

CRATER LAKE
KLAMATH
REGIONAL AIRPORT

Master Plan

February 2021





FEBRUARY 2021

"The preparation of this document may have been supported, in part, with financial assistance from the Federal Aviation Administration through the Airport Improvement Program. The contents do not necessarily reflect the official views or policy of the FAA. Acceptance of these documents by the FAA does not in any way constitute a commitment on the part of the United States to participate in any development depicted herein nor does it indicate that the proposed development is environmentally acceptable in accordance with appropriate public law."



PORTLAND
9600 NE Cascades Parkway
Suite 100
Portland, OR 97220
Ph. 503-548-1494

Acknowledgements



We wish to acknowledge everyone who contributed to the Crater Lake – Klamath Regional Airport (LMT) Master Plan 2020 update. We thank you for your insight and thoughtful feedback.

KLAMATH FALLS CITY COUNCIL

Carol Westfall, Mayor
Phil Studenberg, Ward 1
Kendall Bell, Ward 2
Matt Dodson, Ward 3
Dan Tofell, Ward 4
Todd Andres, Ward 5

CITY AND AIRPORT STAFF

Nathan Cherpeski, City Manager
John Barsalou, AAE, Airport Director
Linda Tepper, AAE, Business Manager
Steve Gharst, CM, Operations Manager
Joseph Goetz, CM, Operations Manager (former)

MASTER PLAN ADVISORY COMMITTEE (MPAC)

Joe Wall, City of Klamath Falls
Jon Anderson, City of Klamath Falls
Mark Willrett, City of Klamath Falls
Erik Nobel, County of Klamath
Jim Chadderdon, Discover Klamath
Rick Flowers, Experimental Aircraft Association (EAA)
Robert Tykoski, FAA Seattle ADO
Ed Langerveld, Fixed Base Operator (FBO)
Justin Dunaway, Fixed Base Operator (FBO)
Heather Tramp, Klamath County Chamber of Commerce
Betty Riley, South Central Oregon Economic Development District (SCOEDD)
Julie Matthews, Klamath County Economic Development Association (KCEDA)
Rudy Cox, Klamath County Economic Development Association (KCEDA)
Dr. Roberto Gutierrez, Klamath Community College (KCC)
Sandra Fox, Oregon Institute of Technology (OIT)

(MPAC CONTINUED)

Captain Joe Young, Oregon ANG
LtCol Jason Nalepa (Weave), Oregon ANG
Captain Oscar Alonso, Oregon ANG
Major Zachary Johnson (Ruckus), Oregon ANG
Heather Peck, Oregon DOT - Department of Aviation
Paul Stewart, Sky Lakes Medical Center
Don Cavin, US Forest Service

MEAD & HUNT, INC.

Mitchell Hooper, West Coast Aviation Planning Manager
Maranda Thompson, Project Manager
Kelly Maddoux, Senior Planner
Jeff Smith, Senior Planner
Barbara Michael, Senior Project Planner
Angela Archibeque, Airport Planner
Colin English, Airport Planner
Daniel Lumetta, Airport Planner
Daniil Repchenko, Airport Planner
Todd Eroh, Senior Technician
Krista Robertson, Editor



CONTENTS

Chapter E	E-1
Introduction	E-1
Aviation Forecasts	E-3
Critical Aircraft and Runway Design Code	E-5
Airside Facilities	E-6
Runways	E-6
Taxiways.....	E-7
Landside Facility Requirements	E-7
Non-Aeronautical Development.....	E-8
Development Considerations	E-9
Development Recommendations	E-9
Financial Implementation	E-11
Summary	E-15
Chapter 1	1-1
Introduction	1-1
Airport Overview	1-1
Location	1-1
Governance	1-3
History.....	1-3
Airport Profile	1-4
Facility Classifications	1-4
Aeronautical Activity	1-5
Airfield and airspace	1-7
Property Interests	1-7
Airfield.....	1-9
Airspace and Airport Traffic Control	1-12
Instrument Approach Procedures.....	1-14
Landside Facilities	1-15
Airline Terminal Area	1-18
General Aviation Facilities	1-18
Airport Support and Tenant Facilities	1-19
Administration Building	1-19
Maintenance Building	1-20
Oregon ANG Facilities.....	1-20
Airport Traffic Control Tower (ATCT).....	1-20

