charter and medical flights. The FBO provided Falcon 50/900B jet takeoff and landing performance charts and confirmed a 5,000-foot runway length was required to satisfy crosswind runway takeoff and landing requirements based on jet operating weights adjusted for LMT field elevation and ambient temperatures. A crosswind runway length less than 5,000 feet would limit jet takeoff and landing capabilities.

- FBO Dassault Falcon 50/900 Series (4,000 feet at MLW and 83°F mean max): **5,000 feet**

Military Crosswind/Additional Runway Requirements

The Oregon ANG 2015 IDP reports the F-15 C/D is unable to use Runway 7/25 under normal landing and takeoff operating conditions due to insufficient length. The 2015 IDP (Table ES-8) recommends a future 8,000-foot Runway 7/25 length, showing a generalized plan for a 3,000-foot extension to the Runway 25 end as a military course of action to meet the IDP Desired Concept. In addition, the 2015 IDP (Table ES-7, Project #5) identifies a future arresting gear installation on Runway 7/25. As documented in the 2005 LMT Airport Master Plan, Runway 7/25 could potentially be extended to 6,500 feet. The east Runway 25 end is constrained by a railroad, land use compatibility factors, and mountainous terrain. The west Runway 7 end is constrained by airspace clearances over the highway and railroad, and mountainous terrain.

The standard military runway length for the F-15 C/D is 8,000 feet. The Oregon ANG requires 7,000 feet, with an arrestment cable, as the minimum landing runway length. The Oregon ANG correspondence (dated September 5, 2019) described Runway 7/25 as a “last resort” emergency landing strip for accommodating the F-15 C/D. Therefore, Runway 7/25 is not planned to accommodate F-15 C/D activity for normal takeoff and landing operations.

However, military standard practices prefer an additional runway to amplify safety factors with the anticipated increase in sortie requirements, augment future mission capabilities, and sustain LMT as a continued training facility for air-to-air combat pilots. Should an incident occur on Runway 14/32 while the F-15 C/D are on a training mission, the Oregon ANG would expend enormous cost landing at another airport (e.g., Rogue Valley International Airport in Medford). Therefore, it is recommended that Chapter 4 Alternatives evaluate the possibility of providing an additional Oregon ANG-funded runway at LMT that is 8,000 feet in length, 150 feet in width, has 1,000-foot overruns located beyond each runway end, and is equipped with instrumentation and lighting to achieve approach visibility minimums not less than ¾ mile to both runway ends.

- Military F-15 C/D Aircraft Requirement (Class B ANGH/UFC Runway): **8,000 feet**

Length Recommendation: A 5,000-foot crosswind runway length is recommended to meet FAA standards, LMT user demands, and LMT critical aircraft takeoff distance requirements. The 5,000-foot length is the future planned length, conforming with the FAA recommended takeoff length performance

curve for 100 percent of the propeller general aviation fleet for the LMT 4,095-foot field elevation and 62°F annual mean high temperature, which is consistent with the seasonal high temperature during the peak winds aligning with the crosswind Runway 7/25 during the months of February to May.

The 5,000-foot length also accommodates the critical aircraft (Beechcraft King Air 300/1900D Series), FBO jet operations, and US Forest Service propeller aircraft operations, but does not accommodate Oregon ANG F-15 C/D operations except for emergency situations.

- Existing Condition: **5,258 (5,260) Feet** (includes displaced thresholds)
- Minimum Standard (FAA AC-4B Curve, 100 percent Piston Fleet at 62°F mean high): **5,000 Feet**
  - Critical Aircraft Performance (Beechcraft King Air 300/1900D Series): 5,000± Feet
  - FBO Jet Performance (Falcon 50/900 Series): 5,000± Feet
  - US Forest Service Performance (Twin-Propeller Aircraft): 5,000± Feet
- Facility Recommendation: **5,000 Feet** (Excludes Displaced Thresholds/Stopway-Overrun)

Note: The 5,000-foot Runway 7/25 length is anticipated to marginally accommodate the return of scheduled airline service and regional jet (CRJ-200) takeoff and landing distance requirements during low density altitude temperatures and dry pavement conditions; operations during higher density altitude temperatures and wet/slippery pavement conditions may not be permissible or involve payload weight restrictions.

Runway 7/25 End and Threshold Disposition

Runway End: The physical ends of the runway that constitute the beginning of the takeoff roll and the end of the landing roll out.

Threshold/Displaced Threshold: The beginning portion of the runway available for landing. Threshold always refers to landing, not the start of takeoff. Displaced thresholds reduce the available length of the runway for

The Runway 7/25 length analysis evaluated the displaced thresholds previously established on the Runway 7 end (306 feet to provide railroad airspace clearance) and Runway 25 end (512 feet to provide ARC/RDC B-III RSA/OFA dimensions).

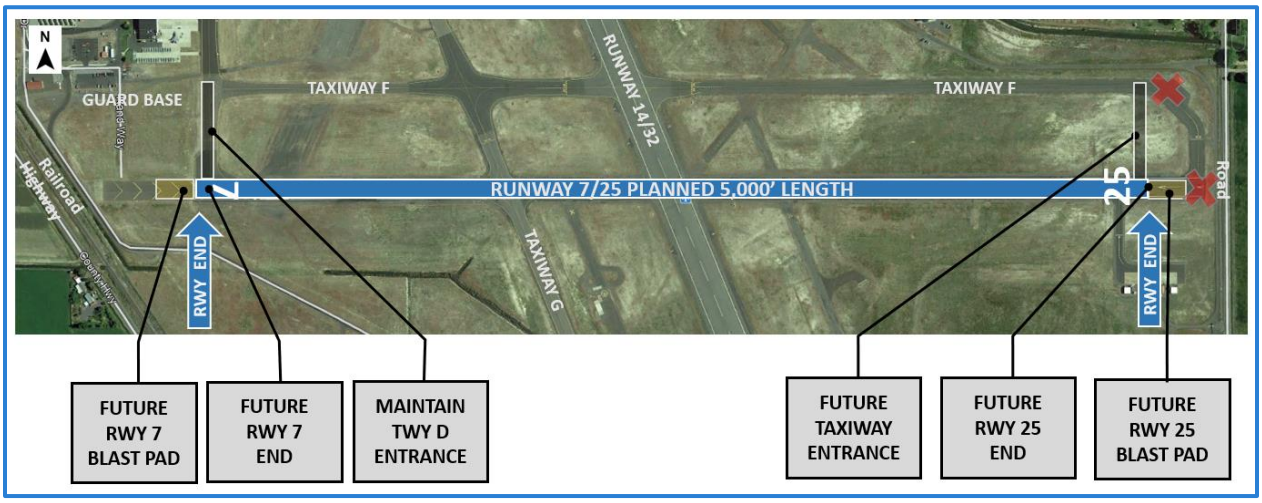
FAA guidance discourages the use of displaced thresholds unless it is impractical to meet design standards and mitigate environmental impacts. The Runway 7 and 25 displaced threshold locations were re-evaluated based on current FAA ARC/RDC B-II critical aircraft standards and FAA approach surface siting criteria (FAA Engineering Brief 99). Application of these standards changes the Runway 7 and 25 runway threshold and end locations.

Runway 7/25 End and Threshold Recommendation: The Runway 7 and 25 displaced thresholds are planned to be removed with the future runway ends established to provide a 5,000-foot usable takeoff and landing distance in both directions. The Runway 7 entrance Taxiway D would remain, and the entrance Taxiway F would be repositioned to align with the future Runway 25 end. **Figure 3-3** illustrates the recommended Runway 7 and 25 end locations based on FAA design and airspace approach standards.

Stopway (FAA Standard): Paved area beyond the takeoff runway designated to support use in decelerating an aircraft during an aborted takeoff.

Overrun (Military Standard): Required paved area beyond the runway end to minimize serious aircraft damage in the event of an overrun of land short event.

Figure 3-3 : Future Runway 7/25 Ends and Displaced Threshold Disposition



Source: Mead & Hunt, Inc., February 2020.

Runway 7/25 Width

Runway 7/25 is 100 feet wide and accommodates turbine and piston traffic. The FAA ARC/RDC B-II standard width is 75 feet. Tenants operating large aircraft on Runway 7/25, including the FBO, FedEx, UPS, and the US Forest Service, confirmed a future 75-foot width does not restrict or impact their crosswind operations. Runway 7/25 is expected to remain a visual runway; therefore, the 75-foot width would not impact future instrument procedures.

Width Recommendation: Reduce the Runway 7/25 width from 100 to 75 feet along the existing runway centerline, accomplished as part of a major Runway 7/25 pavement project.

- Existing Condition**: 100 Feet**
- Existing and Future Requirement (RDC B-II, Large Aircraft)**: 75 Feet**
- Facility Recommendation (RDC B-II, Large Aircraft)**: 75 Feet**

Note: The 75-foot Runway 7/25 width is anticipated to marginally accommodate the return of scheduled airline service and regional jet (CRJ-200) takeoff and landing requirements during dry pavement conditions; operations during wet/slippery pavement conditions could be restricted.