CHAPTER 1 : INVENTORY

Aircraft Rescue and Firefighting (ARFF) 1-20

Air Cargo Facilities..... 1-21

US Forest Service Facilities 1-21

Agricultural-Spray Facilities 1-21

General Aviation (GA) Aircraft Hangar Facilities 1-21

Aircraft Fuel Facilities 1-21

Wash Rack Facilities 1-22

Meteorological Conditions 1-22

 Climate..... 1-22

 Wind Patterns And Crosswind Conditions..... 1-23

 Airport Utilities (Civilian Areas) 1-25

Community Profile 1-26

 Socioeconomic Profile 1-26

 City / Airport Land Use and Zoning 1-27

Environmental Overview 1-33

Inventory Summary..... 1-34

 Airfield 1-34

 Landside 1-34

 Activity 1-34

 Land Use and Property..... 1-34

Chapter 2 2-1

Introduction 2-1

 Forecast Overview..... 2-1

 Forecast Approach 2-3

 Aviation Forecast Resources..... 2-5

 FAA TAF Review and Consistency 2-6

Forecast Components 2-6

 Component #1: Airline Forecast..... 2-6

 Component #2: Air Cargo 2-13

 Component #3: Civilian Aircraft Operations and Peaking 2-17

 Component #4: Based Aircraft 2-22

 Component #5: Critical Aircraft..... 2-26

Specialized Civilian Forecast Activities..... 2-35

 US Forest Service Activity 2-35

 Medical Flights..... 2-35

 Civilian Flight Training Activity 2-36

 Adversary Air (Civilian Contract) 2-36

 Potential Scenic/Tourism Flights 2-36

 Potential Unmanned Aircraft Systems (UAS-Drones) 2-36

Chapter Summary 2-37

 Aviation Forecast..... 2-37

Forecast Planning Activity Levels2-38
 Critical Aircraft Forecast2-38
 FAA Terminal Area Forecasts Comparison and Approval2-38

Chapter 3 3-1

Introduction3-1

Airport Classification and FAA Standards3-1
 Airport Design Standards 3-2

Airfield System Requirements 3-4
 Airport Capacity 3-4
 Runway System 3-8
 Taxiway System 3-22
 Airport Navigation/Weather/Lighting Aids 3-28

Landside Facility Requirements 3-28
 Airline Terminal 3-28
 Air Cargo 3-31
 General Aviation 3-32
 Aviation Tenants 3-37
 Support Facilities 3-38

Planned 3-39

Airport Land Use and Property Interests 3-42
 Airport Property Acquisition 3-42
 Landside Business Development 3-43

Chapter 4 4-1

Introduction 4-1

Alternatives Approach 4-2
 Process 4-2
 Screening Criteria 4-3
 LMT Strategic Development Goals 4-7
 Coordination 4-7

Runway System 4-7
 Runway 14/32 Improvements 4-8
 Runway 7/25 Improvements 4-11

Taxiway System 4-15
 Taxiway Design Standards 4-15
 Taxiway Improvements 4-17

Navigational Aids (NAVAIDS) 4-28
 Runway 14 Instrument Landing System (ILS) Alternatives 4-28

Landside – Aeronautical Facilities 4-34

CHAPTER 1 : INVENTORY

Landside Alternatives Common Elements 4-34

Terminal Building Repurposing 4-35

General Aviation Development..... 4-35

US Forest Service Facilities 4-42

Airport Administration and Operations Facilities 4-43

Oregon ANG Support Facilities 4-45

Landside – Non-Aeronautical Facilities..... 4-67

Non-Aeronautical Development of Airport Property 4-67

Airport Business Park 4-67

City Industrial Park..... 4-68

Airport Entrance Road – Realignment..... 4-68

Chapter 5 5-1

Introduction 5-1

Capital improvement Plan 5-1

Capital Improvement Plan Approach..... 5-2

Cost Estimates..... 5-5

Project Phasing..... 5-6

Funding Sources 5-21

Federal..... 5-21

State 5-22

Local 5-22

Other 5-23

Financial Plan 5-23

Historical Review 5-23

Summary 5-28

TABLES

Chapter E	E-1
Table E-1 : LMT Significant Operational Factors	E-2
Table E-2 : Summary of Aviation Activity, 2018-2038	E-4
Table E-3 : Funding Plan	E-11
Chapter 1	1-1
Table 1-1 : LMT Facility Services.....	1-4
Table 1-2 : Airfield Systems	1-10
Table 1-3 : Taxiway System.....	1-11
Table 1-4 : Instrument Approach Procedures	1-15
Table 1-5 : LMT Fuel Storage and Dispensing Facilities	1-22
Table 1-6 : Climatic Data Summary	1-23
Table 1-7 : Runway Crosswind Component (Percent Coverage).....	1-24
Chapter 2	2-1
Table 2-1 : LMT Forecast Activity	2-2
Table 2-2 : Forecast Airline Service Outlook Summary	2-12
Table 2-3 : Aircraft Operational Peaking (Civilian).....	2-21
Table 2-4 : Based Aircraft – By Aircraft Type.....	2-26
Table 2-5 : LMT Aircraft Traffic Mix (Total and Most Demanding Turbine Aircraft)	2-29
Table 2-6 : Master Plan Forecast Summary	2-37
Table 2-7 : Master Plan Forecast and FAA TAF Comparison	2-39
Chapter 3	3-1
Table 3-1 : Runway 14/32 Facility Recommendations	3-13
Table 3-2 : Runway 14/32 Design Standard Recommendations.....	3-14
Table 3-3 : Crosswind Runway 7/25 Facility Recommendations.....	3-20
Table 3-4 : Crosswind Runway 7/25 Facility Standards	3-21
Table 3-5 : Taxiway System Facility Requirements	3-25
Chapter 4	4-1
Table 4-1 : Summary Evaluation of Runway 14 ROFA Alternatives.....	4-10
Table 4-2 : Summary Evaluation of Taxiway E Alternatives	4-23
Table 4-3 : Summary Evaluation of Runway I4 ILS GS Antenna Location Alternatives.....	4-32

Table 4-4 : Summary Evaluation of Additional Runway Concepts4-49

Chapter 5 5-1

Table 5-1 : LMT Overall Projects5-3

Table 5-2 : Oregon Air National Guard Funded Projects5-4

Table 5-3 : Summary of Project Cost Estimates5-5

Table 5-4 : Short Term Project Cost Estimates5-7

Table 5-5 : Mid-Term Project Cost Estimates5-11

Table 5-6 : Long-Term Cost Estimates5-15

Table 5-7 : LMT Historical Operating Budget Summary5-24

Table 5-8 : Forecasted Compound Annual Growth Rate.....5-25

Table 5-9 : LMT Forecasted Operating Budget Summary5-27

FIGURES

Chapter E	E-1
Figure E-1 : LMT Conceptual Ultimate Development Plan	E-13
Chapter 1	1-1
Figure 1-1 : LMT Vicinity and Location	1-2
Figure 1-2 : Existing Airport Layout and Facilities	1-8
Figure 1-3 : Airspace Structure	1-13
Figure 1-4 : Westside Civilian Landside Area.....	1-16
Figure 1-5 : Eastside Civilian Landside Area.....	1-17
Figure 1-6 : Wind Dispersion Charts (All-Weather and Instrument Conditions)	1-24
Figure 1-7 : City LMT Land Use and Zoning	1-29
Figure 1-8 : Klamath County Zoning Map.....	1-32
Chapter 2	2-1
Figure 2-1 : Airport Master Plan Forecast Process	2-3
Figure 2-2 : Airline Enplanement Forecast	2-11
Figure 2-3 : (Exhibit & Table): Air Cargo Volume Forecast	2-16
Figure 2-4 : Total Annual Aircraft Operations (Civilian)	2-20
Figure 2-5 : (Exhibit & Table): Based Aircraft Forecast	2-25
Figure 2-6 : LMT Similar/Critical Aircraft Users and Types – Turbine Aircraft.....	2-28
Figure 2-7 : Primary Runway / Airport Critical Aircraft.....	2-31
Figure 2-8 : Crosswind Runway Critical Aircraft	2-34
Chapter 3	3-1
Figure 3-1 : Facility Requirements Planning Process.....	3-2
Figure 3-2 : LMT Annual Service Volume (ASV) Congestion/Delay Locations	3-7
Figure 3-3 : Future Runway 7/25 Ends and Displaced Threshold Disposition	3-18
Figure 3-4 : Future Taxiway System Facility Requirements	3-27
Figure 3-5 : Airline Aircraft Apron Parking Space Requirements	3-30
Figure 3-6 : Typical Aircraft Hangar Sizes	3-34
Figure 3-7 : General Aviation Aircraft Parking Area	3-37
Figure 3-8 : Future Building Disposition.....	3-39
Figure 3-9 : Airport Business Site Locations (A, B and C) – Existing and Potential.....	3-44

Chapter 4	4-1
Figure 4-1 : Alternatives Process.....	4-2
Figure 4-2 : Principle Environmental and Land Use Constraints.....	4-5
Figure 4-3 : Runway 7/25 Preferred Alternative	4-13
Figure 4-4 : Taxiway Nonstandard Conditions	4-16
Figure 4-5 : Preferred Alternatives Taxiway Layout	4-19
Figure 4-6 : Taxiway A & C Alternative.....	4-21
Figure 4-7 : Taxiway E Alternatives	4-24
Figure 4-8 : Taxiways F and F1 Design.....	4-26
Figure 4-9 : Taxiways F, F2, and H Design	4-27
Figure 4-10 : GS Antenna Options A, B, and C	4-30
Figure 4-11 : Runway 14 Localizer Antenna	4-33
Figure 4-12 : Westside Development Options	4-37
Figure 4-13 : Eastside Development Options	4-38
Figure 4-14 : Additional Runway Concepts	4-51
Figure 4-15 : Oregon ANG EOR Concept A.....	4-56
Figure 4-16 : Oregon ANG EOR Concept B.....	4-57
Figure 4-17 : Oregon ANG EOR Concept C (Preferred)	4-58
Figure 4-18 : Building 400 Annex Development	4-61
Figure 4-19 : Oregon ANG Capital Improvement Projects (2020-2025)	4-65
Figure 4-20 : Airport Business Park.....	4-67
Figure 4-21 : Airport Entrance Road Realignment	4-69
Figure 4-22 : LMT Road System.....	4-71
Chapter 5	5-1
Figure 5-1 : Short -Term: 5 Year CIP (2021-2025).....	5-9
Figure 5-2 : Mid-Term: 6-10 Year CIP (2026-2031)	5-13
Figure 5-3 : Long-Term- 11-15 Year CIP (2031-2040).....	5-17
Figure 5-4 : LMT Ultimate Development Plan	5-18
Figure 5-5 : LMT Ultimate Property Acquisition.....	5-19