Runway 7/25 Pavement Strength

The Runway 7/25 published pavement strength is 77,000 pounds DWG, with a non-grooved runway surface. The most demanding aircraft regularly operating on Runway 7/25 is the Falcon 50/900 Series (four based at LMT), which has a 46,000-pound dual wheel gear Maximum Takeoff Weight-MTOW and a 42,000-pound Maximum Landing Weight-MLW. The Beechcraft King Air 350/1900D Series critical aircraft has a dual wheel gear MTOW of 18,000 pounds. The US Forest Service operates aircraft on Runway 7/25 with a dual wheel gear MTOW up to 26,000 pounds, which is also equivalent to the MTOW for most business jets operating on Runway 7/25. Runway 7/25 is also used for military F-15 aircraft taxiing between Taxiway D and Runway 14/32, which has a MTOW of 68,000 pounds SWG, equivalent to the Runway 7/25 strength.

Recommendation: The minimum recommended pavement strength for Runway 7/25 is 50,000 pounds DWG to accommodate the Falcon 50/900 based aircraft fleet. This strength also will accommodate the US Forest Service and the anticipated return of regional airline service. A grooved surface is recommended when serving turbojet aircraft and a runway length of 5,000 feet or more.

- Existing Condition: **77,000 pounds DWG (PCN 19 F/B/Y/U)**
- Facility Recommendation: **50,000 pounds DWG – Grooved (Recommended)**

Note: Future pavement thickness will be determined from pavement design using FAA Advisory Circular 150/5320-6F (or current version) Airport Pavement Design and Evaluation. Historically the soils in Klamath Falls are fine-grained and highly susceptible to frost heave, therefore, frost protection pavement design will likely drive the actual future pavement thickness and strength.

Note: The 50,000-pound DWG pavement strength is also planned to accommodate the anticipated return of scheduled airline service with ±50-seat regional jet use (CRJ-200 MTOW is 52,000 pounds and MLW is 47,000 pounds). As a Part 139 runway, a grooved runway surface is recommended.

Summary of Runway 7/25 Facility Design Standard Improvements

Table 3-3, *Runway 7/25 Facility Recommendations,* summarizes the Runway 7/25 facility recommendations for runway dimensions and equipment. **Table 3-4,** *Runway 7/25 Facility Standard Recommendations,* summarizes the existing and planned Runway 7/25 facility conditions based on FAA safety area and setback design standards. The tables are color-coded to show facility requirement changes based on existing conditions and compliance with FAA critical aircraft design standards.

The recommended airfield improvements for Runway 7/25 are listed below:

- Runway 7/25 length: **5,000 Feet** (excludes displaced thresholds)
- Runway 7/25 width: **75 Feet**
- Runway 7/25 Pavement Strength: **50,000 pounds DWG**
- Runway Shoulders: **10 Feet Stabilized Per Side**
- Runway 7/25 Blast Pad: **150 Feet Long x 95 Feet Wide**
- Runway 7 Lighting Aids: **Precision Approach Path Indicator (PAPI)** and **Runway End Identifier Lights (REIL)**
- Taxiway Hold Positions: **200 Feet** (from runway centerline)
- Runway Numbering: **Runway 8 and 26** (change due to magnetic variation)
- Runway Marking: **Visual** (install markings to aid pilot and ATCT awareness)

Table 3-3 : Crosswind Runway 7/25 Facility Recommendations

CROSSWIND RUNWAY SYSTEM				
Facility Component	**Existing Condition (2017)**		**Future Condition (2037)**	
	Runway 7/25		**Runway 7/25**	
	Runway End 7	**Runway End 25**	**Runway End 8**	**Runway End 26**
Runway Type	Crosswind		Crosswind	
FAA Runway Design Code (RDC)	B-II (Large Aircraft)		B-II (Large Aircraft)	
FAA Taxiway Design Group (TDG)	TDG 2		TDG 2	
Military UFC Classification	N/A		N/A	
Runway Facility Systems				
Runway Length x Width	5,258' x **100'**		**±5,000' x 75'**	
Runway Shoulder Width (Type)	None		**10' Per Side - Stabilized**	
Paved Blast Pad (W x L)	None	None	**95' x 150'**	**95' x 150'**
Paved Stopway/Overrun (W x L)	**100'** x 475'	None	**None**	None
Runway Displaced Threshold	306'	512'	**None**	**None**
Arresting Gear (Military Use Only)	None	None	IDP Guard Criteria	IDP Guard Criteria
Land and Hold Short (LASHO)	None		None	
In-Line Taxiway	None		None	
Runway-to-Runway Separation	N/A		N/A	
Pavement and Markings				
Pavement Strength - Pounds (Aircraft Main GearType)	38,000 (Single-SWG) 52,000 (Dual-DWG) PCN 19 F / B / Y / U		**50,000 (Dual-DWG)**	
Pavement Surface Course	Asphalt: Non-Grooved		Asphalt: Grooved	
Pavement Markings	Basic-Visual		Basic-Visual	
Runway Lighting Systems				
Edge Lights	Medium Intensity - MIRL		Medium Intensity - MIRL **(LED)**	
Lighting Aids	None	PAPI-4L, REIL	**PAPI-L, REIL**	PAPI-4L, REIL
Approach Lighting System	None		None	
Centerline Lighting Systems	None		None	
Runway Visibility Range (RVR)	None		None	
Runway Instrument Approaches	Visual	Visual	Visual	Visual
Instrument Minimums (Lowest) Aircraft Categories	None	None	None	None
	None	None	None	None

Note: **Blue** indicates future condition | **Bold** indicates exceeds FAA standard | **Gray** indicates military facility.
Source: Mead & Hunt, Inc., February 2019.

Table 3-4 : Crosswind Runway 7/25 Facility Standards

RUNWAY 7/25 FACILITY REQUIREMENTS						
Runway Design Component	**Existing FAA RDC Standard and Existing LMT Condition**			**Future FAA RDC Standard and Planned LMT Condition**		
	FAA Standard	**Runway 7/25 (2017)**		**FAA Standard**	**Runway 8/26 (2037)**	
		RWY 7	**RWY 25**		**RWY 8**	**RWY 26**
FAA Runway Design Code (RDC)	**B - II (Large Aircraft)**			**B - II (Large Aircraft)**		
Runway Width	75'	100'		75'	**75'**	
Paved Shoulder Width (Per Side)	10'	None		10'	**10' Stabilized**	
Blast Pad Width	95'	**100'**	None	95'	**95'**	**95'**
Blast Pad Length	150'	150'	None	150'	150'	**150'**
Runway Stopway Width	75'	**100'**	None	75'	**None**	None
Runway Stopway Length	N/A	475'	None	N/A	**None**	None
Runway Overrun Width (Military)	N/A	N/A	N/A	N/A	N/A	N/A
Runway Overrun Length (Military)	N/A	N/A	N/A	N/A	N/A	N/A
Runway Safety Areas (RSA)						
RSA Length Beyond Departure End	300'	300'		300'	300'	
RSA Length Prior to Threshold	300'	300'		300'	300'	
RSA Width	150'	150'		150'	150'	
Runway Object Free Area (ROFA)						
ROFA Length Beyond Runway End	300'	300'		300'	300'	
ROFA Length Prior to Threshold	300'	300'		300'	300'	
ROFA Width	500'	500'		500'	500'	
Precision Obstacle Free Zone (POFZ)						
POFZ Length Beyond Runway End	200'	N/A	N/A	200'	N/A	N/A
POFZ Width	800'	N/A	N/A	800'	N/A	N/A
Runway Protection Zone (RPZ)	Visual	Visual		Visual	Visual	
Approach RPZ Length	1,000'	1,000'	1,000'	1,000'	1,000'	1,000'
Approach RPZ Inner Width	500'	500'	500'	500'	500'	500'
Approach RPZ Outer Width	700'	700'	700'	700'	700'	700'
Runway Centerline To:						
Holding Position (Elevation Adjusted)	200' (N/A)	**250'**		200' (N/A)	**200'**	
Parallel Taxiway / Taxilane	240'	**526'**		240'	**240' to 526'**	
Aircraft Parking Area	250'	**400'**		250'	**400'**	

Note: **Blue** indicates future condition | **Bold** indicates exceeds FAA standard | **Gray** indicates military facility.
Note: Unified Facility Criteria (UFC) and Air National Guard Handbook (ANGH).
Source: FAA Advisory Circular 150/5300-13A.

TAXIWAY SYSTEM

The following section documents facility requirements for the taxiway system, including planned taxiway improvements based on forecast user demand, critical aircraft, and design standards. The taxiway system is used to provide aircraft circulation between the runway and terminal area facilities.

Taxiway Design Standards

Taxiway geometry standards are based on the critical aircraft, as determined by the ADG and TDG. The TDG is based on the aircraft MGW and the Cockpit to Main Gear (CMG) distance. The following are the taxiway design standards associated with each runway system based on the demands of the forecast critical aircraft:

- Runway 14/32 Taxiway System (Existing RDC D-III, F-15 C/D and B-737/MD-80 Series critical aircraft): **TDG 3**
- Runway 14/32 Taxiway System (Future RDC D-IV, DC-10-30 critical aircraft): **TDG 5**
- Runway 7/25 Taxiway System (Existing/Future RDC B-II, King Air 350/1900D critical aircraft): **TDG 2**

Parallel Taxiway Configuration

The parallel taxiway configurations required to satisfy user demand and FAA design standards are summarized below:

- **Runway 14/32 Parallel Taxiway System:** Runway 14/32 is served by a westside parallel taxiway system (Taxiway G, E, D) and an eastside partial-parallel taxiway system (Taxiway B, B1, B3). As a precision instrument runway, a full parallel taxiway system is required for Runway 14/32. The east side parallel taxiway would be extended in order to access aviation landside development and provide more efficient runway-to-taxiway routing.