Executive Summary



CRATER LAKE

**KLAMATH REGIONAL
AIRPORT**

Executive Summary

INTRODUCTION

Crater Lake – Klamath Regional Airport (LMT) is located in south-central Oregon, 15 miles north of the Oregon/California border. LMT is owned and operated by the City of Klamath Falls and is situated five miles south of downtown Klamath Falls in south-central Klamath County. The City's Airport Department administers sponsorship for LMT in accordance with Federal Aviation Administration (FAA) grant obligations. The Airport Department includes an Airport Director, Business Manager, and Operations Manager, as well supporting maintenance/operations personnel. The Airport Director is responsible for the overall management of LMT and reports to the City Manager, who in turn reports to the City Council.

LMT is classified as a nonprimary commercial service airport in the most recent version (2020) of the National Plan of Integrated Airport Systems (NPIAS) prepared by the FAA and as a commercial service airport by the Oregon Department of Aviation (ODA). However, no scheduled air carrier service has been provided since 2017 and LMT is operated as a general aviation airport. In the base year of 2018, LMT accommodated an estimated 48,500 aircraft takeoffs and landings and had 85 based civilian aircraft and 32 military based aircraft.

With its many aviation-related businesses and facilities, LMT represents a vital and significant regional economic asset. This includes an on-airport presence of the Oregon Air National Guard (Oregon ANG) that provides flight training for US Air Force F-15 fighter pilots and national defense response capabilities. LMT also serves as a base for the US Forest Service Klamath Air Tanker Base (KATB), which provides aerial firefighting support to the region. In addition to the many aviation-related assets, LMT also provides benefits to local businesses and industries, promotes tourism, provides emergency medical transport services, and encourages additional business development and expansion throughout the community and region. **Table E-1** identifies the operational factors significant to LMT.

In keeping with FAA guidelines and grant assurances, this report explains and documents the reasons and goals for updating the Crater Lake – Klamath Regional Airport Master Plan. It illustrates the comprehensive, long-term, physical airport development that addresses community needs and FAA standards, guidelines, and policies. This chapter provides a summary of the findings and recommendations of the LMT Master Plan Update.

Table E-1 : LMT Significant Operational Factors

Factor	Description
Airport Role	Although currently classified by the FAA and Oregon Department of Aviation as a commercial service (nonprimary) airport, LMT serves a regional role as a general aviation airport. No scheduled air carrier service has been provided since 2017.
Military Use	LMT function does not fit into an existing FAA classification; LMT is not a joint-use or shared-use facility (joint-use means an airport owned by the Department of Defense at which both military and civilian aircraft make shared use of the airfield; shared-use means a U.S. Government-owned airport that is co-located with an airport specified under 139.1(a) and at which portions of the movement areas and safety areas are shared by both parties). LMT is a civilian airport with military operations through an Airport Joint Use Agreement (AJUA).
Resilience Airport	The State of Oregon’s 2013 Resilience Plan identifies LMT as an important transportation lifeline in the aftermath of a natural disaster. LMT is designated as a Tier 1 essential airport facility, which is a facility to provide access to major population centers and areas considered vital for both rescue and economic restoration.
Property Interests	LMT property totals approximately 1,251 acres with nearly 400 of those acres dedicated for exclusive use by the Oregon ANG.
Runway Length	LMT has a 10,302-foot runway and is one of two airports (LMT and PDX) in Oregon with a 10,000-plus foot runway.
Air Traffic Control Tower (ATCT)	The ATCT is a FAA Contract Tower operated by the Oregon ANG and staffed by military and civilian controllers.
Airport Rescue and Fire Fighting (ARFF)	The ARFF is operated by the Oregon ANG and includes state employees.
Foreign Object Debris (FOD) Removal	The FOD removal is conducted by the Oregon ANG for the runway and taxiway system.
Pavement De-icing	Pavement deicing is performed by both the Oregon ANG and the Airport on all movement and non-movement areas. Deicing fluid and equipment are provided by the Oregon ANG.
Security	The Oregon ANG provides security for the base. The Klamath Falls Police Department has a jurisdiction over the Airport in addition to a Letter of Agreement (LOA) to provide first response and Law Enforcement Officer (LEO) services on the base.
Snow Removal	The snow removal is provided by LMT staff for civilian non-movement areas and by the Oregon ANG for all joint use movement areas using military and civilian equipment.
Training Facility	LMT is the only F-15C and D model training facility in United States. Military training involves multiple departments of defense armed-service branches and a civilian contractor.
Traffic Pattern	Local LMT visual traffic patterns are differentiated for civilian and military users. Due to flight congestion and lack of ATC radar, LMT may be the only airport in the United States supporting fighter operations that does not have an operational radar tower display.
Vegetation Control	Grass cutting and vegetation management is provided by both the Oregon ANG and the Airport on and around all movement and non-movement areas.
Wildlife Control	Wildlife management is provided by a full-time US Department of Agriculture (USDA) Certified Wildlife Biologist under contract with the Oregon ANG under their Bird/Wildlife Aircraft Strike Hazard (BASH) prevention program. The biologist’s office is provided by the Airport, expenses are covered by the Oregon ANG, and they perform wildlife management for both the Oregon ANG BASH and Airport Wildlife Hazard Mitigation programs.