- **Runway 7/25 Parallel Taxiway System:** Runway 7/25 is served by a northside full-parallel taxiway system (Taxiway F). As a runway serving commercial operations, flight training, and turbine traffic, a full-parallel taxiway system is recommended.

Exit Taxiway Locations

Exit taxiway locations are important for expediting traffic off the runway and increasing runway capacity. FAA AC-13A provides these standards for the location of exit taxiways relative to the runway end, for various types of aircraft:

- **Runway 14/32 Exits:** The Runway 14/32 parallel taxiway has two entrance taxiways and three exit taxiway locations (Taxiways E, F, K), and an optional Runway 7/25 turnoff. In accordance with FAA exit taxiway guidance, no additional exit taxiway locations are required for Runway 14/32.

- **Runway 7/25 Exit Taxiways:** The parallel taxiway system for Runway 7/25 includes two entrance taxiways (Taxiways D and F), one exit taxiway location (Taxiway G), and an optional Runway 14/32 turnoff. Based on FAA exit taxiway guidance, no additional exit taxiway locations are required for Runway 7/25.

Taxiway System Facility and Design Recommendations

Table 3-5 summarizes the 20-year taxiway facility requirements for each taxiway segment based on FAA design standards**.** The taxiway requirements involve a variety of facility improvements to meet civilian and military needs and FAA design standards. **Figure 3-4** depicts the future taxiway standards and locations of non-standard taxiway conditions. The non-standard taxiway conditions that require improvements to satisfy FAA design standards (FAA AC-13A) are summarized below by number and taxiway designation. The recommended taxiway design options are discussed in the Alternatives Chapter.

Non-Standard Condition 1: Taxiway A

- Direct access between Military Hangar Ramps (Building 400) and Runway 14 end
- Acute-angled Runway 14 entrance
- Penetrates existing Obstacle Free Zone (OFZ) and planned Precision OFZ (POFZ)
  Future POFZ associated with planned Runway 14 ILS
- Taxiway turn radius with Taxiway D (TDG 5 standards)
- Entrance alignment with Taxiway B1
- Shoulder width exceeds FAA standard

Non-Standard Condition 2: Taxiway C

- Direct access from General Aviation Ramp and Oregon ANG Explosives Ordinance Recovery (EOR) ramp to Runway 14 end
- Entrance alignment with Taxiway B1
- Shoulder width

Non-Standard Condition 3: Taxiway E

- Direct access between apron and Runway 14/32
- Acute-angled intersection with Runway 14/32 and Taxiway B3
- Turn radius with Taxiway G (TDG 5 standards)
- Taxiway radius markings at Taxiway G intersection

Non-Standard Condition 4: Taxiway F/D

- Taxiway F width is 50 feet between Taxiway D and Taxiway G. (ARC B-II standard of 35 feet / Military standard 75 feet)
- Taxiway F width is 75 feet between Taxiway G and Runway 14/32. (ARC B-II standard of 35 feet / Military standard 75 feet)
- Taxiway F width is 75 feet east of Runway 14/32. (ARC B-II standard of 35 feet / Military standard 75 feet)
- Taxiway-to-Runway separation (ARC B-II standard 240 feet)
- Taxiway hold position distance (ARC B-II standard 200 feet – visual runway)
- Taxiway D direct access and entrance width at Runway 7 end (ARC B-II standard of 35 feet)
- Taxiway D hold position distance (ARC B-II standard of 200 feet – visual runway)
- Non-Standard by-pass along Taxiway D entrance to Runway 7 end
- Non-Standard by-pass along Taxiway F entrance to Runway 25 end
- Taxiway crossing intersection within middle-third of Runway 14-32

Non-Standard Condition 5: Taxiway H

- Direct access between southeast ramp and Runway 7/25

Table 3-5 : Taxiway System Facility Requirements

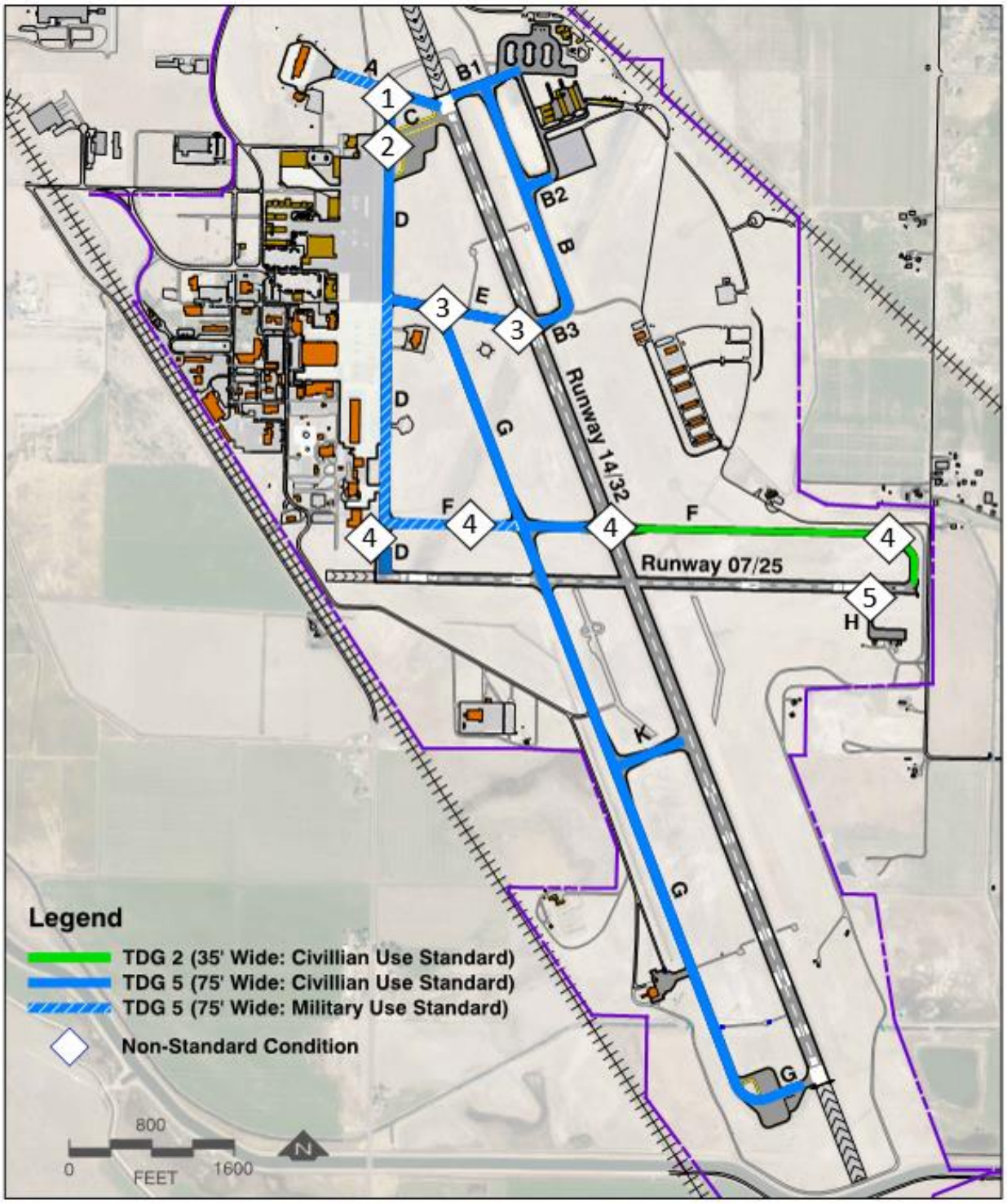
TAXIWAY SYSTEM - FUTURE FACILITY REQUIREMENTS			
Taxiway Segment	**A**	**B**	**B1**
Type	Entrance/Connector	Partial Parallel	Entrance/Connector
Taxiway Design Group - TDG	5	5	5
Taxuway Width	75'	75'	75'
Paved Shoulder Width - Per Side	**50' One Side (30')**	30'	30' One Side **(30')**
Edge Lighting	Medium - MITL	Medium - MITL	Medium - MITL
Pavement Strength - Gear Type	150,000± lbs DWG	315,000± lbs DTWG	315,000± lbs DTWG
Runway-Taxiway Separation	--	400'	--
Runway Hold Short Line	291'	Not Applicable	291'
Taxiway Use: Civilian / Military	Civilian Section	Civilian and Military	Civilian and Military
Facility/Design Correction	**Direct Access, Acute Angle, Shoulder Width**	No Change	**Shoulder Width**
Taxiway Segment	**B2**	**B3**	**C**
Type	Connector	Exit/Connector	Entrance/Connector
Taxiway Design Group - TDG	5	5	5
Taxuway Width	75'	75'	75'
Paved Shoulder Width - Per Side	30'	30'	**50' (30')**
Edge Lighting	Medium - MITL	Medium - MITL	Medium - MITL
Pavement Strength - Gear Type	315,000± lbs DTWG	315,000± lbs DTWG	315,000± lbs DTWG
Runway-Taxiway Separation	--	--	--
Runway Hold Short Line	Not Applicable	291'	291'
Taxiway Use: Civilian / Military	Civilian and Military	Civilian and Military	Civilian and Military
Facility/Design Correction	No Change	No Change	**Direct Access, Alignment with Twy B1, Shoulder Width**
Taxiway Segment	**D-North (Twy A to E)**	**D-Mid (Twy E to F)**	**D-South (Twy F to Rwy 7)**
Type	Parallel/Connector	Connector	Entrance/Connector
Taxiway Design Group - TDG	5	5	**5 (2)**
Taxuway Width	75'	75'	**75' (35')**
Paved Shoulder Width - Per Side	40' to 50' Onc Side **(30')**	10' **(30')**	None **(10' Stabilized)**
Edge Lighting	Medium - MITL	Medium - MITL	Medium - MITL
Pavement Strength - Gear Type	315,000± lbs DTWG	315,000± lbs DTWG	**70,000± lbs DWG**
Runway-Taxiway Separation	--	--	--
Runway Hold Short Line	--	--	**260' (200')**
Taxiway Use: Civilian / Military	Civilian and Military	Military (Twy E to F)	Civilian and Military
Facility/Design Correction	**Turn Radius, Shoulder Width**	**Turn Radius, Shoulder Width (Revert Military Maintenance)**	**By-Pass**