AVIATION FORECASTS

The prior LMT Master Plan and Airport Layout Plan (ALP) were completed in 2005, using 2003 as the base year for forecasts. During the intervening years, changes have transpired within the aviation industry on a local, regional, and national level that impact the aviation facilities and services provided at LMT. Most notably, PenAir ceased commercial service in 2017. This leaves LMT with no commercial flights at this time.

Forecasts provide the basis for effective decisions in planning airports. They are used to determine the need for new or expanded facilities and should be realistic, based upon the latest aviation data, and provide adequate justification for the proposed airport development. **Table E-2** provides a summary of the existing and projected aviation activity at LMT as presented in Chapter 2, Aviation Demand Forecasts and as approved by the FAA on February 11, 2019.

As indicated in **Table E-2**, the total number of annual aircraft operations (takeoffs and landings) is expected to increase from approximately 48,500 in 2018 to 54,955 in 2038. A trend in increasing percentage of turbine-powered aircraft (turboprops and business jets) is expected with a slight decrease in use by smaller piston-powered aircraft.

Table E-2 : Summary of Aviation Activity, 2018-2038

Demand Forecast Component (Annual Activity Totals)		Baseline Year Condition	20-Year Forecast	20-Year Forecast	Preferred Forecast Scenario	Preferred Forecast Scenario Direction
		2017/2018	2038-Low Scenario	2038-High Scenario		
CIVILIAN ACTVIITY (PREFERRED FORECAST SHOWN BY BLUE SHADING)						
Airline Passengers (Enplaned-Boarded)		18,000 (Historical Average)	15,500	30,600	Low	↔
Air Cargo (Total Pounds)		1,500,000	1,709,800	1,963,600	Low	↑
Based Aircraft (Civilian)		85	79	102	High	↑
Total Annual Aircraft Operations (Civilian + Military)		48,500	49,700	55,000	High	↑
Annual Aircraft Operations (Civilian Only)		31,600	32,700	38,000	High	↑
Flight Training (Annual Aircraft Operations)		9,700	9,700	11,100	High	↑
US Forest Service (Annual Aircraft Operations)		250	300	800	High	↑
MILITARY (OREGON AIR NATIONAL GUARD)						
Aircraft Operations (Military)		16,900	16,900	16,900	--	↔
Based Aircraft (Military)		32	32	32	--	↔

Source: Mead & Hunt.

CRITICAL AIRCRAFT AND RUNWAY DESIGN CODE

The individual aircraft types projected to use LMT during the next 20 years are essentially the same types that presently use LMT. An airport's geometric design standards are based on the appropriate Runway Design Code (RDC) for each runway. An RDC is based on the critical design aircraft approach speed and wingspan, as well as the lowest visibility minimums of the existing or planned instrument approaches expressed as runway visual range values in feet.

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 Narrow-body 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)
 - Runway previously designated and 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

The airfield facility requirements and application of planning standards are identified to accommodate civilian use in accordance with FAA design standards. The facility requirements and design standards for shared-use areas to accommodate military use 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.

AIRSIDE FACILITIES

This Master Plan Update recommends the following airfield improvements to meet FAA design standards:

RUNWAYS

- ▶ Runway 14/32 blast pad widths will be increased from 150 feet to the standard 200 feet.
- ▶ Runway 32 Object Free Area (OFA) length beyond the departure runway end is approximately 715 feet, 285 feet short of the standard length of 1,000 feet. The LMT perimeter road and fence, as well as a portion of Brett Way, will be realigned to address OFA encroachment.
- ▶ Runway 14/32 in-pavement threshold lights located outboard of the runway width will be designed to standard and relocated inboard of the runway width.
- ▶ Runway 14 is to have an Oregon ANG-initiated-and-funded Instrument Landing System (ILS) installed that consists of a Glideslope (GS) antenna, a localizer antenna, and Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR). The vertically-guided instrument approach ILS proposal would allow aircraft to land with visibility minimums as low as $\frac{3}{4}$ of a mile and 200-foot cloud ceilings.
- ▶ Due to the precession of the earth's magnetic field, the crosswind runway designators that are aligned to the nearest ten degrees will be changing from Runway 7/25 to Runway 8/26.
- ▶ Runway 8/26 length will be reduced from the existing 5,258 feet to 5,000 feet to eliminate displaced thresholds and accommodate the Beechcraft King Air 350/1900 Series critical aircraft. Taxiway access to both runway ends will be corrected.
- ▶ Runway 8/26 width will be reduced from 100 feet to the B-II standard width of 75 feet.
- ▶ Runway 8/26 blast pads will be provided at each runway end that meet the B-II standards of 95 feet in width and 150 feet in length.
- ▶ Runway 8 will have a Precision Approach Path Indicator (PAPI) and Runway End Identifier Lights (REILs) installed to provide visual vertical guidance and obstacle clearance for pilots on approach to landing on Runway 8. The visual aids improve the pilot's awareness of his/her position relative to the glideslope and runway threshold during the final approach and touchdown phase of flight.
- ▶ Runway 8/26 holding position lines are to be relocated from 250 feet from the runway centerline to the B-II standard of 200 feet, which will reduce the time necessary to taxi onto the runway.

TAXIWAYS

There are several taxiway design improvements recommended to correct non-standard conditions at LMT that include:

- ▶ Taxiway A direct access between Military Hangar Ramps (Building 400) and Runway 14 end will be corrected with pavement removal and realignment with Taxiway D and new Taxiway connector D1.
- ▶ Taxiway C direct access from GA ramp and Oregon ANG Explosives Ordinance Recovery (EOR) ramp to Runway 14 end will be corrected with a consolidation of Taxiway A and C into a new runway entrance, Taxiway D1.
- ▶ Taxiway E direct access between terminal apron and Runway 14/32, acute-angled intersection with Runway 14/32, and turn radius not meeting Taxiway Design Group 5 (TDG 5) criteria will be corrected by removing a portion of Taxiway E and installing a new perpendicular taxiway (Taxiway G2) that connects to Taxiway G with a turn radius that meets TDG 5 criteria.
- ▶ Taxiway F width east of Runway 14/32 exceeding TDG 2 design standard of 35 feet will be corrected by narrowing taxiway edge markings and lighting. Pavement will be retained to create appropriately sized paved taxiway shoulders.
- ▶ Non-Standard by-pass along Taxiway F entrance to Runway 25 end will be removed.
- ▶ Taxiway D direct access to Runway 7 end will be corrected with a westerly centerline shift in the taxiway connector to the Runway 7 threshold and a change in location designation as Taxiway F1 that requires a turn prior to reaching the runway.
- ▶ Taxiway H direct access between southeast ramp and Runway 7/25 will be corrected with a realignment that installs two 90° turns to indicate to the pilot they are approaching a runway.

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.

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).

Hangars

- ▶ 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 (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)

Airport Administration and Operations Building

A replacement building that is 2,500 to 3,000 square feet is recommended and should include office space, a conference room, and storage space. It is also recommended that the future Airport Administration Building be constructed as a centralized Airport Operation Building (AOB) and be combined with the maintenance and equipment storage building as part of a single structure. The preferred alternative location for the AOB is in the northwest corner of the FBO parking area with fence and gate realignment providing operations and maintenance vehicles direct access to the apron and taxiway system.

NON-AERONAUTICAL DEVELOPMENT

Airport Business Park

Approximately 14.8 acres of LMT property are currently reserved for non-aeronautical development. This area is designated as the Airport Business Park and is located west of Arnold Avenue. Access roads have not been constructed and layouts are dependent upon the facility needs of prospective leaseholders. Utilities and other supporting infrastructure are stubbed in for connection to facilities when they are built. Approximately 4 acres of the easterly portion of the Airport Business Park are needed for aeronautical development to meet forecasted GA hangar demand.

DEVELOPMENT CONSIDERATIONS

Using the identified facility deficiencies and proposed improvements, development alternatives were prepared that focused on long-term solutions and remedies. The process of defining and evaluating alternatives is iterative, beginning with a comprehensive range of unconstrained possibilities that are evaluated against screening criteria to assess operational, environmental, and financial constraints. The alternatives are further refined based on LMT strategic development goals, implementation feasibility, and collaboration with LMT stakeholders.

The selection of preferred development alternatives at LMT is guided by the strategic development goals established by the City of Klamath Falls. The development goals recognize LMT's unique structure as a civilian airport with military operations through an Airport Joint Use Agreement (AJUA). The AJUA provides the mechanism for the Oregon ANG to reimburse LMT for expenses associated with maintaining shared airport facilities including the runway and taxiway system.