Table 3-5: Taxiway System Facility Requirements (Continued)

TAXIWAY SYSTEM - FUTURE FACILITY REQUIREMENTS			
Taxiway Segment	**E**	**F (West Rwy 14/32)**	**F (East Rwy 14/32)**
Type	Exit/Connector	Full Parallel	Full Parallel
Taxiway Design Group - TDG	5	3 to 5 (5)	**3** (2)
Taxuway Width	75'	50' to 75' (75')	**50'** (35')
Paved Shoulder Width - Per Side	20' (30')	10' Stabilized (30')	10' Stabilized
Edge Lighting	Medium - MITL	Medium - MITL	Medium - MITL
Pavement Strength - Gear Type	315,000± lbs DTWG	315,000± lbs DTWG	**40,000± lbs DWG**
Runway-Taxiway Separation	Not Applicable	**525'** (240')	**525'** (240')
Runway Hold Short Line	291'	**250'** (200')	**250'** (200')
Taxiway Use: Civilian / Military	Civilian and Military	Civilian and Military	Civilian
Facility/Design Correction	**Direct Acces, Accute Angle, Turn Radius**	**Width, Separation, Intersection, By-Pass**	**Width, Separation, Intersection, By-Pass**
Taxiway Segment	**G**	**H**	**K**
Type	Parallel/Connector	Connector	Exit
Taxiway Design Group - TDG	5	2	5
Taxuway Width	75'	35'	75'
Paved Shoulder Width - Per Side	10' (30')	10' Stabilized	20' (30')
Edge Lighting	Medium - MITL	Reflectors	Medium - MITL
Pavement Strength - Gear Type	315,000± lbs DTWG	30,000± lbs DWG	315,000± lbs DTWG
Runway-Taxiway Separation	785'	--	--
Runway Hold Short Line	291'	**250'** (200')	291'
Taxiway Use: Civilian / Military	Civilian and Military	Civilian	Civilian and Military
Facility/Design Correction	**Shoulder Width**	**Direct Access, Hold Short**	**Shoulder Width**

Note: **Blue** indicates future condition | (Parenthesis Text) indicates future condition/standard | **Bold** indicates exceeds FAA standards.
Note: Signage and markings to comply with FAA AC 150/5340-1L.
Source: Mead & Hunt, Inc., February 2019.

Figure 3-4 : Future Taxiway System Facility Requirements



Source: Mead & Hunt, Inc., February 2019.

AIRPORT NAVIGATION/WEATHER/LIGHTING AIDS

VORTAC Station and Critical Area

The Very High Frequency (VHF) Omnidirectional Range/Tactical Aircraft Control (VORTAC) is a critical FAA facility providing a radio-based navigational aid for civilian and military use. VORTAC signals are susceptible to distortion caused by reflections; as such, the FAA has established object set-back buffers to avoid interference from structures. A 1,000-foot radius buffer is used to establish a building restriction line for metal fencing, buildings, and trees. A 1,200-foot radius buffer is used to establish a building restriction line for overhead powerlines and other electrical structures. No VORTAC changes are planned or programmed by the FAA.

Weather Station (ASOS)

The Automated Surface Observation Station (ASOS), which provides local automated weather dissemination, is located northeast of the Runway 32 end, and contains a 500-foot buffer radius. No ASOS changes are planned or programmed by the FAA. The ASOS is not planned to be replaced or relocated, unless required to accommodate future runway or taxiway systems to support military operations.

Airport Beacon

The airport rotating beacon (47-foot tower with 36-inch dual lens with 2-degree angle) is located southeast of the US Forest Service. The beacon is not planned to be replaced or relocated, unless required to provide proper line-of-sight integrity or relocation due to future east landside development. A replacement beacon may be needed in the future due to the age of the unit.

LANDSIDE FACILITY REQUIREMENTS

This section documents the 20-year LMT landside facility requirements. Landside facilities include areas beyond the airfield that support aviation operations, tenants, and non-aeronautical development. The landside facilities and space allocations are determined from the forecast of user demand, tenant input, FAA planning standards, and LMT operating regulations.

AIRLINE TERMINAL

The airline terminal complex consists of the passenger terminal building, aircraft apron, and the vehicle parking lots. Combined, the airline terminal area occupies 8 acres between the FBO (north) and Oregon ANG complex (south). The airline terminal facilities are evaluated with respect to the forecast airline outlook (low scenario), which characterizes the type of airline operator, passenger demand, and peak-period level-of-service factors. This section also identifies terminal facility scenarios in the event scheduled airline service does not resume during the 20-year planning period.

Passenger Terminal Building

The airline passenger terminal building totals 15,107 square feet (11,300 first floor and 3,800 second floor). The building accommodates space for two airline check-in ticketing counters, a secured gate departure lounge, airline offices, a baggage claim area, non-secured restrooms, Transportation Security Administration (TSA) operating-office space, rental car counters, public foyer and seating area, leased office spaces, and a second-floor restaurant. The building floorspace dedicated to airline operations is 6,000 square feet (40 percent), and the airline gate/passenger departure lounge can accommodate approximately 353 passengers (165 to 495 depending on fire code requirements). The building is in good structural and mechanical condition and functions well in providing a high level of regional passenger service without significant peak-period capacity or passenger processing constraints.

LMT is pursuing options to re-establish scheduled regional airline service with anticipated use by 30 to 50 seat passenger aircraft with 1 to 3 daily departures. The building is capable of accommodating expected scheduled regional airline service without interior or exterior modifications. In the event airline service is not resumed during the 20-year planning period, the following terminal building scenarios have been identified for facility requirement consideration:

Building Facility Requirement Scenarios:

Scenario A: Maintain building for regional/commuter airline
(No change in building facility requirement)

Scenario B: Accommodate aviation-related tenant(s)
(Requires minor internal building renovations)

Scenario C: Accommodate a mix of aviation and non-aviation tenant(s)
(Requires minor to moderate internal building renovations)

Scenario D: Accommodate non-aviation tenant re-use
(Requires moderate to major building modification and potential site development)

Recommendation: As a building providing airline service, the structure and floorspace allocation is adequate to meet the 20-year airline facility demands. Future terminal building facility requirements will be determined and planned according to the airline service outlook.

Airline Aircraft Apron

The airline ramp is approximately 90,000 square feet (320 feet wide and 290 feet deep) with two marked aircraft parking positions (#1 South and #2 North) to accommodate regional turboprops or small regional jets, along with maneuvering areas for airline ground support equipment. A physical and electronic barrier divides the airline ramp from the Oregon ANG ramp to separate civilian and military activities, including

aircraft, ground service equipment, and personnel. The FBO has a similar security-access restriction for airline service. When not required for airline service, the apron is used for aircraft overflow parking.

Based on the two marked parking positions, the airline ramp can accommodate the following:

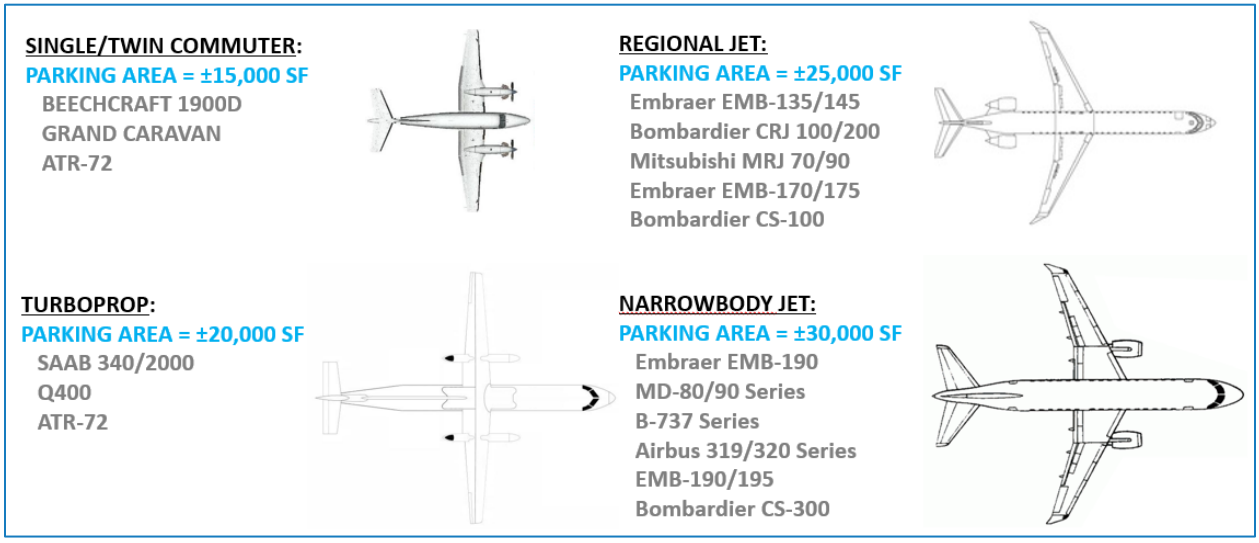
- One large narrowbody transport jet
- Two regional transport jet/turboprop aircraft
  - One active gate and one parked – does not provide wingtip clearance for simultaneous use
  - One of the two parking positions can be used for an aircraft remaining overnight
- Two single- or twin-engine commuter turboprop – simultaneous wingtip clearance
  - Two active gate positions – provides wingtip clearance for simultaneous gate use
  - One of the two parking positions can be used for an aircraft remaining overnight.