The shared facilities necessitate a coordinated effort between LMT, the Oregon ANG, and the FAA for future facility improvements. The strategic development goals include:

- ▶ LMT facility improvements will be designed in accordance with FAA design standards while preserving operational efficiency for military missions and LMT users.
- ▶ Facility improvements initiated by the Oregon ANG or documented in its development plans (e.g., Oregon ANG Instillation Development Plan) will be coordinated with the City and reflected on the LMT ALP where prudent.
- ▶ City investment in LMT facility improvements will be made pragmatically with a focus on safety and level of service enhancements.
- ▶ LMT facility improvements will consider and minimize impacts to the environment and community.
- ▶ LMT facility improvements will support LMT's regional role as an economic development generator (jobs, tourism, business development).

DEVELOPMENT RECOMMENDATIONS

Following a careful examination of several alternatives, a recommended development plan was determined and is outlined below. **Figure E-1** presents LMT's recommended conceptual development plan.

Runway 14/32 Improvements

- ▶ Provide blast pads of 200 feet in length and 200 feet in width at each runway end.
- ▶ Provide 25-foot shoulders on each side of the runway.
- ▶ Relocate outboard in-pavement threshold lights to be within the width of the runway.
- ▶ Relocate Brett Way, perimeter road, and perimeter fence to provide standard 1,000-foot Runway 14 ROFA length.

- ▶ Install ILS components (GS antenna, localizer antenna, and MALSR) providing a precision instrument approach to Runway 14 with visibility minimums not less than ¾-mile.
- ▶ Replace VASI with PAPI to Runway 32.

Runway 7/25 (Future Runway 8/26) Improvements

- ▶ Change runway numbering from 7 and 25 to 8 and 26 due to precession of the earth's magnetic field.
- ▶ Reduce runway length to 5,000 feet and width to 75 feet.
- ▶ Provide blast pads of 150 feet in length and 95 feet in width.
- ▶ Install PAPI and REILs at Runway 7 end.
- ▶ Re-mark runway holding positions to 200 feet from runway centerline.

Taxiway Improvements

- ▶ Close Taxiway C and a portion of Taxiway A and provide new perpendicular Taxiway D1 to Runway 14 end meeting TDG 5 design standards.
- ▶ Remove Taxiway E between Taxiway D and Runway 14/32 and replace with perpendicular Taxiway G1 meeting TDG 5 design criteria and aligning with the Taxiway B3 intersection.
- ▶ Extend Taxiway G from existing Taxiway E to intersection with Taxiway D meeting TDG 5 design criteria.
- ▶ Increase the width of Taxiway F between Taxiway D and Runway 14/32 from 50 feet to 75 feet to accommodate the military standard for regular use by F-15s.
- ▶ Reduce the width of Taxiway F east of Runway 14/32 from 50 feet to 35 feet.
- ▶ Reconfigure Taxiway D at the Runway 7 threshold to create a new Taxiway F1.
- ▶ Provide new Taxiway F2 connection to the future relocated Runway 25 end.
- ▶ Realign Taxiway H to minimize runway incursion.

Landside Improvements

- ▶ Airport Entrance Road - The preferred road alignment is Option A, which provides a new west/east road segment from Washburn Way to Altamont Drive. The north/south road segment would connect to Joe Wright Road via Swan Court through the City Industrial Park.
- ▶ Brett Way Realignment - The Runway 32 OFA length is limited to approximately 715 feet by a portion of Brett Way, the airfield perimeter road, and the perimeter fence. Realignment of Brett Way, as well as the perimeter road and fence, is the preferred long-term option of providing the standard OFA length.

FINANCIAL IMPLEMENTATION

The long-term financial implementation program for LMT is intended to establish a strategy to fund airport improvement and maximize the potential to receive federal grant funds while also establishing a financially prudent plan for improvement funding at the local level. Potential improvements necessary to accommodate LMT's future needs are divided into three phases: Phase I (1-5 years), Phase II (6-10 years), and Phase III (11-20 years). The planning level cost estimates for the three development phases are provided in **Table E-3**. **Figure E-1** illustrates the Airside, Landside, and Non-aeronautical development concepts for LMT.

Table E-3 : Funding Plan

Phase	Total Cost ¹	FAA AIP Participation ²	Local Participation ³
Total Phase I (2021-2025)	\$ 19,907,200	\$ 18,663,000	\$ 1,244,200
Total Phase II (2026-2030)	\$ 24,865,700	\$ 23,311,700	\$ 1,554,000
Total Phase III (2031-2040)	\$ 51,918,300	\$ 48,673,300	\$ 3,245,000
GRAND TOTAL (2021-2040)	\$ 96,691,200	\$ 90,648,000	\$ 6,043,200

Notes:

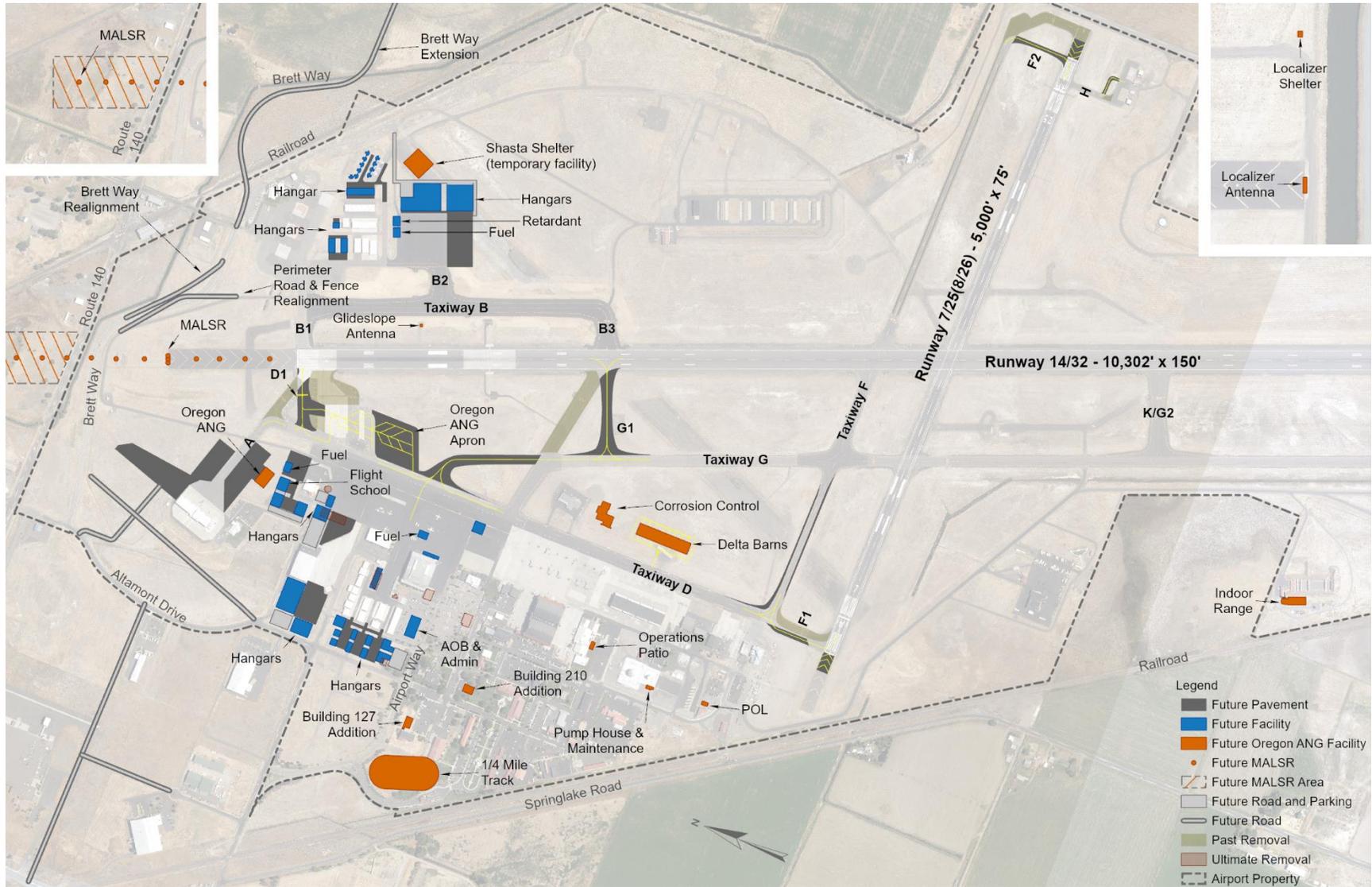
¹ Cost estimates are based on 2020 data, are intended for planning purposes only, and do not reflect a detailed engineering evaluation. Cost estimates are escalated at a three percent annual inflation rate.

² FAA Airport Improvement Program (AIP) funding participation (up to 93.75 percent of total cost). Includes FAA Non-Primary Entitlement (\$150,000 annually) and Discretionary grants (a request but not a guarantee to be received).

³ Local match requirements (6.25 percent of total cost) from current revenues, cash reserves, bonds, and other sources. Can include private monies, funding from revenue bonds, or special tax assessments.

[PAGE LEFT INTENTIONALLY BLANK]

Figure E-1 : LMT Conceptual Ultimate Development Plan



[PAGE LEFT INTENTIONALLY BLANK]

SUMMARY

The development plan for LMT calls for the retention of the basic runway layout as it presently exists with programmed improvements to maximize the efficient and safe aircraft operational activity and to provide adequate areas for future landside facilities. Providing a flexible and realistic development plan and program for future airport growth is the overall objective of this Master Plan Update. Although this Master Plan Update identifies the potential facilities required to meet the forecast demand, only those projects that are needed by actual demand will be proposed for construction. Each year, LMT and FAA staff reevaluate the proposed 5-year CIP to prioritize upcoming projects. If actual demand does not materialize as anticipated, some of the projects will need to be revised, delayed, or potentially eliminated.

[PAGE LEFT INTENTIONALLY BLANK]



Mead&Hunt