Figure 3-5 identifies typical parking area requirements for regional transport aircraft. The apron is constrained for a large narrowbody transport jet and undersized for two simultaneous regional aircraft parking positions.

Recommendation: The apron functions well for a single-gate regional airline service and is adequate to meet the 20-year airline facility demands and site requirements. No apron dimensional changes are required based on the airline forecast outlook (low scenario). However, new aircraft parking position markings may be required to reflect the aircraft type used for future scheduled airline service.

- Existing Airline Apron (2018) = **90,000 square feet**
- Future Recommended Airline Apron (2038) = **90,000 square feet**

Figure 3-5 : Airline Aircraft Apron Parking Space Requirements



Source: Mead & Hunt, Inc., February 2019.

Airline Automobile Parking

The airline terminal parking area includes three separate lots totaling 530 parking spaces and 208,000 square feet, comprising of the following lots.

- **Lot #1** (main short-term, long-term, rental parking): 305 spaces totaling 92,000 square feet
- **Lot #2** (northwest overflow): 110 spaces totaling 53,000 square feet
- **Lot #2** (FBO): 70 spaces totaling 30,000 square feet
- **Lot #3** (southwest overflow): 45 spaces totaling 25,000 square feet

The size of the parking lots and number of parking spaces provided can accommodate normal and peak-period airline passenger demand. Historically, when airline service was active, the main short- and long-term parking lot reached 80 to 90 percent capacity. During non-airline periods, the main short- and long-term parking lot is at 10 to 20 percent of total capacity.

Recommendation: The parking lot provides sufficient capacity and functions well for regional airline service; it is adequate to meet the 20-year airline facility demands and site requirements. No parking lot dimensional changes are required based on the airline low scenario forecast outlook. However, the future parking layout and circulation may be reconfigured to meet future terminal building tenant needs.

- Existing (2018): **208,000 square feet; 530 total spaces** (305 main lot + 225 overflow)
- Recommended (2038): **208,000 square feet; 530 total spaces** (305 main lot + 225 overflow)

AIR CARGO

FedEx (operated by Empire) and UPS (operated by Ameriflight) provide air cargo services. FedEx leases a flightline hangar building for storage and sorting and has an off-site ground facility located in the adjacent City Business Park. UPS uses the aircraft parking ramp to offload cargo to its vehicle fleet and has an off-site sort facility. FedEx and UPS do not anticipate substantial changes to future air cargo demand and service logistics or activities that would necessitate significant improvements to on-airport infrastructure or facilities including aircraft parking and sort building/ramp.

Recommendation: Future air cargo operations are expected to remain in the current location. On-airport air cargo facilities are adequate to meet the 20-year air cargo facility demands and site requirements. During the higher-demand summer months, there is insufficient air cargo apron area due to more frequent parking by large turbine aircraft and helicopters; including seven to nine business jets based at LMT. Designating a larger aircraft parking area for air cargo use is recommended.

- On-Airport Air Cargo Building
  - Existing (2018): 1 Building = 19,000 square feet; Total Site = **90,000 square feet**
  - Recommended (2038): 1 Building = 19,000 square feet; Total Site = **90,000 square feet**
- Air Cargo Aircraft Apron Parking
  - Existing (2018): 2 Aircraft (Single/Twin Turboprop) = **35,000 square feet**
  - Recommended (2038): 2 Aircraft (Single/Large Twin Turboprop) = **40,000 square feet**

- Air Cargo Site (Building, Apron, Auto Parking)
  - Existing (2018): **75,000 square feet**
  - Recommended (2038): **75,000 square feet**

GENERAL AVIATION

General aviation facilities include those supporting pilots, aircraft, and patrons; they are largely facilitated through services provided by the FBO and Specialized Aviation Service Operations (SASO). It is anticipated the FBO will continue to be operated under private ownership rather than the Airport Sponsor. The peak-period forecast activity and tenant input are used to determine the facility requirements and space allocation demand for general aviation facilities.

LMT Minimum Standards and Regulations

The LMT *Minimum Standards for Commercial Aeronautical Activities* and *Rules and Regulations* specify facility and development requirements for airport users and operators. Applicable standards that influence facility requirements are listed below.

Fixed Base Operator (FBO): A full service commercial operator who engages in the primary activity of aircraft refueling and a minimum of two of the following secondary activities: Airframe/Power Plan Maintenance, Flight Training, Aircraft Rental, On-Demand Operations, Avionics Maintenance/Sales, and Aircraft Storage/Hangar Rentals.

Specialized Aviation Service Operation (SASO): Persons providing a single or limited number of Commercial Aeronautical Activities according to Minimum Standards.

Airport Minimum Standards

- Provide a public use terminal building with floor space for customer lobby, office, pilot's lounge, flight planning and weather briefing area, public restrooms
- Provide a minimum of 8,000-gallon capacity tanks of 100 low-lead (LL) and Jet-A fuel
- Provide a minimum of five paved vehicle parking spaces
- Provide a minimum of three transient aircraft tie-down spaces.

Rules and Regulations

- **Aircraft Deicing**: All aircraft deicing activities are to occur on the terminal, FBO or SASO ramp; and deicing of military aircraft occcurs on military leased premises.
- **Refueling Vehicles:** All refueling vehicles must be stored outdoors and at least 50 feet from a building.

FBO Facilities

Existing FBO facilities are located immediately north of the airline terminal area and include two large commercial hangars and an aircraft parking apron. In response to user demand, the following planned facility requirements are anticipated:

- Renovate/expand FBO hangar for general aviation patron (Building #4-B)
- Install 100LL Avgas self-serve fuel storage/dispensing system
- Build new large hangar (±35,000-square-foot building planned west of Building #8-A)
- Provide additional aircraft parking/tie-down area(s).

FBO/General Aviation Terminal Building

The FBO/General Aviation terminal building space is 1,800 square feet and is attached to the FBO maintenance hangar (Building #4-B). The building space accommodates pilots and patrons, also serving as a visible central location and command center for supporting general aviation aircraft flightline services. The FBO terminal is undersized and lacks functionality and esthetic qualities to adequately accommodate general aviation clients, including 24-hour restroom access. It is assumed the FBO/SASO hangar building (Building #8-A/B) would not accommodate public commercial enterprises.

Recommendation: A larger dedicated space or structure is recommended, as either attached to the FBO/SASO hangar or as a stand-alone structure. Based on an assessment of general aviation peak-hour passenger demand levels and comparison with similar-sized airports, the recommended FBO/General Aviation Terminal Building is between 3,000 and 4,500 square feet. The building amenities, including office and retail space, pilot lounge, and 24-hour restroom access, would be dictated by level of service, minimum standards, and cost factors.

General Aviation Auto Parking

The existing FBO/SASO general aviation public auto parking lot has access to 70-plus parking spaces in the airline overflow lot. This lot provides sufficient capacity for pilots, patrons, tenants/employees, flight training, delivery vehicles, and community/civic parking.

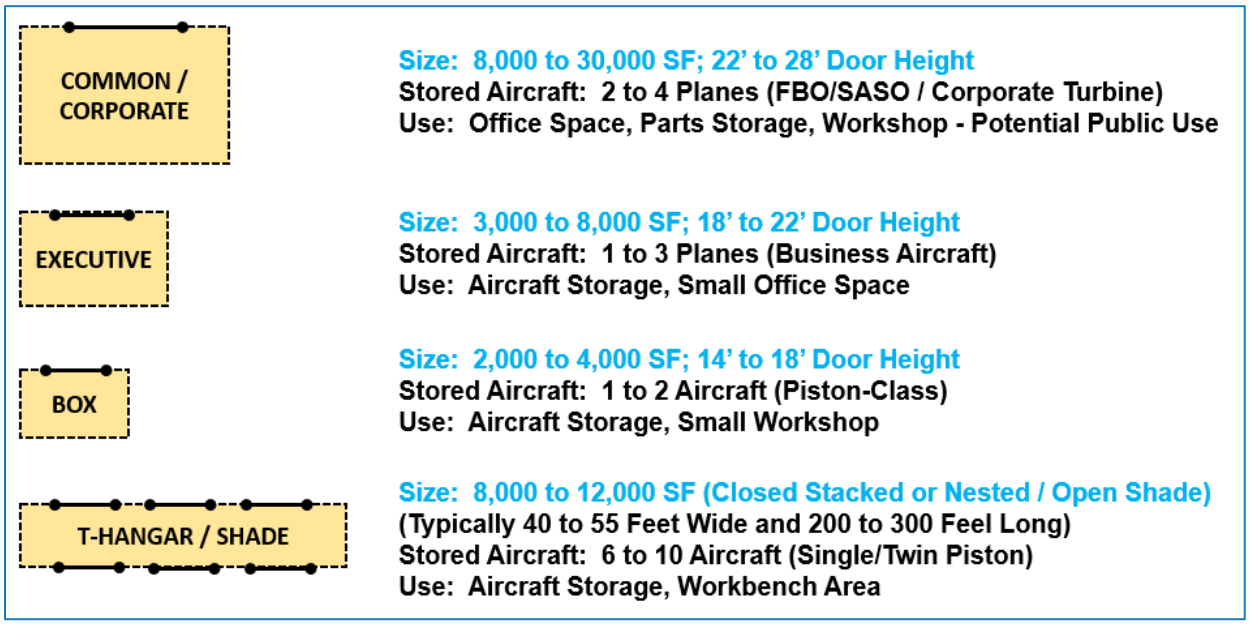
Recommendation: The existing FBO public auto parking area provides sufficient capacity for the 20-year demand. No expansion of the FBO parking area is recommended for the existing FBO location (Building #4-A/B). However, additional parking should be planned as part of a new FBO/SASO building used for providing commercial enterprise.

General Aviation Hangars

Aircraft hangar building storage totals nearly 193,000 square feet with 33 hangar buildings. Approximately 80 to 90 percent of LMT's based aircraft are stored in hangars with the remainder parked on the tie-down apron. The hangars are 100 percent leased but 90 percent occupied with an average on-going hangar waiting list of 6 fixed-wing planes. Nearly 60 percent of the hangars are individual T-hangars/Box hangars comprising 116,300 square feet and the rest are common hangars storing multiple aircraft with 76,300 square feet. Hangar ground leases are controlled by LMT under individual tenant leases and agreements allowing for private hangar ownership or rental arrangements. Aircraft hangars must be developed consistent with LMT Minimum Standards and City building/fire codes.

Figure 3-6 illustrates common general aviation hangar sizes based on aircraft size characteristics. Hangar buildings range from 2,000 to 30,000 square feet depending on hangar type and building amenities, such as offices, storage, a maintenance workshop, and patron/commercial retail space. Based on actual LMT hangar ratios, future hangar floorspace is planned to average 1,400 to 1,800 square feet per aircraft storage unit and occupy a land-to-building footprint ratio of 3.5 to 4.0 square feet.

Figure 3-6 : Typical Aircraft Hangar Sizes



Source: Mead & Hunt, Inc., February 2019.

The primary factors triggering future hangar development are listed below:

- New hangars for individual aircraft owners (T-hangar and box hangar)
- New hangars for business aircraft and office space (executive hangars)
- New hangars for commercial operators (FBO/SASO common or maintenance hangar)
- New hangars to replace obsolete hangars, aircraft upgrades, tenant-owner transitions
- New hangars for contingency or unexpected 20-year waiting-list demand.

A summary of westside and eastside hangar facilities and space allocation is provided below:

Westside and Eastside Hangar Space Allocation

- **Site Area (Westside and Eastside)** = 70 Acres
  - Westside = 40 Acres
  - Eastside = 30 Acres

- **Individual Hangar Area** = 330,000 square feet
  - Westside = 215,000 square feet
  - Eastside = 115,000 square feet
- **FBO/SASO Hangar Area** = 175,000 square feet
  - Westside = 175,000 square feet
  - Eastside = 0 square feet

Recommendation: All future based aircraft are anticipated to be stored in hangars. Future hangar facilities are planned to accommodate a mix of individual, business, and commercial operator storage needs. The 20-year new hangar development will likely require site development. Although the westside general aviation flightline is mostly occupied by existing structures, the area can accommodate a portion of the 20-year hangar demand through in-fill hangars and through re-developed/re-purposed hangar areas. The east side is capable of expansion for both small and large hangars but is constrained by the US Forest Service and Oregon ANG munitions buffer. Therefore, a mix of new westside and eastside hangar development is recommended, in consideration of the hangar type and tenant. Below is a summary of hangar facilities and space allocation by hangar type. Spacing requirements consider the hangar unit and associated apron and excludes snow removal storage areas and taxiway access.

- Individual Hangars (Box/T-Hangar Units)
  - Existing (2018): 72 Aircraft; 33 Hangar Buildings = 116,300 square feet; Site = **7.6 acres**
  - Recommended (2038): 84 Aircraft; 35-40 Hangar Units = 136,000 square feet; Site = **9.5 acres**
- Common Hangars (FBO/SASO/Business Aircraft Owners)
  - Existing (2018): 12 Aircraft; 2 Hangar Units = 76,300 square feet; Site = **5.2 acres**
  - Recommended (2038): 16 Aircraft; 4 to 5 Hangar Units = 137,800 square feet; Site = **9.0 acres**

General Aviation Apron

The general aviation apron totals 781,500 square feet with 62 marked fixed-wing aircraft parking tie-down positions. The parking positions are not designated by tenant user nor are they distinguished for fixed wing or helicopter aircraft types. The apron becomes congested during the summer peak-period season when the FBO transient parking, air cargo parking, based tie-downs, and the fueling area are used simultaneously. Additionally, there is a trend towards more frequent transient and based aircraft traffic by large turbine aircraft.

The public-use apron needs to be able to accommodate 40 percent of the peak/design day itinerant aircraft (44 civilian peak day traffic x 60 percent itinerant traffic x 40 percent = 11 itinerant positions), plus based aircraft and tenant space requirements for fixed-wing and rotorcraft aircraft. FAA airport planning criteria recommends 360 square yards or 3,240 square feet per itinerant aircraft space, and approximately 300 square yards or 2,700 square feet per based aircraft so for LMT that would be 11 itinerant aircraft x 3,240 square feet, which equals 35,640 square feet. **Figure 3-7** graphically shows aircraft parking requirements by representative aircraft types. The apron accommodates the peak/design day itinerant aircraft but is undersized for other space allocation and parking demands.

Aircraft apron size and space allocation factors are listed below.

- Accommodate peak-period parking demand (apron reaches capacity)
- Large turboprop/jet aircraft parking demand
- Fueling activity
- Helicopter activity
- Air cargo parking (typically park adjacent to hangar building #7)
- Utilization of overflow apron (adjacent to hangar building #9)
- Use of FBO/SASO hangar ramp for parking (adjacent to buildings #4-A and #8-A)
- Future hangar flightline building disposition
- Parking tie-down availability on eastside airfield. – depends on ILS critical area

Improvements to the aircraft apron will need to consider the following:

- Install 100LL Avgas fuel storage/dispensing system on main apron
- Expand main apron to accommodate peak operating periods
- Provide dedicated aircraft deicing location

Recommendation: Additional apron area is required to accommodate the 20-year demand for peak-period activity. The main general aviation apron areas should be designed to ADG II standards, with a pavement strength up to 30,000 pounds SWG for piston/turboprop/helicopter aircraft and 60,000 to 90,000 pounds DWG for business jets.

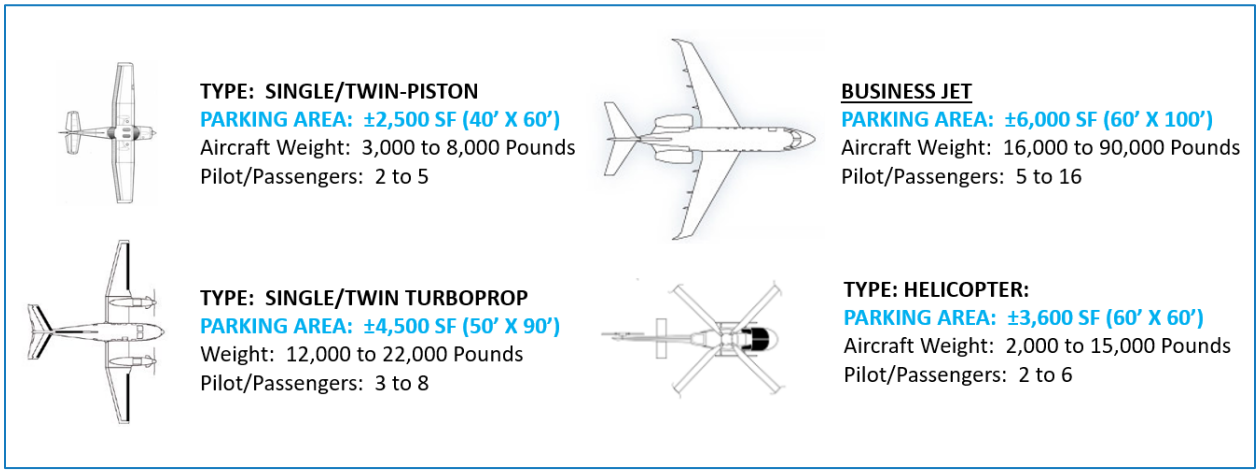
General Aviation Apron (Westside):

- **Existing (2018):** 505,000 square feet; 54 parking/tie-down spaces
- **Recommended (2038):** 565,000 square feet; 60 parking/tie-down spaces

General Aviation Apron (Eastside):

- **Existing (2018):** 276,500 square feet; 8 marked parking/tie-down spaces (including tenant-only use)
- **Recommended (2038):** 276,500 square feet; 8 marked parking/tie-down spaces (including tenant-only use)

Figure 3-7 : General Aviation Aircraft Parking Area



Source: Mead & Hunt, Inc., February 2019.

AVIATION TENANTS

Flight Training Facilities

The flight training activity, gauged by the number of students and aircraft, is forecast to increase. Two flight schools, Pelican and Precision, share a combined building-hangar (Building #11A/B). Pelican has expressed interest in expanding their facilities, including a building-hangar and aircraft ramp, to accommodate additional flight training and classroom instruction. However, future growth of the flight training activity and facilities will likely be dependent on cultivating students based on the state of professional airline pilot hiring, and integration of flight training with aviation educational curriculums and degrees.

Recommendation: Planning of a future flight training building and hangar is recommended, expected to be comparable to the existing 12,000-square-foot building-hangar structure.

US Forest Service Facilities

The US Forest Service leases approximately 12 acres for the Klamath Airtanker Base. The US Forest Service complex includes multiple operations and administration buildings, 60,000 square feet of paved aircraft parking, including three large tanker pull-through pits, and one back-in tanker pad. US Forest Service aircraft activity consists of fixed-wing aircraft and helicopters. The northeast ramp could also be used for parking and reloading US Forest Service transport tankers.

Recommendation: Although US Forest Service activity and aircraft size are forecast to increase at LMT, including more frequent DC-10-30 Very Large Tanker operations, the US Forest Service has not identified facility improvements for their leased area, buildings, aircraft parking, or support facilities. However, for contingency planning purposes, future changes to the US Forest Service mission at LMT may trigger facility improvements and modification to the lease area.

Agricultural Spray Facilities

Agricultural spray activity by single-engine turboprops is expected to increase. The agricultural spray operator leases a four-acre site south of the Runway 25 end, used on a seasonal basis. The facility includes two open-air storage structures, fuel tanks, and a 40,000-square-foot aircraft parking apron with two concrete pads.

Recommendation: The agricultural spray operator has not indicated a need for facility improvements or expansion. However, for contingency planning purposes, if additional or expanded agricultural spray requirements become necessary, modifications to the lease area may be required.

SUPPORT FACILITIES

The following are facility requirements for airport support facilities and services.

Aircraft Fueling Systems

Aircraft fuel service and dispensing, including 100LL Avgas and Jet-A, are basic FBO/SASO aviation service provisions. For planning purposes, the fuel type(s), tank capacity, storage/dispensing location(s) and delivery arrangements influence general aviation landside space allocation.

R**ecommendation (100LL Avgas):** Since nearly 80 percent of the LMT traffic and based aircraft are piston aircraft, it is recommended a 100LL Avgas self-serve fuel storage/dispensing system be installed on the main westside apron, as consistent with LMT Minimum Standards.

Recommendation (Jet-A): No additional Jet-A storage capacity is planned.

Airport Administration Building

The Airport Adminstration Building is 1,680 square feet, in fair to poor condition, and undersized to adequately accommodate staff and public meeting needs.

Recommendation: A 2,500 to 3,000 square foot replacement building is recommended and should include office space, public meeting/conference room, and storage space. It is also recommended that the future Airport Administration Building be constructed as a centralized Airport Operation Building and be combined with the maintenance and equipment storage building as part of a single structure.

Airport Operations/Maintenance Building

The existing 5,000 square-foot civilian Airport Operations/Maintenance Building provides covered storage for Airport vehicles and workshop space. The undersized building, which is in fair to poor condition, has limited vehicle/machinery parking space and is unable to accommodate the snow removal equipment (SRE), which is parked outside throughout the year.

Recommendation: A 7,500-square-foot replacement Airport Operations/Maintenance Building is recommended, to provide adequate parking and storage space. It is recommended the future Airport Operations/Maintenance Building be merged with the Airport Administration Building as part of a single-combined Airport Operations Building (AOB) structure.

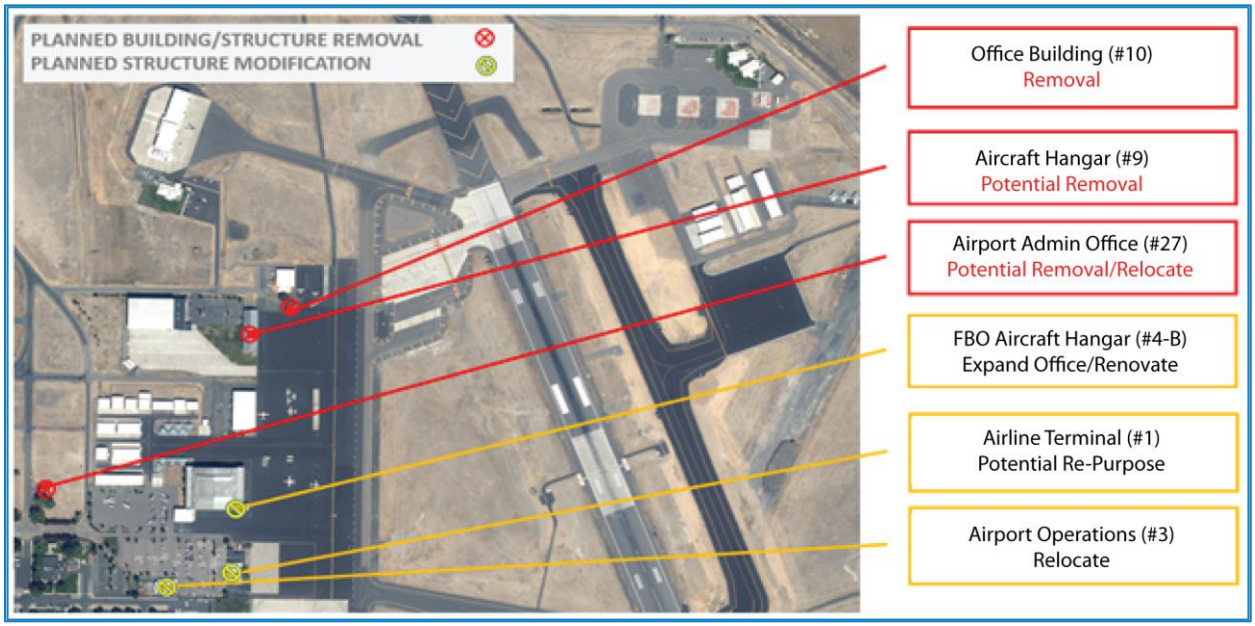
Airport Traffic Control Tower (ACTC)

The ATCT building, which is owned by the FAA and operated by the Oregon ANG is in good condition and provides sufficient services for existing and planned facilities. No changes to the ATCT building or site are recommended, unless required to meet military requirements.

Planned Building/Structure Disposition

Figure 3-8 shows structures/buildings identified for potential removal by relocation or replacement or modification by expansion or renovation due to poor building condition or function. The future building disposition is considered part of the facility requirements and future planning options.

Figure 3-8 : Future Building Disposition



Source: Mead & Hunt, Inc., February 2019.

Apron Aircraft Deicing

Spent aircraft deicing fluids are not currently contained, captured, or treated. As part of future apron improvements, planned deicing capabilities are anticipated to satisfy increasingly more stringent federal, state, and local regulations (see LMT Stormwater Pollution and Spill Prevention Plan dated December 2017). Deicing runoff management systems consist of collection, storage, and disposal components that work in combination. Common centralized deicing options for disposal or treatment of aircraft deicing fluids are listed below.

- Sanitary/Wastewater Treatment Plant Processing
- Collect Deicing Fluids for Off-Site Transport and Processing
- Collect Deicing Fluids for On-Site Land Application

These deicing options include the same conceptual gravity-fed collection and storage approach, with differences in the method for disposal of that material. In each case, the apron trench drains, captures, and conveys stormwater, which may contain aircraft/vehicle petroleum oils and fuel products, and spent aircraft deicing fluid. The stormwater drain would connect to an oil/water separator to isolate the oils from the stormwater, then a deicing diversion valve will isolate the deicing runoff from non-deicing stormwater. The oil/water separator only removes petroleum products from the stormwater and does not separate deicing fluids from the flow.

Rental Car Facilities

Rental car facilities exist on the first floor of the airline terminal. Previous rental car companies included Hertz, Avis-Budget, and Enterprise. Rental car facilities, including ticket counter, parking, and car wash are sufficient to accommodate future rental car businesses throughout the 20-year planning period.

Security Facilities

Airfield Perimeter Fencing and Gate System

Perimeter fence is installed except for a section along the southern Airport Operating Area (AOA), north of the Lost River Diversion Channel. There are 11 secured vehicle gates providing AOA access, principally for the airfield perimeter roadway, airline terminal area, FBO, general aviation hangars, and military facilities.

Recommendation: To comply with 2014 Wildlife Hazard Management Plan, enclosing the entire AOA is recommended. The secured vehicle gates provide adequate AOA access for airport staff and tenants.

Airport Entrance Road

The primary entrance road to the terminal requires crossing the railroad line twice west of LMT on Washburn Way and Joe Wright Road.

Recommendation: For pubic and emergency response purposes, a new entrance road access route is recommended to bypass the railroad tracks and connect directly with Washburn Way.

Facility Setback Requirements

The following list documents setback requirements associated with civilian and military facilities, which are in addition to civilian (FAA) runway safety areas and military (UFC) clear zone standards:

- **VORTAC (FAA Facility):** 1,000-foot and 1,200-foot station radius, depending on the type of structure.
- **ASOS (FAA/DOD Facility):** 500-foot station radius.
- **Munitions Storage (Military Facility):** 1,250-foot explosive safety quantity distance (ESQD) arc from the perimeter structures.
- **Instrument Landing System (ILS) Facilities:** Establishes critical areas and hold positions for ILS facility components (glideslope antenna mast, localizer antenna, approach light system units)
- **Building Restriction and Visibility Lines (FAA Standard):** Establishes a suitable building restriction line and runway visibility zone based on the runway configuration; entails a 640-foot building restriction line separation from the Runway 14/32 centerline and 390-foot separation from Runway 7/25, in addition to runway visibility zone line-of-sight between runway ends.
- **ATCT Line-of-Sight (FAA and Military Standard):** Provide unobstructed visual line-of-sight and radio communication between runway ends and the airfield movement areas.
- **Combat Arms Training and Maintenance Range (CATM) Surface Danger Zone:** The requirement for the partially contained range is for the military to control 50 percent of the surface danger zone distance, which extends 7,874 feet from the firing line. The IDP indicates control over 1,000 feet.
- **Standoff Distances (Military Standard):** These distances are a security measure that prevents unauthorized people and vehicles from approaching within a minimum distance of a building or area. This includes Anti-Terrorism / Force Protection used to mitigate vulnerabilities from outside threats.

Military Site Requirements

The following are military installation areas that influence civilian facility requirements.

- **Command and Support - Cantonment Area:** The main cantonment area is situated at the west side of the airfield and comprises approximately 135 acres. Most of Oregon ANG facilities are located on the main cantonment area. Combined gross square feet of all existing buildings stands at approximately 492,930 square feet. The leased Command and Support Area is not expected to increase during the 20-year planning period.
- **Air Traffic Control Squadron/Aircraft Operations – ATCS (Annex):** The ATCS is located on 16 acres south of the main cantonment area and houses the 270 ATCS tenant unit on base (this area does not include the ATCT). The leased ATCS annex area is not expected to increase during the 20-year planning period.

- **Munitions Storage (Annex):** The munitions storage area annex, operated by the Oregon ANG under lease, and located on the east airfield houses munitions storage and administrative space. A 1,250-foot ESQD arc surrounds the munitions storage area. The ESQD arc crosses a road on the airport boundary, and the roadway must be closed when munitions are being moved. The ESQD encompasses 126 airport acres, which significantly constrain civilian landside development. The Munitions Storage area involves an ESQD boundary, an easement, a lease property boundary, and a land use subzone. It is recommended LMT continue dialogue with the Oregon ANG to reduce these on-airport land holdings and setback restrictions and to develop the area for civil aviation / non-aviation use. The leased Munition Storage annex area is not expected to increase during the 20-year planning period.
- **CATM/Firing Range (Annex):** The CATM/Rifle Range annex and the hush house are located on 29 acres on the south end of the primary runway. The leased CATM Annex area is not expected to increase during the 20-year planning period.
- **Aircraft Maintenance Building 400 (Annex):** This is an aircraft maintenance building occupying 7 acres on the north end of the primary runway that houses the former alert hangar and crew quarters. These facilities are currently used by the 173d Maintenance Group. The leased Building 400 Annex area is not expected to increase during the 20-year planning period.

AIRPORT LAND USE AND PROPERTY INTERESTS

AIRPORT PROPERTY ACQUISITION

The LMT property totals approximately 1,251 acres. In accordance with the facility recommendations based on future conditions, additional airport property interests, in fee and/or easement, are recommended to satisfy FAA standards, meet user demand, and accommodate tenant site developments.

Airport Property Acquisition – Fee

- VORTAC buffer arc – acquire remaining arc radius
- Runway 7 Runway Protection Zone (RPZ) – Convert easement to fee
- Runway 25 Runway Protection Zone (RPZ) – Convert easement to fee
- Runway 14 Runway Protection Zone (RPZ) – Convert easement to fee
- Runway 25 Runway Protection Zone (RPZ) – Convert easement to fee

For the RPZ, the FAA's *Interim guidance on Land Uses within a Runway Protection Zone* (2012) recommends airport owner control over the RPZ land in order to avoid or minimize incompatible land uses. Ultimate land acquisition and ownership interests, which is conducted in accordance with FAA guidance, is recommended based upon the availability of the property and funds.

Airport Property Acquisition – Easement

- ASOS Buffer Arc – Acquire land or easement for remaining arc
- Wildlife Hazard Control – Acquire land interest north of LMT for wildlife hazard control purposes (see Attachment)

Airport Property Release - Parcels

- No planned property releases

LANDSIDE BUSINESS DEVELOPMENT

The landside tenant business area encompasses property not dedicated to the airfield and aviation service providers and do not require access to the runway.

Approach

In the interest of maximizing revenues, LMT property should be planned to accommodate aviation and non-aviation users. The civilian airport property does not have sufficient space available to offer large tracts of land for business development. This includes aviation and non-aviation businesses that are complementary to airport services but may not be directly involved in aeronautical services or require airfield access. The US Forest Service is a good example of this type of business tenant.

Contingency Site Development

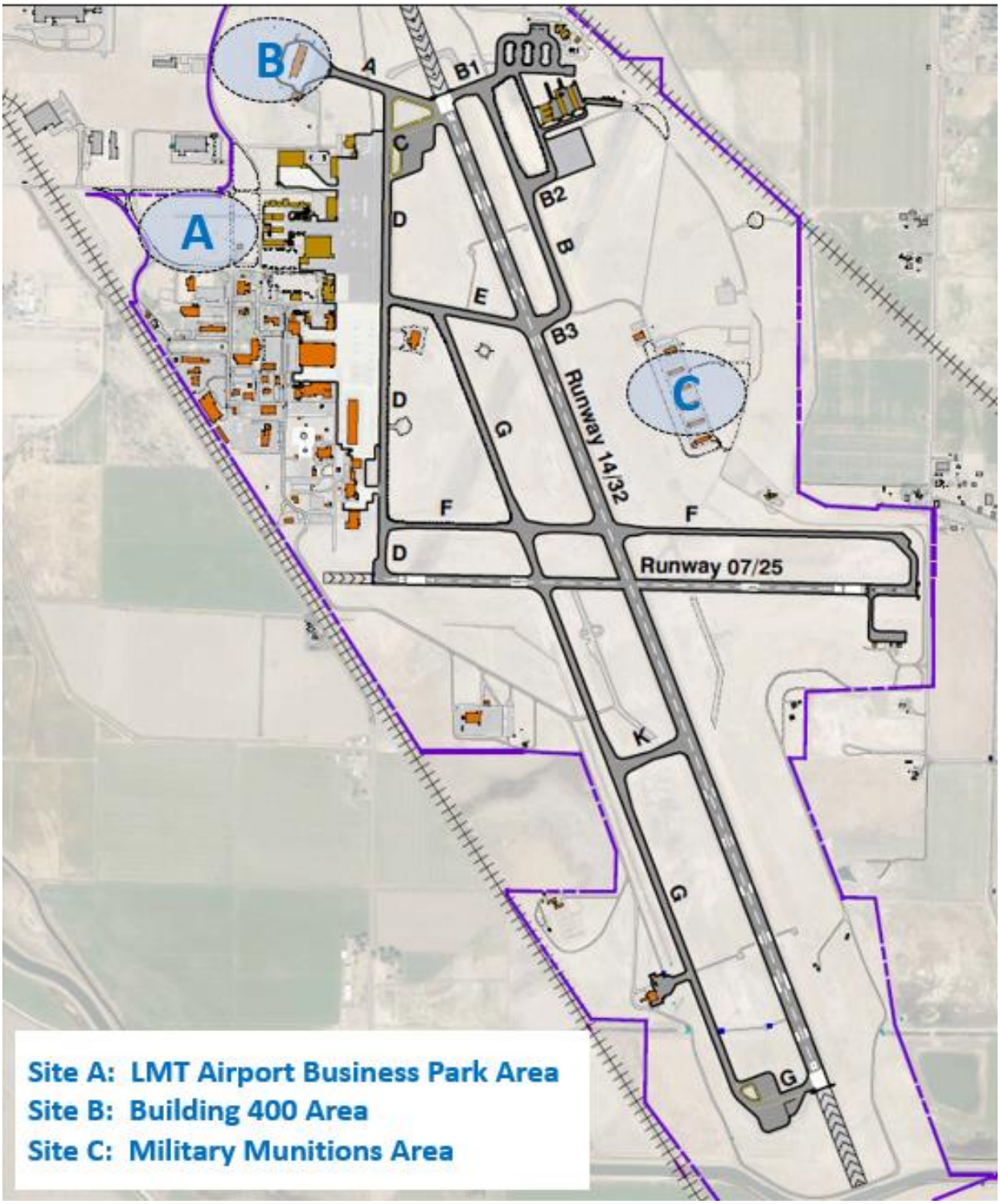
Prudent planning should accommodate compatible land development associated with the potential for accommodating new aviation technologies and emerging aeronautical industries (e.g., aircraft manufacturing, military-centric partnerships).

Business Site Developments and Contingency Factors

Few airports generate sustainable revenues based on rural commercial and general aviation activity. Therefore, as identified in **Figure 3-9**, the following landside tenant scenarios are recommended.

- **Site A:** LMT Airport Business Park
- **Site B (Contingency):** Building 400 Aircraft Maintenance – if deactivated in future
- **Site C (Contingency):** Munitions Storage – if deactivated in future

Figure 3-9 : Airport Business Site Locations (A, B and C) – Existing and Potential



Source: Mead & Hunt, Inc., August 2019.

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